

# Terrain Mapping Information System

## *Moving Forward*

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### **Introduction**

These notes summarize the discussions and consensus reached by the participants, at a two day long workshop on the terrain mapping information system.

### **Defining The Terrain Mapping Information System**

The terrain mapping information system:

- *Gathers old and new terrain mapping and related information*
- *Ensures, as far as possible, the quality and reliability of this information*
- *Places and secures the information in a series of data banks*
- *Makes the information available to a variety of users, for different purposes, and in different formats*

The system contains people and organizations (private, public, and non profit) who:

- Set standards for how terrain mapping information is generated
- Generate terrain mapping information that can be stored
- Set standards for the terrain mapping data that is stored
- Manage and store the terrain mapping data
- Use the terrain mapping information that is available
- Fund the terrain mapping information system
- Manage, coordinate, and provide leadership to the whole system

The data will be stored in three places:

- A digitalized spatial information bank
- A digitalized text based information bank
- A hard copy bank for information that cannot be digitalized

## **Trends Likely To Influence And Shape The Terrain Mapping Information System**

The following trends are likely to influence and shape the development and use of the terrain mapping information system over the next decade.

- Photography technology is moving to larger scales and finer information, and to a use of both aerial photographs and satellite photographs
- Computer technology allows mapping work to be done directly on a computer
- Computer technology will continue to change
- Digitalization of data is the trend
- The Provincial government is moving away from funding, or carrying out directly, terrain mapping work
- The Provincial government has moved away from a rules based approach (for example: in the Forest Practices Code) to an outcomes model, where private companies may choose to do less terrain mapping and related work; or, to do it in unique ways that fit their own specialized needs
- As a result of this Provincial government shift, there are higher expectations on the professional associations to set standards and ethical rules of conduct for terrain mappers and terrain mapping; and, to regulate the professional practices and conduct of their own members
- The Provincial government, like most governments, is adopting more user pay approaches
- At least some users are likely to be prepared to pay for use of the terrain mapping information system
- The Provincial government continues to change its technological systems and approaches, meaning that outside users (may) have to update their own technology
- There has been a tendency within the Provincial government, and other governments, to create different, and unconnected, data bases
- The Federal government is developing a new national Land and Water Information Service, focused on agricultural issues, and in partnership with the provinces
- Members of the terrain mapping profession are aging and retiring, while new people are entering the field
- The need for terrain mapping has shifted from a primary focus on forestry interests, public and private, to many other economic sectors and interests such as environmental sustainability, mining, land development, and oil and gas

- Some of these economic sectors have the funds to use alternate and/or new technologies
- The amount of terrain mapping and related information has been growing in size and complexity
- Yet, at the same time, because of changes in Provincial government regulatory practices, there may be less terrain mapping and related information in the future; or, less that is publicly available
- Generally, information system users have higher expectations for service access, quality, and comprehensiveness; and, expect the system and technology to operate in user friendly ways
- The public's expectations regarding understanding of, and action on, environmental issues is growing
- More First Nations communities, organizations, and governments are becoming interested in using terrain mapping and terrain mapping information

Some of the implications of these trends are:

- Increasing costs for consultants and professionals in carrying out terrain mapping work, and in using the terrain mapping information system
- Less terrain maps and related information generated publicly, through public funds, or through public regulatory expectations - information that is more easily made available for the terrain mapping information system
- More terrain maps and related information generated privately - information that is less easily made available for the terrain mapping information system because it is more specialized and/or privately owned
- Loss of terrain mapping knowledge and expertise in Provincial government ministries
- Loss of the informal knowledge of very experienced professionals, both inside government and outside
- A constant need to provide training and mentoring to new people in the terrain mapping field; and, to ensure that knowledge from years of experience in the field is passed on
- A terrain mapping field that is becoming more complex because of the more diverse interests, and the more diverse ways of carrying out terrain mapping work and generating data
- Diverse interests who, while perhaps wanting a basic and common set of information, also want much more specialized information
- Loss of old terrain mapping and related information that cannot fit the changing technologies
- Possibilities of bringing traditional First Nations knowledge of the land into the terrain mapping information system

*Overall, the terrain mapping field and profession is experiencing a major shift from being largely shaped by the requirements, regulatory frameworks, funding, and direct work of the Provincial government and forestry interests, to being largely shaped by the interests and needs of specific and more diverse users of the information, including public agencies (Provincial ministries, Federal departments, municipalities, and regional districts), First Nations governments, private companies, and individual citizens.*

This shift means that:

- New terrain mapping work is, and will be, defined more by the needs of each unique customer; and, less by a broader public perspective on the importance of comprehensive terrain mapping information of use to everyone
- The terrain mapping information system will have to be highly flexible to be able to embrace the diversity of terrain mapping work now being done
- There are significant amounts of old terrain mapping data and data sources (for example aerial photographs) that need to be gathered from people's offices, before people retire or the offices are closed, so the information is not lost.

## **The Users Of The Terrain Mapping Information System, And Their Interests**

There are a variety of potential users of the terrain mapping information system, who have different needs and interests.

- *Members of the general public*
- *International groups*
- *Students, researchers, teachers, and universities*
- *Advocacy groups, organizations, and individuals*
- *Governments and government staff: Provincial ministries, Federal departments, municipalities, regional districts, and First Nations governments*
- *Private industries and their staff: forestry, mining, oil and gas, land development,*
- *Private consultants who work for government and/or private industry*

At the high end, these users are looking for:

- Fast, easy, logical, and efficient access
- Access to both terrain mapping information, and related data (for example: field notes, specialized technical reports, and meta data)
- Access to different kinds of information (for example: about soils, stability, vegetation, ecology, ...)
- Access to information on contiguous geographic areas
- One stop access to all information; or, at least, one stop access to basic information and to an index of the other available information
- Reliable and quality data; and/or, assessments of data reliability and quality
- User friendly search engines, that are both spatial and linguistic
- Data in different formats
- Access to information and advice about how to use the terrain mapping information system
- Access to quickly and easily available customer supports

Users may be prepared to pay for access to the terrain mapping information system; but, likely, only for the deeper or more specialized information. The question of user fees, while identified, was not addressed at the workshop. For most people, the presumption is that use of the terrain mapping information system should be free.

## **Policies That Should Drive The Ideal Terrain Mapping Information System**

Some people would prefer to see a terrain mapping information system where government carries out all or most of the terrain mapping work; and, is, therefore, more able to control the comprehensiveness and quality to, and access of, the data. It seems unlikely that the Provincial government would be interested in this older model.

An ideal terrain mapping information system would:

- *Include both basic terrain maps and related information, broader information, and deeper terrain mapping related information*
- *Be free, at least at the basic information levels; or, ensure that the benefits offered relate to the fees charged*
- *Include both old and new terrain mapping and related information*

- *Cover public, private and First Nations land (recognizing that there are both financial and cultural proprietary interests)*
- *Be government run, managed, and funded*
- *Be structured and funded in such a way that it is sustainable over the longer term, and not subject to government re-structuring processes*

As governments change, develop new policies, directions, and priorities, and re-structure, information can be easily lost. Often, old and valuable information is stored privately in the offices of individual government staff, who are acting as informal custodians of the information. A key issue raised throughout the workshop was to ensure that this information, currently informally stored, be retrieved and stored.

## **The Players In The Terrain Mapping Information System, And Their Potential Roles And Responsibilities**

In an ideal world, each of the players in the terrain mapping information system would carry out, well, the following roles and responsibilities. More work needs to be done to build relationships with the various users, and to test out over time their interests and real usage of the terrain mapping information system.

### ***Private Companies***

- Provide good information and directions to the professionals and consultants hired to carry out terrain mapping work
- Follow professional standards, and hire accredited professionals, in carrying out terrain mapping work
- Carry out directly, or fund, terrain mapping work
- Make available to the terrain mapping information system, at least the basic information and raw data available from any new terrain mapping work
- Follow agreed upon standards in making information available to the terrain mapping information system
- Reliably store old terrain mapping information; and, be prepared to make some of this available to the terrain mapping information system
- Fund the terrain mapping information system
- Provide input to the design of the terrain mapping information system

The case for private companies supporting and using the terrain mapping information system includes:

- Access to sound and reliable information that supports better decisions, certainty, and risk management
- Access to information that improves their own terrain mapping work; and, makes this work more efficient
- Access to information that is essential in carrying out “bigger picture” work (for example: landscape management)
- Condition of accessing crown land, gaining licenses or permits, gaining environmental assessment approvals, or using government funds

The challenges in gaining the support of private companies include:

- Proprietary interests in information privately generated
- Resistance to giving away for free information that has cost money to generate

Private companies may also be interested in:

- Additional user benefits (for example: access to specialized information, or private management and storage of their own terrain mapping data) as a quid pro quo for providing information

### ***Individual Professionals And The Terrain Mapping Profession***

- Carry out quality and professional work, and create quality products
- Provide assessments of the quality of the data, and the data gaps
- Follow terrain mapping professional standards
- Follow terrain mapping information system data standards
- Use the terrain mapping information system
- Work in partnership with governments and private companies to support and build the terrain mapping information system
- Ensure that agreements reached about the transfer of data to the terrain mapping information system are upheld
- Provide input to the design of the terrain mapping information system

The case for individual professionals supporting and using the terrain mapping information system includes:

- Access to information that improves their own terrain mapping work; and, makes this work more efficient
- Collegial support for the terrain mapping field, and for fellow professionals in the field
- Condition of being an accredited professional

### ***Professional Associations***

- Develop and regulate professional and ethical standards of practice
- Provide increased professional training and mentoring related to terrain mapping
- Provide input to the design of the terrain mapping information system

The case for professional associations supporting and using the terrain mapping information system includes:

- Benefits to member professionals
- Increased standards and reputation of the terrain mapping profession

### ***Government Ministries And Departments***

- Ensure that old and new terrain mapping and related information is made available
- Use the terrain mapping information system
- Ensure coordination across Provincial ministries, Federal departments, and municipalities and regional districts in carrying out terrain mapping and related work
- Fund the terrain mapping information system
- Make a long term commitment to sustaining the terrain mapping information system
- Provide input to the design of the terrain mapping information system
- Develop and enforce the standards for the terrain mapping information system

The case for governments supporting and using the terrain mapping information system includes:

- Access to information to support land use management and decision-making
- Overall responsibility for public lands

- Stewardship of crown lands
- Overall responsibility for environmental management on crown lands
- Support to economic and employment development
- Terrain mapping information available as a general public benefit

The latter argument relates to the increasing interest and concern among members of the general public about environmental issues.

## **The Case For The Terrain Mapping Information System**

The analysis of the interests of diverse users suggests that the case for the terrain mapping information system is based on:

- *Public access to information that has been generated through government work, funds, and requirements*
- *Increased quality, efficiency, and effectiveness of terrain mapping work, leading to better decision-making among public agencies and private companies*
- *Storage of old information that would be useful in the future, avoiding duplicating field and mapping work, and building on previous work*

It is not clear at this point what combination of “incentives” and “requirements” will best motivate public agencies, private companies, and individual professionals to continue to provide new terrain maps and related information for storage in the terrain mapping information system, and, therefore, for collective future use.

## **Leadership Within The Terrain Mapping Information System**

Systems work well with leaders who pay attention to the overall systems issues, and to the relationships among all of the players in the system.

Currently, the Provincial government is developing an internal system and structure where:

- Collectively, six deputy ministers have responsibility for the overall information systems

- There is a single spatial data resource bank to store the data from a variety of information systems
- Each information system has a custodian who has responsibility for data quality, data standards, and data use; and, for developing parallel text based information storage systems
- In the terrain mapping information system, the custodians are staff within the Ministry of the Environment.

There is general agreement that the overall leadership responsibility for the terrain mapping information system should lie with the custodians, within the Ministry of Environment.

There is also a concern that, if the terrain mapping information system is to be robust in the future, then there needs to be continuity in the role of custodian.

## **Implementation Requirements For The Terrain Mapping Information System**

A number of implementation issues regarding the terrain mapping information system were discussed and addressed.

### ***(a) Standards For Terrain Mapping Work***

The quality and reliability of the terrain data, particularly any new terrain data, entered into the data storage banks, rests, in the end, on the professionalism of individual terrain mappers.

There is agreement that:

- Terrain mapping is both a science and an art
- The terrain mapping profession needs a formal statement of professional standards, outlining the required:
  - Educational backgrounds and qualifications
  - Work experience
  - Work practices
  - Work sign offs

- Ethics
  - On-going professional development
  - Peer reviews
- The responsibility for developing and monitoring these professional standards lies jointly with the three related professional associations: APEGBC, BCIA, and ABCFP
  - It may be necessary to define two levels of professional practice: qualified professionals and registered practitioners
  - There needs to be on-going professional education and training for new and established terrain mappers, including:
    - A plan for ensuring that, over a 2 –3 year period, there is a full rotation of the required courses
    - An outline of the skills and courses required to become a professional and accredited terrain mapper
    - Mentoring opportunities, particularly for new people
    - Opportunities to engage with, and learn from peers, such as joint field trips and discussion of unique situations
    - Specialized training on a range of issues such as: GIS and First Nations interest and use of terrain mapping
  - The responsibility for professional education lies with the three related professional associations
  - The terrain mapping profession needs to be promoted, through:
    - Individual terrain mapping professionals educating their clients on the full use of terrain maps and related information
    - Using the terrain mapping information system to provide basic information for the public on terrain mapping
    - Marketing the terrain mapping information system so that its use points people to the value of terrain mappers and their work

Given the future trend for the terrain mapping field becoming more diverse, with more diverse individuals and organizations generating and using the information in more diverse ways, the terrain mapping profession, and the relationships among individual professional terrain mappers, becomes a central “glue” for the field. In other words, the field is no longer “glued” by the actions of the Provincial government and forestry interests.

**(b) *Standards For Terrain Mapping Data***

The data standards define the language, definitions, and degree of comprehensiveness required for a terrain map and related information to be entered into the data storage banks.

There is agreement that:

- There needs to be a balance between consistency and flexibility
- The standards need to be created in such a way that the terrain mapping information system is robust for the future
- Individual terrain mapping professionals need to review the draft statement of data standards
- Including field notes in the data stored is essential
- Digitalization will be the trend for the future
- Old data that cannot be digitalized must be retained in some way

The question was raised as to whether the terrain mapping profession should define a set of professional data standards. There is agreement that this is neither possible nor desirable, given that terrain mapping work is now shaped by the diverse and particular needs of individual customers, whether these are public agencies, private companies, or individual citizens.

**(c) *Bringing Old Data Up To Digital Standards And Ensuring Data Reliability***

There is a project underway to bring the available old digital data up to the required digital standards for entry into the terrain mapping information system.

The reliability of the data, and hence the confidence of users, in the terrain mapping information system will be ensured through:

- Developing professional mapping standards that will ensure all new data is well developed and peer reviewed; and, ensuring that professionals sign off on the data before it is entered into the information system
- Creating a formal complaint system as part of the accredited professional mapper process
- Entering back up meta data into the terrain mapping information system for all old terrain maps
- Ensuring that there is a feedback system for users of the terrain mapping information system to identify terrain maps and related data that are not reliable
- Re-mapping areas of the province where it is clear that the existing terrain maps and related information are not adequate nor reliable

***(d) Gathering And Storing Old Data***

There is a concern that a considerable amount of old terrain maps and related information is sitting in different government offices and private companies. Much of this was developed in a time when the Provincial government required terrain mapping and maps of private companies, particularly in the forest industry.

This old information is invaluable; and, needs to be retrieved and stored safely.

***(e) Providing Education And Training***

Education and training is needed for two purposes:

- Ensuring that people can use the terrain mapping information system efficiently and effectively
  - Hands on technical training workshops

- Promoting terrain mapping, terrain mapping data, and the terrain mapping information system to diverse users and individual citizens
  - Basic training courses, in the classroom and the field, on terrain mapping

***(f) Marketing The Terrain Mapping Information System***

The terrain mapping information system needs to be promoted and marketed, through:

- Distributing information through the professional associations, university courses and departments, the network of terrain mapping consultants in B.C. and Alberta, and the network of key individuals in the terrain mapping field
- Training events for potential users and terrain mapping professionals

***(g) Providing Additional Tools For Users Of The Terrain Mapping Information System***

There is agreement that the terrain mapping information system should provide a range of tools for system users and terrain mapping professionals, including:

- Software to translate string digital data into spatial data
- Software that can be downloaded for interacting with the terrain mapping information system
- Information for the public on the terrain mapping profession, including, potentially, a video
- A list serve to provide up to date information for terrain mapping professionals (for example: government department and ministry, and private company RFPs)
- A list serve to allow information sharing and problem solving among terrain mapping professionals

## **Priorities In Moving Forward On The Terrain Mapping Information System**

There is agreement that there should be two overall priorities in further developing the terrain mapping information system:

- Building the digital data storage banks, both spatial and text, and ensuring that they can be easily used, through:
  - Bringing old digital data up to the required digital standards
  - Entering this data in the new data storage banks
  - De-bugging the terrain mapping information system
  - Then, entering the new terrain mapping and related data as it becomes available
  
- Ensuring that old, non digital data, is not lost, through:
  - Making an inventory of all of the old data, including where it is currently stored
  - Negotiating an agreement with an agency within the Provincial government to store this data safely, and for the longer term
  - On a priority basis, retrieving the old data, and storing it, if it cannot be digitalized or scanned
  - On a priority basis, beginning to scan the old data (where possible), so it can be entered in the new text data storage bank