

Technological Means To Assist Remote Sensing Training  
- A Canadian Perspective -

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Abstract

Advanced technological tools have their costs and benefits. They are being relied upon increasingly for their aptitude in getting complex and abstract concepts across. They are particularly useful for attracting and educating the non-professional in remote sensing topics. The Canadian experience in remote sensing training is evolving through use of a variety of (especially) computer-aided techniques. Using electronic bulletin boards for communication, CD-ROMs for bulk storage of imagery, hypertext "documents" for self directed training, the Canadian remote sensing community is faced by an ever-growing sophistication in services and products. The challenge is for both the provider and user of these technologies to exploit them profitably and well.

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As with any other approach to training, the use of technological aids has its supporters and detractors, its benefits and limitations, its cost and returns. Since the decision to use technology is rarely a "yes" or "no" choice, it most often boils down to what extent to make use of current technological advances. There are many questions along the way, most often surrounding the exploitation of computer hardware and software, despite other forms of technology that are also available.

In the 1990s, we are starting to make use of various forms of multimedia, employing visuals, animation, sound and more. The use of these mechanisms are found to be useful because the extra dimensions (over the more conventional still "slides") of time and audio, for example, multiply our abilities to get "the message" across. Considering the often complex and abstract concepts that we deal with in the remote sensing field, this extra "bandwidth" is not only useful but quite necessary. Consider the difficulty in getting across the concept of the "synthetic aperture" for a radar system. Most of us who teach such topics have to use a lot of body language and gymnastics in order to provide a still imperfect visual analogue. A well-designed computer animation of this topic would be much more informative, elegant, appealing and, therefore: successful.

Advanced (computer-based) technology for training is not only convenient, but anticipated and demanded by modern audiences. Surrounded by modern technological conveniences in our day-to-day business and home life, a contemporary individual expects technology and its benefits at every turn. Decade-old technology bores an audience and detracts from attempts at knowledge transfer. Whether we like it or not, we are inexorably caught up in the technology revolution. It is opportune and judicious to exploit the tools that work best.

Be that as it may, we have to watch out for the pitfalls of technological innovation. As with any other means of delivering information, one has to ensure that the message content is not overshadowed by the delivery mechanism.

The use of advanced computer products for training in remote sensing has been accelerating in Canada. Government, academia and industry are producing an expanding variety of products. Training efforts are increasingly exploiting these training aids. With the proliferation of computer equipment around the country, it becomes practicable to create and send "stand-alone" products that the user can employ by him/herself. Widely available computer hardware also means that the trainer no longer has to lug equipment around, but simply carry the necessary data/media.

The evolution of computer-based training materials in Canada is likely mirrored in other countries. Several developmental "steps" are noticeable in hindsight:

With the preparation of large and complex training manuals such as the "Radar Training Manual", it was a natural step to provide the manual in digital form, since it was prepared in a computer/wordprocessing environment. In digital form, the trainer/educator could edit the text and graphics to suit his/her presentation style, and make customized handouts. Personal experience could be appended easily.

At the same time, image analysis software, intended exclusively for image analysis was being "adapted" to serve for presentations or training events. Those packages with additional capability of user-created macros were used for making interactive, but limited presentations or demonstrations of remote sensing techniques.

Eventually, presentations or training packages were developed using "hypertext" software. Products such as the "Radarsat Tutor", "ERS-1 Electronic User's Guide", "IceXpert" employ hypertext linking to allow an interactive presentation of text, graphics and images. The more sophisticated versions even use animated graphics to capture the viewer's interest and to get complex or time-dependent concepts across.

Since remote sensing usage is imagery-intensive by nature, developers have eagerly embraced technology which allows for the convenient storage of large volumes of imagery. The recent popularity of the CD-ROM has been a boon to those preparing imagery sets, catalogues, tutorials and image manipulation software. Consideration is now being given to using the CD-ROM platform for inexpensive publishing of proceedings of conferences, meetings, workshops, etc. Several remote sensing packages of imagery, explanatory text and access/manipulation software have been published

on CD-ROM (e.g. "Radar Remote Sensing Imagery of Coastal Regions", "Canadian ERS-1 SAR Scenes", "Sample Airborne SAR Images", and "Geoscope". Most of these are imagery-intensive, and enjoy the hundreds of megabytes of space available on CD-ROM. The read-only feature of this medium ensures a much lower risk of data corruption than on conventional magnetic media.

The accelerating use of computer communications and bulletin boards is an additional benefit to trainers. It gives them access to educational materials (software, imagery, graphics, documents, etc.) as well as advice, discussion, and awareness of institutions and events. The Canadian GCNET system maintained at the Canada Centre for Remote Sensing (CCRS) offers connection to:

- the International Directory Network (IDN) for access to a centralized, multidisciplinary directory of scientific data sets pertinent to global change research;
- international data centres for satellite imagery
- the Canadian image inventory of CCRS for LANDSAT, MOS, NOAA, SPOT satellite images;
- RESORS bibliographic database of (international) remote sensing publications;
- PlaNet bulletin board for services, products and activities and projects of the Canadian remote sensing community, as well as company information, events, organization charts, provincial/territorial centres and organizations, and special interest groups.

One of the most heralded products in the remote sensing / GIS field is the "Geoscope" package. A joint undertaking of the Canada Centre for Remote Sensing, the Canadian Space Agency, private companies and other partners, it addresses the need for education and research in a large variety of global environmental issues. It is a Canadian contribution to International Space Year 1992. Global and regional data sets were collected from contributors from around the world. Hundreds of "layers" of data include: cloud distribution, ozone concentrations, sea ice distribution, soil maps, ocean currents, elevation and bathymetry, vegetation distribution, wave heights, earthquakes, forest dynamics, landmass movements, air temperatures, precipitation and much more. Accompanying software allows for image/map manipulation as in an image analysis and GIS package. The software permits the creation by the user of "scenarios" for educational purposes, to concentrate on the evaluation and comparison of specific data sets and images. Several scenarios come prepackaged with Geoscope, and more will be added in later releases. A beta version is now available, with the formal product release expected in the fall of 1993.

In order to provide a comprehensive single source of information on remote sensing training materials and mechanisms, CCRS is contracting the preparation of a resource guide for Canada. This guide will be printed, as well as placed in electronic format on the CCRS bulletin board. Updates to the guide will be invited from the remote sensing community through contributions from the readership. These will be posted in "electronic appendices" to the guide, as it appears on the bulletin board, thus presenting a continuously evolving document that should never be outdated.

Contacts:

1. **■ ■ Canadian ERS-1 Electronic User's Guide, Canadian ERS-1 SAR Scenes on CD-ROM ■ ■**  
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