A New Way of Thinking about

Disruption Spells Opportunity for the Surveying Commu

For the last few years there has been much discussion about web mapping and its impact on the geospatial industry. This discussion is taking place around water coolers, on blogs, at conferences, in trade publications and occasionally in journals. Undoubtedly it has also reached the boardrooms of forward-looking geospatial companies around the world. The conversations are symptoms of a fundamental change occurring in the industry and those who best understand its root cause will be best positioned for the future.

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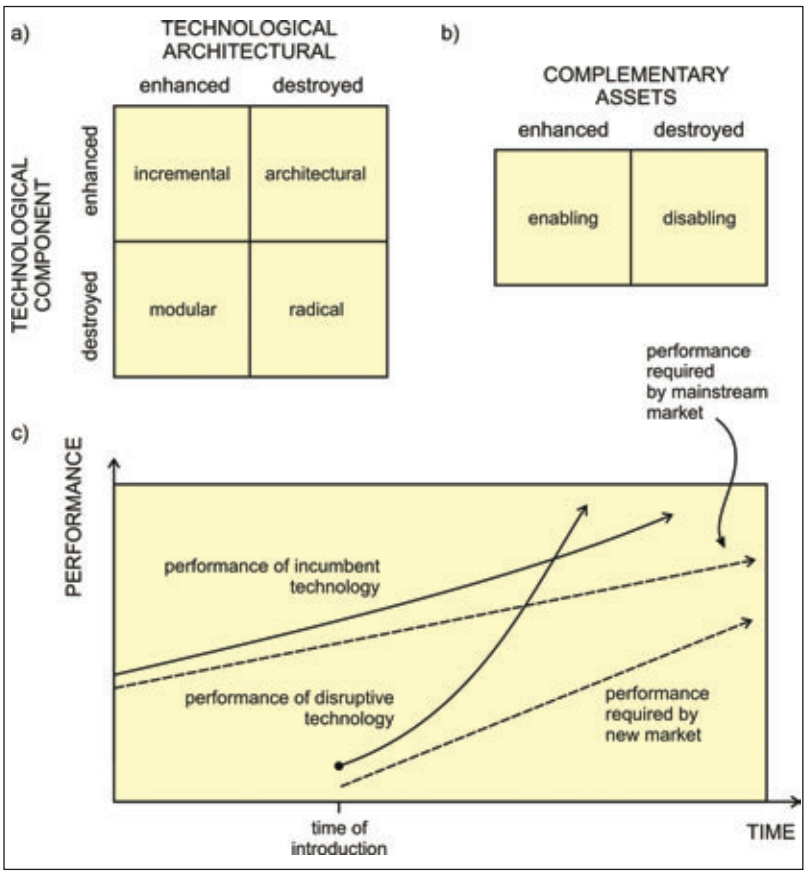

Figure 1: Understanding types of innovation.

Background

The focus in the April/May issue of GeoInformatics was on web mapping. This article extends that important contribution by treating the impacts web mapping services are just starting to have in today's world of surveying. The goals are: 1) to borrow from the innovation literature in order to propose a framework for understanding the new dynamics being driven by web mapping, and 2) to use that framework to analyze the present situation from the perspective of the surveying community. It is hoped that this will contribute to the professional toolboxes of technologists, managers and strategists in the surveying community.

In the surveying and GIS segments of our industry, two types of answers are often given to questions about web mapping. The first is that the industry has done a good job for decades of capturing the benefits of evolving technologies – it's what we do, after all. The second is that the industry will deal with web mapping services in much the same way, should they ever really compete in our markets. The first answer is correct, but the ability to follow through on the second depends on one's understanding of innovation and web mapping.

Innovation Primer

We define innovation as 'the use of new knowledge to offer a new product or service that customers want'. A firm that gains new knowledge has the power to implement an innovation and the potential to change an industry. How and to what extent the industry will be changed depends on the extent to which the innovation enhances or destroys the capabilities of incumbent firms in that industry. When trying to assess the impact of an innovation, it is important for a firm to consider the three different categories of knowledge that may be impacted. They are: 1) technical knowledge of the component technologies, 2) architectural knowledge of the ways in which the components are linked together to form the greater technical system, and 3) the knowledge required to form the complementary assets of a company, such as strategy development, business planning, marketing, sales and many others. This allows any technical innovation to be classified as shown in Figure 1a and Figure 1b according the impact it has on the technical capabilities and complementary assets of the firm. Technical innovations can be further classified as either sustaining or disruptive, both of which are shown by the solid lines in Figure 1c. A sustaining innovation maintains a certain rate of technical progress and delivers to customers better value in the attributes they are already receiving. On the other hand, a disruptive innovation introduces an entirely different package of attributes and does not meet the requirements of the mainstream market. At the time of introduction, the disruptive technology performs worse along one or two of the dimensions that are important to existing

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customers. By enabling less specialized people to do something only specialists could previously do, the disruptive technology appeals to new markets that are often much larger than traditional markets. It minimizes barriers to adoption by those markets because it is often technologically simple. If it is truly disruptive, then investment in the new technology will also result in an improvement in its performance over time until the performance of the incumbent technology is surpassed. This is shown in Figure 1c.

The Innovation of Web Mapping

Innovation has a different effect on stakeholders with different roles in an industry. The web mapping innovation was introduced in the portion of the value-added chain where value is created by converting the acquired data into information. See Figure 2a. This is the domain of the traditional GIS product or service provider and includes factors of value such as the integration, storage, editing, analysis, sharing, and displaying of geographically-referenced data.

Other than their general appeal as trendy new products, web mapping services typically do not meet the requirements of the mainstream market space. For example, accuracy and reliability of the data provided by web mapping services are most often insufficient for most traditional applications. At the same time, a host of new markets is opening up as a result and a new market space has been created. It is given by the value-added chain shown in Figure 2b. Mapping services are technologically simple for users and for application developers, since neither of them requires the same level of sophistication as does the traditional market space. For GIS product and service providers competing in the new market space, there is strong evidence that web mapping is disruptive. Although their knowledge of the component technologies is not significantly challenged, it is argued here that both their knowledge of how the components are put together as part of the greater system and their knowledge of how to do business are challenged in the new market space. Based on this argument, the web mapping innovation is classified as architectural-disruptive-disabling from the perspective of the traditional GIS product and service provider. This is important because architectural innovation is hard to respond to, even harder to recognize and often mistaken for incremental innovation (Henderson and Clark, 1990). This situation typically benefits new entrants that are less tied to old ways of doing things. Think of Google and Microsoft, to name the obvious examples.

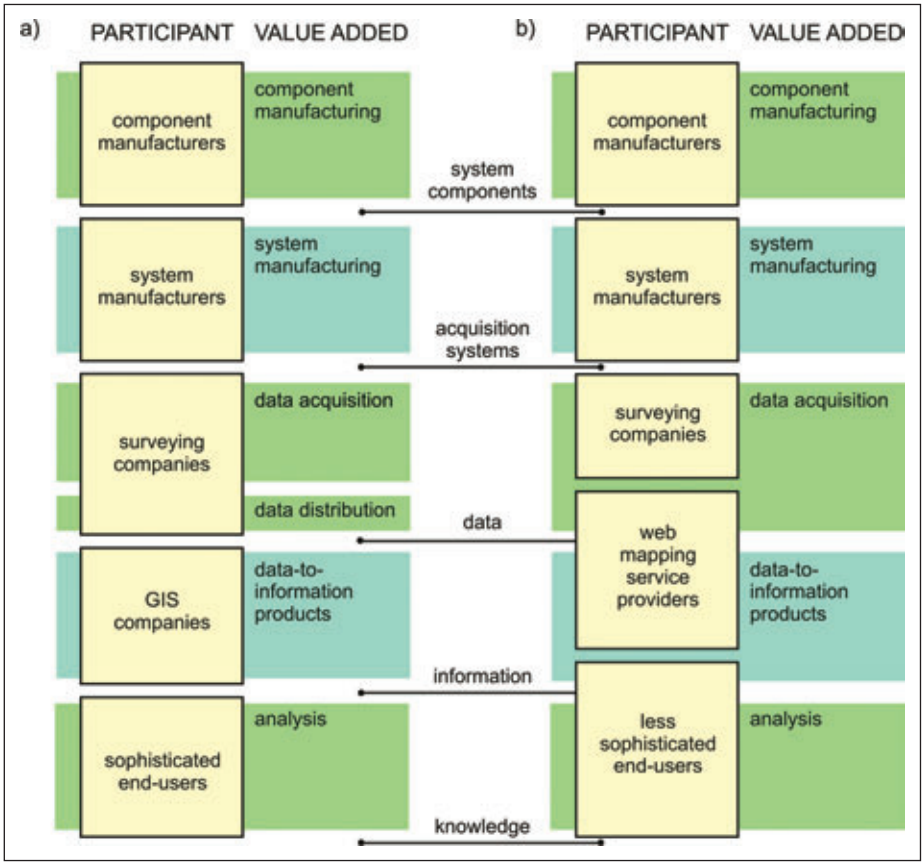

Figure 2: Innovation value-added chains for a) the traditional market space, and b) the new market space enabled by web mapping.

Where all of this gets really interesting for the surveying community is by considering web mapping from the perspective of the companies that acquire geospatial data. The impact of the innovation is different on these companies because they fall at a different place in the value-added chain of Figure 2b. For example, for airborne surveying companies that are already versed in mobile mapping and that choose to compete in the new market space, the innovation is incremental-sustaining-disabling. They have the right technology and can choose whether or not to take advantage of the new markets being created by the disruption. This decision process is taking place all around us today and forms the subject of the next two sections.

The Surveying Community

Since its honeymoon period began in 2005, web mapping has created significant opportunities for surveyors, the biggest of which follows from the disruptive nature of the innovation. Whole new markets and many new applications are becoming much more accessible. These are being implemented in our homes and businesses, on our desktops, laptops and mobile devices, and in our cars. They are calling for content, updates and varying levels of accuracy and reliability. To be sure, not all of them can be attributed solely to web mapping, but each has certainly been impacted by its profound impact. Surveying companies active in aerial mapping are already taking advantage of this and even mainstream media have started to take note of late, e.g. Stone (2006). This opportunity is expected to grow for years to come as web mapping services quench their thirst for imagery taken from the aerial per-

Figure 3: The VISAT Van from Absolute Mapping Solutions.

spective. Competition is likely to intensify in this segment as companies seek ways to differentiate themselves.

Although terrestrial mobile mapping technologies have been around for some time, the disruptive innovation caused by web mapping services is just beginning to open the door to a host of markets crying for terrestrial data. These include highway inventory, road and lane descriptions, assisted steering, fuel efficiency modeling, city modeling, 3D visualization, virtual tourism, gaming and many more. They are being served by leading-edge mobile mapping systems such as the VISAT Van shown in Figure 3.

Exploring and meeting the needs of markets enabled by terrestrial data likely represents the biggest opportunity for growth in the surveying community over the next five years.

As terrestrial mobile mapping makes its move, companies in the land surveying business also face an important decision. For most of them, web mapping is modular-sustaining-disabling. Referring to Figure 1a, the modularity arises from the fact that although they understand how the technological components fit together as part of the bigger picture, they lack the component knowledge associated with today's mobile mapping systems. In other words, companies of this type face the extra hurdle of having to gain the right capabilities with respect to mobile mapping. However, with access to the demand promised by the new market space, this might be worth their effort.

Challenges

For incumbents that do venture into the new market space, challenges arise from the differences in structure between the value-added chains. For example, consider Figure 2 again where it can be seen that the surveying company has a different customer in the new market space. This implies a strong and urgent need to get to know a new group of customers. As another example, there is already some evidence of backward integration by web mapping companies, e.g. Petrie (2006), which is something to watch for because it can significantly change the nature of the playing field for the remaining airborne surveying companies.

Other challenges follow from these and from the fact that web mapping is disabling with respect to the complementary assets of incumbent surveying companies. Those that wish to participate in the new market space have to rethink the way they do business. This has little to do with core technology and everything to do with the knowledge required to build the right complementary assets. It calls for business expertise and experience outside of the norm in the surveying segment. Strategy development, business model development and market analysis are just a few examples where the approaches of the traditional market space do not apply in the same way.

Concluding Remarks

A subset of a larger study has been presented here to encourage a new way of thinking about the innovation brought about by web mapping and to provide a context for the changes taking place today in the geospatial industry. Although web mapping services are almost certainly disruptive to those in the GIS community (which is the possible subject of another whole article), they represent a sustaining innovation for those in the surveying community and bring with them potential access to very large new markets. While technology will always play a role in separating the leaders from the pack, developing the right complementary assets is today's biggest challenge for companies interested in pursuing those new markets.

For now, web mapping does not spell the end of the traditional geospatial market space. It creates a complementary market space with its own rules of the game. This implies a choice for surveying companies and presents a very significant opportunity for those who have the mix of capabilities required to seek it out. Aerial surveying companies are already testing the waters. The next frontiers are terrestrial data and the effective combination of data from all sources.

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Absolute Mapping Solutions (www.amsvisat.com) is building a digital description of the world around us – from the ground up. In the language of this article, the company works in the mobile mapping and web mapping domains. Alex Bruton (abruton@amsvisat.com) is a senior business consultant and the VP of Business Development at AMS. Naser El-Sheimy (nelsheimy@amsvisat.com) is Chief Technology Officer at AMS and Professor and head of the Mobile Multi-Sensor Systems research group at the University of Calgary. Martin Lavigne (mlavigne@amsvisat.com) is the President of AMS.