

## Collaborative Geomatics for Social Innovation

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The Centre for Community Mapping (COMAP) led by **Fred McGarry** specializes in research, development into leading edge Web 2.0 applications which are then broadly deployed in application areas such as environment, health, cultural heritage, economic development and social innovation. COMAP uses technologies developed by the Computer Systems Group (CSG) at the University of Waterloo. CSG is a software engineering research group at the University of Waterloo led by **Professor Don Cowan** that has created the Web Informatics Development Environment (WIDE) toolkit, a set of declarative software technologies designed for building interactive information systems based on the Web 2.0 paradigm.

**Keywords:** Collaborative geomatics, place-based social network  
La géomatique collaborative, un réseau social des collectivités.

### Abstract:

A working paper based on the presentation given by Fred McGarry at the International Conference: *Cartographic Challenges: Movement, Participation, Risk* held at the Università degli Studi di Bergamo. Italy April 23rd-24th 2009:

Inter-agency collaboration with civil society in policy development, planning, decision making and outcomes-tracking is required to enhance governance and adaptive capacity within complex socio-economic ecological systems. Collaborative information infrastructures are emerging that will support cross-scalar, collaborative, place-based services. This type of technology serves to increase the resilience of social ecological systems through the development of social capital, fostering social innovation, the inclusion of a diversity of perspectives and overlap or redundancy in governance systems.

World leading web-based collaborative geomatics, with social networks and application services are being developed in Ontario that enable government and civil society to foster the emergence of governance networks that collectively:

- capture data for cross-scalar analysis, presentation and decision making
- participate in place-based policy development, consultation and dynamic tracking
- sustain community natural and cultural identity values and
- use asset mapping approaches to foster economic development.

The expectation is that highly resolute Orthoimage and thematic mapping will provide a context and fabric where local constituencies can collaboratively sustain local discussions and communications relating to evolving local issues. Collaborative geomatics service initiatives are in planning or production for province-wide application in Ontario, Canada.

The Centre for Community Mapping (COMAP), a not-for-profit corporation, was established in 2005 to do research and development into web-based information systems that rely on collaborative geomatics with social network and application services for social innovation and then to deploy these systems in many different areas of application.

COMAP is building shared information infrastructures for applications in which data, text and media content are authored and managed by communities of interest, practice and geography. COMAP's strategies are designed to address challenges as they are discerned. This paper will discuss known and anticipated challenges and cite projects, being case studies, for which strategies have been or are being implemented.

These strategies include both tools and processes that are responses to anticipated or unanticipated conditions that became apparent through extensive research as COMAP engaged with user-groups and worked to meet their needs. The strategies discussed and illustrated in this paper are:

- a) declarative application development;
- b) collaborative geomatics;
- c) community engagement through dynamic asset mapping processes;
- d) community-based cultural mapping for landscape identity values;
- e) social network services for on-going social innovation and content maintenance;
- f) custodial distribution of authority to publish by assigning access controls using the social network paradigm;
- g) web-based collaboration services for multi-party spatial planning and transactional decision making;
- h) an inclusive service framework for authoritative and volunteered content;
- i) a multi-layer platform approach that leverages community level synergies for system sustainability and
- j) near future context-based mobile computing.

La collaboration inter-agences avec la société civile, dans les domaines de la planification, de la stratégie et des prises de décisions, de la surveillances des données résultantes, est requise afin d'accroître la gouvernance et les capacités d'adaptation au sein de systèmes socio-économiques très complexes. Des réseaux d'informations émergents voient le jour et visent le partage d'informations ce qui appuyera cette collaboration inter-services actuels. Ce genre de technologie sert à rendre plus flexible les systèmes socio-écologiques par le développement de capitaux à caractère social, par la promotion et l'innovation sociale, par l'inclusion de points de vue différents et réduit la redondance des systèmes de gouvernance. (Walker and Salt, 2006.)

À l'avant-garde dans le monde virtuel de l'internet et les bases de données à croisement géomatique ainsi résultant le pouvoir du réseautage social et les applications adaptées aux services sociaux, l'Ontario voit présentement une grande progression dans ce genre de développement informatique ce qui va permettre aux gouvernements et le public de promouvoir une collaboration inter-réseaux :

- La saisie de données pour des fins d'analyses sur mesure, présentations et prises de décision
- L'orientation dans le développement populaire, la consultation publique et les croisements dynamiques de données
- Reconnaître les valeurs culturelles et naturelles des milieux

- L'utilisation d'approches géomatiques afin de promouvoir le développement économique

La prémisse veut que la cartographie thématique à la base de la géomatique moderne, utilisant des images aériennes de qualité jumelées aux bases de données pertinentes, va permettre d'étayer le contexte local, voir régional et supportera une meilleure communication et produira des discussions éclairées relatant les orientations locales. Certaines initiatives en cartographie géomatique inter-agences sont aux stages de la planification ou en cours de production et ces systèmes seront applicables sur tout le territoire de la province de l'Ontario, Canada.

Le Centre pour la cartographie communautaire (COMAP) est un organisme à but non-lucratif, il a été fondé en 2005 afin de déployer les applications informatiques nécessaires et qui dépendent de la géomatique collaborative inter-agences recherchant ainsi l'innovation dans les réseaux et services sociaux.

COMAP bâtit les infrastructures d'information partagé pour les applications informatiques où les données, soient de texte et/ou le contenu thématique, sont saisies et gérées par des communautés intéressées, des gens de la pratique ou en régions.

COMAP a développer des stratégies qui prévoient ou discernent les obstacles. Ce résumé présentera une vision sommaire des ces embuches et des cas d'espèces où nos solutions ont été ou seront implantées. Ces stratégies incluent des outils et des processus qui anticipent les imprévus et la base de recherche avancées que COMAP a complété en partenariat et sur mesure avec des groupes d'utilisateurs. Les stratégies qui seront détaillées dans ce document sont les suivantes:

- a) Le développement de l'application
- b) La géomatique collaborative
- c) L'engagement de la communauté à travers le processus de la cartographie dynamique
- d) La cartographie thématique à base communautaire et culturelle
- e) Le réseautage des services sociaux pour faciliter l'innovation sociale et la mise à jour des données
- f) La distribution et les responsabilités de garde pour la diffusion, le tout, selon le paradigme du réseautage social
- g) Les services à base de l'internet pour les projets à références spatiales et les prises de décisions multi-disciplinaires
- h) La structure pour un service à base de droits d'auteurs et/ou de bénévolat
- i) Une approche multi-fonctions qui soutient les synergies inter-réseaux communautaires
- j) L'accès mobile des données dans le futur

## Introduction:

At the International Conference Cartographic Challenges: Movement, Participation, Risk held at the Università degli Studi di Bergamo Georg Gartner, Vice-President of the International Cartographic Association reminded attendees that Geo-web is more popular than any other Web 2.0 social media application by a wide margin and that this fact represented both a challenge and opportunity for cartographers. This paper explains efforts in Waterloo, Ontario, Canada to leverage both Geo-Web social media technologies and their user-base for progressive purposes as social media applications mature into services that have significant socio-economic and environmental benefit.

‘The Google Maps phenomenon has uncovered new users of geospatial information that was never imagined a few years ago. It is possible that the adoption of the internet as a platform for PGIS applications will open up the process to many people, reduce the cost of organizing PGIS applications and also remove time restrictions on PGIS projects.’  
(Kyem & Saku, 2009: 11)

Collaborative geomatics, social media and application services can enable Web platforms to support consultative contribution and interaction, in which the collective interests of grass-roots and authoritative participants can be negotiated and resolved for societal benefit and economic progress. Such platforms can serve many purposes such as: cultural mapping, planning and decision making, dynamic asset mapping for community economic development, ecosystem stewardship and local news and classifieds. Leading edge strategies, currently in operation or in planning stages, by the Centre for Community Mapping (COMAP) in partnership with the Computer Systems Group of the University of Waterloo in Ontario (UWCSG), are being deployed to meet technological and operational challenges to implementation and wide-spread adoption of these platforms as information infrastructures.

COMAP uses collaborative geomatics and other social networking tools to establish innovative and sustainable virtual communities that share, discover, report and publish information of local relevance. Unlike current popular mapping systems (Google, Yahoo, Bing,...), which allow volunteered but random posting of mapped information, COMAP’s mapping systems provide tools which enable collaborating communities to organize and maintain mapped information around specific interests.

COMAP is building shared information infrastructures for applications in which data, text and media content are authored and managed by communities of interest, practice and geography. COMAP provides application software as a service (SaaS) to portals and to the websites of participating organizations. COMAP’s strategies are designed to address challenges as they are discerned. This paper will discuss known and anticipated challenges and cite projects as case studies for which strategies are being implemented. These strategies include tools and processes that are responses to anticipated or unanticipated conditions that became apparent through extensive research as COMAP engages with user-groups and works to meet their needs. The strategies discussed and illustrated in this paper are:

- a) declarative application development;
- b) collaborative geomatics;
- c) community engagement through dynamic asset mapping processes;
- d) community-based cultural asset mapping for landscape identity values;
- e) social network services for social innovation and content maintenance;

- f) custodial distribution of authority to publish by assigning access controls using the social network paradigm;
- g) web-based collaboration services for multi-party spatial planning and transactional decision making;
- h) an inclusive service framework for authoritative and volunteered content;
- i) a multi-layer platform approach that leverages community level synergies for system sustainability and
- j) near-future context-based mobile computing.

### a) Declarative application development.

COMAP uses an iterative approach to create complex web and database services where the users are completely engaged during the entire specification, design and implementation cycle. The approach is iterative in that once users view or operate a version of the system; they may actually change or refine the specification and thus affect further design and implementation. This method contrasts with the waterfall model where specifications are gathered and then realized as a system without much subsequent input from the user or client. Because part of the iterative approach supports ease of change, COMAP developed systems are usually much easier to maintain than those created using more traditional methods.

The Centre for Community Mapping (COMAP) in partnership with the Computer Systems Group (CSG) at the University of Waterloo is developing software technologies and highly interactive participatory Web 2.0 systems based on the Web Informatics Development Environment (WIDE) toolkit. COMAP and CSG have developed over 50 Web 2.0 interactive information systems many of which involve:

- learning networks tailored to support communities of practice,
- large databases for managing both structured and unstructured data, and
- synthesis processes to create knowledge for specific user groups.

CSG is a software engineering research group at the University of Waterloo led by Professor Don Cowan that has created the Web Informatics Development Environment (WIDE) toolkit a set of software technologies designed for building interactive information systems based on the Web 2.0 paradigm.

In the WIDE context, “programming” has effectively been replaced with a declarative methodology thus making it possible to provide a wizard or forms-based approach to building Web-based systems. This approach allows the technical team to develop web-based information systems about 10 times faster than more traditional methods.

Current WIDE research is producing the second generation of WIDE which supports an even simpler forms-based method for creating data model and workflow descriptions of applications that can then be used to generate software systems. This new technology will be offered as a software service to business and government agencies to enable them to develop applications, without application development services from COMAP.

### b) Collaborative Geomatics.

COMAP anticipates that common mapping consisting of highly resolute airphotos and thematic data will provide a context and fabric where local constituencies can collaboratively sustain local discussions and communications relating to evolving local issues and also use custom built applications based on standard protocols for data capture, analysis and reporting. Collaborative geomatics service initiatives are offered by COMAP, as a result of a project known as the Stewardship Tracking System.

The Stewardship Tracking System (STS) was devised by the Ministry of Natural Resources (OMNR) and the Ontario Federation of Anglers and Hunters with COMAP to address the need for conservation planning for retention of ecosystem functions in the Southern Ontario landscape. The STS is a system which enables the tracking of restoration projects (e.g. landscape elements woodlots, streams, wetlands, prairie) and provides for adaptive management amongst the conservation community of practice. GeoConnections and the Oak Ridges Moraine Foundation funded the project.

A project technical committee comprised of over a dozen non-government and government organizations, oversaw the development of the STS as a concurrent iterative design process, informed by province wide workshops and web-forums. The technical committee comprises OMNR [Southern Science and Information Section, Biodiversity Section (with links to national stewardship), Ontario Stewardship and Community Fisheries and Wildlife Involvement Program, Conservation Ontario and Conservation Authorities ( represented by Otonabee, Nottawasaga, Ganaraska , Kawartha Conservation Authorities) , Ontario Federation of Anglers & Hunters, Forest Gene Conservation Association, Ducks Unlimited Canada, Oak Ridges Moraine Foundation, Eastern Ontario Model Forest, Carolinian Canada, Society for Ecological Restoration, COMAP, and the Faculty of Environment and Computer Systems Group at the University of Waterloo.

The STS project is a web-based database and application that accesses spatial data and information in real time from distributed sources over the Internet. The STS was planned to permit the southern Ontario conservation community participants to collaboratively:

- enter spatial (polygon) and tabular data, photos and documents about their ecological restoration projects as well as exporting entered data to external geographic information systems
- query the database to meet their needs for tracking success of specific restoration projects
- report and summarize monitoring data about numerous restoration projects by numerous parameters (e.g., jurisdiction, implementation year, restoration type, planting stock type)
- implement adaptive management of ecological restoration practices based on an ever-expanding base of knowledge about the factors that contribute to successful ecological restoration projects.

The STS was formally launched and operational for all of the Southern Ontario landscape in November of 2007. To view an Adobe Captivate “Video” that was prepared by the Ministry of Natural Resources to present the STS go to: <http://www.comap.ca/STSVid/Prt1Introduction.htm>

As a result COMAP built a mapping database (WIDE image server, with W3C and Open Geospatial Consortium services: WMS, WFS, VML, SVG ) in cooperation with the Ontario Ministry of Natural Resources (MNR) and Land Information Ontario and can serve thematic and

highly resolute airphoto data for Southern Ontario; the COMAP 'Common Map'. COMAP airphoto data currently extends from Windsor to Peterborough and by year end (2009) will extend to the Quebec border near Montreal. COMAP has installed Quickbird satellite data for remote source water protection regions and anticipates Forest Resource Inventory data for Northern Ontario. To ensure that all of Ontario is served and easily searchable COMAP uses GeoBase satellite data and a Lambert projection throughout.

STS technical objectives achieved:

- common mapping with airphoto, satellite and thematic data to extents available in Ontario
- ability to enter spatial (polygon) and tabular data about stewardship and restoration projects
- stewardship tracking protocol, data model and web service
- ability to export/import spatial data to/from external GIS
- ability to query, report and summarize the database to track success of specific projects.

Remaining STS objectives:

- widespread adoption by the conservation community in Ontario of STS standard protocols for stewardship project tracking
- public awareness of the extent of restoration activities
- identified trends in restoration data that implement adaptive management of stewardship practices
- an expanded base of knowledge about the factors that contribute to successful projects

The STS is an on-going project, acknowledged to be the leading effort in shared information infrastructure for cross-scalar provincial reporting on stewardship in Canada. Several of the most significant challenges encountered were:

- provision for views, differentiated by user, of spatial and other content data,
- governance for distributed authority to access and publish to differentiated views
- cross-scalar reporting of disparate databases and data models (i.e.: program reporting requirements make a one-size-form-fits-all inoperable)

Current advances towards a favourable resolution of the STS challenges, that will permit a roll-up of provincial stewardship activities and analyses of programme efficacy are:

- custodial distribution of authority to publish by assigning access controls using the social network paradigm
- distributed disparate program databases with synchronization tools for STS roll-up

COMAP's infrastructure co-exists with agency geographic information systems (GIS). COMAP supports the capture of fine-scale information using standard protocols which can then be used to augment existing GIS data to permit landscape GIS analyses. COMAP services can increase the value of information management resources by integrating numerous data sources in geographic space in order to provide enhanced direction for asset management decisions. These processes can be manual or automated. The import and export of spatial and attribute data to and from disparate distributed GIS databases can be automated by using COMAP software agents.

### c) Community engagement through dynamic asset mapping processes.

COMAP anticipates that community participants will take the time to populate maps, using collaborative geomatics, with text, data and media to organize and share community perspectives, reporting and analyses, and encourage economic development.

Clay Shirky's concepts for an available 'cognitive surplus' (Clay Shirky, 2009) suggest that community participants do have the time to contribute. As well, the process of community 'Asset Mapping' (Kretzmann, John P. and McKnight, John L., 1993) as initially defined by John McKnight and John Kretzmann and now widely practiced by communities in North America is believed to be an appropriate engine for wide-spread adoption.

Family Service Toronto (FST), a city-wide charity that offers family counselling and community development services, and COMAP have recently formed a partnership to build a portal to support the FST Building Inclusive Communities Division, Community and Neighbourhood Development Unit (CND). CND is funded to facilitate a community development planning process in the O'Connor-Teesdale area that includes established social service agencies, grassroots groups, businesses, faith groups, residents and any other interested community groups that live or work in the O'Connor-Teesdale area. The goal of the O'Connor-Teesdale Community Development Planning Project (OTCDPP) is to create and implement a community planning process, which is fully inclusive and rooted in best practices of community development and empowerment. The main objective is to increase the amount of community planning that is done collaboratively, inclusively and intentionally in the O'Connor- Teasdale community. FST believes that one of the best tools to assist in this process is the development of an "open" and accessible web based asset map that puts mapping tools into the hands of the groups who have the least resources in the community. FST investigated 36 mapping system providers before settling on COMAP as offering the most user-friendly solution.<sup>1</sup>

The evolution of grassroots groups from (horizontal) community circles to coherent organizations with capacity to collaborate with (vertically oriented) external resources is seen, by professional Toronto community developers, as an evolution to viable community governance (Rob Howarth, 2003, A Report for the United Way of Toronto Canada) Survey of Community Building Strategies). Community asset mapping in the pursuit of improving assets and capabilities through collaboration, falls short of viability in situations where governance is weak. In the absence of a coherent system of governance, access by grass-root groups to external resources, by default, falls under the control of the external organizations (that do not necessarily reflect the involved input of community residents). The objective here is to develop capable and effective neighbourhood collaboratives to which resources could be devolved by external agencies.

The following figures containing preliminary design templates are indicative of the form of the NewsAtlas portal that COMAP will build in 2010 with FST as system custodian:

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<sup>1</sup> The FST analysis of the mapping systems can be obtained from Fred McGarry, an author of the paper.

FST has agreed to work with COMAP’s NewsAtlas proposal to work jointly toward accomplishing CNF objectives on an on-going basis. COMAP recommended the newspaper metaphor as a mechanism that would encourage maintenance of current community information. NewsAtlas will pilot with service organizations that participate in FST community development work in 4 Toronto neighbourhoods: O’Connor, Clairlea, Teesdale and Crescent Town. The NewsAtlas service architecture will have three components: (i) a public view with organized news pages, map-layer based search facilities, calendars, classifieds and a service directory (ii) a secure social network service for participants who develop and publish NewsAtlas content and (iii) an underlying database that holds content and application services.

NewsAtlas will start as a community asset mapping initiative and be maintained as a community news source with departments and sections providing: entertainment, arts, sports and recreation

content, lifestyle and spiritual content with mapping and event calendars. The process is available to community groups and social service agencies at no charge which makes the technology available to all and levels the playing field for groups with little or no resources.

At the outset COMAP envisions a Toronto wide service with a list of neighbourhood 'front' pages. The NewsAtlas structure will mimic a city-wide newspaper with neighbourhood sections. As neighbourhoods join NewsAtlas/Toronto, their front-page will be activated and linked at neighbourhood participant sites. Each neighbourhood front-page will be the first page in its neighbourhood websites. All activated neighbourhood front-pages will be portals for local neighbourhood content. All content will be searchable city-wide by drawn map area in combination with powerful temporal and content search tools

The screenshot displays the NewsAtlas website interface. At the top left is the 'newsatlas' logo. Navigation links include 'About', 'FAQs', 'Login/Register', and 'Help'. A secondary navigation bar contains 'Front Page', 'Explore', 'Our News', 'Our Events', 'Our Resources', 'My NewsAtlas', 'Groups', and 'Forums'. The main content area is titled 'Monday 19 October, 2009' and shows the selected neighbourhood 'O'Connor, Teesdale, Crescent Town'. A map search bar is present, along with an 'Events' calendar for October 2009. A sidebar on the left offers options to 'Contribute Content', 'Recommended Content', 'Featured Photos', 'Featured Videos', and 'Forums'. The central map area features an advertisement for 'Royal Bengal' restaurant, which includes a menu, services, and contact information. Below the map, there is a 'Featured articles' section with several placeholder text blocks and dates. The bottom of the page lists sponsors: 'Our sponsors: Family Service Toronto, The Ontario Federation of Indian Business, and United Way Toronto'. Copyright information at the very bottom reads 'Copyright © 2009 | Developed by COMAP | Advertisers' Login | Web design by Common Sense Design | View the Privacy Policy & Terms of Use'.

COMAP's NewsAtlas media services will contribute to building viable community governance. NewsAtlas is intended to bring on-going service sustainability in terms of content, community participation and social enterprise revenues, all to address the main project objective: to increase the amount of community planning that is done collaboratively, inclusively and intentionally.

The NewsAtlas components will be designed to frame and standardize declarative information. In practice, the actors will declare, portray and map their individual and group capacities (assets). COMAP's social network services will emulate community circles, structure relationships between users, leading to practical actions and tangible results. The user and group profile, a key component of the social network, will be designed to encompass information that reflects stages of governance maturity. Where permission is granted, external organizations will be able to access governance information and assess activities to ascertain viability.

### **d) community-based cultural asset mapping for landscape identity values.**

COMAP's most recent software system, the Mennonite Heritage Portrait <sup>2</sup> (MHP), builds on social network and WIKI, as well as Google mapping, concepts. The system combines mapping, social network and WIKI tools with application services. The resulting system allows a community of interest to contribute, discuss, narrate and authenticate specialized content.

The MHP presents and inter-relates current heritage digital media and document collections (such as a photo-negative collection by Peter Entril Snyder a Canadian Mennonite landscape artist), in a comprehensive portrait and narrative. Collections like the negative collection have been digitized and presented along with linked narratives to provide context. The MHP connects this and other, extensive collections, housed in various locations throughout Waterloo Region, and provides collaborative tools:

- for the development of narratives and learning materials that link to collection content,
- for content searches that use combinations of simple map, tags, text phrase and meta-data parameters to reveal, map and list content by themes and quality of provenance, and
- tools that enable social networks of formal and ad-hoc communities of practice to contribute, map and link content.

Novel social network services are provided for the broad engagement of the knowledgeable, professional and academic heritage communities of practice and of youth and family, to initiate a community wide process for continuous improvement of the MHP.

The Mennonite story extends back to the Protestant Reformation in Europe, and has touched most countries around the world. The story of Mennonites in Waterloo Region is closely tied to this broader picture and thus the MHP will be expanded in phases until it presents the full canvas. Tested in Waterloo Region, MHP-derived services are also being rolled out to interested non-Mennonite heritage and cultural groups across Canada.

Cultural content without context provides only part of the picture, a black and white close-up of a vibrant panorama. Local culture and heritage – the buildings and landscapes, community histories, stories, artifacts, paintings, sculpture, music, poetry, photographs, and much more – are among the most powerful tools for consolidating a sense of place and building social capital in

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<sup>2</sup> Mennonite Heritage Portrait (MHP Go to [www.mennoniteheritageportrait.ca](http://www.mennoniteheritageportrait.ca). To view and use all services join the MHP social network). MHP is a social network for a community of practice that contributes digital artifacts and narratives to a rich archival database and web presentation of the Mennonite story. The narratives are WebDocs with WIKI links to digital artifacts and other content types including map location, groups, users, forum threads etc. The MHP uses social network approaches to build a learning network and richer content.

communities. Yet local culture and heritage organizations often lack the tools and capabilities to ‘take stock’ of the full richness of their cultural asset base and communicate and share this richness with residents and visitors to their communities.

Individual heritage groups and heritage sites often operate in information silos, focusing on the content for which they are responsible. In Waterloo Region, where the Mennonite community has a long cultural and economic history, this is a significant concern as numerous groups (Waterloo Historical Society, Mennonite Historical Society of Ontario, Waterloo Regional Heritage Foundation, Doon Heritage Crossroads, Joseph Schneider Haus National Historic Site, etc.) operate to preserve the Region’s unique heritage. A number of museums and collections have begun to digitize their content and make it available online, without reference to material outside their collections. Consequently, many artifacts, media and documents are being displayed in online isolation, without attributions or associations to other collections or material on the same subject.

MHP Objectives and Goals:

- Present content and narratives previously unavailable online in a coherent, easy-to-navigate and useful manner.
- Seamlessly connect content from various collections and present the content in new and meaningful ways, within its proper context.
- Engage Mennonite youth with their culture and history through a social network participatory medium.
- Support social network services to enable local conversations among practitioners, youth, and the community on cultural heritage topics of common interest.
- Provide a mechanism for grassroots generated content to be authenticated and moved into the authoritative collection, i.e. “the canon”.

The MHP provides tools for the development of community narratives with links to a rich database of digital material. Further development of this system to include genealogy and built heritage systems will extend its relevance beyond the immediate community as an attractor for tourism and economic development. As a community-based cultural asset map for landscape identity value the system will have application for land use planning and decision making.

### **e) Social network services for on-going social innovation and content maintenance.**

Social media prompt connection and communication to enhance opportunities for self-organization within virtual communities with shared goals. COMAP offers social network services to encourage social interaction and innovation within virtual communities of interest, practice and geography. COMAP’s social network services prompt communication and enhance opportunities for self-organization among participants that have shared goals and can share applications.

- Communities of interest spring up around subject matter in searchable shared spaces such as forums and wikis rather than organizational hierarchies
- Social media helps people find and connect through user profiles, private messaging, groups, contributed content and WIKI linkage, notification, expert search and social networks
- Tags, social bookmarks, and other social networking tools help bring order to the avalanche of information.

(Andrew Conry-Murray, 2009)

COMAP built a social network service ( My Profiles, My Contacts, My Groups, My Messages, My Recommended Content, My Groups with Forums, managed threads and posts, My Bookmarks, Document development with content upload, writing, WIKI linking, etc.) for its Mennonite Heritage Portrait (MHP). To view a current COMAP heritage system visit and join the recently launched Mennonite Heritage Portrait at <http://www.mennoniteheritageportrait.ca/>. COMAP's social network, as with its mapping, will be a common feature of most COMAP application services. Mapping searches also serve to connect individuals where site related activity is of common interest. COMAP's platform supports extension of social innovation and best practices beyond the location or community of original work.

COMAP has been advised that FedNor, a federal Canadian northern community economic development agency has expressed interest in funding a proposal from the Muskoka Community Network and COMAP to provide web support for the G8 conference to be held in Muskoka , Ontario in June Of 2010. The Muskoka and Parry Sound Collaborative Atlas (G8-MAPSCA). portal will provide quick access to up-to-date G8 Summit Layer information from authoritative sources as and regional information to be discovered on the many and varied layers of the portal. G8-MAPSCA will be truly *community driven*. The many groups and organizations that use, enjoy, represent, protect, and develop the economic, environmental, recreational, heritage and cultural assets in Muskoka will be active participants, providing and maintaining the regional G8-MAPSCA content.

The G8-MAPSCA will be an integrated presentation of the resources of Muskoka and Parry Sound regions. Contextually relevant content will be presented by community organizations using social networks, event calendars and participatory mapping with airborne photography. The presentation of content will serve as an attractor to integrated relevant commercial advertising and connectivity; all one click away.

Muskoka organizational membership lists will be used by COMAP to populate its social network service and provide all participating organization leadership with userid and password access. Leadership participants will be enabled to:

- Create and moderate group forums and invite their membership, and/or participants from the COMAP social network, to join the network and their forums to discuss their agenda and participate in forum-based system applications;
- Control who has access to their group forums, add/delete submitted threads and content and control/deny access to their application(s);
- Add/Update system applications in which they participate (Applications will be tied to group forums that are managed by G8 MAPSCA leadership to ensure that participation and submitted application content is representative of the organization that initiates a forum-based application).

Only members of the G8 MAPSCA social network will be permitted to contribute content and such content will only be published with the permission of the organization that has been assigned the G8 MAPSCA custodian with the right to author content on its own behalf. From completion of the G8 MAPSCA until the close of the G8 Summit conference, participation in the G8 MAPSCA social network services will be deliberately restricted to participants that are representative of Muskoka interests.

### **f) Custodial distribution of authority to publish by assigning access controls using the social network paradigm.**

The NewAtlas system in development with Family Service Toronto, the G8 MAPSCA system that is in development in partnership with Muskoka Community Network, the Invasives Tracking System that is in development in partnership with the Ontario Federation of Anglers and Hunters and all other collaborative geomatics systems developed by COMAP have the same access control challenges. The right to participate in the application social network, contribute and report out data and publish content is distributed to participating organizations and professional individuals, belonging to communities of interest, practice and geography. In all cases system security is or will be managed by the content custodian. The custodian distributes the right to publish and secures agreement (a contract) from rights recipients to conditions necessary for system security and integrity. In NewsAtlas, for example, instead of a single publisher there will be Service Directories of participating neighbourhood individuals, formal and grass-roots groups and agencies that have access, rights and tools to publish.

Participation in the neighbourhood Directory will be managed by the custodian, (e.g. FST in the Toronto NewAtlas), acting as the neighbourhood moderator, until local capacity has been established. Participation will have privileges and responsibilities. A contract between the neighbourhood moderator and each participating individual, group and agency will set out the terms of use. Registered Participants will be able to (or enable their membership or affiliates to) access NewsAtlas content publishing tools and content management services for depictions of their individual or organizational assets. Groups and agencies, in turn, will have responsibility for (i) granting access to their membership and affiliates to tools for publishing on their organization's behalf and (ii) for maintaining the access rights of their membership. Minimum conditions for the right to publish are: Agreement to appoint an organization's group moderator and maintain, in good standing, an organization's membership information for those members that will publish on behalf of the organization.

Authority to publish is effected by granting access to authoring organizations to COMAP's social network services (member profile, group, forum and application content services). The assigned group moderators, in turn, manage the distribution of access rights to group participants (members) who can then access COMAP's social network services and publish application content on behalf of their group.

### **g) Web-based collaboration services for multi-party spatial planning and transactional decision making.**

COMAP has proposed Community Planning, Land Management, Infrastructure and Environmental Resource Management applications services for the Indigenous Cooperative on the Environment (ICE) communities. ICE is a non-aligned national organization.

At the ICE AGM in December 2008, the ICE Board of Directors passed a motion to appoint a lead representative to work with COMAP to develop applications that meets ICE needs.

COMAP's proposal has evolved and is now reframed as the Dreamcatcher Informatics (DI) project with the objective of a secure community driven collaborative geomatics and social innovation software service for Aboriginal Nations developed, managed and maintained by an aboriginal business that:

- supports jurisdiction of First Nations peoples with respect to their lands, ecosystems, resources, culture, traditions and citizenship;
- helps capture, rebuild and restore an authentic aboriginal identity (the spirituality, culture, values, symbols, ceremonies and languages) and
- sustains revenues to support delivery of the DI service

The University of Waterloo, Faculty of Environment (UWFE) in partnership with James Bay, northern Ontario Mushkegowuk First Nations and Mushkegowuk Tribal Council, CSG and COMAP are developing a pilot system for evaluation for a community/regionally-based land use planning process with the objectives to: (i) explore the empowering potential of community and regionally-based land use planning; (ii) determine what Mushkegowuk First Nations would want in community and regionally-based land use plans; (iii) set out a process to develop community-based land use plans using collaborative geomatics.

COMAP has provided a basic system for the UWFE and Mushkegowuk research called First Nations Indigenous Knowledge Mapping and Planning Service. (<http://projects.csg.uwaterloo.ca/fnik/>). This service replicates a new service development, led by Clynt King for the Mississaugas of the New Credit First Nation (MNCFN). The MNCFN Mapping and Planning Service (MAPS) system provides a novel technology that will support an original approach for application based consultation services.

MAPS offers multiparty services for collaborative web sessions. Using MAPS a moderator, who initiates a session, can create and pass a link to other parties in a teleconference. The link gives access to view the moderator's web page. The moderator can 'pass the chalk to' each of the teleconference participants so that participants can each use services for spatial (map-based) feature and text entry on the moderator's page. In this way commentary and spatial elements can be contributed by parties to a teleconference. This ability will be a valuable addition in many application contexts; such as land use consultation, community arts and recreational event planning and collaborative digital media content development.

A database record is kept for all system interaction during the multiparty collaboration session (when parties joined and left, what content was entered, by whom and when etc.) The multiparty collaborative web session service can be adapted to operate in proceedings that have strict evidentiary requirements. If a text chat feature was added this feature could be used for minute taking during a collaboration session. The playback of the database session record should be developed as an easily managed and re-playable file for use in judicial proceedings.

COMAP has developed and launched the Mennonite Heritage Portrait (MHP) above. Any user can join, view and use all services related to the MHP social network, a community of practice that contributes digital artifacts and narratives to a rich archival database and web presentation of the Mennonite story in the Region of Waterloo, Ontario. The narratives are WebDocs with WIKI links to digital artifacts and other content types including map location, groups, users, forum threads etc. The system recommends content to contributors based on their interests and contributions and provides services for communication between participants. (Content author profiles are provided through links associated with content. Messaging facilities are provided to enable contributors to communicate with other contributors that have similar interests.) In this way the MHP deploys social network approaches to build a learning network and richer content.

The DI will deploy services similar to those in MHP for oral and other records of spatial Traditional Environmental Knowledge (TEK) (the spirituality, culture, values, symbols, ceremonies and languages) to help build DI natural and cultural heritage layers.

Planned DI research will advance our intent to build an effective service for the Aboriginal Nations (Mississaugas of the New Credit First Nation, Mushkegowuk First Nations and Mushkegowuk Tribal Council and elsewhere). Laboratory and extensive research and development are needed:

- in the management of access controls for distributed authority to publish
- in the management of spatial filing services
- in the development and use of documents with differentiated access rights
- in the development of a playback service database ‘file’ record of minuted MAPS consultations
- in the interpretation, standardization and application of TEK records for land use constraint purposes and interpretation of MAP records for legal adjudication
- in the integration of layered asset mapping with MAPS services
- in the development of the DI business models and services
- in the development of tools for community engagement and training.

### **h) An inclusive service framework for authoritative and volunteered content;**

The Ontario Invasives Species Tracking System, currently in development by COMAP, for the Ontario Federation of Anglers and Hunters and partnering organizations will use a social network system to allow agencies and the general public to enter site, species, photographs and related content for invasive aquatic and terrestrial species. The data entered will then be verified before it is used to update a provincial database. There are groups, forums and authoring services that the agencies will use to author and publish collaboratively official and authoritative information used to help identify and then control invasive species using mechanical or chemical methods. The agencies that oversee system development refused a public social network, even though the resulting network effects (Amy Shuen, 2008, pp 41-42) would have increased the utility of the system. They reasoned that users may be confused and misconstrue volunteered content with official content.

The benefits of organizing the chaos of social network services for community intentions are legion. Clay Shirky’s comments on ‘cognitive surplus’ (Clay Shirky, 2009) suggest a huge unused capacity that could be channeled for social benefit by new social media frameworks, however, academics, professionals and other authorities strenuously resist the ‘wisdom of the crowd’ for many and often good reasons. COMAP is planning to implement systems that provide for both authoritative and volunteered content in a manner that maintains clear distinctions.

As explained above, COMAP’s most recent software system, the Mennonite Heritage Portrait (MHP), builds on social network and WIKI, as well as Google mapping, concepts. The system combines mapping, social network and WIKI tools with application services. The resulting system allows a community of interest to contribute, discuss and authenticate specialized content.

The MHP permits members of the general public to add digital content to the MHP database and create narratives that link to this and other content in the system. Searches of MHP content rank results according to the number of links embedded in the contributed content. The most linked content appears at the top of the search results. This approach will be further enhanced COMAP’s planned 1812 system.

Called ‘200 Years of Peace: Celebrating the 1812 Bi-centennial through Public History’ the planned system will span southern Ontario and present a comprehensive collection of narratives that are mapped and inter-linked with authoritative content. The system will organize a massive online database of primary and secondary sources that will support researchers, historical tourism, amateur historians, and people interested in the history of the war. In addition this project will create a legacy project for the bi-centennial celebrations. The historian’s social network will

allow for communication between scholars from all disciplines on the same network, rather than the separation created through networks designed for individual disciplines. As scholars from different disciplines converge on the social network our knowledge will deepen and our assumptions will be challenged creating more debate and discussion. This debate will include the general public who are also participating in the conversation about the War of 1812 on the same network.

The intention is to rank search results by authority: source documents or digital artifacts, academic papers (a peer reviewed journal is proposed), known community organizations that have custodial permission to author content, content volunteered by the general public via an open social network but ranked by number of links. In this way the users can distinguish authoritative content from WIKI content but still access all content.

Similar approaches will be investigated for other systems to ensure that the network effects (Amy Shuen, 2008, pp 41-42) that arise from full social network application accrue to the advantage of the community for which the service is intended.

### **i) A multi-layer platform approach that leverages community level synergies for system sustainability.**

The Centre for Community Mapping (COMAP) is a not-for-profit corporation that researches, develops and deploys strategies for social innovation based on modern information and communications technology, with the goal of strengthening civil society. COMAP provides a web presentation of the rural and urban landscape of Ontario where our communities can collaboratively reveal and adapt their practices of caring for our natural, cultural and social fabric.

COMAP deploys geo-web social media services, leveraging grassroots synergies between civil society and local business to create rich multi-layered map-based content with local advertising. Revenues support our social enterprise to build and sustain healthy communities.

Network effects are pervasive and as noted by Amy Shuen: "Online networks form faster, more frequently and more interactively. Active contributors can rapidly trigger a critical mass of online adoption and formation of communities. Many-to-many network effects become more commonplace." (Amy Shuen, 2008, pp 41-42)

As mentioned above, FedNor has recently indicated interest in funding COMAP's multi-layered Muskoka and Parry Sound Collaborative Atlas (MAPSCA), a web presence that will ensure Muskoka and Parry Sound - hosts to the world - provide a visually rich and welcoming experience for the G8 summit in 2010. The system will be truly community driven. The many groups and organizations that use, enjoy, represent, protect, and develop the economic, environmental, recreational, heritage and cultural assets in Muskoka and Parry Sound, will be active participants providing and maintaining the information that they publish to the Atlas. Contextually relevant content will be presented by community organizations using secure social networks, event calendars and participatory mapping with airborne photography.

COMAP's community enterprise strategy, called Mapadit, is intended to provide for the long term sustainability of these and other COMAP services. Mapadit advertising services rely on geographic relevancy to the user and are designed to support community and local economic development as well as COMAP's services.

Audiences interested in visiting Muskoka, patronizing commercial services in Toronto or booking accommodation to visit Ontario for the 1812 bi-centennial will be able to locate advertisers on the map and connect with local accommodation, restaurants, retail outlets etc.

Where the contributed content acts as a geographically relevant attractor to their business services, advertisers can reward community-based content contributors for the quality of their work.

50% of funds generated are channelled back into the services that support local communities and have contributed content. In this way, the reach of Mapadit marketing and advertising will be extended by engaging community volunteers as a sales force. The balance (50%) will be retained by COMAP to defray its direct costs of service, including Mapadit advertising systems, and to further enhance COMAP services.

The objective of Mapadit community enterprise technology is the long term stability and sustainability of systems that support the information technology and communication requirements of collaborating members of Ontario's civil society. As well, by advancing the NewsAtlas system COMAP intends to reverse the decline of local news coverage by traditional media and to reclaim 'public space' for public discourse.

### j) **Near future context-based mobile computing.**

Consider a world where access to the next generation of the Web is highly accessible through a GPS-enabled mobile smart phone. A world in which rich PC web applications extend to the mobile experience bringing personalized, customized and prioritized content to your attention when and where you want it.

Today the smart phone can tell you where to get a Starbucks nearby and when your friends in Facebook are near to you. You might even find your friends at the next Starbucks. While the technology is complex the applications are relatively trivial.

COMAP's next generation Web will bring content, services and products to your attention based on your priorities geographic context and even time.

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