

Law and Policy Implications of Multimedia Land Records: The Talking Titler Project

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SUMMARY

Talking Titler is an initiative to provide appropriate systems and technological support for land occupation and ownership rights for people in developing countries and post-conflict situations. Technology has advanced to the stage where it is becoming feasible to apply multi-media technology to provide additional evidentiary support in land records systems. The first author tested video-evidencing systems in land reform projects in South Africa a few years ago with promising results, but issues such as memory capacity and video authentication have hindered technical implementation. This paper provides an exploratory examination of how such a system can be designed in participation with a community and the legal and policy implications of incorporating audio-visual evidence into land records which, to date, have typically been limited to written text and survey plans or sketch plans. The Talking Titler system holds the promise of increasing social and political stability in complex social settings such as informal settlements where land tenure practices tend to draw on both customary and western concepts of land use and ownership. In one configuration, the system records digital video images of a land owner (beneficiary) in front of their dwelling to produce a video affidavit of what is owned, and the origin and extent of ownership, all of which can be spatially referenced through the use of global positioning (GPS) data. The ubiquitous and accessible nature of video camera technology makes it an excellent tool for application where administrators of conventional land record systems are susceptible to intimidation and subversion. The significance of this work rests, in terms of social process, in augmenting the land record through community involvement, incorporating records in indigenous languages, and providing an additional tool to strengthen local capacity to adjudicate and re-negotiate land tenure relationships. As a technical exercise, this exploration of the use of a multimedia source in the land record anticipates the penetration of digital media into the little-explored application of land tenure security enhancement.

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1. INTRODUCTION

A critical measure of the effectiveness of any cadastral system is that it is used. Otherwise the supposed social and economic benefits will not materialize. Further, if cadastral systems, by which we mean specifically registration and cadastral survey, are not used in the manner intended, this can lead to conflict and social unrest in situations that had previously been stable (Greene 1987, Barry 1999). Thus, it is important that land records systems are used by those whom the systems are designed to serve.

The experience of the first author and preliminary work in eliciting the critical land tenure issues in informal settlements as well as in rural land reform and land restitution projects around Cape Town, South Africa, led him to the conclusion that there needs to be a way to increase the level of land tenure security in areas where multiple, at times overlapping, claims to land occur. Experience in formalising land rights in urban informal settlements and a land restitution case in the Western Cape Province of South Africa suggests that conventional systems of records are inadequate in changing uncertain situations. Conflicts between competing factions in these communities often manifest in the manipulation of local land tenure rules within the community and manipulation of agreements made with land administration authorities. At times these conflicts escalate to violence and can also be characterised by land grabbing by powerful elites and state institutions (Barry 1999, Mayson *et al* 1998, Roux and Barry 2001). These behaviour patterns are found in post conflict situations too (Augustinus and Barry 2004).

This paper represents some early thinking on the use of multimedia data as part of the land record for the purpose of evidencing interests in land, particularly in developing countries and post conflict societies. Furthermore, we posit that multimedia records systems may be more appropriate than written records in First Nation communities in North America and elsewhere where oral traditions and visual symbols have the potential to play a significant role in the land tenure system.

Talking Titler proposes that the land record should not be limited to the conventional devices such as survey plans of parcel boundaries and written deeds or titles that are seen in places such as state Land Registry Offices, government agencies and the like. In addition, video clips, photographs and sound files may be included in a system of records to improve the completeness and quality of evidence relating to claims to rights and interests in land.

There are a number of advantages to using video clips and, to a lesser extent, sound files and still photographs. Firstly, people claiming rights and interests in land on video know that what they say is on record and if necessary the record can be played back. This may prevent some manipulation of the land tenure rules. Secondly, video records can be understood easily, even

by illiterate community members, and the persons claiming rights and interests and the objects which are the subject of these claims can be visually identified from the records. Claimants may be filmed in the same video frame as the parcel or object in which they testify to enjoying rights. For example, in the village of Algeria in South Africa, where such a system was tested, community members read a prepared affidavit in front of their house and, in certain instances, in front of a vegetable garden parcel to which they claim exclusive use rights. It is also possible that other interest holders (e.g. family members) may be included in these frames while affidavits are being read, especially if some of the rights and interests that the claimant describes pertain to them. This is highly significant in the extension of land tenure security to marginalised groups such as women, minors and minority ethnic groups, whose rights are often not reflected in the conventional records. Thirdly, the process of collecting the evidence is comparatively inexpensive, as video cameras are inexpensive compared to the price of hiring experts to conduct titling processes. Fourthly, video records lower the level of skills required to capture data relating to the land tenure system and encourage more frequent collection of data for the land records. Using a camera to film certain events, such as a person reading an affidavit or answering questions in front of their house, is a simple operation and, after a short period of training, does not require much skill. Processes such as this can be standardised and community members can participate by collecting the data themselves. Moreover, if this can be achieved, then in changing situations it will be possible to repeat the reading of affidavits from time to time to ensure that the official record remains current. Fifthly, a video record provides a detailed description of each individual's beliefs and attitudes relating to the land tenure system and the record is not subject to an interviewer's interpretation of events. Moreover, interviews to determine the nature of the tenure system do not have to be interpreted and then transcribed for later analysis - they can form part of the official record of land rights and interests. A written record of the person in whose name the land is to be registered can be linked to a video record of rights which have been approved by authorised members of a community and the land administration authority. With current technology, including video clips in a database using off-the-shelf hardware and software is a relatively simple matter (Roux and Barry 2001). Lastly, video clips require large amounts of storage, but data storage devices have advanced to the point where it is now economically feasible to store large amounts of data and thus video based records are becoming a viable option.

The paper is structured as follows. First, the results of initial tests of using video clips are described. Thereafter, anticipated work in First Nations communities in Canada is described in order to propose the usefulness of such a system and examine the required design features of the system. Following this, law and policy issues relating to digital media evidence are examined.

2. VIDEO CLIPS IN LAND REFORM PROJECTS: THE VILLAGE OF ALGERIA AND IMIZAMO YETHU INFORMAL SETTLEMENT, SOUTH AFRICA

An initial test of using video clips was performed in a land reform project in the village of Algeria and then further tested in an informal settlement upgrade project, Imizamo Yethu (*through collective action* – Xhosa), in Cape Town.

Algeria lies in the Cedarberg mountains wilderness area, some 230 km north west of Cape Town. The Algeria settlement was formed in the late 19th century and now accommodates 240 people living in houses belonging to Cape Nature Conservation (CNC), the authority which administers the wilderness area. Residents were allowed to occupy a house provided at least one family member was employed by Cape Nature Conservation. In addition, families had an exclusive use right to a separate *kombuisplot* (*kitchen vegetable garden* - Afrikaans) irrigated from an adjacent river (Roux and Barry 2001).

Under the terms of South Africa's land reform policy, it became possible for the community to obtain ownership of the land on which they live. Ownership will most likely be held as a Communal Property Association, which is a form of legal entity through which communities can collectively acquire, hold and manage land. Ownership vests in the Association as a juristic person and individuals in the community are entitled to various use rights in terms of their membership.

Volunteers from the Algeria community assisted in testing the land records system which included video evidence. Acceptance of the video filming process was tested in Imizamo Yethu thereafter. In Algeria, people claiming rights in land were filmed on video while they read an affidavit in front of the house that they occupied. A number of people also described their vegetable garden exclusive use areas, pointed out the boundaries of their gardens and indicated to whom the adjacent vegetable gardens belonged. Thus the video provided a property description which included the spatial topological relationships normally shown on a survey plan. The video clips were later included in a relational database. The user interface is an onscreen title certificate which enables the user to view standard titling information obtained from the conventional land records and play back the video if required (Barry *et al* 2002).

In the first stage, a workshop was conducted with a set of 24 volunteers. In the workshop, video evidencing and the concept of affidavits were explained, and the information to be included in the affidavits was discussed and agreed upon. This information included the date of the recording, the name of the claimant, their house number, a person's perceived rights, interests and obligations pertaining to land that they occupied, and information relating to inheritance and the rights of family members. In the second stage, when the researchers visited the site approximately a month after the workshop, people were filmed on video individually (Roux and Barry 2001).

Videotaping people in front of their houses proved to be a simple task. However, recording evidence relating to the vegetable gardens proved to be less satisfactory as the boundaries

were not always clearly distinguishable on video. To overcome this, flags were placed at the corners of each garden. This process draws on an unauthorised, informal system of subdividing and transferring land, which was observed in rural Xhosa communities in South Africa's Eastern Cape Province. To circumvent official planning approvals, registration and cadastral surveying, boundaries of new subdivisions were demarcated by flags in these areas (Ralawe 1993).

Overall the study showed promising results. Twenty five video clips (21 houses and 4 vegetable gardens) were videotaped in a morning. On the whole, the majority of the volunteers participated enthusiastically in the collection of the video evidence. However, certain logistical difficulties were encountered during videotaping. Only a third of the volunteers had prepared a written affidavit at the time the videos were filmed on site. Moreover, three of the twenty-four volunteers were not filmed. Of these, one young woman was not available that day, and two young men refused to be videotaped. Another difficulty encountered was that in some instances the topography, man made structures and vegetation prevented the filming of clear pictures of the houses and vegetable gardens that were the subjects of the affidavits (Barry *et al* 2002).

In spite of the majority of the volunteers not being fully prepared, because they had not prepared affidavits, the testimony that they gave on video proved to be reliable in terms of accurately representing the nature and extent of their ownership. This issue was circumvented in later tests in the Imizamo Yethu settlement, where, instead of people preparing affidavits, a structured interview was conducted with the subjects on camera. This also ensured that there was more consistency in the data collected and that the video clips were of similar length, which is important when planning data storage requirements.

There may be a variety of reasons for certain volunteers refusing to be filmed. However, these reasons fall outside the scope of this discussion. What the above shows is that video clips can augment other information that is normally held in a land tenure information system. Claimants who are recorded on video are aware that their testimony can be played back and it will be difficult to manipulate local land tenure rules. However, even though Algeria is a stable community, it was not possible to obtain a complete set of video records. This, and the physical difficulties encountered in some of the filming, indicates that video evidence should not be used as the only record of rights in land. It should be viewed as an additional tool in a range of administrative tools that may be used to uphold tenure security, for adjudication and dispute resolution. Video evidencing provides information in addition to other symbolic, written, pictorial, mathematical or social evidence relating to the definition and adjudication of boundaries, rights, interests and obligations (Barry *et al* 2002).

What was also observed during the collection of the video evidence was that because the video recordings were conducted in public, the claims to land become public knowledge within the community. Further, the process of filming the videos educated the community in issues relating to land tenure and the administration of the Communal Property Association (Barry *et al* 2002).

3. APPLICATION IN CANADA

At present, the authors are exploring the design of a system that can incorporate a range of multi-media devices and which is designed to apply in a number of different situations.

Interest has been expressed in the system from a number of sources in Canada. Officials from the Legal Surveys Division, Natural Resources Canada, which is the federal government agency responsible for administering land surveys on Canada Lands, have expressed interest in the use of Talking Titler. Canada Lands, which cover half of Canada's land area, include over 2600 First Nation (Indian) Reserves, National Parks and Historic Parks, the Yukon Territories, the Northwest Territories, Nunavut Territories, and the Offshore. One application envisaged is in using videos as a source of ancillary information in support of boundary delimitation. A possible application is in the area of 'Unsurveyed Individual Holdings', for instance where, in the absence of recorded evidence of boundaries, the surveyor must consult with Elders to adduce oral evidence.

First Nations (formerly termed Indians) in the province of British Columbia offer perhaps the biggest opportunity for applying Talking Titler. There are some 1700 land claims in the province and video records and sound files may provide useful evidence in supporting certain land claims negotiations.

Furthermore such a system may be a useful adjunct to implementing provisions of the *First Nations Land Management Act*, S.C., 1999, c. 24. The *Act* enables self-management of land within the reserve land base as detailed on a First Nations Land Management Initiative (FNLMI) map, subject to the provisions of the particular First Nation's Land Code. The degree of applicability of Talking Titler to the FNLMI would depend on the actual structure of the particular First Nation's Land Code, which is generated by that First Nation group. Whether intended as a tool for dispute resolution or as a means of archiving records of occupation and land use for potential use in negotiations with the Crown, the terms of reference for such use are among the objectives of consultation to be held in early 2005.

There is also potential for the use of such a tool in Canada's northern territories (Yukon, North West Territories, Nunavut), where the First Nations will eventually have responsibility for land registration. Much work has been done on traditional land use and occupancy studies in the Canadian north, in terms of documenting indigenous peoples' use of land and cultural knowledge of the environment. Talking Titler could be used to document interests in land that may not necessarily fit conventional ideas of registerable interests. A rigorous, legally defensible, spatially referenced means of representing land use would then support discussions towards establishment of a cadastral record.

As such, Talking Titler is seen by some as a system worth pursuing and Canada's Legal Surveys Division has provided financial support and logistical support in facilitating contact with First Nation Lands Managers.

Specific issues which have to be examined are:

- 1) Whether the system is culturally acceptable and perceived as useful by significant role players in local communities – land tenure, land claims and the role of outsiders are extremely sensitive issues among a number of these societies;
- 2) The role of such a land management tool in institutional development;
- 3) The potential for development as a locally managed land administration tool;
- 4) The possibility of constructing an entire registry comprising this sort of evidence;
- 5) Data delivery to GIS's, for example, GIS's which support the Comprehensive Claims process in British Columbia;

The first issue to be explored relates to the beliefs about the usefulness of the system and thereafter the issues of technical and institutional design features. The approach to ascertaining beliefs can be within a framework of participatory development. The analysis of beliefs would follow within a framework of the Theory of Planned Behaviour (Ajzen, 1991) and the Technology Acceptance Model (Davis 1989). These lines of thought hold that the level of motivation of potential deponents is related to the strength of their belief that the system can provide them with actual benefits - i.e. the perceived usefulness. The cost of entry, so to speak, would be investing the time and effort to prepare an affidavit to be read and recorded on video or, alternatively, to give responses to a structured interview on video. Moreover, on the basis of self-interest, potential beneficiaries should be willing to appear in such a video.

More recent work relating to the acceptance of information technology (IT) has questioned the relationship between culture and the participants' level of trust in the administering agency. Gefen *et al* (2005), in comparing the level of trust that prospective users had in the agency in charge of an electronic voting system in the U.S. and South Africa, concluded that the level of trust was related to the "perceived socio-cultural similarity between the individual and the agency..." Gefen *et al* refer to the underlying rationale of study participants as the "sense of oneness" between users and service provider: "...this sense of oneness is even more imperative because it not only creates trust, but also determines the effect of this trust on user perceptions about the IT." (Gefen *et al* 2005: 71). Therefore as a guiding hypothesis, we posit that in addition to beliefs about direct benefits and notions of usefulness, acceptance of the technology is also influenced by beliefs about the power blocks that are part of the system. It is postulated that these beliefs will primarily be influenced by who administers the system, the quality of the information management, the level of transparency in the management of the system, the potential for abuse of the system, and possibly other elements that will emerge in the course of the study.

As a first phase, workshops are being held with First Nation Lands Managers and /or Band Council representatives for the following purposes:

- 1) To gauge interest in the Talking Titler as an alternative approach to land management or as a tool which may augment existing systems;
- 2) To gauge interest in applying the technique in particular communities; and

- 3) To elicit recommendations towards improvement of the technique, in terms of correcting flawed assumptions, methodological traps and culturally inappropriate lines and means of inquiry.

The technical system is being developed as these interviews proceed. Talking Titler provides a simple means of storing documents, in similar fashion to the most rudimentary deeds system which are merely depositories of documents. However, it can be developed into a fully cross-referenced deeds system which, in the main, adheres to strict database management rules such as South Africa's deeds registration system.

4. POLICY AND LAW ISSUES

Using digital video and sound files as a system to support land tenure has both policy and law implications. It should be noted that experiences in informal settlements and post conflict situations suggests that local land policy develops irrespective of national land policy, which may be swept aside and replaced by local practices during periods of political uncertainty (Barry and Fourie 2002, Augustinus and Barry 2004).

In a stable situation, policy will need to be established on a variety of issues. Among these are hierarchy of evidence guidelines in cases of dispute and policies of how to deal with situations where a records system or parts of it fall into disuse. In the former case, the situation is more complex than is currently the case as a video is likely to provide evidence of both boundaries and who is entitled to rights in land. In most registration systems, evidence of boundaries and rights in land are held in separate documents. This leads to apparent contradictions in the way documentary evidence is applied in these two separate, but linked systems. For example, titles may be indefeasible but the positions of boundaries as depicted on survey plans are not. In the latter case, this may be due to factors such as lack of commitment to implementing a system, institutional problems, or a situation may evolve to a stage where video records or sound files are no longer necessary and written records are sufficient in supporting land tenure security.

Apart from satisfying admissibility requirements of the courts and codified statutory presumptions, video clips may still require authentication by an expert witness such as a forensic video analyst. As yet, no comprehensive body of best practices has been derived from South Africa case law (Skeen 1997, Roux and Barry 2001). In Canada, Goldstein (1986) developed the following general guidelines from a review of cases:

- The video recording must be proven to be authentic and accurate, and proven to contain all the parts that are necessary for completeness.
- No editing may be done, unless it is necessary to remove superfluous material.
- The recording must be used in its entirety.
- The audio track is as important as the visuals of the recording.
- The parties involved must verify the recording.

Digital video (DV) clips, and by implication sound files, require special authentication efforts and, being stored as binary data, they are vulnerable to tampering (whether intentional or not)

such as alteration by inexpensive and accessible digital editing software and hardware (Hak 2004: v-7). Like conventional photographs, “the medium lends itself to distortion and the corrupt use of paraphernalia can result in misleading portrayals.” (Fraser 1992).

Fortunately, unlike analogue videotaped evidence, a DV record does not degrade physically. However, the relative ease with which video images can be altered requires technically reliable and legally defensible means of verifying that the images represented have not been tampered with since being recorded. The rapid development of DV technology entails a relatively short innovation cycle, and some 76% of video equipment manufacturers provide some means of authentication of the integrity of the DV record (Thorwith 2003).

The concern of the security industry has also been voiced. The British Security Industry Association (BSIA 2004) reported, in the treatment of surveillance video, that 97% of law enforcement professionals identified a need to establish reliable standards, guidelines and procedures in support of the admissibility of video records in court. This requires a reliable means of authentication of video images that can satisfy a court that the video record has not been tampered with.

“The major deficiencies of deposition evidence, (comparable to the content of oral testimony within Talking Titler) whether recorded on videotape or not, are that no mechanism exists for the resolution during the examination itself of objections, that the witness cannot be examined or cross-examined as to matters which may have come to light since the deposition was taken and that the witness cannot be interrogated by the presiding judge.” (Fraser 1992: 29).

Watermarking and digital signatures are two current authentication approaches. A prototypical DV authenticator (DVA) developed by the Johns Hopkins University Applied Physics Laboratory that generates and records digital signatures during DV data recording offers promise (Beser *et al*, 2003). Incorporation of digital signatures with the use of both public key and private key (asymmetric) cryptography (that cannot be inverted to disclose the original information) is thought to be superior to digital watermarking, which actually alters the DV image. In the interest of certifying the chain of custody of DV evidence, the minimum amount of post-recording disturbance of DV files is desirable.

Additional practical difficulties in collecting evidence of land rights include the need to authenticate data in the field. The procedure for collecting oral evidence (for example, in a First Nations setting) will be informed by guidelines pertaining to the specific oral tradition. See, for example, Rush (2003). In practice, we envisage that any editing will be conducted in the presence of the deponent and the video subsequently replayed so that they can verify that it is a true record. The actual means of authentication is yet to be decided. It may involve incorporation of a secure digital signature in real time recording, or post-editing insertion of a digital watermark or signature.

In operation, the system would consist of a body of videotaped affidavits as evidence of interests in land. The need to harmonize with the evidentiary standards of the courts is,

therefore, obvious should an affidavit ever be challenged. In Canada, as in South Africa, video clips are classified as real evidence as opposed to documentation in support thereof. Real evidence usually owes its efficacy to the evidence of a witness who verifies the exhibit's integrity and explains its function. Due to the nature of electronic media, the "best evidence" rule – that would ordinarily require the presentation of the "original" evidence – is not particularly relevant to videotapes and other types of electronic information. When dealing with electronic records, the question of originality is largely moot, given the ease and accuracy with which copies can be made. The *Canada Evidence Act (CEA)*, R.S.C. 1985, c. C-5 was amended in 2000 to expand its accommodation of the evidentiary issues of digital records. Section 31.2(1) provides that:

- 31.2(1) The best evidence rule in respect of an electronic document is satisfied
- (a) on proof of the integrity of the electronic documents system by or in which the electronic document was recorded or stored; or
 - (b) if an evidentiary presumption established under section 31.4 applies.

Thus, in the case of Talking Titler video clips, the burden of proving the veracity of the record (characterized in the *CEA* as an "electronic document") would still exist, but with a shift in focus to the integrity of the system that produced it (an "electronic documents system" in the *Act's* parlance). The challenge becomes one of ensuring that the integrity of the system and procedures followed (recording, data compression, storing, etc.) at the time of recording is imbued in the final archived file.

For a definition of "secure electronic signatures," section 31.8 refers the reader to section 31 of the *Personal Information Privacy and Electronic Documents Act (PIPEDA)*, S.C. 2000, c. 5 where this phrase is defined as,

"secure electronic signature" means an electronic signature that results from the application of a technology or process prescribed by regulations made under subsection 48(1).

By comparison, the *PIPEDA* defines an "electronic signature" as,

"electronic signature" means a signature that consists of one or more letters, characters, numbers or other symbols in digital form incorporated in, attached to or associated with an electronic document.

Through section 31.2(1)(b) above, the *CEA* is capable of codifying an evidentiary presumption via section 31.4, which authorizes the Governor in Council to make regulations respecting:

- (a) the association of secure electronic signatures with persons; and

(b) the integrity of information contained in electronic documents signed with secure electronic signatures.

However, as of January, 2005, it does not appear that any regulations have been promulgated to explicitly prescribe the form of secure electronic signatures pursuant to section 31.4. Further, two cases in which sections 31.1 to 31.8 (i.e. the 2000 amendments) were referred, fail to illuminate the specific use of digital video. They do, however, reinforce the necessity of proffering information from an electronic records system in the prescribed form (*R. v. Chanthalangsy*, (2002) Man.R. (2d) 159, at para. 7); and the need for substantiation of the technological system by an expert fully knowledgeable of its operation (*R. v. Gratton*, 2003 ABQB 728, at para. 124). In reference to an additional case, *R. v. Morgan* ([2002] N.J. 15 (Nfld. and Lab. P.C.)), Hak (2004: v-10) quotes judge Flynn, J. in his summary of the intention of the 2000 amendments to the *Canada Evidence Act*:

[20]...what the sections do is to clothe electronically stored and produced documents with the status of “best evidence” provided they meet certain criteria for their admissibility. For example, the documents in this case must first be proven to be business documents or official or public documents which are admissible of themselves as documentary evidence and as exceptions to the hearsay rule. If they are admissible under these other criteria, then Sections 31.1 and 31.2 operate to make them the best evidence available for that purpose.

Flynn, J’s reference to the hearsay rule indicates yet another of the law’s standards of admissibility. Business records are exempted from the operation of this rule, in that they represent acts done in the ordinary course of business, acts which are by nature not misrepresentative. The broad construction of “business” and “record” in the *Canada Evidence Act* would, it seems, include digital video clips for cadastral purposes.

PIPEDA’s (and *CEA*’s) definition of an electronic signature is consistent with the overall approach of the Uniform Law Conference of Canada’s *Consultation Paper on a Uniform Electronic Evidence Act* (ULCC, 1997) which informed the 2000 amendments to the *CEA*. The ULCC document, in turn, was influenced by the recommendations on evidentiary issues of computer-generated evidence contained in Article 7 of the *UNCITRAL Model Law on Electronic Commerce* (UNCITRAL, 1998). The breadth of consultation and research that went into the drafting of the *UNCITRAL Model Law* is significant in terms of the present work, in that it is anticipated that Talking Titler could be developed and implemented anywhere in the world. Thus, coordination and standardization with broadly based statutory concepts and technical norms are an asset. From the guide to the *Model Law*, in Section I, Part E:

It was observed that the Model Law should permit States to adapt their domestic legislation to developments in communications technology applicable to trade law without necessitating the wholesale removal of the paper-based requirements themselves or disturbing the legal concepts and approaches underlying those

requirements. At the same time, it was said that the electronic fulfilment of writing requirements might in some cases necessitate the development of new rules.

Thus, although Goldstein's (1986) guidelines still apply, substantial technological development and development of the law remains to be done. Clearly these issues affect the implementation of a system such as Talking Titler.

5. CONCLUDING REMARKS

In conclusion, preliminary field tests have shown that a multi-media land record system such as Talking Titler has potential as a support system for land tenure security where conventional records may not be effective, at least not by themselves. In the long term, one can expect that such systems will be implemented in various parts of the world. This is likely in informal settlements and societies where political instability and the threat of violence leave the official state-sponsored cadastral institution open to challenge and perhaps fraud, and in customary systems where oral traditions are an important feature of the land tenure system. However, a great deal of work needs to be done on the technical design features of such a system, as well as the legal, policy and institutional issues. A potential problem is that there remains a vacuum in the law and policy area and so certain multi-media records that are currently available or are being developed may be rejected by the courts in the future. Irrespective of the problems that may be encountered with laws of evidence, multi-media provides evidence that would not normally be available and thus we argue that such a system is likely to reduce the likelihood of cases coming before the courts. We envisage that a simple system of records should be developed, similar to a rudimentary deeds system, but it is possible that a system that is far more complex than existing cadastral survey records and land registration systems may be developed in a particular situation.

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BIOGRAPHICAL DATA

Mike Barry is an Associate Professor and Associate Head in the Geomatics Engineering Department at the University of Calgary, where he has been since the end of 2002. He has PhD, MBA and BSc(Survey) degrees and is a registered Professional Land Surveyor in South Africa. His research interests are in land tenure, analysing and managing change in implementing elements of cadastral systems, and applying spatial data analysis to fiscal cadastres.

Khaleel Khan holds a Canada Lands Surveyor commission and has worked on land surveys on Indian Reserves in Canada. His MSc. thesis focused on this area. He has been involved in consulting to Canadian federal and provincial surveying organizations on land survey and First Nations land management issues. Current research interests include land use planning, survey law, and land survey and registration systems. His PhD dissertation focuses on legal and policy implications of the Talking Titler system.

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