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Do Design Science Research and Design Thinking Processes Improve the ‘Fit’ of the Fit-For-Purpose Approach to Securing Land Tenure for All in South Africa?

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Abstract: In South Africa, land tenure security is a challenge for 60% or more of the population who hold interests in land outside of the formal system of registered title. There is a need for the cadastral and land administration systems to be reshaped, and for new land tenure forms to be developed to record all land rights and interests so as to improve land tenure security for all. In this paper, we undertake a reflective retrospective of the processes of land administrative reform in South Africa using a thematic framework that includes fit-for-purpose, design science research, and design thinking processes. Literary sources are coded using the thematic framework to identify potential contributions of foregrounding design science research and design thinking in fit-for-purpose land administration (FFP LA) approaches. Design science research paired with tools of behavioral science add value in understanding the context, problems, needs, and objectives and in communicating the results of critical reflection. The design thinking process has much to offer in capitalizing on the human abilities of empathy, deep understanding, and challenging assumptions, setting the scene for unconstrained creative thinking. Design science research and design thinking within FFP LA may promote innovations in land administration systems reform initiatives that deliver restorative justice in the South African land sector.

Keywords: land rights and tenure; land administration; fit-for-purpose approach; human rights; design science research; design thinking



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1. Introduction

Post-colonial countries may exhibit an awkward combination of *inherent* and *inherited* land administration systems. The *inherent* system is that which was already in existence prior to colonization. It was administered by traditional authorities and structures according to cultural norms and standards. These prioritized the relationships between people and land for purposes of landholding (both individual and communal), grazing, agriculture, and other such land uses [1]. Colonization introduced an *inherited* land administration system (LAS) that is based on the norms and standards of the colonizing nation. This ‘formal’ LAS was designed to secure property rights for the colonizers and promote a land market [2]. The inherited view of land as a commodity was in opposition to the inherent view of land as an integral part of the community and an essential aspect of the indigenous social network [3]. The inherent LAS was thus largely ignored by the inherited system. However, colonial authorities codified the inherent customary traditions creating official customary law. They also employed traditional authorities with elevated political powers to serve the needs of the colony rather than to continue the system of pre-colonial governance. Thus, the inherent LAS post-colonization is no longer a true reflection of its pre-colonial self and exhibits both inherited and inherent attributes [4].

The resulting duality of the LAS, coupled with intentionally discriminatory colonial and (in South Africa) apartheid policies, has led to land dispossession being a symbol of

oppression [5] that cuts to the core of dignity and personhood [1]. This continues to be manifest as land tenure insecurity for those land rights-holders who live outside of the inherited LAS. Estimates suggest that in 2011 this was the reality for 60% or more of the population of South Africa who live in the so-called communal areas (former apartheid ‘homelands’), as farm laborers and their families, in informal settlements, and on former mission stations [6]. Although the Constitution of the Republic of South Africa (the Constitution) [7] recognizes these customary and ‘informal’ land rights, such recognition has not carried through to a national LAS. Instead, South Africa has a fragmented LAS characterized by a legislated and well-functioning ‘formal’ (inherited) system of land registration and cadaster existing alongside an off-register, informal (amended inherent) system administered by traditional authorities, civil society groups, non-government organizations (NGOs), slumlords, and anyone else with the appropriate acquired or appointed authority. Such fragmentation is detrimental to the realization of the objectives of Section 25 of the Constitution, particularly sub-sections (5)–(9) of the Constitution. These sub-sections obligate the State to promote equitable access to land for her citizens, improve tenure security for those whose tenure is insecure due to colonial and apartheid laws and policies, and allow for restitution of land for those dispossessed of land under the same. According to an advisory panel report on land reform and agriculture constituted by the presidency [8], read with the *Report of the High Level Panel on the Assessment of Key legislation and the Acceleration of Fundamental Change* [9], this fragmented LAS is a major contributor to land tenure insecurity in South Africa.

Thus, there is a need for the South African land administration and cadastral systems to be reshaped to allow for the recognition and recordation of rights and interests in land in the country and the improvement of tenure security for all. However, the manner of this reshaping must consider the pressing need for restorative justice, not only related to the outcomes of reform, but also in respect of the process through which it is conducted. Such reform should also improve economic development through improved investment opportunities (for local and international investors) and clear administrative procedures. South Africa’s National Development Plan [10] has broad and bold aims to eliminate poverty and reduce inequality by 2030. These ‘Vision 2030’ objectives are linked to transformation and development and have relevance to a FFP LA system design accompanied by a range of strategies and programs—some formal and others that have not been passed through democratic processes of governance [1].

The goal of increasing recognition and recordation of rights and interests in land and of delivering security of tenure for all is in keeping with Aspirations 1, 3, 4, 6, and 7 of the African Union’s Agenda 2063 and associated calls to action [11], as well as several of the Sustainable Development Goals (most notably goals 1, 2, 5, 11, and 15) [12], summarized in Table 1. The FFP LA approach is promoted as one way of addressing this need [13].

Table 1. Aspirations of the African Union and SDGs that align with FFP LA.

African Union’s Agenda 2063	United Nations Sustainable Development Goals
1: A prosperous Africa based on inclusive growth and sustainable development	1: End poverty in all its forms everywhere
3: An Africa of good governance, democracy, respect for human rights, justice, and the rule of law	2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture
4: A peaceful and secure Africa	5: Achieve gender equality and empower all women and girls
6: An Africa whose development is people-driven	11: Make cities and human settlements inclusive, safe, resilient, and sustainable
7: Africa as a strong, united, and influential global player and partner	15: Protect, restore, and promote sustainable use of terrestrial ecosystems.

FFP LA is intended to include processes that lead to a deep understanding of problem situations and needs, and to design solutions to meet these. FFP LA seeks to “understand the social, cultural, legal and institutional dynamics of their own Communities” [13], but

achieving this at all scales and for all role-players, particularly in complex contexts, is challenging. The approach focusing on the spatial, legal, and institutional frameworks of FFP LA may lead to false assumptions of hegemony and fail to reveal contest between needs within an area or state. Behavioral science and human-centered approaches have different points of entry and focus. Foregrounding their strengths within the FFP LA approach may be useful to address South African land challenges that endure even after more than two decades of change—a deep understanding and creative approaches are required. The consequent aim of this paper is to identify contributions of design thinking and design science research paired with behavioral science to enhance the appropriateness of the FFP process in addressing the shortcomings of land administration and improving tenure security for all South Africans.

It may be noted that the authors do not separate ‘fit’ from ‘purpose’. Purpose may stand alone, and the purpose of LAS reform is discernible from the reviewed literature: in South Africa, the general purpose is to address land tenure insecurity. This problem situation demands creative solutions developed from a deep understanding of complexity in context. The method/approach adopted should fit this purpose. In this paper, we argue that the method/approach can benefit from foregrounding design science research (paired with behavioral science) and design thinking into an FFP approach. This would lead to a better ‘fit’ of the method/approach to the purpose.

This paper adopts a critical realist ontology as per Whittal [14] and Carlsson [15]. This overcomes the toolbox approaches of pragmatism and experimentation associated with positivist ontologies, and the purely social/behavioral approaches associated with constructivism. Carlsson [15] critiques ad-hoc pluralist approaches that fail in assessing causes for success and failure, and the attempts of others to mix the approaches of pragmatism, experimentation, and social/behavioral science without a defensible ontological position. Critical realism overcomes the drawbacks of some common approaches and even of the ad-hoc combinations of these. It also supports the use of a suitable suite of mixed methodologies. Critical realism underpins this investigation and should be considered as a suitable theoretical approach for interventions aimed at improving land administration systems that are ‘fit-for-purpose’.

2. Theoretical Framework

2.1. Overview

The FFP approach has been developed with extensive consultation and testing. It is not the aim of this paper to critique the FFP approach directly, but to explore approaches that may offer improvements in designing interventions for challenging situations, especially for the South African context. The findings should have relevance for similar post-colonial states. Design science research partnered with behavioral science (DSR-BS) and design thinking (DT) are identified as potentially complimentary approaches to the FFP. DSR-BS is chosen since it is highlighted by Çağdaş and Stubkjær [16] as a suitable over-arching approach from their detailed analysis of literature on cadastral research. The DT approach is included since it is starting to receive traction in organizational and policy change where its human-centered approach to innovation is valued [17,18].

The research seeks to reflect on land administration systems (LAS) reform in South Africa in a retrospective analysis of relevant literature. The thematic framework of the DSR-BS, FFP, and DT approaches is used to assess whether the FFP LA approach can be improved by the inclusion of DT and DSR-BS approaches in guiding a process of LAS reform. Improvements to the approach adopted in reform processes may increase the likelihood of meeting identified outcomes (success), delivering solutions that last (sustainability), and that meet the needs of all stakeholders—the State and its organizations, and the land rights-holders, both individually and collectively (significance) [19].

2.2. Fit for Purpose

Significance is an important factor for ensuring the *success* and *sustainability* of LAS [19]. This means that LAS should use tools and procedures and deliver outcomes that are relevant to the end-users: the citizens and communities served by the system. A lack of significance may lead to the proposed system being abandoned by the would-be beneficiaries and a reversion to traditional, indigenous, extra-legal ways of doing things [20]. The issue of significance is partly addressed through a LAS designed along FFP guidelines.

FFP LAS “should be designed for the purpose of managing current land issues within a specific country or region” using an approach that is participatory, inclusive, flexible, and focused on citizens’ needs [21]. Twelve principles grouped into three frameworks provide the foundation of the approach [13] (see Table 2). The spatial framework is concerned with how land is occupied and used. The legal (and regulatory) framework is necessary to support the adoption and implementation of the FFP approach. The institutional framework is required for effective management and administration of land rights and resources, and the delivery of accessible and inclusive services.

Table 2. The key principles of a fit-for-purpose approach to land administration [13].

Spatial Framework	Legal Framework	Institutional Framework
Visible (general) boundaries	Flexible, administrative	Good land governance
Aerial imagery	Continuum of tenure	Integration
Accuracy for purpose	Flexible recordation	Flexible ICT approach
Updating, upgrading, ongoing improvement	Gender equity	Land information: transparent, affordable, accessible

Implementation of the FFP approach to land administration is proposed to follow several steps [22], beginning with an analysis of the country context and ending with a benefits analysis (see Figure 1). The country context analysis is a crucially important first step because interventions should be designed to fit the local context [23,24]. Thus, the FFP approach is noted to be a set of *guidelines to be tailored for individual country contexts*, not a set of principles for guaranteed success [25]. An analysis of the existing spatial, legal, and institutional frameworks provides a baseline assessment for the gap analysis: what is the existing situation, what is the desired situation, and what needs to change to achieve the desired situation [26]? Using the FFP principles and frameworks listed in Table 2 as a guide, the country-specific strategy can then be implemented. Capacity development is a core concern and implementation should follow an incremental approach using intermediate goals and objectives. Detailed instruction manuals should be developed to provide guidance for all stakeholders to ensure that a consistent, cohesive approach is followed. Finally, an analysis of anticipated economic, environmental, and social benefits should include a cost comparison to indicate the anticipated benefits of adopting a FFP approach to land administration and hence garner political support for the process.

Taking the cautions raised by Barry [25] into consideration, these implementation steps should not be considered linear because any intervention changes the context. An analysis of the new country context should thus follow the benefits analysis cyclically to make sure that the newly designed and implemented LAS is ‘fit’ for the changed context (see Figure 1).

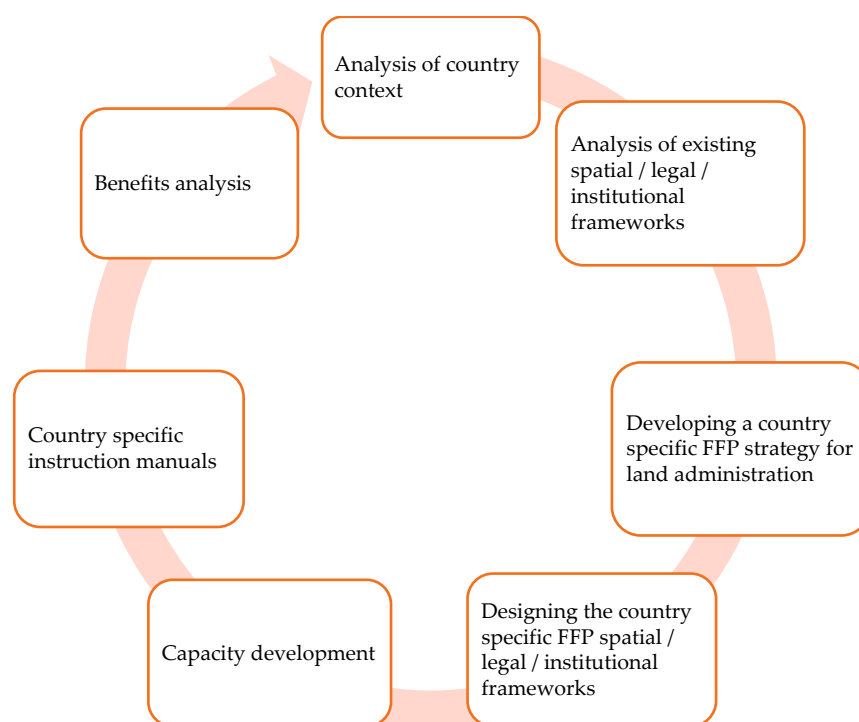


Figure 1. Country-level FFP implementation approach [22]

2.3. Design Science Research Paradigm

The design science research paradigm is becoming mainstream in Information System (IS) research. Most modern organizational management theories rely on a theory of design, focusing on creating or reforming the organization rather than an artefact or service [18]. These include systems thinking approaches to organizational change [18] as a necessary application of behavioral science to ascertain the problem situation in context prior to any intervention. This methodology has been followed in many cadastral research projects [16]. The design science research paradigm draws on existing knowledge and theories in the design of an artefact to meet the identified need in the form of an IS or to reform an existing IS. It considers both the design of the process of reform as well as the design of the product or artefact that results [27]. Thus, assessments of performance management should include assessment of both the process and of the product/artefact.

2.3.1. The Alignment of the Design Science Research Paradigm with Theories and Methods Underpinning LAS Reform

Çağdaş and Stubkjær [16] promote the cadastral design science research paradigm consisting of socio-technical systems theory for the design of a Land Tenure Information System (LTIS) artefact or intervention, possibly augmented by Searle's theory of social reality (STS) [28]. STS includes technical elements that do not display intent, stakeholders (natural persons, collectives/groups, legal persons, and organizations) that do possess intentionality, and social elements such as laws, norms, and practices. Searle's theory separates physical reality (tangible) from institutional reality (which is real but not necessarily tangible). Institutional reality in the cadastral domain includes the rules of land rights and tenure codified into cadastral statutory law, African customary laws of landholding and administration, and legitimate, extra-legal but uncodified rules that may exist in informal urban social tenure contexts, as examples.

Additionally, within the design science research paradigm, methods from behavioral science, such as soft systems methodology (SSM) [29], are promoted by Çağdaş and Stubkjær [16] to understand the context in which the LTIS is to operate. SSM has been (and continues to be) used to good effect in a number of case studies conducted within the research group of the authors, such as in Whittal [14] and Mabesa [30]. More recently,

Augustinus has highlighted the explanatory power of SSM [31]. The Two Streams Analysis of SSM includes Gap Analysis, in which the difference between the current state and the desired state is identified [29]. Change management processes are necessary to move from the present state to the desired state [14]. Social Network Analysis (SNA) [32] adds the sensitivity to transactions between stakeholders. Power differentials, differing and even competing goals, and other aspects of relational complexity may be appreciated and modeled using SNA. New institutional economics (NIE) [33] focuses on institutions (intangible rules, transactions, and laws) and organizations relating to the cadaster (such as the Surveyor-General's and Deeds Offices, and professional registration bodies). NIE is promoted as underpinning the evaluation of efficiency and adoption of the artefact [16].

The pairing of design science research processes and behavioral science (DSR-BS) adds important sensitivity to context—design science research on its own is inadequate.

2.3.2. Relevance of DSR-BS Processes to LAS Reform

Design science research is conducted according to the following six steps [16]:

1. Identify the problem—a process underscored by behavioral science.
2. Define objectives for a solution.
3. Design the artefact—this can be a construct, a model, a method, or an implementation [34].
4. Demonstrate the use of the artefact to solve the problems identified in (1).
5. Evaluation of the artefact.
6. Communication of findings.

As mentioned, for design science research based on a critical realist ontology, the socio-technical system and process of change, not only the artefact, would be evaluated and results communicated in steps 5 and 6 [27]. This compliments the FFP process. Additionally, the pairing of behavioral science methodologies with the design science research process (DSR-BS) adds sensitivity to context and hence value to the FFP process. However, focus on contextual analysis in FFP is at the spatial/legal/institutional level—the DSR-BS approach does not refocus the analysis to the individual, family, kinship group, or customary area, which may be necessary. Additionally, the DSR-BS does not appear to add value in the design phase.

2.4. Design Thinking Process Model

Design thinking (DT) is at its heart a human-centered approach that may help to solve complex problems that will not submit to technical-only solutions [35]. DT is used in policy reform and service design and follows developments in organizational theory (reinventing government, New Public Management (NPM), entrepreneurial state) [17]. There is an assumption that innovation goes hand in hand with disruption rather than through gradual processes of incremental change as are preferred in bureaucracies (though it is noted that this assumption can be challenged) [17]. What DT brings to the change management field is “a framework for more participatory and cross-disciplinary approaches to social problems” [17].

Public Sector Innovation Labs (PSI labs) adopt DT—an inclusive and experimental approach to problem solving that provides a balance to rational positivism with the inclusion of empathy, curiosity, emotion, and intuition. With respect to policy intervention case studies, various steps are identified by McGann [17]. However, these are not well-aligned to pure DT, relying instead on the instrumental rationality of positivist framings of ‘evidence-based policymaking’ [17].

Of important interest to FFP approaches to land administration reform, DT is complementary as it identifies that “Participatory, user-centred [*sic.*] approaches may excel in producing ethnographically informed insights and in collaboratively generating ideas that have ‘buy in’ from stakeholders.” [17] Furthermore, DT promotes “enhancing the lives of individuals” [18]. This aim aligns with the aspect of Significance highlighted by Hull and Whittal [19,36]. In addressing the challenges of FFP LA in complex situations, DT may

offer an interesting approach to “deliver implementable solutions to problems that are structurally complex and necessitate interconnected solutions” [17]. A core premise of DT is that the world is complex.

The usual approach in design thinking follows these steps:

1. Empathize—research the user’s needs.
2. Define—state your user’s needs and problems.
3. Ideate—challenge assumptions and create ideas.
4. Prototype—start to create solutions.
5. Test—try out your solutions.

Some of the steps are familiar to well-known change processes (steps 1, 2, 4, and 5). However, the framing of step 1 as ‘empathize’ firmly positions the approach as human-centered and encourages the researcher to see through the eyes of the other. Step 3 is novel—this step encourages participants to think differently, expand their understanding, and be innovative in ‘ideating’.

In contrast to DSR-BS, DT has at its essence imagination, cognitive processes, the “spirit of creativity and value” [18] within all elements and units of an organization, and creative inquiry (including synthesis—informed intuition) in the process of problem solving. Creative inquiry includes four ‘moments’ [18]:

1. Invention: creation of new ideas—breaking new ground.
2. Judgement: this is based on the criteria of desirability—does the invention meet the needs (significant for the users), is it feasible (suitable in the context), is it viable (sustainable over time)?
3. Connection and development: based on the criteria of usefulness (does it perform the task?), useableness (is it compatible with a human user?), desirability (does it deliver emotional satisfaction?)
4. Integration and evaluation: the worthiness of the solution—should it be implemented (for stakeholders, especially users, society, the state)?

Buchanan highlights creative inquiry as the most essential feature of DT, but DT does not end with concepts and ideas—embedded in DT is making and doing [18].

Most importantly for LAS reform,

“The principle of design . . . is grounded in the quality of experience for all of those served by the organization. This includes the individuals who directly use the products and services of the organization, but it also includes those who are affected by the internal and external operations of the organization and by those in society at large who are ultimately affected by the vision and strategies of the organization”. [18]

Buchanan explores the meaning of “experience”. It can refer to an individual’s perceptions and sensations, but could also refer to an individual’s relationship with the environment (consisting of “objects and activities, signs and symbols” [18]). This relationship is initiated by human intent and human selection of certain aspects of the environment with which to engage. Human engagement creates meanings for that individual. Ideally, DT enhances the unity between humans and their environment—it removes obstacles to meaningful human experiences. These obstacles can be physical/practical, ones of intellectual understanding, and emotional engagement. Furthermore, Buchanan reflects on Asmal, in reference to the Constitution, that:

“Human-centered design is fundamentally an affirmation of human dignity. It is an ongoing search for what can be done to support and strengthen the dignity of human beings as they act out their lives in variety social, economic, political, and cultural circumstances . . . the quality of design is distinguished not merely by technical skill of execution or by aesthetic vision but by the moral and intellectual purpose toward which technical and artistic skill is directed.”. [35]

A truly FFP LAS will strive to deliver this type of unity between all stakeholders (internal and external) and the system in order to deliver on sustainability, success, and

significance [19,36], but perhaps most importantly in South Africa, to deliver on human dignity for all who suffered extreme loss of dignity in the colonial and Apartheid years. DT may assist in this process.

2.5. Comparison

In comparison, these methodologies all begin with understanding the context. Design thinking stands apart in its human-centered approach to this process. It highlights empathizing with the stakeholders, involving engagement with their feelings. Feelings are necessarily related to the stakeholders' experiences. The FFP process is specific in its analysis of "country context" which could include aspects such as history, development, legal pluralism, and culture—both organisational and societal. The design science research paradigm is importantly paired with behavioural research methodologies for this phase—on its own it would be insensitive to context. It is complementary to the FFP process.

Each of the methods includes a stage of identifying the problem. All methods include evaluation/analysis of the results. The DSR-BS methodology requires the design and development of an intervention and a demonstration of the effectiveness thereof. The DT approach has a significant addition of the ideate phase, while its human-centered focus throughout the process is significantly different from the other two.

The thematic framework thus derived appears as Table 3 and forms the basis for the analysis.

Table 3. Thematic framework: the DSR-BS, FFP, and DT approaches.

(Behavioral and) Design Science Research (DSR-BS)	Fit-For-Purpose (FFP)	Design Thinking (DT)
(Describe the situation/context)	Analysis of country context. Analysis of existing spatial/legal/institutional frameworks	Empathize—needs
Problem ID and motivation	(incorporated in analysis above)	Define—needs and problems
Definition of objectives	Developing a country-specific FFP strategy for LA	
Design and development	Designing the country-specific FFP spatial/legal/institutional frameworks	Ideate—challenge assumptions and create ideas—the <i>invention moment</i> Prototype—solution
	Capacity development	
Demonstration		Test—the <i>judgement moment</i>
Evaluation	Economic benefits analysis	the <i>connection and development moment</i> the <i>integration and evaluation moment</i>
Communication	Country-specific instruction manuals	

3. Materials and Methods

3.1. Materials

This paper draws on a range of secondary data sources including papers, reports, policies, critiques, books, media articles, and others to identify challenges relating to land reform processes and delivery in South Africa since 1994: the advent of democratic government. These sources reflect on land reform policy, general nationwide implementation, and specific land reform interventions that cover a variety of contexts such as urban, peri-urban, rural, and customary communal land reform to improve land tenure security. International and sub-Saharan literature, where identified as relevant to the use of these approaches in the South African context, is also included.

The strategy used to identify the sources was as follows:

1. Using various combinations of keywords (FFP LA, FFP, fit-for-purpose, land administration, land reform, South Africa, Africa), online search engines (Google Scholar, Google Books, Google, ResearchGate, International Federation of Surveyors (FIG), University of Cape Town (UCT) library databases including EBSCOhost, Elsevier, Emerald, HeinOnline, Springer, Taylor and Francis, Thomson Reuters) were inter-

rogated for peer-reviewed journal articles, doctoral theses, conference proceedings, books, policy documents, and technical reports.

2. Literature that included FFP case studies and high-level critiques of the FFP approach was considered. Books and chapters that investigate, explain, or critique land reform processes in sub-Saharan Africa, and particularly South Africa, are included. (Many of these are known to the authors or would have appeared on ResearchGate and other searched sites as well as UCT libraries.) National land policies and high-level country analyses provide rich data—these are well-known to practitioners and researchers in South Africa.
3. Literature focusing on technical interventions was excluded.

A list of the 37 sources and coding data is presented in Appendix A. Saturation sampling logic was used—the sources are not intended to be inclusive, but representative. Sufficient sources were included such that additional sources are not likely to cause data divergence or change the research outcomes.

3.2. Coding and Extraction Process

Guba [37] suggests that researchers should establish an audit trail that allows someone else to examine the process of data collection and analysis. To this end, we made use of computer-assisted qualitative data analysis software (CAQDAS) called Nvivo. CAQDAS is useful for making sense of dense, detailed qualitative data in a variety of different formats: textual documents, audio-visual recordings, and pictures [38–40]. Categorization of the source documents and coding were undertaken using this software. This allows for transparency of data analysis, improves the credibility of the findings, and makes it possible for others to replicate the research (dependability).

The source texts were imported into NVivo version 12 and categorized as non-South African and South African. Each source was then read through, coding text that relates to the thematic framework in Table 3 as illustrated by the concept map in Figure 2. The coding process involves selecting text in NVivo and associating that text with one or more elements in the thematic framework—these are called codes. Each theme and its associated coded text were then extracted using the export functions of NVivo. The result is a set of documents, each one containing the selected source texts that relate to that code.

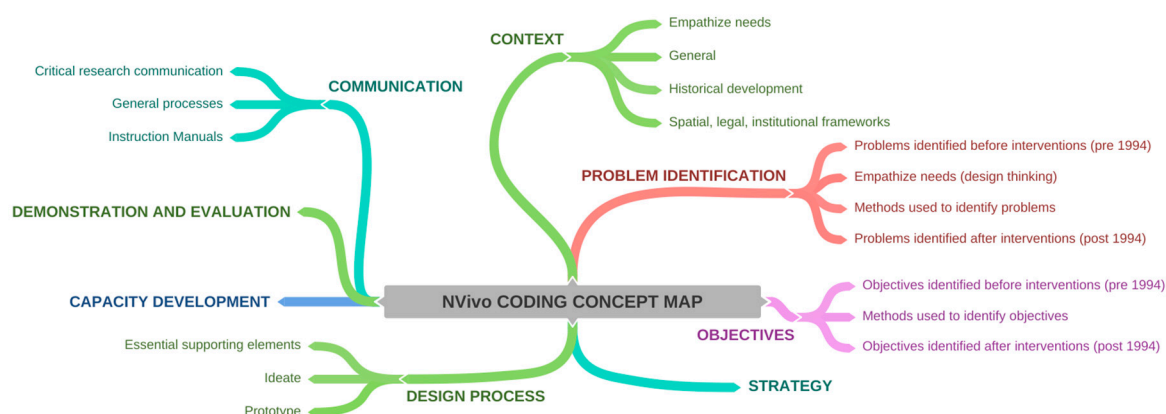


Figure 2. Concept map of coding in NVivo.

4. Results

The text extracts relevant to each code and subcode were analyzed. This involved the researchers synthesizing this information using the thematic codes illustrated in Figure 2. The issues identified are not as relevant to this paper as whether the DSR-BS, FFP, and DT processes would be sensitive to them and could direct appropriate responses. The full suite of themed issues resulting from the coding would be valuable data for another study.

4.1. The Process of Understanding the Context

The assessment of context is tackled differently in the various approaches as shown in Table 4.

Table 4. Extract of context aspects.

(Behavioral and) Design Science Research (DSR-BS)	Fit-For-Purpose (FFP)	Design Thinking (DT)
(Describe the situation/context)	Analysis of country context. Analysis of existing spatial/legal/institutional frameworks	Empathize—needs

DSR-BS relies on a partnership with behavioural science tools that focus on description since DSR-BS does not explicitly include this aspect. FFP focuses on analysis and in particular on the spatial/legal/institutional frameworks, while DT focuses on empathizing with the needs. Embedded in empathy is understanding through the eyes of the stakeholders, in particular, the beneficiaries of land tenure projects. For this reason, the DT “empathize needs” is placed at this level of the intervention—it is impossible to empathize without an understanding of the context and situation—so the process of understanding the context is implied. Similarly, analysis of the context and frameworks relies on knowledge of these—usually in some kind of descriptive form. The three approaches are thus seen as complementary—FFP and DT relies on DSR-BS while DT relies on FFP as well.

There are few if any land tenure interventions that do not spend a good deal of effort on describing the history of the land issues in a country—South African texts show no exception. The essential aspect of understanding land institutions and their functioning in context is also a given. In many cases, the increasingly popular systems thinking approaches are used to describe and assess frameworks, for example legislative, technical, and political systems; e.g., [13,29,41]. The Human-Rights-Based Approach is endorsed as promoting integration between these systems while also promoting the acknowledgement and fulfillment of the South African State’s vertical obligations [42] (i.e., the obligations of the state towards their citizens). Unfortunately, a Human-Rights-Based Approach is seldom or only very briefly mentioned in State policy (e.g., in the Communal Land Tenure Policy [43]) with a shift away from this approach to one of indirect rule used in past oppressive regimes [26].

A combined approach involving description and analysis of the context, while empathizing to include sensitivity to stakeholder needs, would be more useful than any of the approaches alone. This would help in complex cases, where there are unhelpful power relations, and to understand the impact of new technologies in the context [25,26,41,42]. It would include identification of the drivers of change in context—this is an important aspect that influences design later on in the process [14,26]. Hull and Whittal [42] highlight that conceptions of human rights and land rights are culturally nuanced—land rights should be viewed through a socio-cultural lens in the understanding of context. Seeing through a socio-cultural lens different from your own is the essence of empathy, endorsing the DT approach.

Pushing this step further to empathize with the needs of stakeholders also has the potential to:

- build cooperation and partnership [41];
- understand the social aspects of land value (land as a sense of place incorporating both past and present people [1,44,45]);
- explore perceptions of land tenure security as opposed to legal/functional land tenure security [46]. An example is the perceived tenure security through the physical holding of title or occupation documents [26];
- explore the spiritual nature of land, which is tied up with individual and collective identity [9];
- understand different conceptions of the subjects of land holding, such as the strongly expressed view that people belong to the land as well as that land belongs to people.

ple [26], and multigenerational views of landholding that include subjects that are deceased or not yet born [47]; and

- understand customary laws and institutions and community perceptions of their functioning [26].

In the South African context, appreciating such aspects is key to restoring dignity through delivering secure land tenure to all. Furthermore, empathizing facilitates an understanding of land as an essential aspect of a way of life underscored by ubuntu and human solidarity—prioritized in South African land policy [44,48].

4.2. The Problem Identification Process

Assessing the problems prior to any intervention to improve land tenure security is a widely accepted and essential element of development programming. Without adequate understanding of the problems, a solution cannot be designed or will be poorly designed [25]. Table 5 gives the problem identification aspects of the various approaches.

Table 5. Extract of problem identification aspects.

(Behavioral and) Design Science Research (DSR-BS)	Fit-For-Purpose (FFP)	Design Thinking (DT)
Problem ID and motivation	(incorporated in analysis?)	Define—needs and problems

The DSR-BS approach specifies problem identification to motivate change. With the FFP approach, this appears to be implied by the analysis of the context discussed in the previous section. The DT approach specifies the definition of needs and problems. These will be influenced by the rich data resulting from empathizing in the prior stage. The aim of this section is to assess the process of problem identification rather than to reflect the problems, needs, and motivations so identified.

4.2.1. Use of a Framework

In some cases, an established framework is used to assess problems. Bennet and Alemie [49] use the framework of Zimmerman—their paper highlights a number of issues, some of which have relevance to the overall process discussed here: capacity development and institutional support, communication and public–private collaboration, as well as use of standards in assessment and monitoring and evaluation processes. Enemark and McLaren [22] suggest using the Land Governance Assessment Framework (LGAF) developed by the World Bank [50]. Zein assesses business processes using SWOT analysis and assessing the legislation [51]. Flores et al., in designing a FFP response, relied on an extensive literature review and grounded theory case study approach [52]. They propose the FGAF–FFP Governance Assessment Framework, which views the seven FFP principles as governance elements. These are assessed using their Governance Assessment Tool (GAT). Hull proposes a framework developed to deliver land administration systems that are significant, successful, and sustainable [26]. This framework incorporates many aspects of others but is assessed for application in customary land rights contexts. Hull also reviews the theories underpinning land administration reform and places these on a continuum from conservative to adaptation and replacement theories [19]. He contends that “the theory informing development [often] goes unspoken and unnoticed. Conscious decisions at the theory level are important, especially when seeking to undertake cadastral systems development in contexts differing from well-understood western norms, because the value and meaning of land to land rights-holders is context-specific” [26]. Some frameworks will be more sensitive to certain types of problems than others—the choice of framework is important.

4.2.2. Reading and Listening

With regard to methods used to identify problems in South Africa, there have been some very extensive summits, investigations, and reports. The 2005 Land Summit engaged

1500 stakeholders and academics. The investigation that resulted in the High Level Panel report of 2017 involved multiple stakeholder engagement and public hearings across the country supported by two national colloquia on land reform [9]. Submissions from stakeholders and academics as well as working groups, consultative round tables, and commissioned reports were used to identify issues relating to a task list of identified themes. The 2019 Final Panel Report of the Presidential Advisory Panel on Land Reform (the Advisory Panel Report) underwent a diagnostic process that began with existing information and included a detailed consultative process [8].

Empathy for problems and stakeholder needs is an aspect of DT. The White Paper on South African Land Policy of 1997 identified deep resentment over layers of ongoing dispossession of land rights and interests [44]. The 2005 Land Summit suggested a Restitution Truth and Reconciliation Committee at which people's experiences of dispossession could be heard. The aim would have been to bring healing and to restore relationships, but this suggestion early in the process of land reform was never enacted. Healing the wounds of the past is also identified in the National Development Plan of 2012 [10]. However, communal area residents have little voice [5]. The approach reflected by Abubakari et al. [45] also borders on empathy with detailed investigations into the effects of codification, and who was affected. The High Level Panel report of 2017 as well as the 2019 Advisory Panel Report paid particular attention to hearing first-hand the lived experiences of people who live in South Africa [8,9]. The Advisory Panel Report highlights that "rural and urban spaces define people's identities, social standing and the participation in the mainstream economy". This reveals that empathy for how problems affect stakeholders is an important aspect of the process, further endorsing the DT approach. Abubakari et al. [45] highlight the importance of identifying problems with sensitivity to geographical and actor variations in the practices and norms, as well as including socio-political factors and sensitivity to the effects of codification. This counters the drive to find solutions that can be delivered at scale and promotes a more nuanced approach that could also benefit from DT at the design phase since it challenges assumptions and promotes creative thinking.

4.2.3. Sensitivity to the Problems

The problems identified in South Africa with respect to land delivery have been extensively reviewed [1,6,8,9,19,42,44,48,53–58]. With comprehensive reports forming part of the review, saturation sampling was reached—the list of problems is comprehensive and spans those identified in the early stages prior to the implementation of land reform, as well as those identified reflectively. Similar problems have been identified in applying a FFP approach internationally as reflected in the FFP literature and selected case studies [13,21,22,45,49,51,52,59,60]. However, the intention of this paper is not to summarize the problems but to assess the combined thematic framework.

The methods of DSR-BS (see Section 2.3) are likely to be sensitive to problems that would not be revealed by the employment of exclusively non-social science methods. Barry highlights some of these—competing goals, the influence of power, corruption, and contrasting organizational cultures [25]. Abubakari et al. identify political, economic, and sociocultural contingencies to which the FFP approach is not particularly sensitive [45], although the FFP approach's use of spatial, legal, and institutional components reveals some level of systems thinking. Sensitivity to gender issues with respect to land is also important in South Africa [8,44]. Systems thinking could reveal South African institutional issues such as:

- lack of capacity [10,44,58];
- inappropriate policy, weak and bureaucratic institutions, and funding issues [10,57];
- dualistic and inequitable (especially in customary areas) institutional frameworks relating to both land governance and management that are compounded by the silo culture and confusion of mandates in South African land institutions [5,8,10,58];
- disfunctional political/parliamentary systems [9,10];

- inadequate legal structures and processes that are not transparent and cannot accommodate opposing views [8,10];
- inconsistencies, contradictions, and irrationality in the existing laws, even to the extent of being unconstitutional, that bedevils land development and management, especially in relation to communal land, traditional land, and mineral and petroleum resources development [8–10]; and
- social strategies for gaining access to land and securing tenure (often multiple and overlapping holders and rights), especially within informal and customary settings [61].

The DT approach that emphasizes human engagement is clearly aligned with the High Level Panel Report and Advisory Panel Report processes. The meaning of the process for individuals and collectives can be enhanced through the shared understanding of problems and emotional engagement. Thus, the unity between individuals, collectives, and their environments may be improved. The usual aspect of public and stakeholder participation is executed at a deeper level using social science methods with the aim of building a deep understanding and empathy. Since the identification of problems is undertaken at the start of the process, deep engagement at this stage sets the scene for success. Although participation is a FFP element, the DSR-BS and DT approaches offer value to augment the FFP approach at this stage of problem identification.

4.3. The Process of Identifying Objectives and A Strategy

Table 6 shows the identification of objectives, a strategy, and goals in the various approaches.

Table 6. Extract of the aspects of the identification of objectives, a strategy, and goals.

(Behavioral and) Design Science Research (DSR-BS)	Fit-For-Purpose (FFP)	Design Thinking (DT)
Definition of objectives	Developing a country-specific FFP strategy for LA	

Although the DT approach does not specify the identification of goals, objectives, or a strategy, the DSR-BS approach focuses on defining the objectives of an intervention and the FFP approach focuses on developing a strategy. ‘Strategy’ is the approach used to implement change in order to achieve each goal. The interim steps are the ‘objectives’—these form part of the overall strategy. Thus, the DSR-BS and FFP approaches are not substantively different although the terminology is not identical.

Hull, Kingwill, and Fokane [62] highlight the systemic nature of land administration, as illustrated in Figure 3. At the policy level, the vision is set. At the management level, strategies for achieving the vision are laid out. At the administration level, actionable objectives are carried out to realize the strategies and hence the vision. Such an articulation highlights the synergy between the DSR-BS and FFP approaches and their appropriateness for land administration studies.

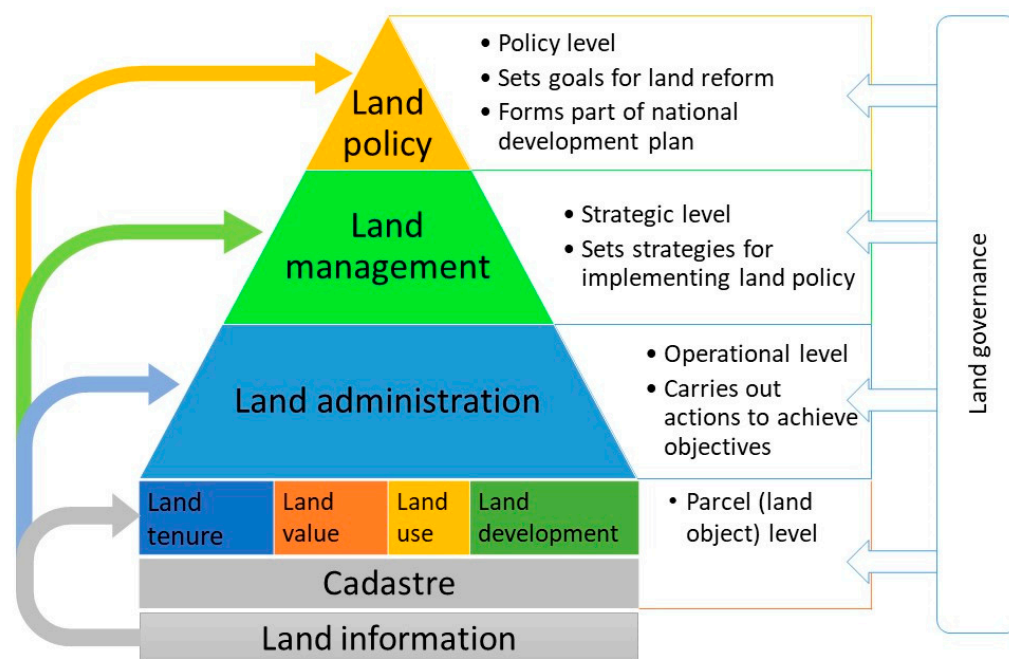


Figure 3. Hierarchy and functions of elements of Land Administration Systems [62].

4.3.1. Underlying Assumptions and How They Influence Goal, Objective, and Strategy Formulation

South African land reform to date is criticized for failing to interrogate assumptions about land access, land rights and tenure, and land administration. Strategy is linked to the type of intervention and whether it follows a conservative, adaptation, incremental, replacement, or systematic titling approach [26]. A bias in favor of replacement theory is based on the belief that a formal land administration system, aligned with the civil law system, is superior to other options aligned with a hybrid civil, common, and African customary law system [26]. The capital value of land to landholders as espoused by de Soto underpins this belief but is strongly criticized for the South African context [61]. Strategies to deliver land rights in customary communal areas are based on contested assumptions about the processes of land administration employed by traditional authorities and the rights in land and land-based resources of individuals and families in these areas [26]. False assumptions about the hegemony of groups such as customary communal and informal settlement residents, the poor [61], and women may also result in misdirected goals, objectives, and strategies for South African land administration reform [8].

4.3.2. Methods Used to Identify and Report on the Goals, Objectives, and Strategy

In much of the literature both internationally and relative to South Africa, the methods used to identify goals, objectives, and a strategy are not explicitly identified. Authors in research institutions may be specific, such as identifying spatial and social science methodologies [46], while others, for example Balas et al. [59], identify frameworks such as those of Williamson et al. [2] and Lewis [63]. Many frameworks used to identify the context and problems (including the FFP approach, Voluntary Guidelines on the Responsible Governance of Tenure—the VGGTs) are also used indirectly to identify goals and objectives of a change process. The literature appears thin regarding information on strategy, except where change management processes (The FFP approach is also described as a change management process [22]) are explicitly identified, e.g., [13], where there is an extensive process such as national land summits [50,53], detailed investigative reports [8,9,58], or in new land policy, such as South Africa’s White and Green papers [44,48] and Rwanda’s policy and legal reform, in which clear goals and objectives are identified. Strategy is then linked to state-led programs such as the South African Reconstruction and Development

Programme and the current National Development Plan with its Comprehensive Rural Development Plan. The National Development Plan resulted from a commission of experts that consulted widely [10].

Acknowledging that the IT/IS aspects are important for any LAS (noting that land information forms the foundation for the LAS and feeds into every level as illustrated in Figure 3), the IT strategy, specifically for capacity development, is sometimes highlighted [22]. The FFP approach specifies formal acceptance of the strategy by senior civil servants and politicians [22]. Apart from embedded strategic components, the FFP approach is also referred to as a strategy [22], but the FFP as a strategic tool is critiqued by Barry [25] in favor of the rational comprehensive strategic planning process [25].

Barry [25] highlights that once a strategy, or pathway, is formulated, there is an important process of stakeholder participation that should be followed prior to implementation. This is a focus of Moreri et al. [60], who highlight that a strategy for public participation is needed. Hull and Whittal promote a Human-Rights-Based Approach that views participants in the process as active rights-holders rather than passive beneficiaries [42]. Top-down and bottom-up processes of engagement and formulating goals, objectives, and strategy should be considered [60]—the duties of the state are paired with citizen and community rights [42]. On the same note, the strategy of FFP is critiqued by Barry [25] for a missing link between community-level problems and national policy. As can be seen in South Africa, policy exists and is in the process of being redrafted. The deep and inclusive analyses, such as expressed in comprehensive reports in South Africa over the last 20 years, go a long way to linking problems to policy amendments, highlighting goals, formulating measurable objectives, and defining a comprehensive integrated strategy for implementation that is approved by the government departments tasked with implementation. These comprehensive reports have benefitted from years of behavioral science research in South African communities to generate a deep understanding.

4.3.3. The Role of Politics in Land Administration Reform Strategy

The strategies employed in South Africa are categorized by Cousins [5] according to successive presidential terms associated with general policy shifts: the Mandela years (1991–1999), the Mbeki era (1999–2000), and the Zuma period (2000–2016). This reflects that the strategic direction is strongly linked to the politics of the day. This is not surprising given the importance of land in political rhetoric, which can often distract the strategy and blur goals and objectives [5].

4.3.4. Commentary on the Process

The gap in this process for the DT approach (see Table 6) necessitates a jump from knowledge of the problems and needs to developing solutions. This seems counter to mainstream change management theory such as Kotter's eight stages [64] and the nudge theory [65] that rely on a vision for the development or reform process. Bringing the strength of DT's creative thought into this stage in some manner may assist stakeholders with deep knowledge and empathy for problems and needs to formulate suitable high-level goals and objectives. This would provide some direction for the next state in DT while maintaining a space for creative and free thought in the design phase.

Linear models in which one stage follows the other are critiqued by Whittal [14] and Barry [25] in favor of a spiral model of continual reflective engagement with prior stages, acknowledging that over time, goals, objectives, and the strategy must change to meet changing circumstances. The process of change is never considered to be over—once objectives have been achieved and goals have been met, the context is likely to change, necessitating ongoing adaption. A slow, methodical, and reflective process is advocated rather than a 'big bang' rapid approach to change. Ongoing assessment as to whether an intervention is realizing its intended objectives is required [14,25]. Furthermore, cultural change is highlighted as Kotter's eighth stage [64] and is endorsed by Whittal [14] and Barry [25], not only within land administration institutions, but regarding societal changes

in relationship to land through LAS. The FFP approach is intended to be repetitive as illustrated in Figure 1, acknowledging that FFP initiatives are socially constructive—this is appropriate for the South African context.

4.4. The Design Process

The design phases of the various approaches are summarized in Table 7. The DSR-BS and FFP approaches are well-aligned with respect to design, with the FFP approach adding some domain-specific detail regarding the spatial, legal, and institutional frameworks. The FFP design phase is thus directly informed by an understanding of these frameworks from the context assessment stage.

Table 7. Extract of the design process aspects.

(Behavioral and) Design Science Research (DSR-BS)	Fit-For-Purpose (FFP)	Design Thinking (DT)
Design and development	Designing the country-specific FFP spatial/legal/institutional frameworks	Ideate—challenge assumptions and create ideas Prototype—solution

The FFP design criteria are well-expressed in the key FFP texts [13,21] and summarized in Section 2.2. There are an additional 10 special design elements for pro-poor land rights recordation [13]. The components of the FFP approach should be weighted up in view of the identified needs and essential elements for the South African context given in Sections 4.4.2 and 4.4.3.

DT offers a fresh approach to problem solving, bringing together human capacity to think of new ideas and possibilities, to be innovative and creative, to encourage the discipline and practice of asking and answering questions, to broaden our cognitive processes to understand, create meaning, synthesize, and make decisions, and making the product in practice. This is described as ‘pluralism of design thinking’.

As highlighted in Section 2.4, Hull’s framework of Success, Significance, and Sustainability [26] is aligned exactly to the judgment ‘moment’—one of the four key ‘moments’ of design thinking. Design thinking is human-centered and affirms human dignity. In reflecting on the importance of this aspect in South Africa’s land history in Section 2.4, DT appears to have a great deal to offer as an addition to the DSR-BS and FFP approaches. The FFP approach is stated to be a human-rights approach [21] and is also intended to be human-centered—the focus of DT is compatible and complementary in the design phase.

4.4.1. International Innovative Design

New approaches are promoted in the FFP strategy [21] although the principles appear prescriptive [13] and may limit design thinking. Innovative thinkers now reject the binaries of informality versus formality, communal versus individual, traditional, customary, and neo-customary versus modern Western forms of rights and tenure as these are identified as possibly unhelpful and limiting in understanding and hence in design. Innovative ideas such as spaghetti boundaries, point cadasters [21], rights and interests recordation (rather than registration—an example is a pro-poor land recordation tool [46]), and flexible land tenure systems show evidence of DT. Spaghetti boundaries have not gained much traction, probably failing on one or more of the four DT ‘moments’ (see Section 2.4). However, point cadasters are promoted as a first step in recording [21], while flexible land tenure systems are now legislated and piloted in Namibia along with the innovative concept of para-professionals. Multidirectional flexibility in landholding type is further evidence of the need for innovative thinking [66].

Conceptual models and domain models such as the new continuum of land rights [21,67] and the Social Tenure Domain Model [68] also reflect innovative thinking. The UN Habitat Global Land Tools Network (GLTN) has for many years supported development of new FFP tools. Its4land prioritizes innovative tool design, revealing some DT elements such as: transdisciplinary work, gender-sensitive analysis, technical innovation for community mapping, localized domain model development, comprehensive stakeholder participation,

design focused on end-user interests and actor preferences, as well as generating innovation capacity and knowledge sharing [41]. Technological innovations are often implemented in pilot test projects; some include social methods of data collection, which also enhance participation [21,69].

Fisher and Whittal [1] highlight future areas of innovation in property definition. These may include fuzzy areas, time-varying areas, multiple overlapping rights and interests, family titles, multidirectional flexibility and conceptions that can reflect mobility of rights holders. Legal freehold space units (or property objects), a three-dimensional cadaster with volumetric representations and registry procedures for titling are also discussed [1]—some of these concepts are in the process of development for dense first-world cities [70]. These concepts have application in the offshore environment as well as for underground and above ground space. The recordation of land-related debts and claims not based on contract, but related to land, such as claims against the State, licenses, permits, and quotas are additional innovative aspects of land rights and interests that are highlighted as possible additions in an inclusive land administration system to improve land tenure security [1]. The suitability of unique parcel identifiers is questioned while spatial location is argued as accessible and thus highly usable for all stakeholders. A mind-shift away from the parcel identifier as the basic unit of the cadaster would be required. The shifting nature of South African Constitutional property law, which now embraces contextual and non-hierarchical thinking, sets the platform for DT from the top down [1].

4.4.2. South Africa's Need for Innovative Design

Case studies and reports on South Africa's land reform process between 1997 and 2021 [1,6,8,9,26,42,44,48,54,56,61,67,71] include repeated calls and suggestions for innovative approaches ("a radical and rapid break from the past" [58]) such as:

- interrogating the legal and social system of landholding;
- design of new ways of recording rights and interests in land and land-based resources (particularly in customary communal and other complex settings, possibly family titles, locally nuanced, that consider new developments such as blockchain);
- design new types of proprietary land unit that may
 - challenge the parcel as the basic unit of the cadaster;
 - include boundaries that are fluid (shifting over the short or longer term), fuzzy (imprecisely defined in space), and adaptable (changing in nature);
 - represent the third spatial dimension;
 - define spatial rights that may be of variable nature, nested, overlapping, and time-varying;
 - relate to rights holders that are individual, family, and kinship (including multigenerational landholding: living, dead, and unborn), and other collectives based on voluntary affiliation (preferred over tribal affiliation);
- overcoming institutional and process issues of delivery and controlling and promoting effective land use;
- passing new laws through interdepartmental work, and modifying and integrating silos in legal and land administration systems;
- adopting a social systems approach to solutions; dealing with complexity; understanding humankind–land relationships through an African lens (or lenses);
- promoting a continuum of land rights in practice;
- promoting new technical (for example IS and surveying) tools;
- promoting gender equity; promoting stakeholder participation;
- dealing with land acquisition by the State for land reform purposes;
- designing dispute and conflict resolution mechanisms; and
- managing differential power relationships and corruption.

4.4.3. Essential Elements Identified for South Africa

The following essential elements are identified from sources (only some of a plethora of sources are referenced) relating to South Africa as key aspects of the land administration design and reform process to improve land tenure security; these essential elements are echoed in international sources:

- a rural development focus and tangible and sustained support [54,72];
- a capable State [8,9,42,54] that meets its obligations [42];
- integrated state institutions [54], integrated traditional administration/leadership, developmental state [9], functional parliament [9];
- good governance [14,56], curbing corruption [8,9], accessible land and land tenure [44], the cost of these [56];
- public participation, especially State-enabled and citizen-empowered [5,8,42,56] and with private sector partnerships [8];
- strong leadership by the State [5,56] and local project leaders [73]; managing risks [8];
- strong policy and objectives, political will and commitment, resourcing [8,9]; shared vision [8];
- communication, especially when innovative policies, laws, and approaches break from the past [5,8];
- reskilling land development and administration professionals [5]; and
- pre-empting, preventing, and resolving disputes [5].

In the South African context, the essential elements and need for innovative design overlap with aspects of the FFP approach. However, in order to retain the creativity of the ideate process of DT, the tools and methods favored in the FFP approach (see Section 2.2) should only be considered as options late in the design process and should not be prescriptive (noting that FFP is a guide and is not intended to prescribe).

4.5. The Capacity Development Process

Capacity development is highlighted in almost all literature dealing with land reform in the developing world. It is interesting to note that it is not an explicit stage in either DSR-BS or DT (Table 8). It is identified as a need at the innovative design stage and is an essential element for implementation.

Table 8. Extract of the capacity development process aspects.

(Behavioral and) Design Science Research (DSR-BS)	Fit-For-Purpose (FFP)	Design Thinking (DT)
Capacity development		

The need for capacity development is not restricted to technological interventions such as the IT/IS strategy although this is often highlighted [22]. People working within the land administration sector also need knowledge and skills development—this extends to capacity building at societal and organizational (governmental, private sector, community) levels [21]. Similarly, capacity development is highlighted as important for the would-be beneficiaries of land reform programs. Some evidence suggests that the concept of land rights is still poorly understood by customary land rights-holders [74]. They need training and resources to claim their land rights and support use of the new systems (technological, legislative, administrative) that have been developed. There is often a gulf between beneficiaries' capacity and the plans of developers [5]. This is a noted shortcoming in South Africa regarding Communal Property Associations [75] and traditional authorities [76]. Hence, while land rights might be recognized and protected in law, administrative incapacity means that people are unable to realize them in practice [77].

Capacity development is identified as a process, not an event, in the FFP literature [21]. Public-private partnerships may assist in the process, which can benefit from a well-formulated incremental strategy [13,22,61,78] with performance measurement [13,22,41].

Balas et al. [59] identify issues such as land law, gender, equity, land administration, technical spatial data collection, as well as monitoring and control as core areas of capacity development. Training should also be focused on the importance of a harmonized methodology [59]. In addition to the community-level support highlighted above, specific South African needs for capacity development are identified: provision of local services [44]; assistance with agricultural processes and infrastructure [44,57]; financial services to beneficiaries [44,57]; understanding of authority and responsibility to act; and empowerment [42]. Implementation of policies and laws has been restricted by insufficient institutional capacity. This limitation was noted in both the South African policy White [44] and Green [48] Papers (published in 1997 and 2011, respectively), yet since then there appear to have been no plans to address these constraints and it seems as if the situation is worsening [5,79]. At national, provincial, and local levels, the South African government appears to lack the capacity for proper land administration [75]. Cousins & Hall [80] and Cousins [5] noted that State capacity for implementation of land reform law and policy is inadequate. The High Level Panel [9] found that many policies and laws were sound, but there are serious concerns around their implementation and enforcement.

From the foregoing, and drawing on the South African experience, it is clear that capacity development is an important stage in the FFP process that would possibly be omitted if the DSR-BS or DT processes were used without the benefit of the FFP approach.

4.6. The Piloting/Demonstration and Evaluation Processes

The piloting/demonstration and evaluation stages of the approaches are highly similar and hence grouped together as shown in Table 9.

Table 9. Extract of the piloting/demonstration and evaluation aspects.

(Behavioral and) Design Science Research (DSR-BS)	Fit-For-Purpose (FFP)	Design Thinking (DT)
Demonstration		Test—the <i>judgement moment</i>
Evaluation	Economic benefits analysis	the <i>connection and development moment</i> the <i>integration and evaluation moment</i>

Only the DSR-BS approach has a separate demonstration and evaluation process, while in practice these processes are usually undertaken as pilot studies that are then evaluated. This stage is key to uncovering aspects in the design that are not FFP, or fit for *local* purpose, and modifying the design accordingly. In the FFP approach, the evaluation appears to be focused on economic benefits analysis, but in the FFP literature this is extended to include economic, environmental, and social benefits. In DT, the *judgement moment* assesses desirability—whether the intervention meets the needs (significant for the users), feasibility (suitable in the context), and viability (sustainable over time). The DT *connection and development moment* assesses usefulness (does it perform the task), useableness (is compatible with human users), and desirability (does it deliver emotional satisfaction), while the *integration and evaluation moment* assess the worthiness of the solution for implementation considering all stakeholders, especially users, society, and the state.

4.6.1. Pilot Studies

The literature reveals that pilot studies are used to test innovative technical solutions; these may include noting of boundary disputes for further processing [21,52,81]. The 2019 Advisory Panel Report advocates for the testing of new approaches, highlighting various challenging areas of land tenure delivery in South Africa [8].

4.6.2. Performance Measurement

Change management is incomplete without measuring the performance of the new design. The land administration reform literature is replete with examples of performance measurement—called quality assurance, auditing, meeting of goals, etc. Broadly

speaking, “unlocking social and economic benefits” is aligned with successful reform [13]; however, metrics for this are necessary. The World Bank’s “Doing Business” reports, the Corruption Perception Index of Transparency International, LGAF, and FGAF&GAT are suggested [13,22,52]. Whittal promotes the 7Es framework for performance measurement, including efficiency, effectiveness, elegance (acceptability), empowerment, emancipation, exception (inclusivity), and emotion [14]. The 7Es framework aligns well with the human-centered DT and could partner well in a process that accommodates DT.

Benchmarking is another possibility [49]. Balas et al. [59] suggest that key performance indicators should be designed for each stage. A well-designed monitoring and evaluation framework is necessary to provide feedback for improvements [14,22]. This promotes a culture of self-critique and self-motivated improvement in land administration organizations [22].

Evaluation and reporting on land reform outcomes include the appropriateness of technology, number of parcels registered, and the cost to do so. Quality assurance is particularly important with data collection using volunteered geographic information (VGI) [60]. There is a caution to not only use numeric indicators; rather, transformation (emancipation) indicators should be used such as those related to poverty, unemployment, and inequality, particularly related to land access [26,44]. Indicators of efficiency, effectiveness, acceptability, security, accessibility, timeliness, affordability, attainability, sustainability, upgradeability, flexibility, inclusiveness, transparency, clarity (especially in governance roles), simplicity, correctness/reliability [14,21], user-friendliness [49,59,81], and resilience (to disasters) are suggested.

Specific issues for South Africa are monitoring of land reform over time [44], monitoring the effectiveness of governance (especially the lack of Parliamentary accountability [9,10]), and the lack of traditional authority accountability [9]. There is a lack of institutions to execute the evaluation process [8], while there is also a need to develop and use ‘outcomes indicators’ that are appropriate to the local context. Hull and Whittal highlight the responsibility of the State to deliver on fundamental Economic, Social, and Cultural Rights [42]. Evaluation of the process of reform and the medium and long-term impacts is important in any process but is especially relevant in South Africa considering the need for dignity and restorative justice [14]. Processes of active participation, listening to suppressed viewpoints [26], consideration of emotion [14], and empowerment/capacity development (a FFP stage), should be evaluated and reported. It is suggested that the evaluation process should be undertaken independent of South African State institutions to avoid bias [26] and even as a political necessity [14].

4.6.3. Commentary on the Process

The demonstration and evaluation included in the DSR-BS and FFP approaches are clearly imperative to understand whether the proposals meet the needs. Although these can include a human-centered approach, this is specified in the DT approach. It highlights sensitivity in line with the needs of all stakeholders and includes assessing desirability and emotional aspects. As discussed above, these are important in the post-colonial and post-apartheid context in South Africa.

4.7. The Communication Process

Change management theory promotes communication in line with meaningful public participation at all stages of an intervention. The placement of communication as an end stage belies the importance of this activity throughout a change process. Table 10 shows the communication aspects in the three processes.

Table 10. Extract of the communication process aspects.

(Behavioral and) Design Science Research (DSR-BS)	Fit-For-Purpose (FFP)	Design Thinking (DT)
Communication	Country-specific instruction manuals	

DSR-BS focuses strongly on communicating findings, which is key to any research endeavor. FFP and DT are processes designed for project implementation domains rather than research domains and so communication of findings is not explicitly advanced. The FFP approach focuses on preparing manuals, outreach materials, and capacity building materials [59]. The latter may include gender equity, land law, conflict resolution, and other aspects of training required in order to ensure consistent implementation [22]. VGI data collection methods require special attention to communication [60].

Participants in communications include government officials, politicians and policymakers, and beneficiaries [59]. Where open-source tools are developed [41], there are accepted methods of communicating these beyond the project stakeholders. In land restitution in South Africa, communication between claimants and the Land Claims Commission has been a concern [57].

Communication is an important stage of the process of change and in this respect the DT process is deficient. The DSR-BS and FFP processes adequately cover this stage with complimentary emphases.

5. Conclusions

The analysis of the sample of literature against the thematic framework of the DSR-BS, FFP, and DT approaches reveals that the land reform program in South Africa could benefit substantially by mainstreaming elements of both the DSR-BS and the DT approaches within the FFP approach. This finding may be generalized (naturalistic generalization) to implementation of FFP LA in other similar contexts. We thus conclude below on the implications of this work for theory and for the South African land question.

The DSR-BS approach is suited to provide rich descriptions of and insights into the context and in identifying problems and needs. It also offers strength in the communication of a critical reflective review of change processes. The use of methods from the behavioral sciences is reflected in land administration reform literature, but such methods are not prominent in the FFP guidelines. The DT process is a human-centered approach that stresses empathy when assessing context, problems, and needs. Although the FFP is intended to focus on human needs and incorporate creative design, human-centered creative design thinking is not mainstreamed in the process and can easily be ignored, leading to mechanistic implementations.

The core strengths of design science research and design thinking are shown to be complementary to the FFP approach. Foregrounding these in FFP LA implementations will provide a focal point at the start of the process. Viewing the problem context (the first stage in assessing the purpose) through a local socio-cultural lens different from that of the implementors is the essence of empathy, which is fundamental to the DT approach (Sections 4.1 and 4.2). At the design phase, the creativity of the ideate process of DT should precede the consideration of the tools and methods of implementation favored in the FFP approach. The DT field of research and practice is relatively new—case studies explicitly implementing DT in land administration reform will most likely follow.

With the land question in South Africa still center stage after 27 years of democracy, it is very important to be boldly creative—approaches with different emphases may help unlock solutions. In dealing with the current complexities in South African land administration, design thinking may facilitate a deep understanding, challenge assumptions, and set the scene for unconstrained creative thinking. Human cognitive abilities such as empathy, questioning, judgement, creativity, and creating meaning have the potential to promote the design of interventions that are responsive to personal and social aspects in addition to

material/technical/procedural aspects (institutional, legal, and spatial frameworks) of LAS, as identified in Section 4.4.2. In seeking to restore dignity and deliver restorative justice in the South African land sector (considering its particular land history), and to deliver sustainability, success, and significance for all stakeholders, DT processes may help to dismantle barriers in thinking and lead to the unity so desperately needed. If an emphasis on a deep understanding and design thinking may help South Africa achieve its land reform aims, there is no doubt that the process could benefit other contexts with complex and intractable land administration challenges such as are found in other sub-Saharan African and post-colonial countries.

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Appendix A

Table A1. Sources Coded in NVivo.

Source (Reference-Date-Ordered)	Number of Codes Used	Coded References
Republic of South Africa White paper on South African land policy; March 1991.; Government Printer, Pretoria, 1997; ISBN 0514308869	42	572
Hall, R.; Mbilinyi, M.; Rusimbi, M.; Omeje, K.; Plaut, M.; Gonzales, D. Briefings. <i>Rev. Afr. Polit. Econ.</i> 2005, 32, 621–651, doi:10.1080/03056240500467138	42	165
Cousins, B.; Cousins, T.; Hornby, D.; Kingwill, R.; Royston, L.; Smit, W. Will formalising property rights reduce poverty in South Africa's 'second economy'? Questioning the Mythologies of Hernando de Soto. <i>PLAAS Policy Br No. 18</i> . Programme for Land and Agrarian Studies (PLAAS), University of the Western Cape. 2005, pp. 1–6.	16	51
Whittal, J. Fiscal Cadastral Systems Reform A Case Study of the General Valuation Project 2000 in the City of Cape Town, Ph.D. Thesis, University of Calgary, Canada, 2008	13	17
Republic of South Africa <i>Green Paper on Land Reform</i> ; Government Printer, Pretoria, 2011	25	103
McLaren, R. Crowdsourcing support of land administration—A partnership approach. International Federation of Surveyors, Article of the month: December 2011.	12	41
Hall, R. <i>Land Reform Policy Discussion Document</i> , South African History Online, 2012.	35	436
Association for Rural Advancement (AFRA), Traditional Courts Bill uses apartheid laws to subjugate communities. Cape Times, 21 September 2012, 11	9	9
National Planning Commission National Development Plan 2030 Our Future-make it work; National Planning Commission: The Presidency; Pretoria, South Africa, 2012; ISBN 9780621411805	24	95
Nkwinti, G. Land tenure summit key summit thematic areas, National Land Tenure Summit, Presentation in Johannesburg, 4–6 September 2014.	16	46
Archary, L. Strengthening relative rights of people working the land, National Land Tenure Summit, Presentation in Johannesburg, 4–6 September 2014.	17	40
Whittal, J. A New Conceptual Model for the Continuum of Land Rights. <i>South African J. Geomatics</i> 2014, 3, 13–32	17	43
Enemark, S.; Bell, K.C.; Lemmen, C.; McLaren, R. <i>Fit-For-Purpose Land Administration</i> ; FIG & World Bank: Denmark, 2014; ISBN 9788792853103.	34	401
COGTA <i>Traditional and Khoi-San Leadership Bill</i> ; Minister of Cooperative Governance and Traditional Affairs: Cape Town, 2015	9	19
Enemark, S.; McLaren, R.; Lemmen, C. <i>Fit-For-Purpose Land Administration Guiding Principles</i> ; United Nations Habitat Global Land Tools Network: Nairobi, Kenya, 2015	27	349

Table A1. Cont.

Source (Reference-Date-Ordered)	Number of Codes Used	Coded References
Bennett, R.M.; Alemie, B.K. Fit-for-purpose land administration: Lessons from urban and rural Ethiopia. <i>Surv. Rev.</i> 2016, 48, 11–20	41	219
Hull, S.; Whittall, J. Towards a framework for assessing the impact of cadastral development on land rights-holders. <i>FIG Work. Week 2016 Recover. from Disaster</i> , Christchurch, New Zealand, 2–6 May 2016; pp. 1–21.	17	102
Zein, T. Fit-For-Purpose Land Administration: an implementation model for cadastre and land administration systems. <i>L. Poverty Conf. 2016 Scaling up Responsible L. Gov.</i> 2016	14	35
Cousins, B. Land reform in South Africa is sinking. Can it be saved? A provocation commissioned by the Nelson Mandela Foundation DST/NRF Research Chair in Poverty, Land and Agrarian Studies, University of the Western Cape	16	76
Hornby, D.; Royston, L.; Kingwill, R.; Cousins, B. Introduction: Tenure practices, concepts and theories in South Africa. In <i>Untitled: Securing Land Tenure in Urban and Rural South Africa</i> ; Hornby, D., Kingwill, R., Royston, L., Cousins, B., Eds.; University of KwaZulu-Natal Press: Pietermaritzburg, 2017; pp. 1–43	16	96
Asiama, K.; Bennett, R.; Zevenbergen, J. Participatory land administration on customary lands: A practical VGI experiment in Nanton, Ghana. <i>ISPRS Int. J. Geo-Information</i> 2017, 6	22	75
Balas, M.; Murta, J.; Matlava, L.; Marques, M.R.; Joaquim, S.P.; Carrilho, J.; Lemmen, C. A Fit-For-Purpose Land Cadastre in Mozambique. <i>2017 World Bank Conf. L. Poverty-Washingt. DC, March 20–24, 2017</i> , 26	45	297
Enemark, S.; McLaren, R. Fit-for-Purpose Land Administration: Developing Country Specific Strategies for Implementation. <i>2017 World Bank Conf. L. Poverty</i> 2017, 1–18	43	137
Report of the High Level Panel on the Assessment of Key Legislation and the Acceleration of Fundamental Change	43	213
Koeva, M.; Bennett, R.; Gerke, M.; Crommelinck, S.; Stöcker, C.; Cromptvoets, J.; Ho, S.; Schwering, A.; Chipofya, M.; Schultz, C.; et al. Towards innovative geospatial tools for fit-for-purpose land rights mapping. <i>Int. Arch. Photogramm. Remote Sens. Spat. Inf. Sci.-ISPRS Geospatial Week.</i> 2017, 42, 37–43, doi:10.5194/isprs-archives-XLII-2-W7-37-2017	50	289
Barry, M. Fit-for-purpose land administration—Administration that suits local circumstances or management bumper sticker? <i>Surv. Rev.</i> 2018, 50, 383–385, doi:10.1080/00396265.2018.1501130	28	73
Balas, M.; Joaquim, S.; Carvalho, J.A.; Murta, J.; Carrilho, J. SiGIT Land Information System and the Challenges Imposed by the Fit For Purpose Approach to Land Administration, <i>Proc. FIG Congress</i> , Istanbul, Turkey, May 6–11, 2018	16	34
Moreri, K.; Fairbairn, D.; James, P. Issues in developing a fit for purpose system for incorporating VGI in land administration in Botswana. <i>Land Use Policy</i> 2018, 77, 402–411, doi:10.1016/j.landusepol.2018.05.063	42	182
van Asperen, P.; Hendriks, B.; Zevenbergen, J. Scaling up Pro-poor Land Recordation: Findings and Consequences of three peri-urban cases from Sub-Saharan Africa. <i>African J. L. Policy Geospatial Sci.</i> 2019, 2, 13–39	11	34
Hull, S. A Framework for Guiding Cadastral Systems Development in Customary Land Rights Contexts, Ph.D. Thesis, University of Cape Town, Cape Town, South Africa, 2019—Chapter 9	26	339
Mahlali, V. <i>Final Report of the Presidential Advisory Panel on Land Reform and Agriculture</i> ; Presidential Advisory Panel on Land Reform and Agriculture: Pretoria, South Africa, 2019	46	534
Fisher, R.; Whittall, J. <i>Cadastre: Principles and Practice</i> ; Roger Fisher, Jennifer Whittall, and the South African Geomatics Institute: Cape Town, 2020; ISBN 978-0-620-82878-9	40	539
Flores, C.C.; Tan, E.; Buntinx, I.; Cromptvoets, J.; Stöcker, C.; Zevenbergen, J. Governance assessment of the UAVs implementation in Rwanda under the fit-for-purpose land administration approach. <i>Land Use Policy</i> 2020, 99, 104725, doi:10.1016/j.landusepol.2020.104725	36	127
Abubakari, Z.; Richter, C.; Zevenbergen, J. Evaluating some major assumptions in land registration: Insights from Ghana's context of land tenure and registration. <i>Land</i> 2020, 9, doi:10.3390/LAND9090281	24	99
Hull, S.A.; Whittall, J. Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development. In <i>Proc. of the FIG Working Week 2020: Smart Surveyors for land and water management</i> ; Amsterdam, The Netherlands, 2020; pp. 10–14	2	2
Williams-Wynn, C.; Applying the Fit-For-Purpose Land Administration Concept to South Africa: Will it Work? In <i>Proc. of the FIG Working Week 2020: Smart Surveyors for land and water management</i> ; Amsterdam, The Netherlands, 2020; pp. 1–15	17	39
Hull, S.; Whittall, J. Human rights and land in Africa: highlighting the need for democratic land governance. In <i>Human Rights Matters</i> ; Corrigan, T., Ed.; IntechOpen, 2021 ISBN 978-1-83968-874-4	43	155

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