



**Robert Moses**  
CEO & President  
PCI Geomatics, Canada

## **Algorithms for near real time image analysis are today's need**

### **IMAGE CENTRIC COMPANY**

In 1985-86, we entered the image processing and remote sensing market space as a result of Canadian government projects related to the working of satellite remote sensing applications on a parallel processor. In those days we were in the middle of the cold war and the government was trying to assess crop yields of Russia, China and other countries, to try and predict whether there was food shortage. Today, we use the same technology for the commodities markets.

This led to the development of the PCI Geomatics Geomatica<sup>®</sup> software suite, which we were selling at the time at around \$50,000 USD. Later, with the rapidly developing IT industry and with lower software prices, we were selling similar packages at \$5,000 USD. This, in turn led to strategic decision from a business point of view.

We realized we had to diversify and expand our client base, while at the same time not competing with ESRI and other well established vector based GIS companies. At the time, the satellite sector was growing at a very fast rate, both in commercial and government and military sectors, at a national level, all over the world. 7-8 years ago we realized that there would be a bottleneck in the industry - both in terms of processing the massive amounts of data collected and in the analysis for user specific applications. In order to succeed in our endeavour, we had to convince government departments about the need for image centric software and solutions, focused on national scale applications and technology infrastructure. We successfully convinced three departments to sponsor us for a large project within Canada and a technology partnership fund to create the building blocks for an image centric, scriptable, scalable, standard based and open type of automatic production system.

### **RASTER VS. VECTOR**

Once we realized the image centric market was an open and available market space and if we could own it by creating a raster based system around it - much like the systems around the vector methodologies - then we could help mitigate the bottlenecks by automated factory-like processing and analysis of the image data.

In the past, we used vector methodologies with an image backdrop; but I recommended the use of image technology with a vector backdrop allowing us to use vector data and attributes that we



gather to help process the image in an automatic fashion - not vice versa. Thus imagery is primary and the vector feature layer is a backdrop to this imagery.

We developed certain applications that were much easier to use and easier to automate because of the raster nature of the data process. This data would be very difficult to process in the vector domain.

Nowadays, not only the satellites, but also UAV's (Unmanned Aerial Vehicles), LEO (Low Earth Orbiting) constellations, HALE (High Altitude Long Endurance) vehicles and even digital cameras are all creating terabytes, petabytes, and even zetabytes of image information. Very soon we will not be able to keep up with the high quality and quantity of image data flow.

The key themes in our business case are cheaper, faster and better because an open and standards based automated system can run 24/7 and is easily scalable, and imagery is, by definition much richer than vector only information. There is a lot of modeled and layered information available, but the satellite image has it all in one place - spatial features like roads and buildings, water bodies and forests, etc., even spectral data from multi/hyper-spectral satellites which are fairly temporal in nature as well.

## **OGC AND INTEROPERABILITY**

We were one of the six founding members of OGC (Open Geospatial Consortium) and we could have never achieved our success to date if not for OGC international standards. It is difficult for small companies to have and maintain different file based formats. Small companies would never be able to sell in Canada, the US, India or Europe unless they adhere to OGC standards to achieve international success. The company decreases the cost of creating the software and lowers the barriers to allow for international penetration. From the government's perspective, if you have only 2-3 monolithic companies with closed proprietary standards, then the cost of the system goes way up, since in a sense, the government becomes a captive client of only a few large private companies. And that is why the US government has mandated all procurements to be OGC compliant. The idea is to have a flexible, scriptable/customizable and interoperable platform based on a centralized server and a data management system with geospatial capabilities.

International interoperability standards are important to industry, government and academe. For industry, such standards help decrease the cost of software development, while increasing the market space to allow for numerous startup companies to grow and create innovative solutions. PCI Geomatics has been able to succeed internationally, in part due to the adoption of OGC standards. Many small Indian companies will also be able to compete internationally, if they adopt the global standard.

For government, the adoption of open standards results in reduced cost of technology acquisitions, as well as an increased number of indigenous companies willing to provide a varied set of local technology to government departments. This allows for competition on the world stage, resulting in increased exports - versus the current state of a few groups providing closed proprietary solutions at high prices. Most importantly, it allows various government groups to interoperate in times of calamity, thus saving more lives. The current issues of our time, including climate change and security concerns, require governments from around the world to work together for solutions; and this is done best through interoperable standards.



For academe, more emphasis on technology provision and education through interoperable software will help assist programs of research in many varying fields.

We, as an international community, need to work together to solve issues of global warming, climate change, terrorism and wars that we are causing to damage our own planet. All these issues are in a way geospatial and to deal with it efficiently we need a system that is interoperable. I believe in the coming 3-5 years we would reach a near ideal situation in interoperability, and India has an important role to play.

### **CAPACITY BUILDING**

Globally, not a single country has enough skilled people to keep pace with the volume of image information that requires processing, especially using the traditional desktop approach. PCI Geomatics' enterprise oriented technology platform, which automates the image pre-processing and information dissemination stages, allows an organization to meet the image processing volume requirements and creates opportunities for people and organizations to allocate time to a vital function; we need to have researchers develop algorithms to improve the automation process and make user-defined data and information available on a near real-time basis. The researchers should focus their learning towards spatial analysis techniques, rather than administrative pre-processing tasks. By embracing an open architecture, we have ensured that as new algorithms and best of breed technologies emerge, that our software is designed for the new technologies to be easily integrated, reducing the long term costs of the system and building flexible capacity and infrastructure.

We have to shift our focus to create higher quality, information rich results, which are closer to the needs of a given decision making process, because in the end, this provides vital and time sensitive information to decision making agencies and individuals for emergency response or anything of that nature; the faster, cheaper and better the data is transformed, the better faster and informed decision is made.

### **PCI INDIA**

We are going to start operations in India that will provide PCI software packages along with solutions for Indian private and government sectors. We are working to become one of the top providers to Indian companies, and to provide all Indian corporations with the underlying image-centric platform technology to allow them to easily build solutions according to their clients requirements. We are also planning to work with some governments like Punjab to help them develop agricultural information systems as well as providing them with information and solutions.

### **VISION**

We are witnessing an image data explosion and extracting information from imagery is a much easier and more automatable activity than in the vector domain (in many cases); thus freeing up people to spend more time in the high quality analysis of the information.

There is so much imagery available and much of it is going to waste unless we switch our paradigm to an image-centric methodology. It is our vision that PCI Geomatics becomes the 'platform image-centric technology provider' to all corporations, governments and individuals, and help them process their image data to extract information for further analysis that will support their



objectives. We are working together, with the international community, to achieve a sustainable and safe environment.