USER DEVELOPMENT AND THE REMOTE SENSING COMMUNITY

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INTRODUCTION

Technology transfer is not just a fashionable phrase to use in government remote sensing agencies; it is a requisite activity upon which depends the well being of the national remote sensing community. It can be thought of as the equivalent to marketing by the commercial sector. We don't delude ourselves with the belief that reliable sources of data, advanced hardware and software tools and competent staff are sufficient to ensure the continuity and growth of our earth observation programs. In addition to these, we must rely on a well-established and growing base of paying users who demand our products and services. But these users do not come unsolicited to a "store front". In fact, they do not become "users" until after a long and sometimes painful process of proving the technology to them.

I submit, that there are actually two major steps in creating a new "user". The second step is what might be referred to as the technology transfer process. This is the "proving" ground, wherein the technology is shown to be sufficiently cost effective, practicable, accurate, timely, etc. It may also include the steps necessary to incorporate the technology into the operational process of the (potential) user agency (e.g. pilot projects, training programs, etc.). The first step, however, is the critical precursor to this and is often unrecognized. It is, simply put, finding the (potential) user.

Too often we deal in our everyday activities within the comfortable confines of our somewhat static user community. Most often our community is defined by the names on our mailing list or contacts database. It is certainly easy to communicate with these people because we know them, and perhaps have dealt with them as clients. Yet these, for the most part, are the "converted". It is a troublesome step, but nonetheless crucial, to continually expand our client base by finding and developing new users.

Daily we immerse ourselves in the minutiae of remote sensing technology, discussing its issues with our peers. It is a sobering thought to remind ourselves that most of our users spend very little time with this technology, being involved with their own work objectives and considering remote sensing as one of the many tools that they could use. Indeed, most of the world of commerce and government does not know that our community and technology exist!

That is why we must recognize that there are potential users out there, that they won't come to us because they don't know we exist, and that we must ferret them out before any technology transfer can take place.

FINDING USERS

Another way to put it, is that unless you are out there, actively searching for potential users, you are conducting a passive marketing exercise - and "passive marketing" is an oxymoron. When one has to overcome the many barriers to the introduction of new technologies in the workplace (professional jealousies, techno-phobia, large start-up costs, unspecified benefits, technical risks, etc.), then only a well-targeted, pro-active marketing approach can hope to achieve success.

Attendance at remote sensing symposia is not the optimum approach to marketing remote sensing. Anyone who has taken the trouble to learn of, and attend such events should be considered part of the "already converted". The search should be for the "unconverted". They will not be found participating in remote sensing association meetings, seminars or workshops. They will not be reading remote sensing journals. They will be found, instead, at their place of work, giving very little thought at all to remote sensing.

So, where do we find these elusive and hidden "potential" clients? Perhaps we should first ask which organizations they would belong to. In the quest to define a market for remote sensing, the three main "client" areas must be examined: academia, the private sector and government(s).

Academia

Educational institutions harbour three kinds of opportunities for creating new users and technological partners.

(i) Educating students to be aware of remote sensing technology is a long-term investment. When these students are in the working force, and especially in later years when they are in positions of (financial) authority, then a "payoff" can be expected in their approachability and openness to this technology.

(ii) Educators, meanwhile, should be seen as a potential source of a multiplier effect to training efforts. By educating the educators, we enlarge our training potential many-fold, not only in dealing with the "captive" audiences in their institutions, but those "volunteer" audiences in extension, evening and adult courses. We further empower their assistance to our cause by creating and making accessible, convenient and suitable training aids.

(iii) Besides education, the traditional role of institutions of higher learning is research. Encouraging their research in a partnership with our own research, draws on qualified expertise that can increase and complement a government-based initiative. An additional spin-off benefit of this is to focus their human and technical resources on our remote sensing priorities. This "enabled" expertise will lead naturally and independently to additional research on other remote sensing topics.

Industry

I submit that a most effective way to measure the maturity of a new technology is to evaluate the degree of involvement of private industry. By "new technology" I mean at a stage prior to full consumer acceptance. I believe that is the current state of remote sensing in Canada. If there is only limited acceptance by industry, or if the use of the technology by industry is predominantly through government contracts and/or subsidies, then it has not yet achieved maturity. When private industry recognizes the commercial potential of a technology, such that it invests in acquiring and developing it for the purpose of offering it to clients, then maturity is at hand. The profit-seeking nature of industry is the basis for this claim. It is the continuity of supply and demand between profit-making organizations and their paying clients that defines "maturity".

So, how can industrial participation be hastened? Where and how do we find commercial clients? As with most things, there is no quick and easy answer. For one thing, industry partitions itself into topical sectors. So any "approach" must be to a unique sector. Logging companies may be considered such a sector. Geological exploration or mining companies form another. Then there are those companies which conduct environmental impact studies. And, of course, there are many more.

One approach, tried in Canada, is to hire the services of a consulting firm which specializes in one of these sectors. Through the (contracted) services of the firm, target companies are offered free workshops, training, sample materials, demonstrations of the technology and, hopefully, a pilot project program. The goal is to interest the target companies sufficiently, so that they will undertake to continue with the use of remote sensing on a regular, operational basis. This could be done by the company "in-house" by acquiring the necessary skills and equipment, or by contracting the firm which provided the original exposure to the technology, through the (government-funded) demonstration exercise. Success comes if the original program succeeds in eventually setting up this supply/demand situation in private industry. Note also, that the consulting firm, which was paid to do the original training and demonstrations, incidentally develops a capability which is marketable. In fact, it should be the clearly expressed intent of the original contract that the consulting firm should market its "enhanced" capabilities beyond the one or few companies targeted by the contract. If this scheme is productive, then a one-time government-based effort (and cost) can induce significant "natural" growth. Needless to say, the nature and attitude of the consulting firm plays the most significant role in determining probability of success.

A consulting firm would want to acquire remote sensing capability in order to enhance its line of services to its clients, improve its competitiveness, or to seek new clients. Regardless of its reasoning, it can rarely afford to dedicate company resources to a long-term program of technology adoption/development. It typically needs an activity which is revenue generating, even in the short term. A practical approach to this problem is to search for a currently active project that the firm is undertaking for a client. The consulting firm can approach its client with a proposition to "enhance" or expand the project for additional funds, in order to incorporate new information derived from remotely sensed data. This approach does not always work, but if the client can see the value of the additional input, both supplier and client can benefit.

Another mechanism for developing capability in consulting companies is through the use of student help. By providing (at government expense) on a temporary basis, a student to conduct remote sensing

work, a consulting firm can determine the commercial value of such in-house capability. This is also a risky method, requiring a suitable (high priority) project on which to prove the technology, a competent student and an open corporate attitude. Again all parties stand to gain from the exercise. The company will have a better executed project for its client, confidence in a new technology and an additional in-house capability that is marketable. The student acquires a potential for future employment.

Other schemes may be appropriate. Any technique used must result in a more capable and active private sector. It must have the critical feature that government intervention (read: funding) is temporary, which means that remote sensing activity afterward is self-sustaining.

Government

Government agencies dealing with natural resources and the environment are the prime target for remote sensing user development. Finding target agencies within a government is a non-trivial task. The first step involves recognizing which levels of government to approach. In the Canadian example, provincial (and Territorial) governments have the mandate to manage natural resources and the environment. For the most part, federal government departments provide research support. Whereas this is an oversimplification of the division of responsibilities, it serves to show that the operational agencies with the potential for regular and recurring consumption of information derived from remote sensing technology are at the provincial level. Yet it would likely be the federal researchers who would show early interest in remote sensing, because they are organized for and capable of dealing with emerging technologies. Both of these types of clients should be dealt with, but in their unique ways.

It is a fallacy to expect that the federal counterpart to a provincial agency (e.g. forestry, geology, water resources, etc.) can be totally relied on to transfer newly acquired skills in remote sensing to its provincial cousin. This might be the avowed goal of the specific federal agency, and it certainly should be encouraged, however, not relied upon entirely. Direct user development in the provincial government sphere by the principal remote sensing organization is an essential and primary marketing stratagem.

Technology Transfer to provincial governments

The Canada Centre for Remote Sensing (CCRS) is a federal government agency. Within Canada, it attempts to stimulate the practical usage of remote sensing throughout the various government hierarchies: federal, provincial and municipal, as well as in non-government sectors. For the above-stated reasons, its main emphasis is technology transfer to provincial government departments, where new users are sought and "developed". The primary mechanism for this is the Technology Enhancement Program or "TEP". The two principal tenets of the TEP are:

- ☞ use only operational techniques, and
- ☞ take the technology to the user.

The formal "umbrella" under which the TEP functions is a Memorandum of Understanding (MOU) which is signed by CCRS and a host province or territory. The MOU stipulates the responsibilities of the two parties, which includes the factor that no financial exchange shall take place. That is, each

participant pays its own expenses.

A TEP runs for a two to three year period, during which, a series of demonstration or pilot projects are undertaken by resource specialists from a number of provincial departments. CCRS posts an applications specialist in the capital city of the province or territory for the duration of the program to conduct training, and to assist with the design and execution of the projects. Sometimes, digital image analysis equipment is also loaned to the province for the same period. The client departments which have proposed the projects are expected to: (1) conduct the projects, (2) provide their own staff and field equipment, (3) purchase their own satellite or airborne data, (4) prepare a report on the outcome of their projects, and (5) incorporate the technology into their operations, if it has met their requirements.

Insistence that the user pay for his own remotely sensed data for a small demonstration project may seem picky and obstructionist at first. There are, however, two good reasons for this. It is a form of commitment by the user department. It is also a precedent-setting move, allowing the subsequent purchases of data to be less of an administrative and financial "shock" to an organization that may never have had such a line item in its budget.

Success of a TEP is measured not by classification accuracies achieved, but by the level of continued and independent remote sensing activity in the province, after the TEP resources are withdrawn at the end of the program. Many steps are taken to increase the probability of success. As per tenet #1, operational remote sensing technologies are emphasized. It is recognized that even well proven techniques need fine tuning in a new geographical and administrative environment. Still, new users and their organizations are directed away from the less-reliable sources of data and unproven methods.

As per tenet #2, we take the "Mountain to Mohammed". We have learned the value of taking a little slice of our organization and placing it temporarily in the office environment of the potential user. Though more expensive and logistically awkward, there are several key benefits. For one, the execution of the program on site, typically exposes additional likely users which can be encouraged by the remote sensing specialist to propose their own demonstration projects. Also, the convenient access to the specialist and the image analysis equipment by the host agency, greatly increases the chances for quality work within the project, timely execution of the work and resolution of logistical and technical problems. Training of host department staff is done conveniently, at no appreciable cost to the agency and can be customized to meet very specific requirements. In fact, much of the training is of an informal nature, and executed one-on-one with the CCRS specialist.

In support of TEP goals, the remote sensing specialist conducts or encourages several other activities, designed to ensure the development of a critical mass of remote sensing users for the post-TEP period. The regular appearance of a newsletter on regional remote sensing functions assures the readership of an active and viable technical "community". So does the holding of workshops, demonstrations, lectures and similar "live" events. Public relations exercises are promoted too, wherein current projects can be exposed to the media, the general public and to politicians. It must be recognized that the specialist provided should not do these activities entirely by him/herself. In fact, it is much more prudent to play a minor role in support of a local "counterpart" to the specialist. The counterpart is

the person who is tasked with learning from, then gradually taking over all of the responsibilities of the specialist, to further ensure a better level of continuity after the TEP is completed.

A TEP is pro-active, very visible in the user's domain, and has an excellent chance of reaching its objective: to transfer remote sensing technology into the operational work environment of agencies with a resource management mandate. Its success in Canada has been confirmed in post-TEP periods by significant increases in satellite data purchase, in some cases the acquisition of image analysis systems and even the establishment of a permanent position for a local remote sensing coordinator. In a few cases a complete centre for remote sensing services may be set up by the host province/territory.

In addition to the TEP concept, other mechanisms are used in Canada to search for new users. Booths are set up at trade conventions (geology, forestry, water resources, etc.), displaying appropriate examples of how remote sensing has been used successfully within a specific discipline. Application of remote sensing techniques to certain environmental or resources problems are illustrated and published in trade (not remote sensing) journals. Each article is concluded with contact names for interested readers. Annual reports of provincial government departments are scrutinized for uncovering likely projects or branches that may have an interest in evaluating this technology.

Conclusion

The constant struggle to expand the base of users for remote sensing has to be recognized and positively implemented. It should be recognized as a legitimate and requisite activity that contributes significantly to the continuity and growth of the technology and its community. Under current economic conditions, even the justification for the existence of a government-based remote sensing agency may have to be rationalized on its user community. Beneficial technology cannot exist without its users and its a fact of (business) life that many of your potential clients may be unaware of you and your services. Implementing a marketing scheme within a government system is awkward at best, but necessary. There are innovative ways of enacting user development schemes, all of which require resources. These resources should be committed with at least the same degree of urgency as for technological developments. The programs, be they called marketing, technology transfer or whatever, should have a major component which deals with the solicitation of new clientele.

Acknowledgement

My thanks to Brian McGurrin of CCRS for reviewing and commenting on this manuscript.