Cape Peninsula University of Technology

DESIGN FOR COLLABORATION IN SOUTH AFRICA: AN ACTIVITY THEORY PERSPECTIVE ON PARTICIPATORY DESIGN

by

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DECLARATION

I, Rael Glen Futerman, declare that the contents of this dissertation/thesis represent my own unaided work, and that the dissertation/thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

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ABSTRACT

Participatory Design (PD) is increasingly being used as a methodology by local government, private designers and design researchers in the Western Cape, South Africa, to democratise the design of product service systems (PSS). Activity theory, specifically Cultural Historical Activity Theory (CHAT) offers PD researchers and practitioners involved in the collaborative design and development of socio-technical PSS's an interpretive lens through which to a) identify existing and potential contradictions and tensions within and between work activity systems for design interventions, and b) provide designers with a conceptual model of investigation. In the last decade participatory development studies have interrogated public participation and approaches to the involvement of civil society in their own development, essentially embracing a shift from passive participation to active participation. PD and participatory development share a number of beliefs, methodologies and goals. This thesis explores the potential of CHAT in contributing to the extension of PD practices, beyond a workplace focus and into the socio-technical development of communities at large.

Legacy projects and activities - those aimed at extending the impact of emergent design and innovation - arising out of Cape Town's designation as World Design Capital 2014 often require community-based participatory design (CbPD) and the development of socio-technical PSS through holistic approaches, centred around participant needs, activities and aspirations. This approach can contribute to social capital and more active citizenry.

The research presented in this thesis draws from an in-depth CbPD project based in an informal settlement in Cape Town, South Africa. The project focussed on solid waste management (SWM) work and life activities and resulted in co-designed PSS solutions. Based in a quad-helix partnership between local government, the Cape Peninsula University of Technology, private designers and the community members themselves, this project a) tested CHAT in the fields of CbPD and PSS design, identifying tensions and contradictions as opportunities for design intervention and, b) produced conceptual and process models, which blend CHAT and service design, for further testing in the design of socio-technical PSS. The overall result is a home-grown methodology for CbPD.

KEYWORDS

- Activity Theory
- Active Citizenry
- Agonistic Democracy
- Cape Town
- Collaborative Learning
- Co-researchers
- Community-based Participatory Design
- Cultural Historical Activity Theory
- Deliberative Democracy
- Design for Participation
- Infrastructuring
- Legacy
- Participation as an end
- Participatory Design
- Publics
- Quad-helix partnerships
- Resilience
- Social Learning
- Social Capital
- Social Innovation
- South Africa
- World Design Capital

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GLOSSARY

AODM	*Activity oriented design model. A methodology aimed at operationalising AT emerging from the need to "systematically explain and demonstrate in a replicable manner the means by which AT can be used to guide the design process in different contexts" (Mwanza, 2001)*
AI	*Appreciative Inquiry, a theory of collaborative change management that shifts from a problem solving approach to a strength-based approach (Cooperrider and Whitney, 2005).*
AT	*Activity Theory. A theory attributed initially to the Soviet psychologist, Lev Vygotsky and his colleagues. AT was further developed by other scholars, including Alexei Nikolaevich Leont'ev and later by Yrjö Engeström used in the analysis of various dynamics in human activities.*
CBO	*Community-based organisation, public or private nonprofit (including a church or religious entity) that is representative of a community or a significant segment of a community, and is engaged in meeting human, educational, environmental, or public safety community needs (nnlm.gov, n.d.).*
CCDI	*The Cape Craft and Design Institute. A not-for-profit company and joint initiative of the Western Cape Government and the Cape Peninsula University of Technology. It was set up in 2001 to support the needs of creative businesses in the Western Cape and grow the region's craft and design sectors (Ccdi.org.za, n.d.)*
CbPD	*Community-based participatory design. This branch of participatory design focusses on citizen collaboration around the design of products, services and systems that affect that community. This extends traditional participatory design practices beyond an organisational setting and into a multi-party community based practices.*
CDAS	*Co-design activity system. The application of activity theory to map collaborative design activities.*
CESD	*Cooperative Experimental System Development is a participatory design method*
CHAT	*Cultural historical activity theory also referred to as third generation activity theory. It embodies five principles: The activity system as the unit of analysis; multi-voicedness with the activity system; the belief that activity systems change over time; contradictions as a source of change; and the possibility of expansive transformations (Nygård, n.d.).*
CLEs	*Constructivist Learning Environments. The CLEs theory assumes that the problem drives the learning, rather than acting as an example of the concepts and principles previously taught (Jonassen, 1999).*
CoCT	*The City of Cape Town.*
CoI	*A community of inquiry. Initially a collaborative, constructivist process model of online learning (Garrison, Anderson & Archer, 2000). Within this thesis it extends beyond the digital space to the analog.*

CoP	*A community of practice. This is a group of people who share cultural practices or interests, and learn how to progress in this collective field of interest through regular interaction (Wenger, 2000).*
Co-design	*Collaborative design. This approach to design draws from human centred design and participatory design, and aims at including end-users in the design process.*
CTD	*The non-profit organisation, Cape Town Design. They were responsible or ensuring that the requirements of the World Design Capital 2014 Host City Agreement were met during Cape Town's designation.*
DEAT	*Department of Environmental Affairs and Tourism*
DEDAT	*The Western Cape's Government Department of Economic Development and Tourism*
DfP	*Design for Participation. A design approach that looks to develop ways for participants to extend their participation in design beyond a project. Relates to participation as an end.*
Empowerment	*Having the means and ends to act on one's choices. Usually within a pre-existing system*
Emancipation	*Having the means and the ends to act on one's choices, often beyond existing systems.*
Expansive Design	*A component of activity theory in which the unit of* analysis is extended to include minimally two interconnected activity systems, resulting in the formation of a shared object between the the designer and user (Engeström, 2006).
Hallmark Event	*A major fair, exposition, sporting or cultural event of international status, held regularly or once off (Hall, 1989). Related within this thesis to the World Design Capital.*
HCD	*Human Centred Design. A field of design that has its roots in semi-scientific fields such as ergonomics, computer science and artificial intelligence (Giacomin, 2014). It aims to place user requirements (usually physical) at the centre of the design process with technology responding to said needs and not determining them.*
IAP2	*International Association for Public Participation*
Icsid	*International Council of Societies of Industrial Design*
ISD	*Information System Development*
IWM	*Integrated Waste Management plans as required by business in Cape Town that generate certain types of waste. They they ensure that all waste generators are compliant, aware and informed about the City's waste management regulations (Capetown.gov.za.,n.d.)*
IWMSA	*Institute of Waste Management for Southern Africa. This is a multi-disciplinary non-profit association that is committed to supporting professional waste management practices in the country (Iwmsa.co.za, 2011).*

MEC	*Member of the Executive Council, the cabinet of the provincial government.*
Mega Event	*These are recurring events of a fixed duration that attract a large number of visitors, have a large mediated reach, come with large costs and have large impacts on the built environment and the population (Müller, 2015:12).*
MUST	*A Danish acronym for theories of and methods for initial analysis and design activities. This is a key participatory design method.*
NAS	*Nested activity system. When one activity system forms a node of another activity system, e.g. designing artefacts as tool node*
NCOP	*The National Council of Provinces, one of the two South African houses of parliament.*
NEMWA	*The South African National Environmental Management Waste Act 59 of 2008.*
NWMS	*The National Waste Management Strategy of South Africa.*
NPC	*Non-profit company.*
NPO	*Non-profit organisation.*
OSCT	*Open Streets Cape Town. This is a citizen-driven initiative, working to change how streets are used, perceived and experienced in Cape Town (Open Streets Cape Town, 2013).*
PaE	*Participation as an end. This developmental paradigm attempts to empower people to participate in their own development more meaningfully (Davids, Theron and Maphunye, 2005:117).*
PaM	*Participation as a means. This paradigm implies the use of participation to achieve a predetermined goal or objective (ibid).*
PD	*Participatory Design. This is a design approach that actively incorporates the contribution and participation of (potential) end-users in the design process (Lewis, 2000).*
PfD	*Participation for design. A design paradigm similar to PaM, where users participate in the design of predetermined goods.*
PSC	*The Public Service Commission of South Africa, mandated to investigate, monitor, and evaluate the organisation and administration of the Public Service (psc.gov.za, n.d.).*
PSS	*Product-Service Systems. This is "a system of products, services, supporting networks and infrastructure that is designed to be: competitive, satisfy customer needs and have a lower environmental impact than traditional business models" (Mont, 2001).*
RDP	*South Africa's Reconstruction and Development Programme. It consists of six principles and five key programmes, aimed ad redressing the imbalances of South Africa's past.*
SALS	*South African Legislative Sector, which has as one of its core mandates, the responsibility of ensuring that there is both*

	representative and participatory democracy in South Africa (sals.gov.za, 2012).
SA	*South Africa*
SD	*Service Design, this a design paradigm that embodies activities "of planning and organising people, infrastructure, communication and material components of a service in order to improve its quality and the interaction between service provider and customers" (SDN, n.d.).*
Social Capital	*Communities or networks who come together embodying "shared norms, values and understandings that facilitate co-operation within or among groups" (Keeley, 2007:103).*
STEPS	*Software Technology for Evolutionary Participatory Design Development. This is an early methodological framework originating from Technical University of Berlin and combines PD and software engineering with a focus on the custom development of new software (Bratteteig et al, 2013:121).*
ubuntu	*A traditional African ideal that finds expression through mutually reaffirming communal interaction, mutual support, group solidarity and humanness (M'Rithaa, 2009).*
UN	*United Nations*
WDC	*World Design Capital*
WCG	*Western Cape Government*
WESGRO	*The Western Cape's destination marketing, investment and trade promotion agency.*
ZPD	*The Zone of Proximal Development*

CHAPTER ONE

WHAT THE STUDY IS ABOUT

1.0 Introduction

"*The most important part of any inquiry or exploration is it's beginning. As has often been pointed out, if a false or superficial beginning has been made, one may employ the most rigorous methods during the later stages of investigation but they will never retrieve the situation"* (Schumacher, 1978:15).

This thesis presents an exploration of participatory design events framed using Cultural-Historical Activity Theory (CHAT) as an analytical lens. This CHAT lens frames participatory design events as object driven, tool-mediated group activities and is used to explore the context of activities as evolutionary, rooted in culture.

The Western Cape was designated as the World Design Capital 2014 (WDC2014), a distinction awarded to cities that recognise design as a tool for social, cultural and economic development (Icsid, 2015). With Cape Town's WDC2014 theme of "Live Design. Transform Life", the city has seen an increase in democratic design practices.

It is the first time an African country has received the title of World Design Capital, and as such, the Western Cape is doing it's best to live up to the themes that secured it this prestigious title. These themes are African Innovation, Global Conversation; Bridging the Divide; Beautiful Spaces, Beautiful Things; and Today for Tomorrow (capetown.gov, 2014).

The legacy aspects of the WDC have been a constant discussion, with the aim of continuing democratic design practices well beyond 2014. Mega events in general, and WDC specifically, involve:

- A fundamental commitment to significantly expand the quality and quantity of public goods (events of a non-commercial nature but with high economic benefits),
- international, multi-stakeholder involvement (public and private organisations as well as citizens) and,
- a complex long-term planning process (Busa, 2011:3).

Public participation and community engagement in design projects, have however, been predominantly seen as a means to a design end. Although citizens have, sometimes, been included in projects based in their community, their participation only lasts as long as the project.

If we are to see sustained engagement and active citizenry beyond outsider-run projects we need to see participation as an end in and of itself. This framing of participation arises from participatory development studies. Interrogating participatory development, participatory design and their components in a South African context, this thesis explores what happens in PD workshops and events, and the concept of design for participation, with the aim of explaining ways in which citizens can be empowered beyond projects and civic momentum be sustained.

1.1 Motivation for Choosing this Topic

The motivation for choosing this topic stems from personal explorations in previous projects and the realisation that PD events and activities have the ability to empower citizens beyond just the project for which they were formed, As a researcher and lecturer at CPUT, I have been interested in the field of PD and participatory development for a number of years. Based on both my own research, and that of others, aimed at understanding the relationship between design and participation, I have seen participation separated into two main areas, Participation for Design (PfD) and Design for Participation (DfP). This relates to Ehn's (2008) unpacking of PD into *design at project time* and *design at use time*, or, *design after design.* Here there is a fundamental shift in participation during design time, aimed at producing useful products and services, to designing good environments for participation at use time.
Similarly, PfD embraces participation to reach a design end, necessary for community ownership, product/service compatibility and context relevance, while DfP explores how design thinking and its methods can sustain civic engagement beyond a project.

Willing participation by communities in design projects is often taken for granted, and it is becoming increasingly important to note that it doesn't just happen, but in fact needs to be designed itself, with participatory processes being customised to deal with the needs of specific communities (Lee, 2006:7). Indeed, participation processes can miss out on the potential benefits of community involvement if they are not properly designed and implemented (von Korff et al, 2010), with poorly design ed participation processes resulting in negative effects, such as:

- Stakeholder disillusionment with participation and lost trust due to unclear or disputed objectives, raised but eventually unfulfilled expectations, and the dominance of powerful participants;
- relaxed environmental legislation or otherwise lopsided decisions because environmental or other interests were inadequately represented;
- reluctance to participate, increased conflict, or reluctance to adopt a decision because stakeholders and decision makers were not adequately identified and involved; and
- lost time and money as a result of the preceding points (ibid).

An underlying question within this thesis is thus *how does one design for improved participation?* In this thesis I hope to explore these ideas and present a more comprehensive study that may potentially inform plans, policies, strategies and services around citizen engagement and grassroots democracy in Cape Town.

My current involvement in participatory projects between local government, private organisations and CPUT has presented a fertile research environment for me to further explore these concepts and understand the role design can play in facilitating civic momentum.

This research also aligns to the following national, provincial and institutional goals:

1. The South African Department of Science and Technology's policy on Indigenous Knowledge Systems (IKS).

This research will explore collaboration in the South African context. Participatory Design as a methodology aims to democratise the design process and legitimise contextual systems of knowledge. This research will show the benefits of collaborative practices including local, experiential knowledge. The aim of which is to reduce hurdles to collaborative learning in Participatory Design practices.

2. Western Cape Policy on Public Participation

This study aims to reduce hurdles to public participation in decision making processes through the development of guidelines for participation. This research includes analysis of Participatory Design projects that tackle complex challenges such as Waste Management in Informal Settlements.

3. National Scarce Skills

Industrial Design has been listed as a national scarce skill.

4. Cape Peninsula University of Technology's Research, Technology Innovation and Partnerships Blueprint (Vision 2020).

This study aligns with Focus Area no.7: 'Design for Sustainability', by developing tools that will promote social inclusion.

1.2 The Research Problem in Context

Participatory Design is increasingly being used as a methodology to democratise the design process. In the Western Cape, local government is engaging communities in all 111 wards in Co-design workshops, as part of its World Design Capital 2014 activities (wdccapetown2014.com, 2014). Most toolkits and guidelines for this form of collaborative problem solving originate from Global North contexts and are aimed at ‘professionals’ (du Preez, 2014). Although quite useful, they generally focus on short-

term methods for collaboration, seeing participation as a means. In the last decade participatory development studies have interrogated community participation and integrated approaches to the involvement of civil society in their own development, a shift from passive participation to active participation (Davids, Theron & Maphunye, 2005). Participatory design and participatory development share a number of beliefs, methodologies and goals. This research thus explores both, and focuses on, what are broadly referred to as Design for Development (DfD) projects, closing with a case study of a Community-based Participatory Design (CbPD) project.

In 2012, the provincial Department of Economic Development and Tourism (DEDAT) collaborated with the Cape Craft and Design Institute (CCDI) to develop a Design Strategy for the Western Cape region. This report identifies five design typologies most prevalent in the Western Cape: Product/Surface, Systems, Communication, Enviro & Spatial and Service/Interaction (Western Cape Government, 2013:13). Design (in general) is increasing as a strategy and practice in the province, especially PD, although it is still predominantly valued as fairly low (Figure 1.1) by industry (Cape Craft and Design Institute, 2015:12). It becomes increasingly important, therefore, to interrogate it as a practice within the Western Cape context in order to bolster industry and government's perceptions of design as a tool for innovation.
Currently participation in design is generally seen as short-term aimed at solving specific issues, usually generated by the focus of an NGO or business or as part of a governmental department's activities. These processes are controlled and run by organisations or individuals outside of the problem-context.

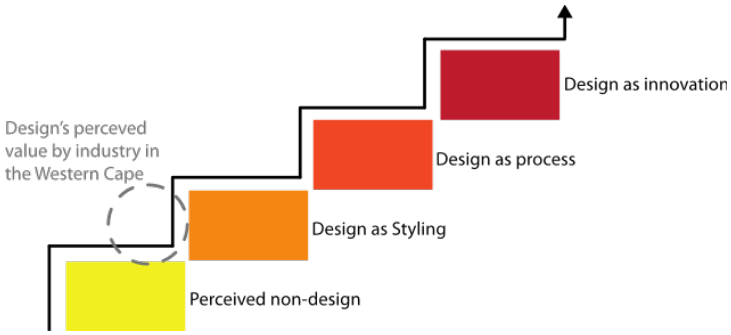


Figure 1.1: Design maturity ladder (adapted from CCDI, 2015:12)

Industry feels design adds the most value in differentiating their products and services, building customer relationships, and increasing profitability; there is little to no belief that design can attract investment (Johnston, 2013:4).

Should we hope to increase the impact of design and PD practices beyond specific projects, it would be beneficial to see participation as an end itself and the PD

workshop as a collaborative learning environment, with knowledge and tools being able to be used beyond the project. The increase in quad-helix projects, involving not only industry and government but also academia and those affected by the potential design, increases the complexity of PD projects. It thus becomes imperative to understand PD engagements as complex socio-technical processes involving a number of activities, and the goals that drive them. These PD projects can also be explored as learning environments within which collaboration activities and learning can take place. These and other traits of PD projects could empower participants beyond a project and need further exploration. This is echoed in Cernea's (1995:466) concern that sustaining PD projects is more difficult than initiating them.

Within contemporary PD research and practice there lies the central challenge of providing for alternative perspectives on participation and democratisation (Björgvinsson, Ehn & Hillgren, 2012:143). This requires explorations around novel ways of organising "future-making and milieus for innovation that are more democratically oriented than traditional milieus that focus on expert groups and individuals" (ibid).
Within this space of political and practical challenges within contemporary PD, Ehn (2008:92) notes two approaches in, those of participatory design (designing for use before use) and meta-design (designing for design after design). Meta-design deals with the limitation of identifiable users within PD, and explores the use of emergent PSS from PD projects by unforeseen users in unforeseen ways. As Ehn (2008:95) states, "Envisioned use is hardly the same as actual use, no matter how much participation there has been in the design process."

It is these concerns and contemporary explorations of and within PD that provide a grounding for this study, explored here in more detail within the context South Africa.

1.2.1 Assumptions of the Study

In setting the objectives of this study, three tentative hypotheses have been formulated:

i) Participatory Design and collaborative design events can be framed using Activity Theory, specifically Cultural Historical Activity Theory (CHAT),
ii) Exploring participatory design through the lens of Activity Theory can facilitate the understanding of collaborative learning practices, and
iii) There are unique factors in Cape Town that present challenges and opportunities that could inform work related to civic engagement and civic momentum.

This study assumes that civic engagement and citizen participation can be improved through participatory design methods and methodologies that have at their core an alignment to design for participation.

1.3 Research Questions

The main research question driving the study is: *How can a deeper understanding of Participatory Design as a collaborative, tool-mediated activity improve CbPD practices*?

Activity Theory frames tools as the mediating artefacts between subjects (people) and their objects (motives that drive their activity). Tools can be used or developed depending on the task at hand. Kain and Wardle (n.d.) note that "as people refine their tools and add new ones to solve problems more effectively, the activities they perform using those tools can change - and vice versa: as their activities change, people use their tools differently and modify their tools to meet their changing needs." PD views tools as artefacts, processes and methods employed in the design of product service systems, as well as the outcomes of design processes. In recent literature regarding PD's shift from "democracy at work" (within organisations) to "democratic innovation" (PD in open, public spaces) (see Björgvinsson, Ehn & Hillgren, 2010, 2012a, 2012b; Binder et al, 2011; Ehn, 2008) there has been an expansion of tool definition, related to *what* is being designed. This reorientation from "things" (artefacts or services) to "Things" (socio-material assemblies) extends tool definition from PSS to environments for collaboration and debate regarding matters of concern (Björgvinsson, Ehn & Hillgren, 2010:41). Winograd and Flores (1986:xi) noted that "in designing tools we are designing ways of being." This statement still has bearing today and relates to the framing of tools in both AT and PD.

These ideas around participation, collaboration, tools and design activities will be explored through the following sub questions:

i) What are the activities of participatory design activity systems?
ii) How can an improved understanding of collaborative projects in a South African context contribute to community-based participatory design projects?
iii) How can community-based participatory design projects contribute toward democratic innovation?

1.4 Research Objectives

The purpose of this study is to explore CHAT as a framework for the qualitative analysis of community-based participatory design activities, as contextual research could help explain the dynamics around the objectives, relationships and tools of the participants.

The objectives of this study are therefore to:

- Explore mediating components of a CbPD project,
- Identify how tools and activities shape one another in CbPD,
- Identify possible tensions and contradictions in CbPD activities in South Africa, and

- Present a design model informed by CHAT for use in future CbPD projects.

1.5 Significance of the Research

Participatory Design (PD) aims to include all people affected, by a new product, service or system, in the design process of said PSS. All stakeholders should be included right from the outset of the project, (Diettrich, Eriksen and Wessels, 2014) with the theme or direction being determined by the 'end users'. A core principle of PD is that people affected by a decision or event should have the right and opportunity to influence it (Hussain, Standers and Steinert, 2012:91). PD, although informed by honourable ideals, faces a number of challenges in its implementation and practice. In order to better understand PD it is important to explore it as a hermeneutic circle. PD projects are made up of a number of activities and mediating factors that all add up to and define the larger project; the project in turn also determines and defines its activities and what is used to carry them out. Participants therefore understand a project in relation to its object/s and resultant activities. These smaller components are what give the project shape.

CHAT provides an appropriate lens through which one can attempt to better understand collaborative design projects, their activities and their mediating components. Activity systems are comprised of and influenced by participants and their aims, the community in which the activity takes place, governing rules and laws, tools, and divisions of labour. It is through these components that this thesis explores collaboration by offering plausible explanations on how collaborative projects' outputs can be further improved.

Participatory Design aims at democratising the design process, giving voice to all stakeholders. It therefore has at its heart political and philosophical ideals related to other democratic practices. In his book The Ecology of Democracy, David Mathews (2014) discusses 7 systemic hurdles to democracy. These are:

- Citizens aren't engaged, they are on the sidelines;
- Issues are approached and discussed in ways that promote divisiveness;
- People involved make poor decisions about the way forward or best interest;
- Citizens' perception that they can't make a difference due to lack of resources;
- Citizen actions can be ineffective due to opposing directions;
- An absence of Shared Learning; and,
- Mutual distrust between citizens and major institutions.

Although not drawn directly from PD literature, these issues often have an impact on CbPD projects as these projects are affected by larger social issues. Kensing and

Greenbaum (2013:31) outline three key origins of PD that contributed to its working principles and practices, these are:

- Political economy - worker's movements and rights in the struggles between workers and management;
- Democracy - the belief in the right of people to express themselves as well as influence decisions that affect them; and
- Feminism - where women initiate change through direct actions.

These influential movements deal with addressing unequal power relations and conflicting agendas, key political dimensions of CbPD.

By exploring PD as a democratic practice this research aims to propose ways in which collaborative design events can benefit all stakeholders involved and contribute to reducing hurdles to democracy.

In PD's increasing engagement in public spheres and everyday life, this research is influenced by Dewey's (1927) definition of a public as a group of people who (1) face a similar problem, (2) recognise the problem exists, and (3) organise to do something about the problem; and later Blumer's (1966) definition of a public as a group of people who are (1) confronted by an issue, (2) divided in their ideas about how to meet the issue, and (3) engaged in discussion about the issue. Ehn (2012) notes this shift towards publics in PD research and practice "is a movement away from design projects and towards processes and strategies of aligning different contexts and their representatives, where differences between current issues and how the future can unfold can be made visible, performed and debated as a kind of 'agonism.' Here he draws on Mouffe's (2000a) ideas of an agonistic democracy, which does not presuppose consensus and rational conflict resolution (Ehn, 2012). Agonistic democracy has at its centre questions of power and antagonism (Mouffe, 2000b) key components of CbPD projects in South Africa, and which are explored here through Activity Theory. Mouffe (ibid) argues that "a model of democracy in terms of 'agonistic pluralism' can help us to better envisage the main challenge facing democratic politics today: how to create democratic forms of identifications that will contribute to mobilise passions towards *democratic designs.*"

This research interrogates both deliberative and agonistic models of PD from which, emergent explanations, tools and models will hopefully contribute to PD practices in South Africa and beyond.

1.6 Structure of the Thesis

This thesis follows the emergence of democratic civic participation and collaborative design in South Africa generally, and the Western Cape specifically. Aligning to CHAT practices, this thesis's structure draws from what Engeström (as cited in Blunden, 2012:15) described as the "ideal typical sequence of epistemic actions in ascending from the abstract to the concrete" and is aligned to the 7-step process of Concept Formation.

The overall process and resultant structure is thus as follows:

- *Questioning* - criticising some aspects of the accepted practice and existing wisdom;
    - This portion of the thesis (Chapter 2) explores the World Design Capital (WDC) award as a platform for aligning civic participation and design practice. In the case study chapter (Chapter 7) this thesis outlines a project aligned to the legacy aspects of WDC2014, which requires this early analysis of WDC objectives and practices. Chapter 3 then presents an exploration and critique of democratic participation in South Africa and the Western Cape, and a discussion and critique of participatory design and participatory development typologies and related areas of research and practice.
- *Analysing* - the situation in order to find out causes or explanatory mechanisms;
    - Analysis here leads from a historical-genetic analysis, where the origins and evolution of democratic participation and social inclusion in design in the Western Cape are tracked (macro), to an actual-empirical analysis where I interrogate PD in the context of South Africa (micro). This is covered in Chapters 3 and 4.
- *Modelling* - the newly found explanatory relationship;
    - This is presented here in the conceptual and theoretical frameworks, as covered in Chapters 4 and 5.
- *Examining* - the model in order to grasp its dynamics, potentials and limitations;
    - The resultant understandings of collaboration in design then inform the research design and methodology (Chapter 6) and applied in a CbPD project, presented as a case study (Chapter 7).
- *Implementing* - the model through practical applications and conceptual extensions;
    - The resultant model is presented and expanded on as part of the case study (Chapter 7).
- *Reflecting* - on and evaluating the process;

- Reflection on the process of collaborative design, and its outcomes is presented in the collective reflection component of the case study (Chapter 7).

- *Consolidating* - its outcomes into a new, stable form of practice;
  - Consolidation of the findings into possible ways forward and resultant conclusions of the study will be presented in the final chapter, Findings and Conclusions (Chapter 8).

1.7 Summary

This study embraces CHAT as a lens through which to frame and explore participatory and collaborative design practices in the Western Cape, South Africa. The purpose of this exploration is to better understand the complexities and activities that exist in these design processes and how collaborative design methods can contribute to citizen needs beyond specific projects. This chapter outlines the motivation for choosing this topic and contextualises the research problem. It presents several basic assumptions of the study and the research objectives and goals that the study aims to tackle. Chapter 2 explores the implications and expectations of Cape Town as holder of the World Design Capital title for 2014. It unpacks why Cape Town won and how it plans to use the WDC title to further build a positive sustainable design legacy. This chapter also presents plans by the local government on how to make use of collaborative design events to improve all 111 wards in the region. Chapter 3 explores the notions of democracy and the participation of civil society in the Western Cape. Here democracy is defined as the ability and means of all people to collectively shape their surroundings. This is based in the philosophy of active citizenship in which civil society actively contributes to the betterment of society as a whole. This chapter also defines ‘community’, a common buzzword in participatory design and studies around democracy. Chapter 4 presents a conceptual framework of collaboration in design. Chapter 5 follows on from this with a theoretical framework of collaboration in design. These chapters (4 and 5) contribute to the framing of CbPD as an activity system, this model forms the basis for the case study fieldwork. Chapter 6 then presents my research methodology and the use of CHAT as my interpretive lens. Chapter 7 presents a case study grounded in a CbPD project in Cape Town and framed using the conceptual and process models of design, as presented in Chapter 5. The case study research makes use of Schön’s notions of reflection-on-practice and reflection-in-practice using the CHAT framework as the basis for the study. Lastly, Chapter 8 wraps up with overall findings from the research and presents concluding remarks.

CHAPTER TWO
CAPE TOWN AS THE WORLD DESIGN CAPITAL 2014

2.0 Introduction

This chapter presents an overview on the various socio-economic, strategic and political imperatives of being nominated as a host city of a hallmark event, specifically as World Design Capital 2014, and highlights the importance that such an event has on legacy, and the social responsibility a field like design has, especially in a city like Cape Town. Design, specifically apartheid architecture and city planning, separated citizens from each other and infrastructure in the past (and still does to a large degree), twenty years on we see the opportunity for design to bridge divides and improve the socio-economic landscape of the Western Cape. Issues of legacy, social interaction, civic participation and resilience are discussed in this chapter. The chapter concludes with a discussion on expectations of, and benefits for Cape Town as World Design Capital 2014.

2.1 World Design Capital

The title of World Design Capital is awarded every two years by the International Council for Societies of Industrial Design (Icsid), and gives international prominence to cities that engage with design for the purposes of socio-economic and cultural development (Icsid.org, 2015). Icsid was founded in 1957 and currently has active members in 50 countries, including South Africa. The title of World Design Capital has been awarded by Icsid three times, with previous recipients being Helsinki, Finland (2012), Seoul, South Korea (2010) and Torino, Italy receiving the first award in 2008 (Icsid.org, 2015).

The host country carries the title for a year, and manages a programme of WDC events based around design projects and events that focus on socio-economic issues and cultural development. These projects are planned in advance, with Cape Town's designation being awarded in October 2011.

As a World Design Capital, many opportunities are presented to a city, including but not limited to:

- Building a global image as a centre of design, creativity and innovation,
- Attracting investors and creative businesses,
- Strengthening and diversifying economic development,
- Joining a committed international design city network,
- Learning about the latest design strategies to enhance municipal development,
- Networking with key civic decision-makers, design leaders and researchers from around the world,

- Creating an inspiring and unifying vision that unites citizens, businesses, designers and policy-makers, and
- Developing legacy projects (Icsid, 2014).

Icsid, by means of the WDC aims to do the following:

- Recognise innovative cities for the use of design as an effective tool for social, cultural, environmental and economic development,
- Showcase a designated city and its achievements on the international forum,
- Promote global understanding of design as an economic development tool,
- Create an international network where cities and municipalities can learn and share innovative design programmes and strategies,
- Present international examples for enhancing economic growth, innovation, public safety, quality of life and social interactions,
- Promote outstanding education and research institutions in the field of design,
- Share municipal design-led projects between developed countries and emerging economies (worlddesigncapital.com, n.d.).

2.2 Implications for the the Host City

The designation of World Design Capital impacts on a city's 'hard' and 'soft' infrastructure in a number of ways, and a deficit in either can negatively impact on the city's ability to meet Icsid's requirements. 'Hard' infrastructure refers to physical, large functional networks built to make new or to improve already existing human relations, to transport and distribute goods and to shelter human activities, and to support public works and services (Piccinini et al, 2013). 'Soft' Infrastructure refers to flexible social and cultural networks and human institutions that provide core services to citizens such as health, public safety, emergency services and education (Atlantis Magazine by Polis, 2013).

In its Draft Tourism Development Framework 2013-2017 (TDF) the City of Cape Town (CoCT) has highlighted hard and soft infrastructure as part of its strategic focus areas. Strategic Focus Area 3, *Support Interventions*, will feed into guiding principles, key focus areas, key actions and projects/programmes for planned future tourism development in Cape Town (City of Cape Town, 2013). Infrastructure development also contributes greatly to citizens. An example is Cape Town's Integrated Rapid Transit (IRT) system, spawned by the city's Fifa World Cup designation. Mega events often require a city to meet certain standards.

Icsid's specific requirements of a host city include:

- Provision of venue facilities for WDC signature events,

- Transportation infrastructure – public transport, road systems, rail linkages and airports,
- Cultural Infrastructure – museums, theatres and cultural centres,
- Security and Public Health – the city's capacity for addressing security and public health emergencies,
- Appropriate finance for operating and programming costs, such as the hosting fee,
- A programme of activities,
- A promotional plan, and a
- Design infrastructure (Icsid.org: 2014)

On top of these infrastructure requirements, a host city needs to specify how it plans to:

- Express the specific relevance of design for the quality of life in the city,
- Ensure the mobilisation and participation of large sections of the population, and
- Promote dialogue between the design community and other groups of the society: business, academics, youth, etc. (Worlddesigncapital.com, 2015)

Therefore, key to Cape Town's WDC legacy, are its citizens opportunities and abilities to collaborate.

2.3 World Design Capital 2014: Cape Town

Of Cape Town's designation as WDC2014 (Figures, 2.1 and 2.2), Cape Town mayor, Patricia De Lille stated: "Cape Town's World Design status will help the region to build on its reputation as a hub of innovation" (Wait, 2012).

Figures 2.1 & 2.2: Official Icsid logo for WDC2014 & Supporters Badge (World Design Capital 2014, 2013; Capetown2014.co.za, 2015)

The city's bid was focused not on presenting an established design capital, but rather on showcasing how design can be a tool for socio-economic transformation

(Wdccapetown2014.com, 2015). This focus on design for transformation has implications for how WCG, Cape Town citizens and Icsid frame their expectations and actions. It is important to acknowledge these multiple perspectives and the alignment of key stakeholders expectations, core values and motivations. The alliance of these fundamental parameters is imperative in successfully performing any regional development program (Bearing Consulting, 2012). These external and internal viewpoints of the World Design Capital designation should be taken into consideration in the development of WDC processes and projects as well as legacy projects. Should Icsid expect one thing and Cape Town deliver another, or Cape Town citizens expect certain things and the WDC office deliver others, the chasm of understanding could impact negatively on all groups.

Indeed, collaboration and project formation should align understandings and expectations. Cape Town's designation as WDC 2014 offers an opportunity to showcase South Africa's development paradigm shift from that of separate development, as was the case during apartheid, to the redefined "integrated, people centred development," characterised by integration between decision makers from the public, private and voluntary sectors as well as citizen representation (Davids, Theron and Maphunye, 2005:19). Lassila et al. (2013:33) argue that events can help build community resources and social capital, but in order to do so event organisers must interact with local businesses and communities.

This quadruple-helix (Figure 2.3) approach to strategy development and decision-making results in socially accountable policies and practices (Prainsack, 2012:1) and can contribute to the development of Mode 3 knowledge production (Table 2.1), that is, socially responsible and reflexive knowledge production linked to current societal needs (Jiménez, 2008:54). This Mode 3 knowledge and contextual understanding is imperative if WDC2014 related products, services and systems are going to be relevant to the citizens of Cape Town. Aspects of influence for contextual understanding include geographic location, timing, political and social climate, economic conditions and other relevant activities (Frierson, Hood & Hughes, 2002:78).

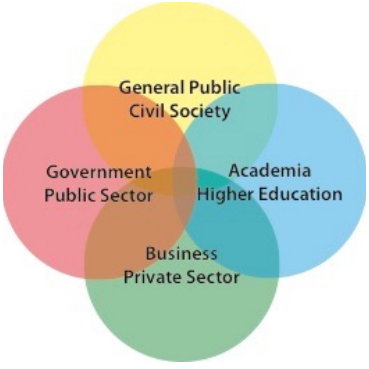


Figure 2.3 : Quadruple Helix (author's construct)

Table 2.1 : Mode 1, 2 and 3 knowledge (Adapted from Gibbons et al, 1994; Jiménez, 2008)

Mode 1	Mode 2	Mode 3
Problems proposed and resolved by a specific community	Problems proposed & resolved in the context of applications	Problems defined, proposed & resolved in the context of applications
Disciplinary	Trans/Interdisciplinary	Trans/Interdisciplinary
Homogeneity	Heterogeneity	Heterogeneity
Hierarchical organisations	Heterarchical organisation	Heterarchical organisation
Permanent	Transitory	Transitory
Peer quality control	Quality control by diverse actors / stakeholders	Quality control by diverse actors / stakeholders
Less socially accountable	More socially accountable and reflexive	More socially responsive and reflexive
		Bottom up

For WDC 2014 to be culturally responsive it must fully take into consideration the multi-layered, heterogeneous context of Cape Town. Whiteley (1993:119) argues that “a product or process which does not grow out of the habits and customs of a country or region is unlikely to be successfully integrated into the society’s culture”; while Johnson (2005:220), in her work on increasing participation of minority groups, suggests significant principles in multi-stakeholder understanding of contextual relevance, which include:

- The importance of input from all stakeholder groups in framing questions and issues,
- The need to select instruments and methods that are culturally responsive to ensure validity of representation, and
- Inclusive representation from all stakeholder groups in analysing findings and understandings (ibid).

Inclusive, citizen-centred planning of WDC 2014 activities would result in projects, events and processes best aligned to the needs and motivations of all stakeholders representing each sector of the quadruple helix, and offer a representative image of Cape Town and its various design requirements. Arcodia (2005) notes the following positive aspects experienced among multiple actors within the timespan of an event:

- Increased awareness of community resources and expertise,
- Social links between groups and individuals that were not previously related,
- Ideas for the development of resources in a community,
- A stronger interaction between organisations,
- A more effective use of community resources, and

- A promotion of social cohesiveness.

The inclusion of multiple actors is thus imperative, as this integrated approach to project planning breaks down silos, facilitates collaboration and provides for shared outcomes (Figure 2.4). If the legacy aspect of WDC2014 is to be met, these aspects should exist not just during the event, but continue long afterward too.

Icsid outlines three reasons to apply for World Design Capital designation (adapted from Icsid.org: 2015):

- To start a new chapter for a city - resulting in a rich legacy and long-term benefits such as an engaged citizen body;
- To benefit from the impact of the WDC - investment and a strengthened knowledge-based economy; and
- The energising of community and awareness around design as a tool for development and innovation.

These embody goals that speak to inclusion and empowerment of citizens, and include the establishment of long-term benefits such as an engaged citizen body, improvement to quality of life, fostering of citizen pride in their city, and community unification (Icsid.org: 2015).

In 2012, the Western Cape Government (WCG) and WESGRO, its destination marketing, investment and trade promotion agency, identified the Western Cape as the only province in South Africa that prioritises design as a key economic tool in driving future growth and job creation (Wait, 2012). The WCG and WESGRO also see design as a tool to build stronger communities and promote democracy.

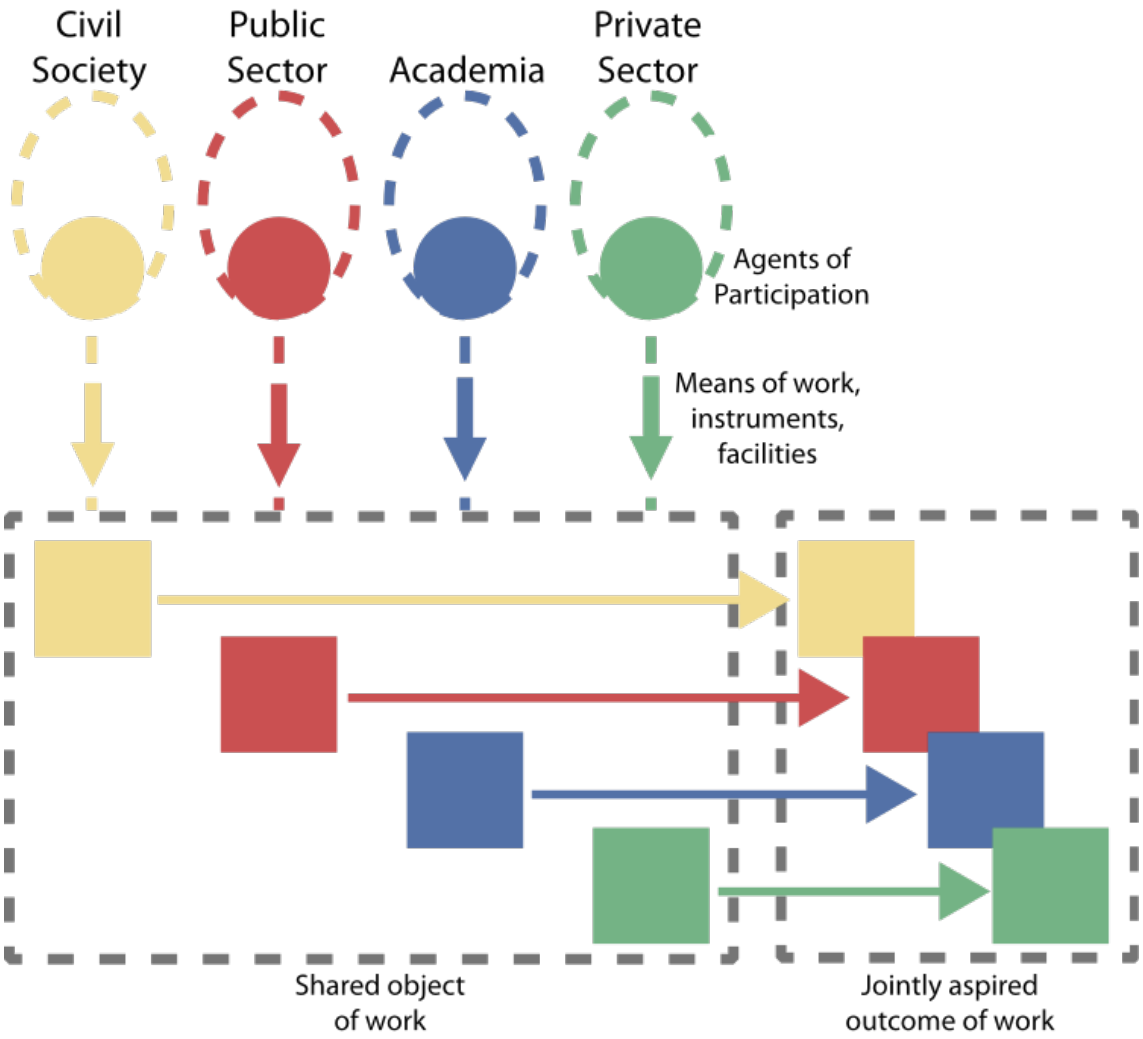


Figure 2.4: Individual actions merging into a joint activity (Adapted from Korpela et al, 2000:194)

With this citizen-centred outlook on design it is imperative the host city focuses on issues of inclusion, participation and empowerment. Matthews (2014:7) provides an apt definition of this citizen-centred democracy, "… democracy of citizens working with citizens to solve common problems and produce things that benefit everyone – things that also help the institutions of representative government work effectively." Western Cape's Premier Helen Zille's view of design echoes this and, at a Premier's Council on Skills meeting, she stated, "Design determines functionality and if done correctly, it increases the efficiency of government and delivery..." (Western Cape Government: 2015).

The Department of Economic Development and Tourism (DEDAT) has also identified design as an important catalyst for economic growth and in 2012 collaborated with the Cape Craft and Design Institute (CCDI) to develop a design strategy for the region (Cape Craft and Design Institute: 2013). This strategy aims at unlocking innovation and creating competitive advantage through design driven development. It defines good

design as "…an activity that uses creative and iterative processes to take account of a range of factors and needs in the development of innovative products, services, environments and communication, in response to the human condition and society's needs" (Western Cape Government, 2013:12).

Cape Town has planned over 460 design projects and events to happen throughout its year as World Design Capital, all of which relate to one or more of WDC 2014's key themes (Wdccapetown2014.com):

- *African Innovation, Global Conversation* – African ideas that speak to the world,
- *Bridging the Divide* – design that reconnects the city and brings communities together,
- *Today for Tomorrow* – sustainable solutions for people and the planet,
- *Beautiful Spaces, Beautiful Things* – inspiring food, fashion, jewellery, architecture, interiors, craft, art and creativity.

These projects aim at embodying the core values of the WDC designation. Beyond 2014, the citizens of Cape Town will experience the city's true investment in its designation. Here the legacy of WDC2014 has the potential to truly integrate design with policy, projects and processes.

2.3.1 Building a Positive, Sustainable Legacy

The legacy aspect of the World Design Capital designation is an important one, and should incorporate all four sectors of the quad-helix partnerships. An event like WDC brings together all types of people around the common theme of design. The social interactions that arise from the activities planned during the WDC have varying degrees of cohesion, with some of them possibly lasting beyond the event. The legacy of these 'event communities' as Wilks (2013:1) terms them, are determined by the ability of the event in catalysing existing social relationships or providing the starting point for the initiation of new social connections to persist (ibid). Maintaining legacy aspects of the Cape Town WDC 2014 has certain challenges, such as the dissolving of the Cape Town Design NPC, the body in charge of developing and implementing the CoCT's WDC programme, on completion of the event. This raises questions as to who will maintain the legacy of WDC 2014 and stresses the importance of social dimensions of the event such as partnerships, collaboration and civic engagement. The social impacts an event, such as WDC, could have include "the development of social networks, community pride, feelings of inclusion or exclusion, social integration, increased mutual understanding, changes in perceptions or attitudes, and the development or preservation of traditions" (Wilks, 2013:1). A successful legacy will thus depend on how well the City of Cape Town mobilises its citizens. The A.T. Kearney (2005) report on Building a Legacy states that for citizen mobilisation efforts to be effective, they need to "go beyond publicity [and] to actively engage communities in

identifying the social and economic programmes that will have the biggest impact at a local level." Although Icsid specifies seven signature events during a host city's designation, citizens are also invited to contribute to the overall programme by deciding on and offering up projects.

Busa, (2011) states four key legacy typologies that should be planned for when hosting a mega event. These are:

- *The informational legacy*, which embodies the know-how of organisers as the result of the compilation and preservation of all the records of the event (data, activities, events, etc.). These records are the knowledge base that will be invaluable for future organisers and researchers,
- *The transformational legacy*, which includes the wealth of different individual and joint projects with lasting impact on the economy, the public services, the city landscape, the culture, the environment, society, politics, etc,
- *The theme legacy*, in this case Design, which includes the projects and initiatives that are the result of the mega-event's focus on the theme, and
- *The cultural legacy* which includes the projects and initiatives that help foster the education of citizens in the history, the values and the future of the relevant mega event (ibid).

Although a country only carries the WDC designation for a year, the benefits should be felt for years after. It is important then to discuss what kind of legacy is left behind. The title of this section *Building a Positive, Sustainable Legacy,* is not done without reason. In South Africa we often refer to the legacy of apartheid. This deleterious legacy has sustained socio-economic disparities, even through the shift to a more democratic society. It has also contributed greatly to the systemic problems of such a democracy. These problems, highlighted in Section 1.6 include the facts that:

- Citizens aren't engaged enough or in the right way, and are often on the sidelines,
- Issues are approached and discussed in ways that promote divisiveness,
- People involved make poor decisions about the way forward or the best interests of themselves or others,
- Citizens can believe that they can't make a difference due to their lack of resources,
- Citizen actions can be ineffective due to opposing beliefs,
- An absence of shared learning can result in misinterpretation or non-alignment of goals, and
- Mutual distrust between citizens and major institutions (adapted from Mathews, 2014:3-5).

The legacy aspects of the WDC2014 designation are a chance to reform people's notions of design, not as a tool for divisiveness but as a tool for inclusion. Designers, and indeed all practitioners engaged with different communities, need to interrogate the legacy aspect of their work.

As Sandhu (2002) states, "design for sustainability and social responsibility, or to put it more bluntly, design for our future survival is an enormous professional challenge". This calls for a paradigm shift towards more participatory approaches to design to secure a sustainable and inclusive future (M'Rithaa & Futerman, 2007:6).

The Cape Town government proposes three broad areas of legacy focus, rooted in their WDC designation. These are:

- Organisational self-perception,
- Systems and processes, and
- Objects and infrastructure (Legacy of World Design Capital 2014, 2014).

These thematic clusters refer to an embedding of design thinking into the local governmental administration, however does not look outward toward society. One way the CoCT does however plan to achieve this entrenchment of design thinking is the formation of a Design Innovation Unit within the city's government (Thomson, 2015).

The three legacy focus areas proposed by the CoCT are explored further here. Organisational self-perception refers to an internal acknowledgement of strengths and capacities and the shift to a design-led organisation. I would like to expand this idea of organisational self-perception to include civil society and reframe it as citizen self-perception; this expands on the empowering self-knowledge of a team in understanding its strengths and capacities (Legacy of World Design Capital 2014, 2014), to the empowering self-knowledge of communities/society/societies based in their acknowledgement of their collective strengths and capacities. This acknowledgement of citizen's capacity would improve civic momentum and contribute toward bottom-up public participation. As Mathews (2014:7) states, "for a democracy to be strong and resilient, citizens have to be producers, not just consumers." An active citizen cohort could also contribute to sustainable long-term partnerships within quadruple helix projects.

The CoCT legacy focus area, termed systems and processes, refers to government accountability and transparency, as well as to establishing the city as more innovation-friendly (Legacy of World Design Capital 2014, 2014). The Western Cape's draft policy on public participation echoes this, and states that, "the intrinsic value of public participation lies in increasing accountability and transparency, broadening the sphere in which citizens can make or influence decisions, building civic capacity and trust

between government and the public" (Provincial Government of the Western Cape, 2010:3). It goes on to define public participation as, "an open, accountable and inclusive process through which individual citizens, community and interest groups, and other stakeholders can exchange views, make or influence the decisions that affect their lives" (Provincial Government of the Western Cape, 2010:6).

This policy is however in a draft phase, and the Western Cape does not have a comprehensive policy framework on public participation, it does however have various legislative and policy mechanisms governing the interface between the provincial government and the public (Provincial Government of the Western Cape, 2010:5). A legacy component to work toward during WDC 2014 could be the improved design of public participation mechanisms. The CoCT ran 111 ward projects during 2014. Each project was based on a specific ward's issues, attained via their ward councillor. These are set up as collaborative design workshops, with participants consisting of stakeholders and interested parties. Learning's from these ward projects could contribute to the design of new or evolved public participation methods. Apart from planned outcomes the CoCT also stated that there were unanticipated outcomes too, most notably, the exposure of designers to the realities of social design, awakening an often dormant sense of active citizenship among participants, and reminding City officials of the rich value public participation can offer (Capetown.gov.za, 2015).

Other knowledge generation regarding public participation can be garnered from public gatherings, summits and conferences.
2013 saw the Future Cape Town Summit on participation and engagement, with representatives from all four sectors of the quad-helix, the main output was a list of suggestions, generated by the attendees, aimed at increasing public participation. They were:

- Ensure adequate budgeting and planning: Ensure that a significant percentage of the project budget is allocated for the public participation process, and that this process is properly planned and delineated as part of the overall building scheme.
- Communicate a vision: Designers and planners should submit mock-ups of their designs and buildings models where relevant, to the affected communities for scrutiny and comment. This could be done by creating a mini-exhibition at the nearest town hall or public space, or by creating an informational website.
- Give the public a stake in decision-making: A significant proportion of the weighting of the final choice of project should be given to the community. For example, a proposed public building should allow for 5-20% (or higher) of the final choice of design to be decided by public vote.
- Plasticity: minor changes to project scope or design should be easier to action,

without the extensive application process they currently have to undergo. These changes should not affect projects in other parts of the city.

- Build local ownership: Local ownership of the project should be fostered from the get-go, through engagement, education and community involvement in the process. This will help reduce vandalism and other forms of property crime.
- A representative committee: The creation of a project steering committee that has significant and representative numbers of locals sitting on it.
- Empowerment of people: It is not simply enough to create a neutral space for comment, one must ensure that the voiceless are empowered to make themselves heard. Extensive investment in engagement becomes a tool for educating communities about civic issues, and will build a culture of active citizenship over time.
- Timing of public participation: Stakeholders are generally only brought in for participative processes after the parameters of a project have already been set (for example, by city planners), and the public can then only respond within that framework. Participatory planning should allow the public to help define the questions that need to be answered by the planning process. This applies mostly to statutory processes like developing a Spatial Development Framework, not to developer-led proposals.
- Empowerment of citizen organisations: If citizens are to be empowered to engage actively in city-making issues, NGOs and community-based organisations that deal directly with urban development issues need to be encouraged and supported with development strategies and funding. It was noted that there has been a scarcity of these sorts of much-needed organisations in South Africa since 1994 (Summit Discussion Paper: Engaged City, 2013).

Focus area three, Objects and infrastructure, deals with the advancement of tangible developments in the City, through both the co-creation ward projects and the efforts of the City's line departments (Legacy of World Design Capital 2014, 2014) and covers both hard and soft infrastructure, as defined earlier. Education falls into this category and has seen a legacy project, called Platform 6, aimed specifically at improving design education by equipping teachers to engage high school learners in the purpose and practice of design (Bizcommunity.com, 2015).

Cape Town Design NPC (CTD), the body in charge of developing and implementing the CoCT's WDC programme, has 5 strategic objectives that contribute to building a resilient design legacy. These objectives also guide the implementation of the WDC 2014 programme of action. They are to:

- Develop the local design industry through developing capacity, building networks and collaborative partnerships,
- Build a greater appreciation and understanding of the value of design to increase the demand for design services,
- Educate and inspire a new generation of design practitioners and thinkers
- Expand the local and international awareness of South African design-led products, services and systems
- Build inclusive relationships with communities, industry and other South African cities and African countries.
- Bridge divides that may exist (Cape Town Design NPC, 2013).

By adopting an integrated, quad-helix approach to public participation and engagement, a socially responsible design model (Figure 2.5) can promote multi-sectoral and transdisciplinary teamwork as it includes amongst its eight tenets; *government* - at national, regional and local levels; *social inclusion* - through participatory design methods; and *education* - through higher education institutions such as CPUT with pedagogic offerings to future designers and planners (Davey, Wootton, Thomas, Cooper, & Press, 2005:5).

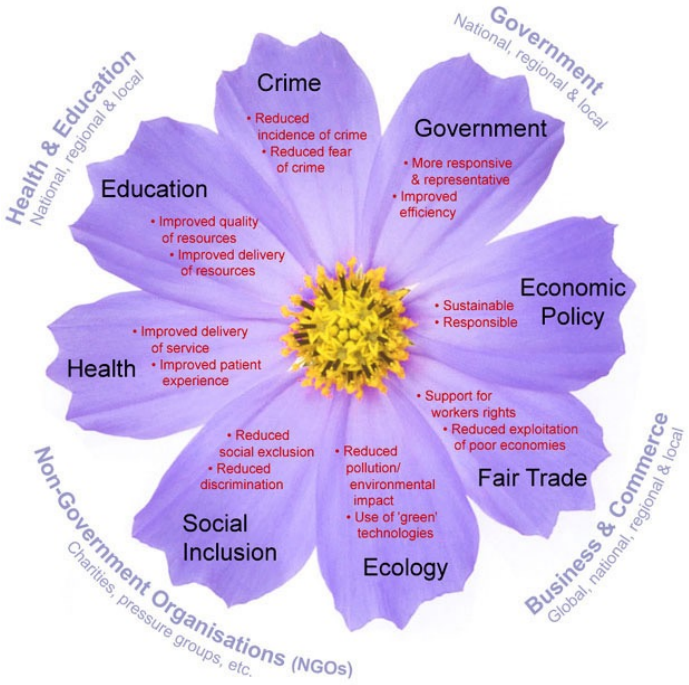


Figure 2.5 Socially Responsible Design (Wootton, 2001)

2.3.2 Anticipated Outcomes

The hosting of hallmark events, such as the WDC, has three key intrinsic benefits for a host city, (Vigor, 2004), they are:

- Global Exposition,
- Economic dividends, and
- Urban transformation

To which I'd like to add fourth:

- Development of Social Capital, both formal and informal (Putnam, 2001).

Social capital is an important addition here as the WDC 2014 planned to include as many people as possible in its activities, through supporting indigenous knowledge, energising communities and building inclusive relationships and educating future design thinkers. Padovan (2005) identifies five key conditions for increasing social capital: *participation in networks and groups*; *reciprocity and exchanges*; *trust and safety; social norms* and *the commons and pro-activity*.

These conditions and their meaning, as well as indicators of social capital are presented in Table 2.2.

Table 2.2: Conditions for increasing social capital and indicators thereof (adapted from Padovan, 2005)

Conditions for Increasing Social Capital				
Participation in networks and groups	**Reciprocity and exchanges**	**Relations of trust and safety**	**Social norms**	**The commons and pro-activity**
People engage with others through voluntary and equal associations	A combination of short-term altruism and long-term self interest	Taking risk in a social context rooted in expectations that others will act in mutually supportive ways.	Mutually agreed rules or norms of behaviour that place group interests above those of individuals	The combined effect of trust, networks, norms and reciprocity creates a good community, with shared ownership over resources known as the "commons"
Social Capital Indicators				
Participation in local society	Pro-activity in a social context	Feelings of trust and safety	Reciprocity and obligations	Neighbourhood connections
Family and friends connections	Tolerance of diversity	Environmental values	Common goods	Personal empowerment

These conditions and indicators of social capital echo the aims of WDC2014 as unpacked earlier, and the offer a rubric with which to evaluate the legacy of World Design Capital projects.

These general characteristics of social capital resound locally with the concept of *ubuntu.* The isiZulu language in Southern Africa illustrates this concept as: *"umuntu ngumuntu ngabantu", directly translated* as *"a person is a person through other persons"* (M'Rithaa, 2009:113). Ubuntu offers an indigenous concept through which the WDC legacy can be viewed.

As such Cape Town will be looking to showcase how design is used for social, economic and cultural transformation all rooted in the spirit of ubuntu. This will be done through the selection of projects aligned to the four themes of WDC2014, namely: African Innovation, Global Conversation; Bridging the Divide; Beautiful Spaces, Beautiful Things; and Today for Tomorrow.

If we are too expand Vigor's (2004) intrinsic benefits for a host city of a hallmark event to include the development social capital; and contextualise these benefits within ubuntu then the anticipated outcomes linked to WDC2014 can be viewed as the following:

- *Global Exposition*:
    - Increased and sustained national and international tourism,
    - Establishment of local design talent on an international stage.
- *Economic benefits*:
    - New investments
        - New injection of national and international investments,
        - New public-private partnerships in investment,
        - A shift in industry's belief that design does not attract investment.
    - New business
        - Repositioning of existing industries, most notably design and related industries,
        - Development and launch of new business sectors across the socio-economic landscape,
        - New opportunities from face to face international business meetings connected to participants, sponsors and suppliers,
    - New revenue
        - Additional tax revenue for the city: national tax revenues that come back to the city,
        - Higher-value real estate and new business and/or residential districts
    - New talent
        - Additional employment options,
        - New training opportunities in different domains that help develop human capital and foster a new professional cultures at all levels

of society through the experience of working within an international event,
        - Development of new entrepreneurial skills in city management, specifically design thinking (Busa, 2011:6; Johnston, 2013:4).
- *Urban Transformation*
    - New infrastructure (Hard and soft, Cultural and Design infrastructure)
        - Linked to Strategic Focus Area 3 of Cape Town's draft Tourism Development Framework,
        - New transport links and services to improve city access and connectivity,
        - Improved secondary design education, and links between tertiary and secondary institutions through projects such as Platform 6
    - New facilities
        - Buildings and public spaces hosting a wealth of different activities to be used during the event and to remain as future legacy (i.e. design parks, conference centres, museums, hotels, etc.)
    - Improved services
        - Improved public service delivery in the city during and after the event
    - Improved management
        - Improved ability of the public administration to understand citizen's needs and deliver and coordinate appropriate services,
        - Design innovation unit embedded in CoCT's management structure
        - Contribution the design and development of a comprehensive policy framework on public participation in the Western Cape (Busa, 2011:7; City of Cape Town, 2013; Legacy of World Design capital, 2014; Bizcommunity.org, 2015; Icsid, 2014)
- *Social Capital*:
    - Improved participation of citizens in society,
    - Project outcomes that build trust laterally and horizontally,
    - Improved connections seeding future collaborations,
    - An awareness of diversity and a tolerance thereof, and
    - Personal empowerment for a common good

Mega events such as the WDC can also contribute to a host city's development (Figure 2.6) and should be aligned with Cape Town's strategic development goals.

	Emerging	Evolving	Excellent
Social, cultural and environmental	• Weak social fabric, ethnic divisions, and limited civil society or community participation • Poor quality of life, lack of public support for arts and weak environmental standards • Health-care and education are poorly funded • Limited access to loans and housing	• Stable and tolerant society with supportive institutions • Environmental degradation in urban centers; limited cultural and leisure lifestyle • Health-care and education are government priorities, but mis-management and bureaucracy hamper results • Sanitation services in place, but access to clean air, water and health is limited	• Diverse, tolerant society with wide choice of lifestyles, leisure and cultural activities • Focus on urban and community design that fosters public health, well-being, business growth and efficient use of resources • High quality education and health-care available to all • Public sanitation is efficient and provided at low cost; leading environmental standards
Economics	• Basic educational system with limited links to business or academic communities • Industry driven by a few vertically integrated sectors, poor supply chains, import-dependent and limited service sector • Central bank is not independent and subject to investor uncertainty • Poor fiscal management, inflation, high debt levels, volatile financial markets and weak growth	• Science and technical institu-tions support industry and are wired into overseas knowledge centers • Moderate levels of productivity, yet weak in terms of innovation • Moderate to strong growth, though not sustainable; econ-omy still vulnerable to swings • Sound economic policies help build investor confidence, but political transitions can upset markets	• Vibrant, connected economy that continuously innovates, renews and leads markets • Large share of profits are plowed back into R&D, corporate innovation and new business models • Above average growth rates over long term and highly diversified economy • Effective coordination of monetary and fiscal policies that are able to adjust to external shocks
Growth and infrastructure	• Regulations are subject to change; narrow group of interests blocks competition • Poor physical infrastructure, unstable administration and legal system	• Physical infrastructure strained by demographic and economic pressures • Basic regulatory, administration and legal systems are in place	• Infrastructure continuously adapts to meet evolving socio-economic needs • Creative and flexible financial sector encourages new forms of financing and broader capital markets • Government supports and facilitates business-driven competitiveness

Figure 2.6 Stages of Development (A.T. Kearney, 2005)

Busa (2011) lists 6 best practices related to the successful hosting and support of a mega event, they are to:

1. Develop clarity on the goals and objectives for the city based on its overall resources and identity – Host city determines expectations of the event, not the other way around,
2. Choose the right event – with the Western Cape's work toward a design strategy for the province and a rich design industry, WDC seems well placed,
3. Ensure local consensus – active engagement of citizens,
4. Integrate the event into the long-term development strategy of the region – WDC2014's objectives, programme of events and requirements must be aligned to the CoCT's development strategy, as effects will be felt long after 2014,
5. Engage all the key stakeholders – as equal shareholders, and
6. Establish and open and inclusive organisation – the Cape Town Design NPC should include representation from all tenets of quad-helix alliance, that is: education, government, business and citizens.

2.4 Summary

This chapter has presented the World Design Capital designation as a platform for aligning civic participation and design practice. The citizens of Cape Town's capacity for participation and the creation of resilient communities can be strengthened through expanding civic organisations, self-awareness by individuals and communities (Davids, Theron and Maphunye, 2005:205) and the capacity to enact change. Wilks (2013:2) notes that it is not enough to focus only on the end result of an event to note its social impact, but rather to interrogate the life cycle of the event, including the context in which it takes place. The legacy aspect of WDC 2014 and its subsequent projects and activities are therefore imperative in continuing the benefits Cape Town and its people could garner during the WDC 2014 designation. Tied into the legacy aspect are issues of social inclusion, design for participation, the development of social capital, inclusion and ownership, and civic momentum.

The following chapter adopts a cultural-historical lens in its analysis of current processes of participation and notes how these could be improved using WDC 2014 as a platform for positive change in this regard. The focus therefore, is on Cape Town and the civic participation therein.

CHAPTER THREE
CIVIC PARTICIPATION IN SOUTH AFRICA

3.0 Introduction

The year 2014 marks the twenty-year anniversary of democracy in South Africa. Davids, Theron & Maphunye (2005:112) state that since the birth of our new South Africa in 1994 there has been an increase in the search for relevant strategies that could improve public participation in all spheres of government, particularly local government. This chapter starts with defining key terms relating to public participation in a democratic system and then moves on to explore the issue of public participation. This exploration is rooted in national and provincial practice.

South Africa is a representative democracy, having elected individuals representing the people, but it also adheres to the principles of participatory democracy, as parliament and the nine provincial legislatures are constitutionally mandated to obtain public participation in their decision-making and policy processes, hereby giving citizens the right and means to contribute toward any political decisions or policies that impact their lives. Supporting this is the South African Cities Network (SACN), which envisions a future where the country and its provinces are rooted in the following visions of what a city should be. These are a:

- *Productive City* – wherein the local economy provides a majority of residents with means to earn a reasonable living;
- *Inclusive City* – wherein residents have the opportunities and capacities to share equitably in the social benefits of city life;
- *Sustainable City* – wherein the city impacts on the envelope of natural resources that sustains the settlement and makes it liveable; and
- *Well Governed City* – wherein the political and institutional context is stable, open and dynamic enough to accommodate all interests (Boraine, 2004:3; South African Cities Network, 2005; 2008 cited in M'Rithaa, 2009:14).

These four tenets can contribute to the development of a more democratic South Africa.

3.1 Definitions

The definition of democracy in this research is based in the etymology of the term itself. Democracy's root words, *demos,* often understood to mean "common people" and *kratos*, meaning "to rule" define today's general understanding of the term as "rule by the common people." If, however, we look further back to the origin of the word demos, we see it's meaning rooted in the idea of place, and refers to districts within Attica, (early Athens) Greece (Reconsidering the etymology of democracy, 2008). Rooted in

locale and based on this definition, democracy can be defined as the ability and means of all people to collectively shape their surroundings. David Mathews (2014:7) similarly relates democracy to "… citizens working with citizens to solve common problems and produce things that benefit everyone."

Referring back to Mathews' problems of democracy (Section 1.6), this thesis explores design's role in mitigating these, and how design can facilitate active citizenry through comprehensive participation and collaboration of civil society.

The South African Legislative Sector (SALS) Public Participation Framework (2009) identified stakeholders that form the 'Public' in public participation. This framework defined 'Public' as:

- Voters and citizens (although this was seen in itself as an exclusionary category)
- The people within the state or area of jurisdiction
- Corporate entities
- Business sector
- Education sector
- Traditional leaders and healers
- Coalitions
- Criminals (there was some debate and consensus that in a particular investigation, such as into Correctional Services functioning, it may be appropriate for a legislature to convene a session to tap into inmates' views or experiences)
- organised civil society (non-governmental organisations (NGOs), community based organisations (CBOs), refugee communities, women's and youth groups, and other sectoral groups)
- Unorganised civil society – individuals

In summary, the SALS defines 'public' as every single citizen, and includes in its definition all three other segments of the quadruple helix, that is Education, Business and Civil Society. This means that Public participation in policy development and legislative processes should include all segments of the quadruple helix in collective decision-making.

3.1.1 The Spectrum of Participation

Kumar (2002) presents seven levels, or typologies, of public participation. At one end there is passive participation, where control is in the hands of outsiders, while at the other end there is self-mobilisation, with the process being controlled by local citizens (Figure 3.1). The shift from passive participation to self-mobilisation also supports a

shift from empowerment within existing structures, to emancipation beyond existing structures and the formation of new ones.

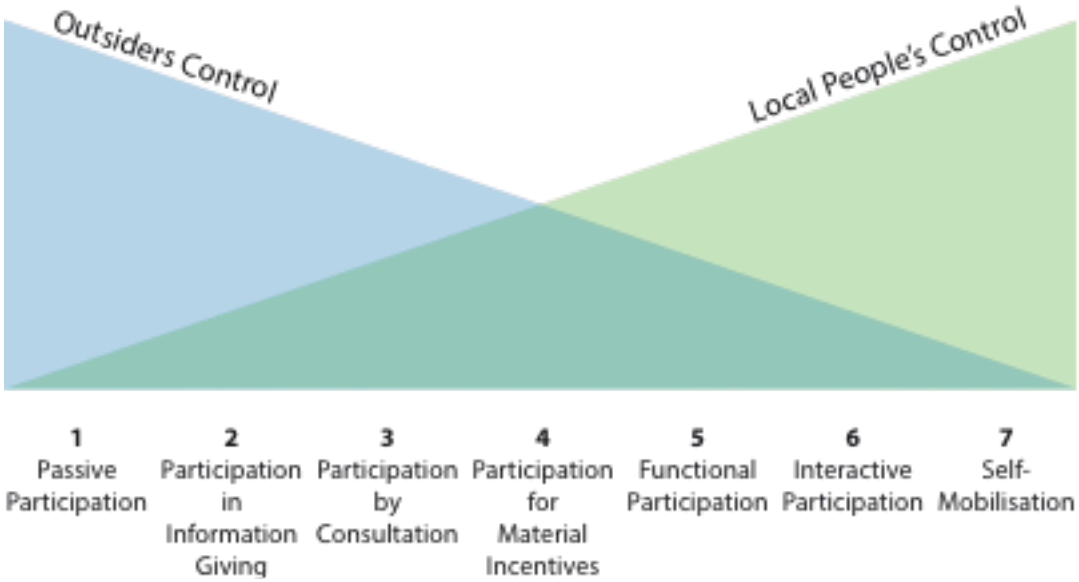


Figure 3.1 The spectrum of Participation (adapted from Kumar, 2002)

Framing the object of participation as either public involvement or public emancipation is another way to define the spectrum of participation. Ideally there should be the shift from the former to the latter, thus moving from a system maintaining stance to one of system transformation (De Beer, 2000:271; Davids, Theron, Maphunye, 2005:117). This move from weak public participation to strong public participation is represented in Figure 3.2.

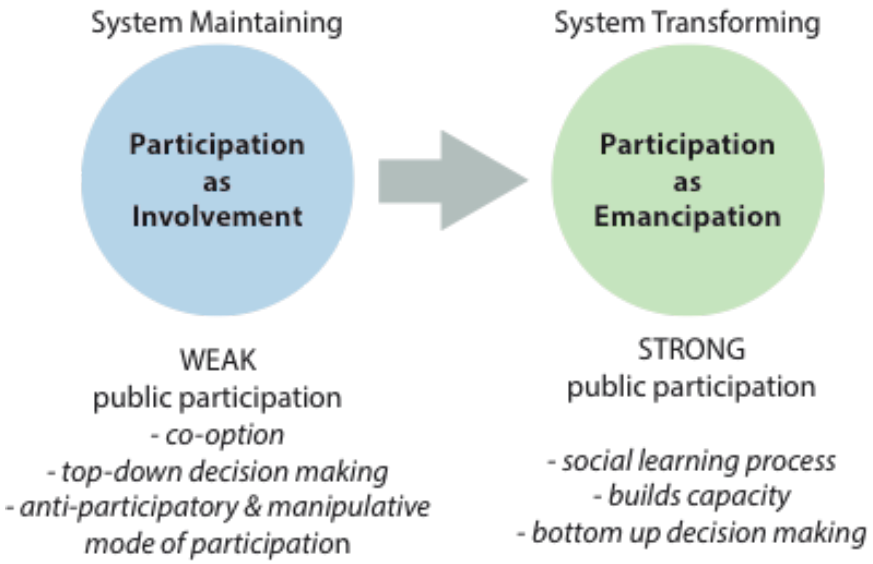


Figure 3.2: Shifting from Participation as Involvement to Participation as Emancipation

Sjöberg (1996:3) also looked at change processes and the shift toward more inclusive forms of participation, and expands on Mumford's (1979) three levels of participation (Figure 3.3). These are adapted to civic participation and contextualised below:

- *Consultative participation* – specialists and community members consulted on occasion, seen as knowledge source to be tapped when it suits outsiders;
- *Representative participation* – specialists and community members are selected by outsiders to represent their field or community at large. Their input is either used or discarded at the will of outsiders; and
- *Consensus participation* – where all community members are invited to take place in all stages of a change process, ideally owning the process and determining the design of the process and its outcomes.

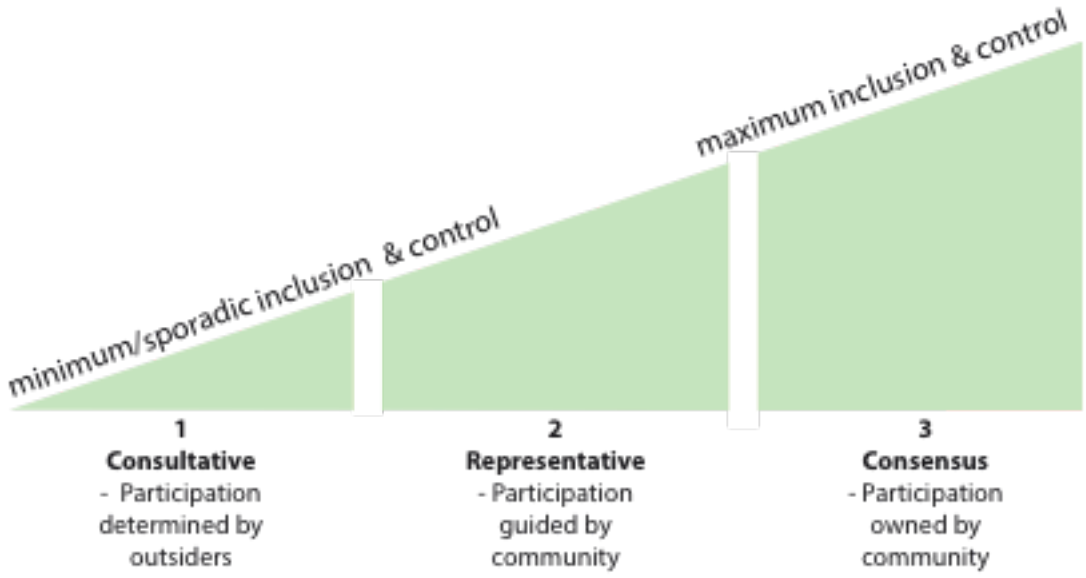


Figure 3.3: Levels of participation (adapted from Mumford, 1979)

Nationally, the Public Participation Strategy for the South African Legislative Sector (2013) defines public participation as, "the process by which Parliament and provincial legislatures consult with the people, i.e. interested or affected individuals, organisations and government entities before making a decision. [It] is two-way communication and a collaborative problem solving mechanism with the goal of achieving better and more acceptable decisions. Other terms sometimes used are 'public involvement', 'community involvement' or 'stakeholder involvement'", while the Western Cape Policy on Public Participation (2010) defines public participation as "an open, accountable and inclusive process through which individual citizens, community and interest groups, and other stakeholders can exchange views, [and] make or influence the decisions that affect their lives." These two definitions are at tension with one another. While the national definition of participation aligns to a more consultative, top-down form of

participation, the Provincial definition leans more toward representative or consensus participation.

The Public Participation Framework for South African Legislature goes on to present a ladder of participation (Figure 3.4), adapted from Arnstein (1969), to reflect what they term a 'best-fit' approach to public participation. As participation is framed by each 'step' of the ladder, citizen's input, influence or impact is increased.

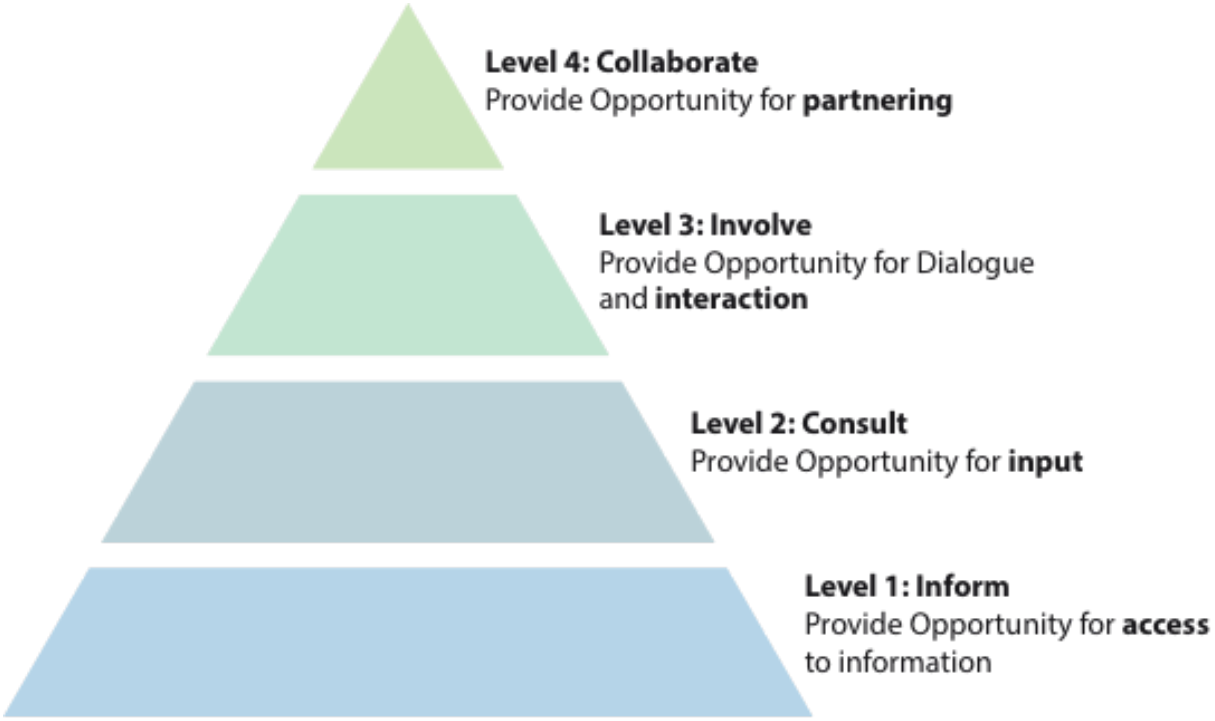


Figure 3.4: Participation Ladder (adapted from Legislative Sector South Africa, 2013)

The National view of citizen participation is still framed as consultative, with National Government determining participation of the people, Provincially, we have seen a slight shift to more empowering forms of participation. Oakley (1991:7) draws the distinction between participation as a means, and participation as an end (Table 3.1). This is an empowering paradigm shift, with the latter framing participation as a more active process. The key shift is the reframing of participation as a tool to achieve something, to participation as the end goal, requiring the design of tools to achieve this.

Contemporary PD practice explores the notions of publics and agonistic participation, which are central to the discussion of participation as a means/end, that is, participation during a project versus participation as an ongoing phenomenon beyond projects (projecting vs infrastructuring) Ehn, 2008; Björgvinsson, Ehn and Hillgren, 2012a, 2012b; and, Le Dantec and DiSalvo, 2013).

Table 3.1 Participation as a means & Participation as an end (adapted from Oakley (1991) & Davids, Theron & Maphunye, (2005:117))

Participation as a means	Participation as an end
Implies the use of participation to achieve some predetermined goal or objective	Attempts to empower people to participate in their own development more meaningfully
Attempts to utilise existing resources in order to achieve the objective of programmes/projects	Attempts to ensure the increased role of people in development initiatives
Emphasises achieving the objective rather than the act of participation	Focuses on improving the ability of the people to participate rather than just achieving predetermined objectives of the project
More common in government programmes, where the main concern is to mobilise the community and involve them in improving the efficiency of the delivery system	Find relatively less favour with government agencies. NGOs/NPOs in principle agree with this viewpoint.
Participation is generally short-term, defined by the project	Participation is long-term and is the sum of projects
Participation as a means, therefore, appears to be a passive form of participation	Participation as an end is relatively more active and dynamic then participation as a means

The national and provincial definitions of public participation both speak of participation as a process, initiated by government. If we are to have a truly “citizen-rich” (Mathews, 2014:66) democracy, we need active participation by citizens. By exploring activities associated or rooted in democratic practices, we can begin to contextualise and explore tacit examples of democracy in action. This requires a shift from viewing democracy as a concept to exploring democracy as consisting of tangible processes and activities. When viewed as a process, democracy can be redefined as the activities that enable all people to collectively understand and shape their surroundings, producing things that benefit everyone.

This relates directly to the two types of values that strategically guide Participatory Design processes. Outlined by Björgvinsson, Ehn and Hillgren (2012a:103) they are:

- The social and rational idea of democracy as a value that leads to explorations of conditions that would enable proper and legitimate user participation - referred to as *staging and infra structuring design Things* - “staging” (assembling socio-material design Things) and ”infrastructuring” (the socio-technical mechanisms for constituting and supporting a public) design *Things* (Co-design activity systems as socio-material assemblies of humans and non humans) (Le Dantec and DiSalvo, 2013; Björgvinsson, Ehn and Hillgren, 2010, 2012a, 2012b; and Ehn, 2008) (elaborated on in Chapter 4); and
- The importance of making participants’ tacit and indigenous knowledge come into play in the design process - not just their formal and explicit competencies, but

those practical and diverse skills that are fundamental to the making of things as objects or artefacts.

The next section elaborates on democracy and its components as tangible processes.

3.2 Democracy as Process

Democracy is a process (O'Malley, 1999:124; Williams, 2003:339). It is a process, or processes, of inclusion and unity, and one that respects diversity. It is an [iterative] process that can best be defined and justified as a set of procedures, which leave open, within limits, the range of outcomes produced (Philp, 2001), a definition that is remarkably similar to the process of design. Its outcomes are determined by context, the spectrum of public participation and levels of inclusion and access, amongst other aspects. The design of these procedures is critical in providing all of civil society the appropriate tools for full participation in collectively shaping their lives. The United Nations World Summit for Social Development (1995) acknowledged that in order to ensure good governance there must exist the [on-going] exchange amongst civil societies in a region, to reinforce identity, improve socio-political processes and sustainable development.

To explore civil society, democracy, design and participation it is imperative to distinguish the differences in these themes when either viewed as concepts/ideas and processes (Table 3.2). In her work on Civil Society as Idea and Civil Society as Process, Whitfield (2002) provides a distinction between the two paradigms, and argues that "the relevance of civil society as process for any notion of 'democracy' lies in a shift towards new methods of participation for previously excluded groups" (Whitfield, 2002:7). In this transferable framework (Figure 3.5) we can view the concept as a set of assumptions that obfuscates reality, whereas when viewed as process, these presuppositions can be deconstructed by examining what is actually happening in a context.

Table 3.2 Key themes as concepts and processes (adapted from Philp, 2001; Whitfield, 2002; WSJ, 2014)

	Concept	Process
Civil Society	o Ambiguous o Obfuscates reality o Conceals disunity	o Actual o Contextual Characteristics o Shaped by change o Historical memory o Reveals power relations
Democracy	o Undefined o Abused	o Redefined o Permanent dialogue o Deliberative o Contextual

Design	o Fuzzy o Mysterious o Undefined o Out-of-context o Outcome	o Contextualised o Iterative o Hermeneutic o Grounded
Participation	o Undefined o Civic engagement o Abused	o Inclusive o Active o Qualitative o Civic empowerment

When public/community participation is viewed as either a concept or an idea, it can elicit antagonistic perceptions. Okui (2004), states that when community participation is used as a cosmetic label for civic programmes or as a co-opting practice to utilise local populations in external projects, the concept is open for abuse; however, when grounded as an empowering process that enables communities to design, plan and implement action, the exploitation of the term is reduced. It is only in practice that matters of power, inclusion and participation can be explored.

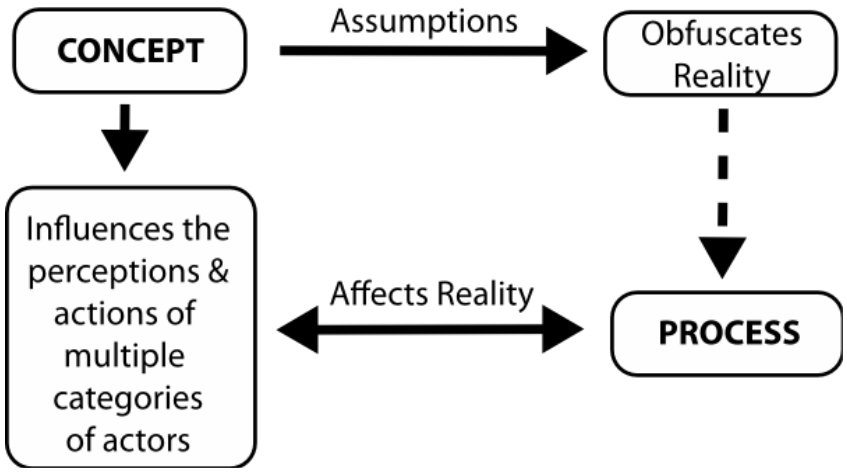


Figure 3.5 Framing of key themes as Concepts/Ideas and as Processes (adapted from Whitfield, 2002:5)

By framing Democracy and its components as processes rooted in reality one can contextualise them and begin to explore them as culturally historical activities grounded in locale, in this case South Africa and the Western Cape[1].

The following section on Public Participation in South Africa explores past and current processes, providing context, tangible exemplars, and key issues related to transitions in government's engagement with civil society.

[1] The case study in chapter 7 provides a grounding as such

3.3 Public Participation in South Africa

Following the first democratic elections in post-apartheid South Africa in 1994, certain key government and civil publications, processes and programmes were responsible for framing democratic participation in South Africa. The first of which was the drafting of the South African Constitution, a landmark process of public participation. The empowerment of civil society, by the Constitutional Assembly, to participate in the constitution-making process produced a new dimension related to the concept of democracy in South Africa; that is, a participatory democracy (Sahistory.org.za, 2015).

At the same time as public participation was being garnered for development of the constitution, one of the key publications that acted as a foundation for developmental local government was published, the 1994 White Paper on Reconstruction and Development and its action plan, termed the Reconstruction and Development Programme (RDP). The RDP promotes the collaboration of local government with local communities in finding sustainable ways of meeting contextual needs and improving their quality of life and is grounded in seven main principles, these are:

- Integration and Sustainability,
- People-driven,
- Peace and Security,
- Nation Building,
- Meeting Basic Needs and building Infrastructure,
- Democratisation,
- Assessment and Accountability (White Paper on Reconstruction and Development, 1994:7)

Several of these principles relate directly to the goals of Participatory Design, notably, Integration and Sustainability, Meeting basic needs and building infrastructure, Assessment and accountability, People-Driven processes and Democratisation. The White Paper on Reconstruction and Development (1994:8-9) defines the last two RDP principles, key within PD, as follows:

People-Driven:

> *Our people, with their aspirations and collective determination, are our most important resource. The RDP is focused on people's immediate as well as long-term needs and it relies, in turn, on their energies. Irrespective of race or sex or age, or whether they are rural or urban, rich or poor, the people of South Africa must together shape their own future. Development is not about the delivery of goods to a passive citizenry. It is about involvement and growing empowerment. In taking this approach the Government will build on the many forums, peace structures and negotiations that our people are involved in through the land. The Government therefore commits itself to maximum transparency and inclusivity.*

Democratisation:

> *A thorough-going democratisation of South Africa is central to a coherent programme of reconstruction and development. Above all, the people affected must participate in decision-making. Democracy is not confined to periodic elections, but is an active process enabling everyone to contribute to reconstruction and development. The democratisation of society will require a process of transformation of both the state and civil society. The Government and its institutions will be restructured to fit the priorities of the RDP. Here, especially, there is no 'business as usual*.

These two principles speak to a more involved public, where active citizens should be able to continually contribute to their well being through various channels, including input into the relevant government institutions.

1997 saw the publication of the White Paper on Transforming Public Service Delivery, which aims at facilitating the meeting of basic needs of all citizens, in line with the RDP's key programmes. This white paper proposed a fresh approach to service delivery which it framed as "an approach which puts pressure on systems, procedures, attitudes and behaviour within the Public Service and reorients them in the customer's favour, an approach which puts people first" (Draft White Paper on Transforming Public Service Delivery, 1997). This approach has given the policy its adopted name, Batho Pele, derived from a Sotho adage meaning 'People First', and aims at the operationalisation of ubuntu (M'Rithaa, 2009:116). This people-first approach was meant to reframe government's viewing of citizens to that of customers. The White Paper states that treating citizens as 'customers' implies:

- Listening to their views and taking account of them in making decisions about what services should be provided;
- Treating them with consideration and respect;
- Making sure that the promised level and quality of service is always of the highest standard; and
- Responding swiftly and sympathetically when standards of service fall below the promised standard (Draft White Paper on Transforming Public Service Delivery, 1997).

To enable national and provincial government departments in applying these approaches, the white paper identified the eight principles of Batho Pele. These are:

1. *Consultation*
   - Citizens should be consulted about the level and quality of the public services they receive and, wherever possible, should be given a choice about the services that are offered.
2. *Service Standards*

- Citizens should be told what level and quality of public services they will receive so that they are aware of what to expect.

3. Access

- All citizens should have equal access to the services to which they are entitled.

4. Courtesy

- Citizens should be treated with courtesy and consideration.

5. Information

- Citizens should be given full, accurate information about the public services they are entitled to receive.

6. Openness and transparency

- Citizens should be told how national and provincial departments are run, how much they cost, and who is in charge.

7. Redress

- If the promised standard of service is not delivered, citizens should be offered an apology, a full explanation and a speedy and effective remedy; and when complaints are made, citizens should receive a sympathetic, positive response.

8. Value for Money

- Public services should be provided economically and efficiently in order to give citizens the best possible value for money (Draft White Paper on Transforming Public Service Delivery, 1997).

Within the framework of the constitution, the White Paper on Local Government (1998) established the basis for a new developmental local government system that shifted the emphasis in development interventions to the public – *people-centred development* – and away from objects, delivery and systems (Davids, Theron & Maphunye, 2005: 120). This people-centred approach committed local government to working with citizens, groups and communities in providing a decent quality of life and meeting the social, economic and material needs of its constituents in a holistic way.

3.3.1 National Initiatives for Public Participation

Since the country's first democratic elections in 1994, the National government has implemented a number of initiatives in the attempt to facilitate the practical implementation of public participation into civil society. These initiatives include:

- Imbizos
    - In situ public meetings between communities and government representatives from all levels to discuss, amongst others, issues of government policies and service delivery.
- EXCO Meets the People
    - Similar to Imbizos, but at a provincial level
- Public Hearings
    - Parliament and the National Council of Provinces (NCOP) engage with

the general public in a variety of public hearing formats

- Ward Committees
    - These are statutory bodies created in terms of the Municipal Structures Act (Act No.117 of 1998) and consist of community members who have the task of assisting democratically elected ward representatives (Councillors) in carrying out their mandate. Chapter 4 (part 4) of the Act requires that municipalities must establish ward committees, with the objective of enhancing participatory democracy in the local government.
- Community Development Workers (CDWs)
    - Community members who help fellow community members obtain information and resources from government departments.
- Citizen Satisfactory Surveys
    - A methodology used to engage with citizens regarding their views on service delivery, and
- Citizen Forums
    - These forums aim to evaluate the delivery of particular services throughout the country, and to enable active involvement of people affected by government programmes in service delivery improvement processes (Public Service Commission, 2008:15).

Key Findings from the Report on the Assessment of Public Participation Practices in the Public Service (2008) interrogated how civil society was being included by government in social development projects. Findings consisted of the following:

- There is a common understanding of public participation.
- The existence of public participation guidelines/policies is uneven.
- Stakeholders are aware of the departmental public participation guidelines/ policies.
- Departments apply different methodologies to effect public participation.
- There is common agreement on what the benefits of public participation are.
- Departments still have challenges in the application of their public participation practices.
- 56% of [Government] departments have established public participation units.
- Functions of public participation units are varied.
- Staff have not received special training on public participation.
- Budget allocation for public participation varies from one department to another.
- Departments do consider citizens' views during planning.
- Departments do consider views of populations with special interests.
- Departments make use of local languages.
- Engagement with citizens affected by service delivery protests is varied (Public Service Commission, 2008:vii-x).

The Public Participation Framework for South African Legislation Sector (SALS) proposes the shift from a ‘best-practice’ approach to a ‘best-fit’ approach (Figure 3.6) in the design of a comprehensive public participation framework (Legislative Sector South Africa, 2013). This is due to the fact that although current processes are derived from international best practices, up to now the implementation of public participation systems and programmes has fallen far short of public expectations. This shift from a ‘best practice’ to a ‘best fit’ approach embodies a paradigm shift from matching people to processes, to matching processes to people. Here we see a move away from blanket participation methods to more responsive ones driven by context.

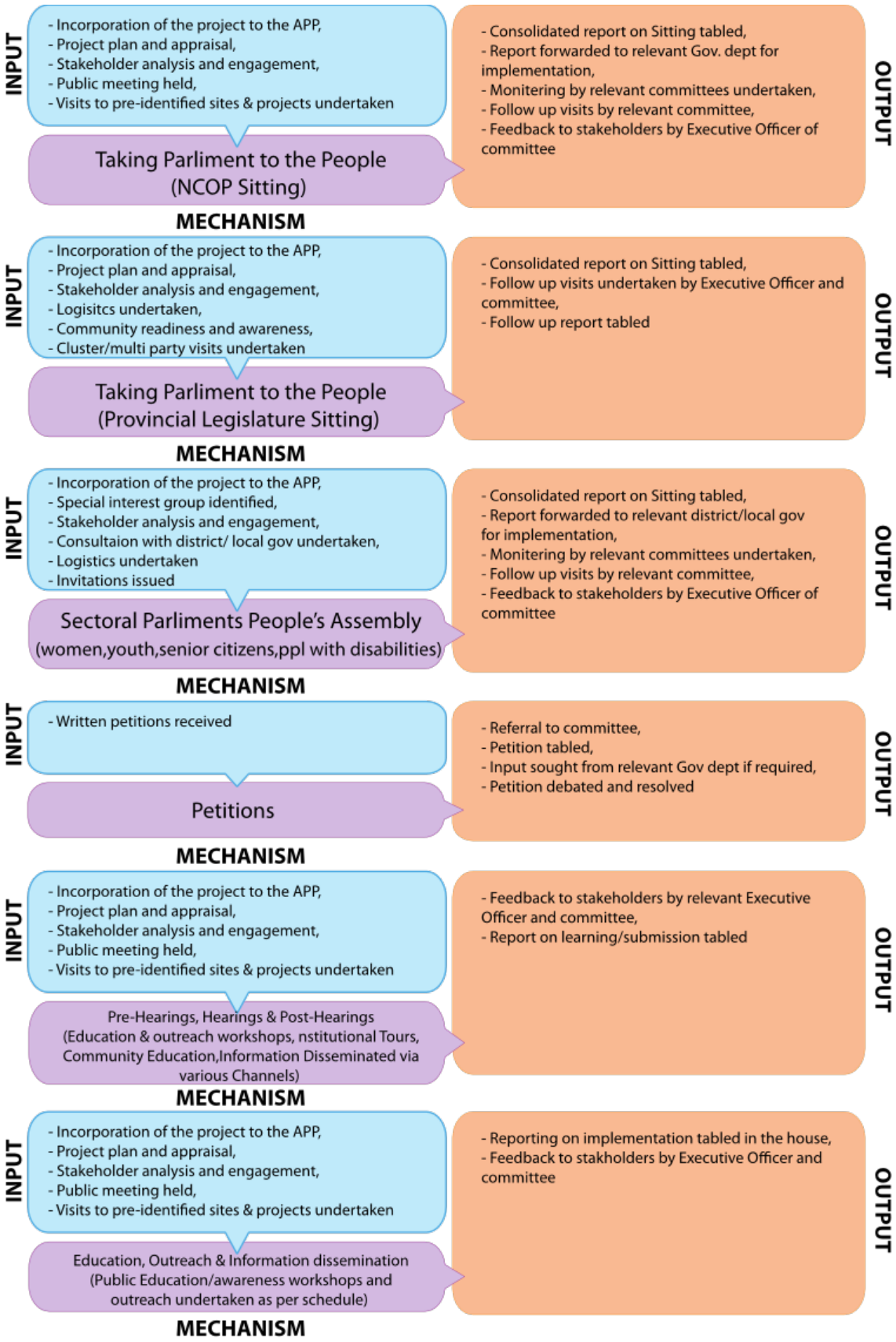


Figure 3.6: Best-fit Approaches to Public Participation (adapted from Legislative Sector South Africa, 2013)

3.4 Public Participation in the Western Cape

The Western Cape does not have a comprehensive policy framework on public participation, however there exists a draft policy (Western Cape Policy on Public Participation, 2010) that subscribes to the '7 core values of effective public participation' developed by the International Association for Public Participation (IAP2), these are:

1. Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
2. Public participation includes the promise that the public's contribution will influence the decision.
3. Public participation promotes sustainable decisions by recognising and communicating the needs and interests of all participants, including decision makers.
4. Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
5. Public participation seeks input from participants in designing how they participate.
6. Public participation provides participants with the information they need to participate in a meaningful way.
7. Public participation communicates to participants how their input affected the decision (The IAP2 Core Values, 2013)

The purpose of this policy is to "provide for opportunities for meaningful public participation and engagement to improve provincial laws, policies and service delivery in the province" (Western Cape Policy on Public Participation, 2010:7).
This purpose statement however is focussed on local government agendas, and doesn't encompass bottom-up proposals.

The Public Engagement Policy (2009) of the City of Cape Town aims to facilitate the contributions of the public to decision making processes in the Municipality. The policy outlines a sequence of activities in this regard and provides a table of tools the Municipality should use to engage with its constituents (Table 3.3).

Table 3.3 Public Engagement Tools (Public Engagement Policy, 2009:15)

	Build Capacity	Participate	Consult	Inform	Brand Build Image	Integration (Imbizos)	Customer Satisfaction Survey
Public Meetings	X		X	X		X	
Workshops	X	X	X	X	X	X	
Public Hearing			X	X			
Ward Forum Meeting	X	X	X	X	X	X	
S/council Meeting	X	X	X	X			
Internet & E-mail	X	X	X	X	X		
Website	X	X	X	X	X		
Cellphones	X	X	X	X	X		
Questionnaires							X
Radio Interviews	X	X	X	X	X		
Press Releases	X	X	X	X	X	X	X
C3 Notifications		X	X				
Sectoral Engagement	X	X	X	X	X		
Radio Ads	X	X	X	X	X		
Breakfasts	X	X	X	X	X		
Smartcape Access	X	X	X	X	X	X	
Phone in		X	X	X	X		
Written Submission		X	X	X	X		
Flyers		X	X	X	X		
Posters		X	X	X	X		
Email to Community Org		X	X	X	X		
Market Research			X		X		X
Doc at Libraries and Council offices	X	X	X	X	X		
Staff Payslips	X	X	X	X	X		
Loud Hailing	X	X	X	X	X	X	
Municipal accounts	X	X	X	X	X		

As one can see, public participation the Western Cape is yet to develop toward more emancipating, citizen-centred approaches. However, there is an improvement on inclusion and the framing of participation when compared to national policy. There still needs to be a ways in which government responds to citizen ideas, and not merely tie in participation to achieve governments goals. This bottom-up approach is emerging slowly, through grassroots initiatives.

3.4.1 Examples of Citizen Driven Approaches in the Western Cape

3.4.1.1 Open Streets

Open Streets Cape Town (OSCT) is a citizen-driven initiative, which works in partnership with the City of Cape Town (CoCT), to change how streets are used, perceived and experienced (Open Streets Cape Town, 2013). This non-profit organisation (NPO) was founded in 2012 (registered 2013) by several volunteers "committed to a more equitable, integrated, safer and vibrant city," and aims to "build shared places that embody respect for all and help bridge the social and spatial divides of Cape Town" (ibid).

3.4.1.2 Moonlight Mass

Moonlight mass began as a social experiment on Twitter in which two Capetonians tried to rally as many people as possible to gather and cycle together around a fixed route around the city. It grew into a monthly event, from 30 to over 4000 riders, and became the largest social ride in Africa (moonlightmass.co.za., 2014). The event grew to the extent that the organisers had to work with the CoCT and local traffic police to ensure road closures and the safety of the ride.

In November 2013 the rides were cancelled indefinitely however, due to the CoCT withdrawing their permit (thehub.co.za., 2013). In November 2014, with the buy-in though from both a CoCT councillor and minister, the rides were reinstated and continue to draw thousands of cyclists from around the city.

These two examples of citizen driven approaches outline the dynamics of bottom-up approaches. These, and other examples in Cape Town, often centre around an event that organises mass participation disrupting the status-quo.

3.5 Criticisms of Public Participation in South Africa

An evaluation tensions within public participation in South Africa present opportunities for the design of future participation processes. Understanding how public participation is garnered and to what end can contribute to improved processes and means.

Government's approach to citizen participation in SA is often seen as "compliance driven," designed to meet the needs of legislation and no more (Van Donk, 2014). Martin (2009:2) argues that there are tensions between civil society and policy makers regarding the understanding and processes of participation, with each group often having conflicting ideas around the purpose of participation, the nature or role of the 'expert' and 'lay' knowledge, that is ,experiential knowledge.

The term participation is in fact often overused in public engagement projects and has become a buzzword that government, private and academic institutions use in projects that in fact rarely embody authentic participation by the public. This, Davids, Theron & Maphunye (2005:113) state, 'has created misunderstanding and blown-up expectations amongst the public…stakeholders."

The Centre for Public Participation (2003) questioned whether the public participation process of SA adheres to and applies the seven IAP2 principles and core values in SA, stating that this integration remains to be seen.

Meyer & Theron (2000:i) state that current approaches to public participation tend to be ad hoc, incremental, unstructured, unbalanced and uncoordinated. This is echoed in the Public Service Commission Report on the Assessment of Public Participation Practices in the Public Service (2008), which states that although there is a common understanding amongst South African government departments of public participation

as ‘a process of engaging citizens to allow them to have a say in policy making and service delivery,’ this understanding is not matched with the departments’ actual implementation of public participation (2008:vii) with only 25% of the participating departments actually having public participation guidelines/policies in place. This lack of public participation guidelines in 75% of government departments surveyed results in haphazard implementation.

These contradictions and misaligned understandings between government and the people create a number of challenges in the development of future participation strategies and processes.

3.6 Challenges within Public Participation

There are numerous challenges regarding successful public participation, especially when framing participation as an end. Many of these challenges arise because participation can mean many things to many people. Brown (1997: 69-87; 2000:172-186) in Davids, Theron & Maphunye (2005:121) states that the challenges that face policy makers and development professionals relate to thirteen strategic shifts in conceptions around public participation. In order to improve public participation Brown (ibid) states that the following shifts are necessary:

- From a top-down to bottom-up approach,
- From a blueprint to a social learning process,
- From a system maintaining to a system transforming approach,
- From a control to a release style,
- From a ‘person-as-subject’ to a ‘participant-as-actor’ focus,
- From a ‘hard/hardware’ scientific approach to a ‘soft/software’ scientific approach (interdisciplinary approach),
- From a closed system to an open system approach,
- From a mechanical to a dynamic approach,
- From representative democracy to a participative democracy approach,
- From a closed communication style to an open style,
- From a formalised to an incremental approach,
- From public participation as cost to public participation as benefit,
- From a ‘fast-slow’ sequence in project planning and management to a ‘slow-fast’ sequence

It is imperative that citizens and all stakeholders in a project understand participation and share a definition. Misalignment of objectives and confusion regarding division of labour and roles and responsibilities can hinder, and even jeopardise completely, collaborative projects. Many misunderstandings can be solved through managing expectations early on and through the adoption of a social learning approach to development projects. Prahalad (2005:61) speaks of learning as a two way street. He

states that the flow of ideas, knowledge, and innovation moves between participants. This network of relationships encourages an iterative flow of learning in development and design projects (Figure 3.7), between designers, development practitioners, government and citizen participants. The context should present initial learnings from which an approach can be developed, as Prahalad (2005:48) states, the traditional approach most often taken is the application of existing models, this however is often a recipe for failure.

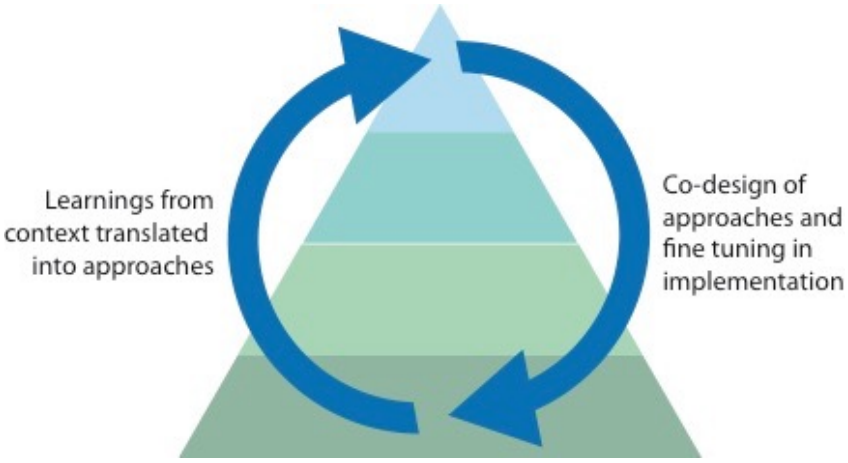


Figure 3.7: Iterative process of context-responsive participation and engagement strategies

Socio-economic conditions of many South Africans, and the way in which participatory initiatives are implemented can also hinder their effectiveness (Selebalo, 2011). The marginalisation of disadvantaged communities from participation can also be attributed to time constraints, limited access to information and lack of education.
Unintended consequences of initiatives intended to encourage citizen participation can include the following:

- Decreased participation due to misalignment between institutionally set terms and citizens reality,
- Mismanagement of expectations resulting in dismay,
- Focus on connecting people to institutions can overlook the importance of citizens first connecting with each other,
- Copying best practices can fail outside of intended context,
- Misalignment with citizen defined issues resulting in lack of interest,
- Participation as tokenism,
- Studies dependent on grants aligned to funders agendas rather than community priorities (Mathews, 2014:31-33).

The Public Service Commission (PSC) Report on the Assessment of Public Participation Practices in the Public Service (2008:viii) lists key challenges raised by

the surveyed South African governments departments in their application of public participation practices as:

- Budgetary constraints in 80% of departments,
- Lack of feedback-report on issues raised by citizens,
- Inadequate human resources
- Poor institutional arrangements such as weak ward committees and local government,
- Poor planning,
- Translation of documents into different languages, and
- Political dynamics where political parties always fight for influence.

The World Bank discussion paper Participation in Practice (1996) identified the following key barriers to effective public participation in planning:

- Lack of government commitment to adopting a participatory approach: Public participation is often seen as a time consuming process,
- Unwillingness of the project officials to give up control over project activities and directions: Officials are often not receptive and do not acknowledge the importance of citizens' views. This is because officials consider themselves experts in their field.
- Lack of incentives and skills among project staff to encourage them to adopt a participatory approach: Public participation requires a set of skills amongst officials to be able to interact with diverse communities and understand dynamics of the society. Without incentives, officials do not go an extra-mile to involve the public. Lack of community engagement skills also compromises effective public participation.
- Limited capacity of local-level participation and insufficient investment in community capacity building: Community members require information about available platforms for participation. They need to be capacitated on how to get involved in matters that affect their lives so that they appreciate the importance thereof and make a meaningful contribution.
- Participation starting too late: Often communities are not involved at the beginning of programmes or projects, they are only brought on board when development initiatives have not succeeded in order to manage the crisis and rectify the processes.
- Mistrust between government and communities: lack of transparency and openness often disrupts public participation. Due to past experiences, certain communities have lost trust in government departments (Rietbergen-McCracken, 1996)

These challenges to participation offer insight into the complexities of public participation and social engagement and the need for government channels and policies to be responsive, rather than prescriptive in their design.

3.7 Summary

The public's participation is often controlled by government, who determines when, how and to what degree participation takes place. IF Cape Town is to become a truly productive, inclusive, sustainable and well governed city, as outlined by the SACN, then residents capacity to participate and determine what their participation is centred around is imperative.

Channels and policies regarding citizen ideas, around which government participates should be interrogated further.

Currently, most government policy frames participation as something to engage with when a decision needs to be made, or a service needs improving. It does not promote citizen ideas or framing of issues. Key to improving citizen engagement around important issues is the shift from government-determined public participation to public sector-civil society collaboration, where ideas and decisions move between the two.

CHAPTER FOUR
COLLABORATION IN DESIGN: A CONCEPTUAL FRAMEWORK

4.0 Introduction

This chapter explores participatory and collaborative models of both development and design. It explores related concepts, methodologies and processes of both development studies and participatory design and collates the two themes as Design for Development (DfD). Both development and design when framed as ideas/concepts lack definition and mean different things to different people, as unpacked in Chapter 3 (Table 3.2). This research presents development and design as complex, multidimensional, integrated and people-centred, essentially framing them both and specifically, DfD, as intersecting systems of object driven, tool-mediated group activities.

Both development and design theory and practice have evolved over time into more human-centric approaches. Development theory has seen the shift from post World War II modernisation theory (the essence of which was that 'less-developed' or "third-world" countries should follow the path of 'developed' countries) to a more humanist paradigm, placing people at the centre of development (Davids, Theron & Maphunye, 2005). These more human-centred approaches focus on people's needs and aspirations, acknowledge latent creativity and indigenous knowledge systems, and are adapted to unique contextual requirements. In the transition from applying predetermined, western ideas of what development is, to people-centric development, four key questions arise:

- Development - from what?
- Development - by whom?
- Development - from whom? and,
- Development - in what way? (Theron & Barnard. 1997:37; Coetzee, 1989:100 in Davids, Theron and Maphunye 2005:104).

These move development practices from a somewhat deterministic approach regarding socio-economic improvement, to a more stochastic model, in which complexity and uncertainty are acknowledged, and indeed embraced.

Design has seen a similar paradigm shift, moving from a 'technology push' approach to that of a 'people pull.' Norman (2007:168), using the motto of the 1933 Chicago World Fair "Science finds, Industry applies, Man conforms" reframes design practice as more people-centred in which "People propose, Science studies [and] Technology conforms."

Makhetha (2004:145) states that we need to find ways of holding in dynamic tension "the imperative of sound technological knowledge and an openness to trust ordinary

people's creativity to find appropriate solutions for themselves." This thinking is at the heart of Design for Development.

Drawing on Makhetha (2004), Korten (1990) and based in PD principles, adopting a people-centred approach to DfD we must focus on three key areas of those affected by such development, these being their aspirations, their creativity and their rights (Figure 4.1). To transform individuals, institutions and societies we need to move away from purely technical knowledge and linear processes, so common in development, to more interpretive and iterative approaches.

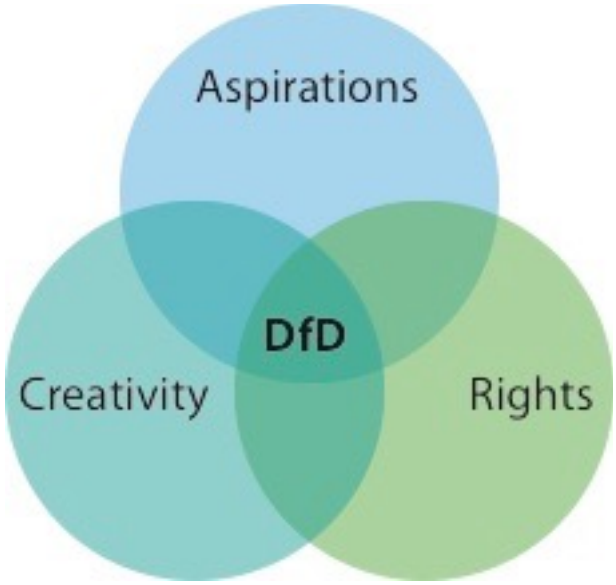


Figure 4.1: People-centred design for development lens (Authors construct)

4.1 Participatory Development and Related Concepts

This subsection explores participatory development, its strategies and related concepts, with the aim of understanding human-centred change and identifying opportunities for design in development processes. Korten (1990:70) describes a humanist approach to development as "a process by which the members of a society increase their personal and institutional capacities to mobilise and manage resources to produce sustainable and justly distributed improvements in their quality of life, consistent with their own aspirations." Campbell & Vainio-Mattila (2003:420) state that although there is no one definition of participatory development, the concept can be understood by its two key concepts, the 'actor' and the meaning of 'participation.' They go on to write that the varied use of concepts to define the actors of participation, such as people-centred, community, humanist, self-driven etc. reflect a variety of sociological and political epistemologies. The common factor though, is the shift from a passive voice to an active voice in development (Campbell and Vainio-Mattila, 2003:420). Oakley (1991:7-8), Kumar (2002:25), Campbell and Vaino-Mattila (2003:420) all speak

of a fundamental paradigm shift in the move to participatory forms of development, that is, the reframing of participation as a means to participation as an end (see Table 3.1).

This shift from a passive to an active approach to civic participation in development grew out of the realisation by development theorists and practitioners that development cannot be studied or brought about by only focussing on theories and micro-strategies, at its heart are people (Davids, Theron and Maphunye, 2005:17). By the late 1980's certain development theorists and practitioners were shifting from the macro-theories of Modernisation and Dependency to a more contextually responsive micro-approach, with people and community the main focus. The prescriptive and oversimplified macro-theories had been the main competing paradigms of development up until this point (Figure 4.2), but neither had been particularly successful. This paradigm shift to smaller, more localised approaches aims to actively involve people in their own development, giving citizens control over how their society evolves.

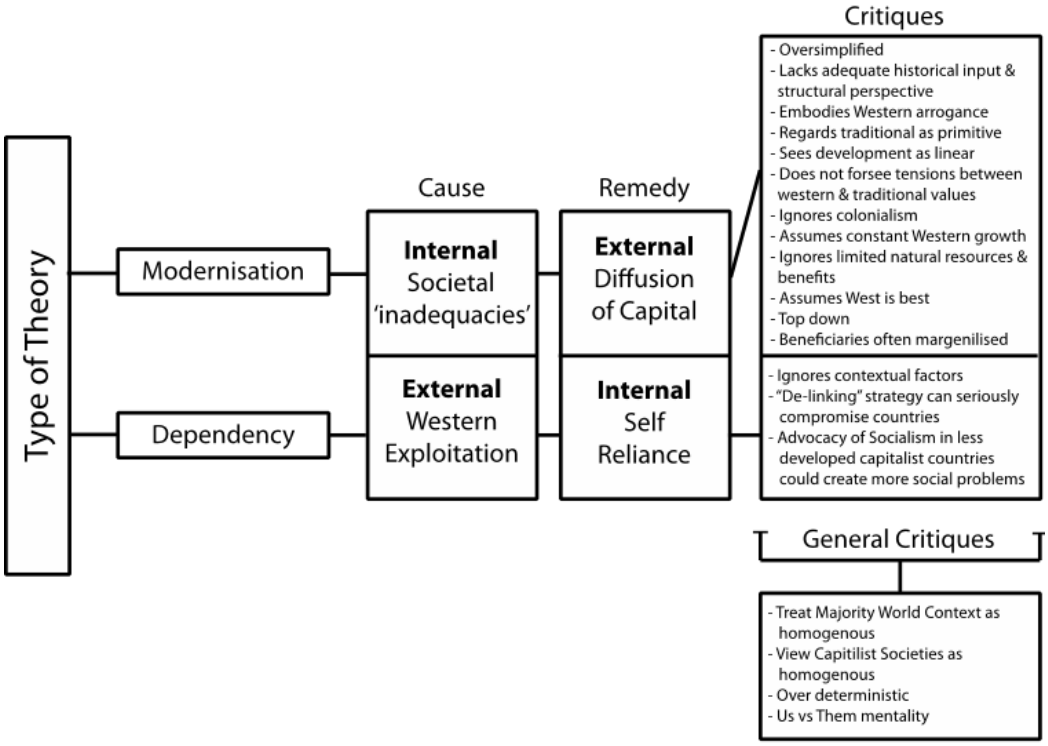


Figure 4.2: Differences and Critiques of Modernisation and Dependency Theories (adapted from Davids, Theron & Maphunye (2005:17) (Websters, 1984:62-63; Joshi. 2015; Mack and Leaver, 1979:258; Matunhu, 2011:72)

As designers and development practitioners have shifted from generalist approaches to more people-centred ones, their need to navigate complexity has increased. No longer can a purely scientific-rational, deterministic approach be applied to problem solving socio-economic issues, as multiple voices and differing perspectives of stakeholders cloud problem definition. Problems or Issues of complexity in social policy and development planning that have contradictory, incomplete or changing

requirements have been termed ‘Wicked Problems’ (Rittel & Webber, 1973). These problems differ to ‘tame problems’ in a number of ways (Table 4.1) and are defined as having the following characteristics:

- There is no definitive formulation of a wicked problem.
- Wicked problems have no stopping rule.
- Solutions to wicked problems are not true or false, but good or bad.
- There is no immediate and no ultimate test of a solution to a wicked problem.
- Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial and error, every attempt counts significantly.
- Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
- Every wicked problem is essentially unique.
- Every wicked problem can be considered to be a symptom of another problem.
- The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
- The social planner has no right to be wrong (i.e., planners are liable for the consequences of the actions they generate) (Rittel & Webber, 1973).

Indeed, sustainable development itself is a wicked problem, requiring the capability of different actors and groups to communicate, negotiate and reach collective decisions (Pahl-Wostl 2002; Schusler et al 2003; Woodhill 2004 as cited in Muro & Jeffrey, 2006). These groups of people that form through and around issues, Dewey (1927) termed *publics*. For Dewey (ibid), “Those indirectly and seriously affected for good or for evil form a group distinctive enough to require recognition and a name. The name selected is ‘The Public’.”
DiSalvo (2009:50) notes, on the pluralism of Deweyan publics, that they are not exclusive to a particular class or social milieu.

Within publics we therefore see multiple actors coalescing around collective issues or problems. As DiSalvo (2009:51) notes, the challenge of public action arises from the inability of a public to form, that is “before a public acts it must come into being.” Wicked problems, lacking definition but having major impact on multiple actors in multiple and differing ways, can inhibit this formation of publics. This inability of a public to form is therefore not due to a lack of issues, but rather “because the issues resist identification and articulation” (ibid).

Table 4.1: Tame Problems vs Wicked Problems (adapted from Ramalingam, 2014)

Characteristic	Tame Problem	Wicked Problem
Problem Formulation	The problem can be clearly defined, and stated as a gap between what is and what ought to be. There is easy agreement about the problem definition.	The problem is difficult to define and many possible explanations may exist. Individuals perceive the issue differently. Depending on the viewpoints, the solution takes on a different form. Broad disagreement.
Testability	Potential solutions can be tested as either correct or false.	There is no single set of criteria for whether solutions are right or wrong; they can only be more or less acceptable relative to each other.
Finality	Problems have a clear solution and end point.	There is always room for more improvement and potential consequences may continue indefinitely. Solving one aspect might affect others.
Level of Analysis	It is possible to bound the problem and identify its root cause. There is no need to argue about the level at which to intervene; the parts can be easily separated from the whole.	Every problem can be considered a symptom of another problem. There is no identifiable root cause and it is not possible to be sure of the appropriate level at which to intervene; one cannot easily separate parts from the whole.
Replicability	The problem may repeat itself many times; applying formulaic responses can produce predictable results	Every problem is essentially unique; formulae are of limited value. The same problem in different contexts can have different symptoms and effects.
Reproducibility	Solutions can be trialled and excluded until the correct solution is found.	Each problem is a one-shot operation. Once a solution is attempted, you cannot undo what you have already done.

Rittel and Webber acknowledged that "in a pluralistic society there is nothing like the indisputable public good; there is no objective definition of equity; policies that respond to social problems cannot be meaningfully correct or false; and it makes no sense to talk about 'optimal solutions' to social problems unless severe qualifications are imposed first" (1973:1). These changing, contextual concepts of public good, equity, meaning-making and design of optimal solutions present development practitioners and designers with amorphic challenges to development. Roberts (2000) presents three strategies often used in dealing with wicked problems. These are based on levels of conflict in the problem solving process, the distribution of power and division of labour among stakeholders, and the degree to which power is contested. They are:

- *Authoritative*

These are ‘taming’ strategies in which problem solving is transferred by all stakeholders to a few key stakeholders. These key stakeholders are identified by the larger group as having the required knowledge and expertise, organisational or social position, key information or coercive power.

- Benefits - Reducing the number of stakeholders decreases complexity and can reduce time spent on problem solving
- Disadvantages – ‘Authorities’ and ‘experts’ can be wrong about problem definition and therefore the solution; experts tend to identify solutions based in their field. There is a lost opportunity of collaborative learning and idea transfer, whereas a democracy depends on an informed citizenry.

- *Competitive*

  Assumes a ‘zero-sum game’, where the right to define the problem is won or lost, thus moving from competitive to authoritative strategies.

  - Benefits – Competition generates novel solutions and circulating power among competitors means it cannot be centralised.
  - Disadvantages – Can provoke argument and uses resources better used for problem solving. Stalemates or gridlocks can occur when one party has enough power to block another, but not the means to resolve the issue.

- *Collaborative*

  Working together can accomplish more than working as as individual. It assumes a win-win view of problem solving as opposed to the zero-sum approach in competition.

  - Benefits – Shared costs and benefits, encourages social learning through sharing of knowledge
  - Disadvantages – Can be slower as consensus meeting can be difficult with multiple stakeholders, can result in stalemates (Roberts, 2000).

Conklin (2006) went on to generalise and reframe the characteristics of Wicked Problems into 6 key characteristics. If we compare these 6 defining characteristics with Roberts’ (2000) three generic coping strategies, we see a clear case for exploring strategies that can facilitate collaboration. Although collaboration has its inherent difficulties, the outcomes from co-creation processes can far outweigh those of competitive and authoritative approaches, not least, social learning, an empowered society and solutions representative of the multiple voices.

Table 4.2: Wicked Problems drawing on Conklin (2006) & Roberts (2000)

	Authoritative	Competitive	Collaborative

The problem is not understood until after the formulation of a solution	Perceived 'experts' frame problem from their point of view	Opposing views of problem should not be in competition as they present experiences of those involved and both could be relevant	A jointly defined focus allows all for all points of view to be considered and facilitates social learning
Wicked problems have no stopping rule.	Single party decides problem is solved when their needs are met, ignoring other participant needs	Group with most immediate needs could leave project when their needs are met, resulting in fragmented group continuing without key input.	Participation as a means results in collectively solving problems that arise
Solutions to wicked problems are not right or wrong, but good or bad.	Authority decides what is good, singular focus undermines complexity	Competition between viewpoints could result in single 'good' being designed when problem requires multiple 'goods'	All 'goods' tackled resulting in 'win-win' solutions
Every wicked problem is essentially novel and unique	Authorities or 'experts' tend to solve problems in their field, reducing opportunities for novel solutions	Competition could reduce collaborative understanding, resulting in simplified view of problem	Collaborative problem identification and solving allows for interdisciplinary, often novel solutions
Every solution to a wicked problem is a "one-shot operation"	Authorities often apply 'best practice' approach instead of 'best fit', however solutions are not universal	Competition can provide novel solutions to phases of problem solving	Collectively solving problems long term results in each solution being beneficial to all parties
Wicked problems have no given alternative solutions	Authoritative approach narrows solution options	Competition might be so strong that a solution is proposed when none is relevant	Collective framing of the problem increases solution options

Mathews (2014:60) states that often, even the most powerful agencies and knowledgeable professionals require citizen-produced goods to tackle their wicked problems. A characteristic of wicked problems, Mathews (2015:61), goes on to write is that the citizenry has to respond. This is because citizens have resources and knowledge different to that of institutions. Collaboration between civil society and the public sector is thus essential in combatting wicked problems.

South Africa has a very segregated history, most notably due to the National Party's policy of 'separate development' implemented during apartheid. This policy divided the population across four racial groups, creating a hierarchy of social and political positions. African, coloured and Indian South Africans suffered innumerable human costs under the separate development policy, most notably racial hatred, inadequate basic services and the separation of families brought about by the Native Land Act (1913), the Asiatic Land Tenure Act (1946), the Group Areas Act (1950 and 1966), and

the Rural Coloured Areas Act (1963) (Davids, Theron & Maphunye, 2005:18). This distorted view of progress by the old South African government impacts on how some South Africans frame the term 'development.' The fall of apartheid in 1994 saw a shift from this highly authoritarian, biased, top-down implementation of 'development' to the redefined *integrated, people-centred development* as proposed by today's government. This holistic approach to development is participatory in nature and is characterised by integrative decision-making between the public, private and voluntary sectors, and the intended beneficiaries of development, the people (Davids, Theron & Maphunye, 2005:19).

Davids, Theron and Maphunye (2005:20-23) propose three building blocks of people-centred development in South Africa, they are Social Learning, Empowerment and Sustainability. South Africa however is in a state of constant flux and disequilibrium. Change is a constant. Impacted by global events, such as the global financial market crash emerging from 2008 and changed from within, for example, by policies, elections and new governmental strategic goals such as the proposed shift in the Western Cape to a green economy. It is in this context that I propose a new set of building blocks, grounded on the above-mentioned. These are Social Learning, Emancipation and Resilience (Figure 4.3), expanded on later in this chapter.

Figure 4.3: Building Blocks of People-Centred Development in South Africa (adapted from Davids, Theron and Maphunye (2005)

Schadewitz (2009) suggests a framework (Figure 4.4) to support collaborative learning and design processes for contextual design innovations. This framework also focuses on the early phases of the design process and explores how local cultural contexts and multicultural team composition influence collaborative design and learning processes. Schadewitz's findings offer initial areas for exploration in the study of participatory design projects, these include intercultural awareness, contextual and multi-modal

communication, experiencing content through hands-on activities and lo-fi prototyping in context (Schadewitz, 2009:243).

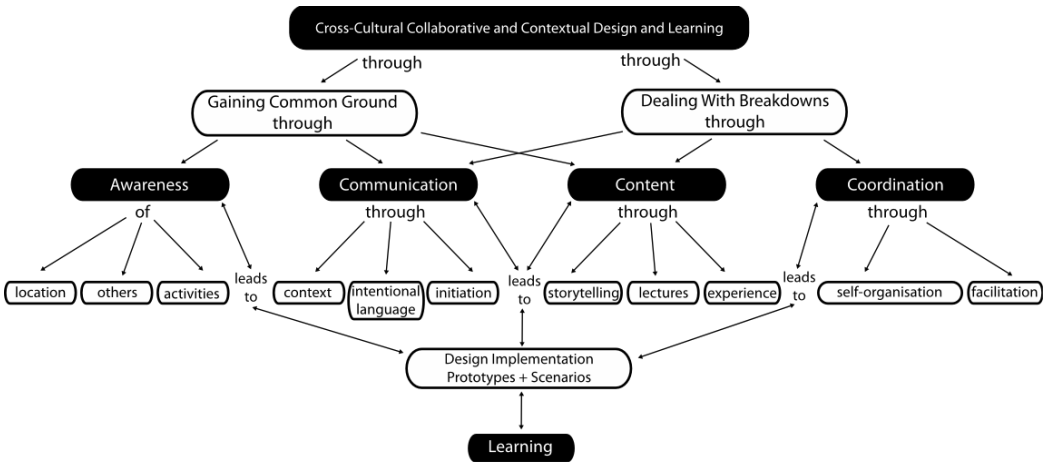


Figure 4.4 Framework to support Collaborative Learning (adapted from Schadewitz, 2009)

Korten (1980:502) discusses the need for action-based capacity building, and how public participation in projects should lead to increased social capacity beyond the project. He calls for increased competences in building capacities for action through action. Korten defines what he terms a Learning Process Approach to community development. This three-stage approach to programme/project development places emphasis on a succession of phased learning tasks. These are, stage 1 learning to be effective, stage 2 learning to be efficient, and stage 3 learning to expand (ibid). He states “Neither researcher, administrator, nor villager is likely to achieve his or her potential for contribution to development until they join as partners in a mutual learning process, committed not to the search for magical blueprints, but to the building of new capacities for action” (ibid).

DfD projects have at their heart collaborative learning, and often have a binding ‘concept’ or theme (object) directing the actions, activities and learning of the participants. Participants, coming from varied backgrounds, can however understand this concept differently, their personal meaning of it being influenced by their previous experiences. This can give rise to misunderstandings and tensions, but can also enrich the concept through a shared, co-constructed understanding. Blunden (2010:256) states that because collaborative projects are made up of multiple (personal) concepts, differences and contradictions can arise, these however are coherent and belong to the greater concept, a living concept. The concept that drives participants activities, or in Activity Theory terms, the object, cannot be given beforehand, but unfolds and becomes concrete through interactions (Kuutti, 2009:76). Collaboration in projects is active, initially around developing a cohesive understanding of the main concept, a shared vision and jointly negotiated outcomes.

In her book, Creative Collaboration (2000), Vera John-Steiner describes collaborative endeavours as 'dynamic, changing processes'. She then goes on to describe four patterns of collaboration, distinguished by the roles of the collaborators/participants, the extent that values are shared, and working methods. These are, (a) distributed collaboration, (b) complementary collaboration, (c) family collaboration, and (d) integrative collaboration. Participants may move between these typologies as a project progresses (John-Steiner, 2000:199). She notes that integrative collaboration, where the division of labour roles change and adapt to the project needs, is the model most associated with innovation. This is something to keep in mind when exploring PD activity through AT.

4.1.1 Knowledge Production in Design for Development

This section elaborates on the building blocks of people-centred development (Figure 4.1), and explores learning theories pertinent to knowledge production in collaborative DfD projects; presents an introduction to Activity Theory (AT); an exploration of emancipation; and finally, an exploration of the qualities of resilient communities.

4.1.1.1 Socially Situated Learning

Social Learning, draws from both transformative and communicative learning (Van der Veen, 2000) and experiential learning (Kolb, 1984) and can broadly be defined as "learning how to use oneself and one's environment to better meet one's needs and those around of others" (Davids, Theron & Maphunye, 2005:20). Van der Veen (2000 as cited in Muro and Jeffrey, 2006) believes that through social learning people construct inter-subjective understandings of a situation with others, which is especially relevant in the context of wicked problems "where there is no clear knowledge, or perhaps there is conflicting knowledge, available about the situation or the best solution". Reed et al (2010) expand on the individual focus and state that for a process to embody social learning it must:

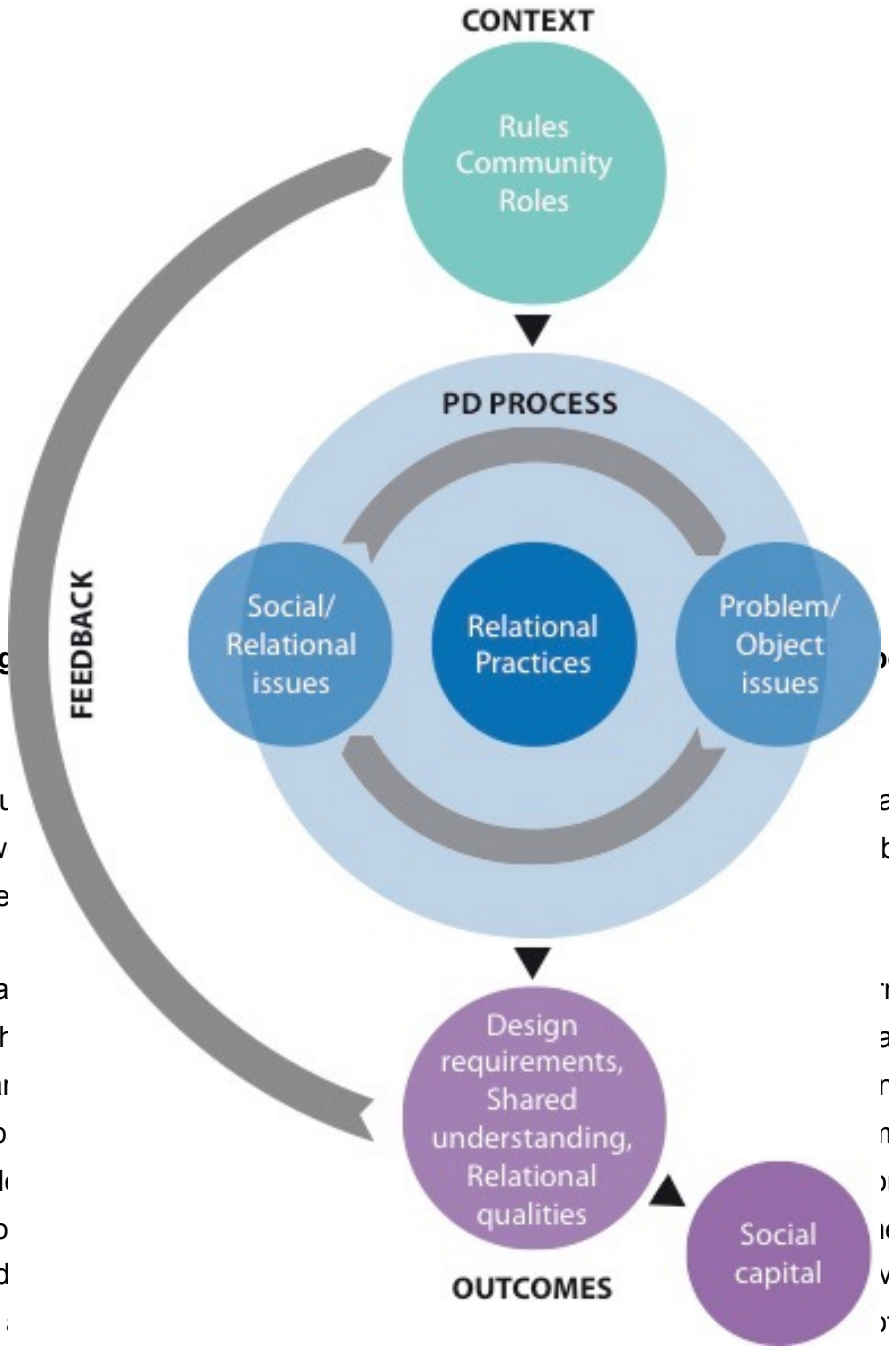
- Demonstrate that a change in understanding has taken place in the individuals involved,
- Demonstrate that this change goes beyond the individual and becomes situated within wider social units or communities of practice, and that
- It occurs through social interactions and processes between actors within a social network.

In participatory development, social learning emerges through the inclusion of multiple stakeholders with differing knowledge and experiences, and involves the unpacking and integration of different and often contrasting participant viewpoints (Mostert et al., 2007). When tackling a complex problem these multiple view points synthesise into

shared understanding and can contribute to empowerment and eventually emancipation.

Pahl-Wostl et al (2007) present a conceptual framework for analysing multi-party collaboration in a specific context that leads to specific outcomes, and that captures the essential practices of multi-level social learning. Writing from a resources management perspective their focus is on how synergies between the natural environment and various technologies are understood and developed by a multi-party, collaborative group resulting in specific technical requirements and building social capital. Figure 4.5 presents an adapted model using participatory design as the lens. It presents the process of social learning as a collective activity driven by contextual needs. The iterative nature of the model also frames participation as an end, with the long term goal being the development of social capital and ongoing civic momentum.

The context of social learning in participatory design is made up of rules and regulations rooted in formal (legal and institutional) and informal (traditional systems/ customs) institutions; the community as place/relationships/collective political power, and; roles and the division of labour within the community. The PD process component forms the core of social learning and provides the platform for sharing of knowledge, framing/reframing objectives and developing relationships. The integration of social and contextual issues is facilitated by relational practices, such as object-oriented reciprocal and reflexive actions (Bouwen and Tallieu, 2004 cited in Pahl-Wostl et al., 2007).



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and skills, and the core component of collaboration, trust.

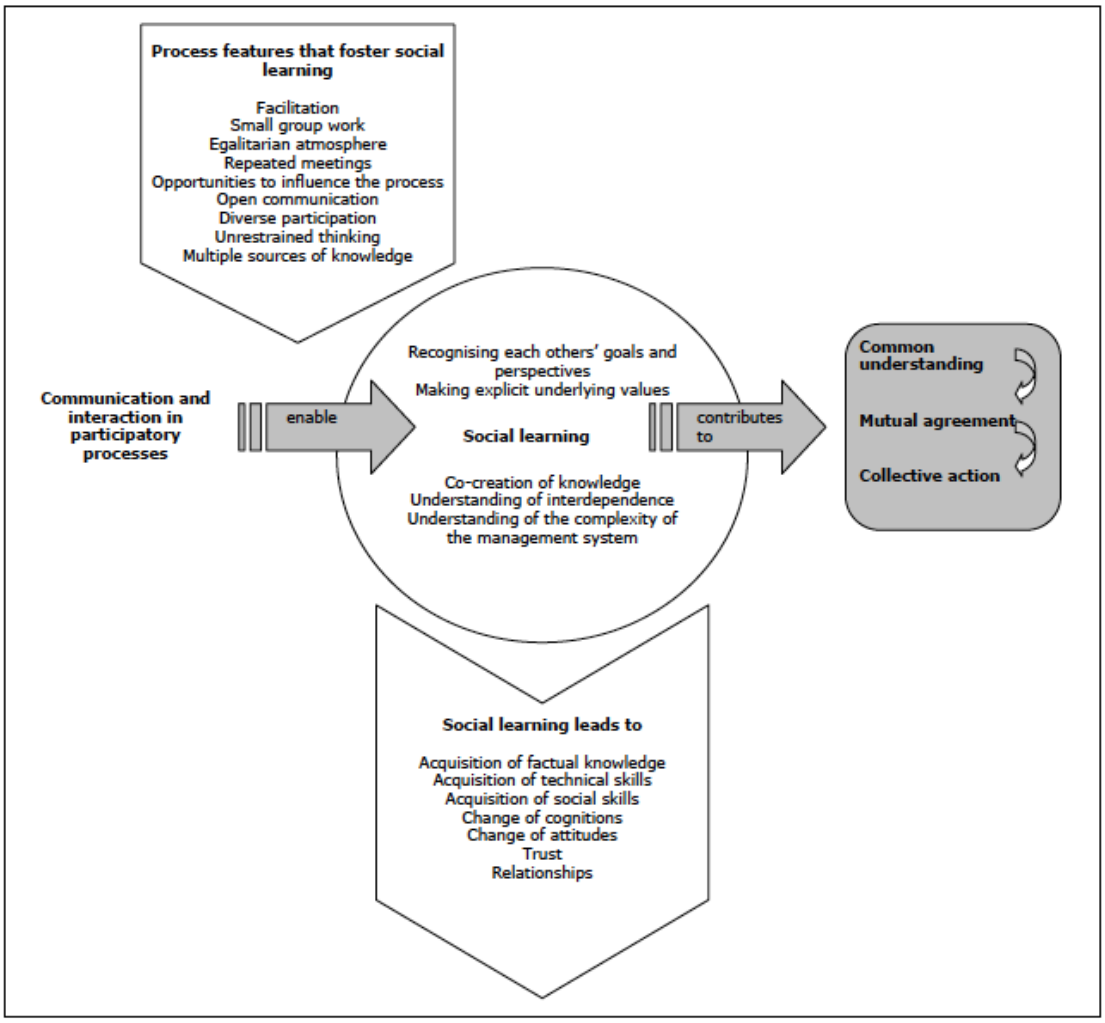


Figure 4.6: Compound model of social learning (Muro and Jeffrey, 2006)

Because social learning is most useful when there are multiple viewpoints and different perspectives on a mutual issue, it is important to get "the whole system in the room" (Roberts, 2000). This can often be difficult as although people might be concerned, there are a number of factors that can keep them from full participation. Mathews (2014) states three general components that influence a person's participation in voluntary initiatives, these are:

- Their perception of the context,
- Their social relations within the context, and
- Their perceived control and empowerment within the community.

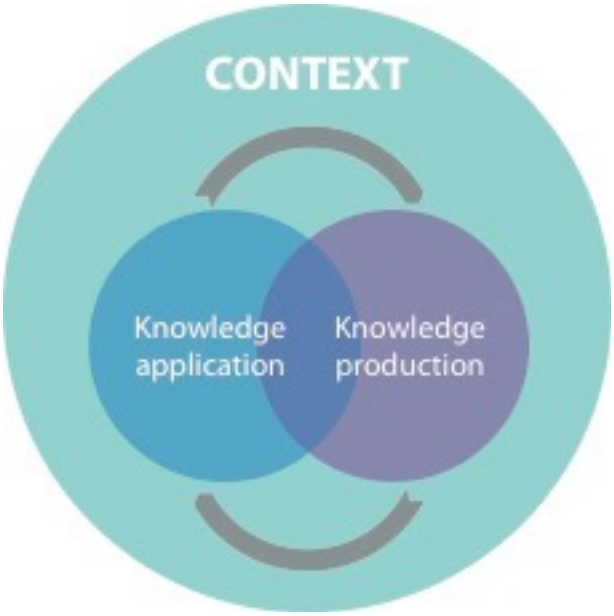
These however, primarily speak to an insiders perspective and willingness to participate, it is important to also note 'outsiders' reasons or motives for participation in collaborative projects. Although individuals might have their own preconceived agendas, and although these might need to be addressed to retain their participation, the crucial point of social learning in a collaborative setting is when "the group transforms from a collection of individuals pursuing private interests, to a 'community'

which defines a common purpose and is oriented toward shared interests" (Webler et al, 1995 as cited in Muro and Jeffrey, 2006). Here we see a community as a place or series of relationships progress to a community as a collective political power. As individuals become a community rallied toward mutual interests they become a community of inquiry (CoI), recognising knowledge as embedded within the social context, which requires agreement and consensus among those involved in the process of inquiry. It is through this collective understanding that legitimacy is reached.

Arising out of this community of inquiry is a community of practice (CoP). Although in early definitions a CoP was defined a group of people who share a craft or profession (Lave & Wenger, 1991) Wenger (1998) later went on to embrace the notion of duality in CoP's, of which he identified four, participation-reification, designed-emergent, identification-negotiability and local-global, and describes CoP's as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, n.d). Here we see a shift in focus from a shared profession to a shared objective. Wenger (1998), in his description of a CoP structure, states three interrelated components:

- *Mutual Engagement*: the formation of collaborative relationships between community members through participation. A social entity, in this case a CoP is as strong as its relationships.
- *Joint Enterprise*: the creation of a shared understanding created through interaction. Continually (re)negotiated by its members, the joint enterprise is sometimes referred to as the 'domain' of the community and contributes to the its resilience.
- *Shared Repertoire*: the production of shared resources through collaborative practices, which includes both symbolic and literal meanings. This collaborative meaning-making contributes to the groups object formation, i.e. the goal/s that orient the groups activity (Wenger, 1998; Kaptelinin, Kuutti & Bannon, 1995:191).

Mutual engagement, joint enterprise and a shared repertoire can contribute to a CoP supporting situated learning, when said CoP is based in a specific social and physical environment, what Schön (1983) refers to as a "conversation with the situation." Here we see the interplay between knowledge production and knowledge application directly linked to the context (Figure 4.7). This ongoing contextual learning can contribute to a community's resilience. Hung (2002) states that learning starts with trying to solve a problem. If the problem/s are framed collectively, one should see a collaborative approach to problem solving, and shared outcomes that benefit all.



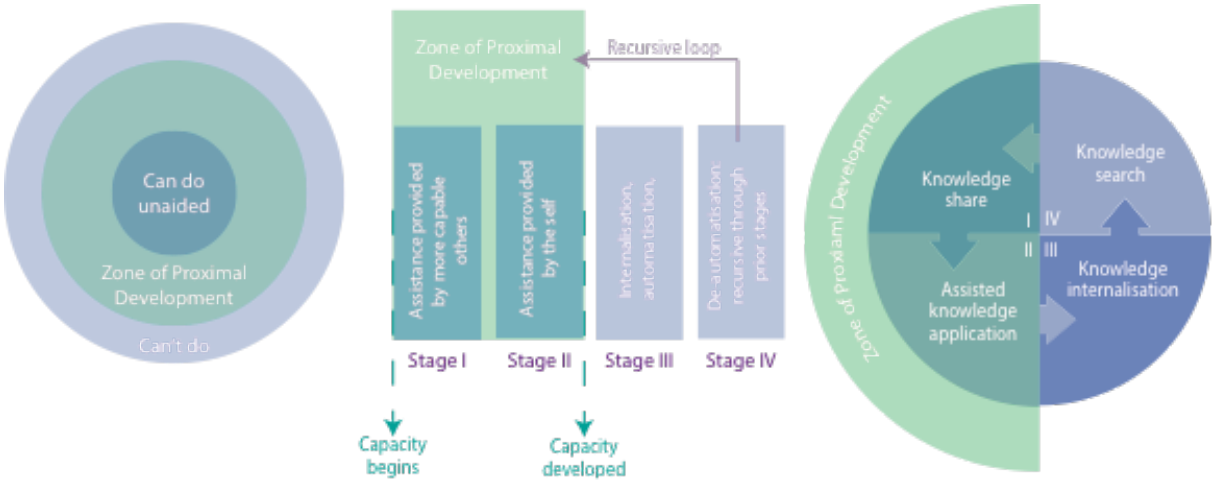
4.1.1.2 Zone of Proximal Development

To paraphrase Vygotsky's (1987:211) analysis of development amongst children, *what a person can do in collaboration today, they can do independently tomorrow.* This viewpoint relates to what Vygotsky calls the zone of proximal development (ZPD) (1978) which is based on the premise that effective learning is situated in activity, context, and culture as a collaboration in a community of practice (Marsh & Ketterer, 2005). Vygotsky defines the ZPD as the space between what one can do independently, and what one can potentially do (Figure 4.8a) it is the "distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978:86). He goes on to state that "the actual developmental level characterises mental development retrospectively, while the zone of proximal development characterises mental development prospectively (Vygotsky, 1978:87). The ZPD was developed to understand development in children and embraces the concept of 'scaffolding,' that is "support provided by a teacher/parent, peer, or a computer- or paper-based tool that allows students to meaningfully participate in, and gain skill in a task they would be unable to complete unaided" (Belland, 2014: 505). As ZPD emerges out of child development studies it has a hierarchical, asymmetrical approach to knowledge production, that is teacher as knowledge provider and student as knowledge receiver. Gallimore and Tharp (1990:185) modelled ZPD as a four stage iterative process, aligned more to lifelong learning (Figure 4.8b). In this model, the four stages encompass capacity building of an individual, with the final stage feeding back into the process, providing the knowledge learned during the previous iteration as the starting point for the next iteration. The stages are as follows:

- *Stage I*: Here a learner has some knowledge on which to build. They can demonstrate the basic requirements appropriate to their study, but rely on others, such as instructors and capable peers, in order to perform the task.

- *Stage II*: During this stage, learners use recently garnered knowledge to perform tasks, without guidance. The ZPD encompasses both Stages I & II. During Stage II learners are not at perfect proficiency and might require further assistance.
- *Stage III*: This phase represents the internalisation of knowledge and marks the stage of independence. Here the student does not require help from peers or instructors.
- *Stage IV*: During this stage learners are at the de-automatisation of performance that leads to the process of repeating a function, each time applying it to the results of the previous stage through the ZPD (Gallimore & Tharp, 1990; Siyepu, 2013).

Lifelong learning by any individual is made up of the same regulated ZPD sequences, from other-assistance to self-assistance, recurring over and over again for the development of new capacities (Gallimore & Tharp, 1990).



Figures 4.8 a, b & c: Multiple Models of the Zone of Proximal Development (adapted from Vygotsky, 1978; Gallimore & Tharp, 1990)

In collaborative learning environments, such as participatory design groups, where participants have different knowledge, all of which contributes to a collective understanding of the issues at play, a more reciprocal, heterarchical approach to ZPD is required. In participatory processes the role of teacher/student is not constant, the title of expert, as it were, shifts depending on what information is required. Figure 4.8c presents a collaborative learning model of ZPD, drawing on Vygotsky's original model (1978), and Gallimore & Tharp's model of ZPD in lifelong learning (1990). The most important aspect of the ZPD is the emergence of a new form of collective consciousness, something that cannot be achieved if we act in solitary fashion (Roth & Radford, 2010).

Collaborative learning, understood in its broadest sense, is a situation or process in which *two or more people learn or attempt to learn something together* (Dillenbourg, 1999:1). Dillenbourg (1999:1-2) goes on to unpack these three key elements of collaborative learning as follows:

- *"two or more"* may be interpreted as a pair, a small group (3-5 subjects), a class (20-30 subjects), a community (a few hundreds or thousands of people), a society (several thousands or millions of people); and all intermediate levels.
- *"learn something"* may be interpreted as "follow a course", "study course material", "perform learning activities such as problem solving", "learn from lifelong work practice",
- *"together"* may be interpreted as different forms of interaction: face-to-face or computer mediated, synchronous or not, frequent in time or not, whether it is a truly joint effort or whether the labour is divided in a systematic way.

The collaborative learning model of ZPD (Figure 4.8c) draws from Dillenbourg (1999) and is an iterative model comprising of four phases. It is not meant to be prescriptive, but rather, used as an interpretive lens through which to view learning developments and problem solving in collaborative and participatory projects. The four phases progress as follows:

- Phase I – Knowledge Share: It is during this phase that members share their views, understandings, experiences and knowledge on the issue/s at hand. Here all participants are both student and teacher, learning from group members who have different insights, and teaching based on their personal knowledge. What emerges is a collective understanding of the issue/s at play.
- Phase II – Assisted Knowledge Application: Group members have absorbed the recently garnered information of their peers and apply it to their role in the group. As members progress in their roles, they might still require input from other group members. Emerging out of phase II is the collective object/s on which the collective will act.
- Phase III – Knowledge Internalisation: This phase usually encompasses action, acting upon the object/s generated in Phase II. Group members perform their roles, or aspects of, having taken into account key information from the rest of the group. This could include government representatives providing holistic feedback to their department, or designers modelling up collaboratively generated design options.
- Phase IV – Knowledge Search: Here group members collate their action outputs, findings and feedback and enter into a new phase of knowledge sharing, where input from group members contributes to further understandings and iterations. When re-entering Phase I, members now bring jointly produced tools and objectives that emerged from the previous iteration. It must be noted that at this point the group might opt to split into two or more groups based on findings and

project requirements, each of these groups then follow the four phases with possible further collaboration in Phases I and II. There is no limit to iterations, in fact civic momentum requires the continual co-development of issues and solutions.

Collaborative problem framing and solving can be seen as an example of double loop learning (Argyris: 2002) where the group doesn't merely advance towards externally established objectives, but rather jointly establishes new objectives based in the group's collective knowledge. Cartwright (2002:68) states that "double-loop learning is not only about changing the objective, but involves questioning the assumptions about that objective, the ways of discovering and inventing new alternatives, objectives, and perceptions, as well as ways of approaching problems". This form of inquiry based dialogue is what drives collaborative learning in PD.

4.1.1.3 Reflection

Inquiry in collaborative learning and problem solving involves reflection. Schön (1987:18) defines a reflective practicum as a practicum aimed at "helping … acquire the kinds of artistry essential to competence in the indeterminate zones of practice." A reflective practicum is essential to design practice, particularly collaborative design practices, which often deal with these complex problems or issues. DfD has become increasingly interdisciplinary and collaborative, as the practice has begun to tackle these increasingly messy, indeterminate problems. In PD, multiple participants are imperative in the thematic exploration and problem definition that happens at the beginning of the design process. Working within wicked problems, participants can define which issues are most prevalent and important to them, and although they can help focus the process, the issues at play are often still reasonably undefined and require further abductive thinking and sense-making approaches (Kolko, 2010). Schön (1987) emphasises the fact that problems of real-world practice do not present themselves as well-formed (obvious) structures, often not even as defined problems, but rather messy, indeterminate situations. When confronted by these indeterminate zones of practice, Schön describes our general knowing-in-action (tacit knowledge) responses as hindering problem solving - as novel problems cannot necessarily be solved with existing knowledge, that is, tacit knowledge alone. Instead, he proposes approaching uncertainty through reflection. This can be done in two ways. Schön (1987:26) states:

> *We may reflect on action, thinking back on what we have done in order to discover how our knowing-in-action may have contributed to an unexpected outcome…[where] our reflection has no direct connection to present action. [Or]…we may reflect in the midst of action without interrupting it…[where] our thinking serves to reshape what we are doing while we are doing it…reflection-in-action*.

Mezirow (1990:7) also writes about reflection as either happening during an activity or after the fact, both with different purposes. He states that “Ex post facto reflection, which looks back on prior learning, may focus on assumptions about the content of the problem, the process or procedures followed in problem solving, or the presupposition on the basis of which the problem ha[d] been posed” (1990:6). This ex post facto reflection can influence what he calls “thoughtful action” which is similar to Schön’s idea of reflection-in-action. Mezirow (1990:7) writes that both “thoughtful action” and “ex post facto reflection” lead to Reflective Action, defined as “action predicated on a critical assessment of assumptions.”

Reflection is however not, by definition, critical. Adapting Brookfield’s (1995:8) definition of critical reflection to the field of DfD, can facilitate the uncovering of paradigmatic and structuring assumptions in collaborative design. In collaborative design practice, we can thus say that reflection becomes critical when it has the following two distinctive purposes:

1. To understand how considerations of power and the division of labour undergird, frame and distort design processes and interactions of participants, and
2. To question assumptions and practices that are perceived to simplify the design process but actually work against participants long term interests (adapted from Brookfield, 1995). These “contradictions” indicate a misalignment within elements, between them, between them, between different activities, or between different development stages of a same activity (Kuutti, 2009:78).

Mezirow’s definition of critical reflection can be compared to that of design thinking in that it is about reframing problems and improving approaches through iteration. He states that “We become critically reflective by challenging the established definition of a problem being addressed, perhaps by finding a new metaphor that reorients problem solving efforts in a more effective way” (1990:12).

Welsh & Dehler (2013) believe that becoming critically reflective is central to success in multidisciplinary environments. They reiterate Schön’s idea of knowing-in-action as inadequate in solving complex problems and write that critical reflection can draw attention to the difference between doing something because “that’s what we do” to doing something because it is necessary and possible in the situation (Welsh & Dehler, 2013:24). This relates to object(ives) in design practice as being justified outcomes and new forms of knowledge generated through the exploration of contradictions of present practice. Welsh and Dehler go on to build on Raelin’s (2001:16) concept of “deep scrutiny” stating that critical reflection can facilitate “the [co]development of shared meaning and establishment of foundations necessary for the productive dialogue connecting disparate ideas, methods and interests…” (Welsh and Dehler, 2013:24).

The idea of critical reflection carries through to critical collaboration, collaboration often being interdisciplinary, with specialists drawing from different theoretical concepts. Co-design often involves multiple stakeholders, usually from quite different backgrounds. It becomes increasingly important to find a common theory that facilitates collaboration within and between these heterogeneous groups. Blunden (2010:170) draws from Davydov (2008) and states that 'activity' could provide a common theoretical foundation across disciplines, facilitating critical appropriation of insights from other disciplines and providing overlapping, conceptual tools for all stakeholders to use.

4.1.2 Emancipation

Emancipation embodies a shift from empowerment within an existing system to citizen liberation through the participatory design of new systems. This puts the power in the hands of those affected by the system, it shifts from not only the delivery of goods to citizens, but to citizen production. As Mathews (2014:54) notes, a democratic public has to be able to act, producing things that benefit all. Dahlgren (2006:27) states that over time "practices become traditions, and experience becomes collective memory; today's democracy needs to be able to refer to a past, without being locked in it." The development of skills through practices is essential for mobilising passion and engagement, which in turn fosters a sense of empowerment for civic agency. Dahlgren (ibid) goes on to stress the importance of developing practices that can grow into tradition. In order for communities to become empowered and shift themselves beyond certain top-down systems and processes they need to build capacity from within, this requires collective decision making and deliberation.

Collective decision-making offers two clear advantages over acting as an individual, these are synergy and sharing of information (Boundless, 2015). Synergy arises out of discussion, collaboration and questioning, and in turn gives rise to more complete and robust solutions. Sharing of information takes into consideration the broad scope of contributions by community members and can increase understanding, clarify issues and facilitate momentum toward civic empowerment.

Reaching collective decisions and agreement in complex communities poses its own set of issues. Externally, institutional and professional hesitation toward public involvement arises from worries that citizens won't make thoughtful decisions (Mathews, 2014:71). Another concern is that decisions will be based purely on emotions. One avenue to counter these concerns is the provision of information to citizens, yet informed decisions require more than facts alone (ibid).

Mathews (2014) refers to deliberation, that is, public deliberation as one avenue in which the public can exercise collective judgement and consensus making.

Deliberative dialogues deal with uncertainty, disagreement and trade-offs, and are useful for framing the problems-behind-the-problems, fundamental and systemic problems that contribute to more obvious ones (Mathews, 2014:xvii), framed earlier as wicked problems. Mouffe (2000) however, posits that "deliberative democrats tend to

erase the tension that exist between liberalism and democracy and they are therefore unable to come to terms with the conflictual nature of democratic politics." She argues that a "model of democracy in terms of 'agonistic pluralism' can help us to better envisage the main challenge facing democratic politics today" (ibid). CbPD draws on this agonistic pluralism as its analytical frame of reference and shifts from design politics for democracy at work, which epitomised early Scandinavian PD practices, to "democratisation as political design in an agonistic public framework" (Björgvinnson, Ehn and Hillgren, 2012b:129). This shift acknowledges and embraces difference amongst actors in a system, seeing tensions as points of departure. Ehn (2008:99) notes how democracy and skill, when embraced as guiding values for CbPD can lead to the support of legitimate participation, and opportunities for citizens to express and communicate "tacit knowledge" and "aesthetic experience". Drawing on Barry (2001), Ehn states that design as 'democratic innovation' can 'open up' questions and possibilities around socio-technical transformations. These questions and possibilities can contribute to new knowledge and new ways of doing and being.

The development of new knowledge happens best in a group, when a community identifies and critically reflects on an issue, learning from one another and collectively formalising actions (Du Preez, Barnes & Futerman, 2014). Issue formation and alignment around the issue contributes to the emergence of publics.

Marshall Ganz (2011:282) states three necessary narratives as imperative in bringing people together to work on issues of common concern, these are: the story of *self* (individual viewpoints and narratives), the story of *us* (shared perspectives of the group), and the story of *now* (issues and choices the group must make to move forward). These narratives help define the personal and collective narratives of a public, as well as the object or concern that aligns those involved.

4.1.3 Resilient Communities

Resilience is closely linked with emancipation, and sees citizen-producers as citizen-reproducers, able to collectively tackle new issues that arise. Resilient communities do not merely sustain themselves, but thrive through self-organising and acting in response to adversity. Building on the work of Tobin (1999), Campanella (2006) and Hultman & Bozmoski (2006), Callaghan & Colton (2007:932) describe the processes critical to a resilient community as: planning and developing strategies that minimise vulnerabilities, developing communication and crisis response systems, supporting government/private partnerships and independent initiatives that create social support, and developing strategies that diversify risk across space, time and institution.
Rodin, (2014) presents five characteristics of resilience. They are:

1. Awareness,
2. Diversity,

3. Integration,
4. Self Regulating, and
5. Adaptability.

A resilient community is one that is aware of its assets, resources and strengths, as well as its vulnerabilities and liabilities, and it must have the ability and willingness to constantly assess, absorb new information and adjust accordingly, termed “situational awareness.” There needs to be heterogeneous sources of capacity and knowledge that can be coordinated to develop cohesive solutions, this relies on collaboration and information sharing. The community must be able to regulate itself in ways that enable it to deal with difficult and unseen circumstances; it must be able to fail safely.

Lastly, the community must have the ability to adapt to changing situations by “developing new plans, taking new actions or modifying behaviours” (ibid). These ideas relate back to the development of social capital and ubuntu as discussed in the previous chapter.

4.2 Participatory Design and Related Concepts

Fundamental to this research is the framing of design not solely as a process for producing an artefact, but also, defining design as the process of producing a series of participant structures and supports to facilitate the emergence of future activities (Barab, Evans & Baek, 2004:200).

Ehn (2008:93) notes that since the final embodiment of the object of design is a thing (generally a component or multiple components of a product service system), it is open to unforeseen appropriation. He notes that strategies and tactics of design *for* use must therefore also be open for appropriation and appreciation *in* use, after a project is finished (ibid).

Participatory Design aims to include users in the design process from the outset of a project, with participants determining the direction of the project as a collaborative group. Here we see a meeting of the user-expert, with tacit, experiential knowledge of the context, and the designer-facilitator, with knowledge of design tools and processes. PD is underpinned by a belief that, politically and ethically, the gaps between participants tacit knowledge and researcher-designers’ more abstract, analytical knowledge needs to be bridged, with both forms of knowledge as equal as the other.

The problems around PD are complex and interrelated. Participatory design aims to give potential users of product service systems (PSS) a voice in the design process and place them at the centre of a design project, with the goal of designing more sustainable PSS’s. This approach sees participation used as a means, supported by

external agency such as a NPO/CBO. PSS is the term given to the paradigm shift from the "production of goods to the provision of knowledge-intensive systemic solutions" (Morelli, 2002:3).

In DfD and CbPD projects where participation and collaboration needs to be long term (beyond the project), or where the goal is the development of social capital, designers need to take cognisance of developing/evolving needs and requirements. Systems need to be evolvable to fit new needs, account for changing tasks, and incorporate new technologies. Judith Gregory (2003:66) states that "embracing value-oriented design encompasses care in building working relationships of trust, reciprocity, and mutual learning, with the understanding that these relationships with (and within) communities that need to last over time, to form the basis for viable participation and codetermination, as design and changes in practice unfold iteratively."

Regardless of context, PD projects often face the same sustainability issues. Clement and Van den Besslaars' (1993) view that the experimental nature of most workplace-based PD projects often leading to isolated solutions rings true too for CbPD projects. A goal of CbPD projects should be the development of a local knowledge base that can help sustain PD as a practice after designers, researchers and other outside actors leave (Bødker, 1996; Kensing & Blomberg, 1998:179). This is in line with the *participation as an end* approach in the field of participatory development and goes beyond project-based participation. It requires a paradigm shift in designers and stakeholders' approach to PD projects, a shift around purpose and objectives.

In Ehn's *Participation in Design Things* (2008), he highlights this shift from participatory design (designing for use before use) to meta-design (designing for design after design). In PD's move beyond the workplace and into more community-based interactions, we see elements of both participatory design in the conceptualising and formation of things (artefacts, services and systems), and meta design, in the facilitation of continued design input from unforeseen users beyond project design.
Ehn (ibid) posits that to deal with these challenges of CbPD a more general understanding of design processes is necessary, one which he frames as "entangled cultural-material *design games."* Design games, as Ehn (ibid) goes on to define them can take on multiple forms, namely:

- The many everyday professional design-games of both users and designers (participants everyday practice related to a design project understood as design-games).
- There are the explicitly constructed specific design-games that have family resemblance with these everyday design- games (the design process as a shared design thing).
- There are specific performative 'design-by-doing' and 'design-by-playing' design-

games (design methods and devices understood as design-games).

- Though not design-games in the same sense, there are even specific ‘design games’ like participatory organisational games, ‘concept design games’ or ‘video as design material’ (the use of specific design devices understood as design-games).

These design games aim to integrate designers and users in the design process.
With the aim of a more ‘integrated and sustainable Cape Town,’ one needs to unpack the term ‘integration.’ This connecting of the city relates to both physical and social structures. During Apartheid, the design of the built environment led to social separation. We need to take an approach to design that ensures peoples integration into both the built environment and society as a whole. This requires a more inclusive, democratic approach to design and development. PD posits that people affected both directly and indirectly by a system should be part of that system’s design. As systems change and evolve, public input into to that system needs to continue, and it is increasingly important to develop these processes of participation and collaboration.

4.2.1 Origins of Participatory Design

Participatory Design grew out of the Western social, political and civil rights movements of the 1960’s and 1970’s, which saw much of society demanding increased say in decision-making regarding different spheres of their lives. There was also preparedness by people to participate and contribute to collective action around shared interests and values (Robertson & Simonsen, 2013:2).

Design as an activity has been developed over a long period. One major change, the division between the use and design processes, occurred with industrialisation and with the division of labour (Sjöberg, 1996:10). Participatory design grew out of this and evolved as an approach focusing on the early phase in systems development, specifically the development of information systems within organisations, and adopted a socio-technical perspective (Sjöberg, 1996:10).

Europe and Scandinavia, gave birth to the workplace democracy movement of the 1970’s, which saw the empowerment of workers in the their jobs during a time of uncertainty when computers were being introduced (Robertson & Simonsen, 2013). Key to this movement was a partnership between academics and trade unions. As PD developed into a notably important approach for researchers, it spread across the Atlantic, undergoing many changes up to the present day.
Over the years, Scandinavian PD has also been known as the Collective Resource Approach, Cooperative Design, and more recently, Cooperative Experimental System Development; in the USA and elsewhere, PD approaches include work-oriented design, situated activity, contextual inquiry and situated design (Gregory, 2003:63).

Although related approaches of user inclusion were prevailing, such as user-centred design, PD differed from them in that it included users in the design process, and did not just conduct research and design on their behalf.
Gregory (2003) highlights how Scandinavian PD can be distinguished by three principles:

- Striving for democracy and democratisation,
- Explicit discussions of values in design and imagined futures,
- The ways conflicts and contradictions are regarded as resources in design.

For the purpose of clarity in the myriad of people-centric slanted design approaches, Participatory Design, as it is referred to in this thesis is: a collaborative design process of investigating, understanding, reflecting upon, establishing, developing, and supporting mutual learning between multiple participants in collective 'reflection-in-action (adapted from Robertson & Simonsen, 2013:2).

The focus of this thesis is specifically on Community-based Participatory Design (CbPD), a distinctive field of Participatory Design that "highlights social constructs and relations of groups in settings that include, but go well beyond, the formal organisational structures commonly foregrounded in more traditional workplace studies" (DiSalvo, Clement & Pipek, 2013:182). This involves designing with informal settlements, rural communities and other often underserved communities As Kuutti (2009:69) states, "a solution cannot be forced from the outside, it has to be created within."

Although there is no singular path tracing PD as a practice, its heritage as a simple involvement of workers, along its evolutionary track of increasing complexity, to active participation of communities has seen an increase in how and to what degree people participate in the design of products, services and systems that affect them. Out of PD's rich heritage and blend of projects and practices certain key principles have emerged. These underpinning, guiding principles are outlined by Kensing & Greenbaum (2013:32) and include:

- *Equalising power relations* – which involves giving voice to those who have less power,
- *Democratic practices* – that is, implementation of practices that facilitate the education and engagement of people, allowing them to act on their own interests and those of a common good,
- *Situation-based actions* – Contextual approaches to developing activities with people in their working/living environment,
- *Mutual learning* – which involves facilitating and enhancing the understanding of different actors through developing a common ground and ways of working,

- *Tools and techniques* – that help different actors express their needs and visions, and foster collaboration, and
- *Alternative visions about technology* – in line with people's choice.

As PD has migrated from *democracy at work* to *democratising innovation* in the public sphere, its challenges have, and continue to, change.

4.2.1.1 Contemporary Discussions within PD

As Bjerknes et al (1987) note, early PD activities were mainly concerned with workplace issues related to information technology and the development of user participation in its design. Contemporary PD practices have seen a reorientation towards everyday life and the public sphere (Björgvinsson, Ehn and Hillgren, 2010:42), referred to in this thesis as community-based participatory design (CbPD). Le Dantec and DiSalvo (2013:242) note the importance of developing theoretical perspectives and approaches within PD as it moves from the workplace into community contexts. These perspectives should aim at characterising the forms of social organisation and actions and activities at play within communities, and PD's relationship to them (ibid).

Related to these perspectives of CbPD, Ehn, (2008) and Björgvinsson, Ehn and Hillgren (2010 & 2012) present two fundamental challenges within contemporary PD practice, namely:

- The shift from designing "things" to designing "Things", and
- The shift from "projecting" to "infrastructuring."

While DiSalvo (2009), Björgvinsson, Ehn and Hillgren (2012b) and Le Dantec and DiSalvo (2013) draw on Dewey's (1927) concept of publics and discuss the:

- Formation of publics in PD

The concepts of Things and infrastructuring, and their role in constituting publics contribute to PD's concern of moving from its focus on products toward a view of innovation that "embraces working relations where questions and possibilities can be raised" (Björgvinsson, Ehn and Hillgren, 2010:43). This more dialogical approach within PD is prompted by the view of innovation today as "heterogenous, partly open and public" in its engagement with users and other stakeholders, which happens "across organisational and community borders" (ibid).

In the reframing of designing 'things' to 'Things', Björgvinsson, Ehn and Hillgren (2012a) draw on the etymology of the term and note how over time its meaning has changed from that of a social and political assembly to that of a material object or artefact. PD's shift to focusing on the design of Things as socio-material assemblies where conflict can be negotiated, is motivated by the "diversity of perspectives, concerns and interests" present in the public sphere (ibid).

Within this “thinging" framing of PD there exist two approaches, the first relates to traditional PD practice and is characterised by the involvement of users in the design process. Here we see users’ participation as a way to anticipate possible uses before actual use, that is, *use before use*. The second, complementary, approach defers some design and participation until after the design project, which can open up actual use as a design phase, that is *design-after-design* (ibid).

The design *project* is the socio-material Thing that aligns design activities (Björgvinsson, Ehn and Hillgren, 2012a:104). Björgvinsson, Ehn and Hillgren (ibid) note that the shift from *projecting* to *infrastructuring* involves reimagining the design process from one of prescriptive, consecutive stages to one that is adaptive, non-hierarchical and loose. They note that this approach raises certain questions around the construction of the object of design, alignment of participants and staging of the design Thing. This thesis explores Activity Theory (AT), specifically Cultural-Historical Activity Theory (CHAT) as lens and a tool for understanding and carrying out participatory design Things (Chapter 5).

Björgvinsson, Ehn and Hillgren (2010:43) describe infrastructuring as:

> *an ongoing process [that] should not be seen as being delimited to a design project phase in the development of a free-standing system. Infrastructuring entangles and intertwines potentially controversial ‘a priori infrastructure activities’ (like selection, design, development, deployment, and enactment), with ‘everyday design activities in actual use’ (like mediation, interpretation and articulation), as well as ‘design in use’ (like adaptation, appropriation, tailoring, re-design and maintenance).*

Infrastructuring, then, are the activities of “creating socio-technical resources that intentionally enable adoption and appropriation beyond the initial scope of the design, a process that might include participants not present during the initial design” (Le Dantec and DiSalvo, 2103:247).

Drawing on Latour (2004) and Marres (2007), Le Dantec and DiSalvo (2013:242) suggest that a central component of infrastructuring toward the formation of a public is the process of identifying and forming *attachments*, which they describe as “the social and material dependencies and commitments of the people involved” in the design process. Attachments can be seen as a public’s relationships with other component of the design system, and embody an interplay of ‘dependency on’ and commitment to’ (Le Dantec and DiSalvo, 2013:245).

Framing CbPD as a design *Thing* (Figure 4.9) through the lens of Activity Theory offers an insight into the design process as an activity of relationships.

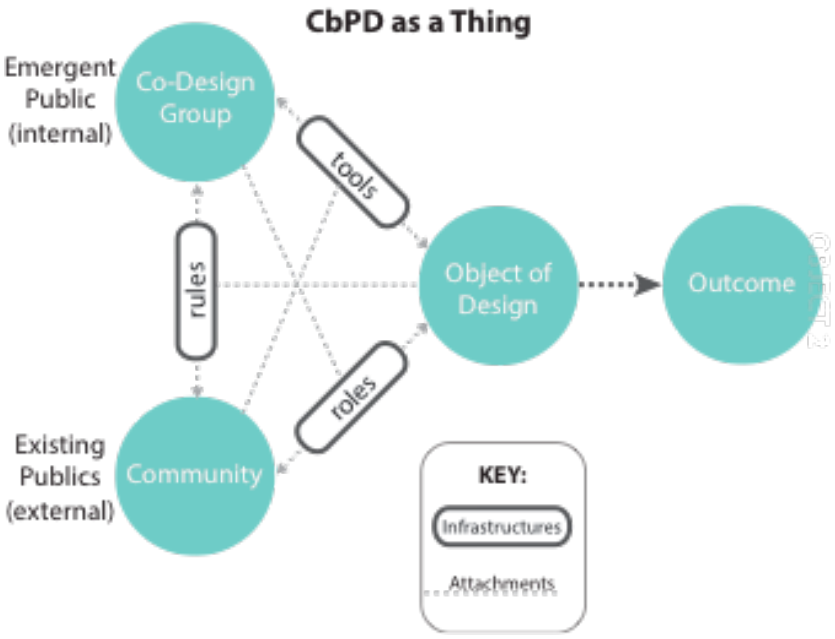


Figure 4.9: CbPD as a Design Thing

Here, publics exist to a degree within various communities already, such as communities of practice, communities of interest or geographic communities. Ehn (2008:94) notes that when thinking in terms of communities of practice in a framework for PD, dimensions of internal power struggles become apparent. These power struggles relate to participants' attempts to appropriate tools and social relations (ibid). These ideas of roles and tool use relate to other forms of community too. In negotiating the object of design between multiple communities, usually a form of the object is introduced by one, a co-design public emerges and further defines the object or objects of design. During the design process relationships between the co-design team members are mediated by infrastructures which can either be brought in to the activity of design or can emerge from it. These relationships between actors and infrastructures within the design activity are where Le Dantec and DiSalvo (2013) term attachments.

4.2.2 Levels of Participation

Participation is at the core of participatory design (Robertson & Simonsen, 2013:4), thus unpacking what is meant by the term in the realm of PD is imperative.

There are generally two avenues of argument for participation in design. Firstly, the political, which emphases that people *should* have the right to influence their working conditions or systems that affect them, and secondly, the pragmatic argument, which posits that in the process of involving people in design as agents of participation, better, more appropriate and accepted results will emerge (Kensing & Greenbaum, 2013:27). Whether based on rights or results, participation between and among different power groups results in mutual learning, a key component of participatory

design (ibid). Taking the political stance, people have the right to participate in decisions that affect them, not only because of the end result, but because they have the right to learn. Defining commitments then of PD are mutual learning and the setting up of mutual learning processes (Robertson & Simonsen, 2013:6). The latter usually involves evolving ideas and visions that form and reform during the design process. These co-defined ideas reveal goals, define problems and indicate possible solutions (Bødker, 2004:13). Bødker (2004) refers to the full involvement of 'users' as 'genuine' participation. Here we see a fundamental shift in users' role from informant to legitimate participant (Robertson & Simonsen, 2013:4).

Wandersman (1981) presents an interdisciplinary organising framework for participation, which attempts to provide a map of the key dimensions, intrinsic in the complex phenomenon of participation. These are:

- Environmental, ecological and sociological characteristics of the community,
- Individual differences,
- Parameters of participation,
- Mediators, and
- The effects of participation (Wandersman, ibid).

All of which need to be understood to fully engage community participants. PD has at its core "an ethical motivation to support and enhance how people can engage with others in shaping their world…over time" (Robertson & Wagner, 2013:65).

Uphoff (1991) lists five ways to ensure beneficiaries' participation in a project's design and implementation. These are:

- Co-defining the degree of participation from all parties at the outset,
- Setting of realistic objectives for participation at various stages,
- Alignment with local organisations where possible, if these are insufficient or have inadequate skills and capacity to support participation, there should be the formation of facilitating organisations congruent with local culture,
- There must be an explicit adequate financial commitment to popular participation, goodwill is not enough, and,
- Plans of shared responsibility at all stages of the project cycle

These were derived from Uphoff's investigation of several rural development projects and based in the finding that beneficiaries involved in the planning and execution of projects are better informed and more committed to the success of the project than those who are just suddenly handed an asset to which they have contributed nothing (Cernea,1995:466). PD aligns itself with this belief, and expands on these findings, to include participants not just in the planning and execution of projects, but in defining and designing the possible outcomes too.

Dewey (1927) insisted on citizen's continuous participation in identifying social problems and in bringing them to the attention of decision makers. We have seen a shift in how continual participation is understood, from merely the identification of issues, to the collective solving of these issues. If participation is to lead to democratic practices, citizens need to become the decision makers themselves. This governance from the ground up requires active citizens who can participate fully in the betterment of their communities. Mathews (2014:55) writes that there are these emerging groups of citizens, who have a broader focus than just a specific project or issue, and who are concerned with the well being of their entire community. He states that these 'activists' aim at "increasing the civic capacity of their community, the capacity for solving problems and becoming more resilient when faced with challenges" (ibid). Practitioners of Community-based PD (CbPD) should consider this in their approach to participation. Although project-based participation has its place, one needs to consider designing for participation and social cohesion beyond projects.

4.2.3 Participation for Design & Design for Participation

This thesis frames participatory design in two ways. Firstly, participation for design (PfD), which uses participation as means to a design end; and secondly design for participation (DfP), where the focus is participation as an end in itself. The latter requires new ways of co-designing participation for improved collaboration and, extended empowerment of participants beyond a specific project, as within "Participatory Design, what is being designed is both the technological product or artefact and the process that enables different participants to engage in designing this product" (Robertson & Simonsen, 2013:8). Project owners traditionally determine user/ community participation in DfD projects. Whether it is the design of products or processes, participation usually ends when the final design or outcome is handed over to the users. Bratteteig et al. (2013:135) have highlighted the importance of widening the participatory perspective to include design-in-use stating that, "…Participatory Design practitioners need to refine their visions resulting from the Participatory Design process". This phase, post handover, extends participation beyond the standard design cycle, however still frames participation as a means to an end.

Participation is still determined by 'outsiders'. Participatory development practices have taken this a step further and argue for a move from participation as a means (PaM) to seeing participation as an end (PaE). This challenges designers to reframe how they view participation and the two areas they are involved with i.e. Participation for Design (PfD), which results in artefact/product, and Design for Participation (DfP), which results in tools for participation. If we frame the concept of DfP through the lens of PaE, identifying participation as the end goal, we open up a new area of investigation, one that aims at progressing from the empowerment of communities to emancipation.

Participation is often not sustainable if controlled by outside agencies, which is often the case in PD projects. Ramphele (1990:8) defines social participation as "a process through which people gain control over social, political, economic and environmental factors determining their lives, through acquiring appropriate knowledge, skills and organisational capacity." This expands the notion of designing for participation as a means, to designing for participation as an end. Bonsiepe (2006:30) relates to this approach, referring to what he terms 'design humanism', which is "…the exercise of design activities in order to interpret the needs of social groups, and to develop viable emancipative proposals in the form of material and semiotic artefacts" (ibid). Design is a prism through which to address the political, and is central to identity, participation, human rights and the public's interest (Weber, 2010:9). By viewing participation as a long-term activity, designers need to engage fully with the communities in which they work, in order to collectively design processes and methods for active citizenry which could result in improved social capital.

4.2.4 Participatory Design in South Africa

Participatory Design has mainly been practiced in Europe, Scandinavia and the USA, and has focused on business contexts in the Western world, with minimal application to developing country settings, especially in the context of social development (Korpela et al., 1998; Byrne and Sahay, 2006:71). Social design toolkits have emerged as methods for approaching collaborative design around social development in 'developing communities', however, most social design and service design toolkits and resources have also been conceptualised and produced in Europe and America (du Preez, 2014:40). The general result of this is a Western perspective on domain and methods for participation. Participatory Design in South Africa is more prevalent in social design projects than workplace technology projects, yet most of the literature and methods support collaboration in the latter. In a cross-cultural social development domain PD goes beyond the involvement of users in the design of the product or technology application, and includes an appropriation of the design process itself (Inschiers, 2006). This supports the notion of meta-methods, methods that are appropriate not only in the design project, but in the design of the project itself.

Oyugi et al (2008:295) present several unique issues that arise when practicing PD in a majority world context. These include:

- Power distance: this is the perceived status between the host communities and the designers.
- Cultural/language barriers: there are normally language and cultural barriers between the host communities and the visiting designers.
- Incompatibilities of PD techniques with host community values and communication codes.

- Uncertainty about appropriate methods/techniques when participant users and developers are from different national and organisational cultures
- Dispersed geographical distances mean that travelling costs are high and time zone differences make remote synchronous communications difficult.
- Low literacy levels: the host communities may have low literacy level thus hindering collaborative activities between them and the designers.
- Poor telecommunication infrastructure: this means that activities that could be followed-up from a distance or meaningful communication between the two dispersed groups may prove to be a challenge (ibid).

These issues are echoed in du Preez's (2014:41) analysis of several main service design toolkits. She states that the key challenges facing community-based design are literacy levels required to complete tasks, the (unstated) reliance on a competent facilitator and unconsidered questions around group work and collaboration (ibid).

Byrne and Sahay (2006) interrogated what is meant by 'participation' in the context of PD for Social Development. With South Africa as the exploratory domain they posited that the meaning of participation in PD for social development depart from conventional ideas of participation in PD in order to ensure the required diversity of participation and participants (Byrne & Sahay, 2006:87). This reconceptualisation of participation in PD includes:

- Going beyond end user participation. Participation should include all those affected by the design project.
- Adopting a multilevel and multi-sectoral approach. A homogenous participant base will enrich (albeit complicate) the design project, and
- Enhancing reflective practices and the capacity to participate. Development needs to happen not just around the object of design, but of the process itself. (ibid).

4.3 Summary

In social development, design can play a key role in facilitating the alignment of actors around shared concerns, social learning and idea generation. These are key in identifying and clarifying issues, which in turn contribute to the formation of publics. Dewey's *The Public and its Problems* (1927) has relevance today in CbPD in its alignment with majority world conditions. Through it's pluralistic stance, it endorses a public that is "broad, inclusive and multiple" (DiSalvo, 2009:48).
La Dantec and DiSalvo (2013) go on to note how the concepts of *infra structuring* and *attachments,* increasingly relevant in PD, are central to the constitution of publics.

In order to continue these aspects of CbPD projects, participation should not be seen merely as a tool to achieve an end, but as an end in and of itself. PD has embraced

this shift from participation as a means, to participation as an end, what Ehn (2008) refers to as a shift from design for use to, design-for-design.

Participation beyond a project can involve unidentified users, and as Ehn (ibid) states, stakeholders other than immediate users can appreciate and appropriate outcomes in unforeseen ways.

Long term participation and collaboration amongst community members around design outcomes can develop local social capital, imperative in transforming a community from one that complies to existing systems to one that can emancipate themselves beyond existing systems.

CHAPTER FIVE
COLLABORATION IN DESIGN: A THEORETICAL FRAMEWORK

5.0 Introduction

This chapter encompasses the theoretical frameworks applied in the study, which are informed by the conceptual analysis of collaborative design provided in Chapter 4. The rationale for the selection and application of these frameworks is as follows.

This study focuses on understanding how stakeholders, particularly civil society, participate in collaborative design projects, underpinned by the ways in which, historically, the South African public has been engaged. To better engage the public in the design of products, services and systems that affect them, one must appreciate and understand their reasons for and lack of participation and collaboration historically (see previous Chapters). This is necessary in the development of processes and structures for future stakeholder participation in activities of community-based participatory design projects. The use of Activity Theory as the analytical and theoretical framework employed in this study offers a way to characterise, analyse and design for the participatory unit (Barab, Evans & Baek, 2004:199).

This characterising, analysing and designing for participation facilitates the primary focus areas of this study, these are, exploring historical and present participatory practices, understanding the complexities of community-based participatory design projects, and exploring how collaborative design projects can facilitate expansive learning and the building of social capital. These all contribute to developing civic momentum in and beyond CbPD projects in a South African context.

Using Cultural Historical Activity Theory (CHAT) as the primary theoretical framework, facilitates the acquisition of new ways of working collaboratively, and the development of concepts and tools to account for dialogue, multiple perspectives and networks of these intersecting systems (Engeström 2001:135,139), imperative in CbPD.

5.1 Cultural Historical Activity Theory as a Methodological and Analytical tool for Exploring Stakeholder Participation in Co-Design

CHAT's attention to cultural history and tools makes it useful for exploring interaction among multiple participants in an activity (Silo, 2011:97). The activity this research focuses on is the activity of collaborative design.

In using CHAT to account for activity, one is concerned with more than simply 'doing' or 'performing' as a disembodied action, but rather on 'doing in order to transform something' with the focus on the contextualised activity of the system as a whole

(Barab, Evans & Baek, 2004:200). Barab (2002:533) states that "the **'**minimal meaningful context**'** for understanding human actions is the activity system, which includes the actor (subject) or actors (subgroups) whose agency is chosen as the point of view in the analysis and the acted upon (object) as well as the dynamic relations among both."

Kaptelinin (2014) acknowledges two key aspects that differentiate activity from other forms of interaction:

- Subjects of activities have needs, which should be met through an interaction with the world, and
- Activities and their subjects mutually determine one another, that is, activities are generative forces that transform both subjects and objects.

Activity Theory provides us a lens to critically reflect on and in design processes. It facilitates the identification of components of an activity system, in this case a participatory design system. Design research can make use of the AT framework in facilitating explorations into situations, contexts and motivations, not only related to human-artefact relationships, (Sato, 2009:34) but also their place in their located socio-technical and economic environments.

Activity is an 'interdisciplinary' concept by nature, and analogous to what Heidegger and later Gadamer termed, the 'hermeneutic circle' (Blunden, 2010:170). This refers to a relationship between the whole and its parts and how each can only be understood in relation the other. Concerning the relationship between individual actions and collective activity. Gadamer viewed understanding as linguistically mediated. He believed that it is through conversations with others in which reality is explored and an agreement is reached, that a new understanding is developed. The centrality of conversation to the hermeneutic circle was taken further by Donald Schön (1983), who characterises design as a hermeneutic circle that is developed by means of "a conversation with the situation". In AT this 'conversation with the situation' results in individuals acting toward an object, these actions being mediated by physical, cultural and mental tools (Clark, 2012:2).

Kaptelinin (2014) and Kaptelinin & Nardi (1997; 2006) build on Leont'ev's (1978) and later Wertsch's (1981) definitions of the five basic principles of AT. These are:

- Object-orientedness
- Hierarchical structure of Activity
- Mediation
- Internalisation and externalisation, and
- Development

The principle of *object-orientedness* states that all human activities are directed toward their objects and are differentiated from one another by their respective objects.

Therefore, “objects motivate and direct activities, around them activities are coordinated, and in them activities are crystallised when the activities are complete” Kaptelinin (2014). In CbPD there are often a number of participants from various contexts. These participants’ individual actions toward the object can differ but should align to best crystallise the object. In quad-helix projects there are, at least, government representatives, researchers, designers and citizens from the activity context. Each participant might perform a different actions depending on their role and experience, but these are all focussed on achieving the co-defined object of activity. This principle implies that to be able to understand both the individual and collective activities of humans, it is necessary to investigate and analyse object properties of all those involved.

Activities are composed of three *hierarchical* layers, namely operations, actions and activities (Leont’ev, 1981) (Figure 5.1). Blunden (2010:206) summarises this hierarchy as follows: *operations* are not consciously motivated, but rather flow from will to action; *actions* are oriented to individual’s goals and collectively realise the activity; and activities, which have a social motive and are independent of individual will (Table 5.1).

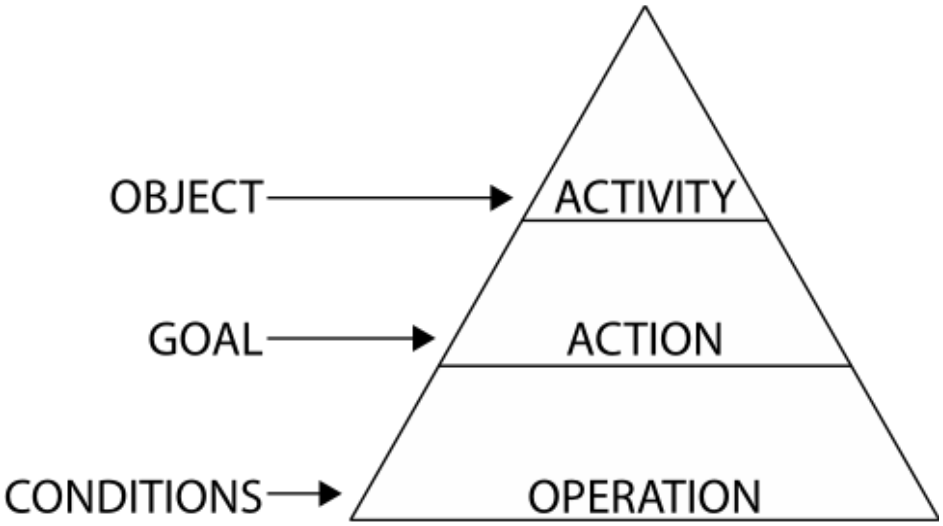


Figure 5.1: Hierarchical Levels of Human Action in Activity (Leont’ev, 1981)

Table 5.1: Leont’ev’s three level model as adapted by Engeström et al (1990)

Unit	Directing Factor	Subject
Activity	Object / Motive	Collective
Action	Goal	Individual / Group
Operation	Conditions	Non conscious

Kaptelinin (2014) combines the above two diagrams into a model that represents not only hierarchy, but also how multiple smaller components of activity systems contribute to single larger components, that is multiple operations facilitate actions, of which multiple versions contribute to an activity (Figure 5.2).

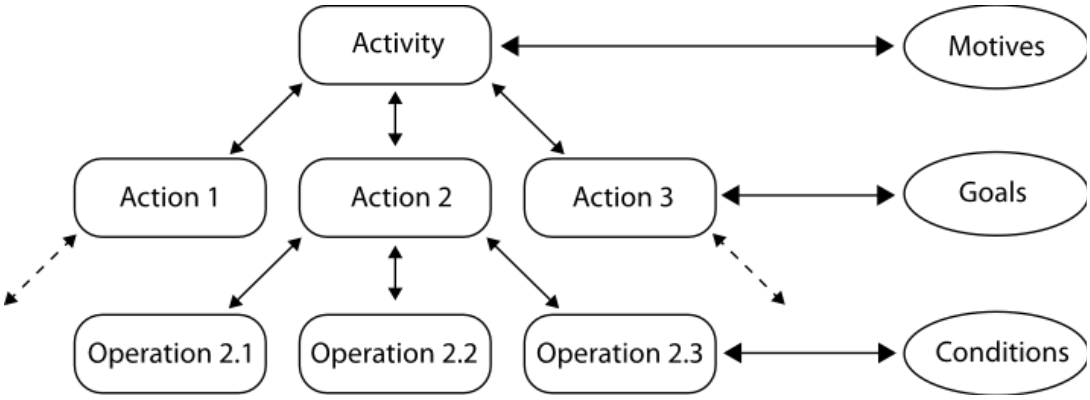


Figure 5.2: Nested hierarchy of activity (Kaptelinin, 2014)

Kaptelinin (2014) goes on to note that when considering human activity as a three layer system, there is the opportunity for a combined analysis of motivational, goal-directed and operational aspects of human acting in the world, which brings together what Bødker (1991) refers to as issues of Why, What and How, all within a consistent conceptual framework. Kaptelinin (2014) goes on to state that realising this possibility in a concrete study may prove problematic as revealing the ultimate motives of an individual or the complex structure of automatic operations may prove difficult if not impossible. Hence, this study is predominantly concerned with collective activity, however, adopts an "actions first" approach, beginning analysis at this central layer and identifying how these actions contribute to the activity of design.

Action, within an activity system, is *mediated* by tools, signs and techniques. These tools both shape the way human beings interact with reality, and are themselves usually shaped by previous activities and thus carry a particular culture. These meditational tools or artefacts are therefore not the object of our activity, but appear already as socio-cultural entities (Kofod-Peterson & Cassens, 2006:620). That is not to say that the object of an activity cannot be the design of new tools, for use as mediators in future activities. In drawing from the works of Vygotsky (1978), Bernstein (1990), Hassan (2002) and Daniels (2010) I propose three levels of mediation in collaborative design practices (Table 5.2). Vygotsky (1978) in his work on tool definition separated meditational artefacts into two distinct categories, 'tools' and 'signs'. Contextualised in design practice, a tool, such as a pencil, mediates object-oriented material activity, whereas signs function as means of social or interpersonal interaction. Design though, presents an interesting blending of tools and signs, where the pen,

used as a tool, results in a sketch, which acts as a sign, or means of interaction between design and client; hence the grouping of these in Table 5.2. Embodied mediation refers here to the way in which individuals use these tools or signs based in their previous experience, linked closely to socio-cultural meditation, which accounts for the building of individuals experiences and includes social, cultural and historical structures (Daniels, 2010:112).

Tools & Signs	The ‘things’ that are used
Embodied	The ‘way’ they are used
Socio-cultural	Historical aspects of use

Table 5.2: Levels of mediation

If we take collective lo-fi prototyping for example as an activity within CbPD, we often see different participants using different materials in different ways based in their experiences and perceptions of the materials present. Kaptelinin (2014) notes that the use of tools is a form of accumulation and transmission of social, cultural knowledge. Therefore, discussing tool preference amongst participants in CbPD can provide insight into embodied and socio-cultural aspects of use, which supports situated learning.

Activity theory differentiates between *internal and external* activities and posits that one cannot be understood without analysing both as they are intrinsically linked. This principle encompasses the fact that human activities are distributed, and dynamically redistributed, along the internal/external dimension (Kaptelinin, 2014). Internalisation relates to understanding, and the mental simulation of external interactions without physically performing the activity. Externalisation is the transforming of internal activities into external ones, necessary when an internal activity needs to be ‘repaired’ or when a collaborating group need to coordinate their activities (Kaptelinin, Kuutti & Bannon, 1995:192). In collaborative design activities, coordination is key as subjects should act on the same object or at least related objects. Within this space, internalisation can encompass the absorption of new knowledge by participants while externalisation can be seen in the sketching of an idea or modelling of a concept. Within design, the internalisation/externalisation process happens constantly, especially during the concept-defining phase. Similar to internal/external dimensions are individual/social ones. Here we see socially distributed activities containing more than one actor being appropriated by one person within the activity. For example, collaborative prototyping involves dialogue and group design decisions, the results of which eventually get taken up by a single designer to render in CAD. Cole and Engeström (1993) and Kaptelinin (2014) also note that individual activities can become

socially distributed ones, and use the example of a person initiating a group project to help an individual carry out their actions.

Continuous development in Activity Theory posits that all [human] practices are a result of historical development, under certain conditions and are formed by continuously developing processes (Kaptelinin, Kuutti & Bannon, 1995:192). Activities, therefore, must always be studied in their context of development (Kaptelinin, 2014). Within AT the study of how the object changes over time is essential for a deep understanding of the object (ibid). Within this study we will look at a case study through the lens of AT and explore both the changing object of work activity in context, and design in the CbPD project (Chapter 7).

5.2 Activity Systems as Frameworks for Interpretation

Within AT there are three key theoretical constructs, namely, activity systems, contradictions and the zone of proximal development. The zone of proximal development was elaborated on in the previous chapter as important in understanding the potential for human development in quad-helix projects. This section will look at activity systems and the contradictions that exist within and between activity systems in more detail.

Activity systems are collective formations that consist of a complex meditational structure (Engeström, 2008:5). Essentially, they are the frameworks into which AT is grounded. Activity systems are also the basic unit of analysis in AT.

Vygotsky (1978) introduced the basic meditational model of activity (Figure 5.3) and the concept of mediated action. This concept of individual work is rooted in the belief that humans do not interact directly with their environment; rather, this interaction is mediated by tools and signs (Vygotsky, 1978; Greenhow & Belbas, 2007:366). This model is based in individual action, and doesn't cater to collaboration.

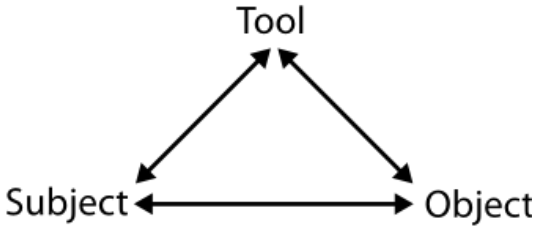


Figure 5.3 Basic mediational model (Vygotsky, 1978)

Engeström (1987) expanded on Vygotsky's model, by including community as another component of activity systems as well as additional meditational components of *values, rules and conventions*, and, the *division of labour* (Figure 5.4).

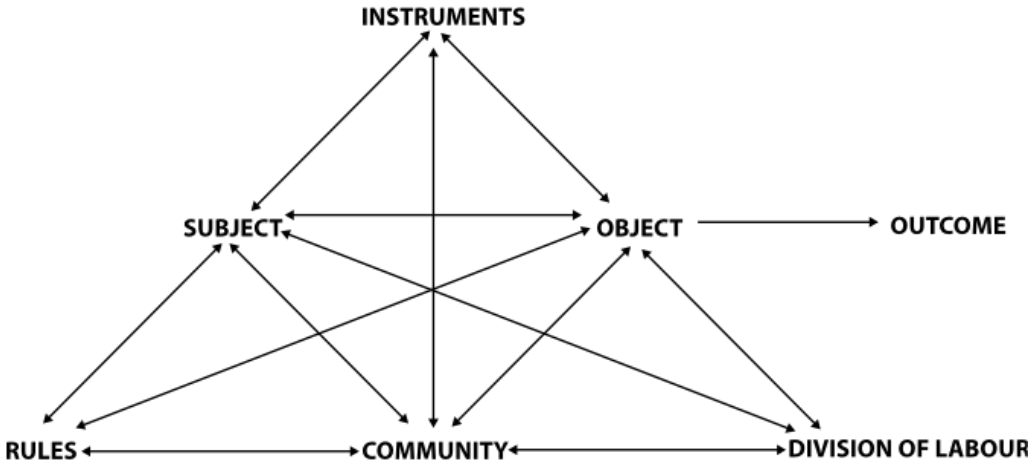


Figure 5.4 The Meditational Structure of an Activity System (Engeström, 1987:78)

Yrjö Engeström's model of activity (1987) expanded on Vygotsky's original model of activity by extending the concept into the realm of collaborative work. Cultural Historical Activity Theory (CHAT) as he called it, expanded to include *community* and the mediating factors between the subject and the community of activity, and between the object and community of activity. The *division of labour* is constantly negotiated by the community and mediates between the community and the object. *Rules,* such as codes of conduct, laws and legal frameworks mediate the relationship between the *subject/ subjects,* and their community.

Engeström's (1987) expanded model of mediation opens up direct relationships as follows:

- The subject/s' relationship with their environment opens up as the direct relationship with their object/objective, and is mediated by external and emergent tools,
- The relationship of the entire community of the activity to the object opens up with the direct relationship being replaced by a division of labour, and
- The direct relationship of the subject/s to the community of activity gives way through the emergence of larger and more complex communities and social relationships mediated by norms, rules and traditions.

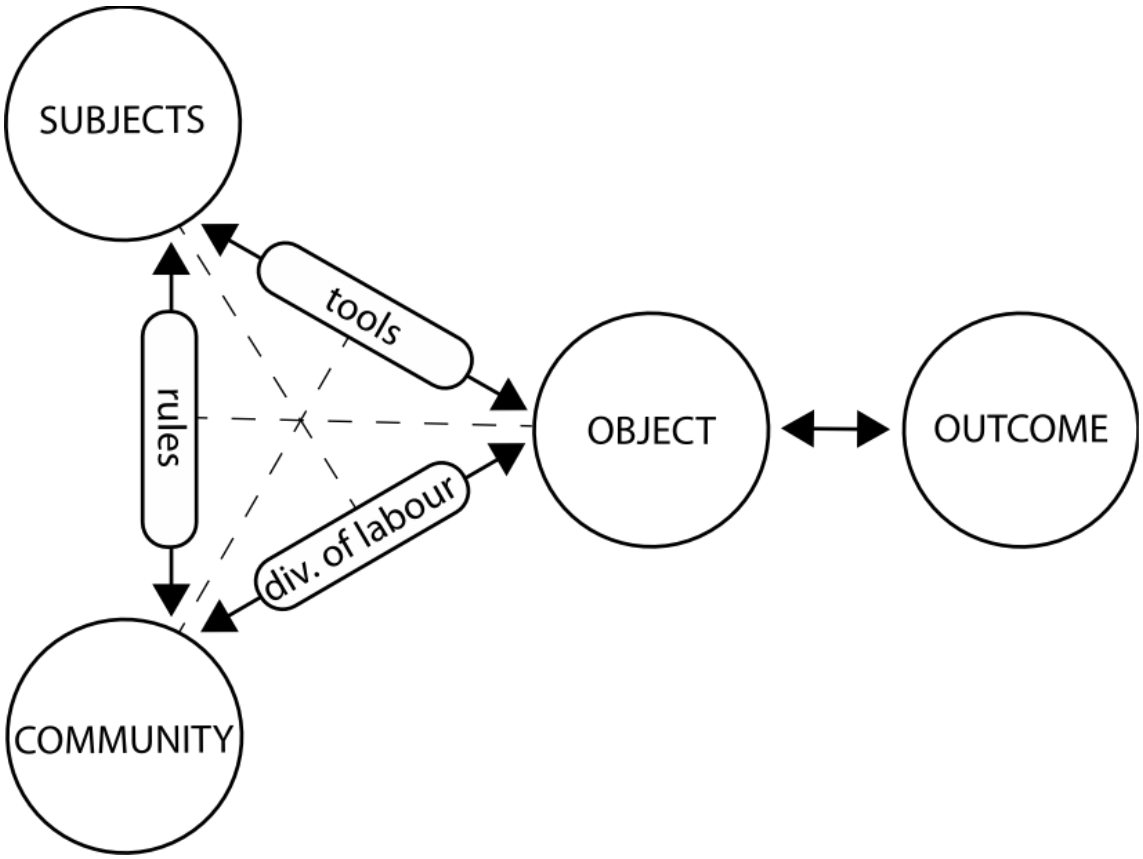


Figure 5.5 Adapted version of Engeström's model of activity (1987)

Figure 5.5 presents my adapted version of Engeström's model. I felt this was necessary as in Engeström's triangle of an activity system the mediating components are presented as the end nodes on the triangle making it seem, the subject, object and community are the mediating means. Although this is not the case, it can be visually confusing. The model I present is structured around the three-way interaction between the *subjects, object* and *community*. *Tools, instruments and practices* mediate the subject/object interaction (Engeström, 1987; Greenhow, 2007), *rules* mediate the subject/community interactions, and the *division of labour* mediates community/object interactions. Echoing Engeström's (1987) model of an activity system the model includes the *outcome* of the complete activity system. The outcome is as Kaptelinin (2014) describes it a "transformation of the object produced [and acted upon] by the activity in question into an intended result, which can be utilised by other activity systems." Where my model differs is the two-way interaction between the activity system and the outcome; this aligns better with participation as an end, allowing the outcome to constantly be evolved by the actors that produced it. The outcome is no longer just a product of a system, but an integrated component feeding back into that system over time. I have also increased the singular subject to *subjects* as collaborative design activities, the focus of this thesis, always include multiple participants.

Activity systems are not static, and their constant development can best be understood "in a dialectical sense as a process driven by contradictions" (Kaptelinin, 2014). Contradictions are inherent to all activity systems and explain historically accumulating structural tensions within and between activity systems (Engeström, 2001).

Engeström's activity framework has, as a key tenet, this fact of constant change and he identifies four types of contradictions that drive said change, *primary contradictions (1), secondary contradictions (2), tertiary contradictions (3)*, and *quaternary contradictions (4)* (Figure 5.6).

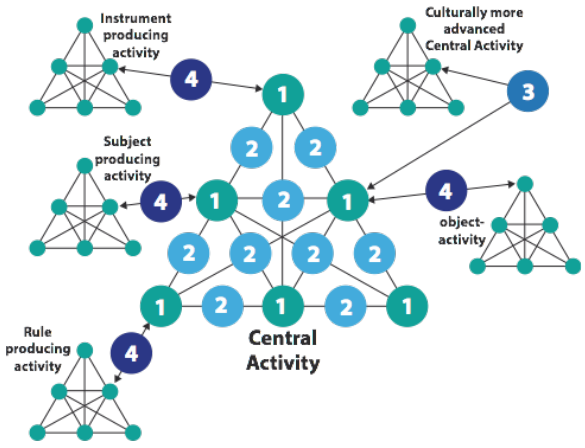


Figure 5.6: Activity System Contradiction Framework (adapted from Engeström, 1987)

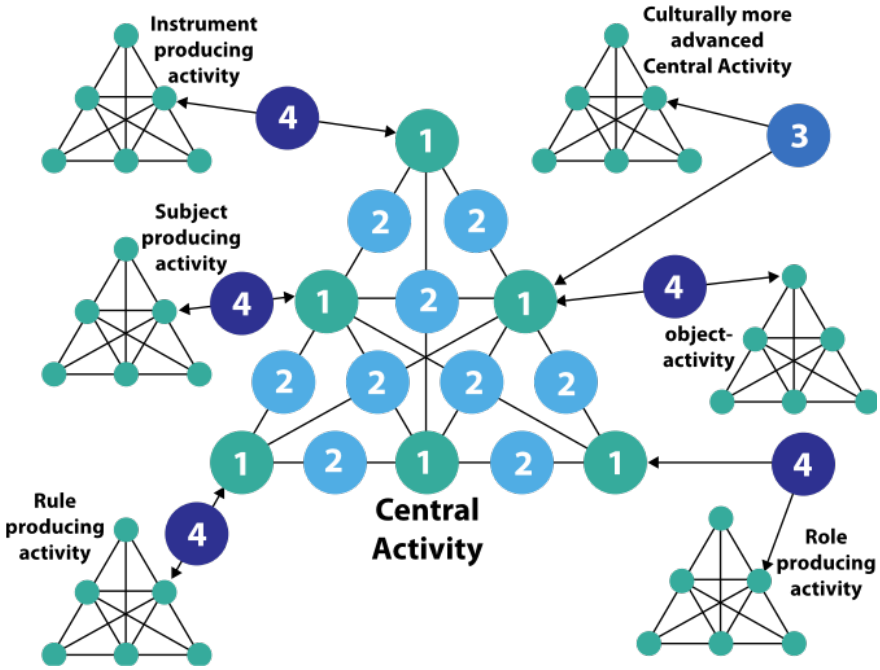


Figure 5.7: Activity System Contradiction Framework to include role production (adapted from Engeström, 1987)

The schematic in (Figure 5.7) presents these contradictions in an adapted version of Engeström's (1987) contradiction framework. Here '1' represents a primary contradiction. These are inner contradictions of each node of the activity system and represent the tension between use value and exchange value. An example in the context of CbPD could be: a volunteer at a community-based organisation (CBO) offers their time to the organisation for the betterment of the community yet also needs to earn a living themselves.

Foot and Groleau (2011) note that should attempts to resolve other levels of contradiction be successful, the primary contradiction still remains. It therefore requires direct resolve. Primary contradictions are foundational to other levels of contradiction (ibid).

Secondary contradictions, represented in Figure 5.7 as '2', are those that arise from conflict between two nodes in an activity system (Kaptelinin, 2014), and can prompt latent primary contradictions in the activity system to surface as specific problems (Foot & Groleau, 2011). For example, the primary contradiction faced by the volunteer's need to earn a living and their desire to improve their community might be exacerbated by the requirement that they must dedicate more time to the CBO when other volunteers are not available. Foot & Groleau (2011) note that "secondary contradictions exist *a priori* to and independently of tertiary contradictions."

Tertiary contradictions arise from relationships between existing forms of an activity system and its potential, more advanced object and outcome (Kaptelinin, 2012) or as Engeström (1987) terms it "a culturally more advanced central activity." For example tensions between new and old ways of doing things. Kaptelinin (2012) notes that resistance to change could in fact undermine the advancement of the present activity system. The role of user-inclusion in design, intrinsic in PD practice, is imperative in reducing this resistance. It is through including users that contextually based designs improve this compatibility between current work activities and future work activities.

Lastly, a reconfiguration of the activity system can lead to quaternary contradictions between the central and the neighbouring activity systems, when for example a new form of practice is employed based on a reformed and/or expanded object (Bonneau, 2013:4; Foot & Groleau, 2013). Quaternary contradictions can emerge between a central activity system and any/all of its neighbours (Foot & Groleau, 2013).

Engeström (1987) termed these neighbouring activity systems as follows: *instrument-producing activity, subject-producing activity, rule producing activity* and *object-activity*. No neighbouring activity related to the division of labour and the production of roles was included though, and hasn't been since. I have included this related activity

system for the exploration of CbPD activities, as key elements of PD are equal participation and role formation (Figure 5.7). This can be seen in how both specialist and experiential knowledge is viewed as equally important, and how users can often become co-designers. Designers roles also change constantly, in response to the situation or task at hand. Indeed, Lauren Tan (2012) identifies seven new roles designers have begun to play, namely: *co-creators, researchers, communicators, entrepreneurs, capability builders, facilitators* and *strategists*. Building on these roles I'd add an eighth, that of *negotiator.*

As activity systems change we see secondary, tertiary and quaternary contradictions forming a sequence that explains the process of cyclical development characterised in CHAT (Foot & Groleau, 2011).

Engeström (1987, 2000:526) notes that collective activity systems move through relatively long cycles of qualitative transformations, which he termed an expansive cycle. Weibell (2011) notes that through this cyclic process, the object and motive of the activity are reconceptualised to allow for greater possibility and flexibility than the previous pattern of activity. Engeström proposed a set of relationships between the contradictions through which activity systems evolve, and the collective epistemic actions that make up this expansive spiral. Foot & Groleau (2011) note that each of the four contradiction levels corresponds to a particular epistemic or learning action, which drives the activity through a distinct phase of the development cycle. These epistemic actions contribute to moving the activity system from the abstract to the concrete (Engeström & Sannino, 2011:11). An ideal-typical sequence of epistemic actions in an expansive cycle is comprised of the following seven phases:

- *Questioning* – criticising or rejecting some aspects of the accepted practice and existing wisdom.
- *Analysing* – analysis of the situation involves mental, discursive or practical transformation of the situation to find out causes or explanatory mechanisms. Analysis can happen in two ways, historical-genetic, which seeks to explain the situation by tracing its origins and evolution, and; actual-empirical, which seeks to explain the situation by constructing a picture of its inner systemic relations. Both forms of analysis prompt 'why' questions.
- *Modelling* – the third action is the modelling of the newly found explanatory relationship in some publicly observable and transmittable medium. This requires constructing an explicit, simplified model of the new idea that can explain possible solutions to the problematic situation.
- *Examining* – this fourth action involves examining the model, running, operating and experimenting on it in order to fully grasp its dynamics, potentials and limitations.

- *Implementing* – model implementation is done through practical applications, enrichments and conceptual extensions.
- *Reflecting* – the process is reflected upon and evaluated
- *Consolidating* – finding cohesion in the process's outcomes and consolidating them into new and stable forms of practice (Engeström, 2001; Engeström & Sannino 2011:7).

Foot and Groleau (2011) present the above contradictions, their characteristics and their corresponding epistemic actions in a collated table format, adapted here as Table 5.3. Here we see iteration through the epistemic actions, that on reaching new practices, begin questioning again.

Table 5.3: Types of Contradictions and their Resulting Epistemic Actions (adapted from Foot and Groleau, 2011)

Types of Contradictions and Resulting Epistemic Actions		
Types of Contradiction	**Characteristics**	**Corresponding epistemic action/s**
Primary (1)	Occurs between the use value and exchange value of any corner of an activity system.	Questioning
Secondary (2)	Develops between two corners of an activity system.	Analysing Modeling
Tertiary (3)	Arises when the object of a more developed activity is introduced into the central activity system.	Examining model Implementing model Reflecting on the process
Quaternary (4)	Occurs between central activity and neighbouring activities.	Consolidating new practice Questioning

These epistemic actions can act as collective group activities in the co-design process, prompting holistic interrogation into existing and emerging contradictions and tensions. These collaborative problem-solving activities provide opportunities in CbPD for knowledge sharing, collective learning and co-defined designs.

5.3 Participatory Design as a Cultural Historical Activity System

Using CHAT to explore DfD and CbPD we can explain how practices change over time, and identify learning and collaboration patterns useful in the development of future collaborative projects. This can contribute to the design of new systems, important in shifting from 'empowerment within' to 'emancipation beyond' existing systems.

Cultural Historical Activity Theory frames artefacts and people as embedded in dynamic activity systems (Engeström, 2006,4), and combines multiple levels of analysis in how practices change (Mørch, Nygård & Ludvigsen, 2010:187). It provides an interpretive lens through which to view historical changes of Participatory Design activities. As discussed earlier in this chapter, the use of CHAT can explain how the activity of PD has changed over time. Although the Scandinavian model hasn't changed too much, Figure 5.8 schematically represents the shift in differences from the original Scandinavian model of PD focussed predominantly on systems development in the domain of the workplace or organisation, to a CbPD approach which takes place in geographic communities and is focussed on social development in the public domain.

Engeström's "abstract-empirical" approach starts with a collection of abstractions, providing an activity template for research (Blunden, 2010:231). Clark (2012), in his interpretation of Engeström's model of activity also speaks of abstractions, where he references Davydov's ascent from abstract to concrete.

Clark (2012) in his description of collaboration and activity in the zone of proximal development, locates concept mapping within the theoretical framework of CHAT, as a tool to mediate the performance of subjects; the object being concepts that can lead to new forms of knowledge and improved learning of students and teachers. Figure 5.9 represents Clarke's ideas as an adapted version of an activity triangle, showing CHAT ideas framed within an activity system. This study however, expands beyond *knowledge maps* as mediating tools. In Figure 5.9 we see how collaborative learning within a zone of proximal development happens in publics within communities of either practice or geographic. These different voices impact on the roles or division of labour and the differing rules impacting on an activity.

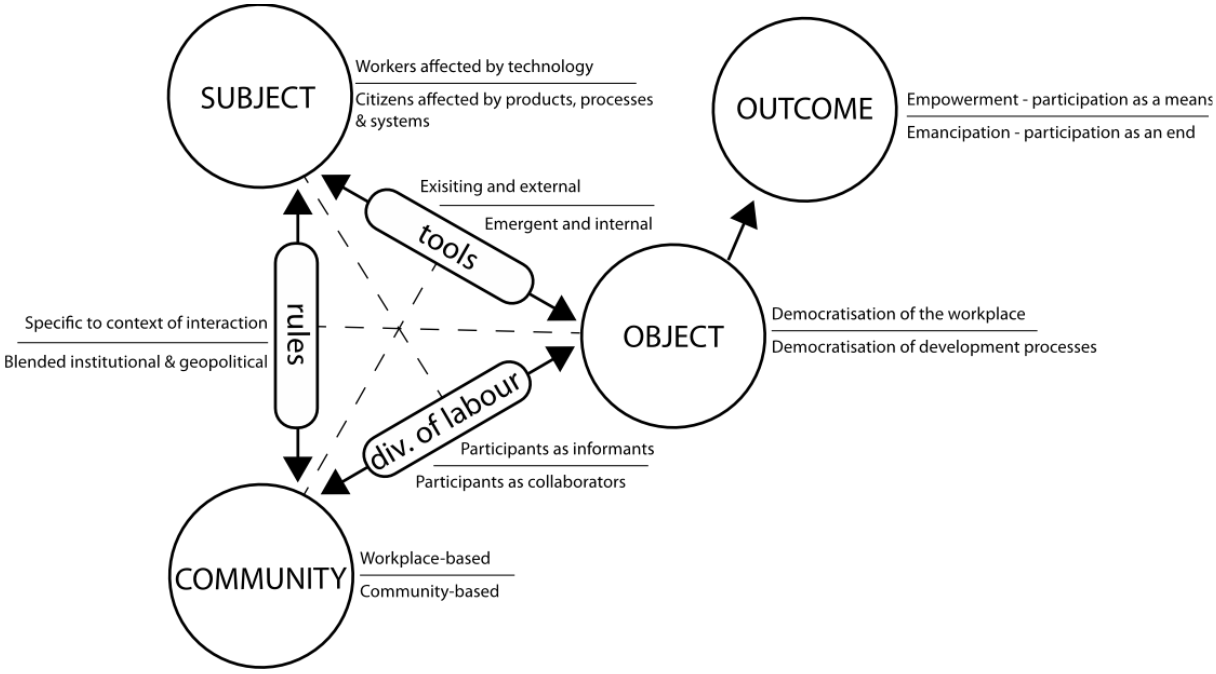


Figure 5.8: Participatory Design's change over time

Community based participatory design (CbPD) projects form the main context of this research; it is through the use of Activity Theory as an interpretive lens that I aim to explore these Participatory Design practices in more depth.

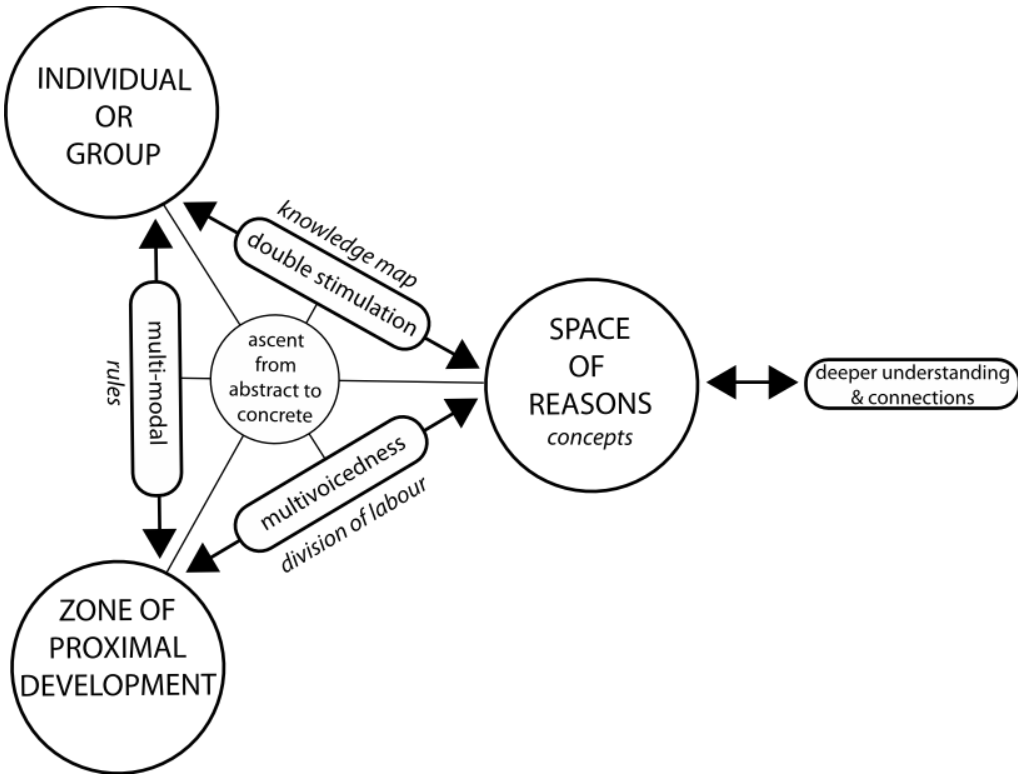


Figure 5.9: CHAT presented as an Activity Triangle (adapted from Clark, 2012)

Since its beginnings as a way to democratise the workplace, Participatory Design has seen a number of changes in its focus. Using CHAT to present the shift from Participatory Design's beginnings up to now we see an increase in complexity and heterogeneity of activity components and their mediating factors. The components of the PD activity system have evolved as follows:

- *Subject/s:* From its start PD has focused on involving users in design processes. The rationale behind worker inclusion in the 1970's was the fact that these workers would essentially be the people using the technology on its implementation, and therefore their opinion mattered (Gudikson & Svabo, 2014:142). The fundamental principle of inclusion stands fast, however, in contemporary PD practices the context has expanded out of the workplace and into society as a whole, therefore who is included varies far more. Essentially there are more people affected by design nowadays, requiring improved methods for inclusion, especially as these contexts have become far more heterogeneous in character.

- *Object:* The object of participatory design has shifted over time, from strengthening workers rights and a democratisation of the workplace, to democratisation of the development process (Sjöberg, 1996,30), and is "constantly oscillating between something to be created and something to be used" (Kuutti, 2009:79). Initially, employees of companies that were beginning to introduce computers to the workplace were the subjects of PD activities. The object of deign was therefore the democratisation of the workplace. The object of design was negotiated internally in businesses, between workers, union representatives and business owners. Giving the workers a say in implementation of the systems that they would be working with garnered acceptance and ownership. In contemporary PD activities, the expansion out of the workplace means the object needs to be negotiated by numerous people at many levels of society, and not necessarily end users, but all those affected by new products, services and systems. This shift on the object of PD is what Björgvinsson, Ehn & Hillgren (2012) refer to as "design-after-design" or the "infrastructuring" of design. As we have seen the shift from democratising the workplace to democratising development processes, the complexity of object negotiation has increased. Today, the object of design "must be considered as a horizon, as a guiding set of values, and as an axiological landscape to which one always must refer when taking a decision or evaluating a proposition within the design project, and is not an ideal goal to be reached in the more or less, near future" (Findeli, 2001:13 cited in Kuutti, 2009). Therefore, not only has the object of design shifted in terms of spatial impact, but also in time. Within PD projects we have seen a shift from a

fairly homogenous technology focus, toward more “local, particular and timely” objects, unique to their setting (Kuutti, 2009).

- *Tools:* Within PD there exists a wide range of tools to involve users in the design process. Although many original PD tools are still used, there has been a shift from system descriptions to more ‘hands on’ approaches such as mock-ups and prototyping, either in paper sketching or 3D mockups (Bjögvinsson et al, 2012). What has remained constant is the aim of these tools in facilitating dialogue and learning between all participants. We have also seen a shift in the type of learning tools in PD, from the fairly one-sidedness of tools to inform designers about worker needs, to the facilitation of more mutual processes of knowledge creation, where all participants involved contribute and learning can be seen as expansive. Engeström (2001:133) states that any theory of learning must answer at least four central questions:
    - Who are the subjects of learning, how are they defined and located?
    - Why do they learn, what makes them make the effort?
    - What do they learn, what are the contents and outcomes of learning? and,
    - How do they learn, what are the key actions or processes of learning?

  As the context of PD has expanded, so has the need for tools to emerge from the context. If tools are to facilitate participants learning and cater to the four questions above, they need to be more appropriate to their context of use, based in contextual ways of being and knowledge production. As PD is focussed on the emergence of new ways of being through collaboration, generative tools need to encapsulate the following aspects, (Gudiksen & Svabo, 2014:143):
    - Accessing and addressing user perspectives,
    - Flexible, easy, changeable journeys,
    - Tangible and dynamic materials, and
    - Game mechanics to enable “as-if-journey-scenarios”.

- *Community:* de Abreu & Elbers (2005) state that “in order to understand social mediation it is necessary to take into account ways in which the practices of a community…are structured by their institutional context”. Community practices are shaped by social, cultural and historical circumstances and in turn form individual’s identities and aspirations (Daniels, 2010:113). As the shift has taken place, from workplace-based PD activities to community-based PD activities, so has the need to understand community complexity. The community of PD activity has thus expanded to include a more diverse user base.

- *Rules:* The rules of PD have at their core remained the same, that is, direct involvement of people in the co-design of products, services and systems that affect them. These rules have increased in complexity however, as in the 1970's they were predominantly to do with workplace-specific technologies where workers had to accommodate the technology push. Rule complexity has increased in focus, and now takes into consideration community-level social needs, determined through more people-centred development processes. The rules of CbPD activities are now influenced by multiple layers of context, from internal cultural norms to external, imposed laws and policies.

- *Division of Labour:* During the 1970's workplace emergence of PD, power was held by the employee, as they determined *what* technologies were going to be introduced to the workplace. PD at this stage aimed at empowering the workers to determine *how* this (already decided upon) technology could best be integrated. We are at a point now where, especially in design for democracy activities, power is shared amongst all participants (Bratteteig et al, 2013:130), or at least, should be. Community members determine *how* development should take place (if at all) and *what* tools they will use to get there. These are co-designed and emerge from collaborative issue framing. There has thus been a general historical shift in power relations from a vertical to a horizontal division of labour. This cannot be said to always be true however, as specific contexts have their own power structures, and these are not always democratic.

This overview of PD activities from their emergence in the 1960's and 1970's to now, presents a simplified evolution of participatory design activity systems. Although very useful in understanding the conceptual changes of the field, if we are to understand specific projects and activities within PD, we need to adopt the lens of *expansive design*, that is multiple activity systems interacting with one another.

In the study of complex real-life phenomena, such as activities of co-design, applying one activity system model is often not sufficient (Kaptelinin, 2014). The complexity of such phenomena requires it be represented as *networks of activity systems* (ibid).

The minimum unit of analysis for expansive design is two interacting activity systems (Figure 5.10). This is the simplest form of design as an activity, with the triangle on the left representing the designer's activity, while the triangle on the right represents the customer or user. Engeström (2006:5) states that the formation of a partially shared object between the design and the customer/user is a crucial challenge. If the designer doesn't understand the user's needs or desires the activity systems will not align, resulting in a product/service or system that doesn't speak to its intended user. By first aligning the design activities of the designer with the use activity of the customer/user,

a shared object of activity can be formed, resulting in a co-defined outcome that benefits both parties. In Figure 5.10 Object 1 represents the initial problem or assignment of the design process as understood by both designer and customer/user. These perspectives do not necessarily align. Through interaction and dialogue these two objects begin to align. Object 2 represents the elaborated concept of the object. Here there is some common ground, with the object of design still being perceived from individual experience or knowledge. Object 3 represents the potential common ground or synergy between the two perspectives (Engeström, 2006:5). Here we see a collaborative object of design activity. This expansion of objects can also be seen in Figure 5.11.

In CbPD, the focus of this thesis, there are usually four interacting systems: the public sector, the private sector, academia and civil society (Figure 5.11).

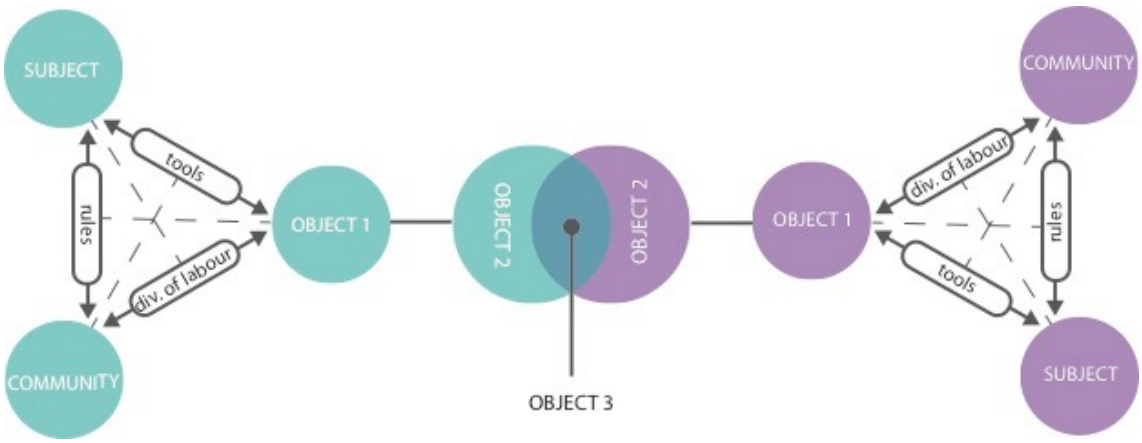


Figure 5.10: Expansive model of design (adapted from Engeström, 2006)

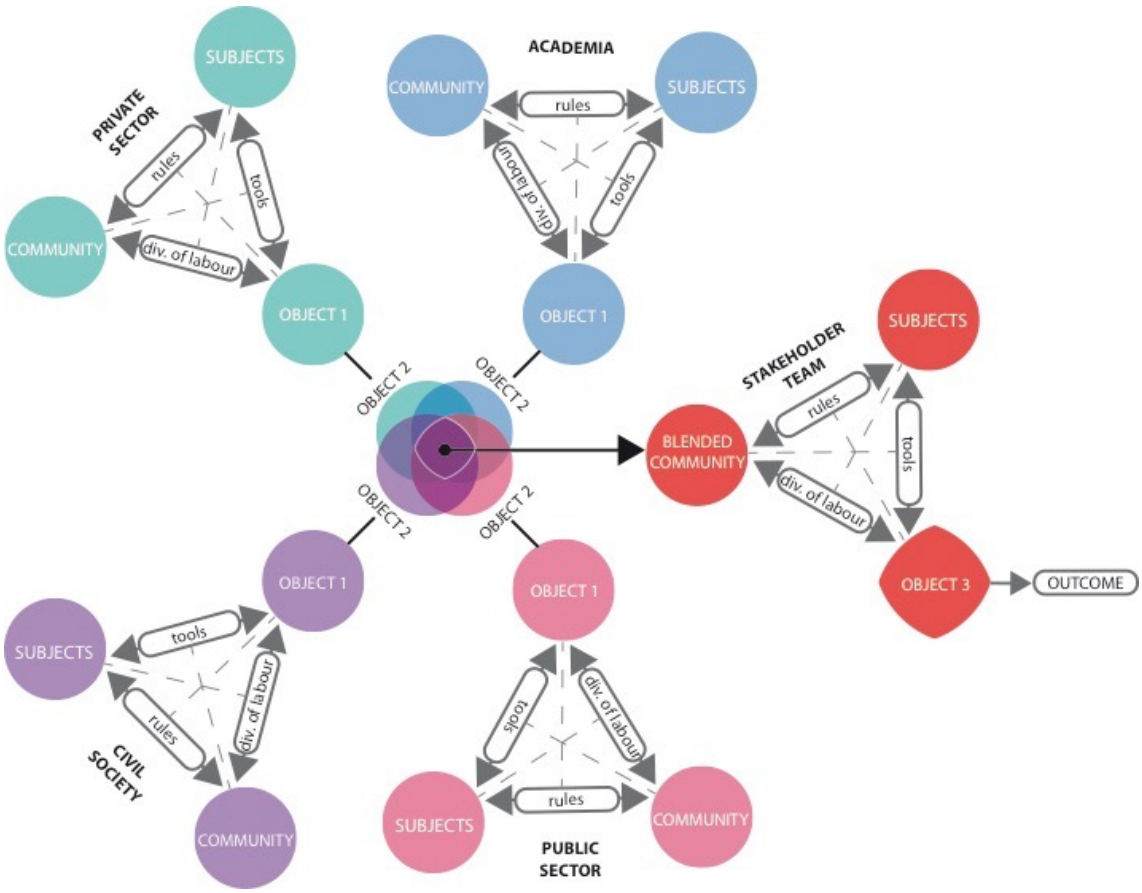


Figure 5.11: Expansive model of CbPD

This presents a more complex network of activity systems. Here we see the coming together of multiple activity systems representing multiple sectors around a specific theme, the object of design. Through discussions, planning and negotiations this object of design activity is reformulated, acknowledging each groups visions and motivations. This new, negotiated object of activity becomes the focus for a blended team of stakeholders, who act on it collectively. This community of activity represents the co-design team. The representation of CbPD in Figure 5.11 is however simplified, as each activity system itself contains multiple activities and there could be multiple activity groups from the same sector. It is imperative to note that this representation of CbPD activity is a snapshot of collaboration formation, and that Object 3 is continuously developing and being reframed, as changes within each activity system take place. This also results in multiple co-defined objects that evolve and emerge from collaboration.

This expansive design approach presents a shift from designing well-bounded singular products to designing "*tool constellations* or *instrumentalities*," toolkits needed in an activity (Engeström, 2006:14). Expansive design emerges in specific historical situations, involves development of both spatial and activity attributes and can be seen to have the following characteristics:

- It is an effort to change both activity and space,

- It unravels activity embedded into space and vice versa,
- It anticipates activity/spacial development by representation of future situations,
- It is primarily concerned with agency and the capacity to act,
- It is non-linear,
- It is bottom up,
- It is triggered by conflicts and fuelled by contradictions,
- It deals with conflict in a playful way,
- It has the tendency to broaden and diversify practices and concepts, instead of eliminating, focusing and concentrating (van Amstel, 2015).

Van Amstel also states that expansive design creates new social relations and spaces, which are not necessarily better, just different (ibid). I disagree with this aspect and believe that if expansive design has at its core expansive learning and the questioning of accepted practices, activities and spaces, then through a collective critique better social relations and spaces will emerge.

Figure 5.12 represents expansive design slightly differently. Here representatives of the design team initially present their individual understanding of the theme (Object 1). In moving to greater understanding these actors begin to reframe their ideas, with input from the rest of the team (Object 2). Finally, Object 3, represents a unified framing of the theme or object of design activities.

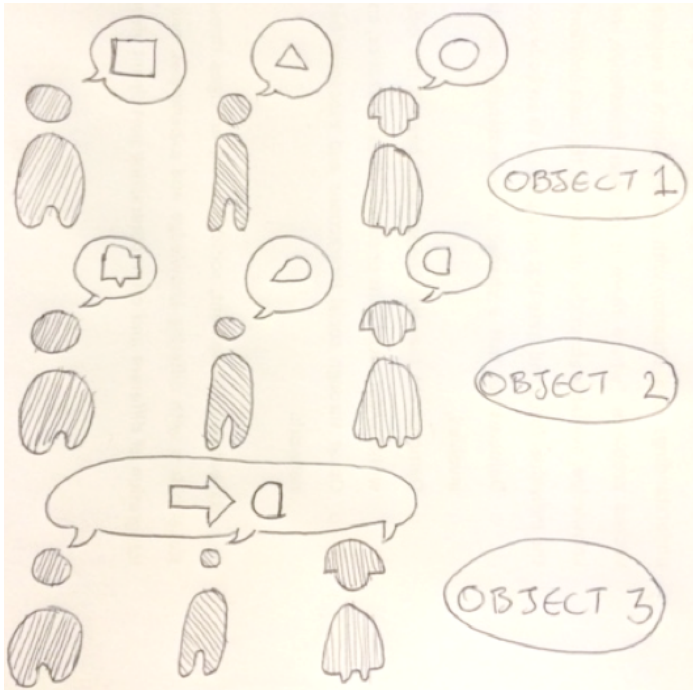


Figure 5.12: Expansive design revisioned (Authors construct)

5.4 Methods of Participatory Design as Activity Systems

From democratising the workplace to democratising development processes, PD practitioners engage with a number of methods aimed at actively involving users in design projects. These methods, embody techniques and tools for use in a range of settings, from tackling IT design in organisational settings to supporting communication and collaboration among health professionals.

Early PD projects embodied political overtones in which approaches were developed that aimed at helping various groups gain or regain their rights or influence decisions related to the increase in technology in the workplace with only a few studies discussing cultural-historical links between PD and method development within deeper sociocultural perspectives (Bratteteig et al, 2013:120-121). The early workplace technology projects, with their focus on developing methods for participative analysis of relations between work and technology, and the outline of strategies for union sway over technology projects, led to the development of methods, tools and techniques still used in contemporary PD projects (Kensing & Blomberg, 1998:174). The location of PD projects in socially embedded systems ranging from the workplace to community-based development requires its methods to be adaptable. PD can therefore be understood as a methodology, having it's own methods, specifically *meta-methods*, that is "a set of principles or method which in any particular situation has to be reduced to a method uniquely suitable to that particular situation" (Checkland, 1981 cited in Bratteteig et al 2013:118). This speaks to the contextual awareness and responsiveness that PD must embody.

This section briefly introduces and outlines 4 of the better documented methodologies used in PD and frames them using AT as an interpretive lens. The aim of this is to identify commonalities and differences, as well as guiding principles for future PD methods.

The PD methods explored are as follows: STEPS, MUST, CESD & Use-Oriented Design.

5.4.1 Software Technology for Evolutionary Participatory Design Development

STEPS *(Software Technology for Evolutionary Participatory Design Development)* is an early methodological framework originating from Technical University of Berlin and combines PD and software engineering with a focus on the custom development of new software (Bratteteig et al, 2013:121). It embodies a paradigm shift in software engineering from a 'product-oriented' to a 'process-oriented' paradigm (Floyd, 1992). This method facilitates the co-development of usage and software as a joint design and exploratory learning process (Bratteteig et al, 2013:121). The main perspectives are therefore those of the designers and users, acting together on emergent, jointly formed

objects. The gradual establishment of requirements take place in “an interplay of anticipative, constructive and evaluative steps” (Floyd, Reisin & Schmidt, 1989:53) developed through the interactions of developers and users.

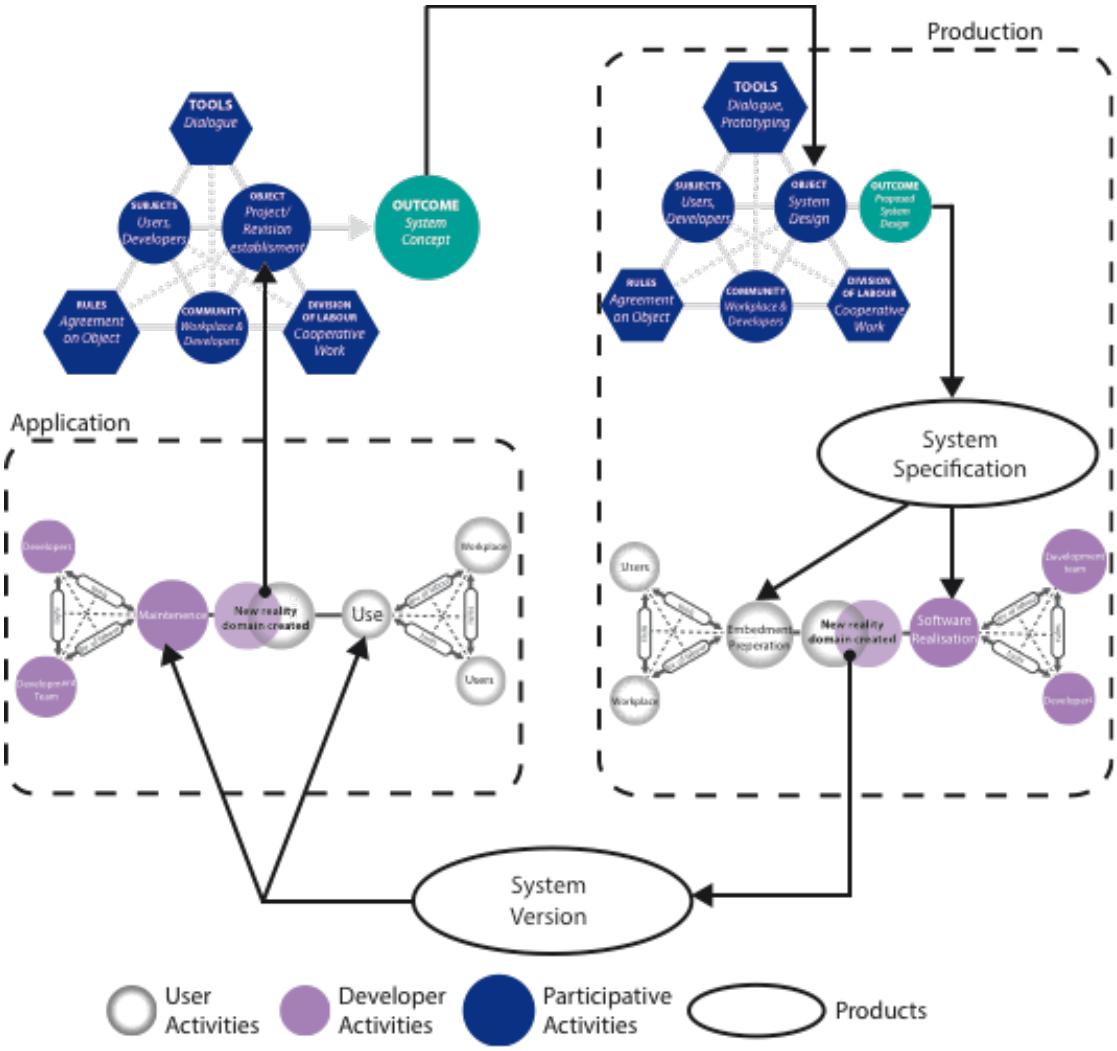


Figure 5.13: STEPS framed through Activity Theory

Within STEPS there are certain stages that are carried out by a blended design team of developers and users, termed *participative activities*, and other stages where the two work in parallel. In these parallel work activities we see expansive design taking place, where developers and users negotiate a way forward based in findings from each group’s activity. Floyd, Reisin & Schmidt (1989) refer to these negotiated objects as *new reality domains.* Figure 5.13, adapted from Floyd, Reisin & Schmidt (1989) presents the STEPS model framed through AT. Here we see the starting point as *Project Establishment* where users and developers collaborate on concepts of software development, with users deciding on which options to take forward. These options are then taken forward into the initial production phase of *System Design*, again a collaborative activity between users and developers. The object of this activity is the

development of proposed system designs, arrived at through mediation by dialogue and prototyping and other tools. The product of this activity is the system specification, which is then constructed by developers while users prepare the context for embedding of the software. These two parallel activities come together to produce a *system version,* which is then tested by users and maintained by developers. This expansive design phase requires continual negotiation of the object of design, which emerges and evolves through use. Once testing has taken place the cycle begins again with either revision or refinements taking place. STEPS, therefore adopts an evolutionary approach to design, comprising various forms of prototypes and the development of system versions (Floyd, Reisin & Schmidt, 1989:53). Within each cycle there is the combination of development and application of the software, with activities by designer/ developers, users and collaboration between both groups. Through the acknowledgement of joint and role-specific responsibilities, STEPS aims to incorporate heterogeneous perspectives from users and designers in the design of software systems for the workplace (Bratteteig et al, 2013:122). Floyd, Reisin & Schmidt (1989:53) note that 'multiperspectivity' is a basic prerequisite for cooperative work.

The following framing of STEPS through the interpretive lens of AT elaborates on Figure 5.13:

- *Subjects:* Developers and Users come together at the project establishment phase. Here, this collective group makes up the subjects component of the activity. During the development process though, this group splits into their two original groups of subjects, each acting on their own activity's object. Subjects in the STEPS process can therefore be seen as a converging and diverging component of the development activity system, coming together when a joint decision needs to be made, and separating when domain-specific knowledge is required.
- *Object:* Users and developers act together on the co-development of the software artefact, as well as the design and development process itself. The result or outcome of which is mutual learning between the users and designers. Objects in STEPS are acted upon by the collective group of developers and researchers, or negotiated by the two groups in expansive design phases.
- *Tools:* This method does not specify any tools or techniques, relying rather on the selection of these by designers and users as and when they are needed STEPS is compatible with any technique, tool or other method, provided they allow for evolutionary modelling (Bratteteig et al 2013: 123). The outcome of this process is the development of tools, in the form of programs. These tools will go on to mediate the user's objects well beyond the project.
- *Community:* The community of activity is the workplace, with developers embedding themselves in the user's space. Different activities throughout the design process require different communities of activity. The two community groups are the users, that is the workers who will end up using the software that

gets developed, and the developers. During the establishment of the project and subsequent revisions, users and developers work collectively in a community of practice, however, once the system is specified users and developers work in parallel on complementary activities, *embedment preparation* and *software realisation*. This parallel activity is seen again in the application stage.

- *Rules:* These include the joint participation in system development, user-oriented quality criteria favoured over technical quality criteria and the fact that design decisions rest with the users (Floyd, Reisin & Schmidt, 1989). As the process is made up of a series of activities, collective and expansive, certain rules and guidelines are developed for these by those involved, that is, they are domain specific. For example in the *application* phase, the rules that apply to developer work activities would different to the rules that apply to the user work activities. That is not to say they are always mutually exclusive, as overlap is possible.
- *Division of Labour:* STEPS specifies both aspects of joint-responsibility and role specific actions. The overarching labour concept however is that of equality, where the designers and users decide on the scope and structure of the object together.

5.4.2 Theories of and Methods for Initial Analysis and Design Activities

MUST is a Danish acronym for *theories of and methods for initial analysis and design activities*. This PD method offers a conceptual framework of the design process, focussing on the early activities of a development process while offering guidelines for project management as well as for the design proper (Kensing, Simonsen & Bødker, 1996: 137). It has been developed through projects based in the phase-driven sequential waterfall project model for IT development (Figure 5.14) with focus specifically on the initial design phase, and deals coherently with all design activities. Kensing, Simonsen & Bødker (1996:131) list these as: *needs and possibility analysis, generation of visions for change, project management* and *organisational implementation.*

The model provides four types of resources for action (Figure 5.15): well defined *concepts* to help designers understand and frame the situation; a particular perspective formulated as 4 PD *principles* forming the backbone of the method; suggestions for how to *organise* the design project in four phases; and a set of *techniques and tools* for specific activities, including meta guidelines to help in selecting and tailoring techniques or tools for specific purposes (Bratteteig et al, 2013:123).

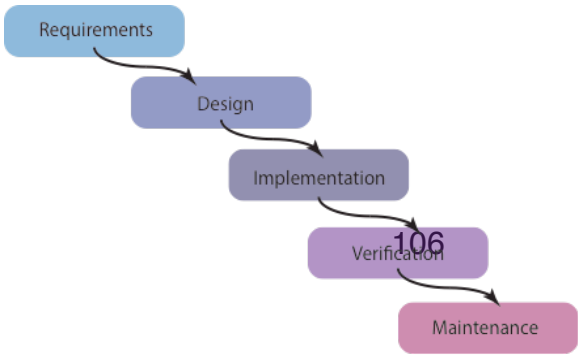


Figure 5.14: Sequential waterfall model of IT development

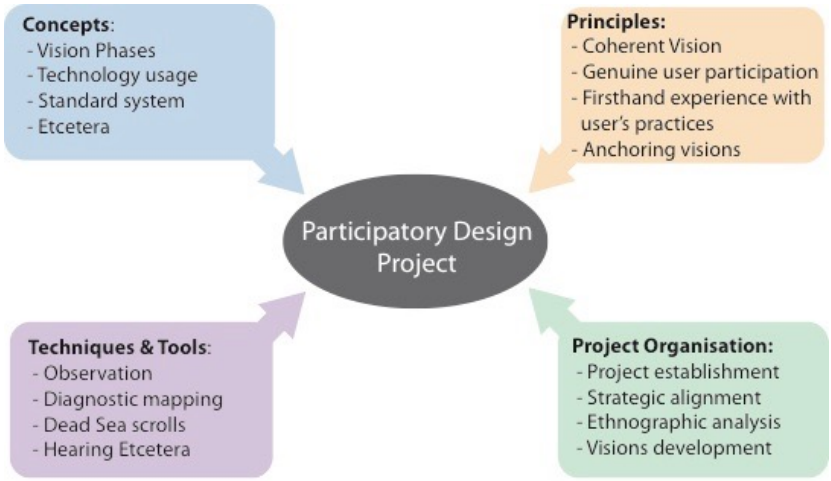


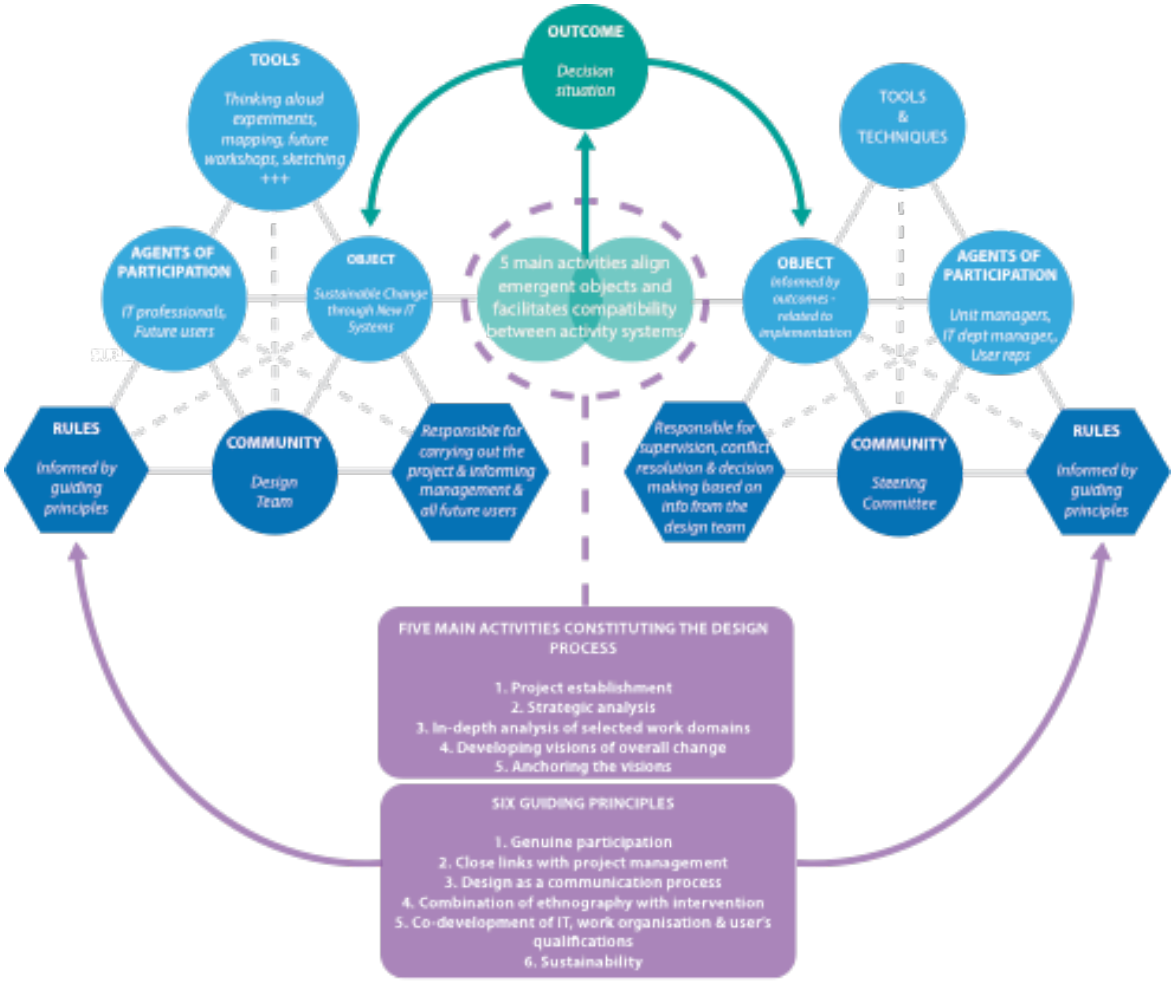
Figure 5.15: MUST method's four types of resources for a PD project (Bratteteig, 2013:124)

Framed using AT (Figure 5.16) we see an overview of the MUST method as an example of expansive design, with the two key communities of activity, the design team and the steering committee, acting on emergent objects. These objects are related to the 5 main activities that constitute the design process, with each producing an object to be co-defined. The general object of these activity systems is the sustainable change of an organisation through new IT solutions. The design team acts on this by co-developing possibilities, while the steering committee selects which options will be carried forward. Throughout the process, five main activities ground both activity systems actions in collaboration, resulting in a *decision situation*. These decisions navigate the individual activity systems as they act on the resulting objectives. A framework for mutual learning (Table 5.4) functions as a guide to support different types of mutual learning situations (Bødker, Kensing & Simonsen, 2014:61).

Figure 5.16: MUST framed through AT lens

Table 5.4 Six Domains of Knowledge (Bødker, Kensing & Simonsen, 2014:62 based on Kensing & Munk-Madsen 1993)

	Current Practices	Practices with new technologies	Technological options
Abstract Knowledge	Relevant descriptions	Visions and design proposals	Overview of technical options



Concrete experience	Concrete experience with current practices	Concrete experience using new technology	Concrete experience with technological options

As stated above, the MUST method focuses on the requirements and design phases of the waterfall model. Within the design phase however are a further four phases. These phases are the activities performed by the separate communities of activity, the design team and the steering committee, and take place between each collaborative decision point. The term ‘phase’ here is aligned to the work of Anderson, Kensing et al (1990 as cited in Kensing, Simonsen & Bødker, 1996:130) who define a phase as “the activities which are performed between two major decision points, and that each phase includes analysis, design, programming and documentation to the degree that these activities are needed to bring about a sound basis for evaluating the distance between current status and current plans.” Table 5.5 presents these four phases adapted here for DfD, their scope or object in AT terms, the planned outcomes and associated decisions.

Phase	Object	Planned Out-come	Decision

Initiation: project establishment	Scope of the design project	Project charter	Premise and scope of design project
In-line analysis: strategic alignment	Aligning the project's goals and community's strategies	Strategic alignment report	Social domains to investigate
In-depth analysis: ethnographic analysis	Social practices in selected domains	Analysis report	Prioritising goals and ideas for change
Innovation: vision development	Visions of design and relation to context and local skills and knowledge	Design project report	Visions to realise, scope and order of successive implementation projects

Table 5.5 Focus of the Four Phases and Associated Decisions (adapted from Bødker, Kensing & Simonsen, 2014:63).

The following framing of MUST through the interpretive lens of AT elaborates on Figure 5.16:

- *Subjects:* An organisational cohort of workers including users, management and other staff. In large companies all staff cannot be involved, in which case the method utilises representation. Including staff from multiple levels of management and with different jobs, this method makes use of varied indigenous workplace knowledge
- *Object:* According to MUST, the original object of design is the enablement of a "…Participatory Design approach responding to contemporary business needs and conditions for IT projects" (Bødker, Kensing & Simonsen, 2014:60), while in an organisational setting, the object of design "is to achieve sustainable change by introducing new IT systems" (ibid). The five main activities constituting the design process are each directed at an object, thus with each phase comes a new object derived from co-definition between all agents of participation.
- *Tools:* Literature lists a number of tools and techniques available in mediating the activity of the design team, such as observations, Diagnostic Mapping, Dead Sea Scrolls, Hearing Etcetera, Thinking aloud experiments and Future Workshops (Bratteteig, 2013; Kensing, Simonsen & Bødker, 2013) to name a few, however little attention is given to the tools used by the steering committee in decision activities. The decision-making activities of the steering committee are rather influenced by the Rules and the six guiding principles of MUST. All in all MUST makes use of 17 well defined concepts to understand and frame the situation; 16 techniques and related tools, including meta-guidelines to help select and tailor techniques or tools for specific purposes; a framework for mutual learning functions and various ethnographic inspired techniques (Bødker, Kensing & Simonsen, 2014:61-62).
- *Community:* Based in the organisational context, the two key communities that interact in the project are the design team and the steering committee. These are

populated by designers and users, or a representation of users in large companies.

- *Rules*: MUST is a conceptual framework emphasising the need for a thorough definition of the problem setting during the early stages of design that 'reveals goals, defines problems and indicates solutions' (Bødker et al, 2004 cited in Bratteteig et al, 2013:123). Specific rules are determined externally by workplace practice such as a code of conduct, and internally by the 6 guiding principles that mediate the activities of the two activity systems. These include the active involvement of users, the rule that users must be assured a say in design when users and designers are not co-located, and the fact that findings and proposals must be grounded in the larger work group (Bødker, Kensing, Simonsen, 2014:59-62).
- *Division of Labour:* shared amongst participants, MUST calls for genuine user participation, that is, active participation of organisational members. The role of the design team is to investigate the situation and provide information for a decision about how to proceed, while the role of the steering committee is to make decisions based on what the design team presents. Therefore the design team is responsible for carrying out the project and informing management and all future users of their findings, while the steering committee is responsible for supervising the design project, dealing with potential and manifest conflicts and making decisions based on information provided by the design team (Kensing, Simonsen & Bødker, 1996).

These components of a participatory activity system based in MUST aim to produce one or more coherent visions for change, in relation to the context.

5.4.3 Cooperative Experimental System Development

The Cooperative Experimental System Development (CESD) method is characterised by its focus on:

- Active user involvement throughout the entire development process,
- Prototyping experiments closely coupled to work situations and use scenarios,
- Transforming results from early cooperative analysis/design to targeted object-oriented design, specification, and realisation, and
- Designing for tailorability (Grønbæk, Kyng and Mogensen, 1995:1).

At this approach's foundation is its alignment with the 'tool perspective', which takes the labour process as its origin, rather than data or information flow (Bratteteig et al., 2013:125; Ehn and Kyng, 1985:1). In the development of tools, Ehn and Kyng (1985:13) refer to the 'experienced end user' and the 'skilled worker', acknowledging their tacit knowledge, which forms the basis of analysis and design and thus

necessitates their inclusion in the design and development process. That is, users contributing to the design of the tools they use.

To do this CESD moves away from an activity flow model, apparent in the previous PD method examples of STEPS and MUST, toward a conceptual model (Figure 5.17) that analytically separates abstract concerns from concrete activities and techniques. At an abstract level, concerns capture what a project is about, while activities are what actually goes on in a project (Bratteteig et al, 2013:126). This analytical separation of activities and concerns acknowledges that an activity may contribute to several concerns and vice versa, that is, “any one concern is realised through a number of activities” (Grønbæk, Kyng & Mogensen, 1995:5). Figure 5.17 presents this separation in a conceptual model for cooperative experimental system development.

This conceptual model places project *activities* in the centre of the top layer. CESD activities relate to the early Scandinavian model of Cooperative Design, where the important, distinguishing activities are workshop-based cooperative experiments and interventions. These activities develop in the context of the involved domains, which include the practice of the developers and users, and the technology and visions of technology in use (Grønbæk, Kyng & Mogensen, 1995:4).

The central level shows the *concerns*, which as illustrated in the internal cone, are realised through activities. Grønbæk, Kyng & Mogensen (1995:4) state that, “One activity typically contributes to more than one concern, but usually an activity has one concern as its main focus.” Figure 5.18 presents a fictional example of how project establishment could be framed as an activity, with end users, developers and designers planning tasks and deliverables, actions mediated by observations and descriptive techniques. The activity here has as its focus the concern of management (M) but also contributes to design (D) and analysis (A), to lesser degrees.

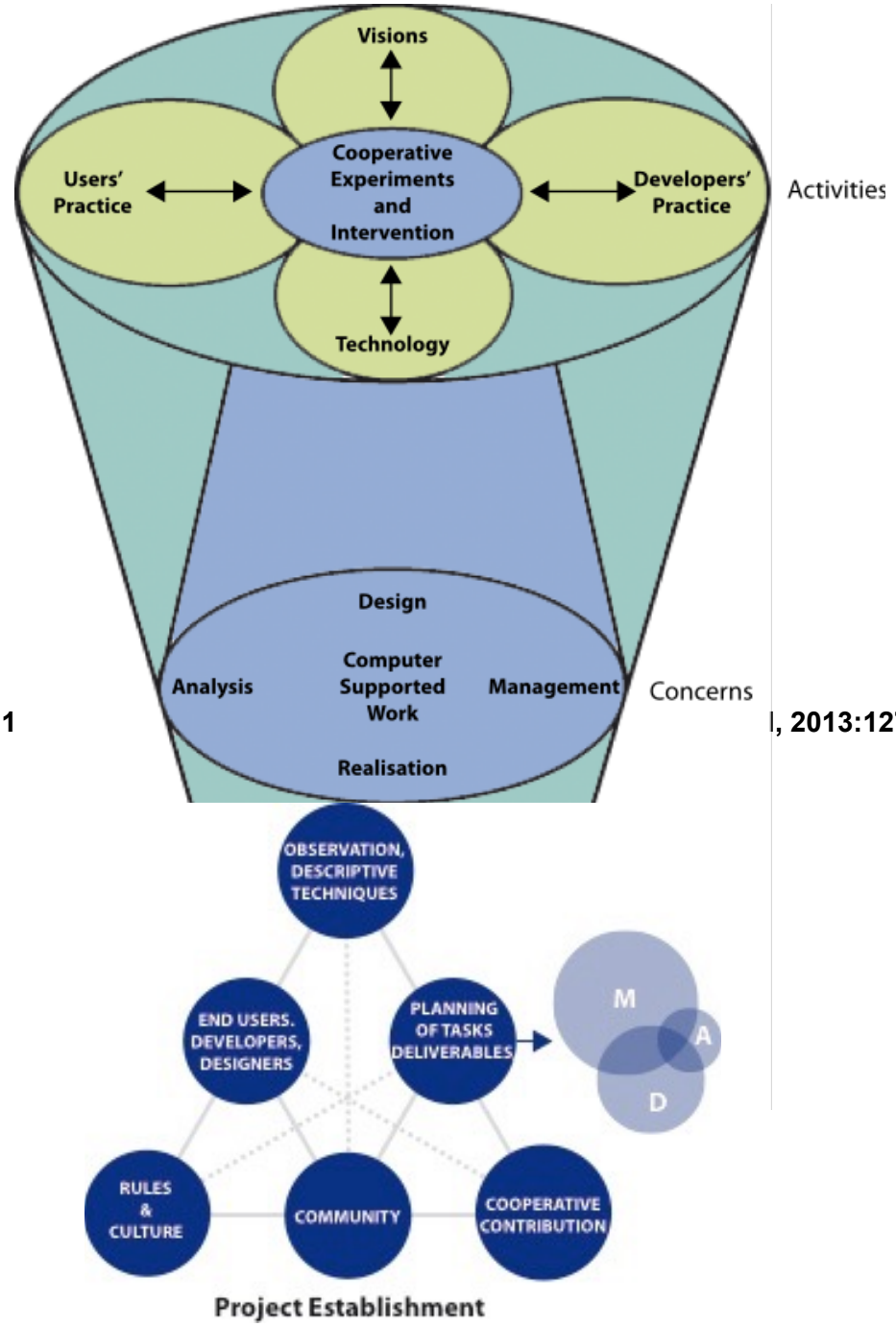


Figure 5.1 **, 2013:127)**

Figure 5.18: Activity system with management, analysis and design as outcomes of planning phase

Figure 5.17 also illustrates the relationship between the concern and activity levels, such that project management is mainly directed towards the developers practice, analysis towards user's practice, design towards visions of technology in use, and realisation towards technology (Grønbæk, Kyng & Mogensen, 1995:4). At the base of the model (Figure 5.17) is *project assignment*, which represents the task as it is understood by the project participants, this also gives direction to the concerns (ibid).

Figure 5.19 presents an example of the CESD conceptual model through the lens of activity theory, where the *object* of the activity, a collective understanding of the task by

users and developers, is embodied in the activity and acted upon by participants. The *Project Assignment* component of the CESD conceptual model can be understood as the co-defined object of activity, representing the task or work activity as it is understood by the participants. The object contributes to multiple concerns, which are in turn realised through various activities. The model represents the complex work environment where, through activity, possible tools for the domain are produced and tested, giving rise to emerging *artifacts-to-be* (Kuuti, 2009:80).That is, through activities focussed on improving tools currently used, new uses emerge. This relates to Grønbæk, Kyng and Mogensen, (1995:9) in their unpacking of analysis, in which they state that, "Challenging the established with alternative possibilities is a primary means to investigate constraints and potentials for change within current practice."

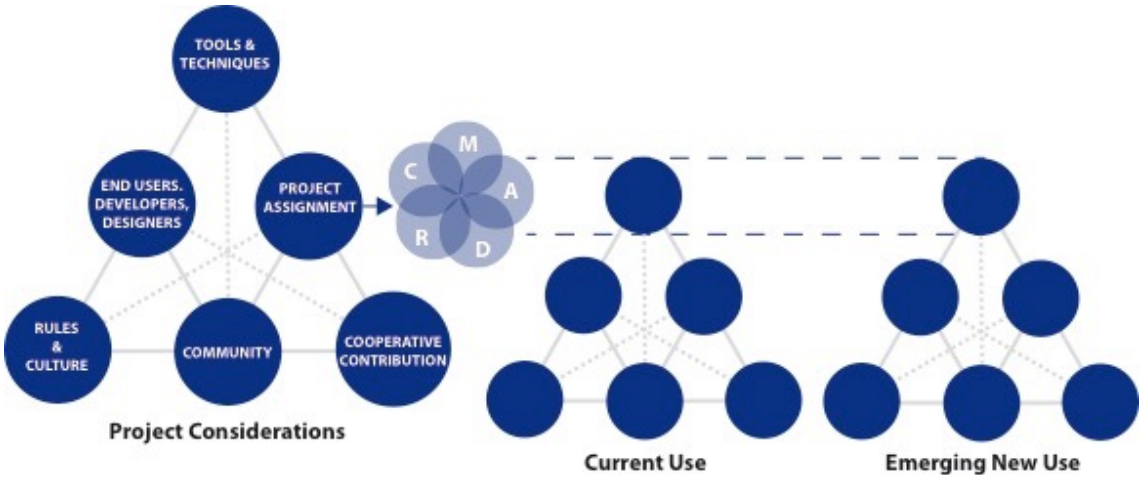


Figure 5.19: Example of CESD framed through an AT lens

The following framing of CESD through the interpretive lens of AT elaborates on Figures 5.17 and 5.19:

- *Subject:* End users, developers, analysts, designers & programmers all play a role in CESD projects. CESD makes use of 'user representatives', users involved in the design process who intermittently discuss concepts, visions and progress with colleagues and other community members not involved in the project. This extends the analysis and design beyond the working group (from subjects to community) and can provide new insights and contributions to the project (Grønbæk, Kyng & Mogensen, 1995:13).
- *Object:* The overall object of CESD is *change within practice with people from practice* (Grønbæk, Kyng & Mogensen, 1995:8). Individual activities that make up the process will each have their own object, determined by those involved. The *project assignment* (lower level in Figure 5.17), encapsulates the concept of a co-defined, shared vision of change driving the activity, and is presented here as the object of design.

- *Tools:* The basis of the tools and techniques of CESD is their object-orientedness, aimed at mediating change. These include thought provoking artefacts, prototyping and mockups, descriptive techniques, ethnographically-inspired approaches, observational techniques and dilemma games (Grønbæk, Kyng & Mogensen, 1995:9,10,11,12). The tools and techniques used in CESD are 'flexible' allowing them to be modified for different purposes or adapted to participant needs.
- *Community:* The activity community is a team made up of users and designers in an object-oriented development environment, stated in CESD literature as the best opportunity for cooperation in system development (Grønbæk, Kyng & Mogensen, 1995:11).
- *Rules:* Rules in CESD are aimed at ensuring genuine participation by users, fostering tailorability and continued development, and establishing an object-oriented approach to design. They include but are not limited to, specifying that a minimum of one contact person (minimum) per group of end-users be involved; rules around establishing and sustaining cooperation; and specifying that implementation happens incrementally, giving continued feedback toward analysis and design, and facilitating learning from real use (Grønbæk, Kyng & Mogensen, 1995:7,13,14).
- *Division of Labour:* Labour is shared equally by all involved, however each participant works to their strengths, ie developers mock up software and users provide tacit knowledge of use in context.

5.4.4 Use-Oriented Design

The use-oriented design process is an iterative cycle of development, grounded in a series of PD activities (Figure 5.20). Starting with framing a real-life problem situation and then garnering an understanding of practice within this situation, use-oriented design is initially concerned with activities and the logic or reasoning behind them (Bratteteig et al, 2013:127). That is, it is initially centred around *what* is taking place rather than *who* is performing the task.

Grounded in *future use,* the process can be seen to focus on defining use through use, that is, by focusing on what is taking place and what/how tools are being used, it aims at envisioning use-before-use (Bratteteig et al, 2013:127; Ehn, 2008; Redström, 2008:416).

Exploring tools and their use in context with users, this process is aims at delaying any decisions around the design problem, until after a fair amount of mutual learning has taken place. During this time developers learn about context and tool use from those that experience them, the users; while users learn about technical possibilities from the

developers. This pre-design phase is imperative in garnering working relationships and trust, and in the co-defining of common objects of design.

From this evaluation of existing tools and their use, the development team moves on to understanding user needs and wishes related to future use of tools. Sketching and prototyping facilitate communication and help concretise ideas and visions into possible new tools and ways of doing. Redström (2008:416) states that this participatory process of defining use through use is a central basis for design exploration.

In further definition of future tools, tool requirements are matched to user needs and wishes, and then materialised for testing. Once testing and evaluation has taken place, the iterative cycle of design begins again, now focussed on these tools in use. Design methods therefore facilitate future tool use before they become concretised in actual use. Key to use-oriented design are the ways existing tools mediate between an understanding of current practice and user needs, and how future tools facilitate the concretising of these user needs.

The following framing of use-oriented design through an AT lens elaborates on Figure 5.20:

- *Subjects:* Subjects in use-oriented design include a user group and developers/ designers. In more complex projects multiple user groups might partake in the project, with the outcome from the previous phase or design activity forming the object of design for the new group (Figure 5.21). These groups work together to define the object of design, with the users being the conduit through which work activities are explored. Users offer past experiences to the design mix, which is combined with developer's technology knowledge.
- *Object:* The object of use-oriented design evolves with each phase. Because phases are modelled as PD activities, each has a unique object toward which the participants act. These objects are negotiated during the process by users and developers. A constant object that underpins all phases and activities is mutual learning.
- *Tools:* This method utilises tools for mutual learning throughout the process, aimed at drawing out aspects of user experience on one hand, and technical options on the other. Here, developers learn about context and tool use, while users learn about technology options, which can go on to inform their design proposals. Sketching and prototyping are used extensively to concretise ideas and communicate design options. Prototypes that arise from the co-design process act as *boundary*[2] *objects* representing the future object of use (Ehn,

[2] Boundary in this case relates to a shared space (Star, 2010)

2008). Boundary objects embody three qualities: *Interpretive flexibility*, the *structure of informatic and work process needs and arrangements*, and finally, the *dynamic between ill- structured and more tailored uses of the objects* (Star, 2010; Star & Griesemer, 1989). Each phase or PD activity utilises a set of techniques and tools appropriate to that phase, here the object of the process determines tool use.

- *Community:* The community of each project is the larger work organisation or department within which the project takes place. From this cohort a single group or multiple user groups are formed for collaboration within the project.
- *Rules:* A key to use-oriented design is the postponement of the design problem definition until after the users and developers have "got to know each other" (Bratteteig, 2013:127). Here, collaboration and negotiation precede problem definition.
- *Division of Labour:* Users and developers collaborate and negotiate the problem domain and solution together, co-defining the object of design. This collaboration is rooted in the fact that both groups have a mutual interest in a successful solution.

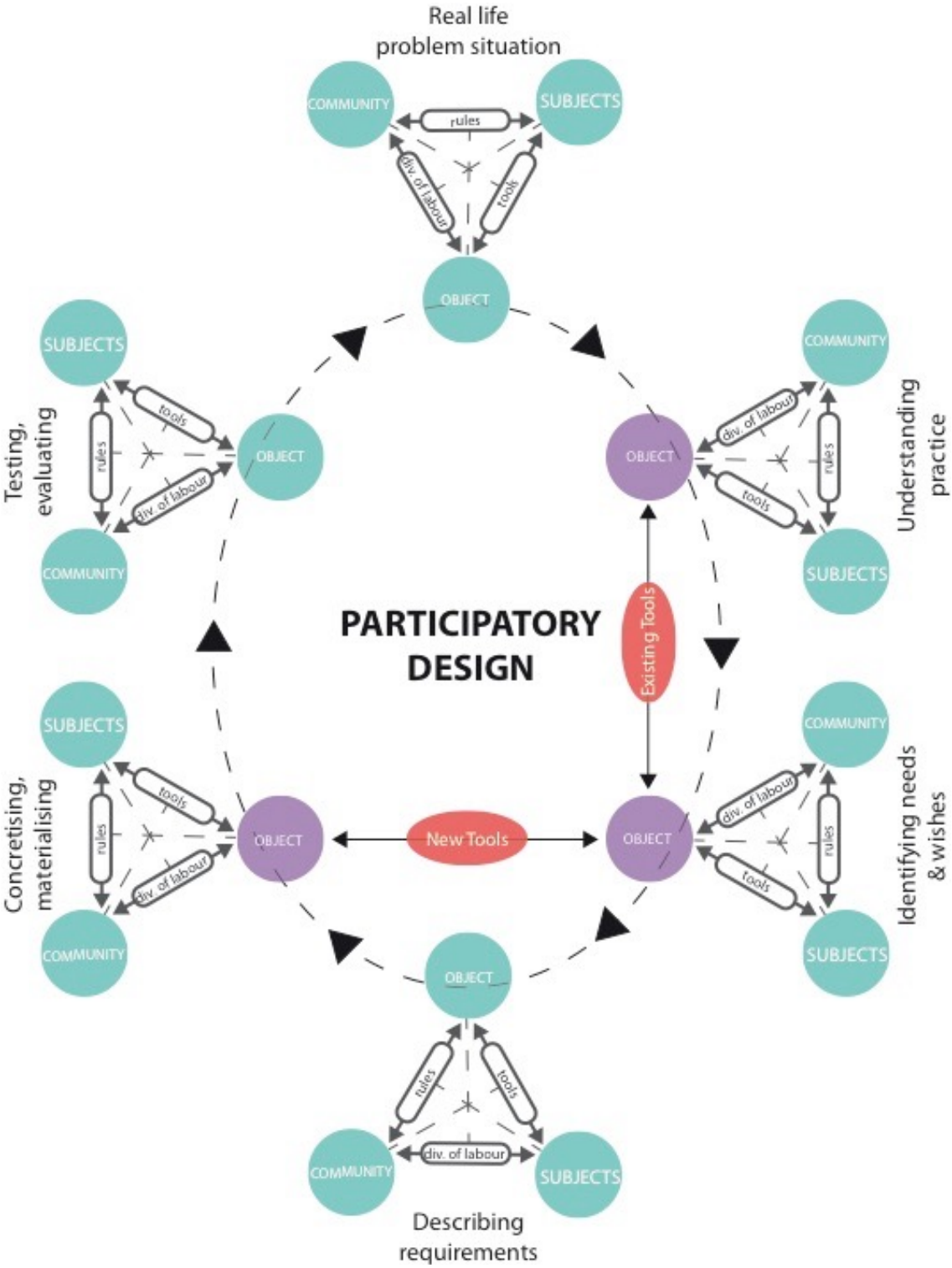


Figure 5.20: Use-oriented design framed through AT

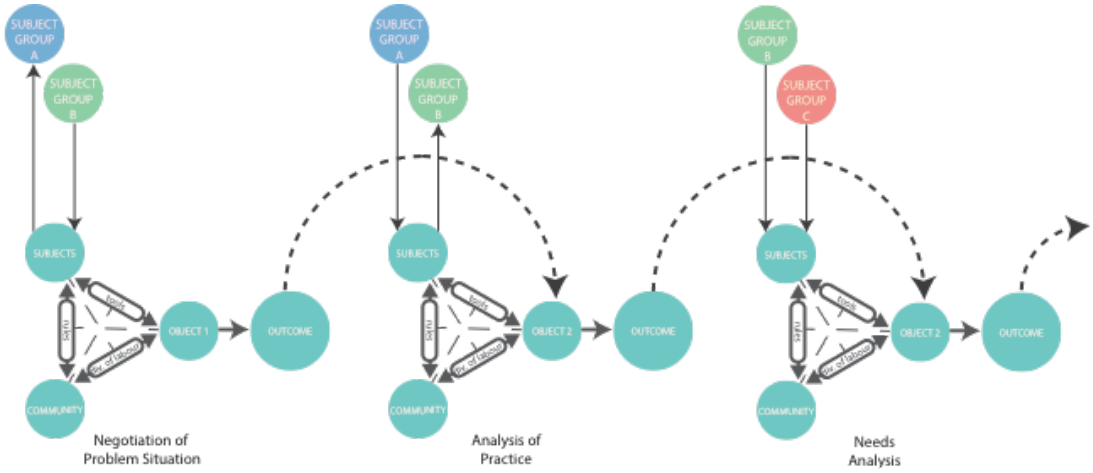


Figure 5.21: Example of use-oriented design involving several user groups

5.5 Collated Findings of Participatory Design Methods

Presented here are four key methods adopted in the practice of PD, and as can be seen, they focus predominantly on technology in the workplace and traditional Scandinavian models of PD. This thesis extends the realm of PD beyond the workplace and into society. Based in collaborative projects and CbPD, the focus is not on system development, but on social development. Although it is acknowledged PD is moving beyond technology design, few methods in PD literature deal with this space. The methods presented here are drawn from the *Routledge International Handbook of Participatory Design* (2013) yet they are all still based in projects focussing on technology in the workplace. These PD methods still echo Kensing & Blomberg's (1998:167) framing of PD research as the exploration of "conditions for user participation in the design and introduction of computer-based systems at work." As we move beyond the workplace and into the complex social landscape, it can serve us well to identify what works in these existing methods and how they can possibly be adapted, informing CbPD practice. PD methods essentially focus inclusion of users and facilitating the co-design and development of change, which is also applicable in CbPD.

Cultural Historical Activity Theory (CHAT), as a theoretical framework in the analysis of these PD methods, was chosen for its usefulness in multilevel analysis of how institutional practices change, in this case through the co-design of technology. The methods were presented as design and development activities containing within them lower level activities. Although these methods are not framed in use in specific projects, with specific activities and actions, CHAT provides a useful framework for deep

analysis of these methods, and a universal lens through which to compare and explore them.

In STEPS we see two forms of participation between users and developers happening. Firstly, the co-development of the project specifics, its outline and initial system design, with both users and developers working in a single group within the same activity system. This group then splits into two groups, one of users and one of developers, who continue to work in parallel but in their own domain, these two activity systems co-define a new object in relation to their work which is then produced and becomes the focus of the next phase of expansive design, the outcome of which goes on to form the basis of project revision by a single blended activity group. MUST presents an expansive design model with the two key activity groups, the design team and the steering committee, in continual object negotiation and production. Once an object is agreed upon this information feeds back into both groups, with developers and users producing phased outputs which the steering committee then evaluates.

In CESD we see a move away from an activity flow model toward a conceptual model. This less prescriptive approach frames a collective understanding of the task by users and developers as the object of activity, which gives direction to the project. Within CESD there is a single blended activity group who work together throughout the project, with activities unfolding in the context of the involved domains. In use-oriented design we see a core, blended design group performing a number of activities, the output of which become the focus of the next activity. What is important to notice in use-oriented design is “the way in which needs are identified and how the understanding of practice and the ability to concretise and materialise…solutions interplay” (Bratteteig et al, 2013:128). These methods, framed through AT, provide a good grounding for approaches to PD beyond the organisational setting and beyond the scope of information technology.

Emerging from PD for information system development (ISD) there has emerged a key definition of what a method consists of. Mathiassen (1981), defined a method as consisting of a definition of the application domain; the perspective and preferred principles of organisation and cooperation used to approach the defined domain, such as the preferred structure of division of labour and coordination; and, how these principles guide the application of specific design principles, tools and methods. Anderson et al (1990) later echoed this definition, stating that a coherent method must consist of an application area or scope; a perspective or standpoint from which guiding principles are derived; and guidelines on how to carry out the design process, facilitated by techniques, tools and principles for organisation. In PD this would typically include the type of stakeholders to include, how to involve them in core activities, and how to resolve conflicting viewpoints (Bratteteig et al, 2013:119). Hirschheim, Klein and

Lyytinen (1995:128) go on to state that the term method, arising from ISD, could be seen as “an assembly of tools and methods into a systematic approach, covering the complete lifecycle from problem formulation to implementation, evaluation and maintenance.”

PD methods can thus be interpreted as meta-methods, that is “a set of principles of method which in any particular situation has to be reduced to a method uniquely suitable to that particular situation” (Checkland, 1981:161 as cited in Bratteteig et al, 2013:118). A Meta-method determines not only the tools and techniques used in the project, but its use in designing the project itself – the project begins with the co-design of the project; knowledge sharing forms the initial object of the activity of design – this gives rise to subsequent activities of design. Within PD Ehn (2008) refers to meta-design, *design-after-design*, where the focus of design extends to the use phase of a design outcome, giving rise to subsequent activities with unforeseen users who might engage with the artefact in unforeseen ways.

5.5.1 Transferable Perspectives

Drawing on an analytical perspective of the above four recognised PD methods through the lens of AT has elicited nine key perspectives and guiding principles applicable to PD beyond the domain of organisational information systems, and that I believe to be relevant, to CbPD. These PD principles aim to democratise the design process and at equalising power structures amongst participants. As noted earlier in this thesis unequal power structures and conflicting agendas are central to the political dimension of PD. These perspectives are explored from an empirical grounding in the case study (Chapter 7). Drawing from STEPS, MUST, CESD and use-oriented design, I propose that CbPD should take into consideration:

- ***Genuine participation of all participants -*** Kensing (1989) argues that genuine participation entails *access to information, resources* (time, money and expert assistance) and *the power to influence decisions.* Kensing & Greenbaum (2013:23) also point to the work of Clement & van den Besselaar (1993) who suggest a further two components of genuine participation, which are *appropriate participatory development methods* and *organisational and technical flexibility.* In addition to these I’d add that participation should happen from project formation, with participants co-defining the project domain. This facilitates more of a partnership between designers and users, and pre-empts the idea of user buy-in.
- ***Consensus around the object of design*** - acknowledges that advancement of the workplace and the tools that are used in that space are compatible to the user’s needs. User skills and knowledge, and the tools they use, need to align with how the community wants to develop. If there is a chasm between these three components, development will falter. This can be extrapolated into CbPD

projects where, on the development of negotiated objectives, tools and the skills and knowledge appropriate to the journey can be developed in unison. Therefore one isn't just designing tools with current users for current use, but aligning tool design with future-use. A design project therefore needs to address, plan for, and estimate the costs of the activities taking care of technical, organisational, and educational issues (Kensing, Simonsen & Bødker, 1996: 134). Here we see the shift in co-defining the the object of design before the co-designing of the object.

- ***Facilitation of mutual learning*** – Schön (1992:4) describes the process of designing as "a reflective conversation with the materials of a design situation." Schön (1992:5) goes on to expand on this notion of design as a conversation as a "communicative activity in which individuals are called upon to decipher one another's worlds." This *deciphering* can be seen as an attempt by stakeholders to understand one another's domains. Mutual learning begins here, in an understanding of one another (the known); it then progresses through co-design to focus on future tools (the unknown). The facilitation of this learning is imperative. The *tool perspective* in CESD proposes prototypes as a way to avoid using technical language in communication with the users, where use-oriented design posits that user's should not have to use technical-oriented language (Bratteteig et al, 2013). Through the reduction of language barriers (technical or cultural) participants can better learn from one another, allowing access by all to the various knowledge fields present within the design group.
- ***Fostering Resilience and Social Capital*** - This principle posits that processes, activities and tools used with the design process are accessible to stakeholders beyond the design project, allowing community members to control and develop further iterations, frame new community issues and answer new needs that might arise.
- ***Alignment of design object to implementation agent/agency*** - Grønæk, Kyng & Mogensen (1995:11) note how PD literature rarely pays attention to cooperation around realisation of the design outcome, and stress the importance of an overlap between the analysis/design group and the implementation group. Within the realm of CbPD it is imperative that design options are compatible with the resources of the project owners. Too often designs pitch beyond the realistic, resulting in tainted expectations of community members.
- ***Tradition responsiveness*** – Successful products, processes and systems can be seen to be successful when they are adapted into the practices of their users (Grønæk, Kyng & Mogensen, 1995:14) thus a thorough understanding of domain is imperative. Ehn (1989:28) suggests that PD attempts to balance "tradition and transcendence" that is, it moves between participants tacit knowledge and the more abstract, analytical knowledge of researchers or designers. The tools and methods that people use to mediate their activities also evolve, and thus customisation/tailoring of PSS need to be possible. CbPD approaches should also

allow users to tailor solutions or define new solutions in response to evolving or emerging traditions.

- ***Adaptability -*** Cooperative analysis and design techniques may be applied during use to identify needs for continued development or tailoring (Grønæk, Kyng and Mogensen, 1995:14). This has bearing on participation as an end, as during the use phase of PSS, designers are not present. Within CbPD, design tools and processes should be passed on to users to allow them to analyse and design iterations of the design output. This implies a mutual learning component in the collaborative design process, that is, designers learning about context from users, and users learning about design and technology from designers. It is in reference to this that Grønæk, Kyng and Mogensen (ibid) state that "To maintain evolving opportunities for use, it is important to pay explicit attention to creation of open points for tailoring, flexible system architectures and tools for tailoring, during analysis, design and implementation." Due to the difficulty in developing a fully tailorable system, especially when moving from digital solutions to physical ones, the authors (ibid) suggestion of anticipating where variations in use might take place and the design of *open points*, allows users the option of changing or adapting the project output to varied or new uses. The idea of adaptability needs to be embedded throughout the design process from problem analysis to design to implementation.
- ***Inclusive and exclusive practices*** – This principle outlines the need to identify which activities suit collaboration and which align to specific participant practices. It also acknowledges that participants enter and exit design activities, with collaboration taking place at intervals. The five activities within MUST show the importance of joint activities that all participants can participate in, these are spaces for sharing of knowledge before the multiple 'subjects' go back to their own domain-specific activity systems.
- ***Design as hermeneutic process -*** This principle posits that understanding and knowledge within the design process is a cycle of exposure to contextual information and its subsequent interpretation before re-exposure to the context. As Snodgrass and Coin (1997:17) state, "meaning is not an immutable object that stands over against us but is an ever-changing part of an ever-changing situation." As the design process progresses through different activities and situations, participants iterate between questioning and understanding. Relating design to a hermeneutical understanding of words and text, Snodgrass and Coin (1997:32) go on to state that "we cannot understand the meanings of isolated elements such as words in a sentence or design tokens in a design situation unless we have a prior knowledge of the whole context within which the elements occur." This principle also draws from CESD's approach to the activity of design, where a project is broken down into smaller sub-activities which in turn feedback into the larger project, allowing emergent sub-activities to take advantage of "real

use experience of earlier sub-activities" (Gronbaek, Kyng, and Mogensen, 1997:13).

5.6 Toolkits

The above nine principles provide a good grounding for PD work that goes beyond the organisation or workplace, and beyond the application area of technology or systems development. They are not meant to be prescriptive, but rather act as considerations for designers entering a CbPD project. If PD practice is to move beyond an organisational setting it is important to develop CbPD methods that have applicability in complex multi-organisational, social settings.

Mathiassen's (1981), definition of a method (as a process characterised by its application area, its perspective and its guidelines) as accepted in PD theory and practice also encompasses certain *toolkits* developed for collaborative design around social issues. Within the landscape of collaborative, user-centred design there exist a number of such toolkits, these include but are not limited to, the *Human-Centered Design Toolkit* & *Design for Social Impact* (Ideo.com, 2015), *Participatory Methods Toolkit* (Slocum & Steyaert, 2003), *CommonSENSE* (Vardouli et al, 2012), *Collective Action Toolkit* (Frogdesign, 2013), *Design Methods for Developing Services* a collaboration between British Technology Strategy Board and the Design Council, the *Service Design Toolkit* (Namahn, 2014) the *Social Design Toolkit* (Themes & Co, 2015), the *Design Policy Toolkit* (Designing Policy, 2013) and *Boxcutter* (CCDI, 2013), to name a few. As can be seen these toolkits range in focus from the design of policy and services to general social activation around yet undefined, emergent themes.

5.6.1 Service Design

Exploring all the toolkits available is outside the scope of this thesis. Instead, I will explore those related to Service Design (SD), as most of the CbPD projects in Cape Town relate specifically to products, services and supportive systems and Service Design shares strong methodological links with CbPD.

Service Design, a holistic, multidisciplinary, integrated field (Moritz, 2005:7), shares a number of values with CbPD. Both design approaches encompass influential factors such as a holistic analysis of the situation and context; iterative, knowledge building processes; and user involvement through genuine participation. The experience-focussed nature of services has led to the development of what du Preez, (2014:36) terms *service dominant logic*, which focuses on "the role of the user in the development of business practice and public policy" (ibid). The similarities in approaches and guiding principles require a deeper look into Service Design toolkits as methods for CbPD.

In her review of a number of social design toolkits, including service design, Kimbell (2013) identified the emergence of certain dominant issues and themes. These were:

- The extent to which those engaging with a toolkit are inside or outside an issue it aims to address (an emic v etic perspective);
- How difference, power relations, and conflict are acknowledged and handled;
- Claims of legitimacy and knowledge by experts v non-experts;
- How constructs such as behaviour, behaviour change, collaboration, participation and innovation are set up within the toolkit and how they unfold in its usage and in relation to wider conversations within policy, activism and politics;
- The boundary-creating practices and moves that render some participants as insiders and others as outsiders, or as experts, or as designers;
- The relationships between "tools" and modes of being and working, in particular professional, activist and non-designer practices (ibid).

These Service Design toolkits generally follow similar phases of design, starting with a discovery phase, followed by a defining phase, then developing and finally a delivery phase (Figure 5.22). The delivery phase then might feed back into a new discovery phase for further iterations.

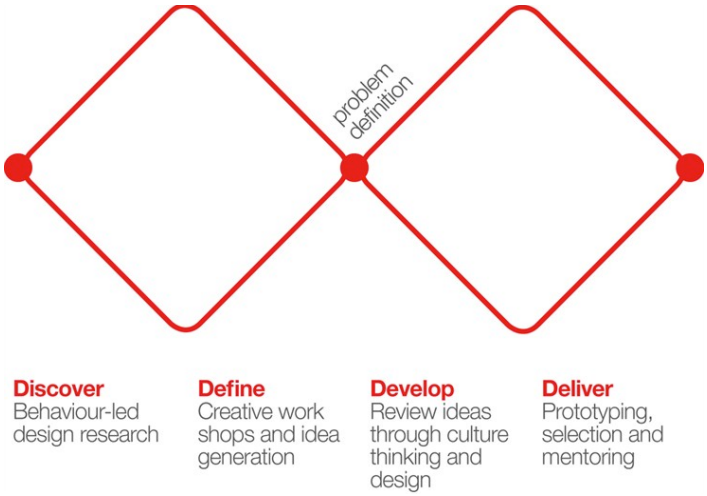


Figure 5.22: The double-diamond approach in Service Design (Hunter, 2014)

The double-diamond approach to design presents iterative steps of divergent knowledge seeking and converging information clarification, with the convergent phases resulting in something concrete. Mat Hunter (n.d), the chief design officer of the British Design Council presents these four phases as follows:

- *Discover* - This initial phase covers start of the project where the designer gathers insights and understanding of the problem domain, and attempts to look at the world in a fresh way.
- *Define* - This is the sense-making phase where the possibilities identified in the previous stage are framed as the fundamental design challenge.

- *Develop* - Here, concepts and solutions are created, prototyped, tested and iterated; with the aim of designers refining their ideas.
- *Deliver* - The final quarter marks the delivery phase where the resulting project is finalised, produced and launched.

This definition of the double-diamond approach is very designer-centric and doesn't acknowledge the roles of other stakeholders or the complexities of a participatory approach. By framing each phase as a collective activity system, in relationship with other activity systems (Engeström, 1993), we are able to garner a deeper understanding into collaborative approaches to CbPD.

Figure 5.23 reframes the 'double diamond' approach using AT and shows how the outcome of each phase becomes the object on which participants act in the next. For example, if the object of the design activity is initially the co-development of a brief, the first discovery phase will aim to identify all relevant information to the project, the defining phase then focusses and frames this information, after which participants during the development phase collate and prepares the brief for delivery. Once delivered, the brief then presents new objects of design activities. Within each of these phases are activities mediated by various tools and techniques and although iterative in nature, seem to use participation as a means to an end. As is often the case after the delivery phase, designers and other outsider-stakeholders leave the project and context, taking the toolkit and design knowledge with them.

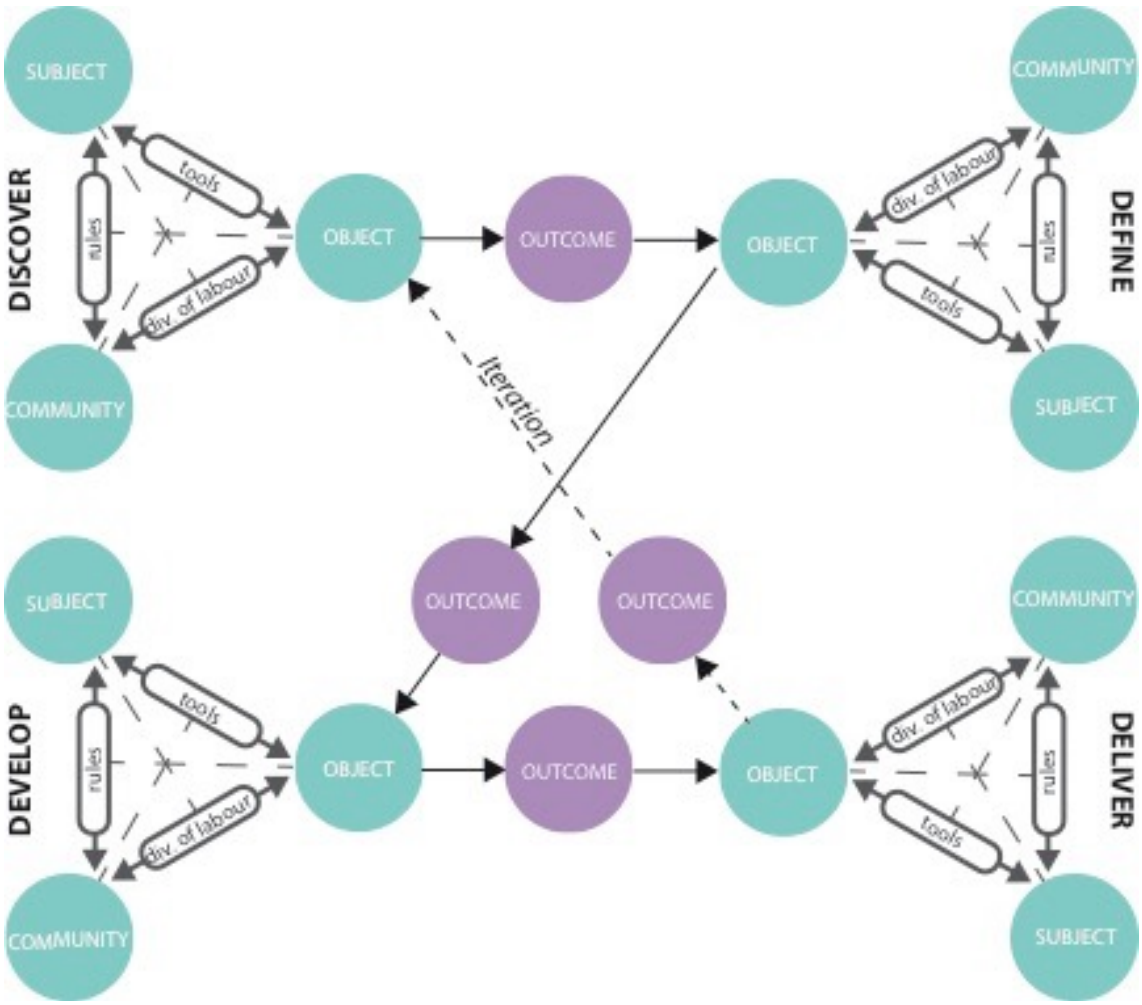


Figure 5.23: The double-diamond approach reframed through the lens of AT

Du Preez (2014:38) presents a selection of user related obstacles that have been noted in relation to SD process phases, this is adapted and elaborated on in Table 5.6. Emergent from these obstacles is the need to handle unequal power relations and conflicting agendas.

Table 5.6: User-related obstacles during Service Design (Adapted from du Preez, 2014:38; Gulliksen, Lantz and Boivie, 1999).

Design Phases	Obstacles Noted
Discovery Phase	o Identifying and engaging appropriate users, o Relevant user capacity, o Users lacked information as to what designers need to know, o Users lacked information as to what the design process meant, o Designers lacked knowledge for engagement – approaches, language etc, o Lack of time, o Participants lacked confidence and were reluctant to talk to designers, o Users ascribe different values and meanings to experiments and objects, o Power relationships affect user participation.

Define Phase	o Challenges in consensus meeting, o Users felt their views were not taken into account, o Aligning objects.
Develop Phase	o User motivation, o Developers lack knowledge on how to engage new participants and obtain feed back from existing participants, o Users reluctant to engage with designers – influenced by confidence, perceived roles, o Time for learning to take place – participants absorb the understanding of models and proposals at different speeds, o Little time for reflection and exploration.
Deliver Phase	o Users unaware of implementation constraints, o Trickle off of user commitment, o Outcome outside of scope of implementation group, o Early miscommunication or misalignment of objects result in reduced user uptake, o Outcome not evolvable by users.
Throughout	o Communication, o Conflicting goals, o Competence, o Attitudes, o Project organization, o Work organization, o Work activity, o Activities: Methods, techniques and tools.

The specific obstacles noted above in Table 5.6, combined with Engeström's four types of contradictions and their corresponding collective epistemic actions (as outlined earlier in this study), when merged with the double-diamond design approach, provide a useful method for approaching CbPD (Figure 5.24).

Within this adapted model, the initial *discovery* phase focusses on the exploration of needs, assets and other information related to the object or theme of the project. During this phase, co-design activity system (CDAS) components, such as the design group composition, tools and instruments for design and role definition are identified. The tensions within and between each of these components are then explored. Collective actions during the discovery phase include questioning the status quo and analysing the situation to identify underlying causes and tensions. Here we see the beginnings of mutual learning between stakeholders. The *defining* phase follows on from this and aims to clarify the CDAS, (that is the participants involved, certain tools, and rules and roles) and collectively frame the object of future design activities. The aim of this phase is to, as Virkkunen (2013:50) states "construct an explicit, simplified model of the new idea that explains the problematic situation and offers a perspective for resolving or transforming it" that being, the object of the CDAS. Also within this phase, tensions between the CDAS components are worked through. Here we begin to see the shift from ethereal concepts to grounded processes (as discussed in Chapter 2).

The *development* phase explores and evaluates notions around the object of design and its relationship to other objects of more advanced activity systems. Here we see a grounding of the design object in contextual realities, and initial concepts emerging. The final, *deliver,* phase sees a concretisation of the design object in practical applications, such as prototypes, and a reflection on the process and object of design. Here, needs for further developments are determined based in appropriateness of the design proposal and its relationship to other peripheral activities. Further actions of consolidating and generalising the outcome take shape and the outcome then leads to the next phase of questioning in the iterative process.

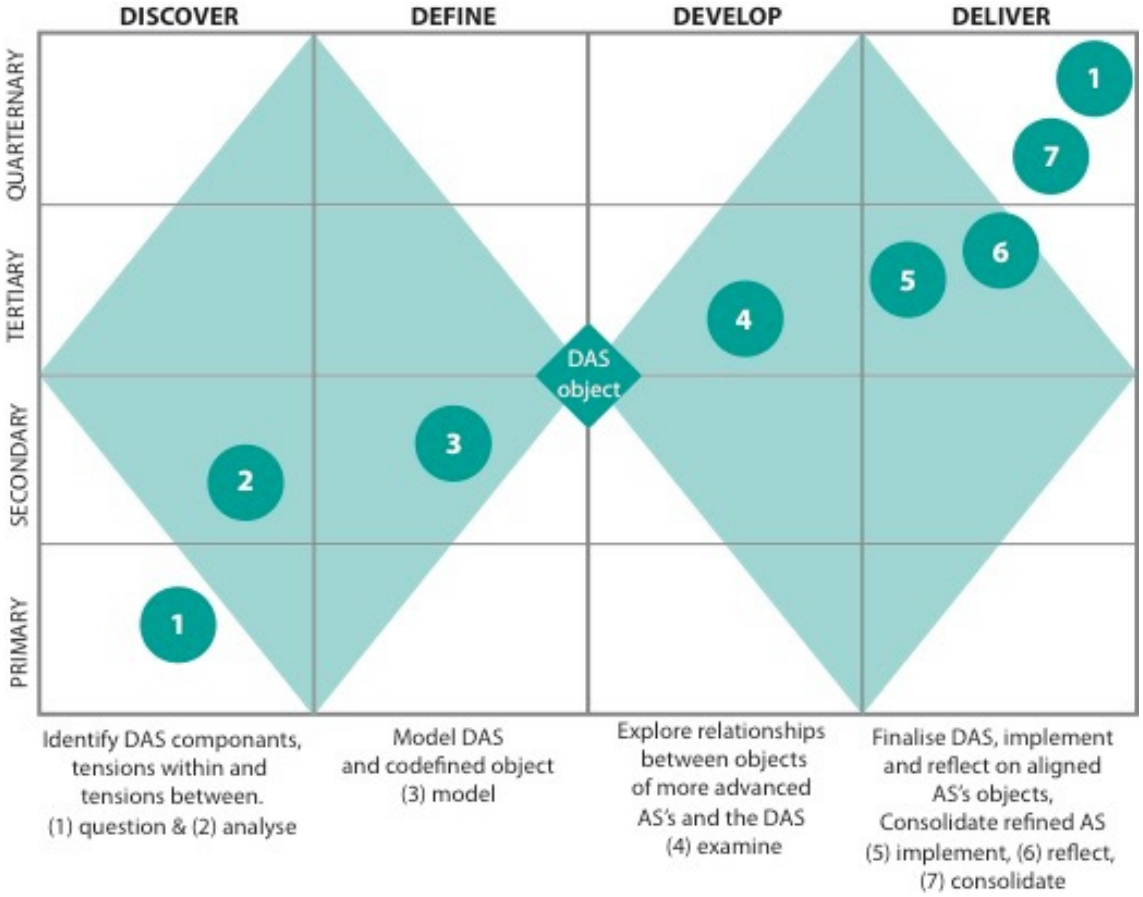


Figure 5.24: Double-diamond approach informed by four types of contradictions and their corresponding epistemic actions

This revised double-diamond design approach acknowledges the complexities of collaborative design projects and the multiple activity systems at play. It offers a procedural approach to grounding AT in the practice of collaborative service design.

Indeed, it offers a practical theory (Cronen, 1995) approach to designing for complex social activities. Cronen (1995:231-232) suggests that a practical theory be defined by the following five features:

1. It should be concerned with the way embodied persons in a real world act together to create patterns of practice that constitute their forms of life.
2. It should provide an evolving grammar for a family of discursive and conversational practices. The grammar of practical theory should be internally consistent and defensible in light of data.
3. These practices constitute a family of methods for the study of situated social action wherein professionals join with participants and clients. As such, practical theory respects the centrality of the grammatical abilities of persons in conjoint action.
4. Practical theories are assessed by their consequences. They are developed in order to make human life better. They provide ways of joining in social action so as to promote (a) socially useful description, explanation, critique, and change in situated human action; and (b) emergence of new abilities for all parties involved.
5. Practical theory co-evolves with both the abilities of its practitioners and the consequences of its use, thus forming a tradition of practice.

5.7 Summary

This chapter presented the theoretical framework of this study. It provided a background to Cultural Historical Activity Theory and applied it to unpack several PD methods, from which a list of nine key PD principles was extrapolated. These offer designers a grounding in the shift from workplace-based PD projects to those in more socially complex CbPD projects.
CHAT was also used to extend the designer-centric rhetoric of service design to that of collaboration and co-design.

Drawing from CHAT's focus on the dynamic structure of participants' interactions in design activities and the tools, rules and roles that mediate these interactions; PD's methods of context and tool understanding, futuring and mutual learning; and SD's framing of a PSS process, a user-centred, inclusive approach to CbPD has been presented.

The following chapter proposes the use of these findings, and the use of the above models, in a CbPD case study, informed by a culmination of previous chapter outputs.

CHAPTER SIX
RESEARCH DESIGN AND METHODOLOGY

6.0 Introduction

This chapter presents the research design and methodology employed in this study. It presents the chosen epistemological orientation and describes how the study objectives, presented in Chapter One, are achieved through data sourcing, collection and analysis, and the methods used for doing so.

The research design adopts a case study approach, aimed at exploring the characteristics of a CbPD project in Cape Town, South Africa. Presented in previous chapters were the ideas of WDC legacy projects, contextual examples of participation processes employed in Cape Town, and how a deeper understanding of collaboration in design could advance PD research and practice. These provided an overview of collaborative learning, participation and design. Through the use of a case study, I explore deeper, the tensions, activities and processes of a WDC 2014 recognised, quad-helix CbPD project. The point of departure for the research design is my main research question:
How can a deeper understanding of Participatory Design as a collaborative, tool-mediated activity improve CbPD practices?

This research question is underpinned by three sub-questions:

- *What are the activities of Participatory Design activity systems?*
- *What is unique about the South African condition?*
- *How can CbPD practices contribute toward active citizenry?*

6.1 Ontological, Epistemological and Methodological Approaches

According to Guba and Lincoln (1994:108), research paradigms can be characterised through three questions: the *ontological question (What is the form and nature of reality, and therefore what can be known about it?)*, the *epistemological question (What is the nature of the knower or would-be-knower and what can be known?)* and the *methodological question (How can the inquirer go about finding out what they believe can be known?)*.

These questions contribute to a holistic outlook on how we view knowledge, how we see ourselves in relation to this knowledge, and the methodological strategies we deploy to discover it.

This qualitative, rather than quantitative, study is guided by participatory/ social constructivist paradigms of knowledge construction. A qualitative approach attempts to

study human action from the perspective of the social actors themselves, also know as the emic perspective, the primary goal of which is the describing and understanding of human behaviour, rather than an explanation (Babbie & Mouton, 1998:270).

Qualitative research is further defined by the following key features:

- Research is conducted in the natural setting of social actors;
- It has a focus on process rather than outcome;
- The actor's perspective is emphasised;
- The primary aim is in-depth descriptions and understanding of actions and events;
- The main concern is to understand social action (and activities) in terms of their specific context, rather than to generalise to some theoretical population;
- The research process is often inductive in its approach, resulting in the generation of new hypotheses and theories; and
- The qualitative researcher is seen as the 'main instrument' in the research process (ibid).

Babbie and Mouton (1998:273) present the differences between qualitative and quantitative methodologies, presented in Table 6.1.

Table 6.1: Qualitative and quantitative methodologies (Babbie & Mouton, 1998:273)

	Quantitative Studies	Qualitative Studies
Approach to the setting	Controlled settings; Selected Samples	Natural settings; whole context
Aims of research	Quantitative descriptions; explanation and prediction	Thick descriptions; interpretive understanding
Research strategy	Hypothetico-deductive; Generalising (nomothetic)	Inductive; contextualising (idiographic)
Notion of objectivity	Natural science definition: maximum control over extraneous factors	Intersubjectivity: gaining trust and rapport in order to get as close as possible to subjects/ trustworthiness & credibility

This research draws from constructivist and critical theory inquiry paradigms, as outlined in Guba and Lincoln (1994) and based in the belief that knowledge is constructed hermeneutically and dialectically through interactions between the researcher and co-researchers/stakeholders.

Ontologically it aligns to historical realism, that is, the belief that reality is shaped by social, political, cultural, economic, ethnic and gender values, crystallised over time. It also draws on relativism, believing realities are local and specifically constructed.

Cultural Historical Activity Theory (CHAT) aids in the bringing of these perspectives together, initially in an understanding of collaborative practices and their past and present forms in Cape Town, South Africa, and to new ways of co-designing collaboration between researcher and participant. Hashim and Jones (2007) note that "Activity Theory is an approach which underpins the complex and dynamic human problems of research and practice" and therefore "is geared towards a practice which embodies a qualitative approach that offers a different lens for analysing processes and the outcomes" (ibid).

Methods linked to the research paradigms above revolve around dialogue and form making, and embrace Activity Theory and design principles of internalisation/ externalisation and iteration. Here, communication between the co-researchers and participants is externalised through actions, artefacts and dialogue, and internalised through interpretation and sense-making.

Epistemological beliefs of the study are transactional and subjectivist with the researcher and the researched object interactively linked. Here the values of the researcher and the participants inevitably influence the inquiry. Findings of this study are therefore value-mediated and the traditional line between ontology and epistemology disappears (Guba & Lincoln, 1994:112). Table 6.2 expands on other related issues to the paradigmatic positioning of this study.

Qualitative researchers, are themselves, a key instrument in data collection (Denzin & Lincoln, 2003; Creswell, 2013:45). The role of researchers adopting an interpretive lens is twofold. Firstly it is to engage with other peoples lives, and secondly, to enable the 'voices' of others to be heard (Crouch & Pierce, 2012:60). The researchers role is thus that of an active learner, and participant-observer.

Table 6.2: Paradigmatic positioning of this study Guba & Lincoln (1994:112)

Paradigm Positions on Selected Practical Issues		
Issue	Critical Theory et al	Constructavism
Inquiry Aim	critique & transformation; restitution and emancipation	understanding; reconstruction
Nature of Knowledge	structural/historical insights	individual reconstructions coalescing around consensus
Knowledge Accumulation	historical revisionism; generalisation by similarity	more informed and sophisticated reconstructions; vicarious experience
Values	included / formative	included / formative

Paradigm Positions on Selected Practical Issues		
Ethics	intrinsic; moral tilt toward revelation	intrinsic; process tilt toward revelation
Voice	"transformative intellectual" as advocate and activist	"passionate participant" as facilitator of multi voice reconstruction

The research methodology uses Cultural Historical Activity Theory (CHAT) to explore, in depth, a community based participatory design (CbPD) project on solid waste management in an informal settlement. This highlights two key approaches, CHAT and CbPD, and the development of a blended model drawing on both.

Nardi (1996:47) compares Activity Theory, Situated Action Models and Distributed Cognition in the study of context and notes that Activity Theory offers the richest framework for studies of context or domain "in its comprehensiveness and engagement with difficult issues of consciousness, intentionality and history," while Hashim & Jones (2007) note that Activity Theory offers a "holistic and contextual method of discovery that can be used to support qualitative and interpretative research." They go on to state that "Activity Theory is particularly relevant in situations that have a significant historical and cultural context and where the participants, their purposes and their tools are in a process of rapid and constant change" (ibid). Such is the case in South Africa, where developing informal settlements to formal ones is key for the provision of basic services by local government.

Toomela (2000; 2008) however, argues that Activity Theory has five fatal faults and critiqued that:

- it relies on unidirectional instead of a dialectical view of culture-individual relationships;
- it focuses on analyses of activities without taking into account the individual involved in the activity at the same time;
- it underestimates the role of signs and the importance of focusing on sign meaning;
- it approaches mind fragmentally, without understanding the holistic nature of mind; and
- it is fundamentally developmental and therefore not appropriate for understanding emerging phenomena, including mind (ibid).

Engeström (2008:2) argued Toomela's critique of Activity Theory pays no attention to concrete research, and that neither Toomela's 2000 nor 2008 article references recent concrete, grounded activity-theoretical studies, preferring rather to be based in a "frozen image of activity theory." Roth & Lee (2007:188 cited in Engeström 2008) argue that activity theory is on the rise, showing the rise in journal citations of activity-theoretical terms and texts.

In summary, research based in activity theory is increasing, making it that much more important to a) be aware of the critiques of activity theory so as to not propagate their arguments, and b) ground future studies in concrete examples.

Activity Theory is geared towards research and practice that embodies a qualitative approach offering a different lens for analysing processes and the outcomes (Hashim & Jones, 2007). This stems from its foundational view "of purposeful activity in a cultural historical context as the fundamental unit for the study of human behaviour" (ibid).

6.1.1 The Methodology of Activity Theory

In activity theory, the method of inquiry cannot be separated from the theoretical approach (Guy, 2005:48). Chapter 5 provided the theoretical framework for the use of AT, and this chapter continues with a discussion of AT's methodology.

There is no single unified approach to applying AT to practice, but rather a number of structured approaches. These are presented below, with a collated methodology adopted in this research presented at the end of this section.

Adopting AT as an interpretive lens focuses on "human action and assumes that all human action is meaningful and hence to be interpreted and understood" (Usher, Bryant & Johnston, 1997). Crouch & Pierce (2012) list the purposes of interpretive research; these are contextualised for this study as follows:

- To explore habitus of participants, in interaction with each other and the context (people);
- To interpret participatory design practices, tools and activity systems (processes); and
- To understand how participants engage with participatory design practices, tools and activity systems (*people + processes).*

Engeström (1993) notes that AT does not offer specific techniques and procedures for research; but rather, it is a conceptual tool. These conceptual tools must be adapted to the specific nature of the object being studied. He describes the principles of activity theory, summarised here, as follows:

- The unit of analysis is a collective activity system, in relationship with other activity systems;
- An activity system is multi-faceted with different viewpoints, interests and histories;
- CHAT facilitates the analysis of the development of the activity and its constituent components and actions historically;
- Internal contradictions are the driving force behind disturbances, innovations, and change in the activity system.
- Activity systems when combined can have expansive transformations (as presented in expansive design earlier in this thesis) (ibid)

Engeström (2005), along with colleagues at the Centre for Activity Theory and Developmental Work Research at the University of Helsinki propose a methodology based in AT, that of Developmental Work Research (DWR). It is based on a combination of ethnographic observation and intervention in work and is an innovative approach to the study and reshaping of work and learning (ibid). DWR is underpinned by five claims:

- The object-oriented and artefact mediated collective activity system is the prime unit of analysis in cultural-historical studies of human conduct;
- Historically evolving inner contradictions are the chief sources of movement, change and development in activity systems;
- Expansive learning is a historically new type of learning, which emerges as practitioners struggle through developmental transformations in their activity systems, moving across the zones of proximal development;
- The dialectical method of ascending from abstract to concrete is the key for mastering cycles of expansive learning; and
- An interventionist research methodology that aims at pushing forward, mediating, recording and analysing cycles of expansive learning in activity systems is needed (Engeström, 2015:xvi).

These posit key methodological aspects that influence this study, such as:

- the collective activity system as the unit of analysis;
- contradictions within this system as opportunities for intervention and design; and,
- the role of collective knowledge production in CbPD and how knowledge sharing can produce concrete outcomes that suit all participants.

Mwanza (2001) proposed a methodology aimed at operationalising AT emerging from the need to “systematically explain and demonstrate in a replicable manner the means by which AT can be used to guide the design process in different contexts” (ibid). This methodology, based in Engeström’s activity triangle, is applied procedurally through the following six stages:

- Stage 1: Model the situation being examined;
- Stage 2: Produce an Activity System of the situation;
- Stage 3: Decompose the situation's Activity System;
- Stage 4: Generate research questions;
- Stage 5: Conduct a detailed investigation;
- Stage 6: Interpret findings.

This phased approach was later termed the Activity Oriented Design Model (AODM) (Mwanza, 2002; Mwanza-Simwami, 2009 & 2011). AODM presents several key contributions in operationalising AT aimed at improving the overall activity being explored. They are comprised of:

- A method for applying fundamental principles of activity theory to the phenomenon being investigated;
- Four methodological tools presented as analytic scheme for identifying the essential elements of human activity and for examining inter-relationships; and
- Guidelines to help identify contradictions that exist in the activity being investigated.

These methods, tools and guidelines contribute to the framing of this study in Chapter 7.

Mwanza's operationalising of CHAT and the resultant AODM echoes to a degree Jonassen and Rohner-Murhpy's (1999) AT framework for designing constructivist learning environments (CLE). This six step process, consisting of major design steps, sub-steps and sample questions and actions contributes to the analysis and design of CLEs. The six major design steps and their sub-steps are collated as follows:

- Step 1: Clarify the purpose of the activity system.
  - *Understand relevant context(s) within which activities occur.*
  - *Understand the subject, their motivations and interpretations of perceived contradictions in the system.*
- Step 2: Analyse the activity system.
  - *Define the subject.*
  - *Define the relevant community/communities.*
  - *Define the object.*
- Step 3: Analyse the activity structure.
  - *Define the activity itself.*
  - *Decompose the activity into its component actions and operations.*
- Step 4: Analyse tools and mediators.
  - *Tool mediators and mediation.*
  - *Rule mediators and mediation.*

    - *Role mediators and mediation.*
- Step 5: Analysing the context.
    - *Internal or subject-driven contextual bounds.*
    - *External or community-driven contextual bounds.*
- Step 6: Analysing activity system dynamics.
    - *What are the relationships that exist within the components of the system?*
    - *How formally established are those components?*
    - *How have these interrelationships changed over time?* (ibid)

Community-based Participatory Design (CbPD) has as one of its key tenets collaborative learning, with collaborative design workshops and activities closely resembling Jonassen's (1994) definition of constructivist learning environments (CLE). CLE's can be defined as having the following characteristics:

- They provide multiple representations of reality, which avoids oversimplification and represents the complexity of the real world;
- They emphasise knowledge construction not knowledge reproduction;
- They emphasise authentic tasks in a meaningful context rather than abstract instruction out of context;
- They provide real-world settings or case-based learning;
- They encourage thoughtful reflection on experience;
- They enable context- and content-dependent knowledge construction; and
- They support collaborative construction through social negotiation not competition (Jonassen, 1994:35).

This thesis embraces constructivist learning as a catalyst for design development, and the environments that support it as impactful on designing good environments for, as Ehn (2008) terms design activities, design games (at use time).

Nardi's (1996) paper states four methodological implications for the use of activity theory in research. They are:

- A research time frame long enough to understand users' objects, including, where appropriate, changes in objects over time and their relation to the objects of others in the setting studied;
- Attention to broad patterns of activity rather than narrow episodic fragments that fail to reveal the overall direction and import of an activity;
- The use of a varied set of data collection techniques including interviews, observations, video, and historical materials, without undue reliance on any one method; and,
- A commitment to understanding things from the user's point of view (Nardi, 1996:47).

The methodological contributions of Nardi (1996), Jonassen and Rohner-Murhpy (1999), Mwanza-Simwami (2011) and Engeström (2005; 2015) contribute to a robust

framework for exploring, analysing and presenting activity system components, tensions, learning processes, and more. These approaches to AT also align well to PD, having similar aims of understanding.

The following section presents an overview of the collated methodology components utilised in this study.

6.2 Research Activities

This research engages in a literature review (previous chapters) of both AT and PD research and culminates in a cultural historical activity theory (CHAT) analysis of a case study of CbPD. As discussed earlier on in Chapter 5, AT provides a practical, analytical lens to view the activities of multiple actors in developmental contexts. In applying AT, the research identified certain tensions and hurdles to participation; and explains ways in which these tensions could be reduced, improving collaboration and knowledge sharing amongst participants of future projects. The case study focusses on solid waste management in an informal settlement in Cape Town, South Africa.
This project is a WDC 2014 legacy project and aimed at improving waste management products, processes and systems in the context of an informal settlement. Table 6.3 draws from the methodologies discussed in the previous section and presents an overview of components of the study, contributing the overall research design (Figure 6.1).

Chapters 2 presented a review and critique of socio-economic, strategic and political imperatives of being designated as WDC 2014, and Chapter 3, the strategic and political processes of civic inclusion and participation in the Western Cape and South Africa. Chapter 4 presented the conceptual framework for the study and discussed collaboration in design and related concepts. It also grounded concepts of participation and collaboration in design in practical examples in the Western Cape.

Chapters 5 presented the theoretical framework of the study, analysing PD methodologies through AT and presenting a new process model for design, drawing on the analysis of PD methodologies and collaborative design toolkits.

These chapters provided the basis for Chapter 7, where conceptual and theoretical analyses are grounded in the selected case study.

Table 6.3: Overview of the Case Study presented in Chapter 7

Solid Waste Management in an Informal Settlement	
Domain	Doornbach, an informal settlement 20 minutes outside Cape Town
Subjects - Quad-helix collaboration	- Academic: CPUT DESIS Lab representatives - Civil Society: Community representatives - Public Sector: Department of Solid Waste Management representatives - Private Sector: Design consultant
Unit of Analysis	Collective activity system of waste disposal/collection and its relationship to supportive activity systems
Time Frame	July 2013 to date
Focus	- Participatory Design of related products, processes and systems - Developmental transformations - Tensions within and between activity systems - User perspectives - ZPD - Activities of design - Mediators: external and emergent
Related Methodologies	- Community-based Participatory Design (CbPD) - Appreciative Inquiry (AI)
Methods	- Interviews - Historical materials - Field notes - Observations - Codesign Workshops
Activity Questions	- What is the activity of interest? - Why is the activity taking place? - Who is involved in carrying out this activity? - What are participants using to perform the activity? - Who is responsible for what within the activity and how are the roles organised? - Where is the activity carried out? - What is the desired outcome of the activity?
Questions related to Tensions	- What tensions exist within the nodes of the activity system of waste collection, and what tensions exist between nodes? - What tensions exist between the object of the current system and more establishes systems? - What tensions exist between related systems and individual nodes of the waste disposal system?
Research questions related to Case Study	- How did the waste management system develop over time? - What are the impacts of a CbPD approach to PPS development? - How did participants generate and share knowledge?
	adapted from Nardi (1996), Jonassen & Rohner-Murhpy (1999), Mwanza-Simwami (2011) and Engeström (2005; 2015)

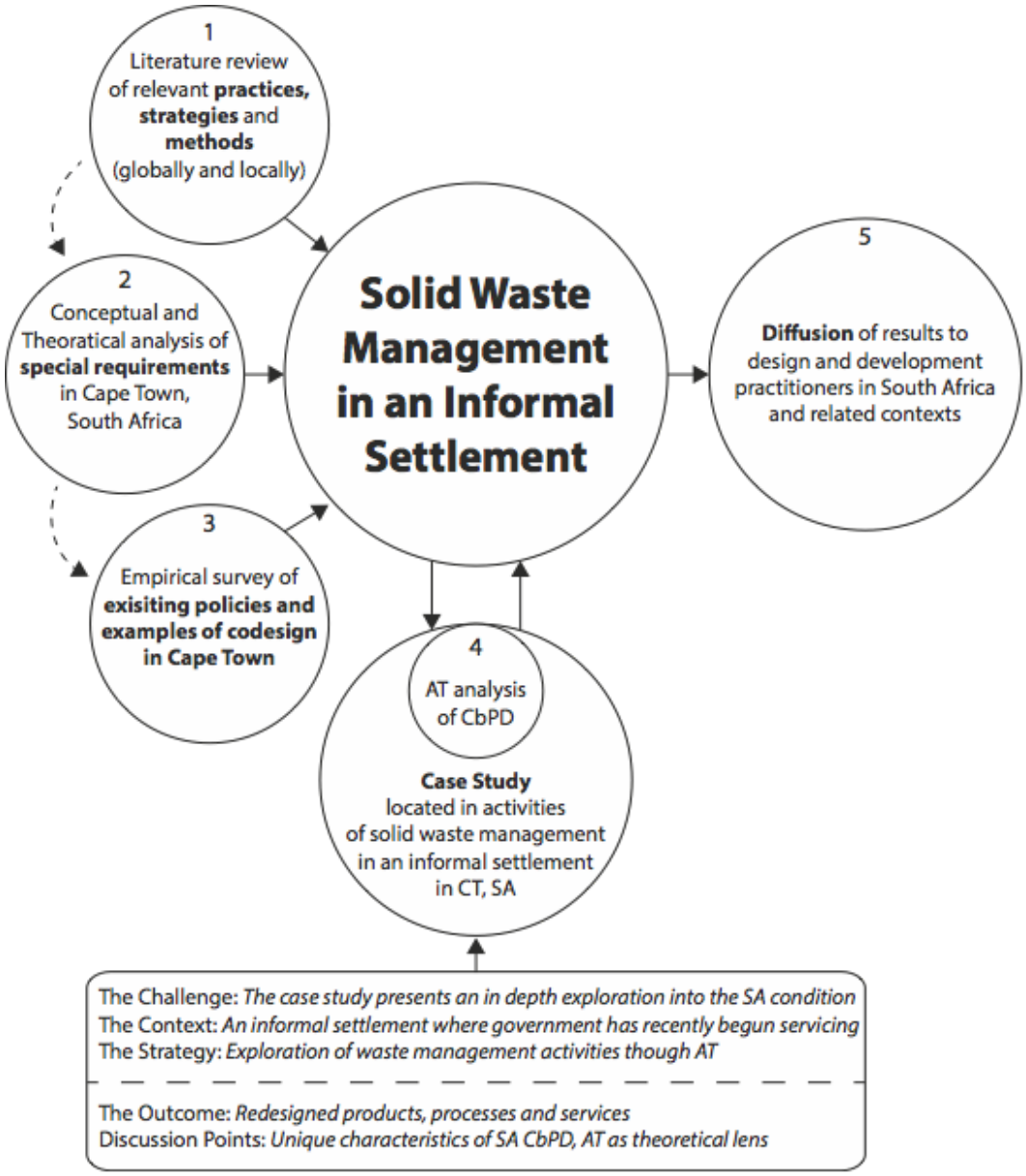


Figure 6.1: The Research Design (after Korpela et al., 2006:18; Commonwealth Association for Public Administration and Management, 2010)

Figure 6.1 collates these research practices in an overall research design, drawing from Korpela et al (2006) and the four phases leading to an overall picture of the study theme. The final phase, after the research project, is to find out how the methodology can be diffused back to everyday use. In presenting the case method, the research design draws from the Commonwealth Association for Public Administration and Management (2010) on case study models and methodologies, adopting their case study structure.

6.2.1 Related Methodologies

Several key methodologies contribute to this research. This study employs CHAT to analyse and reflect on a case study in which Community-based Participatory Design and Appreciative Inquiry (elaborated on in 6.2.1.3) were used (Figure 6.2). Activity Theory and CbPD have been presented in depth as conceptual and theoretical frameworks in Chapters 4 and 5. The case study methodology, Appreciative Inquiry and reflection, and their contribution to the methodological base of this study, are elaborated on here.

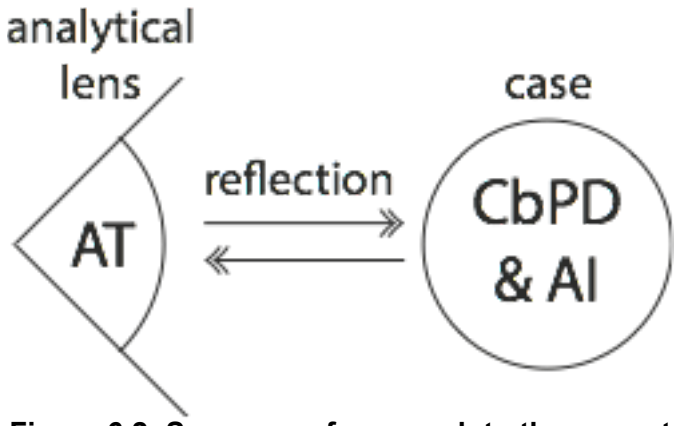


Figure 6.2: Summary of approach to the case study

6.2.1.1 The Case Study

In order to capture the complexities of the South African condition related to Community-based Participatory Design, the penultimate chapter (Chapter 7) of this thesis is grounded in a case study. This study explores a CbPD project that involved actors from all four sectors of the quad-helix. Johansson (2003:2) notes that there are different ideas about what a case study is, and collates existing literature from the field, positing that a case study has, as its object of study, a case. He goes on to state that a case should:

- be a complex functioning unit;
- be investigated in its natural context with a multitude of methods; and
- be contemporary (ibid).

Case studies could be said to be a meta-method, combining other research strategies, in this case AT and reflection in the analysis of CbPD and AI. Thomas (2012:92) specifies a case study should have as its starting point, a *subject.* That is, a type of case from which emerges a *purpose,* an *approach,* and a *process.* Note here that Johansson's (2003) "object" and Thomas's (2012) "subject" are the same thing, that is the case domain or theme, and shouldn't be confused with AT nomenclature. For clarity I refer to this beginning phase as a case typology. Thomas (2012:92) presents three case typologies, namely *a key case, a local knowledge case,* and *a special or outlier*

case. The case type aligned best to this research is that of the key case, in summary, its a comprehensive example of quad-helix collaborative design in the Western Cape, and South Africa. Within this case typology I align the study to Johansson's *explicative* strategy which focusses on the history of a single case as well as its context, encompassing many variables and qualities (Johansson, 2003:5). This strategy aligns with CHAT and its cultural-historical analysis of activity systems.

Figure 6.3 presents an outline of the case study discussed in the following chapter, delimiting what it is and what it isn't. It draws from case study literature on distinctions within the case method (notably Stake, 1995; Bassey, 1999; de Vaus, 2001; Mitchell, 2006; and Yin, 2009) and is adapted from Thomas's (2012:93) simplification of case studies model. The different purposes, approaches and processes determined the types of methods used in the study and aligned the methodological approaches of the study to its epistemological and ontological perspectives.

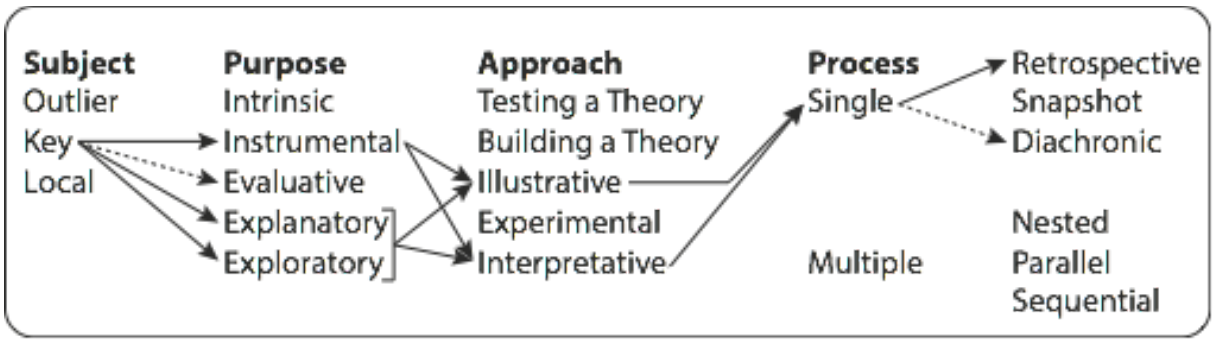


Figure 6.3: Mapping out the Case Study design of *Solid Waste Management in an Informal Settlement* (adapted from Thomas, 2012)

As stated before the case study is a key case. Stake (2005) defines two purposes for engaging in a case study, namely *intrinsic* and *instrumental*. Stake (2005:445) defines an intrinsic case study as one that is undertaken purely to understand that specific case, "…because, in all its particularity and ordinariness, the case itself is of interest" (ibid). Instrumental case studies are carried out to "provide insight into an issue" with the case being of secondary interest, instead "it plays a supportive role, and it facilitates the understanding of something else" (ibid). The theme of the case study in this research, that of 'solid waste management' is of secondary interest to how activity systems move between the abstract and concrete during a CbPD project. The process of collaboration is generalisable, to a degree, to other CbPD projects.

The purpose of the study is also exploratory and explanatory. Exploratory case studies are presupposed by perplexing issues or problems, and is focussed on what is happening and why. Thomas (2012:104) states the researcher may have some familiarity with the issue, but only see it from one perspective, theirs, calling for an

exploration of others perspectives. This links in with the explanatory nature of the case study, which aims to increase the depth of understanding of the issue of collaboration in heterogeneous contexts based in the interrelationships between the activity components. I have included a dotted line to the evaluative purpose of this study, that of testing AT as an analytical lens. In the case study AT facilitates the framing of complex issues and although its use offers a novel framing of CbPD, it is secondary to understanding the complexities of the systems themselves. It can be said that AT is the tool mediating my understanding of collaborative activity systems of design.

The approaches adopted in this study are interpretive and illustrative. As Thomas (2012:118) states “some case studies aim first and foremost to illustrate a phenomenon.” In this case the phenomenon is CbPD and its embodied activities. The tensions within and between these activities and those that support the activity of waste collection are illustrated using AT. Interpretive inquiry is an approach that “assumes an in-depth understanding” and a “deep immersion” in the domain of study (Thomas, 2012:124). It is ethnographic in nature and aims at understanding the phenomenon from within. This approach aligns with CbPD, where an understanding of participant perspectives throughout the project is imperative.

The process for carrying out the case study relates to the study’s structure, with qualitative case studies providing tools for researchers to study complex phenomena in their contexts (Baxter & Jack, 2008:544). In stand alone case studies also termed single case studies, “attention is drawn to the local situation and concentrates on the embeddedness of the phenomenon in local contexts” (Swanborn, 2010:41). Thus the single case study is a useful option in unpacking the complexities of CbPD in Cape Town. Yin (2003) further splits single case studies into *holistic single case studies* and *single cases with embedded units*. The latter defines this study as the sub-units of the different activity systems, situated within the larger case is analysed *within* the subunits separately (within case analysis), *between* the different subunits (between case analysis), and *across* all of the subunits (cross-case analysis) (ibid). This exploration of activity components across a quad-helix CbPD project provides insight into similarities and possible tensions, for example, tools designers use can be different to those of civil servants or similar in some cases, but named differently. Engaging in a rich analysis of these embedded units serves to better illuminate the case (ibid).

The CbPD single case study in this thesis is retrospective in nature, with elements of diachronic studies (Thomas, 2012); that is, it looks back on the collaborative design activities identifying how the different activity systems emerged and influenced one a another, but it also shows how activity system components and the relationships and tensions between them changed during this time. The use of Cultural Historical Activity

Theory (CHAT) as the analytical lens is well suited to this. CHAT works well as a framework for illustrating the activity systems as well as reflecting on them.

6.2.1.2 Reflection

In order to address the main research question of this study it is important to explore co-researcher perspectives in depth, as well as the relationships between the different components of the collaborative design activity system, namely: Subjects, Tools, Objects, Rules and regulations, Communities and Division of Labour. By exploring the nature of these relationships, it is hoped that tensions and hurdles to participation can be identified.

Reflection and collaboration are key competencies in Design practice, as they support personal and collective learning processes. Argyrus and Schön (1974) state that all human beings, not just professional practitioners, should be competent in taking action and simultaneously reflecting on their actions to learn from them. As collaborative design practices include people from multiple aspects of a society affected by the project, it is imperative that reflection is built into participatory design practices.

This study explores the notion of reflection in participatory design practices through the lens of CHAT. Related to the hermeneutic framing of design research, Blunden (2010:170) states that "the meaning of each individual action is derived from an understanding of the whole activity of which it is a part…" and vice-versa, while Davydov (2008) suggests that exploring 'activity' can provide a common theoretical foundation across disciplinary boundaries. In order to do this, the study explores the role of reflection at different stages of the participatory design project and draws from Donald Schön's (1987) work on the reflective practitioner.

6.2.1.3 Appreciative Inquiry

The CbPD case study explained in Chapter 7, also drew from appreciative inquiry (AI) in its approach in exploring best (fit) practices the residents of the informal settlement had arrived at and had implemented regarding solid waste management. This is a methodology embraced by several of the design researchers involved in the project and although does not emerge directly from the PD field, relates in many ways to the involvement of people in the creation of product service systems that impact them.

Appreciative Inquiry relates to the coevolutionary search for the best in people, their organisations, and the relevant world around them (Cooperrider & Whitney, 2005). AI founded on the following set of beliefs about human nature and human organising:

- People individually and collectively have unique gifts, skills and contributions to bring to life.

- Organizations are human social systems, sources of unlimited relational capacity, created and lived in language.
- The images we hold of the future are socially created and, once articulated, serve to guide individual and collective actions (ibid).

It is a “method for studying and changing social systems (groups, organisations, communities) that advocates collective inquiry into the best of what is in order to imagine what could be” (Kessler, 2013). As a design project, this is followed by the collective design of products services and systems drawing on contextual ideas and assets. Including all stakeholders in the design process, the collectively designed future is “compelling and thus, does not require the use of incentives, coercion or persuasion for planned change to occur” (ibid).

The initial set of principles for AI was that the inquiry should begin with appreciation, should be collaborative, should be provocative, and should be applicable (ibid), These are similar to those arrived in the AT analysis of PD methods (Chapter 5).

CbPD embodies these principles beginning with identifying what works and why, followed by the design of future products, services and systems together with stakeholders as participants. Cooperrider & Whitney (2005) later published a set of five key AI principles, they are:

- The *Constructionist* principle, which proposes that what we believe to be true determines what we do, and thoughts and actions emerge out of relationships. Reality, as we know it, is a subjective vs. objective state and is socially created through language and conversations.
- The *Simultaneity* principle, which proposes that as we inquire into human systems we change them, thus inquiry is an intervention.
- The *Poetic principle*, which proposes that community life is expressed in the stories people tell each other every day, and the story of the community is constantly being co−authored, thus the most prominent themes of conversation can describe common issues for design, essentially contributing to the creation of new worlds.
- The *Anticipatory principle*, which posits that what we do today is guided by our image of the future. In design the term is *futuring,* the idea of conceiving new ways of being or new ways of doing, and then designing toward them. Here image inspires action. These “horizons of expectation” can be powerful mobilising ideas, the result of which is the need to manage expectations as often people are let down when their ideal futures are not delivered on. This often leads to participation apathy in future projects.
- The *Positive principle* posits that momentum and sustainable change require positive affect and social bonding. The focus here is on building “strong

connections and relationships between people, particularly between groups in conflict, required for collective inquiry and change." The momentum required for positive change is best generated through positive questions that amplify the positive core. Positivity leads to an increase in creativity, openness to new ideas and people, and cognitive flexibility (Kessler, 201; Centerforappreciativeinquiry.net, n.d.; Cooperrider & Whitney, 2005; Cooperrider & Whitney, 1999).

These principles informed the CbPD approach in identifying what works, in order to build on it. It was also useful to identify assets in the community before design begun, as each phase of CbPD should have a useful outcome. These said principles and those of critical reflection and CbPD contributed to the methods used in the case study.

6.3 Data Collection Methods

In a case study approach, triangulation is an essential prerequisite (Thomas, 2012:68). Triangulation was used to gather information in two key ways, firstly by viewing the phenomenon being studied from different perspectives from different actors, and secondly through using multiple methods in which to gather these views and contributions. In this regard, Foucault (1991:77) presents his 'polyhedron of intelligibility' stating that "we can only really understand something by looking at it from different directions and using different methods."

Simons (2009:33) specifies three qualitative methods used in case studies that facilitate in-depth analysis and understanding, namely, interviews, observations and document analysis. Thomas (2012:162) elaborates on commonly used methods in case studies and collates them into three typologies, these are, those that use mainly words, those that use words, images and/or numbers, and those that use mainly numbers.

The methods used in this research draw from the epistemological paradigm of this study, those of critical theory and constructivism. Duke (2007 as cited in Simons, 2012:33) presents exemplars of methods relevant to research questions, and their epistemological roots. The related examples are presented in Table 6.4.

Table 6.4: Key Methods related to Research Epistemology

Epistemology	Primary Values	Key Audience	Preferred Methods
Interpretivism, constructivism	Pluralism, understanding, personal experience	Programme directors, staff, participants, social science community	Qualitative: case studies, open-ended interviews, observations, document reviews
Critical Theory	Emancipation, empowerment, social change, egalitarianism, critical enlightenment	Programme beneficiaries and their communities, social science community	Action oriented: qualitative methods, stakeholder participation, interpretive analysis

In collecting data in CbPD it is essential that the methods suit the participants. They need to be compatible with education, language and practices of those involved. Collaborative prototyping for example is suited to situations where there is a language chasm between designers and community members, as this method elicits observation data and can lead to specific questions and discussions.

The methods chosen for this case study focussed on participant inclusion in the understanding, conceptualisation and design of solid waste management products, services and systems in an informal settlement, and are presented below.

6.3.1 Interviews

Interviews were conducted with all members of the immediate design team (3 people in total), in AT terms, the subjects of the collaborative design activity. This included members of the community, government employees, a private designer and researchers from a local university. These interviews were semi-structured, adopting the *interview as conversation* approach, the aim of which is to equalise the interviewer/interviewee relationship and provide the opportunity for active dialogue, co-constructed meanings and collaborative learning (Simons, 2012:44).

Initial group interviews were conducted with members of the two key activity systems, that is waste disposal (community members) and waste collection (government employees) to identify each group's perspective on waste management in general, and their personal experiences. Group interviews offered a number of advantages in the early stages of the project, namely: the fact that they are less threatening to any one individual encouraged open dialogue; and they provided a clear image of each group's framing of solid waste management. These interviews identified certain tensions early on, which would become focal points of design intervention. These group interviews took place in situ, that is with government employees in government offices and with the community group in a community hall. All community group discussions made use

of a translator, adept at both english and isiXhosa, as well as design terminology. It was important to minimise “tech-speak” in order to reduce the boundaries to engagement.

Following on from these group interviews, semi-structured interviews with individual group members from both government and the community were conducted. Aligned to the first phase of appreciative inquiry, *Discovery,* these conversations were aimed at exploring *what is*, specifically, values, strengths, best-fit practices, personal experiences and possibilities, around the theme of solid waste. Keeping these interviews conversational and unstructured allowed community members and government staff to identify peripheral issues not directly related to the issue of solid waste, but issues that impacted the system indirectly. Further interviews and discussions were aligned to the subsequent phases of design and AI, and were driven by: *Dreaming,* imagining *what could be*; *Designing*, determining *what should be*; and *Destiny,* creating *what will be* (Cooperrider & Whitney, 2005).
These conversations were conducted during multiple field visits to the community and involved community member-led walks, discussion groups and collaborative design workshops.

6.3.2 Historical Materials and Document Analysis

Interrogating historical materials was useful in understanding how the waste management system had changed over time. Data on the informal settlement also proved useful in understanding how the community had developed to date. Historical material included government reports and documents, press statements and other documentation related to the informal settlement, its people and the implementation of services.

In dealing with these secondary sources it was important to reduce the effects of selectivity in use. Guidelines to this effect were taken into consideration and were:

- Get to know the case well to avoid the inaccuracies in interpretation and evidence that often come with a failure to fully examine the literature,
- Recognise the limits placed on historical evidence from the context provided by the historian, and
- Do not limit the search for evidence among secondary sources to only those that provide confirmation of findings (adapted from Thies, 2002:364).

6.3.3 Observations

Observation in case studies is present throughout the entire research process, beginning with first encounters with participants and ending when the researcher leaves the field (Simons, 2012:55). Simons (ibid) proposes five reasons for formal observation as a research method in case studies, they are:

- The researcher gains a comprehensive picture of the site, a “sense of setting” that cannot be obtained through only speaking to people. This was done through multiple visits to the informal settlement and included guided and non-guided walks of the place. These observations contributed to the understanding of the waste management system from the perspective of the residents and highlighted a number of key factors.
- The documentation of observations provides a “rich description” and basis for further analysis and interpretation. This documentation took the form of written field notes, photographs and video.
- One discovers cultural norms and values of the community. CHAT further facilitated these discoveries through its use as an analytical lens, directing focus toward rules, roles, artefacts and tools and other mediating aspects of the activity system.
- Interviews benefit the articulate and favour same-language communication. Observations can offer another way of capturing participant experiences when language hinders discussion. Observations in this study were later unpacked with those participants who had been observed performing certain tasks, with the help of a translator. This was to ensure I hadn’t misread the participant’s actions.
- Finally, observations can provide triangulation or a cross-check with other data collected. In the research presented here observations both initiated conversation and qualified conversation topics. This moving between seeing and discussing offered rich findings and helped avoid misinterpretation.

Within the case study presented in this report, observations were related to community members’ interactions with solid waste. This entailed several sessions where design researchers were led around the informal settlement by community members and observed how people discarded waste, what tools they used, and the type of waste being discarded. These observations prompted questions around how the community understood the current waste management system implemented by the CoCT and highlighted certain contradictions between their understanding and its implementation.

6.3.4 Co-design Workshops

Collaborative design workshops formed the basis of the *dream* and *design* phases where participants collectively imagined what could possibly work, and then later, contributed to the design of these products and the revised solid waste management system. During these workshops participants from all spheres of the quad-helix were involved, this was imperative in reaching consensus during the workshop. This was important as if ideas produced needed to be checked with other participants, the entire process can be slow. It also give participants time to learn from one another and the realities each cohort faces in relation to the system.

Data from these workshops took the form of concept sketches, system descriptions and notes.

6.4 Analysis and Description of Research

CHAT formed the dual lens of both analysis of the case study, and the description of findings (Figure 6.4), as well as being used within the project itself as tool to understand activities associated with SWM in an informal settlement.

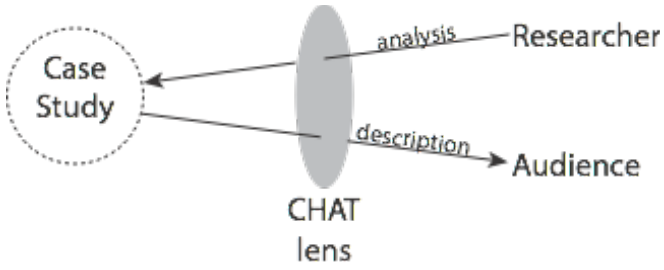


Figure 6.4: CHAT as dual research lens

6.4.1 Data Coding

Data coding drew from CHAT and aimed at coding design interventions related to three types of tensions (Table 6.5) , namely,

- Tensions within the activity node (TwAn); for example, between tools used by the community members in discarding waste.
- Tensions between nodes within the activity (TbAn); for example, between the community member and a tool.
- Tensions between node and other activity systems (TbAS); for example, between tools the community uses in discarding waste and tools the government uses in the collection of waste.

Table 6.5: Tension typologies as areas for design intervention

		Subject	Object	Tools	Community	Rules	Division of Labour
Subject	TwAn	TbAS	TbAn	TbAn	TbAn	TbAn	TbAn
Object	TwAn	TbAn	TbAS	TbAn	TbAn	TbAn	TbAn
Tools	TwAn	TbAn	TbAn	TbAS	TbAn	TbAn	TbAn
Community	TwAn	TbAn	TbAn	TbAn	TbAS	TbAn	TbAn
Rules	TwAn	TbAn	TbAn	TbAn	TbAn	TbAS	TbAn
Division of Labour	TwAn	TbAn	TbAn	TbAn	TbAn	TbAn	TbAS

Table 6.5 (expanded in Appendix B) helped plot where design interventions could most benefit the informal settlement community. This table is also applicable beyond this project, to other interventions where tensions within and between systems need to be identified. It is also useful to test or validate design input when used post-project.
These tensions are determined through analysis of historical documents, interviews, collaborative design workshops and observations.

6.4.2 Data Evaluation

Two key strategies exist in qualitative case studies in the evaluation and validation of data, namely triangulation and respondent validation (Simons, 2009:129). Simons (ibid) states that although these strategies are key, even more critical are the relationships formed in the field with participants, which enable the collection of "quality data that accurately represent the phenomena" and negotiation of "meanings that are valid for the specific purpose in the particular context."

Data evaluation was conducted side-by-side with data collection. Interpretation of data was often informed through participant validation, with findings from the analysis of historical documents discussed with participants to verify certain aspects, and also gain a more qualitative view of events and evolution of the context and waste management activities. Post project reflection was also used with participants to evaluate findings.

The Tension Typology table (Table 6.5) was populated through these community interactions with the data coding and evaluation structured as a continuous feedback loop. The types of tensions or contradictions identified assisted in the generation of focus areas for design intervention.

6.5 Ethical Considerations

There were a number of key players and interested parties in this research project and it was essential to consider ethical issues relating to each of them. The key actors included:

- Participants, represented by community members, private designers, government representatives and academic researchers. There are a number of terms to refer to participants, depending on the context, for example informant, collaborator, interviewee and actor. For purposes of clarity and alignment with this research I predominantly use the terms participant or co-researcher, to designate the participative role the other key members of the design team play in identifying tensions and collectively producing interventions; and subject/s which aligned to CHAT refers to a participant or group of participants acting as a whole;
- The researcher;
- Associated research units, in this case the CPUT DESIS Lab; and
- The supportive/ sponsoring body, the CoCT Solid Waste Management Department.

6.5.1 Ethical Considerations Relating to Informants

Any research must be ethical especially when dealing with issues of subjects involved in the study, whether they are human being or animals. The following measures were taken to ensure that the study is ethical:

- The informants were not compelled into participating in the study. A signed consent form (Appendix 1) was one of the pre-requisites for participation.
- Any informant who chose to withdraw from the study and revoke the information she/he supplied to the investigator was granted their wish without prejudice.
- Information collected is confidential so as to protect the informants from any (potential) psychological harm.
- Information on personal details by informants was optional and treated with due confidentiality.
- Names of the informants (or their organisations) were not used in the findings if doing so could harm their reputation or jeopardise their work. Explicit requests were made to informants to allow their names to be included in this thesis.
- The informants were not deceived and were told the truth about the intent of the study. Informants were not induced into the research by giving them any incentives to participate in the study. Instead the importance of the study was emphasised to them.
- After analysing data and finishing the report, the informants were provided with the findings so as to clear any misconceptions arising during the data collection phase.

6.5.2 Ethical Considerations Relating to the Researcher

The researcher was ethical when dealing with the research and the following issues were taken into account:

- The investigator endeavoured to ensure that the data collection procedures and interpretation were not biased.
- Appropriate methodology was used when conducting the study.
- The results of the report were communicated correctly without bias.
- There was no information obtained from the subject in any adverse manner to them.
- The investigator endeavoured to uphold the accepted and expected code of ethics principles incorporating among others, the guidelines of beneficence, respect for human dignity and justice.

6.5.3 Ethical Considerations Relating to the Research Unit

The research unit, CPUT DESIS Lab, associated with this study is one of a number of such units associated with university design departments worldwide. Ethical issues in this regard related to preservation of the lab's standing in research circles and alignment with its focus areas of social innovation and sustainability.

6.5.4 Ethical Considerations Relating to the Sponsoring Organisation

The primary source of the funding for this study came from the Western Cape Provincial Government. There was no chance of manipulation of the study by the sponsor because the research was not commissioned by nor conducted for the sponsor, but for academic purposes with endorsement from provincial government. Advice was sought from the Doctoral Supervisors concerning unforeseen ethical implications.

6.6 Summary

This study benefited from a CHAT informed, appreciative CbPD approach, as it allowed participants to act as co-researchers, in the exploration of community assets and practices; and co-designers in the resultant design interventions related to solid waste management. The facilitation of knowledge sharing amongst all participants contributed to mutual learning, and the ability to collectively define the object of design activities. This expansive design greatly enriched understandings regarding the complexities of interlinked activity systems.

The following chapter presents the case study, offering insight into South African conditions related to CbPD; and methods for operationalising CHAT in CbPD projects. The aim of which is to improve collaborative design activities in this domain through the development of a practical theory of participatory design.

CHAPTER SEVEN
THE CASE STUDY

7.0 Introduction

This chapter takes the form of a case study, specifically a key case, presenting a comprehensive example of quad-helix collaboration within Community-based participatory design (CbPD). Drawing on Ehn (2008) and (Björgvinsson, Ehn and Hillgren, 2012a:104) it frames the design project as a social-material *Thing* that aligns design activities. Reflection on the case study presents the design process as a series of phases, namely discover, define, develop and deliver. These phases however were not used to prescribe activities during the process, but rather act as a guide for participants, one which they could move with or away from as new insights arose; thus aligning to contemporary ideas within PD around shifting from *projecting* to *infrastructuring,* and the framing of the design process as adaptive, non-hierarchical and loose. Decisions on direction, when to move ahead, and which emergent objects of design to act on were made collectively by the design *public,* represented here as the co-design group and made up of the emergent group of people from the different quad-helix sectors.

The focus of this CbPD project was the design and development of product service systems (PSS) associated with solid waste management (SWM) in Doornbach, an informal settlement, located approximately 20km outside of Cape Town, South Africa (Figure 7.1).

The purpose of this case study is twofold. Firstly it is to explain a community-based participatory design project, teasing out the tensions, findings and recommendations; and secondly, it aims at exploring and explaining how cultural-historical activity theory (CHAT) can inform the participatory design process as well as retrospectively, in reflection on the process of design and development for complex, collaborative human activities. The aim of which is to improve design for collaboration in the South African context.

The case study story comprises a blend of formal and interpretive reporting (Simons, 2009). It is presented in a linear form, outlining the nature of the project, and follows the four key stages of design, *discovery, define, develop* and *deliver.* These stages had no time limit and were guided by participant activities, rather than vice-versa.

The chapter is then concluded with an interpretive, reflective summary of the process.

Pseudonyms are used in the presentation of participant interview snippets and viewpoints. This is done for two reasons, firstly, the anonymisation of individuals offers some protection of privacy and allowed interviewees to offer frank observations, and secondly, as co-researchers all interviewees are equal in their contributions. Title or

rank should not impact on the validity of the statements. Within the CbPD paradigm the voices of co-researchers should all be heard equally.

Adopting a cultural-historical activity theory perspective of CbPD, and drawing from Jonassen and Rohrer-Murphy (1999) and other examples of AT operationalisation, such as Nardi,1996; Mwanza-Simwami, 2011; Engeström, 2005 & 2015; and Korpela 1998 & 2006, this chapter presents participatory design activities related to solid waste management within an informal settlement.

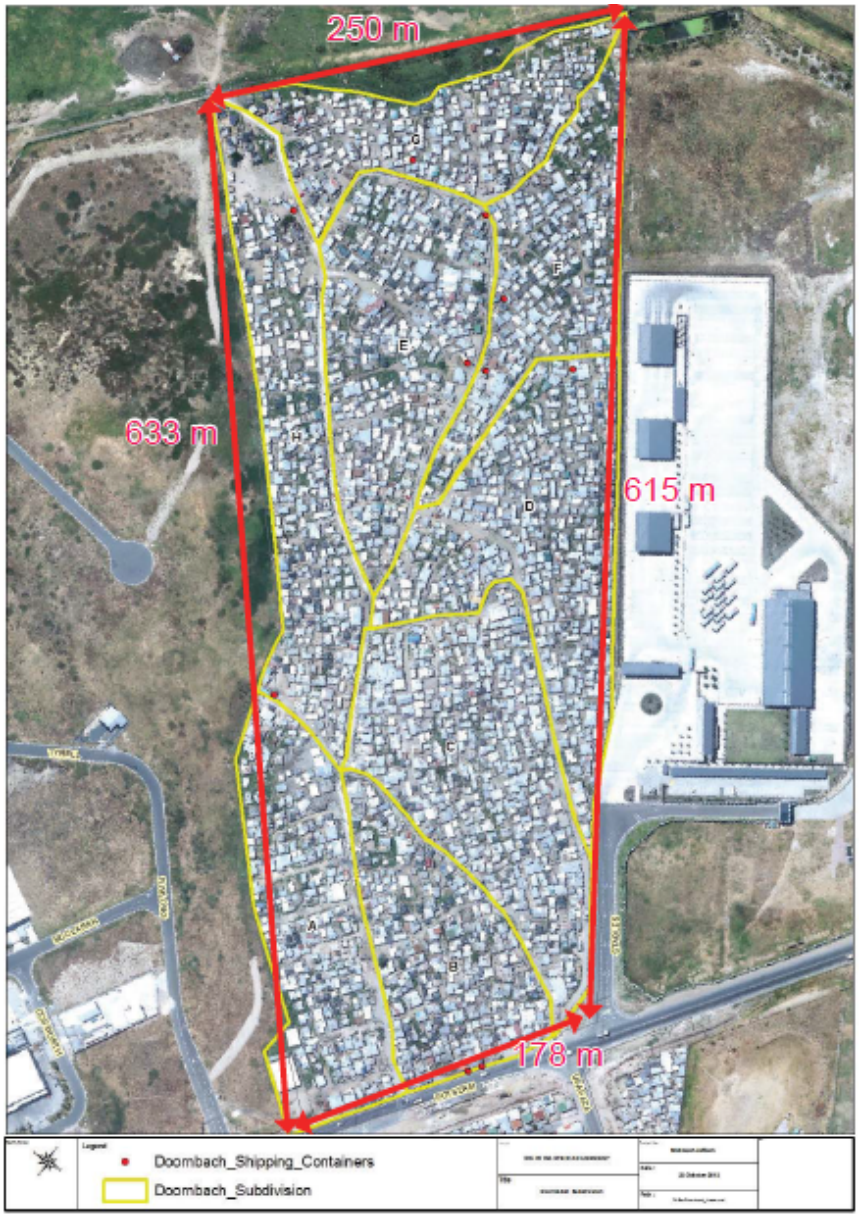


Figure 7.1: Arial view of Doornbach

The focus is thus on CbPD, with the SWM project providing the grounding and context.

The chapter leads with a history, framing and contextualisation of waste management, specifically waste management in high-density unserviced areas (Department of Environmental Affairs and Tourism, 2000), in the Western Cape and Cape Town, it then presents a general overview of the research strategy followed by an in-depth look at each phase of the project.
This is followed by a brief conclusion which is expanded on and presented along with key findings and recommendations in the Chapter 8.

7.1 History and Framing of Waste Management in Informal Settlements

This chapter demonstrates a cultural-historical activity theory (CHAT) based analysis, as developed from the work of Vygotsky (1978), Leont'ev (1978; 1981), Engestrom (1987; 1990), of solid waste management in an informal settlement in, Cape Town, South Africa.

Waste collection in the Western Cape has been a formal service since 1786 and by the 1820's it had taken a form, not too dissimilar to that of today, as a regular collection service carried out on specific days of the week (CSIR, 2005).
Although the service aspect of waste management has remained fairly unchanged, the introduction of motorised vehicles in the 1920's saw a shift away from traditional carts. Motor vehicles were easier to supervise as fewer could do the work of the previous many, and could provide the same service for less (ibid).

The next major influence to solid waste management came much later, and was in the form of legislation, specifically the South African Constitution (1996). Since South Africa's transition in 1994, from apartheid to a democracy, the government has embarked on implementing the Reconstruction and Development Programme (RDP), which aims at addressing the chasm of socio-economic disparities. A key aspect to this has been to address the massive shortfall in social services to previously underserved communities. In CHAT terms, SWM activities have seen major historical shifts in its mediating aspects of tools (the introduction of motorised vehicles) and rules (South African Constitution).

Indeed service delivery, such as solid waste management, is a constitutional imperative. Chapter 10 of the South African Constitution contains the basic values and principles that govern the public service. These key constitutional principles (in CHAT terms, *Rules*) that govern the activities of the public service are:

- The maintenance of a high standard of professional ethics;
- The promotion of efficient, economic and effective use of resources;
- Public-administration must be development-oriented;

- Services must be provided impartially, fairly, equitably and without bias;
- People's needs must be responded to and the public must be encouraged to participate in policy-making;
- Public administration must be accountable;
- Transparency must be fostered by providing the public with timely, accessible and accurate information;
- Good human resource management and career development practices, to maximise human potential, must be cultivated; and lastly,
- Public administration must be broadly representative of the South African people,with employment and personal management practices based on ability, objectivity, fairness and the need to redress the imbalances of the past to achieve road representation (South African Constitution, 1996).

The South African National Constitution (Act 108 of 1996) goes on to stipulate that everyone has the right to an environment that is not detrimental to their health (SA constitution Act No 108, section 24; 1996).

South Africa's Integrated Pollution and Waste Management Policy (2000), established by the Department of Environment Affairs and Tourism (DEAT) notes that waste management is a major challenge of the twenty first century. Indeed, the prioritisation of service delivery, to particularly those who are trapped in social exclusion, is the single biggest challenge for the public service (Taljaard, 2010:79).

It has been noted that disparities exist between higher-income and lower-income countries in their volume of waste generation and management strategies (Africa Institute of South Africa, 2012). Higher-income countries generate more waste per capita (approximately 2,7 m3/capita per annum) than the lower-income countries (approximately 0,2 m3/ capita per annum) (ibid). Similar disparities exist within countries too, with households generating varying amounts of waste depending on settlement type and income (National Treasury, 2011:178). Table 7.1 presents the amount of waste produced based on settlement type. Even though wealthier consumers are predominantly located in lower density suburbs, their waste production far exceeds residents of informal settlements which have a much higher population density.

Table 7.1: Production of Waste by Urban Settlement Type (National Treasury, 2011:178)

Settlement	Waste Quantity
Suburban	0.8 - 3kg per capita per day
Township	0.2 - 0.8kg per capita per day
Informal Settlement	<0.2kg per capita per day

The DEAT recognises these disparities, and as part of their programme for the implementation of the National Waste Management Strategy (NWMS), they produced the *Reference Document for Waste Collection in High Density Unserviced Areas* (2000). This document identifies and analyses the various problems associated with waste collection in these areas and, based on data from several local case studies, presents the following key principles of sustainable waste management services for high-density unserviced areas:

- *Community education* and awareness programmes are necessary.
- There must be sufficient *political will* at both government and local authority level.
- The *community must be actively involved* in the decision making process.
- Ultimate r*esponsibility for collection* services remains with the *local authority.*
- *Technology needs to be appropriate* for the local situation.
- Primary collection services are ideally suited to “one person” type contracts.
- Secondary collection services are better suited to slightly larger contractors.
- Street sweeping and litter clearing are an integral part of the waste collection.
- *Secondary collection points* must be strategically located.
- Appropriate *training* and capacity building for all parties is essential.
- *Private sector participation* can result in more cost effective and efficient services.
- There needs to be adequate *cost recovery*; i.e. payment for services rendered.
- *Capital funding* in the form of donor grants or soft loans is necessary to set up.
- Guidelines need to be sufficiently flexible to account for *diversity of local factors* (Department of Environmental Affairs and Tourism, 2000).

In South Africa, solid waste management is primarily a local government function. Local government, in line with section 156(1)(a) of the Constitution and Schedule 5, is responsible for refuse removal, refuse dumps, solid waste disposal and cleansing (National Treasury, 2011:176). A brief outline of the levels of government an their responsibilities can be seen in Table 7.2.

Table 7.2: Institutional Arrangements for Solid Waste Services (adapted from National Treasury, 2011:176)

South Africa	National Government	• Maintain essential national standards • Establish uniform norms and standards • Promote and give effect to the right to an environment that is not harmful to health and well being
Western Cape	Provincial Government	• Implementation of the national waste management strategy and national norms and standards
Cape Town	Local Government	• Ensure the sustainable delivery of services, subject to national and provincial regulations and standards

There are a number of policies and regulations regarding the governance of waste management in South Africa (Table 7.3).

Table 7.3: Legislation Related to Solid Waste Management (Sawic.environment.gov.za, 2014; Department of Solid Waste Management, 2014)

Regulatory Legislation	Act Number & Year
Hazardous Substances Act	Act 5 of 1973
National Health Act	Act 63 of 1977
Environment Conservation Act	Act 73 of 1989
Occupational Health and Safety Act	Act 85 of 1993
The South African Constitution	Act 108 of 1996
National Water Act	Act 36 of 1998
The National Environmental Management Act	Act 107 of 1998
Local Government Municipal Structures Act	Act 117 of 1998
Local Government Municipal Systems Act	Act 32 of 2000
Mineral and Petroleum Resources Development Act	Act 28 of 2002
Local Government Municipal Finance Management Act	Act 56 of 2003
Air Quality Act	Act 39 of 2004
National Environmental Management: Waste Act	Act 59 of 2008
National Environmental Management: Waste Management Act (NEMWA)	Act 58 of 2009
National Waste Management Strategy (NWMS)	2011
National Environmental Management: Waste Amendment Act	Act 26 of 2014

In 2001, government set itself the target of providing all households access to refuse removal services by 2012. Significant progress has been made in expanding access, but significant challenges still remain (National Treasury, 2011:182), and indeed still do

post 2012. A key hurdle is that services cannot be provided by government to people squatting on private land. Land appropriation by government is required in order to provide public services, and with the spread of informal settlements this is a moving target. The Department of Environmental Affairs National Waste Management Strategy (NWMS) seeks to address the backlog in the provision of waste services particularly to urban informal settlements and rural/tribal areas (ibid), and has been structured around eight goals, which are:

- To promote waste minimisation, re-use, recycling and recovery of waste,
- To ensure the effective and efficient delivery of waste services,
- To grow the contribution of the waste sector to the green economy,
- To ensure that people are aware of the impact of waste on their health, well-being and the environment,
- To achieve integrated waste management planning,
- To ensure sound budgeting and financial management for waste services,
- To provide measures to remediate contaminated land,
- To establish effective compliance with and enforcement of the Waste Act (Environment.gov.za, 2011).

The key principles, outlined in the *Reference Document for Waste Collection in High Density Unserviced Areas* (2000) contribute to the framing of solid waste management in informal settlements. The case study presented in this chapter is aligned to four key conclusions drawn from the above principles, namely:

- The waste collection system must be *community driven*, so that the community takes "ownership" of the system.
- *Education and awareness programmes* are necessary to sensitise the communities in environmental issues and the importance of waste management.
- *Community based contracting* is the most appropriate means of private sector participation in waste collection for high-density low-income areas; these community-based contractors must be contracted directly to the local authority, and,
- *Appropriate technology* to suit the local conditions must be used.

As such, the participatory design processes and activities were designed as expansive learning environments with the objects of education; designing and producing appropriate waste management products, services and systems, and; job creation aligned to new systems.

7.1.1 Vision for Waste Management in Cape Town

The City of Cape Town's Solid Waste Management Department provides a Solid Waste Management Sector Plan for the City of Cape Town, which incorporates the Integrated

Waste Management (IWM) Plan. This consists of operational support strategies, and contains a schedule of projects and activities (Department of Solid Waste Management, 2012).
The IWM plan aims to:

- Give effect to the Sector Plan strategies;
- to manage and minimise waste;
- to ensure sustainable and affordable services; and
- to comply and meet objectives of the National Waste Management Strategy (ibid).

The City of Cape Town Waste Management Draft Sector Plan (2013-2014) states that:

> *The long term vision for the City of Cape Town's waste management services, is to integrate waste management services in such a way that they are able to not only provide basic services, but to augment economic activity and minimise the effects of waste on human and environmental health.*

The sector plan goes on to summarise it's long term vision's key aims, which are:

- To improve access to basic services for all residents (formal, informal and backyarders) to as close to 100% as possible within the constraints of available funds and unplanned growth;
- to develop multiple integrated initiatives that will reduce waste and the associated impacts substantially as well as contribute to and support economic development;
- to generate other sources of funding for integrated waste management through Public-Private Partnerships within the Cape Town municipal area;
- to improve the income generated by the Council's waste services;
- to optimise the utilisation of the Council's resources and capital; and
- to regulate waste and the associated services that will ensure sustainability and prevent impact or harm to people and the environment (Department of Solid Waste Management, 2014)

Drawing on the aims of SWM in Cape Town as stated in multiple legislative documents presented here, certain key themes arise, they are the *integration* of SWM into communities and other related and supportive services, based on their unique needs and context; *inclusion* of citizens in the conception of these services; *job creation* linked to SWM PSS; and *human and environmental wellbeing*.

7.2 Introduction to the project

This CbPD project was initiated in July 2013 as a partnership between the City of Cape Town's (CoCT) Solid Waste Management Department and the Design for Sustainability and Social Innovation (DESIS) lab of the Cape Peninsula University of Technology (CPUT). The aim of the project was to explore solid waste management (SWM)

systems in Doornbach with the purpose of designing new possibilities for related product service systems (PSS).

The project involved representatives from the Solid Waste management department of the CoCT, design-researchers from the DESIS lab of CPUT, students and staff from the Faculty of Informatics and Design, private designers, and residents of Doornbach.

7.2.1 Doornbach

The geographic location of the project was the informal settlement of Doornbach.

Basic data regarding population and households:
Area: 0.76 km²
Population: 5033 (6630.88 per km²)
Households: 2622 (3454.43 per km²) (Census, 2011)

In 2011 the land on which Doornbach is situated was bought by the City of Cape Town, at which point the earliest residents had been living there for 18 years (Luhanga, 2011). In accordance with national legislation, the CoCT could not provide services up until this point as it is illegal to provide services on land not owned by the city. Prior to the provision of services, the main source of health issues was the excess uncollected solid and liquid waste (Disaster Management, 2006), making the provision of waste collection a priority service.

In 2012, Doornbach received its first electrical connections (capetown.gov.za., 2012) with other basic services also beginning soon after the purchase of the land. In alignment with the CoCT's quest to provide services to the area, and basic services to all, the SWM CbPD project began in 2013 with the aim of designing appropriate strategies for enhancing solid waste management processes.

7.3 Research Strategy and Activities

Drawing from participatory design, service design theory and practice, and CHAT (presented in the previous Conceptual Framework and Theoretical Framework chapters) the research strategy for this project aimed at moving iteratively through four key phases, namely: *Discovery* of key concerns, tensions, and objects of design; collective *defining* of these concerns, tensions, and objects; *Development* of publics and approaches related to each; and the *delivery* of prototypes and models as *boundary objects*, as well as on infrastructures and the process of *infrastructuring* (Ehn, 2008:92).

These activities were supported by Engeström's four types of contradictions, and their corresponding collective epistemic actions (Figure 5.24), as outlined in the previous chapter.

Drawing on Figure 5.24, Figure 7.2 depicts the design process and the movement between convergent and divergent thinking and acting, aligned with Engeström's (2014) concept of expansive learning and its actions of ascending from abstract to concrete, and his 7 step process of Concept Formation (numbers 1-7 in the diagram). Below is an overview of the four phases as they pertained to this project.

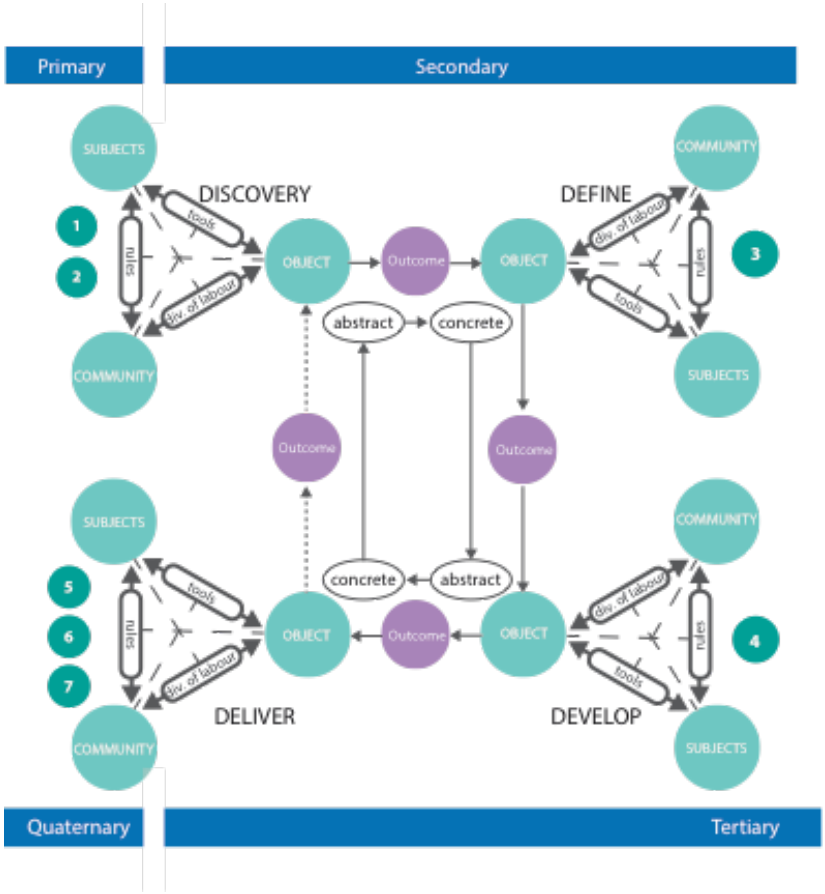


Figure 7.2: Service design process model framed through CHAT

Phase 1 : Discovery

Activities: Preparatory work, negotiation with local authorities (CoCT SWM dept, local councillors), negotiation with Doornbach residents (community leaders, other interested parties), preparation of agreements/MOU's, Initial data gathering.

Aims: Establish relationships with key players, gain an understanding of the designated settlement (political, socio-economical, geographical), establish rules and roles, establish core design team representing all stakeholders.

Contradiction Identification: Primary and Secondary - identify tensions within and between activity nodes.
Epistemic Actions: Questioning accepted practice, Analysing current SWM situation (historical-genetic and actual-imperical) (Engeström, 2001; Engeström & Sannino 2011:7).
Outcomes: Emergence of a design public in the form of the initial co-design team, around definitions of SWM activities and tensions between quad-helix groups.

Phase 2 : Define
Activities: Site visits, community leader-led "walk-about", stakeholder meetings, SWM activity mapping, community asset mapping.
Aims: Identify mediating tools, rules and roles in SWM activities; object alignment; Co-definition of brief .
Contradiction Identification: Secondary - tensions between activity nodes.
Epistemic Actions: Modelling SWM activity systems.
Outcomes: Descriptions of tensions between existing publics as they relate to quad-helix structures; description of operational processes from which these tensions arise; and the further evolution of the design publics around emergent tensions.

Phase 3: Develop
Activities: Visual Mapping, Community co-design workshops, CAD modelling.
Aims: Concept development and refinement.
Contradiction Identification: Tertiary - tensions between existing and new system objects.
Epistemic Actions: Examining SWM activity model to discover potentials and limitations.
Outcomes: Boundary objects, opening up new ways of thinking and behaving

Stage 4: Deliver
Activities: Prototyping; negotiation of placement; prototype implementation; reflection on design process.
Aims: Test prototypes; define further requirements; refine co-design process.
Contradiction Identification: Tertiary & Quaternary - tensions between existing and new system objects & between central activity system and any/all of its related systems.
Epistemic Actions: Implementing design interventions; Reflecting on process and interventions; Consolidating findings into a stable form of practice (Engeström, 2001; Engeström & Sannino 2011:7).
Outcomes: Prototypes for use in extending design from *design-for-use* to *design-for-design* (Ehn, 2008), with the aim of including more participants' voices and possible unforeseen uses in further design iterations.

These phases will now be presented in depth, supported by interviews with co-researchers, data from archived material and field notes, and personal observations.

7.3.1 Discover

This phase of the design process embodies certain levels of uncertainty and is often referred to as the fuzzy front-end of design (Figure 7.3). Sanders and Simons, (2009) ascribe the term *fuzzy front-end* to this phase of design "because of its ambiguous and chaotic nature" and it often embodies the pre-design phase of a project. This is often overlooked, with projects usually beginning with a specific brief. In the case of this project, the brief was negotiated during the predesign phase by all stakeholders, academia, public sector representatives and residents of the project context, thus blurring traditional distinctions made between public, private, the state and the market (Björgvinsson, Ehn and Hillgren, 2012b:127). The design project was born out of initial discussions between local government and academia around improving service delivery related to solid waste in informal settlements. Upon academia's engagement with an informal settlement and the solid waste management department, key stakeholders emerged, giving rise to the initial *public.* This public emerged through the identification and naming of issues related to solid waste in informal settlements, and consisted of members from the CoCT's Solid Waste Management department, CPUT's DESIS lab and residents from Doornbach.

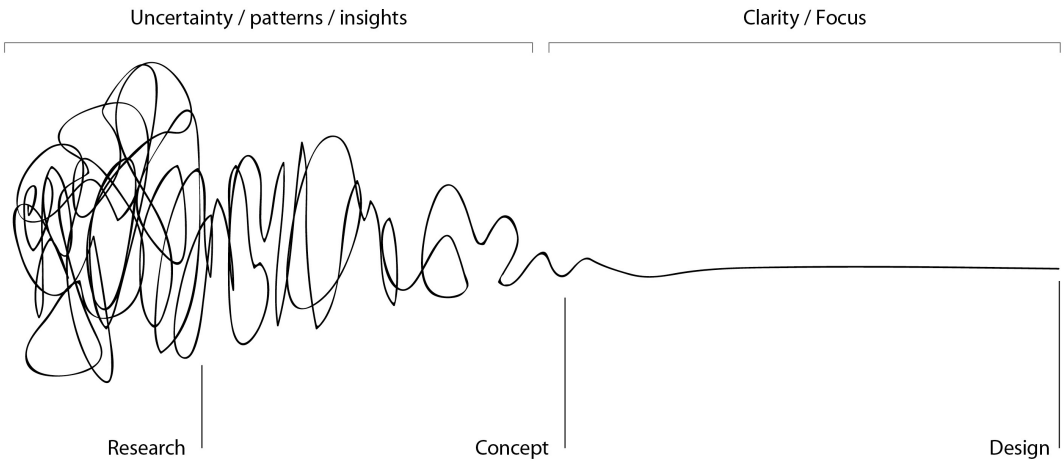


Figure 7.3: The Process of Design Squiggle (Newman, n.d.)

The discovery phase involved initial meetings between academia (members of the CPUT DESIS Lab) and the public sector (CoCT SWM Department), who discussed the potential scope of the project based on available resources, both monetary and human, and each others mandates and goals. A key aspect of the framing of the project was to limit its scope to what could be delivered. In past CbPD projects it has been observed that designers, unfamiliar with the realities of the context, focus beyond the scope of project owners (such as CBO's and NGO's) and deliver solutions incompatible with

their knowledge/skills and resources. These 'solutions' therefore don't find traction and can damage design's reputation amongst those involved by creating false expectations.

To best achieve an understanding or scope of possibilities it was important to share both experiential and professional knowledge between stakeholders.
Within CbPD, stakeholder knowledge is seen as equal, with all participants taking the role of co-researcher. Here potential partners met and teased-out project possibilities, negotiated the object of design and presented their motivations, requirements and shared experiential and professional knowledge.

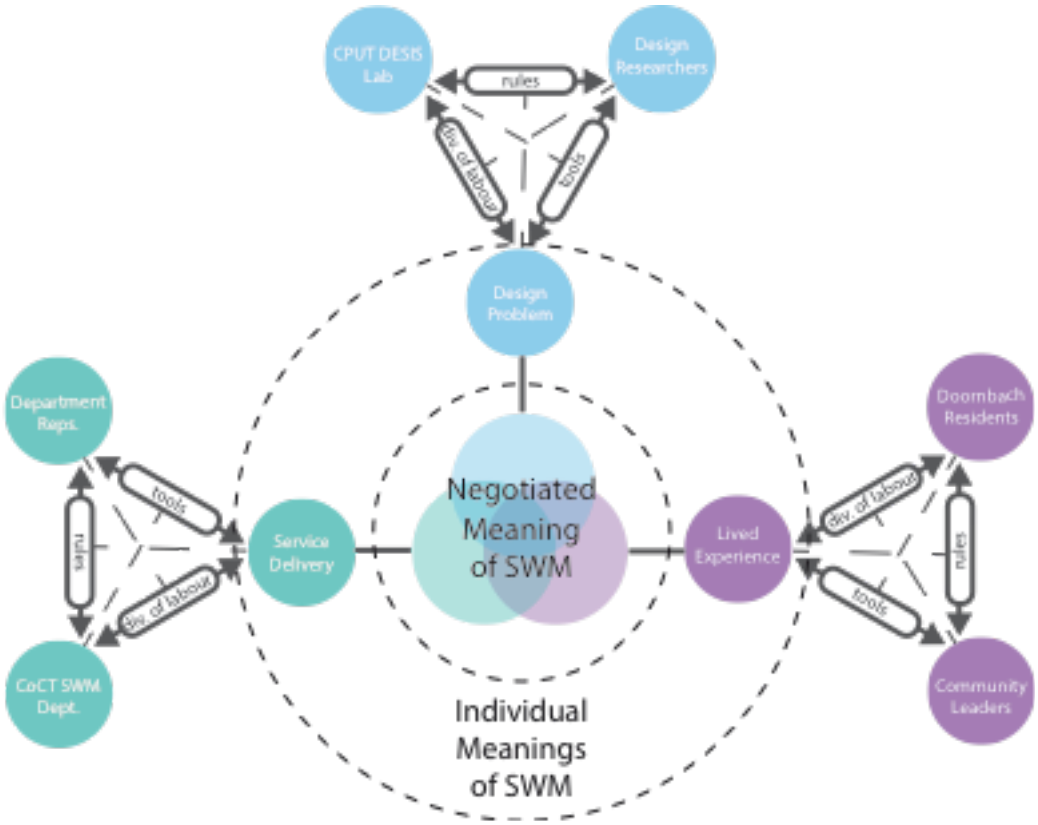


Figure 7.4 Moving from an individual to a negotiated meaning of activity

The *Discovery* phase of this project was key to understanding and learning between stakeholders, indeed one participant stated:

> *"…we tried to expand the DISCOVERY phase of the process, so that it would include all the bits about the conversations with the community and so on, and not just discovery in the traditional sense. Our Discovery [phase] was the most important part of the process in terms of what we actually found and what we came to think, [it] benefitted the most from being expanded. The definition of our meaning of possibilities within that process found the greatest expression there"* (Participant A, 21/04/2015).

Key to this description of the Discovery phase is the idea of *meaning-making*. Each group entered the project with their understanding of SWM being determined by their role and/or own personal experience. The public sector view it as a service that they are mandated to deliver and thus understand it from a technical, service-oriented perspective; designer-researchers understood it from a PSS perspective and viewed it as a socio-technical systems design problem; while Doornbach residents viewed it as a lived experience. These views straddle the continuum of conception, design and delivery and use. Currently the system is conceived and put into practice by local government, with residents as recipients. Through inclusion of residents in the redesign of solid waste PSS, their lived experience, previously relegated to a product of PSS design, became acknowledged as a key factor in developing a more appropriate PSS. This inclusion aimed at equalising power structures and giving voice to those whom previously only received the service. This collective exploration also facilitated the emergence of the initial design public, around emerging key issues. This approach facilitated the formation of the co-design team around specific issues, rather than framing an issue within an existing team.

Key to moving from the *discovery* phase into the *definition* phase of design was developing a shared meaning of SWM activities, negotiated amongst stakeholders and actors (Figure 7.4). This exploration and sharing of ideas, knowledge and experience is typical of the divergent nature of discovery, through developing a shared meaning the design team could begin focussing in on defining related work and life activity systems and preparing the design brief. One co-researcher commented on the extended early pre-design phase, stating that "…*negotiation has possibly been the most time consuming process, negotiation with city, negotiation with the various power structures. Communication has been another important part of this early phase"* (Participant B, 14/05/2015).

For this communication to happen it was important the teams evolved from, what Nummijoki & Engeström (2010, 56) refer to as "three modes or developmental forms of epistemological subject-object-subject relations", namely, from *coordination* to *cooperation* and eventually, *communication*.

Coordination involves actors within the work activity, in this case co-design, approaching the theme or activity, here SWM, from their historical standpoint, similar to the individual meanings described above. Nummijoki and Engeström (2010:57) describe this mode of subject-object-subject relationship as the "normal scripted flow [of] interaction where various actors are following their scripted roles." Figure 7.5 presents the structure of the project during its initiation. At this point, future participants were interacting with SWM activities from their historical standpoints; CoCT are focussed on providing a service based in historical methods, design researchers were

focussed on understanding SWM as a design problem, while residents of the informal settlement were engaging with the realities of a system that seemed misaligned to their specific needs.

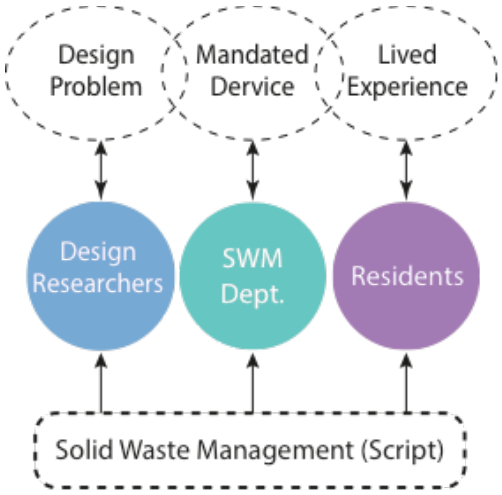


Figure 7.5: Structure of coordination regarding SWM (adapted from Nummijoki & Engeström, 2010)

During the *cooperation* phase of relationship building, negotiation activities between the three actor groups, existing publics, saw the reconceptualisation of these objects in mutually acceptable ways. Nummijoki & Engeström (ibid) describe this as "interaction in which the actors, instead of focussing on performing their assigned roles or presenting themselves, focus on a shared problem." This involved the collaborative design team focussing on SWM activities as a common theme. Co-design offered these groups a way to collectively define and focus their actions on issues at hand. An example of this was reflected on by one of the co-researchers in an interview, they stated:

> *we had someone like [name removed] who themselves is a graphic designer by training but has experience in this type of "design storming" activity, but because of his communication bias he was more interested in the story of what was happening there [in the community], while the industrial designers were looking into products and systems. If I were to break down PSS, product-service systems, the Product designers were looking more at the product and the system, while the private designer was looking at the service element of where things are failing and what the situation on the ground was. So there was obviously different ways of looking at the problem, but we all agreed on the object, that was the one thing that defined everyones collective task [actions]* (Participant A, 21/04/2015).

This issue framing contributed to the constitution of a public around keys issues. DiSalvo (2009:49) describes the Deweyan publics as "an entity brought into being through issues for the purpose of contending with these issues in their current state

and in anticipation of the future consequences of these issues." Indeed, the emergent public as a co-design team was formed by making key issues visible, through coordination around the shared object of solid waste management.

Combining all perspectives, SWM was framed as being made up of complex socio-technical product service systems in need of improved contextual compatibility (Figure 7.6).

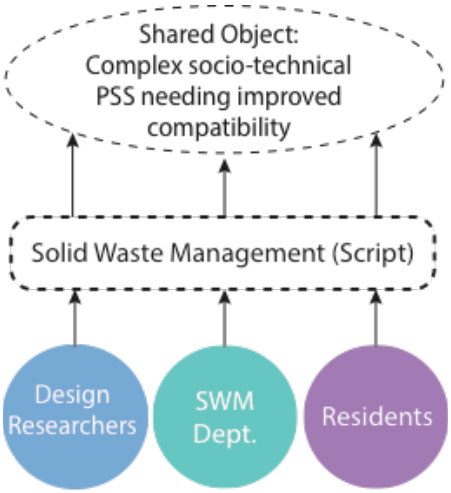


Figure 7.6: Structure of cooperation regarding SWM (adapted from Nummijoki & Engeström, 2010)

This cooperation facilitated a move toward ongoing *communication* (Figure 7.7), defined as "reflective interaction in which the actors focus on reconceptualising their organisation and interaction in relation to their shared objects" and which is reflective in nature (Engeström, 2010:51). During this state we see roles shift, collaborations form and activities emerge based not on preconceived ideas of the script, but rather based on continual collaboration around the shared object, and future objects that might form. A pertinent aspect of this communication we encountered was the evolving understanding participants from the public sector and community had of the definition of design. Initially, design was understood by these groups as the final artefact or *thing*, not as a process of interaction around arriving at the artefact, the *Thing*.

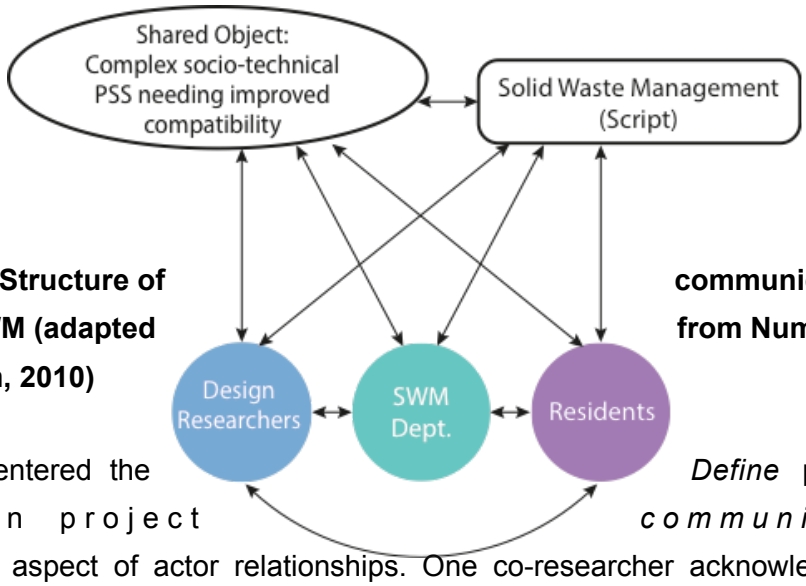


Figure 7.7: Structure of communication regarding SWM (adapted from Nummijoki & Engeström, 2010)

As the team entered the *Define* phase of the design project *communication* became a key aspect of actor relationships. One co-researcher acknowledged the importance of ongoing framing and reframing, stating "*I think that ongoing sensing and feedback coming back from the context is really really crucial, because things change"* (Participant B, 14/05/2015).

7.3.1.1 Findings

Initial explorations into SWM activity system structures identified three key subject groups and their work activities; the CoCT SWM Department responsible for managing solid waste activity systems, the residents who dispose of waste, and the contractors who are hired by the CoCT to collect waste in the informal settlement.

These activity systems impact directly on the functioning of the others and were viewed as a hierarchy (Figure 7.8).

Another key finding was how the community did not relate the area's given name of Doornbach, but preferred the are be called Sibabalwe, meaning "*we are blessed."*

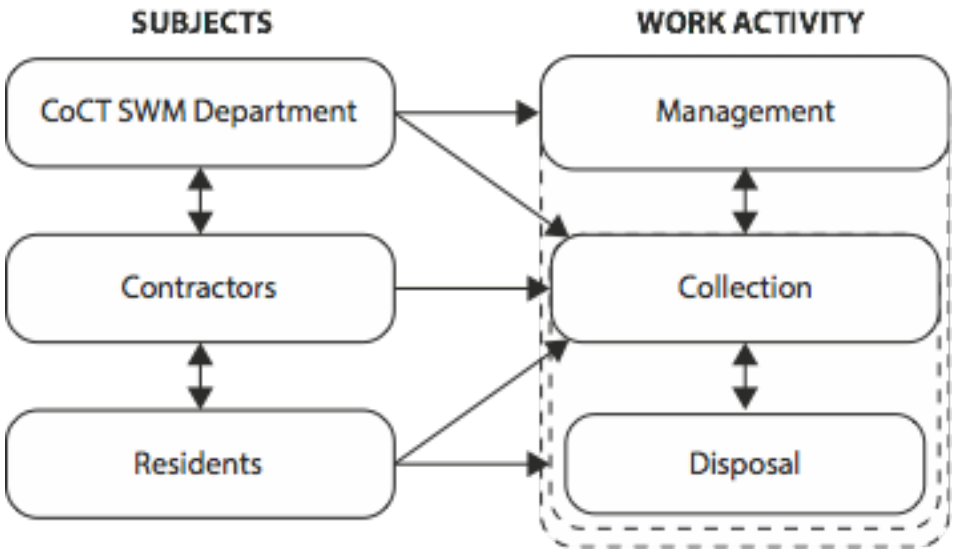


Figure 7.8: Hierarchy of Work Activities Related to Solid Waste Management

Further unpacking of these work activity systems was needed to identify a deeper understanding of the system structures. Drawing from Mwanza-Simwami's (2011) Activity Oriented Design Method (AODM) the following table (Table 7.4) defines and collates the components of the activity systems identified during the Discovery phase of the research.

Table 7.4: Eight Step Model of SWM activities (adapted from Mwanza-Simwami, 2010)

Eight Step Model				
		Initial Focus and Findings:		
Step 1	Activity of Interest	SWM in Doornbach informal settlement		
Step 2	Object	Disposal/collection/management of SW		
Step 3	Subjects	Residents, Contractors, SWM department		
Step 4	Tools	**Residents:** Blue government issue bags; shipping containers;	**Contractors:** Collection vans; containers	**CoCT SWM Dept**: Collection vans; digital management tools

Eight Step Model				
Step 5	Rules & Regulations	Individual rules per household; Rules regarding dumping and storage of waste imposed by government	Required to meet tender requirements as per agreement with SWM dept	Responsible for refuse removal, refuse dumps, solid waste disposal and cleansing, as per national/ provincial legislature requirements (see Table 7.3)
Step 6	Division of Labour	Each household responsible for the safe disposal of their waste	Contracters hired by SWM dept, who in turn hire members of the community for door-to-door collection and area cleansing, as per tender agreement	SWM Dept. responsible for collection, managing collections, disposals, area cleaning and strategic planning *see Figure 7.9.*
Step 7	Community	Doornbach informal settlement	Collection activity is carried out in Doornbach with drop off happening in separate context	Management and key tasks take place in both an office and the field
Step 8	Outcome	Clean, sanitary home	Clean, sanitary environment	Basic waste services, job creation and a minimisation of waste on human and environmental health

The discovery phase provided us with a general understanding of functions and those responsible for these within the SWM activity system. The SWM activity system was understood at this point to function as follows: Residents, designated with two blue bags per week, are responsible for disposing of their waste outside their homes for collection. Contractors, hired by the SWM department and in turn are mandated to hire residents of the ward in which they operate, are then responsible for collection of these bags twice a week. They then place the bags at central collection points where the SWM department then collects for removal from site.

With each system impacting on and interacting with the other it was important to begin mapping these relationships. A key to this mapping phase was an understanding of the system interrelatedness as a nested activity system (NAS).

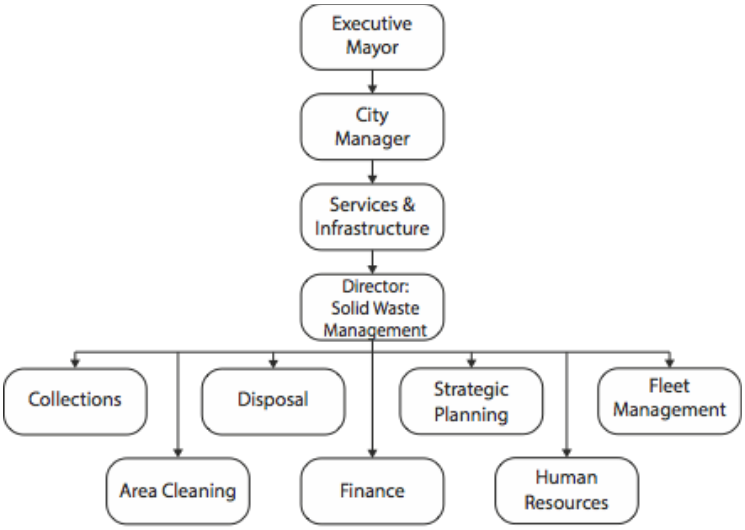


Figure 7.9: Organogram of CoCT's Department of Solid Waste Management (adapted from Engledow, 2007)

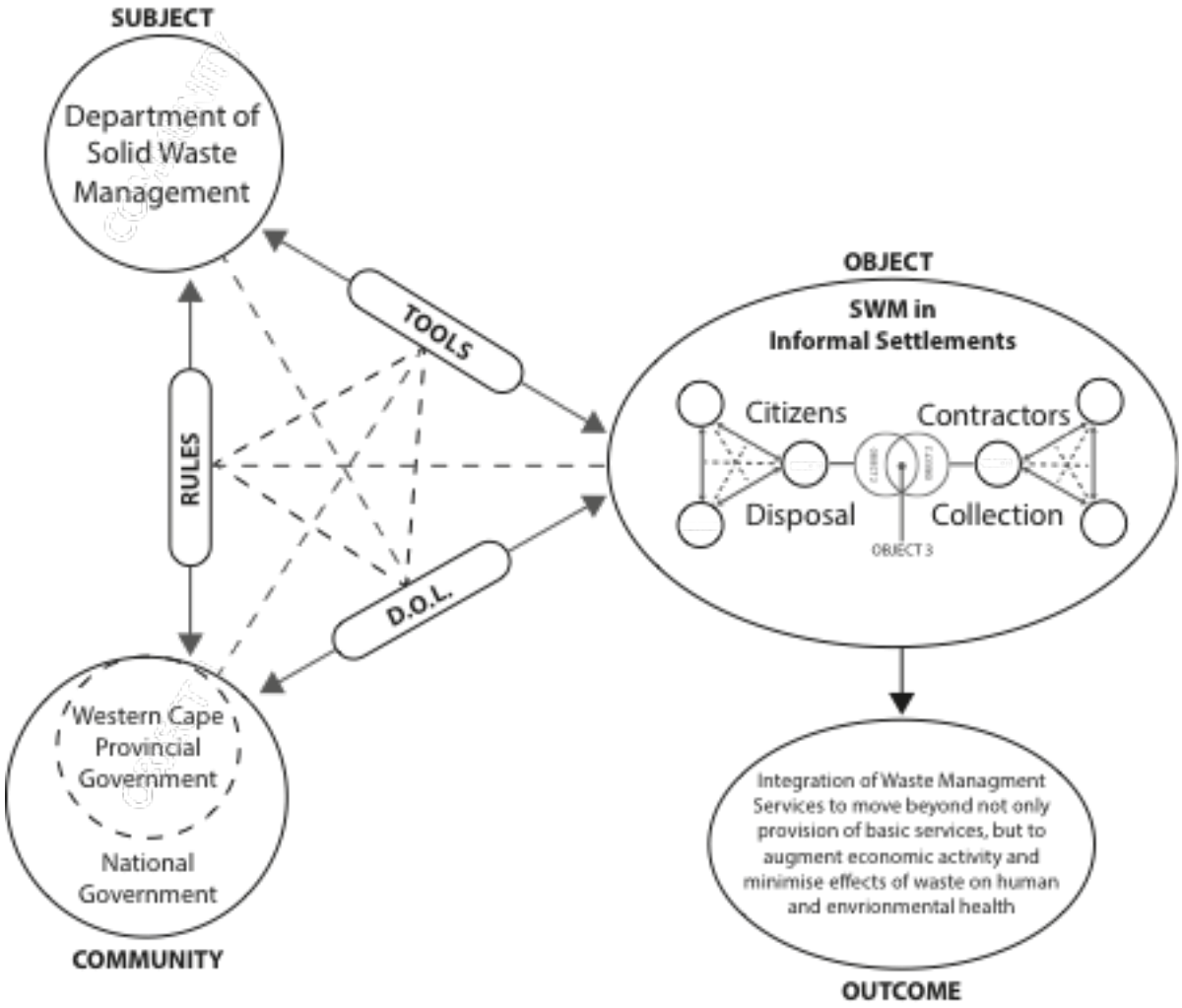
This nested activity system frames SWM work activities as interrelated and intrinsically linked to one another. The functioning of the disposal/collection activities determines the success of the SWM department in achieving their object(ive). Here the outcome of two interconnected activity systems (disposal/collection) form the object of a larger system (management). An initial framing of these activities is presented in Figure 7.10.

Figure 7.10: SWM presented as Nested Activity Systems (NAS)

Here the overarching object, SWM, is acted upon by CoCT SWM department. In this case, various people use various tools in order to do this, depending on whether they mange the fleet of collection vehicles, human resources and other divisions of labour, outlined in National and Provincial legislature.

Within Doornbach, two key activity systems interplay with one another: residents, whose object is the cleanliness of their home, and, contractors whose object is the cleanliness of the community as a whole.

The object of SWM can therefore be said to contain an expansive model of cleanliness, where the two interacting activity systems formed the minimal unit of analysis. This



analysis adapts Engeström's (2001:131) definition of expansive design, where two interacting systems form the minimal unit of analysis.

Within the object of SWM in Figure 7.10 the triangle on the left represents the disposal activity system of the residents, while the triangle on the right represents the collection activity system of the contractor. This is a simplified representation as households might dispose of waste in different ways, even having different ways of disposing of waste related to each person within the home. Contractors also vary, and might carry out their work activities slightly differently. The key here though, was to represent a general understanding of complex activity systems for further exploration during the *define* phase of the design process. Making sense of these complex work activities represents what Engeström (1999) refers to as "visibilisation."

Object 2 in the figure represents the formation of a partially shared object between resident and contractor and represents "an elaborated image, vision or prototype of the object" (Engeström, 2006).

With cleanliness being identified as a common component of the shared object during the *discovery* stage of design, this became a crucial area of concern, with the following

define phase interrogating this further. Object 3 represented this "potential common ground or synergy" between these two systems (ibid). These synergies were explored further in the *define* phase.

7.3.2 Define

The aims of the *define* phase of the project included the alignment and negotiation of the object of the SWM co-design project, the detailed mapping of SWM activity systems and the identification of tensions within these systems. These aims would then go on to define the design brief.

After initial meetings and outlining basic ideas of SWM in Doornbach, hearing from predominantly the service providers, the design team began in-depth explorations in situ, guided by community leaders and other resident volunteers. These involved a number of site visits, guided walkabouts and stakeholder meetings.

Visibilisation and sense-making of SWM work activities, discussed in the *Discover* portion of this case study, required further definition. Engeström (2006) describes this next step of expansive design as "opening up and making visible the activity systems of key customers or users," requiring that "the unit of analysis is extended to include minimally two interconnected activity systems". Initial framing of the two interconnected activity systems, design and SWM, can be seen in Figure 7.11.

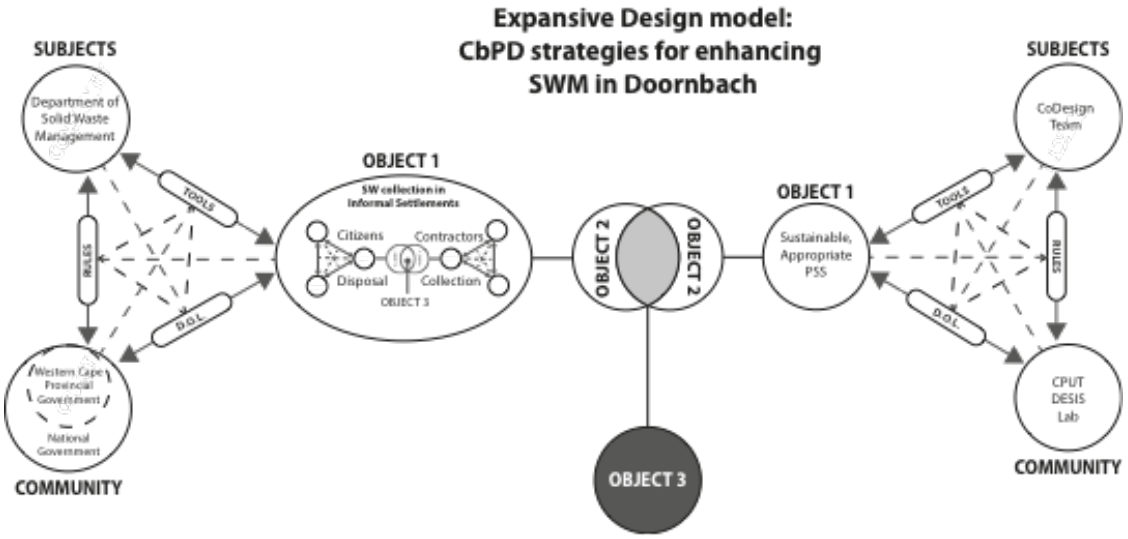


Figure 7.11: SWM activity system and Design activity system as minimal unit of analysis in expansive design.

This expansive design model represents the initial designer/client relationship as the team exited the *discovery* phase and moved into the *define* phase. Here, the object of the design researchers was the sustainable, appropriate design of PSS based in social

innovation. This object was framed by their focus within the CPUT DESIS Lab. The object of the CoCT SWM Department was the management and collection of solid waste in Doornbach, determined by policy, laws and historical ways of carrying out the activity. Object 2 represents “an elaborated image, vision or prototype” of the object (Engeström, 2006). This elaborated image of SWM activities was based in the sharing of knowledge between the CoCT SWM Department members and CPUT DESIS Lab design researchers. Here the team began to tease out and define the intricacies of the complex socio-technical activities related to SWM. Object 3 represents the “potential common ground or synergy between the two perspectives” (ibid). This involved the development of a way forward based in each others knowledge and capabilities. It was also clear at this point that the activities of another key customer, the residents, needed to be mapped to properly develop appropriate SWM PSS. The updated expansive design model can be seen in Figure 7.12.

Although the team would have liked to have included contractors in this updated model, it was requested that they focus their work on collaboration with CoCT Solid Waste Department and the citizens of Doornbach.

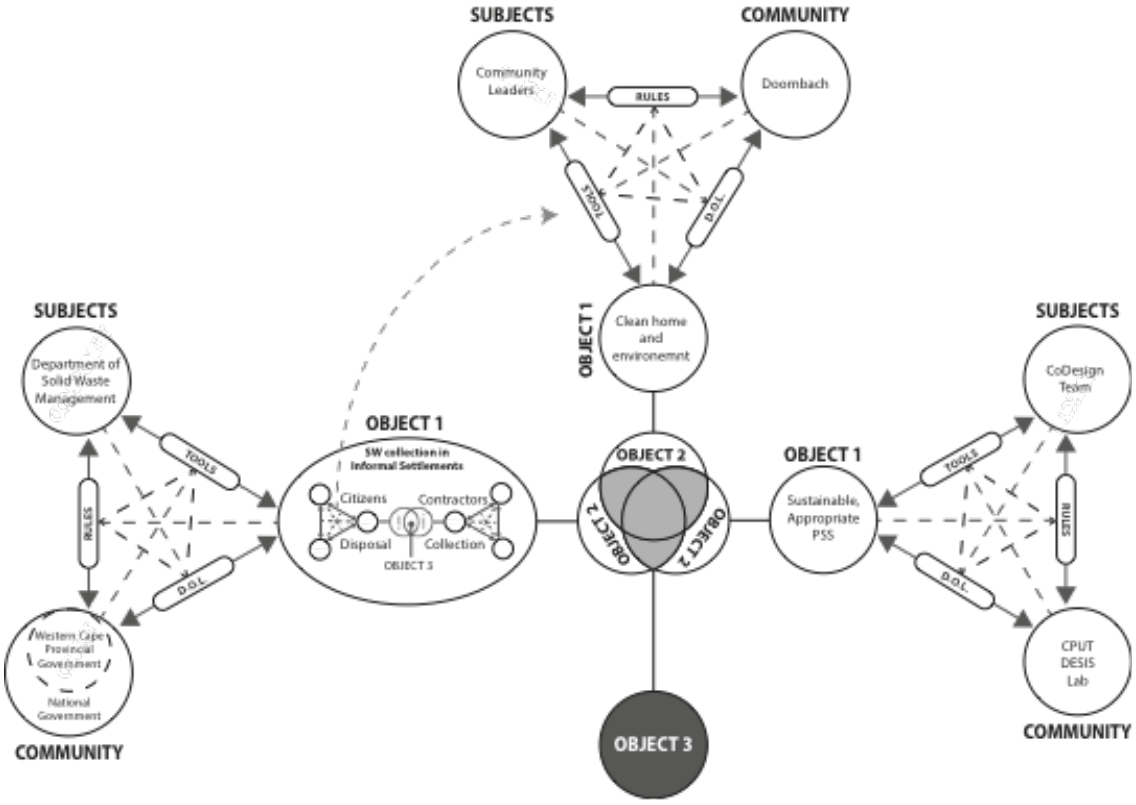


Figure 7.12: Expansive Design Model to Include Community Members as key customers

The design team had met with the SWM Department a number of times at this point and had a comprehensive understanding of the city’s SWM object. In order to further

define the object that would underpin the design brief, the design team began a series of interactions with and within the community of Doornbach.

7.3.2.1 Community Engagement

Community engagement began with meeting the Doornbach community leaders and explaining the project, with the aim of garnering support and collaboration.
Community members were happy to be included in the process and to collaborate in the design and development of SWM PSS.

Community Leaders led several walkabouts with design researchers and SWM Department representatives. Together the team, now including design researchers, SWM department representatives and community members, began mapping the area and discussing root causes and effects of SWM related issues. Design related activities during this phase were aimed at reducing complexity, building trust and sharing knowledge.

The team adopted an appreciative inquiry (AI) approach to further define SWM activity systems and their components. AI involves "asking questions that strengthen a system's capacity to apprehend, anticipate, and heighten positive potential" (Cooperrider & Whitney, 2005). In doing so, the team identified existing best practices around waste management, and the meditational tools residents were using in their discarding of waste. Key to this phase was the detailed mapping of the community's activities related to the disposal of waste, and the tensions between these activities and those of contractors and the CoCT SWM department.

Another tool the design team used in understanding the context of SWM activities was IDEO's HCD toolkit, adopting the three lenses of human-centred design (Figure 7.13). Beginning with *desirability* we interrogated what kind of SWM PSS residents desired. Key to this was the sharing of technical and experiential knowledge by designers and residents. In previous projects we found that citizens not exposed to existing solutions or technical possibilities can battle to express their needs. Aligning user requirements to what the CoCT SWM department could realistically deliver followed on from this. Tackling the *feasibility* of citizen requirements involved identifying what was technically and organisationally possible. Tied to this was the final phase of *viability,* here we explored the financial implications and viability of the proposed design options.

Two researchers recall these approaches:

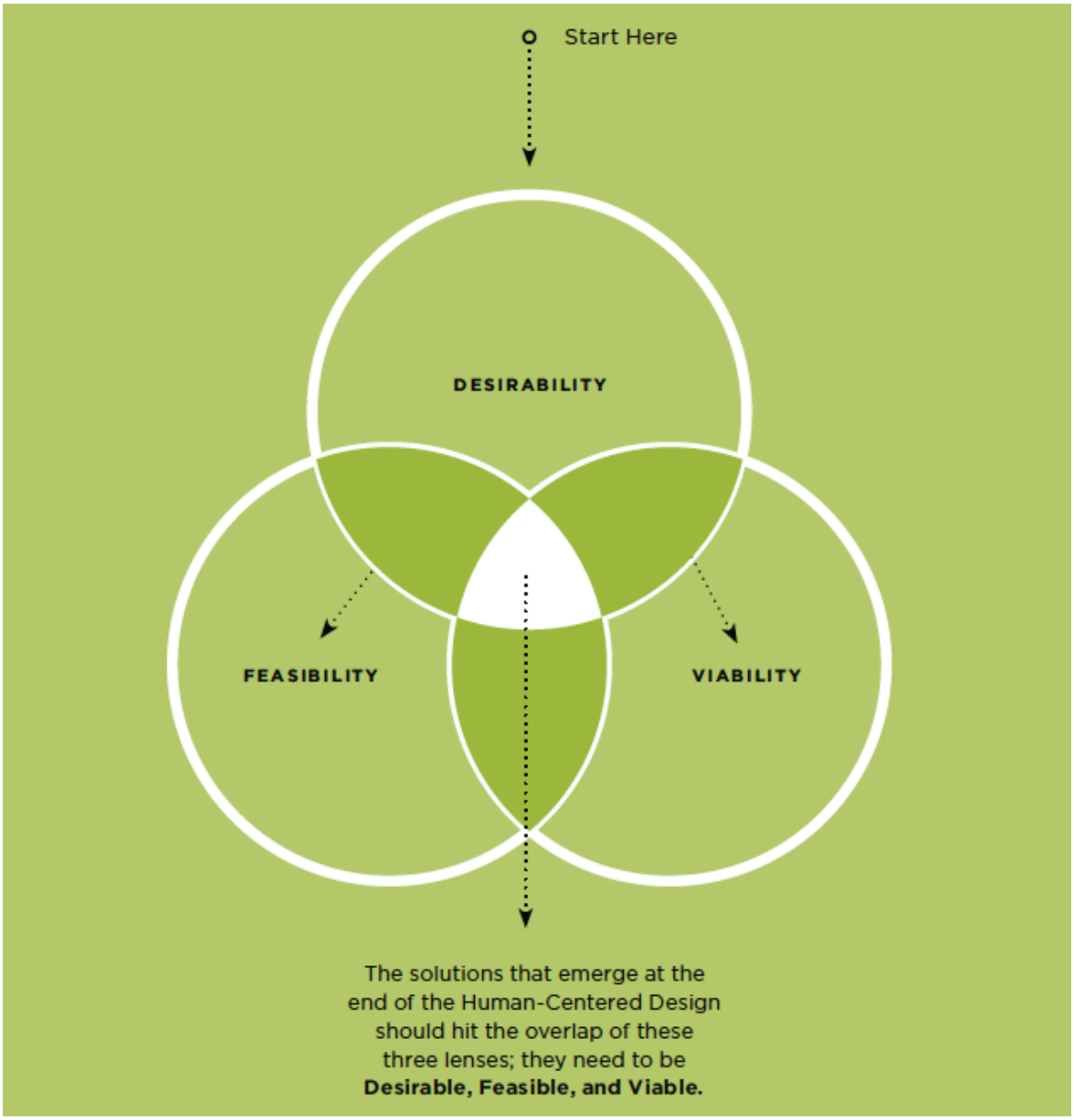
> *First of all we used AI as a way of mapping the context, we had a group if IT and Design Postgrad students that were part of the research gathering team, we also sent in a team of designers to specifically do photo and video documentation,*

and…a tool we used which was external (existing) *was the HCD toolkit, from the outset this was a tool we adopted"* (Participant A, 21/04/2015)*;*

while another noted,

"*…the HCD approach is a clear set of guiding phases and principles here which have been very influential…understanding* [it] *as a methodology and an approach, I think that the observation phase, and that sort of empathic-listening, has been a key initial component."* (Participant B, 14/05/2015).

Figure 7.13: Three lenses of human-centred design (IDEO HCD Toolkit)



To better define the SWM activity systems and their components, researchers drew from AODM's *Technique of Generating General Research Questions* (Mwanza, 2002) and it's *Technique of Mapping Operational Processes* (ibid).

Table 7.5 provides general and more focussed research questions that were used to further define Doornbach community members' interactions in SWM sub-activity systems (Mwanza-Simwami, 2011:80). This approach facilitated a more detailed investigation into relevant activity systems and their components, as well as the identification of contradictions between activity systems. The focus of which, was between community disposal and contractor/Dept of SWM collections.

Table 7.5: Technique of Generating General Research Questions (Mwanza, 2002)

Technique of Generating General Research Questions
1) What Tools do individual residents use to achieve safe waste disposal and how?
2) What Rules affect the way the individual residents achieve safe waste disposal and how?
3) How does the Division of Labour influence the way individual residents achieve safe waste disposal?
4) How do Tools in use affect the way the Community achieves safe waste disposal?
5) What Rules affect the way the Community safely disposes of waste and how?
6) How does the Division of Labour affect the way the Community safely disposes of waste?

The following subsections outline the findings generated by this approach and present an in-depth look at the meditational components of SWM activity systems discovered in Doornbach.

7.3.2.1.1 Mediating Factors of Waste Disposal and Collection

The mediating factors of solid waste disposal and collection include tools, rules and the Division of Labour.

Residents in Doornbach use a number of tools and methods for discarding solid waste. One common tool is the 'blue bag' a plastic rubbish bag of which each household is given two per week by the SWM department (Figure 7.14). These bags are numbered and have unique codes that the city uses to monitor their dispersion and use.

Figure 7.14: Blue refuse bag distributed by the CoCT

In the suburbs and areas of Cape Town that have road access rubbish is collected once a week from black ‘wheelie bins’ placed outside of homes. These bins can hold several black bags of rubbish. In most of Doornbach however, this service is unavailable due to lack of vehicle access, caused by the close proximity of dwellings. Here rubbish bags are left outside, sans bin, for removal by city or contract workers twice a week. These bags are taken to drop-off points and from there taken, by truck to a dump. These central drop-off points are re-purposed shipping containers and not designed for this use. As noted by Russell (2014), this bag collection process, done on foot, slows down the collection process and necessitates a fairy large cohort of refuse removal workers. We discovered that due to the personal nature of this collection method, certain workers might skip individual homes if they did not get along with that resident.

Due to the fact that bins are not provided to residents, they have developed a number of different ways to try protect the bags from being damaged by rats, dogs or children. These supportive methods include raising, burying or containing the bags (Figure 7.15).

Figure 7.15: Methods for storing Rubbish bags

A common tool in this process is a round 25 litre bucket, however, as can be seen in Figure 7.15 found containers such as this old vacuum cleaner base suffice. Although

fairly accessible and robust, the buckets only allow the bags to hold around half of their capacity. This necessitates a more regular swapping out of bags than it should. A knock-on effect of this is that residents, not wanting to have rubbish piling up outside their home, take the bags to the central drop-off containers themselves. As these containers are managed by the collection agency and kept locked (this is not always the case), residents do not have access to deposit their bags inside and thus dump them outside (Figure 7.16). This action of placing the bags outside the containers propagates the idea that the containers are in fact dump sites, and become places for all sorts of waste to be placed.

Figure 7.16: Locked container gathering waste (Slowdesign, 2014)

Identifying these mediating factors contributed to a mapping of operational processes (Figure 7.17). This technique was used to interpret and communicate research findings to the rest of the co-design team and stakeholders. It provided a visual representation of the transition of activities, sub-activities, activity components and relations, which in turn facilitated the identification of tensions and contradictions in the existing system (Mwanza-Simwami, 2011:81).

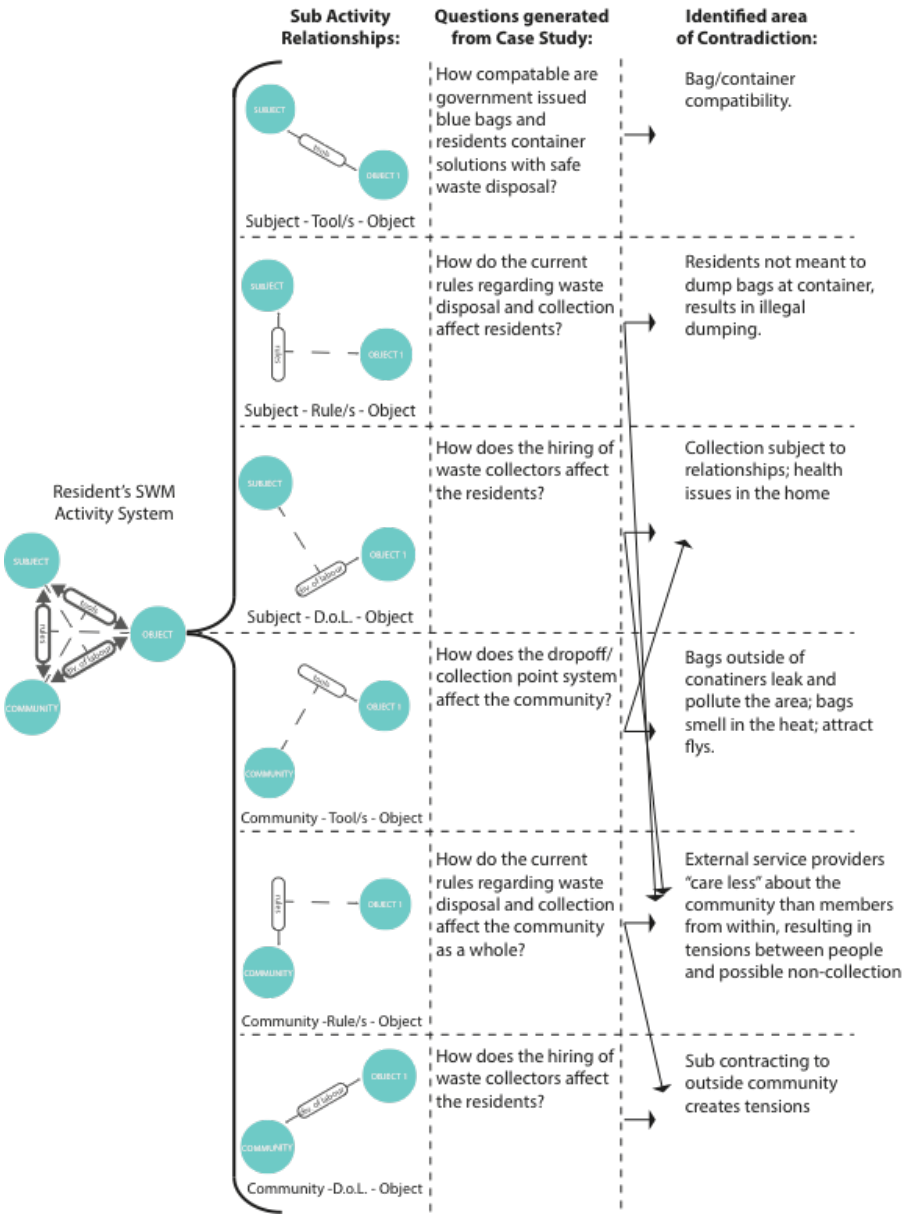


Figure 7.17: Operational Processes in SWM (adapted from Mwanza-Simwami, 2011:81)

The contradictions identified in the operational process mapping facilitated the construction of a SWM activity system model, based in the work activities of the residents of Doornbach (Figure 7.18).

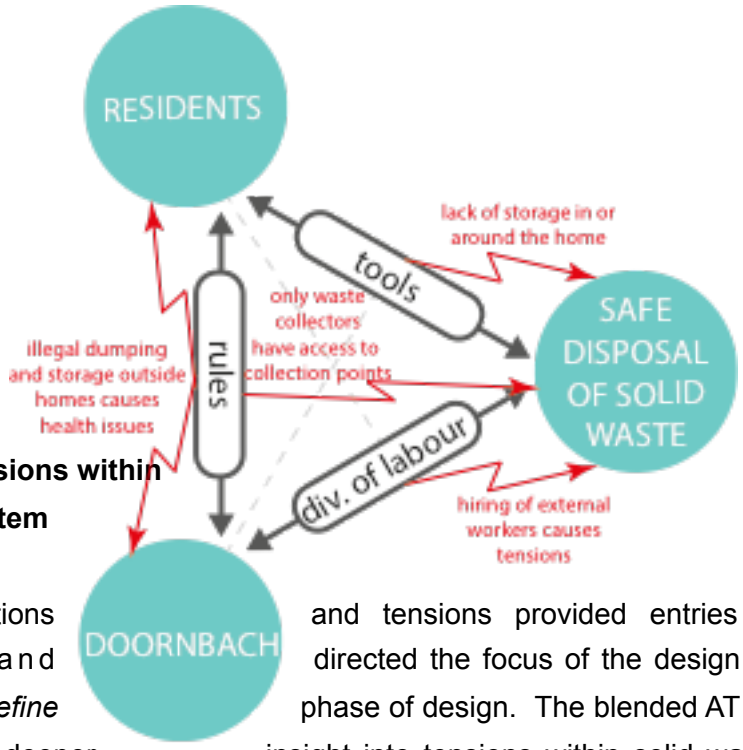


Figure 7.18: Tensions within the SW disposal system

These contradictions and tensions provided entries for design intervention and directed the focus of the design brief, a key output for the *define* phase of design. The blended AT approach to CbPD provided deeper insight into tensions within solid waste systems than a standard ethnographic field study; it facilitated the identification of tensions and contradictions between three key actor relationships, that is non-human to non-human (for example home bin solutions too small for plastic bags), non-human to human (for example children's exposure to rubbish bags) and human to human (such as those between residents and collectors from outside the community).

The fundamental issues that emerged around socio-technical aspects of SWM were:

- The need to safely contain a plastic bag, at its full capacity, outside the home;
- To facilitate the easy removal of waste from the home to drop-off points
- To reevaluate the current container use as centralised drop-off points;
- To evaluate the CoCT SWM Department tenders regarding hiring of staff.

These finding drove the development of concepts and prototypes in the following phase.

7.3.3 Develop

This phase of the design process was driven by the co-developed brief that emerged at the end of the *define* phase. The divergent nature of the *develop* phase involved exploring the key aspects of the brief in more detail, opening up the design process once again. It aimed at co-designing and developing concepts, refining them through iterative collaborative workshops, involving all stakeholders.

This phase of the design process then involved an exploration into the proposed solutions as components of a new SWM activity system, in an attempt to predict their potential and limitations. The object of the proposed SWM activity system was also explored in correlation to other related activities, to try determine future tensions. That

is, the object arrived at between the SWM activity systems as a model of expansive design (Figure 7.12).

Engeström (2006), discusses two key characteristics of expansive design, those of *instrumentalities* and *anchoring*. Although he focused on expansive interaction design, its orientation is very similar to expansive PSS design, that of “complex configurations of people, organisational arrangements and mediating technologies, including language, concepts and patterns of discourse” (ibid).

He goes on to state that orienting design in such a manner requires a shift from the design of “well-bounded singular products to designing tool constellations or instrumentalities” (ibid). The idea of a tool constellation speaks to a PSS approach, expanding the possible outputs of a design project from a single artefact to a “system that includes multiple cognitive artefacts and semiotic means that form a dense mediational setting” (Sannino, Daniels and Gutiérrez, 2009).

The design brief for this project emerged from such an expansive design approach and draws on the tensions and contradictions inherent in the relationships between SWM activity systems.
The proposed SWM activity system aimed at resolving the tensions and contradictions in Figure 7.18 with the creation of a new instrumentality. This new instrumentality, because it was arrived at through collaboration between all stakeholders and based in their expanded object of SWM, complemented existing services and was compatible with both work and life activity systems of those involved.
The waste cycle observed in Doornbach (circled in Figure 7.19) forms part of a larger waste management system.

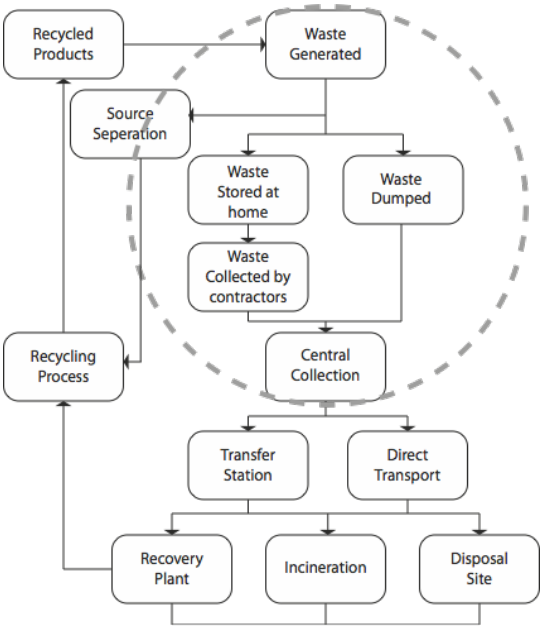


Figure 7.19: The Waste Cycle (adapted from CSIR, 2005)

It was important to understand this larger system when designing instrumentalities for waste management in Doornbach, as the changing of one component has a knock-on effect and can affect other related activity systems.

Expansive design operates by "anchoring its ideas and outcomes upward, downward, and sideways" (Engeström, 2006). In Engeström's hierarchy of tools (Figure 7.20) he refers to the vision of a system as a *germ cell*, as this is where the proposed redesigned system is seen to grow toward.

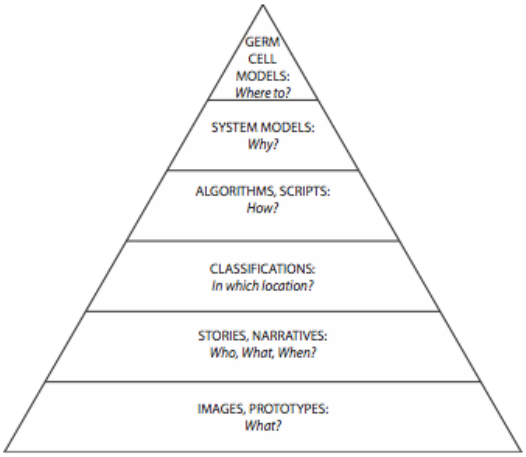


Figure 7.20: Engeström's Hierarchy of Tools (2006)

Figure 7.21: Proposed Germ Cell model of SWM

Germ cell models are therefore a way of anchoring a design to stakeholder vision. A SWM germ cell model revisioning the existing solid waste cycle is way of anchoring the newly design SWM instrumentality upwards. This SWM germ cell model is shown presented in Figure 7.21.

This germ cell model also aligns to the CoCT's vision for SWM, which as noted earlier is to "*integrate waste management services in such a way that they are able to not only provide basic services, but to augment economic activity and minimise the effects of waste on human and environmental health" (City of Cape Town Waste Management Draft Sector Plan (2013-2014)*

Designing tools for solely for existing systems, without regarding future use based in a collective vision can be detrimental in two ways. Firstly, citizens voices might not be heard and as a result they are not emancipated beyond, but merely empowered within an existing system. Empowerment, although a step in the right direction, does not

generally allow a community to develop beyond an organisational or governmental system imposed on them. Secondly, the design of intermediate tool constellations “may easily become mere techniques or, in the worst case, empty forms or rules imposed from above” (Engeström, 2006).

Therefore, the design of new PSS needs to embrace transition, a shift from current practice and work activities to new ways of doing, while at the same time, being relevant to both.

Understanding current practices and activities around SWM, whilst imagining future scenarios was key to the development of the brief.

The brief focussed on three key design interventions, comprising the instrumentality of negotiated SWM in Doornbach: The home bin, the transport platform and the centralised drop-off/collection site. Outside of the design scope was policy reform, which was discussed separately with local government. The introduction of new tools to a government managed system, required a revision of supportive structures and policy. Therefore design and policy reform needed to happen simultaneously.

7.3.3.1 Co-Design workshops

During the co-design workshops the design team, comprising of design researchers, private designers, SWM departmental representatives and residents of Doornbach, worked on the three design interventions (Figure 7.22).

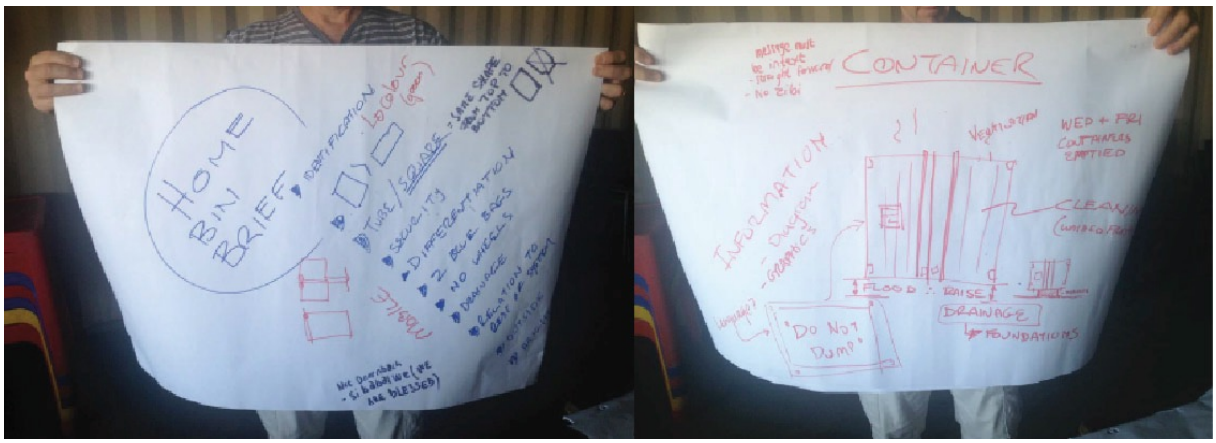
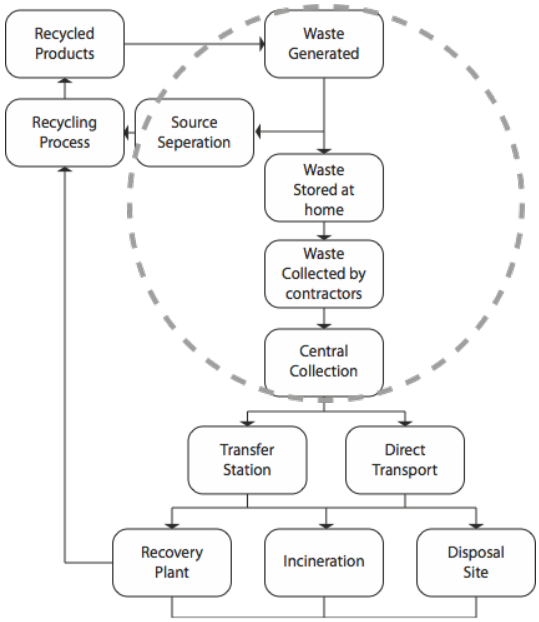


Figure 7.22: Examples of concept mapping

During 2014 there were several community-based one day workshops during the design process, and one three day workshop, running from the 4th to the 6th of March. These workshops took place in the Doornbach community hall, to cater for the participants’ lack of transport and due to the fact that they felt more comfortable there.



This three day workshop involved 23 members from the Doornbach community, three design researchers, one solid waste management representative, one private designer, and a translator.

Key Findings from this workshop included:

- Residents use of plastic buckets as improvised bins for the blue rubbish bags (typically 20m litre capacity ones), there is space only for one bag at a time, and typically;
- If it rains the residents make holes at the base of the blue bags in order to allow water to go drain through them, which can cause sanitation risks;
- If the plastic bucket is filled prior to waste collection, the residents often deposit the blue bags at the containers. Generally speaking, this is not a problem during the day because the containers are open and accessible. However, in the early mornings and evenings when the containers are locked, the lack of access leads to dumping near or at the container (or other locations in close proximity to the households). This littering propagates health and safety hazards as children and pets may have access.
- Residents are often unaware of the communication by the Solid Waste Department. Only the community leaders are aware of the rules around the collection schedules of solid waste and how the system works.

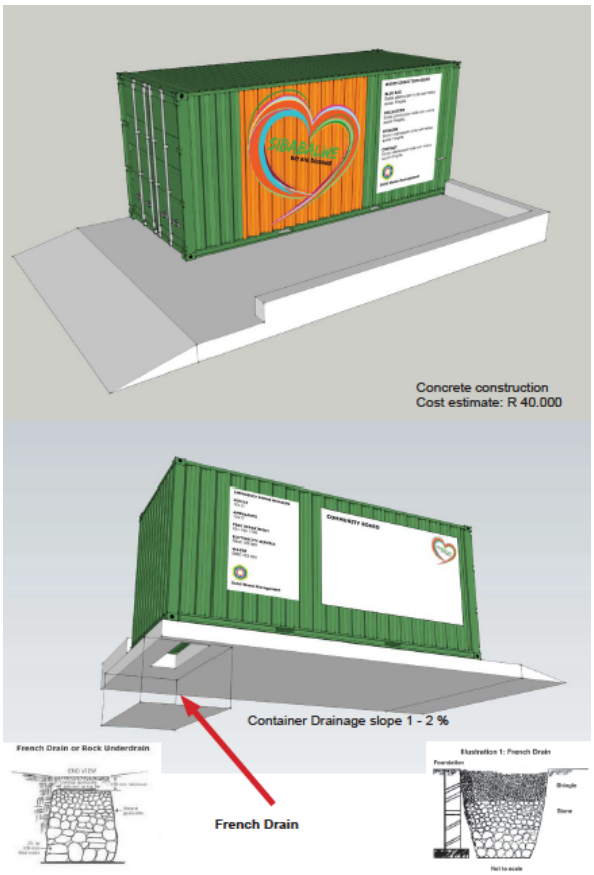
- The containers are cleaned twice a week, but no provision is given to the draining off of the run-off water – this often exacerbates the corrosion. Additionally, some of the residents complained that the waste in the plastic bucket is often collected before the blue bags are completely full.
- There were mixed responses around the number of blue bags allocated to the households – some residents felt that two bags a week per household is adequate whilst others felt that they should receive additional bags in view of greater demand (either because of having more members in their households, or where small babies were resident).

Key issues relating to the home bin that were developed were related to sanitation and security. For sanitation issues such as contamination, drainage and sealing of waste were focussed on, while issues such as differentiation, location and fastening to the home were related to security. Residents and SWM department representatives noted that to reduce theft, differentiation should be looked into. Government-issued bins have different colours designating their use and location. Wheelie bins are black, public bins are green and bins for recycling are offered in several colours. It was decided the bins for Doornbach would be red, with the preferred name of Sibabalwe (Figure 7.23) incorporated into the mould too, to further locate the bins to a specific setting.

Figure 7.23: Logo options incorporating the community's preferred name

Container proposals were predominantly retrofitted engineering solutions, and service related. Other additions to the container drop-off/collection points were to do with education and access to information regarding correct use (Figures 7.24 and Figure 7.25).

Figure 7.24: Container drainage to prevent surface runoff



This blend of tools were designed to mediate current SWM activities, while providing the platform to develop related services according the germ cell map of future SWM activities. They bridged the objects of the new systems with those of current practice.

Figure 7.25: Container Signage in English, isiXhosa and Afrikaans

7.3.4 Deliver

Designs emerging from the *develop* phase were refined and prototypes planned for production. However, due to manufacturing issues, physical high fidelity prototyping extended beyond the timing of this thesis, and will form part of further investigations.

The aim of the prototypes within this project are twofold. Firstly, the basic testing of the product itself. Through in-situ use and testing the design team can further refine the products through the input of existing and unforeseen users and ways of use. When the prototypes are placed in context they become tangible actors in a new PSS network. They prompt discussions and draw in participation from passing residents who might not have been able to participate in the initial design. The options of the these residents will be included in the final re-design. This approach aligns with PD's shift toward meta-design (Ehn, 2008:92), infrastructuring (Björgvinsson, Ehn and Hillgren, 2012; Le Dantec and DiSalvo, 2013) and grounding the concept of 'agonistic public spaces' (Björgvinsson, Ehn and Hillgren, 2012).

Meta-design extends elements of design and participation beyond the participatory design project, toward use-time described by Ehn (2008:92) as 'design-after-design'. Utilising the prototypes to elicit users (both known and unknown), views over time, this position extends beyond the design project, with each prototype contributing to the design *Thing* as an agonistic public artefact, stimulating debate and discussion. The outcomes of which can hopefully contribute to better PSS design regarding solid waste. This relates to earlier discussions around the shift from participation for design to designing for public participation, and as Ehn (2008:96) states, "the object…is to produce a public thing open for controversies from which new objects of design can emerge in use." These new objects can in turn turn give rise to new publics.

From this arises the second aim of the prototypes; the facilitation and the uncovering of possible new contradictions and tensions between existing and new system objects & between the expansive activity systems of waste disposal and waste collection. The residents who have offered to utilise the prototypes will themselves become community researchers, willing and able to note key issues, problems, successes and stories related to use of the bins.

Through the refinement of these prototypes the design team plans on consolidating findings into a stable form of practice (Engeström, 2001; Engeström & Sannino 2011:7).

7.4 Reflections on the Design Process

Reflecting on the design process involves a 'stepping out' of the project and a move beyond just description, to analysis. Schön (1987:115) presents the ladder of reflection as a way of describing modes of reflection. At its base is the action, or in the case of

collaborative design, *activity of designing*. One level up is the *description of designing,* which involves describing the process of design. The third level, or *Reflection on description of designing,* involves a questioning and description of the process as a whole and subsequent reflection on certain aspects. The fourth and highest level is *Reflection on reflection in description of designing,* here one interrogates their own ideas or reflections, or in the case of multiple parties, the dialogue itself (ibid).

In reflecting on the design process, or as Schön (1987, 115) terms it, *reflection on the description of the design process*, the object of reflection within this thesis, from the point of view of the researcher, is the CbPD project itself (Figure 7.26) and the activities that construct it. Reflection in this chapter is done personally through my own interrogation of the process, through revisiting field notes, images and recordings, as well as collaboratively with members of the design team, through reflective interviews and discussions. Interview questions have drawn from AODM (Mwanza-Simwami, 2011), specifically AODM's Activity Notation (Mwanza, 2002; Mwanza-Simwami, 2011), a technique for generating research questions. This instrument/tool mediated my own object of the reflective interview. Using it, provided both general and more focussed questions, which were used to reflect on co-researcher actions and interactions in sub-activity systems, the aim of which was to explore what mediated participants activities and how this impacted their experience of the collaborative design process. An example of an Activity Notation used in a reflective interview can be seen in Table 7.6.

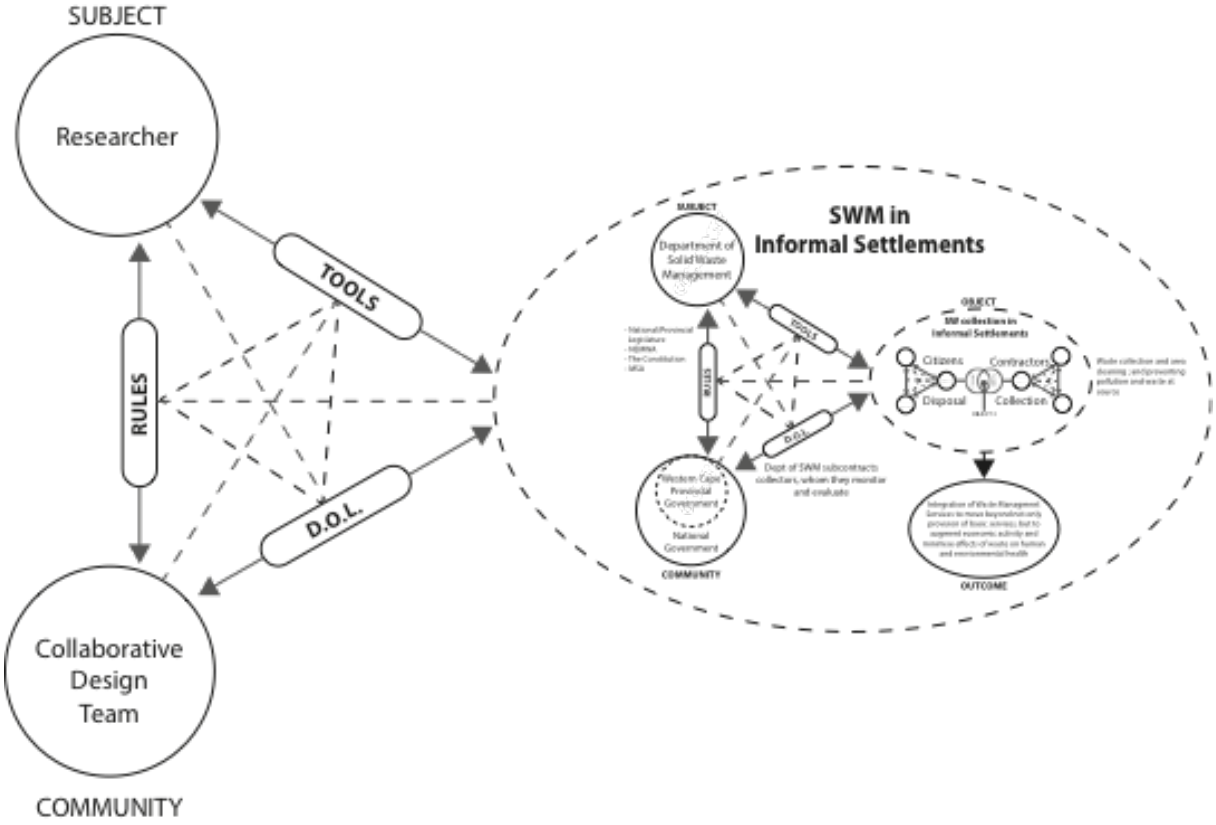


Figure 7.26: The CbPD project as the object of reflection

Table 7.6: Sample Activity Notation and Questions for Design Researchers

ACTORS	**~**	**MEDIATOR**	**~**	**OBJECT**
Design Researcher	~	Tools	~	co-development of SWM PSS
Design Researcher	~	Rules	~	co-development of SWM PSS
Design Researcher	~	Division of Labour	~	co-development of SWM PSS
DESIS	~	Tools	~	Sustainable Social Innovation Solutions to Community Needs
DESIS	~	Rules	~	Sustainable Social Innovation Solutions to Community Needs
DESIS	~	Division of Labour	~	Sustainable Social Innovation Solutions to Community Needs
Questions related to Actor's activities and mediating tools, rules and roles				
What did you see the object of co-design as? What tools mediated the co-development of SWM solutions ? (define tools) What tools did you as designers use to collaborate? What tools did you as designers use to (co)design? What tools did you as designers use to understand context? Were tools brought into the process, or did they emerge as the process evolved? What rules applied when collaborating with other stakeholders? (ethics, co-researchers etc) Who decided on the rules? Were they external or internal? How did the other stakeholders impact on/ introduce these rules? How did rules introduced by one stakeholder impact on another? What roles did designer researchers play? Were these roles static or did they evolve? Did roles determine the process or did the process determine roles? Did/does DESIS provide tools for this kind of project? How does working for the university / DESIS impact on the 'rules of enagament'? How were roles determined by the research unit (DESIS)/University?				

Further questions and discussions centred around other aspects of the process, such as legacy and learnings. Findings from these discussions and interviews provided reflections on each phase of the design process.

Key to the *discovery* phase, five common themes emerged. These were touched on by several co-researchers, and were:

- ***Communication***, which included:
    - Language - Working in South Africa and the Western Cape, language can often present hurdles to collaboration. Amongst the collaborative design team, first

languages included english, afrikaans, isiXhosa, and Italian. As none of the design researchers spoke Xhosa it was necessary to bring in a Xhosa speaking colleague when activities involved members of the Doornbach community. Language here also refers to jargon based in ones profession. For example the 'development' when initially used had different meanings for designers, who related it to both the development of an idea as well as social development, and IT students who relate the term to software. It became clear that a common, negotiated language of the project was needed. Together the team defined words and terms.

- Channels - Communication channels are imperative in the predesign and discovery phase, and can impact on other aspects such as timing and funding. Communication is impacted on by technological and geographic divides. For example emails that circulated amongst the co-design team wouldn't reach certain community members due to the lack of computers and internet access. Although increasing numbers of the population now have access to cellular phones, often feature phones and occasionally smart phones, people don't necessarily have access to data due their prohibitive costs. It was also more expensive and time consuming for community members to travel into town, having to rely on public transport. These prohibitive factors meant that it was fairly easy for design researchers, private designers and SWM dept reps to contact and travel to Doornbach residents, however, this did not work the other way round. Communication channels therefore favoured certain members of the team more than others.
- Silos - A number of participants were aware that communication often happens within city departments, but not necessarily between them.

- ***Managing Expectations*** - This was important going into the project as well as during. Although the focus of the project was SWM PSS, as designers were using appreciative inquiry and a people-centred approach other social issues came to the fore, such as residents concerns with shack fires and how due to them ID's and other important documentation had been lost. This often necessitates those who still had their ID's and other documents to leave them with employers or back in their hometowns. Not being able to prove their identity or that of their children was a major concern, impacting on access to schools, jobs and other crucial life-improving contexts.

- ***Timing*** - This is an important issue in quad helix collaborations as organisations, government departments and university programmes all need to comply with their own timetables. Government department's activities are dictated by funding cycles, elections etc. Academic institutions run on a semester or term basis and often need to align projects accordingly. Lecturers often plan projects for the year in advance

and it can be difficult to slot in new projects. As such, student involvement is often suited to post graduates, as their timetables are less prohibitive. Another aspect related to timing is how long it can take to align objectives in the predesign phase of these projects, as a participant noted, "*negotiation has possibly been the most time consuming process, negotiation with city, and negotiation with the various power structures*" (Participant B, 14/05/2015).

- ***Resources***, which included:
  - Human - Academic participants noted the importance of these projects and the need to engage learners in this space. Community engagement is a key tenet of the university and academics acknowledged the need to develop collaborative projects as integral components of curricula, one researcher stated, "…*to be honest the student engagement has been fairly low, but I think we went into this project with the intent to pioneer and trail blaze a bit within this notion of community engagement as a curriculum component, and to open up the space for students who want to do this kind of work, to find a locale, a situation, where their work could be practiced. It's almost like [being] an early adopter, so to speak, of this kind of curriculum content and I think that we have pioneered this space, it's been quite a slow process, it's been frustratingly slow in many respects, but it's possibly better to be pioneering it without too many student qualifications being contingent or hanging on the success of the project, so hopefully out of this there have been lessons learnt* (Participant B, 14/05/2015).
  - Financial - Funding is key to these projects. Insights were shared around creating funded post-graduate positions to garner student input and build capacity around social engagement projects. As these projects happen in the field there needs to be support for travel and basic field working equipment and materials. Funding can often hold up these projects as academia often requires a detailed funding proposal to garner funds, which aren't guaranteed. Access to these funds, should they be awarded is often hindered due to red tape. Government funding is often aligned to tender processes which are more aligned to industry proposals than academic.

- ***Ownership*** - Within CbPD projects ownership can be a grey area. Citizens are engaged as owners of the project, however their requirements can be out of synch with those of funders. This can create tensions when negotiating the object of the project. Extending user involvement and participation beyond the design project, in this case through the use of prototypes, can garner further ownership of the process and resultant products. Key findings from this design-after-design phase can contribute to further projects and contribute to the constituting of publics around emergent objects.

Making sense of SWM activities in Doornbach involved a number of visits and workshops with the residents. During this time it emerged that the residents often did not associate their community with its given name of Doornbach, but rather preferred to call it Sibabalwe. This isiXhosa name reflected the residents aspirations and is translated as "*we are blessed".* By naming the area themselves they created a sense of ownership, and place. In the co-design team's work we began referring to the area by this name, which saw the increased participation of the residents, extending the name into the branding off the bins, at the will of the residents.
The ideas of place-making and ownership came through strongly in our interactions and aligned well to the overarching methodology we adopted of PD.

Looking back on the mutual learning that took place, there were similar phases to the zone-of proximal development phases as presented in Chapter 4, specifically Figure 4c, where knowledge was shared and built on together. Figure 7.27 presents an outline of the general design process and how the design group moved through the zones of proximal development.
Adapted from the Gallimore & Tharp (1990) iterative model of the zones of proximal development, the model presented in Figure 7.27 follows a similar process, but shifts from the hierarchical perspective of student-teacher, to a more PD aligned levelling of knowledge. Here all participants are co-researchers offering different types of knowledge, from technical to experiential, each as important as the other.

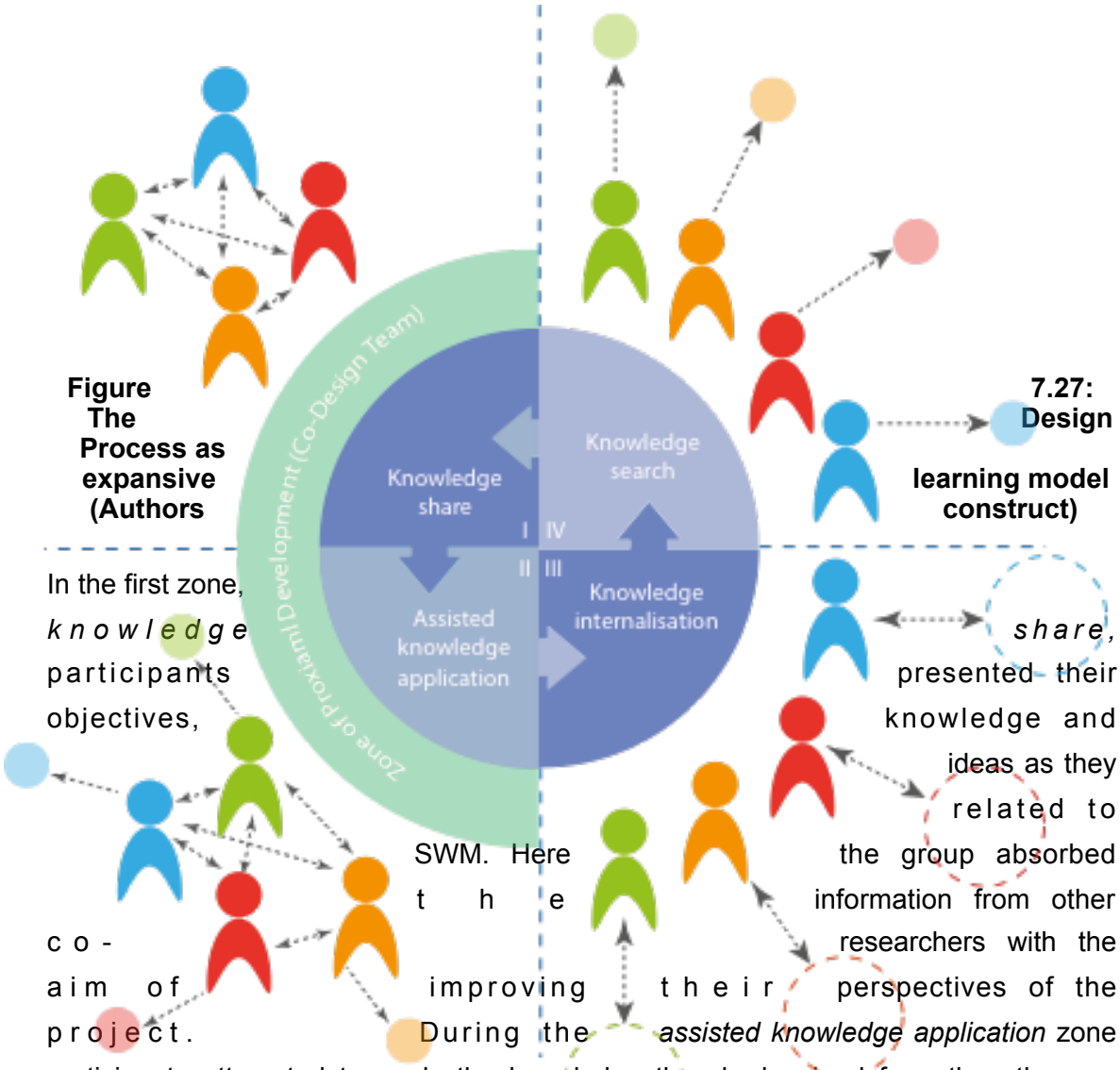


Figure 7.27: The Design Process as expansive learning model (Authors construct)

In the first zone, *knowledge share*, participants presented their objectives, knowledge and ideas as they related to the co-SWM. Here the group absorbed information from other researchers with the aim of improving their perspectives of the project. During the *assisted knowledge application* zone participants attempted to apply the knowledge they had gained from the other co-researchers in their own fields. For example, designers could sketch options based in information from the city and the residents, while the city, on learning how the residents understood the SWM system could adjust certain aspects of service delivery. Here this application of knowledge is still informed by other members of the team. After the *assisted knowledge application* phase we saw *informed capacity*, that is, the internalisation of other participant's insights. Entering the *knowledge internalisation zone* of proximal development, participants were more informed and had a holistic picture of SWM. Upon this internalisation we saw members from the group return to their own domains and apply their recently acquired knowledge. Examples here were designers taking co-designed sketches back to work on in CAD; government representatives giving feedback to their departments; and residents discussing SWM more holistically at their community forums. With the actors exploring SWM further in their own domains, certain questions would arise form their community of practice, colleagues or fellow residents. This initiated the final zone of *knowledge search,* where the co-design team would come together again around emergent, often more specific

issues and enter the *knowledge share* zone once again. These iterations happened multiple times during the process, with each iteration honing in more on co-defined issues or areas of focus.

It was through these activities that the CbPD process evolved as a constructivist learning environment in which collaborative learning took place, driven by the co-defined object of design. Here we saw the group progress from *coordination* to *cooperation* and eventually *communication* (Nummijoki and Engeström, 2010:56).

7.5 Emerging Picture of Community-based Participatory Design

Framed using CHAT as an analytical lens Figure 7.28 presents a collated picture of CbPD activities. This framework builds on the Participatory Design Activity Framework (PDAF) (Futerman, 2014) which draws on key themes and classifiers of CHAT and CbPD and presents them in a way that aims to facilitate project planning and the critical reflection-in-action and reflection-on-action of collaborative design practices. It also draws on the PD methods framed using AT in Chapter 5, and the case study discussed in this chapter.

This framework can further go on to facilitate the identification of primary, secondary, tertiary and quaternary contradictions as posited by Engeström (1987).

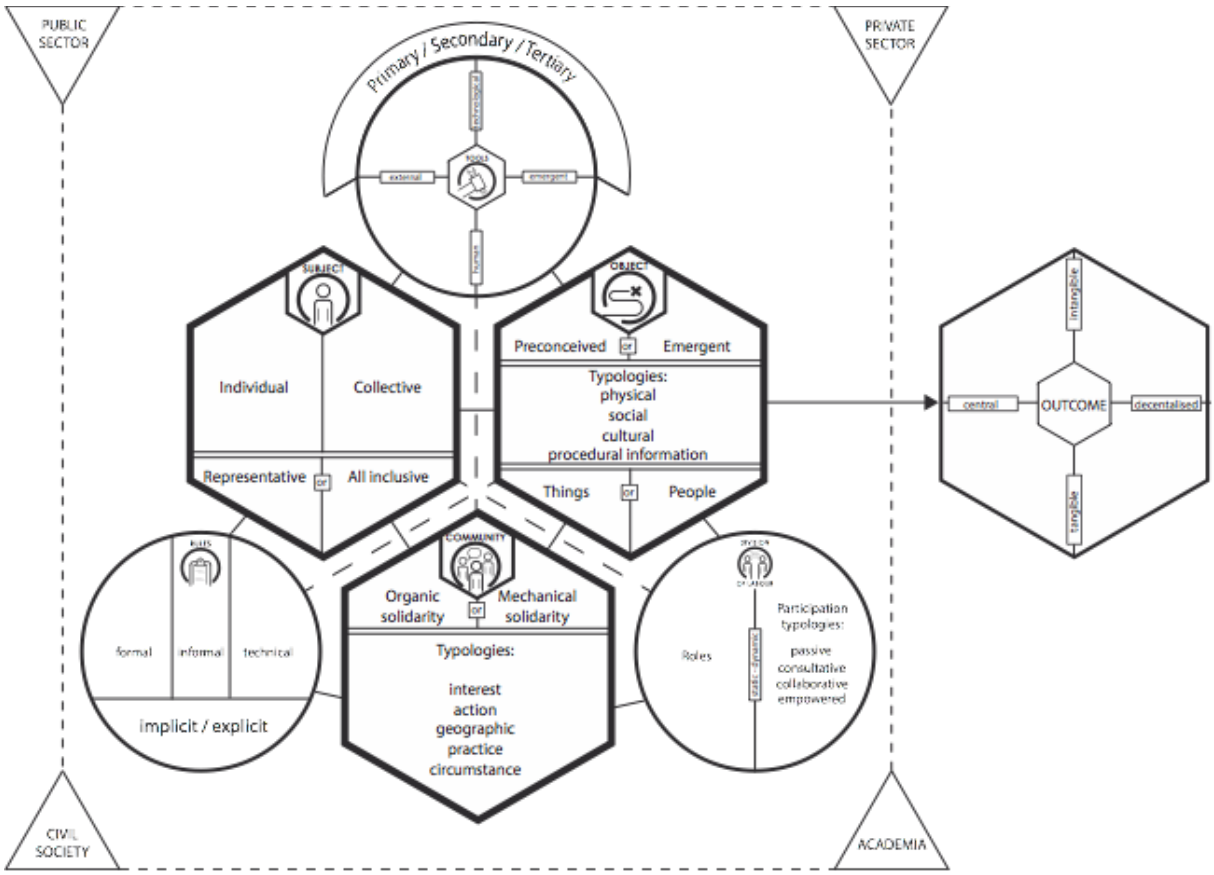


Figure 7.28: Emerging Picture of Community-based Participatory Design (adapted from Futerman, 2014)

At the framework's centre is CbPD activity system. This activity system is framed by the quad-helix groups that often collaborate on such projects. Emerging from the Quad-helix informed CbPD project is the outcome. These component are elaborated on here:

Quad-helix framing

This social structure is made up of civil society, academia, and the public and private sectors and influences CbPD activities. Because projects are determined by their context the blend of quad-helix representatives varies. As stated earlier in this thesis, a quadruple-helix approach to strategy development and decision-making results in socially accountable policies and practices (Prainsack, 2012:1) and can contribute to the development of Mode 3 knowledge production, that is, socially responsible and reflexive knowledge production linked to current societal needs (Jiménez, 2008:54).

Subject

This node encompasses those directly involved in the activity being studied or carried out. The subject can be an individual performing a task, or in the case of collaborative design activities, a group of people. This group, in CbPd projects, is often made up of members from the four groups of the quad-helix. It can be all inclusive of a certain group or, depending on the group's size, representative.

Object

Subjects' interaction with the world is organised around their objects (Kaptelinin, 2014). These objects are the reason why individuals and groups of individuals choose to participate in an activity (Kaptelinin et al 1995:192). As Yamagata-Lynch (2010:17) stated, the object can either be the goal or motive that drives the activities of the co-design group, or the material product that participants try to gain through an activity. It can either be preconceived or it can emerge through critical reflection by the group. In expansive design the object is negotiated and arrived at through collaboration and knowledge sharing. Human activity is directed towards two types of object, 'things' or 'people'. Things here do not necessarily have to be tangible and thus includes all aspects of PSS. Objects of activity systems can thus be physical, social or cultural (Clark 2012:2).

Tools

Mediating the subject-object relationship are technical tools/instruments, referred to as artefacts, and psychological tools, referred to as signs (Yamagata-Lynch 2010:16). CbPD is essentially human-centred and as such "acknowledges the diversity of human

conceptions that motivate how things are acquired, exchanged, rendered meaningful, and used" (Krippendorff, 2007:2). This diversity of human conceptions can mean that people entering CbPD activities may attach different meanings to certain tools and signs. It is imperative then that when introducing tools to an activity "we must be clear about whose meanings we are talking of and allow for the possibility that we may see things differently" (ibid).

Tools and signs within activity systems can either be brought into the activity or emerge through the activity of co-design. Examples of physical tools include co-design toolkits, prototyping materials and computers, to name a few. An example of a psychological or human tool is language. Wartofsky (1979) presents three levels of mediating tools, namely: *primary*, tangible, external or physical; *secondary*, internal, semiotic or mental; and *tertiary*, schematics where mind and culture act together such as environments or ecosystems. Clark (2012:2) has a similar classification, labelling tools as physical, mental or cultural. These classifications help us identify and code the types of tools used in PD practice.

Community

Traditionally, the community node represents the collective groups who have a shared interest in the activity being studied (Greenhow and Belbas, 2007:367). In CbPD projects the community node extends to include people who share the same cultural beliefs, practice, activity or geographic location, or who happen to work together or are brought together by outside circumstances. Communities have aspects of both shared and personal experiential knowledge. For example, those living in close proximity, such as an informal settlement, will have knowledge of the area that is shared with other residents, such as weather patterns, shop locations and such, but will also have personal experiences (Futerman, 2014). Durkheim (1893/2014) introduced the terms "mechanical" and "organic" solidarity as part of his theory of the development of societies in *The Division of Labour in Society*. Mechanical solidarity is found in less structurally complex societies, where people are bound together by commonalities, similitudes and likenesses (Pope and Johnson, 1983) or what Durkheim termed "collective consciousness", while organic solidarity emerges in industrialised societies and is held together by inter-dependence. Mechanical communities are fairly homogenous, with individuals sharing the same beliefs or type of work, this like-mindedness facilitating cohesion of the group; whereas organic communities find their cohesiveness in differentiation, and the interdependence that comes from specialisation (Futerman, 2014).

Rules

Rules represent the norms, expectations and conventions that constrain or influence the means by which an activity is carried out, and can be implicit or explicit (Greenhow

and Belbas, 2007:367). Drawing from social rule systems theory, rules can also be divided into formal, informal and technical (Barab, Evans and Baek, 2008:206). Formal rules are systematic, general and expected, i.e. they are predetermined and can relate to policies and laws governing the community. Informal rules can be idiosyncratic and arise from the communities' beliefs and practices or the collaborative activity itself. Technical rules are generally followed habitually and relate to the use of tools. They therefore embody inherent sanctions important in supporting required actions (Burns and Carson, 2002:6).

Division of labour

The division of labour relates to group dynamics and, roles and responsibilities of subjects within an activity. Greenhow and Balbas (2007:367) state that it can determine the allocation of tasks and relates to hierarchical status and power. CbPD attempts to democratise the design process with all participants having equal power. Here, the division of labour relates mainly to peoples strengths. As the process of design is a dynamic one, roles can change throughout. The roles that people are given or that they adopt during a co-design project can therefore also either remain static, for example the facilitator might stay the same throughout, or be dynamic, for example community members adopting the role of designer (Futerman, 2014). Dynamic roles and relationships evolve during the workshop and cannot necessarily be predetermined. Participant involvement can however be determined by what level of participation is taking place, and generally falls into one of the following typologies, passive, consultative, collaborative or empowered (Tufte and Mefalopulos, 2009:6).

This framework aims at providing nodal information regarding the activity of CbPD. It is non prescriptive and attempts to provide insight into the complexities of socio-technical activity systems, often engaged with during collaborative design projects.

7.6 Summary

This chapter presented the operationalising of cultural historical activity theory in a community-based participatory design project. CHAT was used during the design process to identify contradictions and tensions, which became focal points for design interventions, and afterwards to facilitate reflection. Drawing on AODM (Mwanza-Simwami, 2011) key research questions were developed for use within and after the study.

Participation was garnered from stakeholders during the project in co-defining and then co-designing product service systems related to solid waste management. The design process, aimed at extending participation beyond the design project phase, saw a shift toward approaching use situations as design situations, so that "there is design during a project ('at project time'), but there is also design in use ('at use time')", that is, "There

is design (in use) after design (in the design project" (Ehn, 2008:96). The process also engaged with contemporary PD concepts of *thinging, infrastructuring* and *the emergence of publics.*

The application of the CHAT-informed service design method proved useful in project planning and as a tool during the process. Having a general process plan upfront helped relate the process to those unfamiliar with design.

The reflection on the case study resulted in improved understandings of the complexities of quad-helix CbPD projects, collated here within the emerging picture of CbPD projects (Figure 7.28). This framework is generalisable to further projects within the field of CbPD and beyond, within fields such as social development. It can be a tool to further facilitate discussions in the ever important pre-design phase.

CHAPTER EIGHT
DISCUSSION AND CONCLUSION

8.0 Introduction

This final chapter reviews the research objectives set out at the beginning of this exploratory study and presents the pertinent findings that emerged. Further, the chapter presents a justification of the study in its contribution of knowledge to several inter-related fields at the heart of this research, namely, community-based participatory design, cultural historical activity theory and development studies.

Though every effort has been made in addressing as many issues as possible emerging from practicing CbPD in a developing/majority world context, no single study can claim to adequately address all the questions arising from the research process. Therefore, limitations of the study and implications for further research are presented in this chapter, for due consideration.

8.1 Revisiting the Research Objectives

The main research objective of this study was the *exploration of CHAT as a framework for the qualitative analysis of community-based participatory design activities.* This objective was addressed through the following processes:

- The exploration of mediating components within a CbPD project;

- Identification of how tools and activities shape one another within CbPD;
- Identification of examples of tensions and contradictions in CbPD activities in South Africa; and
- The presentation of design models informed by CHAT for use in future CbPD projects and related fields.

The specific conclusions linked to the above-mentioned research objectives are elaborated in the following section.

8.2 Conclusions

In this study's exploration and development of mediating components within a CbPD project, several key findings emerged (Figure 8.1). In applying CHAT as an analytical lens and it's framing of mediation in human activities, the focus was on *tools and instruments*, *rules* and the effect the *division of labor* has on *roles* within collaborative projects.

What became apparent was the use of methodologies and their principles and methods, as tools in design practice. Another key aspect of CbPD is the interrelationship between mediating components. Understanding how the mediating components of the activity system contribute to the success or failure of a system was noted. Also apparent was the issue of power and how roles change throughout the process. For example, the designer's changing roles during the process, such as co-creators, researchers, communicators, entrepreneurs, capability builders, facilitators and strategists (Tan, 2012) and the tools they use within each of these roles. Adopting each of these roles also requires different rules.

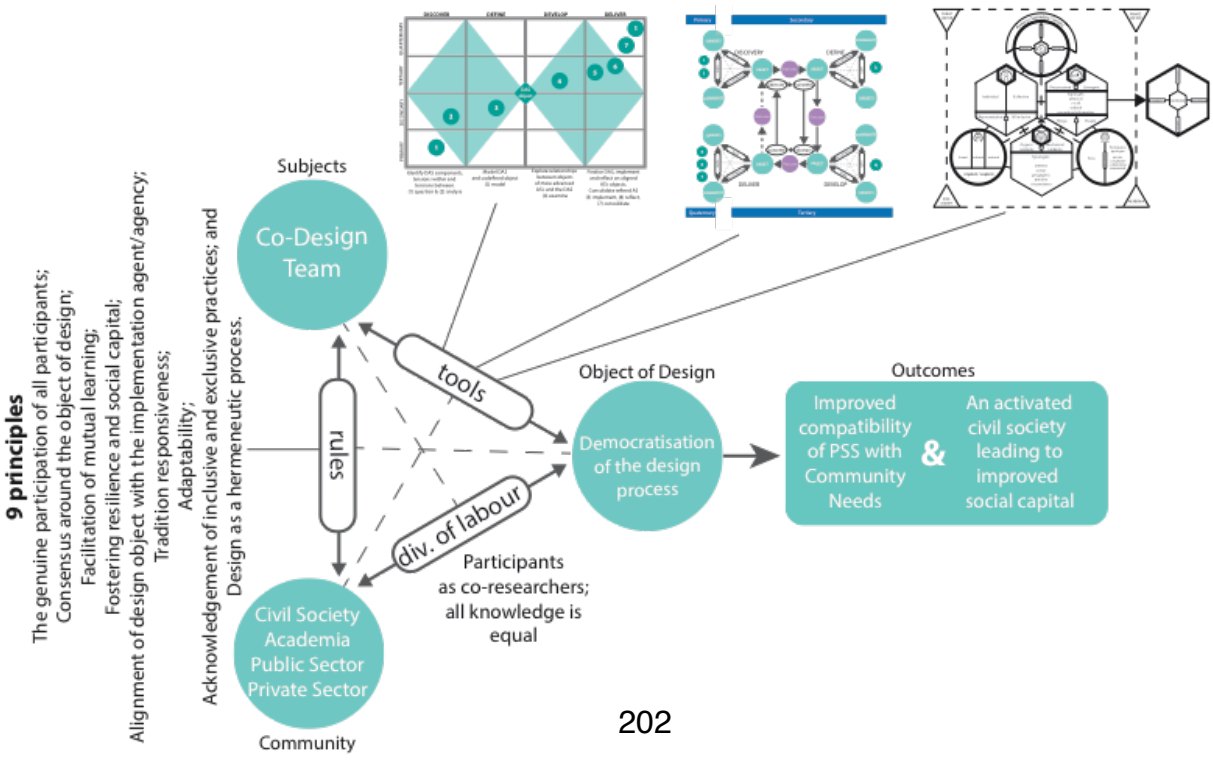


Figure 8.1: Mediating artefacts developed in this study

With regard to tools specifically, the participatory design process itself proved useful in eliciting participant's involvement and their inherent knowledge, in the design of solid waste management product service systems. Contextual inquiry is an important aspect of CbPD. Here, CHAT proved a useful tool in this process, and integrated well with both participatory and service design processes. The emergent conceptual and process models facilitated the operationalisation of CHAT and CbPD.

The introduction of collaborative methodologies as tools in the design process allowed further, more contextually relevant tools to emerge. CbPD embodies certain rules or principles, such as the inclusion of all those affected by a PSS in said PSS's design, amongst others. Using CHAT to analyse PD methodologies (Chapter 5) nine key principles relating to CbPD emerged, namely:

- The genuine participation of all participants;
- Consensus around the object of design;
- Facilitation of mutual learning;
- Fostering resilience and social capital;
- Alignment of design object with the implementation agent/agency;
- Tradition responsiveness;
- Adaptability;
- Inclusive and exclusive practices; and
- Design as a hermeneutic process.

These were then explored and empirically grounded in the SWM project.

Engeström (1987) adapted activity theory to emphasise the collective nature of human activity. Collective activities within CbPD are centred around knowledge sharing, contradiction/tension identification and design futuring based in these uncovered contradictions. CHAT informed CbPD therefore elicits change within communities through a sequence of events or activities focussed on contradiction resolution. The concept of *contradiction* in CHAT is deeply rooted in a socio-historical context (Groleau et al., 2011). Contradictions are inherent in all activity systems and explain historically accumulating structural tensions within and between socio-technical activity systems (Engeström, 2001).

Employing existing methods such as AODM (Mwanza-Simwami, 2011) and the adapted version of Engeström's Activity System Contradiction Framework (Figure 5.7), as well as emerging tools such as the CHAT informed double-diamond process model (Figure 5.29), the Tension Typology Table (Table 6.5) and the CHAT informed service

design process model (Figure 7.2), facilitated the identification of tensions with SWM activity systems.
Contradictions identified were numerous, and were present from within activity nodes, such as the tools used by residents to dispose of waste, to between activity systems, such as disposal and collection.
The identification of key contradictions contributed to the formation of the design brief.

The process and conceptual models that emerged form this research, along with the key principles, address the final objective of the study by offering future CbPD projects, and design for development projects in general, tools and rules with which to:

- Frame the collaborative project;
- Identify where, when and what type of contradictions to be aware of; and
- Ensure a positive legacy through collaborative learning and design.

These contributions emerged from implementation of the main objective of the study, the *exploration of CHAT as a framework for the qualitative analysis of community-based participatory design activities.*

8.3 Contributions to Knowledge

In line with the main objective, stated above, emergent findings arising from the interplay between CHAT and CbPD offer useful knowledge to both fields.
Regarding PD, the proposed conceptual and process models offer sufficient adjustability and context-responsiveness to allow for application in similar majority world settings and beyond to collaborative projects in developed/minority world contexts. These models also offer PD practitioners methods for expansion beyond information system development in organisational settings, to community-based collaborative projects synonymous with CbPD.
With further development and design, these approaches to CbPD projects could expand beyond the design and research realms, and into professional practice,
the public sector and most importantly, civil society.

A number of researchers have proposed future prospects of Activity Theory and ways in which it should be taken forward. These include the grounding of AT through local applications and modifications (Hong, Yang and Cheng, 2007), localised versions of AT (ibid), discussions around sign meaning (Toomela, 2008), a shift in focus from large *runaway objects* to intermediate runaway objects that could reduce the marginalisation of potential users (Engeström, 2008) and, to which I add, the extension of AT beyond work activities and information systems to a larger socio-technical context of activities.

I have attempted to engage with these proposals in my study by grounding CHAT in a local case study, focussing on the intermediate runaway object of solid waste management. I have also included a discussion on meaning making during the design process.

This research also contributes to the Cape Peninsula University of Technology's Research, Technology Innovation and Partnerships Blueprint (Vision 2020) where it aligns with Focus Areas no.5 ‘Human and social dynamics, including issues related to service delivery’ and no.7 'Design for Sustainability.’ Key CPUT RTI areas relating to Focus Area no.5 that this thesis contributes to include *community sanitation*, ergonomic technology, *workplace learning and professional education,* and *socio-technical advancements through technology assessment*. This research also contributes to Focus Area no.7 with its focus on *low-cost housing solutions, healthcare and sanitation.*

CPUT is currently developing post-graduate programmes in Service Design as well contributing to the City of Cape Town’s continued focus on service delivery through involving undergraduate students in WDC 2014 legacy projects in this field (see Capetown.gov.za, 2014). It is also engaging in international PSS research projects with other universities (see lenses.polimi.it, 2014). It is therefore becoming increasingly important to develop methodologies, methods and tools that draw from our local context and knowledge, for use in this field. This research and the resulting conceptual and process models aim to inform teaching materials and further study in the field of PSS at CPUT, bridging programmes such as Design, ICT for Development and engineering.

Alignment of the project with the provincial germ-cell model of growth (as presented in Chapter 7) contributes to knowledge related to several provincial strategic goals, as presented in the *Provincial Strategic Plan 2014-2019.* These include Strategic Goal 1: *Create opportunities for job development and growth*; this was done through identifying key work-related issues related to waste collection. Strategic Goal 3: *Increase wellness, safety and tackle social ills;* through an inclusive approach to the design of solid waste management PSS. Strategic Goal 4: *Enable a resilient, sustainable, quality and inclusive living environment;* through an attempt to establish these qualities and that of social capital as key elements of WDC 2014 legacy projects. Strategic Goal 5: *Embed good governance and integrated service delivery through partnerships and spatial alignment;* through developing quad-helix relationships and the methods to do so for application beyond this project.

This study further aims to contribute to the development of a comprehensive Western Cape Policy on Public Participation. The aim is to reduce hurdles to public participation in decision making processes through the development of guidelines for participation. This research includes analysis of a community-based participatory design project that tackles complex challenges around solid waste management and related product-service systems in Informal Settlements.

Lastly, this research aims at improving the perception of design in the Western Cape. As noted in Chapter 1, industry and I believe much of the public sector, currently views design as a mere styling exercise (Figure 1.1). Therefore the hope is that the research emerging from this thesis and future work in this field can improve these sectors views of design and begin to see it as more of a process and tool for innovation.

8.4 Limitations of Research

Due to the complexity of examining a live project over time, certain deadlines did not align with the research plan. The main limitation was the ability to explore the prototypes in situ, over time, uncovering unforeseen uses and users. The time consuming processes of gaining access to and releasing funds within this project resulted in prototypes only going into production after the thesis deadline. Therefore the greatest limitation was the lack of examination of the *deliver* phase of the case study. This meta-design aspect will however form the basis of future studies and publications.

Control over a project is a constant issue of contention in shared projects. Reflecting on this limitation is key to improving future quad-helix collaborations. Aspects of power relations in PD are a key area of concern, with each project or design *Thing* contributing to new ways of approaching this issue.

Timing was touched on earlier and is probably the largest hurdle to collaboration and the success of quad-helix projects. With each sector operating on a different timeline, collaboration can be difficult.

Generally speaking, academia operates on a fixed university timetable with each study having its own internal deadlines, the private sector on a monthly or per job pay schedule and government on a tender bases, each having their own turnaround times. Community members, an integral part of the collaborative process each have their own commitments. This misalignment of timelines can inhibit collaborative attempts.

Although an in-depth study of the *delivery* phase would have added further insight regarding CbPD projects, the key focus of this research was the *exploration of CHAT as a framework for the qualitative analysis of community-based participatory design*

activities. As most of the design activities take place in the planning, pre-design and co-design of PSS, I believe this research adequately meets its aims.

Future research should tackle the issue of quad-helix alignment within CbPD projects, with the aim of developing strategies for enhancing collaboration in design activities, within South Africa.

8.5 Implications for Further Research

The Design Strategy for the Western Cape, developed in collaboration by the provincial Department of Economic Development and Tourism (DEDAT) and the Cape Craft and Design Institute (CCDI), identified five design typologies most prevalent in the Western Cape, namely Product/Surface, Systems, Communication, Enviro and Spatial, and Service/Interaction design (Western Cape Government, 2013:13). With the increased interest in the role design can play in social development, many designers are looking for ways and means to work with marginalised communities.

In addition to research on the design of strategies to improve alignment between key actors within CbPD projects, a second research avenue is proposed. That of the expansion of the conceptual framework arrived at in this study. Currently this framework is shrouded in academic rhetoric and language.

For it to be truly useful beyond the realm of academia, it needs to be developed into an accessible ‘tool-kit’ for social development and CbPD activities.

This would require its development aligned to more accessible language and forms. The future development of the ideas, conceptual and process models and CbPD principles that have emerged from this study could contribute to improved localised versions of AT and SD, through a grounding in local applications and modifications as proposed by (Hong, Yang and Cheng, 2007).

Within the health sector it has been stated that the provision of research findings to stakeholders can empower them to make improved evidence-based decisions (Chalmers, 2013; Cpc.unc.edu, 2009).

Research in this sector is however frequently not available, accessible, relevant, or useful, which limits its applicability for improving health systems (Cpc.unc.edu, 2009). Similarly design research should not remain in the hands of academics, but be shared with those whom could benefit.

Ulin, Robinson and Tolley (2005) stated that “Different stakeholders need different information, in different languages, using different terminology, delivered in formats that respect culture and norms.” Doing so could drastically increase stakeholders’ research uptake and contribute to designs’ image as a tool for innovation. The dissemination of research findings to stakeholders should be considered during the research planning phase, and address “the communication objectives, target audiences, appropriate channels, and assessment of use” (ibid).

8.6 Summary

In recent years there has been an increase in the use of participatory methods by local government to include citizens’ voices in development of policy, places, services and systems. Cape Town’s nomination as the World Design Capital 2014, acknowledged the steps the city is making in using design to further better the lives of its citizens. Participatory Design as a strategy, has proven very useful in various of these social development projects, linked to legacy aspects of the WDC 2014 nomination.

Extending the usefulness of Participatory Design from and organisational or workplace setting into a more complex social, multi-sectoral setting requires improved approaches. The use of Activity Theory, specifically Cultural-Historical Activity Theory provides a useful analytical lens through which to explore the interactions of these multi-sectoral activities.

Both Participatory Design and Activity Theory have been applied extensively in the exploration and development of information systems, however work activities in majority-world contexts are not often mediated by digital tools. Therefore, Community-based Participatory Design approaches in these developing, majority-world contexts require an interdisciplinary approach to product-service systems design. With Information Technology, Engineering and Design professionals working together, a common lens applicable to all is required. The conceptual and procedural frameworks developed within this study provide such a lens, and draw from participatory design, service design and Cultural-Historical Activity Theory.

Kuutti (2006) stated that aim of design research is “to develop intellectual and practical tools for design work.” Aligned to the philosophical underpinnings of community-based participatory design, *design work* should include all stakeholders and existing and potential users of a product-service system. The *practical and intellectual tools* that mediate design work therefore need to be accessible and useful to all. These philosophical underpinnings as well as the fact that every citizen as a right to social inclusion and participation in all matters that affect them (as enshrined in our constitution) impacts on the need for design research to made publicly accessible.

The increased appropriation by local government of participatory design strategies in WDC 2014 legacy projects requires methodologies, methods, principles and tools that are contextually appropriate. It has been presented in this research that merely applying methods and toolkits designed in developed countries to issues in developing/ majority world contexts doesn't work. Instead, what is required are practices and processes that are "local, particular and timely" (Kuutti, 2006). Consequently, any future participatory design projects should make use of local knowledge not just in the *design of the object*, but also in determining the *object of design.*

Such an approach fundamentally fosters democracy and active citizenry, which if supported can develop into social capital. This approach aligns community-based participatory design with the notion of *participation as an end.* Ultimately, the end goal of public participation in design should be an emancipatory one, that is, public participation beyond the design project. Collaborative design projects have the potential to uncover objects and issues around which new publics can form, offering communities environments from which social capacity can emerge.

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APPENDICES
Appendix A: Letter of Informed Consent

Benefits of your Participation:
This interview aims to give you the opportunity to discuss your perceptions and concerns related to your involvement in the Solid Waste Management project. The idea is to give your voice to the final write up of the project, and hopefully influence future projects.
Your input is also invaluable in contributing to current academic research on the topic of Community-based Participatory Design practices and collaboration between multiple stakeholders.

Risks & Rights Involved in the Study:
There are no foreseeable risks or discomforts anticipated from your participation in this study. However, should you feel that there are any questions during the interview that may pose a risk to you, you may decline to answer any or all the questions.
Participation in this study is on a voluntary basis. Therefore you are free to withdraw consent and terminate your involvement at any time should you wish to.

Confidentiality:
Information garnered from this interview will be stored securely at the Cape Peninsula University of Technology. Your name and any other identifying details will not be published in this study without your permission. The information you provide will be coded and used where important, as it will be of great value in its contribution to this thesis and the readers thereof.

CONSENT:
I,_____,have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without any implications. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

My name and other identifying details may be included in the study ._____Yes_____No

Signed at:_____ on this date: _____

Signature of participant:_____Signature of researcher:_____

If:
(a)You would like a copy of your interview transcript once it is available
(b)You are interested in information about the research findings
and/or
(c)If you would be willing to be contacted again in the future for a possible follow-up interview, please provide your contact information below:

Phone:_____Email:_____

Tick those that apply:
_____I would like a copy of my interview transcript
_____I would like information about the research findings
_____I would be willing to be contacted in the future for a possible follow-up interview

Appendix B: Tension Typology Table

Tensions between within disposal activity system and between disposal and collection activity systems - ***minimal unit of analysis in CHAT***

- Tensions within the activity node (TwAn); for example, between tools used by the community members in discarding waste.
- Tensions between nodes within the activity (TbAn); for example, between the community member and a tool.
- Tensions between node and other activity systems (TbAS); for example, between tools the community uses in discarding waste and tools the government uses in the collection of waste.

LETTER OF INFORMED CONSENT

Dear Participant,

I would like to invite you to participate in qualitative research study titled *DESIGN FOR COLLABORATION IN SOUTH AFRICA: AN ACTIVITY THEORY PERSPECTIVE OF PARTICIPATORY DESIGN.* A summary of the the research is provided below. If you would like further information about this research please contact me.
Validation can also be provided my researchers, all details below.

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Background and Purpose of Study:
Participation of citizens in the conception, design and implementation of services in Cape Town is receiving increasing acknowledgement as a way to provide better, more appropriate service delivery by local government. It is important then to understand the sort of relationships and processes that could better facilitate such progress.
The purpose of this study is to explore Activity Theory as a framework for the qualitative analysis of Community-based Participatory Design (CbPD) activities, as contextual research could help explain the dynamics and tensions that exist in Quad-helix design projects in Cape Town, South Africa.

Explanation of Procedures:
Your participation in this study will involve a discussion/interview that comprises questions relating to your involvement and experience with the ongoing Solid Waste Management project. The interview will be conducted by me, at a time and place that is suitable to your schedule.
The aimed completion date for these interviews is Friday, May 22, 2015.

Participants Involved in the Study:
The participants consulted for the purposes of this study will include the community leaders, researchers, government employees and the private designers involved in this project.

		Subject	Object	Tools	Community	Rules	Division of Labour
Subject	Residents in agreement with each other around issues regarding solid waste - no tensions	Tensions between residents within disposal activity system and contractors within collection activity system	Residents often unable to properly dispose of waste.	Residents do not have access to any waste management tools, other than government issue plastic bags.	Confusion exists within the community on the correct ways to dispose of rubbish - can lead to tensions between residents	Dept of SWM rules of how waste is managed contradicts how residents understand the system.	Residents have developed their own ways of dealing with waste. Each home has its own rules.
Object	Residents aligned over object of improving home management of solid waste, and improving collection system	Sanitary disposal of waste drives residents to come up with their own ways of doing	Community's use of bags not conducive to collection requirements. Bags get deposited at drop off sites by residents, whilst collectors have to cover arge distances in order to collect loose bags.	Sanitary disposal of waste drives residents to come up with their own tools, such as buckets; and storage such as on the roof, buried or raised	Although the object of sanitary disposal is shared by the community, it has not contributed to a collective approach.	Object of community not supported by rules imposed	The object of sanitary disposal not supported by roles.
Tools	Tensions between tools used in the home exist, such as: - compatibility between make-shift bins and government issue rubbish bags - makeshift bins not secured to homes	Tools currently in use limit community members' ability to properly dispose of waste. Can lead to negative issues such as residents dealing with rats, broken bags and children's exposure to waste.	Tools limit residents object of sanitary waste disposal.	Tools the community use in discarding waste and tools the contractors use in waste collection, AND tools Dept of SWM use in removing waste form the area.	Tools are varied, with community using different methods of disposal.	Tools are not conducive to current rules around SWM.	Artefacts residents use do not impact on division of labour within disposal system, but do clash with collection and remova systems.
Community	Some differences existed regarding cleanliness. Permanent residents were more likely to want improvement, while temporary residents were less invested.	Community at large does not determine waste activities of residents. Only community leaders are aware of correct procedures, but do not impose them on residents.	Community share object of sanitary waste disposal, however use different tools and methods to achieve it.	No cohesive tool constellation exists for the community to manage waste.	Communities of disposal and collection activity systems can clash around proper collection, proper disposal and non-collection due to personal issues with resident	Community have no say in how waste should be managed.	Residents are supposed to be hired by contractor collectors. Jobs are in high demand and any vagueness around who gets hired can cause tensions within the community.
Rules	Tensions existed between Dept of SWM rules carried out by contractors, and residents. These related to use of current system and central collection points.	Impact negatively on residents as they are not supported by the right tools and systems.	Rules inhibit community's object of sanitary waste disposal	Rules determine tools for collection and removal but not disposal - create tensions between these activity systems	Have little impact on how community actually deals with waste.	Rules of collection not conveyed to residents. Only community leaders understood the process. Tensions exist around correct management of waste.	No common rules within the community to determine roles around the home. Each home develops its own based in tools available and location in relation to disposal points.
Division of Labour	Tensions between residents and contractors not from the area. Confusion over roles of waste disposal.	Roles within disposal activity system do not explicitly exist, determined on a home to home basis	Lack of DOL within disposal system - only impacted on by imposed DOL	Links between DOL and tools, such as adult's responsibility to dispose of rubbish in raised bucket as children can't reach	Members hired randomly by contractors to do removal (in line with Dept of SWM's directive and selection system)	no real impact within disposal activity system.	Residents often dispose of rubbish at central collection points due to either non-collection by contractors or nowhere to keep rubbish until collection. Roles are confusing around waste disposal at collection points.