Achieving Success and Sustainability Through Significance: a Cross-case Analysis of Cadastral Systems Development in Europe and Africa

Simon Antony HULL and Jennifer WHITTAL, South Africa

SUMMARY

A framework for guiding cadastral systems development towards success is used to assess the process of development in four different cases: Germany, the Netherlands, Mozambique, and South Africa. It is cautioned that development initiatives that do not take land rights-holders' context-specific needs into consideration may lack significance for them. This leads to a lack of engagement with the new development, compromising its sustainability and contributing to its overall failure. The developed framework serves to avoid this problem by highlighting certain elements that should be addressed to improve the significance of the process and outcomes, leading to sustainability and hence enduring success.

In our research, cadastral systems development is understood to transcend conventional descriptions of the cadastre to incorporate customary land administration systems that lack precision and are not time-constrained. It is shown that the concept of a cadastral system linking people, land and rights can apply equally in registered and off-register scenarios.

Rich, qualitative data is gathered via one-on-one interviews and through secondary, published sources. Using a progressive case study approach, the data is assessed against the conceptual framework regarding how well each element is addressed in the particular cases. New elements are allowed to emerge from the data, which highlights the sensitivity of the approach to context-specific nuances in each case.

Ten recommendations are presented for cadastral systems development particularly in (but not limited to) customary land rights contexts. The first relates to alignment between the theory underlying development and the understanding of the land rights-holders. The second is for greater awareness of climate change and disaster management to feature in cadastral systems development. The third is for cadastral agencies to operate (semi)independently of the state to safeguard land issues against corruptive political influences. The fourth is for land reform to be managed by inter-departmental organisations within government (if the third recommendation is not heeded), rather than for different departments to be handling different components. The fifth is for the cadastre (land parcel boundaries and extents) and land record (land registries and other institutions to record land rights and holders) to be integrated under one organisation, or to be very well inter-linked, to avoid duplication of information. The sixth is for capacity enhancement to be built into development plans. The seventh is for the safety of participants, non-participants, land rights-holders, affected communities, and all other stakeholders to be given a prominent position in development planning. The eighth is that all cadastral systems development processes must include comprehensive, transparent, well-defined reviews

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

throughout the process. The ninth is for a single, clear policy to guide land reform. The final recommendation is to use the conceptual framework to guide cadastral systems development to promote success and sustainability by improving significance.

1   INTRODUCTION

In order to meet modern challenges, cadastres continually need to change (Bennett et al., 2010). Well-functioning cadastres are considered by some as essential for securing property rights, economic gain, and environmental management, yet according to Jones & Land (2012) there are only about 40 countries in the world whose cadastral systems may be described as well-functioning. Cadastral agencies need to continuously work at improving the quality and security of their data as well as their interaction with citizens and other users of cadastral data (*Ibid.*). If countries want to reap the benefits of a good cadastral system, they will need to embark on a project to either revolutionise the existing system or implement, from scratch, a modern cadastral system.

But such modernisation efforts come at a cost: the migration from old cadastral systems to modern Land Information Systems (LIS) is challenging (Furuholt, Wahid & Sæbø, 2015). There may be unintended consequences to these projects. It is also not clear whether these modernisation initiatives do benefit citizens and communities (through for example improved tenure security and land governance) and if so, how. Though these projects aim to improve the LIS, the needs of citizens and communities and the impact of modernisation may not be fully considered. Hence, *success* and *sustainability* may be compromised through a lack of *significance* of the change effort (Hull & Whittal, 2016, 2019).

1.1   Aim and outline

This paper is a brief summary of the first author's PhD thesis (Hull, 2019). The intent of this paper is to present a cross-case comparison of cadastral systems development based on the framework previously developed by Hull & Whittal (2019) – see Table 4 in the Appendix – and extended in the thesis – see Table 5 in the Appendix. The purpose of such comparison is to highlight strengths and weaknesses in the development process by which targeted interventions can be carried out and improvements made.

To ensure that significant terms have shared meaning with the reader, several definitions are presented in the following section. The methodology is presented in part 2, followed by a description of the data collection, analysis and results. Several recommendations conclude the paper.

1.2   Definitions of terms

1.2.1   Success, Sustainability, and Significance

A *successful* intervention results in the closure of the gap between the initial (undesirable) state and the (desired) end state. To ensure success, suitable goals should be set, and success is measured through the achievement of these goals. Success should not only be measured once, however. Cadastral systems development is an on-going process, hence *sustainability* (or on-going success) is vitally important (Williamson et al., 2010). Sustainability should thus be designed into interventions. Where goals are not aligned with land rights-holders' needs, interventions aimed at improvement may fail through a lack of *significance*. Land rights-holders

are unlikely to engage with a cadastral or land administration system that is not addressing their context-specific needs. For example, Barry and Roux (2013) report how beneficiaries of land registration projects fail to remain engaged with the land registration system, resulting in a proliferation of off-register land transactions. Hence, for on-going *success*, the inter-related goals of *sustainability* and *significance* should be integrated into cadastral systems development planning – see Figure 1.
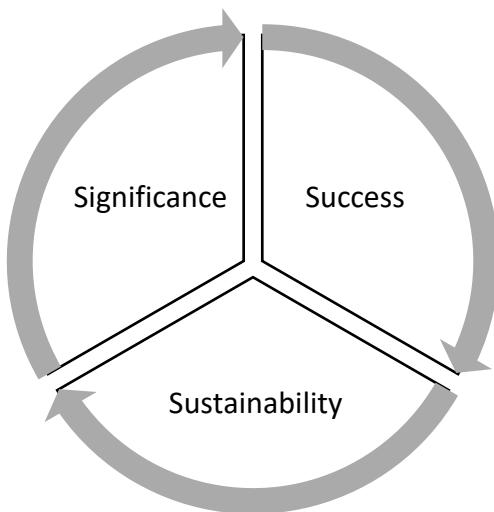

Figure 1 The three inter-related goals for lasting cadastral systems development

1.2.2   The '3S' framework

To facilitate successful cadastral systems development, a framework for guiding such was previously developed from a selection of published literature following a research synthesis methodology (Hull & Whittal, 2016, 2019). This *conceptual* framework is presented in Table 4 in the Appendix. It has subsequently been amended based on the outcomes of several case studies reported on here – see Table 5 in the Appendix. The framework comprises of five evaluation areas broken down into associated aspects and elements which may be measured using appropriately defined indicators. The focus for the amended framework is on customary land rights contexts in Africa, hence it contains many of the nuances typical to such contexts. It was developed with reference to two European and two African cases of cadastral systems development and draws from their strengths while highlighting some potential weaknesses. Embedded within the framework are the three inter-related goals of *success*, *sustainability*, and *significance*, hence the framework may be referred to as the '3S' framework.

1.2.3   Cadastral systems development – a customary land rights perspective

Although *cadastres* are usually associated with surveyed land parcels and registered land rights (FIG, 1995; Silva & Stubkjær, 2002), the land parcel and associated rights, restrictions and responsibilities (RRRs) could refer equally to off-register and customary land interests and tenure arrangements. It is important to acknowledge that the definition of the cadastre as parcel-based is changing to allow for the inclusion of other means of spatial identification (see Wallace, 2010). A 'continuum of accuracy' has been proposed such that spatial units may be

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

described via text, points, lines, polygons, or polyhedrons as contextually appropriate (Lemmen, van Oosterom & van der Molen, 2013). Point-based cadastres, wherein the plot may be identified via a single point location rather than as a geometric figure (Hackman-Antwi et al., 2013), allow for the accommodation of different expressions of land, including fluid (non-static) boundaries. De Vries, Bennett, and Zevenbergen (2015) discuss the emergence of *neo-cadastres* that rely on crowd-sourced geospatial information to record cadastral extents of off-register land rights (such as customary land rights). Thus, the modern cadastre may accommodate a range of levels of (im)precision and (in)accuracy in the description and recordal of plots. This may address the tension between the conventional, Western-based notion of the cadastre as highly precise and rigid, versus non-Western, customary conceptions of land and property rights that accommodate imprecision and fluid boundaries.

Adams, Sibanda & Turner (1999: 2) succinctly define *land tenure* as "the terms and conditions on which land is held, used and transacted". The Food and Agriculture Organisation of the United Nations (FAO, 2002: 7) define land tenure as "the relationship, whether legally or customarily defined, among people, as individuals or groups, with respect to land". The legal approach recognises the *de jure* (formal, statutory) identification of land rights. Enemark (2005) takes the legal approach, defining land tenure as the allocation and security of land rights through legal cadastral surveying, land transfers, and the management of boundary disputes. The customary approach focuses more on the *de facto* (informal, extra-legal) situation, constituting the communally accepted rules defining rights of access to land (FAO, 2002). These rules reflect the balance of power among stakeholders. Changes to these rules may result in a fundamental shift in existing power structures.
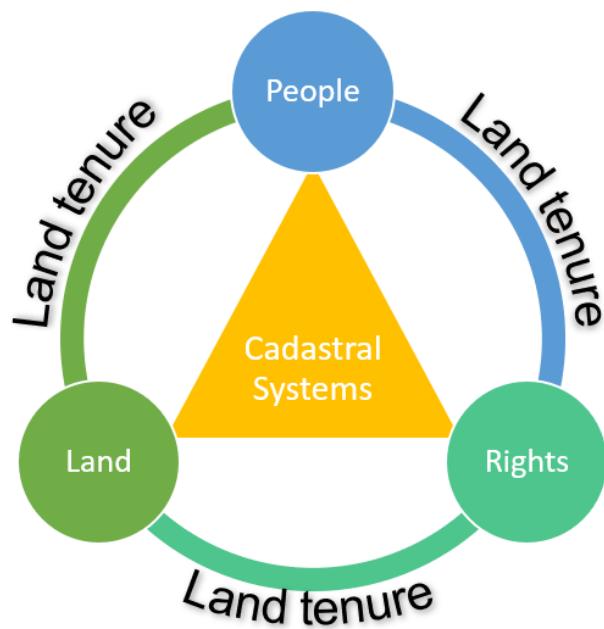

Figure 2 Cadastral systems and land tenure: linking people to land and rights

A *cadastral system* combines the cadastre, with its spatial focus, and the land record, with its legal focus (Silva & Stubkjær, 2002). Hence, cadastral systems link people to land (spatial component) and rights (legal component) as well as other (off-register) land-based interests, through the accepted rules defining the relationship (land tenure) – see Figure 2. It is conceivable that unregistered, customary land rights may also be recorded in a cadastral system of sorts, as illustrated in Table 1. Such off-register cadastral systems contain all of the elements of registered, formalised cadastral systems using methods and instruments appropriate to their given contexts. Hence a cadastral system should not be understood to refer exclusively to formalised systems of property rights, but may refer to non-exclusive, customary property rights too, as per both official and living African customary law. Extending the definition of cadastral systems to a conception inclusive of off-register rights and interests addresses the tension between formal land law and lived experience with respect to land in a legally pluralist society. A caution is that the new conception of an inclusive cadastral system should treat the off-register but legal cadastre with the same value as the formal cadastre in re-engineering an inclusive system.

Table 1 Cadastral systems of registered freehold or unregistered customary land tenure

Cadastral system	Registered freehold	Unregistered, customary
People	Juristic persons (e.g. individuals, companies, trusts)	Recognised members of a customary community governed according to African customary law.
Land	Parcels precisely defined by land surveyors following legislated standards of accuracy (e.g. the South African Land Survey Act 8 of 1997 and associated regulations).	Plots allocated according to custom (Alcock & Hornby, 2004) and demarcated following customary norms (e.g. building a cairn at the corners of the demarcated plot). Plots and boundaries may be flexible (variable over time).
Rights	Exclusive use, ownership, occupation, access, exclusion (Whittal, 2014) as stipulated in the registered title or deed and as restricted by any relevant legislation.	Access, occupation, use, exclusion, rights and interests defined according to (official and/or living) African customary law (Whittal, 2014) and recorded in the collective memories of the community or by some other means.

Cadastral systems development may be understood to refer to any intervention aimed at improving an existing cadastral system, whether legally or customarily defined, i.e. improving the links between people, land and rights. Developments of the cadastral system may change the nature of existing land rights, but this is not necessarily the case. Developments may relate to how land is demarcated, how rights are recorded, and the administration of land rights. *Land tenure reform*, a planned change to the terms and conditions of land tenure (Adams, Sibanda & Turner, 1999) that serves to recognise locally-held land rights and to transfer power over these rights to the land rights-holders (Alden Wily, 2000), may be considered a type of cadastral systems development. These improvements may be anything from small changes – "fine-

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

tuning" (Bruce, 1993: 43) – to complete redesigns or brand-new developments. It is not assumed that cadastral systems development replaces living customary land law with official customary land law, fluid boundaries with fixed boundaries, or customary landholding with registered freehold. Cadastral systems development involves taking what is already in existence (not promoting radical and destructive transformation) and changing it (sometimes innovatively, sometimes to turn over the Western traditions) to meet current needs.

2 METHODOLOGY

The methodology followed is that of the progressive case study. This is a cross between the deductive case study approach of Yin (2009) and the inductive grounded theory approach, or GTA (Strauss & Corbin, 1990). Progressive case study begins with literature review, as advocated by Yin (2009) for the case study approach and as discouraged in a GTA (Glaser, 1978; Glaser & Holton, 2007). The literature should be used to sensitise the reviewer to the pertinent concepts of the study (Steenhuis & De Bruijn, 2006). In this research, the literature review is used to develop the conceptual framework in Hull & Whittal (2019) – see Table 4 in the Appendix – drawing on existing land administration frameworks, human rights-based approaches, good governance and pro-poor concepts (Hull & Whittal, 2016). This is subsequently "validated and adjusted through empirical case study" (Steenhuis & De Bruijn, 2006: 7). Each case study builds on the results of the previous case study as data collection and analysis follow each other cyclically. Hence subsequent cases allow for the emergence of new concepts as well as the replication of previous findings.

The intent is for the researcher to adhere, as far as possible, to the three pillars of the GTA: emergence, constant comparison, and theoretical sampling (Holton, 2017). *Emergence* requires the researcher to have an open mind when approaching the data. This approach begins with observation of a phenomenon of interest, usually qualitatively described. The features of the phenomenon thus described are broken down, conceptualized, and re-constituted through the processes of 'coding' and 'categorizing'. Coding is the process of identifying important issues that emerge from the data and describing these issues with short phrases (Allan, 2003). Similar codes are then grouped together to form concepts, and similar concepts are grouped into categories (*Ibid.*). *Constant comparison* requires the researcher to keep comparing the emerging codes, concepts and categories to those that were previously collected. Codes, concepts and categories thus acquired may be compared to the descriptors, elements, and aspects in the conceptual framework respectively. It is here that the methodology deviates from a pure GTA into what Holton (2017) calls 'grounded theorising'. Constant comparison with the conceptual framework allows the researcher to identify gaps in the data, leading to *theoretical sampling* as data is specifically collected to fill in the gaps (Glaser & Holton, 2007).

Once this iterative process has been repeated several times, the researcher will identify which codes feature prominently in the case, and which do not. This is referred to as 'groundedness'. Other codes, not included in the conceptual framework, may emerge from the data as relevant for the case under study. Hence, strengths and weaknesses of each case are identified related to the ***significance*** of the change process for land rights-holders, indicating potential for ***success*** and ***sustainability*** of the project.

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

3   DATA COLLECTION

3.1   Case selection

Four cases have been studied – from Europe: the Netherlands and Germany, and from southern Africa: Mozambique and South Africa. The choice of cases from 'developed' (European) and 'developing' (southern African) contexts is one of theoretical replication (Yin, 2009) – the cases from these different contexts should yield contrasting results due to the differences between their generalised contexts.

The European cases are included both for their exemplary quality and as influencers of cadastral systems development globally, especially in Africa. For example, the South African cadastre has British and Roman-Dutch legal heritage, while that of Mozambique draws on the influence of Portugal. These imposed colonial legal systems overrode existing African customary law that, in South Africa, is now recognised and assuming a more prominent place in mainstream law and practice. The European cases are also held up as examples of 'good practice' because they represent the most developed cadastral systems (Rajabifard et al., 2007). Through sharing their knowledge, land administration and cadastral systems development may be improved in other nations. For example, *Kadaster* International has influenced cadastral development in Rwanda and Lesotho (Kadaster, 2012).

The *conceptual* framework is tested against these examples of 'good practice' to assess whether the components of the framework are present in these cases, and whether anything is missing from the framework. Specifically, Germany was chosen because this nation has recently embarked on a cadastral improvement project: the migration from the outdated ALB / ALK systems to the future-oriented ALKIS® and the AAA® model (Gundelsweiler, Bartoschek & De Sá, 2007). The Netherlands case is chosen because they have also recently embarked on cadastral renewal projects (Vos, 2010; Louwsma, van Beek & Hoeve, 2014) and export their expertise to developing countries around the world (de Zeeuw & Lemmen, 2015). While it is acknowledged that these cases will not contain customary context-specific elements, this first round of analysis is undertaken to check whether the framework contains the basic elements of 'good practice' cases. It is also acknowledged that not all elements identified in these European cases will be relevant in other contexts such as those of African customary land. Application of any framework in a new context demands a process of naturalistic generalisation – taking what is valid and useful in a new context and rejecting/ignoring what is not.

The southern African cases are chosen, firstly, because this is the researchers' context and there are pressing land access and tenure security needs. Secondly, LAS in the southern African region are likely to be requiring, or currently implementing, LAS development projects, hence testing and developing fit-for-purpose tools for evaluation of these projects is timely. Thirdly, human-rights issues are important in all contexts, but their impact is greater in a developing context due to the higher proportion of disadvantaged and marginalised people than are serviced in developed contexts. Mozambique is chosen as a case study area because, like Germany, it has recently undergone a cadastral systems development project (Tanner, 2002). The rationale for the South African case is the widely publicised failure of its land reform programme (see e.g. Cousins, 2016); adherence to the framework may assist in turning this failure into success. It is expected, in this second round of analysis, that these cases will reveal more nuanced,

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

context-specific elements and descriptors that are more relevant for customary contexts than the European cases.

Within these generalised contexts, cases are chosen for their literal replication (Yin, 2009), i.e. Germany and the Netherlands should yield similar results, because they are cases within similar contexts. Likewise, Mozambique and South Africa should yield similar results because both countries are members of the Southern African Development Community (SADC) and have been undergoing significant changes at the national level since the early 1990s. Multiple cases are used so that the resulting framework is grounded on a diversity of cases for greater credibility and generalisation to (substantive) theory (Barry & Roux, 2012). It is acknowledged that no single study can investigate an exhaustive set of cases – the addition of other cases in new studies will be an ongoing process by multiple researchers. The analysis and generalization processes will strengthen the resulting substantive theory over time.

3.2 Data sources

The types of sampling employed here are informant sampling and theoretical sampling. Informant sampling involves targeting knowledgeable sources for information: the researcher seeks out the people and documents that are best able to provide the answers to the research questions. This involves an element of snowball sampling as well, where the researcher is guided by the interviewees as to who to interview next, because the interviewees know who can better provide the answers to the questions.

Primary data collection is mostly by face-to-face interview using semi-structured questionnaires and a combination of open-ended and specific questions. Some interviews were conducted telephonically, and others over email (especially follow-up interviews). Interviewees were encouraged to speak freely of their experiences of cadastral systems development and land tenure reform to allow for the gathering of rich, in-depth data on the subject. Interviews typically lasted up to two hours. In Germany, there were three such interviews; in the Netherlands there were 10; in South Africa there were 10 (including a focus group of customary land rights-holders). The Mozambique case was a desktop study, hence secondary data comprised the only source of information

Secondary data collection concerned published materials related to land tenure reform and cadastral systems development pertinent to each case. Publications include magazine and newspaper articles, conference proceedings, books, reports, and peer-reviewed journal articles. Operational manuals and organisational newsletters also served as sources of information. By combining such secondary data with the diverse opinions collected from the interviewees, the data is triangulated to improve trustworthiness of the results.

4   ANALYSIS

Through consideration of the rich, qualitative evidence (see Hull, 2019), each of the cases is assessed against the conceptual framework to determine whether, and how well, each element is addressed in the case. To this end, the first author made use of computer assisted qualitative data analysis software (CAQDAS) called Atlas.ti. CAQDAS are useful for making sense of dense, detailed qualitative data in a variety of different formats: textual documents, audio-visual recordings, and pictures (Bringer, Johnston & Brackenridge, 2006; Friese, 2014; Woods et al.,

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

2016). Coding and categorising of the interview transcripts and documentary evidence have been done using this software, which allows for transparency of data analysis, improves the credibility of the findings, and makes it possible for others to replicate the research.

Figure 3 is a screenshot of Atlas.ti showing, on the left, the list of sources used in the Mozambique case. One of the sources is selected and displayed in the centre. Text relating to dispute resolution mechanisms is selected in the source (towards the bottom of the figure, shaded in blue). On the right are the codes that have been assigned to sections of text on the shown page. Each element is thus assessed using context-specific descriptors for that element.
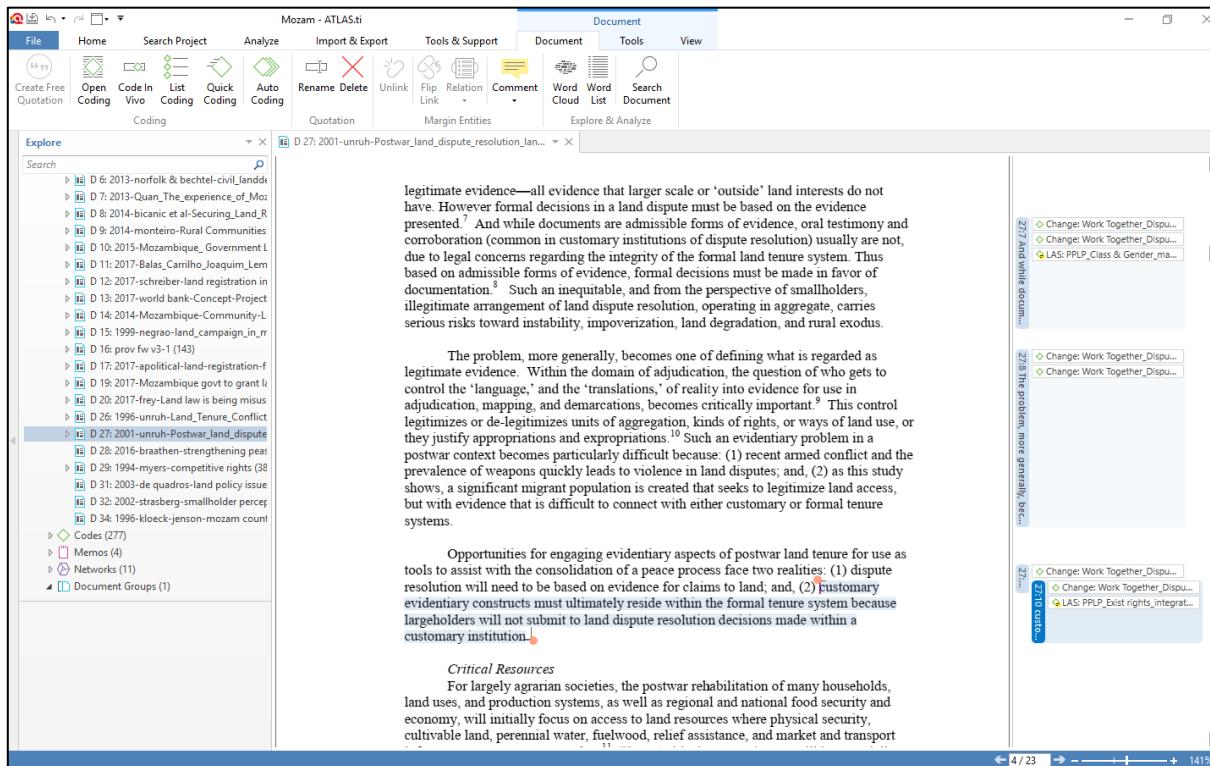
Figure 3 Screenshot of Atlas.ti project

The descriptors are assigned values of 5, 3, or 1 for satisfactorily addressed, partially addressed, and not addressed, respectively. Taking the mean of the values of the descriptors for each element, elements are then positioned on a 5-point Likert scale – see Table 2. Emergent elements are added in *italics*.

Table 2 Likert scale for assessing elements in case studies

5	4	3	2	1
Satisfactorily addressed	Adequately addressed	Partially addressed	Inadequately addressed	Not addressed

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

It is acknowledged that taking a straight mean of the descriptor values assumes that the descriptors are equally weighted, and that this may not be the case. Some descriptors may well be more influential than others on their corresponding elements and aspects. However, it is cautioned that applying a quantitative value to a qualitative descriptor may be inappropriate. Assessing the relative importance of different descriptors lends itself to bias and interpretation. Hence, the intent here is not for statistical evaluation of descriptors and elements, but rather to allow for a general sense of how well the conceptual framework is able to reveal strengths and weaknesses in each of the different cases. In this way cases may be compared with each other at the element level, taking the context-specific descriptors into account.

5 RESULTS

5.1 Overview

Referring to Table 5 (in the Appendix), each of the four cases is compared against the conceptual framework. Regarding the Underlying Theory evaluation area, the element *Attitude towards human and land rights* is not addressed in either of the European cases. This is because awareness and protection of human rights was not a consideration for development in these cases. It is partially addressed in the southern African cases due to the influence of the rights-based approach adopted by both countries' constitutions.
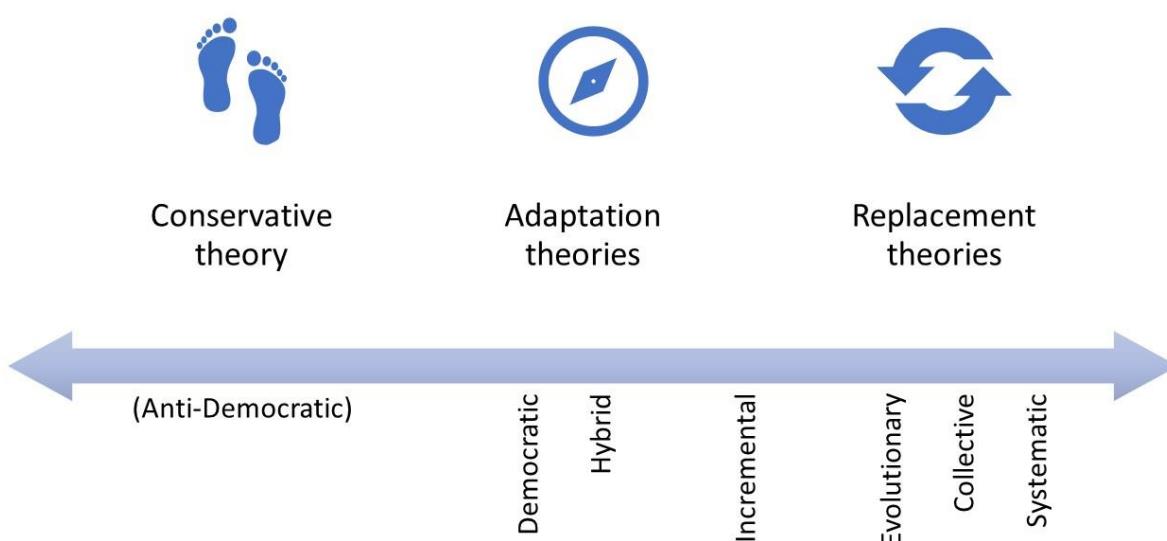
Figure 4 Three schools of land reform theories (Hull, Babalola & Whittal, 2019: 7)

With reference to Hull & Whittal (2016), Hull, Babalola & Whittal (2019) have developed a typology of theories influencing land reform (Figure 4). This typology was used to help locate the theory informing cadastral systems development in each of the four cases. In all cases, the underlying theory belonged mostly to the replacement school of theories. It is cautioned, for the southern African cases, that this may represent a mismatch between the theory of cadastral systems development and the lived experience of customary land rights-holders, leading to a loss of *significance* and compromising the *success* and *sustainability* of development. The

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

problems and needs driving development were clearly articulated in all cases, but in South Africa the goals and measures of success appear to not be aligned to these.

Regarding the LAS context, class-responsiveness and gender-sensitivity were missing from both European cases. These omissions are related to the difference between the context of the case study and the intended context of the framework. Both elements were partially addressed in the southern African cases and are needed for *significance*. Although the nature of the land record was clearly identified in all cases, the land tenure information system (LTIS) and land governance elements are better addressed in the European than the southern African cases. Except for the Netherlands case, the cadastre and registry are not integrated, and the cadastre is not multi-purpose-ready in the southern African cases. These differences reflect expected theoretical replication arising from the differences in the state of cadastral systems development of the two groups of cases.

Comparing drivers of change, the need to improve tenure security and the LAS, reduce uncertainty, and manage the environment, are seen to be drivers for all four cases. *New approaches* was added as an element in the Mozambique case and found to be partially addressed in the South African case. The influences of climate change and disaster management are not adequately addressed in all cases except Germany. New theories have partially contributed to cadastral systems development in all cases except South Africa.

Concerning the change process, it is apparent that there were concerns about time to completion, handling equity, and resolving disputes in all cases. Good leadership is imperative for *successful* development, and in the South African case, leaders have been found wanting. Capacity, a descriptor of the current context, is essential for *sustainable* development. Capacity issues were identified in both of the southern African cases. The use of pilots, phasing, and appropriate methods of implementing change are adequately addressed in all but the South African case. Using appropriate methods and adopting an incremental approach fosters *significant* development. The historical background is acknowledged and generally engaged in all but the Netherlands case. Engagement is also well represented across all cases, although safety of participants in the development process is not adequately secured in any case, and the South African case again comes up short when compared with the other cases.

The review process was deemed inadequate for both European cases, although the Netherlands fared better than Germany in this regard. Despite this, both cases introduced a new aspect: *how* reviews should be conducted. From Germany, we learnt that sufficient funding should be allocated to the review process. From the Netherlands, we learnt that greater transparency, accessibility and user-friendliness improve the quantity and quality of users' feedback. Overall, the review process was better-addressed in the Netherlands and Mozambique than in Germany and South Africa. To ensure that the development process and outcomes yield results that are *successful*, *sustainable*, and *significant*, an adequate review process is essential.

5.2   Comparison

Taking all of the elements and descriptors from each case, and tallying the numbers of elements that are satisfactorily addressed, adequately addressed, partially addressed, inadequately addressed, and not addressed, Figure 5 is presented. The results are presented as percentages of

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

the total numbers of elements for each case, because the cases differ in numbers of elements. This is because, in keeping with a progressive case study approach, each case builds on the previous cases. The total numbers of elements for each case appear in the last row of Table 3. The original conceptual framework (Table 4) had 45 elements. This was progressively increased to 48, 49, and 52 (Table 5) as new elements emerged from the cases while the research progressed linearly through the case study analysis stage.
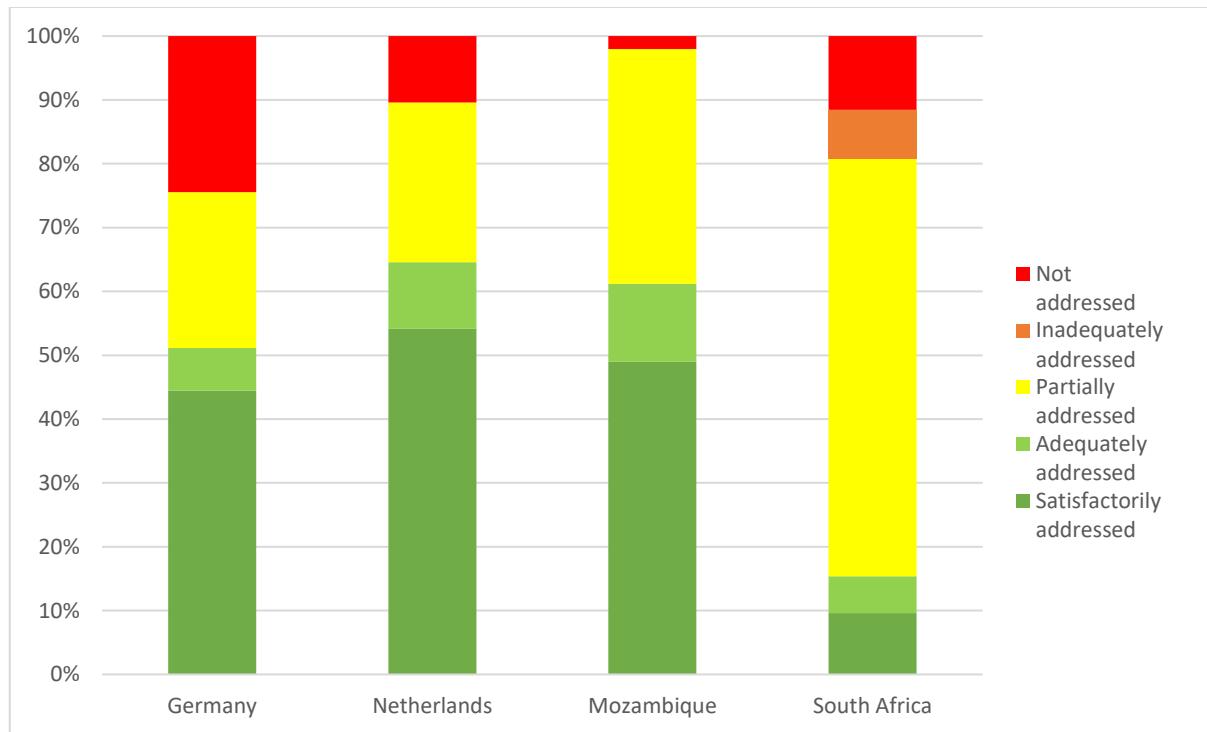
Figure 5 Cross-case comparison of elements

Table 3 Progressive increase in elements across cases

	Germany	Netherlands	Mozambique	South Africa
Satisfactorily addressed	20	26	24	5
Adequately addressed	3	5	6	3
Partially addressed	11	12	18	34
Inadequately addressed	0	0	0	4
Not addressed	11	5	1	6
Total	45	48	49	52

Regarding literal replication, Figure 5 and Table 3 reveal that Germany and the Netherlands produced predictably similar results due to the similarity of the contexts of the two cases. Surprisingly, Mozambique and South Africa produced quite different results, and the Mozambique case appears to be more alike to the European cases than the South African case. This may be due to the impact of international donor organisations who were influential in

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

driving change in Mozambique, or it may be linked to the underlying legal framework of Germany, the Netherlands and Mozambique being that of civil law. South Africa has a much more complex, hybrid legal system involving civil law, common law and African customary law.

It also appears that the Mozambican and Netherlands cases fared 'better than' the other cases, having the least number of 'not addressed' elements and the greatest number of 'satisfactorily addressed' elements respectively. South Africa has fared the 'worst', with by far the least number of 'satisfactorily addressed' elements, and the most partially, inadequately, and not addressed.

6   RECOMMENDATIONS

6.1   Theory alignment

The most important recommendation is that the theory of cadastral systems development (see Figure 4) must be aligned with the lived experience of customary land rights-holders. The evidence from the two southern African cases is that developers have relied on theories with which they are familiar and that have worked well in other contexts, but these theories may be inappropriate for *these* contexts. Interviewees spoke of the 'supremacy of ownership', which Hornby *et al.* (2017) link to the formalised system of land administration, referred to as 'the edifice'. A paradigm shift is required to allow all stakeholders to recognise and respect customary land rights *as equal to* titled ownership. Only when customary landholding is brought to the same conceptual level as other recognised forms of ownership rights, such as freehold and leasehold, will customary tenure security be improved.

6.2   Disaster management

While environmental management featured prominently in all cases, concerns over climate change and disaster management did not feature. Disasters such as earthquakes are already displacing people from their lands (Mitchell et al., 2017). Cadastral systems development, as a component of land administration, has an important role to play in recovery from disaster (UN-HABITAT, 2008; Enemark, McLaren & Lemmen, 2015; Unger, Zevenbergen & Bennett, 2016).

6.3   State independence

From interviews in the Netherlands, we learnt that part of Kadaster's success may be attributed to its semi-independence of the state. In Mozambique, the Community Land Initiative's (iTC) success was also attributed to their political independence (Mole, Monteiro & Quan, 2012). Hence it appears that it may be desirable for the agency responsible for the cadastre and land administration to be independent of the state. Then the timeframes for cadastral systems development could be realistic and not dictated to by political- and donor-based agendas (Burns et al., 2006; Barry, 2018). The change process will also be more likely to succeed in African contexts if leaders of change processes are independent of government because political agendas may be separated from cadastral systems development.

It is cautioned, however, that organisations require funding. In South Africa, land reform is state-funded. In Mozambique, the Community Land Initiative (an organisation set up to support land administration) was donor-funded (EDG, 2014). State-funding is generally more stable

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

and sustainable than donor-funding. Truly independent organisations would need to collect funding from their clients, but this is not pro-poor and hence is unsuitable in developing contexts. What is clear from South Africa is that politicians may use land issues for their own, political purposes (High Level Panel, 2017). Land rights-holders need to be protected against this.

6.4 Break down silos

Part of the failure of land tenure reform in South Africa is attributed to the silo model of development within government: each State department is focused on its own goals with little collaboration and sharing of ideas or objectives (High Level Panel, 2017; Mahlati, 2019). If the cadastre and land administration is not made independent, then at least there should be a commitment to breaking down the silos of governance. The experiences from Germany and Mozambique are good examples of success in this regard.

6.5 Redefining cadastral systems

As far as is possible, the cadastre and registry should be integrated into one system (as in the Netherlands) or extremely well-linked (as in Germany) to avoid duplication, redundancy, and conflicting information. The registry should be extended to accommodate recordation (usually less rigorous than registration and can accommodate overlapping RRRs and non-individual landholders); the cadastre should be extended to accommodate other forms of land location and extent that match with African customary land law and practice.

6.6 Capacity and support

Capacity enhancement should be integral to the development process. The southern African cases were hampered by capacity issues and several good ideas became unsustainable as a result. A plan for on-going post-development support needs to be formulated at the beginning of the development process.

6.7 Ensuring safety

Safety should be a concern that is built into development planning. Land issues are sensitive issues and lives have been lost when parties cannot come to agreement (Dladla, 2016; Clark & Luwaya, 2017; Carnie, 2018). To this end, concern must be given to cultural differences, issues relating to equity, dispute resolution, and effective engagement. There should be no assumption that all parties are approaching the concern in the same way, or with transparent and good intent. Similarly, there must be awareness that people's cultures and practices are not homogenous, and developments may have differential impacts on different people groups. This is especially concerning for the poor, vulnerable, and marginalised.

6.8 Independent review

There should be an independent review process and it should be built into the development plan from the outset. It should be ongoing, operating at frequent, well-defined intervals, throughout the development process. The results of the reviews should be shared with all stakeholders for transparency and to avoid corruptive influences. Reviewers should therefore be independent to the development process to give unbiased feedback. Adequate funding should be allocated and suitable indicators for *success* and *significance* should be defined concurrently with the goals

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

of development. These should also take the *significance* of the development into account for land rights-holders.

6.9   Coherent land policy

There should be a single, clearly articulated, non-contradictory policy on land reform that aims to secure land tenure for all land rights-holders while ensuring continued and improved productivity of the land. South Africa's land policy is noted to be 'as clear as mud' (Donnelly, 2015), and recent analyses have recommended the drafting of new policy to address this (High Level Panel, 2017; Mahlati, 2019). Such was the experience in Mozambique, which has been lauded as exemplary (Tanner, 2002).

6.10   Use the '3S' framework

Finally, for cadastral systems development that aims to be *successful*, *sustainable*, and *significant*, developers should use the grounded framework (Table 5) as a guide. Practitioners should assess interventions for any additional elements that are important for their context and assess existing elements in the framework for relevance prior to application. This is a process of naturalistic generalisation. By taking note of each of the elements, aspects and areas, the goals for development may be aligned to land rights-holders' needs, ensuring their relevance and promoting their sustainable achievement.

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

7   REFERENCES

Adams, M., Sibanda, S. & Turner, S. 1999. Land tenure reform and rural livelihoods in southern Africa. *Natural Resource Perspectives*. February(39):1–15.

Alcock, R. & Hornby, D. 2004. *Traditional land matters – a look into land administration in tribal areas in KwaZulu-Natal.* Available: https://www.researchgate.net/publication/267260749%0ATraditional [2017, May 18].

Alden Wily, L. 2000. Land tenure reform and the balance of power in eastern and southern Africa. *ODI Natural Resources Perspectives*. (58):1–4.

Allan, G. 2003. A critique of using grounded theory as a research method. *Journal of Business Research*. 2(1):1–10.

Barry, M. 2018. Fit-for-purpose land administration – administration that suits local circumstances or management bumper sticker? *Survey Review*. 50(362):383–385. DOI: 10.1080/00396265.2018.1501130.

Barry, M. & Roux, L. 2012. A change based framework for theory building in land tenure information systems. *Survey Review*. 44(327):301–314.

Barry, M. & Roux, L. 2013. The Case Study Method in Examining Land Registration Usage. *GEOMATICA*. 67(1):9–20.

Bennett, R., Rajabifard, A., Kalantari, M., Wallace, J. & Williamson, I. 2010. Cadastral futures: building a new vision for the nature and role of cadastres. In *FIG Congress 2010: Facing the challenges - Building the capacity*. Sydney, Australia: International Federation of Surveyors. Available:
http://www.fig.net/pub/fig2010/papers/ts08k/ts08k_bennett_rajabifard_et_al_4096.pdf [2013, July 19].

Bringer, J.D., Johnston, L.H. & Brackenridge, C.H. 2006. Using Computer-Assisted Qualitative Data Analysis Software to Develop a Grounded Theory Project. *Field Methods*. 18(3):245–266. DOI: 10.1177/1525822X06287602.

Bruce, J. 1993. The Variety of Reform: A Review of Recent Experience with Land Reform and the Reform of Land Tenure, with Particular Reference to the African Experience. In *Institutional Issues in Natural Resource Management*. V. 9. H.S. Marcussen, Ed. Denmark: Roskilde: International Development Studies. 13–56. Available: https://ojs.ruc.dk/index.php/ocpa/article/view/4115.

Burns, A., Grant, C., Nettle, K., Brits, A. & Dalrymple, K. 2006. *Land Administration Reform: Indicators of Success, Future Challenges*. Wollongong: Land Equity International.

Carnie, T. 2018. Wild Coast: Bazooka Rhadebe's murder probe 'sabotaged' by police. *Daily Maverick*. 23 March. Available: https://www.dailymaverick.co.za/article/2018-03-23-wild-coast-bazooka-rhadebes-murder-probe-sabotaged-by-police/ [2018, August 06].

Clark, M. & Luwaya, N. 2017. *Communal Land Tenure 1994-2017*. Available: https://www.parliament.gov.za/storage/app/media/Pages/2017/october/High_Level_Panel/Commissioned_Report_land/Commisioned_Report_on_Tenure_Reform_LARC.pdf [2019, January 21].

Cousins, B. 2016. *Land reform in South Africa is sinking. Can it be saved?* Available: https://www.nelsonmandela.org/uploads/files/Land__law_and_leadership_-_paper_2.pdf [2017, February 02].

Dladla, S. 2016. Community celebrates as iron mine plan shelved. *GroundUp*. 26 July. Available: https://www.groundup.org.za/article/kwazulu-natal-community-celebrates-mining-

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

companys-withdrawal/ [2018, August 06].

Donnelly, L. 2015. SA land policy is as clear as mud. *Mail & Guardian*. 16 October. Available: http://mg.co.za/article/2015-10-15-sa-land-policy-is-as-clear-as-m ud [2017, February 02].

EDG. 2014. *Evaluation of the Mozambique Community Land Use Fund - Final Report*. Maputo, Mozambique: Effective Development Group, GRM International, The QED Group.

Enemark, S. 2005. Understanding the Land Management Paradigm. In *FIG Commission 7 Symposium on Innovative Technologies for Land Administration*. Madison, Wisconsin: International Federation of Surveyors. Available: http://www.fig.net/council/enemark_papers/madison_2005.pdf [2013, April 05].

Enemark, S., McLaren, R. & Lemmen, C. 2015. *Fit-For-Purpose Land Administration Guiding Principles*. Copenhagen, Denmark: Global Land Tool Network (GLTN).

FAO. 2002. *Land tenure and rural development*. Rome, Italy: Food and Agriculture Organisation of the United Nations (FAO).

FIG. 1995. *FIG Statement on the Cadastre*. Available: http://www.fig.net/commission7/reports/cadastre/statement_on_cadastre.html [2013, March 26].

Friese, S. 2014. *Qualitative Data Analysis with ATLAS.ti*. 2nd ed. London: SAGE Publications Ltd.

Furuholt, B., Wahid, F. & Sæbø, Ø. 2015. Land Information Systems for Development (LIS4D): A Neglected Area within ICT4D Research? In *48th Hawaii International Conference on System Sciences*. Grand Hyatt, Kauai: IEEE Computer Society. 2158–2167. DOI: 10.1109/HICSS.2015.259.

Glaser, B.G. 1978. *Theoretical sensitivity: Advances in the methodology of grounded theory*. Mill Valley: Sociology Press. Available: http://www.getcited.org/pub/101904376 [2013, December 03].

Glaser, B.G. & Holton, J. 2007. Remodeling Grounded Theory. *Historical Social Research, Supplement*. (19):47–68.

Gundelsweiler, G., Bartoschek, T. & De Sá, L.A.C.M. 2007. Development in the German Cadastre. *Boletim de Ciencias Geodesicas*. 13(2):423–432. Available: https://www.scopus.com/inward/record.uri?eid=2-s2.0-39549106886&partnerID=40&md5=fec7ffdaea5b2da9a1e142e2de5ad35d.

Hackman-Antwi, R., Bennett, R.M., de Vries, W., Lemmen, C.H.J. & Meijer, C. 2013. The point cadastre requirement revisited. *Survey Review*. 45(331):239–247. DOI: 10.1179/1752270612Y.0000000015.

Hawerk, W. 2001. ALKIS ® - Germany's way into a cadastre for the 21st century. In *FIG Working Week 2001*. Seoul: International Federation of Surveyors. 1–10. Available: http://www.fig.net/pub/proceedings/korea/full- papers/pdf/session16/hawerk.pdf.

High Level Panel. 2017. *Report of the High Level Panel on the Assessment of Key Legislation and the Acceleration of Fundamental Change*. Available: https://www.parliament.gov.za/storage/app/media/Pages/2017/october/High_Level_Panel/HL P_Report/HLP_report.pdf [2018, January 15].

Holton, J.A. 2017. From Grounded Theory to Grounded Theorizing in Qualitative Research. In *The SAGE Handbook of Qualitative Business and Management Research Methods*. C. Cassell, A. Cunliffe, & G. Grandy, Eds. London: SAGE Publications Ltd. 233–250.

Hornby, D., Royston, L., Kingwill, R. & Cousins, B. 2017. Introduction: Tenure practices,

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

concepts and theories in South Africa. In *Untitled: Securing Land Tenure in Urban and Rural South Africa*. D. Hornby, R. Kingwill, L. Royston, & B. Cousins, Eds. Pietermaritzburg: University of KwaZulu-Natal Press. 1–43.

Hull, S. 2019. A Framework for Guiding Cadastral Systems Development in Customary Land Rights Contexts. Cape Town. DOI: 10.1080/00396265.2017.1381396.

Hull, S. & Whittal, J. 2016. Towards a framework for assessing the impact of cadastral development on land rights-holders. In *FIG Working Week 2016: Recovery from Disaster*. Christchurch, New Zealand: International Federation of Surveyors. Available: http://www.fig.net/resources/proceedings/fig_proceedings/fig2016/papers/ts01a/TS01A_hull_whittal_7995.pdf.

Hull, S. & Whittal, J. 2019. Human rights in tension: guiding cadastral systems development in customary land rights contexts. *Survey Review*. 51(365):97–113. DOI: 10.1080/00396265.2017.1381396.

Hull, S., Babalola, K. & Whittal, J. 2019. Theories of Land Reform and Their Impact on Land Reform Success in Southern Africa. *Land*. 8(172):1–30. DOI: 10.3390/land8110172.

Jones, B. & Land, N. 2012. Cadastre 2.0 – A technology vision for the cadastre of the future. In *FIG Working Week 2012*. (Working Week 2012). Rome: International Federation of Surveyors. Available: http://www.fig.net/pub/fig2012/papers/ts04a/TS04A_jones_land_5601.pdf.

Kadaster. 2012. *Establishment of Land Administration Systems*. Available: https://www.kadaster.com/documents/33433/36597/International+-+Establishment+of+Land+Administration/35556905-ebd3-477e-a1ee-6a7ee5a497fd [2017, September 06].

Lemmen, C., van Oosterom, P. & van der Molen, P. 2013. Land Administration Domain Model. *GIM International*. (May):18–23.

Louwsma, M., van Beek, M. & Hoeve, B. 2014. A New Approach: Participatory Land Consolidation. In *FIG Congress 2014: Engaging the Challenges - Enhancing the Relevance*. Kuala Lumpur, Malaysia, Malaysia: International Federation of Surveyors. 1–10.

Mahlati, V. 2019. *Final Report of the Presidential Advisory Panel on Land Reform and Agriculture*. Pretoria, South Africa: Presidential Advisory Panel on Land Reform and Agriculture. Available: https://www.gov.za/documents/final-report-presidential-advisory-panel-land-reform-and-agriculture-28-jul-2019-0000 [2019, August 05].

Mitchell, D., Grant, D., Roberge, D., Bhatta, G.P. & Caceres, C. 2017. An evaluation framework for earthquake-responsive land administration. *Land Use Policy*. 67:239–252. DOI: 10.1016/J.LANDUSEPOL.2017.05.020.

Mole, P., Monteiro, J. & Quan, J.F. 2012. *Ensuring community land rights in a land investment pressed country - The Community Land initiative (iTC) in Mozambique*. Available: http://www.itc.co.mz/wp-content/uploads/2017/12/iTC-Artigo-Community-Land-use-rights-PMJM-Web.pdf [2018, January 23].

Rajabifard, A., Williamson, I., Steudler, D., Binns, A. & King, M. 2007. Assessing the worldwide comparison of cadastral systems. *Land Use Policy*. 24(1):275–288. DOI: 10.1016/J.LANDUSEPOL.2005.11.005.

Silva, M.A. & Stubkjær, E. 2002. A review of methodologies used in research on cadastral development. *Computers, Environment and Urban Systems*. 26(5):403–423.

Steenhuis, H.-J. & De Bruijn, E.J. 2006. Building theories from case study research: the

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

progressive case study. In *OM in the new world uncertainties. Proceedings of the 17th annual conference of POMS*. V. 53. Boston, USA: Florida International University. DOI: 10.1017/CBO9781107415324.004.

Strauss, A. & Corbin, J. 1990. *Basics of qualitative research: Techniques and procedures for developing grounded theory*. 3rd ed. Newbury Park: Sage Publications.

Tanner, C. 2002. *Law-making in an African context: The 1997 Mozambican land law*. V. March. Maputo, Mozambique: Food and Agriculture Organisation of the United Nations (FAO). Available: http://www.fao.org/%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Law-making+in+an+African+context:+The+1997+Mozambican+Land+Law#0 [2018, January 22].

UN-HABITAT. 2008. *Secure land rights for all*. Nairobi, Kenya: UN-HABITAT.

Unger, E.-M., Zevenbergen, J. & Bennett, R.M. 2016. On the need for pro-poor land administration in disaster risk management. *Survey Review*. 1–12. DOI: 10.1080/00396265.2016.1212160.

Vos, J. 2010. The digitalization of land registration in the netherlands: paving the road for cross border practices. In *17th Congress IPRA-CINDER*. Lima, Peru: International Property Registries Association. 1–14.

de Vries, W., Bennett, R.M. & Zevenbergen, J. 2015. Neo-cadastres: innovative solution for land users without state based land rights, or just reflections of institutional isomorphism? *Survey Review*. 47(342):220–229. DOI: 10.1179/1752270614Y.0000000103.

Wallace, J. 2010. *Rights, Responsibilities, Restrictions (RRRs)*. Perth, WA. Available: http://www.csdila.unimelb.edu.au/people/PeopleFiles/JudeWallace/Registrars_Presentation_4.pdf [2019, July 17].

Whittal, J. 2014. A New Conceptual Model for the Continuum of Land Rights. *South African Journal of Geomatics*. 3(1):13–32.

Williamson, I., Enemark, S., Wallace, J. & Rajabifard, A. 2010. *Land administration for sustainable development*. Redlands, California: Esri Press.

Woods, M., Paulus, T., Atkins, D.P. & Macklin, R. 2016. Advancing Qualitative Research Using Qualitative Data Analysis Software (QDAS)? Reviewing Potential Versus Practice in Published Studies using ATLAS.ti and NVivo, 1994-2013. *Social Science Computer Review*. 34(5):597–617. DOI: 10.1177/0894439315596311.

Yin, R.K. 2009. *Case Study Research: Design and Methods*. 4th ed. V. 5. (Applied Social Research Methods Series). Thousand Oaks: Sage Publications.

de Zeeuw, K. & Lemmen, C. 2015. Securing Land Rights for the World. In *FIG Working Week 2015*. Sofia, Bulgaria, Bulgaria: International Federation of Surveyors.

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

BIOGRAPHY

Simon Hull is a full-time lecturer and 2019 PhD graduate at the University of Cape Town (UCT). His doctoral research was in the field of customary land tenure reform. He completed his MSc at UCT in the field of digital close-range photogrammetry in 2000 where after he spent two years working as a marine surveyor. He spent a further four years completing his articles and is a registered South African Professional Land Surveyor qualified for sectional title surveys. In 2006 he changed careers and became a high school Maths and Science teacher in a rural village in northern Zululand. He has held his current position at UCT since 2012.

Jennifer Whittal is an Associate Professor in the Geomatics Division at the University of Cape Town. She obtained a B.Sc. (Surveying) and a M.Sc. (Engineering) specializing in global navigation satellite systems from the University of Cape Town. In 2008, Jenny obtained her Ph.D from the University of Calgary applying critical realism, systems theory and mixed methods to a case of fiscal cadastral systems reform. She is a Professional Land Surveyor and lectures advanced surveying and land law. Research interests are land tenure and cadastral systems with specific interest in sustainable development and resilience in land holding for the poor, historical property holding, and cadastral issues in the coastal zone.

Contacts:

Address: Geomatics: School of Architecture, Planning and Geomatics, University of Cape Town, Western Cape, South Africa, 7700.

Tel: 021 650 3574   email: Simon.hull@uct.ac.za

Tel: 021 650 3575   email: Jennifer.whittal@uct.ac.za

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020

APPENDIX

Table 4 Conceptual framework for guiding cadastral systems development in customary land rights contexts (adapted from Hull & Whittal, 2019)

Areas	Aspects	Elements
Underlying Theory	Theories of tenure reform	Identifying theory on a continuum of land reform theories
	Understanding land in its social context	Attitude towards human and land rights
		Justification for development
	Goals for development	Gap analysis
		Measures of Success
Land administration system context	Land policy	Recognition and protection of existing land rights
		Class-conscious and gender-sensitive
		Improving productivity and livelihood
	Land governance	Active participation
		Equitable access
		Transparency, clarity, simplicity
		Accountability and the rule of law
		Appropriate technology
	Strategic level	Possibly changing land rights type
		Improving tenure security
	Implementation level	Land recording / registration mechanisms
		Land tenure information system
Responsive change drivers	Demand	Economic
		Political
		Social
		Legal
		Administrative
		Environmental
	Supply	New technology
		New theories or methods
		New policy
Change process	Community / country context	Historical background
		Current context
	Getting to the end state	Good leadership
		Build on existing practice
		Time to completion
		Implementing change
	Working together	Effective, sustainable engagement
		Handling equity
		Resolving disputes
Review Process	Why	Ensuring success, sustainability, and significance
	What	Outcomes
		Impact
	When	Well-defined intervals
		Throughout development process
	Who	External reviewers
		State organisations
		Community

Table 5 Comparison of cases (G: Germany, N: Netherlands, M: Mozambique, SA: South Africa)

Area	Aspects	Elements	G	N	M	SA
Underlying theory	Theories of tenure reform	Identify theory on a continuum	5	5	3	3
Underlying theory	Understanding land	Attitude towards human and land rights	1	1	3	3
Underlying theory	Understanding land	Justification for development	5	5	5	1
Underlying theory	Understanding land	*Perspectives on ownership*				*5*
Underlying theory	Goals for development	Gap analysis	5	5	5	4
Underlying theory	Goals for development	Measures of Success	5	5	5	3
LAS Context	Land policy	Existing land rights	3	4	5	3
LAS Context	Land policy	Class and gender	1	1	3	3
LAS Context	Land policy	Productivity and livelihood	3	3	3	3
LAS Context	Land policy	*Uniformity*				*1*
LAS Context	Land governance	Active participation	3	5	3	3
LAS Context	Land governance	Equitable access	3	5	3	3
LAS Context	Land governance	Transparency, clarity, simplicity	5	5	1	3
LAS Context	Land governance	Accountability and rule of law	5	5	4	3
LAS Context	Land governance	Appropriate technology	5	5	3	3
LAS Context	Strategic level	Changing land rights type		3	4	3
LAS Context	Strategic level	Improving tenure security	3	5	3	3
LAS Context	Strategic level	*Choices*				*3*
LAS Context	Implementation level	Land recording / registration	5	5	5	5
LAS Context	Implementation level	Land tenure information system	5	5	4	2
Change drivers	Demand	Economic	5	5	3	3
Change drivers	Demand	Political	5	5	5	4
Change drivers	Demand	Social	3	3	3	4
Change drivers	Demand	Legal	5	5	5	3
Change drivers	Demand	Administrative	5	5	5	3
Change drivers	Demand	Environmental	5	3	3	3
Change drivers	Supply	New technology	5	5	5	3
Change drivers	Supply	New theories	3	3	3	1
Change drivers	Supply	New policy	5	5	5	3
Change drivers	Supply	*New approaches*			*5*	*3*
Change process	Community / country context	Historical background	5	1	5	3
Change process	Community / country context	Current context	4	4	4	3
Change process	Getting to the end state	Good leadership	4	4	4	2
Change process	Getting to the end state	Build on existing practice	5	5	5	3
Change process	Getting to the end state	Time to completion	3	3	3	3
Change process	Getting to the end state	Implementing change	5	5	5	2
Change process	Working together	Effective, sustainable engagement	4	4	4	2
Change process	Working together	Handling equity	1	1	3	3
Change process	Working together	Resolving disputes	3	3	3	3
Review process	Why	Success	1	5	5	3
Review process	Why	Sustainability	1	5	5	3
Review process	Why	Significance	1	5	5	3
Review process	What	Outcomes	1	4	5	1
Review process	What	Impact	3	3	5	3
Review process	When	Well-defined intervals	1	3	5	5
Review process	When	Throughout development process	1	3	5	5
Review process	Who	External reviewers	1	3	5	5
Review process	Who	State organisations	3	5	5	3
Review process	Who	Community	5	5	5	1
Review process	*How*	*Funding*	*1*	*1*	*3*	*1*
Review process	*How*	*Accessibility*		*5*	*3*	*3*
Review process	*How*	*Transparency*		*3*	*3*	*3*

Achieving Success and Sustainability Through Significance: a Cross-Case Analysis of Cadastral Systems Development in Europe and Africa (10239)
Simon Hull and Jennifer Whittal (South Africa)

FIG Working Week 2020
Smart surveyors for land and water management
Amsterdam, the Netherlands, 10–14 May 2020