

Interview with David Schell for December, 2001 GEOWorld

David Schell, president, Open GIS Consortium Inc.

GEOWorld: What will be the leading growth sector of the geospatial technology industry in 2002 and beyond?

Schell: There are many aspects of the geospatial market, and, when you look at it short- and long-term, I think you're looking at two entirely different propositions. I think the next large growth opportunity is the enterprise enabling of spatial information or spatial processing with the advent of interoperability in the network and the accessibility of enterprise computing to geospatial processing.

I think we're going to see many of the traditional geospatial companies thrive as they cross this enterprise divide and begin to work more with large end users who understand that the architecture requires a spatial data type and intelligence. There's so much infrastructure, in government and Fortune 500 companies, that hasn't been spatially enabled yet. I think you're going to see a steady penetration of these areas, and a lot of conventional and interoperable GIS will be purveyed.

This is going to give rise to a significant amount of geospatial product activity on the Web. Companies with traditional competencies are the only ones that really know how to handle complex back-end geospatial analysis. They definitely have the advantage in providing any kind of geospatial intelligence to the enterprise. Companies they have partnered with them will also benefit, because of the infrastructure and integration they provide. The major database companies and big hardware and computing platform vendors, for example, who have worked with the GIS companies over the years know how spatial technology can work in the enterprise market. They will continue to provide part of the solution as the market grows.

For the long-term, I think you're looking at an interesting transition. Companies that don't focus on geospatial products and intelligence, but focus on communication and content delivery, are going to come into the ascendancy. I don't mean only to focus on companies that have content, because I don't think it's content delivery per se that is the business. I think it's services based on content that will provide the greatest opportunity in the long run.

This is why Open GIS Consortium (OGC) has gone in the direction of supporting or developing interfaces for Web services and location services. Notice that this is Web and location service as opposed to Web and location content—services remain constant and content changes. What people are really looking for is the ability to get an answer, which is dependent on a service that's defined to give them an answer based on variable content.

So in the near term, there's a tremendous opportunity for companies that know how to engage in enterprise spatial enablement, using all the current tools to do it, including the

Web. In the longer term, it's going to be organizations that know how to provide spatial information services on a transactional basis on the Web and in the wireless environment.

GEOWorld: What role do you see the wireless Internet playing in our industry?

Schell: I think the wireless Internet is going to provide a significant marketing channel for our industry. I don't think it replaces our industry, but it's another channel that gets built. Too little attention has been paid to channel building within the geospatial market. Many worthy enterprises have gone down because they didn't pay enough attention to how you build a marketing channel. A lot of businesses haven't succeeded because they focused on the technology without understanding that they need a channel. The wireless Internet is another channel for spatial information.

The companies with traditional spatial intelligence, the successful GIS companies who are moving in this direction, are going to play a prominent role and are going to be the ones that shape the market. It's been a difficult transition, but they've learned how to view the wireless Internet as a channel, and they're beginning to do business modeling that will allow them to deliver their expertise in the form of answers across this channel.

A typical GIS company has had to develop on every level. But when you look at the wireless Internet, you're looking at a component-based environment in which a GIS company can carefully calculate value and find specific opportunities for what it knows how to do well. I think this is going to be reflected in new kinds of platforms. You're going to see a lot of devices whose value depends partly or wholly on geospatial capabilities. The wireless Internet is going to give rise to a lot of new products, services and content that we haven't really thought of before, based on spatial information.

You have to look at our industry as just being at an incubator stage in this regard. A lot has to be done before we can really get going. With wireless technology, we're sort of at the rear end of a long train of technology that has to be implemented. That train is just beginning to get itself organized. To build out wireless location services, we're dependent on a lot of technologies that deal with network phenomena first. Like the convergence of circuit and packet-switching capabilities in wireless infrastructure, the Internet has to be capable of handling the kind of data we're talking about and handling them with acceptable performance and reliability.

We're learning a lot about how to insert spatial standards into the broader standards infrastructure, and I think the players in the market are learning how to adapt to this new environment. I think what's going to determine the success and evolution of the market is how successfully these businesses adopt business models that can incorporate the new capabilities. It's clear that our business isn't going to be the same in the future. There are so many developments that have to take place, particularly with the network, I think that it's easy to think we can leapfrog them. But the wiser approach is to try and move slowly and cautiously until the infrastructure gets built out in a way that we can move smoothly into it.

We have a lot of people who are innovating quickly. It's easy to look at this or that PDA with a glitzy little map on it, and say, "There's the future." It's entirely different to appreciate that for these devices to really work, they have to be the result of a complex chain of technologies that involves network infrastructure and service interfaces as well as an infrastructure for treating the wireless Internet in the same way you treat the wired Internet.

GEOWorld: Are packet-based systems largely in place in Europe now?

Schell: The basic infrastructure hasn't really been crafted yet. The telephone industry is just beginning to understand what the issues are. Organizations like the World Wide Web Consortium and the Location Interoperability Forum are just now beginning to understand what location means. Even though you have phones that claim to display certain information based on a coordinate-specified point, it doesn't mean that it's a product of an infrastructure of geospatial intelligence that can provide you with information.

There also are several companies that have seized on the opportunity to create proprietary spatial information environments on these small phones, but they're locked into their own data access and database capabilities. When you compare that with the vision OGC has of making the wireless Internet capable of accessing any number of interoperable servers regardless of their location, there's a long way to go. Open interfaces will enable service providers to compete in offering more and better services, and open interfaces will provide access to the comprehensive spatial data infrastructures that are being built around the world. Metcalf's Law applies here: The more interoperable nodes you have on the spatial web, the greater its value for everyone who uses it.

GEOWorld: Is greater bandwidth required before we see large-scale movement to wireless handheld devices?

Schell: This is a crucial question, because bandwidth is in front of everybody. The bandwidth issue is what stands in the way of wireless devices really creating an experience for users that draws on a lot of traditional technologies. With a lot of bandwidth, you can leapfrog some of the present limitations of the wireless Internet, particularly with regard to cell phones and handheld devices. It really confronts the issue of what's possible with a handset or with a mobile device in general.

As you go from second generation to third generation of wireless, you're going from a relatively limited medium that requires a cumbersome mode of interaction to a medium where full, scoped information can be made available efficiently. Limited bandwidth is a major constricting factor in the area of wireless handheld devices. It seems that the most profound enabler will be bandwidth sufficient to allow users to bring full imaging and video into the devices. Until the bandwidth problems are solved, you're not going to be able to realize the benefits envisioned by the spatial community.

As bandwidth increases, you'll see the value chain evolve. The major opportunity with spatial information is to provide content and information to users of millions of devices so that pay-per-transaction models become the norm. You'll begin to see the market governed by the kinds of business models that have been characteristic of the telecommunications industry rather than those that have been characteristic of the geospatial industry.

Right now the industry is in transition. It's learning to deal with the wireless Internet constrained by the limited capabilities of the modern cell phone, and you see the stirrings of the new business model and value chain building out. Without the killer app, based on high bandwidth and excellent ergonomics, you're not going to see the value chain built out extensively, and you're not going to see the tremendous and robust markets that people have been hoping for. What mitigates against these frustrating realities is the fact that there's been such a great investment in third-generation spectrum.

It's a difficult issue, and I think it's in the hands of the carriers and the handset manufacturers and how much they want to put into this area. The investment that's put into companies positioned to put applications in the wireless network is significant by GIS market standards. The question is whether or not these organizations with deep pockets and new business models are going to be able to compete with the GIS companies that have legacy markets, which are likely to be quickly enabled with wireless capabilities.

GEOWorld: The deadline for Federal Communications Commission (FCC) E-911 compliance has come and gone, and most of the carriers have been granted an extension. When do you think we'll see consumer location-based services, and how large will the market be?

Schell: The E-911 area is captive to a set of global market conditions that the FCC can't legislate. It's now acknowledged to be a global universal service that will be generated in many areas. Anyone using a phone should be able to request emergency assistance and be able to be located by a public-safety organization so the assistance can be delivered rapidly. This can be a major, sustaining driver. But as the market evolves at a higher bandwidth, it's going to require significantly evolved forms of application. E-911 will be a part of it, but it won't be center stage.

It's hard to know the time frame or size of the market. Location-based services aren't a complete reality today, so no one has a measure for what the market is. It's not really going to come together until industry connects the E-911 issue with a lot of existing open-platform frameworks that define the Internet. With E-911, it's clear that open platforms are the key market enablers. And location services are really crying for market enablement. So how do you see how big the market is? You can talk about the number of cell phones that are out there. That's not to say that there will be a market beyond that for location services. That's a function of an evolving market for Web services that's hard to figure now. I wouldn't even try to guess on how big it will be.

I think that E-911 will establish for North America the kind of market foundation on which a lot of other revenue-based services can be built, so the carriers are focusing on E-911 first. In Europe, carriers are looking for a broader set of location applications and aren't limiting themselves to E-911, but they may be simply further along on the development curve.

GEOWorld: Will Internet computing technology continue to grow at the same pace as the last few years?

Schell: My feeling is that it will, but it's going to depend on continued emphasis on interoperability and security. An insecure Internet can't survive to have interoperability problems, but a non-interoperable Internet will develop islands of proprietary service—a kind of conundrum. The pressure's immense to keep the Internet standards-based. We think that this is a phenomenon that will continue as we move along and as Web services develop. My organization tends to support this by developing many more specifications in the geoprocessing domain, and we also intend to put as much emphasis as we can on security.

I think the Internet is going to continue to grow, because the real practical aspects of the Internet haven't been explored adequately yet. I view the last 10 years of Internet development as a period of experimentation. I recall that Scott McNealy (CEO of Sun Microsystems) is quoted as saying once, something to the effect that the Internet was not meant to be a vehicle for bringing Beavis and Butthead into everyone's living room, but was actually intended to be a serious technology designed to support business operations. I agree with that point of view.

Even simple things like information access falls into the category of experimentation now. I don't think that hardened lines of serious use have developed. When business practice comes to be more aligned with Internet usage, we're going to see a stabilizing of Internet usage. I think we're going to see a lot of directed applications. We're going to see people using the Internet and wireless Internet for business applications, and we're going to see business applications taking over the center of the market. Personal use will become more peripheral.

There's also the generational issue. The Internet has largely been a novelty during the last 10 years. Younger generations tend to see the Internet as a natural medium for getting things done. As time passes, more particular uses will be made of the Internet, particularly in regard to spatial information. As these things are more lined up with real business requirements and practices, we're going to find that the center of gravity for the industry moves to a more commercial footing.

GEOWorld: What's the main lesson to be learned from the "dot-bomb" phenomena?

Schell: In a way that's the most important question. People entirely misjudged the requirement to have solid business models underwrite technology deployment. Because of the exhilaration in the Internet's growth and the personal inspiration that people

experienced, the whole thing tended to be driven by imagination rather than practical business requirements. It's interesting for those of us who have been in the computer industry for a long time and have seen this kind of thing before. For example, it reminded me of all the money that was poured into artificial intelligence. Artificial intelligence, when it was a brand new technology, was looked at as something unique that needed to be invested in for its own sake. It was looked at as an industry, but three or four years later, it was clear that the novelty had burnt away. All the laboratories that needed it were saturated, and it began to be assimilated by mainstream computer organizations, so there's still a lot of artificial intelligence technology, but it was put to the service of mainstream computing and operational requirements.

The same thing has happened in the dot-com world. Many companies endeavored to set up dot-com organizations, not realizing that there was only a limited kind of advertising or marketing purpose that they could fulfill. As the major traditional business enterprises began to absorb this technology, they proved that those organizations that had an ongoing business—a well-defined traditional business and a customer base—were able to assimilate these practices and use them. The companies that didn't have the strong business base outside of the dot-com angle fell away as the investment dried up.

It's important that we realize we're capable of entering the same kind of bubble with location services. Everyone could begin investing in the really "whizzy" cell phone applications, not understanding that until the markets for location services get stabilized with real business practices will location services find a solid foundation for itself.

GEOWorld: There has been increasing interest to couple GIS, Global Positioning System (GPS), photogrammetry and related spatial technologies. Where can we expect this convergence to lead in terms of software and interface developments?

Schell: There are quite a few mobile applications that will benefit from these kinds of services. GPS in particular, when you put it together with significant graphics and bandwidth capability in mobile devices, gives you the ability to acquire data and apply analysis in local environments. I think the convergence will take place in devices that provide deployed workers in a variety of industries the tools to do their job more effectively. I see convergence enabling people who are doing infrastructure maintenance, for example, to be more efficient. I see a significant market there.

Convergence is such a new concept that people tend to look at the market for it before they have defined what convergence is and means. You have the opportunity for a lot of money to be pumped into markets that would seem to require an application for converged technologies, but you don't necessarily have the infrastructure to meet the need of that market. It takes time in an age of convergence to evolve appropriate models of behavior with these devices. In particular, it takes a lot of interaction between commercial and academic people to evolve methods.

I'm an inveterate reader of a magazine called *Pen Computing*, because every month it gives you a catalog and pictures and details of dozens of small devices that

exercise the concept of the PDA and mobile computer in a dozen different ways. You see that the world is struggling to come to terms with what people want to do with these devices. You sense a great deal of anxiety in the market concerning the fact that industry is “all dressed up and ready for the party,” yet isn’t ready to put meaningful investment into something that we all know is going to take the market by storm.

It’s a frustrating time. There’s a great deal of experimentation, but I think the responsible approach to take, and the approach the consortium is going to take, is you have to be patient and fight to take logical steps. Gradually the people working in applications can get a better sense of what they can marshal. This is really where we are now and where we have to settle for the time being. As the device manufacturers develop their capabilities, you’re going to see the two sides merge, and you’re going to see some industrial-type applications that will have some real success.

GEOWorld: How will interoperability standards affect our industry?

Schell: This is an easy one, because it’s our business. The standards allow for “plug and play,” which is really the long and short of it. The issue of interoperability has to do with standards that facilitate plug and play and component-based architecture. These are what enable the construction of an architecture that can provide interoperability and produce an environment in which a market can flourish. Without standard interfaces that enable components to be interchangeable, you’ll go back to the GIS market of the last 20 years, which was characterized by “stovepipes” and proprietary information. The story of standards is interoperable interfaces, the development of interoperable components and componentware markets in which plug and play operates as freely as it does on a Microsoft Windows desktop.

The standards for open interfaces and protocols aren’t data standards, although there’s a place for data standards in government and critical infrastructure. You need data standards so you can certify that something is where it’s supposed to be. But universal data standards aren’t necessarily essential. OGC takes the position that data should be used in the environment where they’re found. It’s rather the software environment of the data that is the issue, or the wrapping of data in interoperable interfaces, so the data can be accessed through those interfaces. That’s important, because a lot of intellectual activity has gone into the construction of datasets. You take the profound and brilliant work that has taken place in many universities to construct datasets based on specific sorts of measurement, and you don’t necessarily want to fool around with how those datasets are structured. You’d much rather be able to interact with the software environment that has created those datasets and allow it to interoperate through a set of interfaces that leave it untouched.

Having said that, I should also say that there are two kinds of data standards that are important. Encoding spatial information in XML using the Geography Markup Language (GML) is important because it’s a format that’s leveraged by the World Wide Web. Every web browser has the ability to interpret and present geodata in this format and even perform complex spatial analyses on it using applets that can be delivered with the data.

The UK Ordnance Survey, the US Census Bureau and others are investing heavily in this. And feature naming and metadata standards are important because they enable fine-grained spatial web searches. Different information communities, of course, will always need to name things differently, but if they produce data consistent with a published community standard, automated methods can make both intra-community and inter-community data sharing much more practical.

An important aspect of open interfaces and standards is lowered development cost. We find it interesting that in a time of economic downturn, many organizations continue to work with OGC and even step up their involvement. It's less expensive for an organization to participate in a collective development activity with a consortium than it is for them to develop a whole suite of technologies for themselves. When an industry collaborates on developing open interfaces, the total cost is spread across a large number of organizations.

Standards also make it possible for companies to access broader markets. We find that applications that have been designed for one community of users frequently are able to find utility in other communities because of standardized interfaces. Developers can actually cross into new markets much more easily.

Many times interoperation is the "trip wire" of understanding. People understand that when they're looking at the same thing through different data structures, they look different and there's reason to argue. But when they look at these same things through the same structure and interface, then there's no reason to argue.

GEOWorld: What impact do you feel the Sept. 11 tragedy will have on our industry?

Schell: The tragedies in New York City and Washington, D.C., and the continuing concern with biological threats have provided a wakeup call to people around the world. Safety in our society depends on our ability to protect people and protect critical infrastructure that supports our society, commerce, environment and government. In this context, you know how important spatial information is. It has been difficult in the past to make decision makers understand the immediacy and critical requirements for spatial analysis, information and infrastructure. The world has known how to spend money on operating systems and rocket ships, but it hasn't really known how to spend its industrial and investment money on spatial data infrastructure. I think the world woke up on Sept. 11 and realized what was happening.

All the people involved in trying to deal with the mapping of land and facilities in lower Manhattan suddenly realized that they didn't have the ability to deal easily with the great variety of maps covering all the different themes involved. They realized that when the many different agencies and mapping applications came together, they didn't have a well-oiled and defined methodology for putting the different mapping perspectives together. Among other things, they began to realize what we've been concerned with for a long time, that in such a complex and critical situation it's mainly a question of "interoperability".

Spatial information and technology are being used heavily in the recovery operations in New York as well as to analyze threats, track terrorists and try to plot the course of future threats. Consequently, I expect that decision makers will begin to consider investments in spatial technologies necessary to render good decisions. Interoperable technologies are the key to ensuring the kind of community collaboration that's going to be necessary to deal with the unexpected.

When something this horrible happens, it puts society in crisis, and society has to take a hard look at what's important. It has to look at what it's done and what it hasn't done in terms of preparing itself to deal with the present situation. It's time to start looking at spatial infrastructure and how to properly characterize it. Spatial information is a public trust and resource that's essential to be able to preserve public order and the well being of society.

OGC has been acutely aware of this. We have been building testbeds for the last three years that have dealt with emergency situations, floods and hurricanes in particular. Not enough resources have been put into making the nation ready to deal with these things. That has to do with the coordination of agencies and the public and private sector. In this regard, an organization like the Federal Geographic Data Committee is positioned to serve as a hub for a lot of the issues that relate to a healthy spatial infrastructure. But it has been sadly under-funded and has not been given the ability to provide the leadership that it's positioned to provide.

We may have a better opportunity now to pull this community together in a new spirit of cooperation. OGC, dealing with interoperability, is in the middle of this, because our members are creating the tools that will make this kind of cooperation necessary. Interoperability needs to begin to be national policy and the instrument of integration for disaster management specifically.