

BIOGRAPHICAL INFORMATION

Dan Shannon
Past President
Integrated Cadastral Information Society

Specific Responsibilities

During 5 years as an ICIS board member, Dan has been responsible for providing governance and oversight. From 2007 to 2009 as President Dan's role was to oversee the General Manager, function as CEO of the Society, and chair the Board of Directors

Past Experience

Dan has worked with TELUS Communications since 1981, holding a variety of roles including Forecaster, GIS Manager, Engineering Manager and Conduit Engineering Manager. While with TELUS Geomatics Dan's responsibilities included managing the Data Operations team as well as being the Alliances Manager, developing and maintaining strategic alliances with TELUS Geomatics' business partners.

Dan has worked a field surveyor for TELUS and for BC Rail

Educational Information

Drafting Technology – College of New Caledonia
Knowledge Management – Royal Roads
MBA – Athabasca University

Professional Associations

GITA 2004-2010

A Practical Model for an Affordable and Accurate Common Cadastre
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Introduction

GIS and CAD Systems are open and spatial data is everywhere. But that's kind of the problem! Sure, data availability is increasing, but the ability of utilities and municipalities to share their spatial information often remains hobbled by cadastre data that's still all over the map, literally.

Organizations need someone to validate the accuracy of the cadastre before committing to the cost of re-aligning infrastructure data. Who better to do so than the surveying community?

Meanwhile, many surveyors consider GIS data to be just a 'pretty picture', not a product with the integrity of a parcel survey. Often it's been a challenge to get the GIS and survey community working together toward a single cadastre that meets the needs of both groups. This is particularly true for a Province of over 235 million acres (Beddoes, Taylor, 2008) with over 1.9 Million active titles (LTSA, 2010).

British Columbia's Integrated Cadastre Information Society has turned to the surveyors to 'pin down' cadastre in a unique and mutually beneficial new model for data sharing.

Integrated Cadastral Information Society

As ICIS states on its website (ICIS, 2009);

- ◆ ICIS is a non-profit society incorporated in May 2001 as collaboration between Local Government, Provincial Government and major Utility companies in British Columbia.
- ◆ ICIS members are dedicated to the 'collaborative sharing and integration of spatial data for the economic and social benefit of British Columbia'.
- ◆ ICIS is about sharing data from multiple agencies so that members can access spatial data from multiple sources in one place.
- ◆ ICIS is committed to protecting shared data with a Data Sharing Agreement and Addendum that all members agree to, ensuring that shared data is legally protected.

ICIS' original purpose in forming was to share spatial information which led to the first key enabler; a common cadastre. This remains ICIS' primary operational objective: to create a maintained cadastre for all of BC.

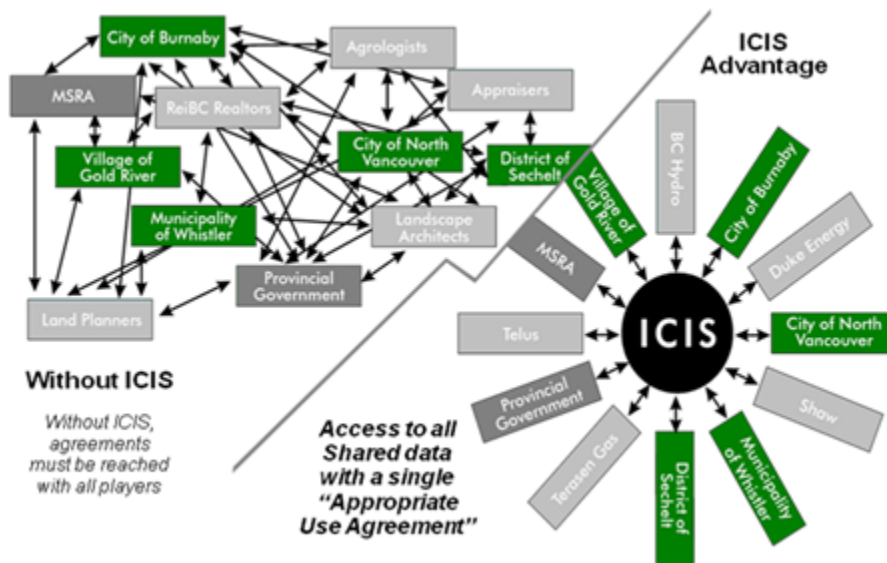


Figure 1 – ICIS Advantage

Initially, ICIS focused on building membership amongst local government while enabling our capabilities for assembling and making available as much member data as possible. Currently, with over 95% of BC's 180+ local governments signed on, they have moved into the next phase; completing the cadastre build while maturing the tools and processes that support ongoing maintenance. This phase is being enabled by the BC Spatial program. BC Spatial's objective is to have each local government maintain their own cadastre; to avoid building and maintaining secondary duplicate products that would be out of sync with the local governments' authoritative versions.

ICIS continues to refine processes and maturing its hardware/software capacity to better enable inter-organizational cadastral management and later will refine the way ICIS currently shares other data, such as infrastructure data from Local Governments and Utilities.

The Address BC project is building tools and processes to do the same thing for civic addresses. This initiative has engaged others beyond our ICIS membership to include Emergency Responders and E911 organizations. By Q2 of 2010, ICIS will have its application running with over 800,000 addresses in the database. Address BC is built on the principle of a single database, configured with various means for each local government to maintain their own address data. Some will upload, some may choose replication, and for smaller, less enabled municipalities ICIS offers a secure Web Application to add and edit of address data over the internet.

Civic Spatial provides a means of encouraging participation in ICIS by local government. Although the Province, BC Assessment, and the Utilities fund ICIS, it initially was a challenge to get some local governments to see why they should

sign up and sharing their spatial data, which some still saw as a revenue source. Civic Spatial is a grant program allowing local governments to apply for funding to help improve the quality of data supplied to ICIS. Some use it to build FME scripting, for example, so they can more easily provide their data to ICIS. Others use the funding to help pay for the installation of more survey monuments in their communities to improve the spatial accuracy of their cadastre. Others have used it to help fund initiatives to reconcile boundary misalignment issues with neighboring municipalities. It isn't a huge amount of money (\$1,500 to \$15,000 per grant) but it has been very effective at showing municipalities that ICIS is there to help them, not just to get their data. The program is funded by ICIS Utilities, the Ministry of Agriculture and Lands, BC Assessment and the BC Real Estate Foundation.

The Need for an 'Accurate' Framework

Carsten Rönnsdorf of the Ordnance Survey suggests "A consistent and accurate base data framework with national coverage, such as OS MasterMap® in Great Britain, makes high-quality base data available to a wide user community. The fact that virtually all large-scale spatial data in [England] is referenced against OS MasterMap® enables true data sharing between different organizations." (Rönnsdorf, 2008) Few would argue, but when a collaborative is formed out of diverse user communities, there are bound to be different definitions applied to basic terms.

What is a "Complete Cadastre"

In the case of ICIS a 2009 needs assessment of its various members asked what each member considered to be 'complete'.

For most, complete means the cadastre fabric has to have two characteristics.

1. All parcels present
2. Parcel Identifiers exist for each parcel.

This second point speaks to the point that despite all the discussion on spatial accuracy, to a large extent the parcel polygon in a cadastre fabric is really a gateway to the information that is of most value, whether that be title, assessment, zoning, interests information or reference to the original survey plan.

While the above criteria did represent a consensus, there remained more to the issue, and it was indeed a matter of different definitions applied to common terms. For some, such as many local governments, parcel meant private property parcels. For the Province, the private parcels were of less importance than the crown land. And for BC Assessment, they concerned themselves somewhat with private parcels, but they were primarily focused on Assessment

Parcels. For utilities Rights of Way and easements were an additional item they considered when speaking about parcel data.

Ultimately, from the perspective of ICIS, as a collaborative, it meant that its operating objectives were set to accommodate the most inclusive definition of parcels. The goal is to create a complete integrated parcel fabric that includes private parcels, Federal and Provincial Crown parcels, interests, Rights of Way and easements data and assessment parcels, with priority placed on those parcels of most interest to all members.

Even the term Parcel Identifier needed clarification as initial cadastre data collected from local government included various combinations of Parcel Identifier (Land Titles PID), Crown Parcel Identifier (PIN) or Jurol (BC Assessment Roll Number). For ICIS, the decision was that PID and PIN data were both required, as both recorded parcels the other did not. Jurols need to be referenced to the other two as appropriate.

Accuracy

Accuracy was another characteristic deemed important by ICIS members.

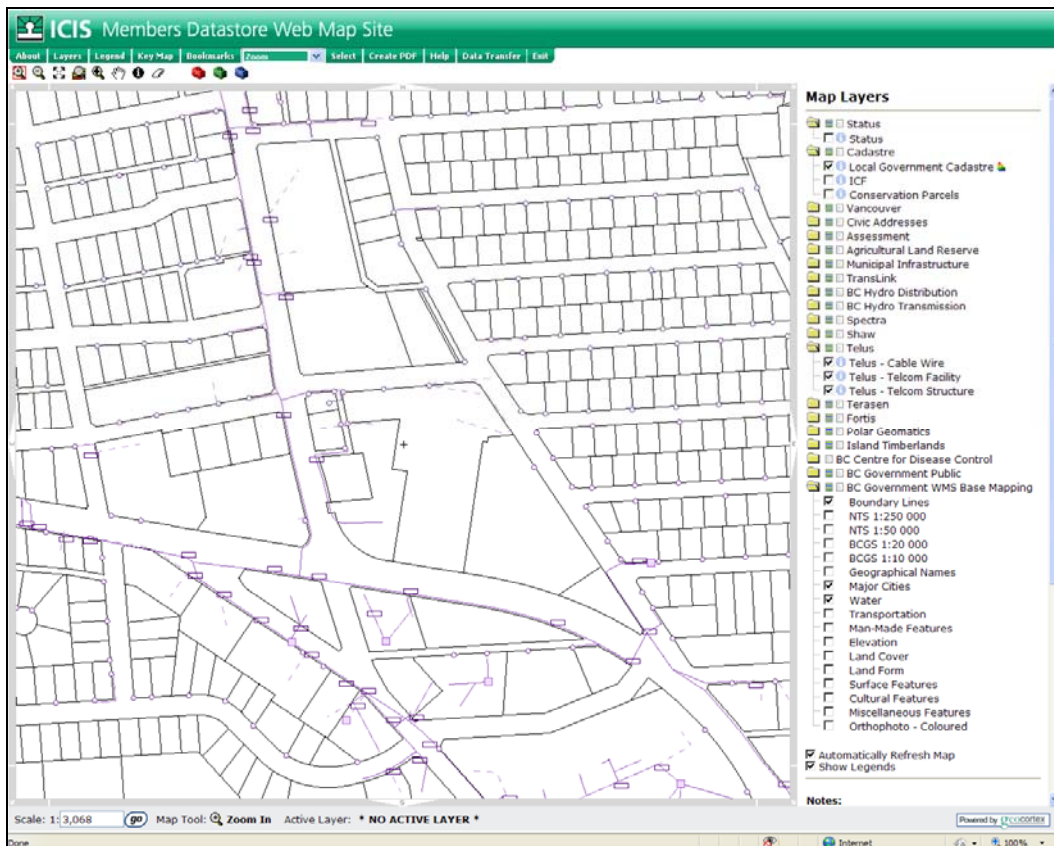


Figure 2 – Local Government Land with Utility Data in Good Alignment

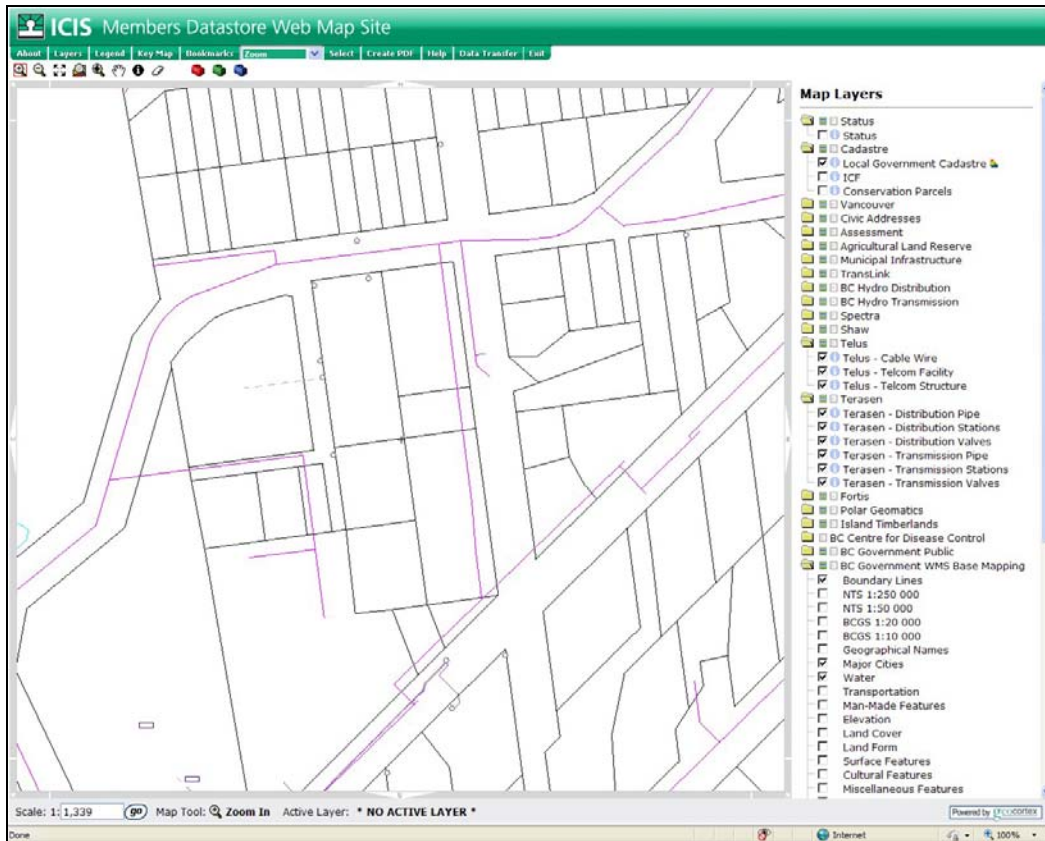


Figure 3 – Example of Utility Not Yet Aligned with LG Data

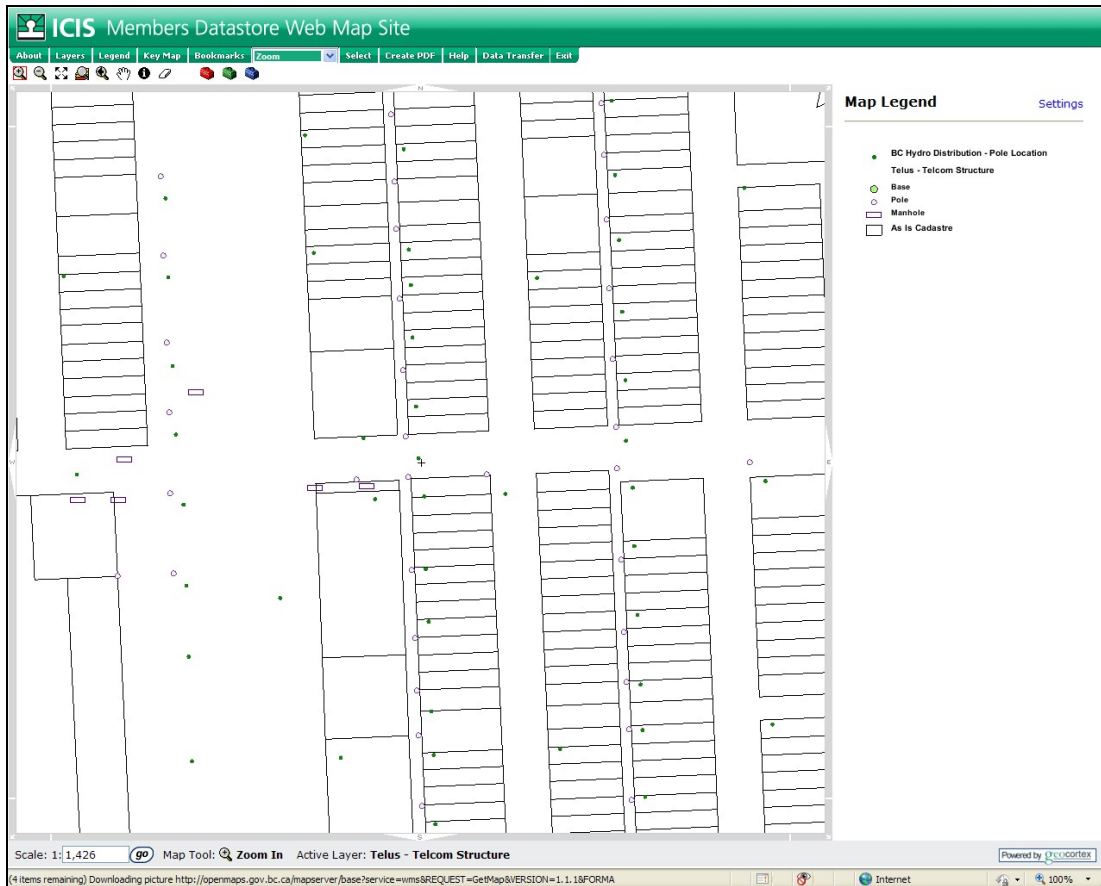


Figure 4 – Joint Poles From Separate Utility GIS

Particularly key for Utility companies was the need to understand accuracy of the parcels. Before they committed to costly data conflation programs to move their existing facilities into alignment with newly adopted ICIS land base, they wanted to be confident the data to which they were re-aligning the facilities was accurate enough that it was unlikely to shift significantly in future. This led to the following metadata requirements being identified regarding accuracy.

- ◆ All members need to know the degree of error inherent in the data.
- ◆ Standard definition of accuracy across the province
- ◆ Accuracy Declaration depends on methodology, which needs to be defined for the parcel and for the layer.

For the most part, accuracy declarations were provided by the local governments supplying the cadastre data and it was one declaration for the entire data set, even in cases where it was well accepted that some data was of a greater, or sometimes lesser accuracy level than assigned to the entire data set.

Incorporating this information into the data deliveries has become one of the operational objectives for ICIS staff. But the question was, how would an objective and consistent method for determining and reporting accuracy be

agreed upon, and would it be reasonable to expect over 180 local governments to not only do the work, but do it in a consistent way?

ICIS has signed on over 95% of local governments, and not all signed local governments have provided cadastre data. Therefore completing the fabric remains the top operational priority.



Figure 5 – ICIS Local Government Member Status (ICIS, 2010)

While the fabric is not yet complete, through implementation of the cadastre available by the members, and through the sharing of other member data, the society has been able to deliver value before achieving its ultimate goal, ensuring continued participation and support.

Meanwhile, there was one key stakeholder group who had not originally been at the table when ICIS was formed: The Surveying community.

Land Title and Survey Authority

The Land Title and Survey Authority of BC (LTSA) was established as independent corporation. It is responsible for managing the land title and survey systems of BC which provide the foundation for real property business and ownership in British Columbia (LTSA, 2010).

Mike Thomson, British Columbia's Surveyor General, heads the Surveyor General Division of LTSA. This division is responsible for;

1. Maintaining the Integrity of BC's Cadastral Survey System
2. Distribution of Survey Records
3. Preparation of Crown Grant Documents

In 2005 ICIS was approached by the Land Title and Survey Authority (LTSA) who had recognized that it would be beneficial to have an integrated parcel cadastre for BC to which it could reference its land title and survey plan information. Their initial position was that the data ICIS was assembling, while of some value, would not in its current form be sufficiently accurate nor was it complete. In addition, the LTSA did not want to build key business processes upon a data set that it did not own or control. It represented too large a risk.

While the LTSA and the Province continue to look for opportunities to fund the creation of a complete provincial cadastre, ICIS continues to work at completing its cadastre fabric and assisting local governments in improving the quality of that data.

So how can the efficiencies of "Create once, use many times" apply when there is such a divide between what the survey and titling community consider an 'acceptable' product vs. what other users of the information require?

Changing Requirements

There are external forces that are bringing these two communities together.

The requirements of the LTSA appears to be moving to 'centre' somewhat in its acknowledgement that much of the ICIS cadastre would be an adequate starting point if there is at least a parcel that can be attributed to a parcel ID.

What would move them even closer to the centre would be an acceptance that regardless of the accuracy of the cadastre fabric, it has been and always will be a derivative *representation* of the survey plan.

It is in the same way that utilities post a representation of their facilities. They do enter data into their GIS databases with some level of geospatial accuracy, yet most also reference the original civil permit which is considered the most trustworthy source of information. The 'running line' in the GIS is a simplistic representation that is very useful to a broad community of users who get all they need from this abstraction.

What is moving the more 'casual' consumers of parcel fabric toward the center? Or in other words, what is fueling the increase demand for accuracy by those who long have advocated accuracy requirements that were based on relative accuracy "As long as we're all using the same base, our infrastructure is accurate relative to each other."

“We need side of street accuracy” had been an all too common accuracy criteria, and there were valid justifications for this position. GIS systems were in many senses abstractions, verging at times on being schematic. For safety, Locates were done based on ‘side of street’ criteria. If a screener notes there are facilities on the side of the street being excavated, a locator is dispatched regardless of the absolute positioning in the GIS. In addition O/S annotation was commonly used, conveyed from as-built documents, on to UG records as annotation or annotated attribution. Conflicts with other utilities were seen as a primary concern.

The most obvious change is the proliferation of GPS enabled field data collection tools that place a spotlight on spatially inaccurate land base data in a GIS. Geoff Zeiss suggests “the As-built Problem” is one of the biggest challenges in infrastructure management (GIS Development, 2006).

The drive for cost efficiency means more firms are finding it unacceptable to produce underground designs for a civil permit on a CAD based system, only to have to enter that information a second time into a GIS as an asset record. Of course this drives not only the need for a spatial data and applications capability to combine civil and GIS data entry, but that work must be done against a cadastre that meets the more rigorous criteria of a civil design application.

The convergence of CAD and GIS, chiefly through the emergence of Building Information Management (BIM), blurs the lines between site specific engineering and geospatial environmental analysis. Everything is spatially related, and there is no longer an obvious dividing line between the two worlds. The increased awareness of the impact of development on its surrounding environment, urban or rural, has created a need for site specific design to occur in context. And, as before, the appetite to duplicate data input at two different levels of abstraction drives convergence.

Increased scrutiny and risk related to trespass also increase the importance of mapping infrastructure accurately against an accurate cadastre base. The public has become more aware, and less tolerant of, utility trespass. Civic web maps showing a cadastre overlay on high-resolution aerial photography allow property owners to identify potential trespass situations more so than before. In BC, there are additional challenges to reconcile utility construction through First Nations lands as the agreements of who and what was permitted and where are often vague and the very veracity of those agreements is subject to challenge. Overall, as contention increases there is greater need to have a more reliable and accurate understanding of where each stakeholders’ assets are in relation not only to each other, but to legal property boundaries as well.

None of these issues can be resolved if GIS and Civil design are performed on different sets of base data. That disconnect will persist.

Cost

The issue of affordability is not insignificant. If a little bit of cash could deliver a complete, correct and current cadastre, it'd have been done long ago. But in a province where there has been to date no support for a legislative funding key or simple Government funding, ICIS and the LTSA continue to work toward a solution. Initial estimates from both parties to build a cadastre from 'scratch' were in the range of \$20 to \$25 Million.

While no objective valuation of the Local Government cadastre has been done, recent estimates suggest the cost of completing the provincial cadastre by leveraging municipal data is at least an order of magnitude less.

Another key benefit of leveraging municipal data is avoiding having a provincial fabric that is not adopted by municipalities, resulting in duplication of effort and frustration for the business community. Unfortunately, this has been the experience in other provinces and it is a situation BC hopes to avoid.

Coming Together

ICIS is employing strategies to bring authors and consumers closer together. ICIS is welcoming private surveying companies as Associate Members of ICIS. Access to ICIS member data is proving useful to Surveyors who are in turn providing data to ICIS members – provides a tool to improve cadastre. In addition, ICIS has invited the Land Title and Survey Authority to the table, with BC's Survey General now sitting on the Board of Directors.

A recent initiative has been to engage the surveying community to assist in providing objective assessment of Local Government Cadastre. This will provided value not only to Utility members, but it will identify areas of priority to guide Civic Spatial grants, and it will assist in valuing Local Government data for possible inclusion into a Cadastral Parcel Fabric should the mechanism to fund an LTSA centric product.

Some of the information they would assess includes how the data for the cadastre is integrated into the local government cadastre. Do they force fit plans into existing data? Are there least squares adjustments applied? Is there any adjustment of surrounding parcels to improve its accuracy based on new survey plan data? How well to the real world coordinates match survey monuments in the area? Who is doing the work? In some cases cities employ registered land surveyors, while in other areas field pick up and mapping is performed by Drafters, clerks or Engineering Technologists.

Conclusion

Working together has been a long process, requiring a lot of patience by all involved. If there were a legislative mechanism in place to fund the build and maintenance of a provincial fabric then there might not have been a requirement for ICIS. Over the past few years, however, one of the perceived weaknesses of the society has proven to be one of its key strengths. Because it is a volunteer effort the board had to work carefully to develop consensus. Without a regulatory 'hammer' to ensure cooperation, members have to listen to each other's needs. Each member group is critical to the society's success, so it's been essential not to steamroll over anyone. The building of trust and the acknowledgement of mutual dependencies may take more time, but the quality of the communication and increased collaboration has become a valuable member benefit. Whether they are connected directly to ICIS as Associate Members, or through the representation of the Surveyor General and the LTSA, ICIS is hopeful that its latest member community, the professional land surveyors of BC come to realize the same benefits, and that together BC achieves a comprehensive, maintained Cadastre of sufficient accuracy and quality to meet everyone's needs.

Appendix A: Requirements Assessment

		Utility 2	
1	<u>Parcel</u>	1a	Completeness To achieve a seamless fabric start by framing the province. Need populated areas of the island. Lots, blocks, plans in area of interest
		1b	Accuracy Better fabric data (land base)
		1c	Currency Framework for relating economic activity to infrastructure. Need title parcels that are current from LG and survey groups. Proposed land base.
		1d	Data Conformity Better use of utility data and LG data
		1e	Attributes PIDs, PINs and legal description. Province data - easements, rights of ways
		2 <u>Addresses</u>	
		Addresses - common reference between customers and Utility 2 for service queries - need to know where people are.	
		Geocoded address point for enabling the determination of who to dispatch. 'right people to the right place.'	
		One-call activities - be more selective on One Call notification buffer zones, reducing those dispatched. 'better the data better the accuracy'	
		4 <u>Other Layers</u>	
FN Data & Federal land - ideally get all federal land (nationally) from ICIS			
5	<u>Miscellany</u>	5b	Training ICIS Workshop
		5c	Participation Will supplement internal Web GIS

Table 1 - Example Assessment for Utility 2

Answers from individual members evaluated and categorized.
Needs Assessment results were consolidated into Matrix.

Utility 1	Utility 2	Utility 3	Utility 4	Utility 5	Local Government	Ministry 1	Ministry 2	Ministry 3	Ministry 4	Authority 1	Authority 2
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Completeness	Utility 1	Utility 2	Utility 3	Utility 4	Utility 5	Local Government	Ministry 1	Ministry 2	Ministry 3	Ministry 4	Authority 1	Authority 2
One authoritative source of information is needed. One place to go to get the information we need.												
Dataset must be complete and cover the whole province.												
All of the real parcels present in the fabric and only the real parcels												
Areas of high interest to BCA without data - high concern re: those w/o resources to join or contribute to ICIS												
Access to maintained data - the 'white space' - admin., muni., prov., fed. boundaries, postal code.												
Complete fabric. Concern over certain areas which may require starting from scratch.												
Need one source for data that is accessible, complete and accurate.												
Administration and Tenure information critical. Use polygon to determine Land Title or tenure plan or have a link to .pdf of plan.												
There is a tie between completeness and simplicity for Front Counter operations - Completeness is more important												
Completeness of fabric is critical												
Very important is boundary of crown land and private land.												
To achieve a seamless fabric start by framing the province. Need populated areas of the island.												
Lots, blocks, plans in area of interest												
parcel data and address data - primary interest is in targeted data areas where Shaw is licensed (vs. filling white space.)												
All parcel data for areas not imported currently in the AMFM production system.												

Table 2 – Combined Matrix for 'Completeness' category

ICIS focused questioning to 'top' concerns to help identify 'hot spots'.
 Further consolidation of results pulled into Matrix Summary.

Business Requirements Matrix - Summary	Utilities					L G Local Government	Province				Authority 1	Authority 2
	Utility 1	Utility 2	Utility 3	Utility 4	Utility 5		Ministry 1	Ministry 2	Ministry 3	Ministry 4		

Parcel

1a	Completeness												
1b	Accuracy												
1c	Currency												
1d	Data Conformity												
1e	Attributes												
1f	Record Metadata												

Addresses

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Meta-Data

3a	Completeness												
3b	Accuracy												
3c	Currency												
3d	Attribute												

Other Layers

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Miscellany

5a	Wish list												
5b	Training												
5c	Participation												

Table 3 – Business Requirements Summary

This assessment of member business requirements was used to set the strategic and operational focus.

Appendix B – Member Testimonials

A sample of member testimonials highlighting the value derived from their involvement in a collaborative data sharing community.

City of Surrey

"Membership with ICIS has allowed the GIS Section of Surrey to work more effectively. It just makes good business sense to collaborate.

The sharing of data fosters economic activity, improves the implementation of information technology standards and facilitates better decision-making because of improved access to the most up-to-date data."

Sean Simpson
GIS Manager

Carrier Sekani Tribal Council

"When people share a common direction and sense of community, they can get where they are going easier and faster because they are traveling on the thrust of one another."

Excerpt from **The Goose Story** of the **Carrier and Sekani People**.

Shaw Cablesystems

"Providing excellent service to our customers is a top priority for Shaw. Our membership with ICIS allows us to work more efficiently by providing land based information that is as close to real time as possible. We are able to pass on the benefits of these efficiencies to our customers by providing more effective service."

Mike Bazowski
Senior Manager

City of Burnaby

"Membership in ICIS brings collaborative, convenient and cost effective access to utility and provincial data and is an important initiative, providing opportunities for Local and Regional Governments to increase capacity with data sharing, grants and software upgrades that improve the cadastral fabric for the economic benefit of all British Columbians while maintaining data 'ownership' for the City of Burnaby."

Brian Sameshima
Chief Information Officer

City of Courtenay

"The common language and the spirit of collaboration at the heart of our ICIS relationship has become an essential element of our efforts. 2010 will see continued improvement of the City of Courtenay's cadastral fabric."

Derek Richmond
Manager of Engineering

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