

# ESRI, Bentley and Intergraph on Today's GIS Industry

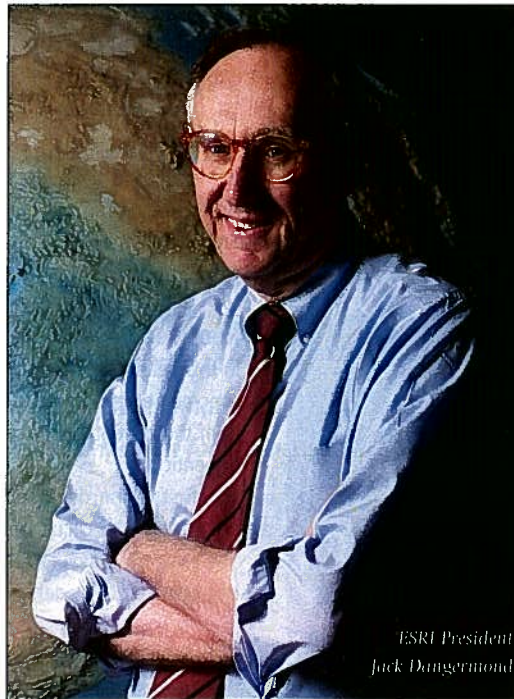
## Why We have to thank Neogeographers like Google

*The GIS world is constantly changing and expanding: on the one hand we see an increase in hardware and software technology development, and on the other hand we see the spread of WebGIS and the continued integration between different disciplines, such as CAD. Every company has its own views on the challenges that face the GIS industry, and also the solutions. With this in mind we asked three major GIS vendors to share their views on some of today's hot topics, such as DeskGIS versus WebGIS, GIS-CAD integration and the current economic downturn. The interviewees are: ESRI president Jack Dangermond, Ton de Vries, Bentley's Cadastre and Land Development Solution Executive, Richard Zambuni, Bentley's Global Marketing Director, Geospatial, and Halsey Wise, Intergraph President and CEO.*

By Eric van Rees

**What will be the role of GIS specialists in the future? Will GIS-specialists rather be professionals in informatics or does it more to make a GIS-specialist? Or do we rather need geo information-economists with broad knowledge about technology, information economy, information society and legal issues of geo information?**

**ESRI:** First, we are seeing continued expansion of GIS into many fields, requiring many people who really know geographic information science as well as the technology that can evolve its application in various fields. Driving this is an increasing understanding among senior leaders in both government and industry of the pivotal role that the application of geospatial knowledge can play in the decision-making process. This knowledge is created by specialists from many fields often brought together by GIS professionals who focus on the broad subject of integration and providing access. This latter set of skills is the most critical and, ultimately, requires real experience coming from practicing the trade in many forms. The key to the exponential use of the technology will be education. GIS education at the university level is still primarily found in geography and GIS departments; we are beginning to see the spread of spatial science. In part, this is supported with institutions setting up centers for GIS and spatial science. On ESRI's side, we have been supporting these efforts by providing campuswide GIS site licenses, which provide greater accessibility to the technology. University libraries are also providing new portals for access to GIS systems to students and faculty for reference and research. In the future, we will see more senior executives supporting the application of GIS capa-



ESRI President  
Jack Dangermond

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bilities in their organizations. Some of their staff members will have the technical skills needed to perform geocentric applications that support mission-critical applications. This will lead to a better understanding of the many complex issues and more holistic approaches to decision making.

**Bentley:** The industry is broadening its view, and we see geospatial information popping up in both business and general public situations where we didn't see it five or ten years ago. Traditional GIS companies need to thank the neogeographers like Google, Microsoft, TomTom and Garmin for that. GPS devices and internet mapping lifted the use of geospatial information to a higher level. In our own profession, we see a growing need to use geospatial information in engineering workflows beyond the traditionally GIS-intensive industries like electric and gas utilities, and communications service providers. Nowadays, infrastructure engineers such as road design engineers, railway engineers, facilities managers, mining experts etc. all require immediate and integrated access to the corporate GIS database. They need to use intelligent geospatial information in their engineering and maintenance workflows. So we see a growing need for geospatial data and geospatial experts in infrastructure projects and operations. And, we see a growing need for GIS technology to be deployed within mainstream IT infrastructures and organizations.

**Intergraph:** There are many roles and disciplines occupied by geospatial or GIS specialists today. Certainly there are many GIS specialists on the IT side of the equation, implementing and managing geospatial systems. However, there are also many examples of GIS or geospatial specialists working in areas such as urban planning and land

management. The field of economic geography is already well established, and represents a melding of geospatial and economic knowledge. We are also seeing an increase in the use of geospatial technologies in areas such as public safety and security and environmental monitoring.

As the use of geospatial information becomes more widespread, there is certainly the opportunity for geospatial expertise to further expand into other areas. This can happen in one of three ways: 1) geospatial professionals move into other fields, 2) other fields begin to incorporate geospatial knowledge into their education, training and best practices, or 3) geospatial professionals work in a collaborative manner with other disciplines. For example, we can point to lawyers who have become experts on the rights to government-owned data sets such as geospatial information, and can also identify geospatial experts who have morphed into city managers. All three of the above approaches are already happening and will continue to become more prevalent.

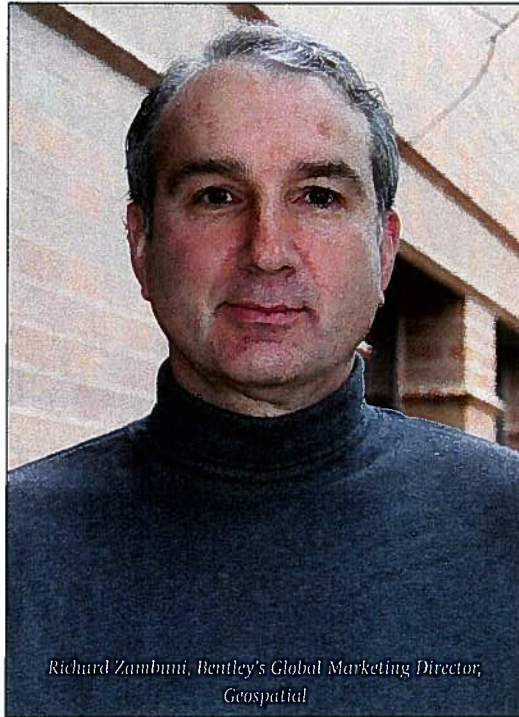
Academia has a significant role to play here in educating more disciplines on the basics of GIS capabilities. Many undergraduate programs today, such as business programs, include an exposure to data management and information technology. Exposure to GIS capabilities seems to be a logical extension as the use of geospatially-based information becomes more ubiquitous.

**The second question we'd like to ask you is about Desktop-GIS: do you think there will still be Desktop-GIS in the future or will we all use server-based GIS?**

**ESRI:** At this time, desktop GIS continues to grow and be the primary platform of choice by GIS professionals for their efforts in creating and applying geographic knowledge. Cloud computing is continuing to expand. This platform allows organizations to leverage their GIS people and their geospatial knowledge with a minimal investment.

ArcGIS Desktop has been engineered so that it can consume cloud/Web services from a variety of sources, including ArcGIS Online, which can then be mashed up with local content (MXD) and integrated into applications that can be made available for subsequent use. The service-oriented model for GIS will allow distributed sharing across an organization.

Desktop GIS will continue to grow as it serves as both a fundamental authoring platform for geographic knowledge and a solution for spatial analytics and individual project efforts. We have hundreds of thousands of users of



*Richard Zamboni, Bentley's Global Marketing Director, Geospatial*

our desktop products, and we are aggressively growing the functionality of this software platform to support them.

**Bentley:** There is no doubt that server-based GIS usage will grow, but there will always be a need for desktop GIS as well. Web 2.0 GIS is just the beginning. Interactive GIS via web technology will increase and at Bentley we're ahead of it. Where everybody can serve maps to the internet, the interaction and management of the data behind the web GIS becomes the critical factor. This also brings us to the next level of expanding geospatial information into mainstream IT environments. Geospatial information is increasingly supporting mainstream business workflows through service oriented architectures, serving up geospatial data seamlessly via web services. However, data acquisition, precise parcel editing, and map creation are still activities carried out by a lot of individual professionals, not to mention the need for these desktop activities in emerging economies.

**Intergraph:** The real crux of this question is "how thin or thick a client will be required in the future?" The answer varies depending upon what type of workflow or role in the organization the application is designed to support. Operations such as basic queries, map viewing and repeatable workflows are all well supported today by thin clients, with most of the processing being performed on the server.

Where there is still a role in the foreseeable future for a thicker client is in what we refer to as the organizational "heavy lifting." These are seats that perform complicated design, data creation and maintenance, as well as sophisticated analysis. In these cases, a thicker client provides a better user experience and supports workflows and operations in a manner that thin clients still have difficulty emulating.

It's also important to state that even thick clients of the future will leverage server-based capabilities as appropriate. For example, a future smart client being used for design and data maintenance in an electric utility could use a server side operation to perform geocoding or tracing. This really represents the "software plus services" model, which makes a lot of sense for these heavy lifting seats in the organization.

*Bentley: "In our own profession, we see a growing need to use geospatial information in engineering workflows beyond the traditionally GIS-intensive industries like electric and gas utilities, and communications service providers."*

**What is your company's response to the current economic downfall? Does it create opportunities for using GIS, and if yes, which opportunities?**

**ESRI:** Our business has continued to grow steadily in spite of the economic conditions. GIS has become a key part of many busi-

ness operations including the decision-making process. In the United States, the government's plan to stimulate our economy with a variety of capital infrastructure investments will require geospatial information in many forms. In addition, there is a sense among some economists that the economy will rebound the quickest in the housing, construction, energy, and infrastructure sectors—all GIS-related industries.

Today, the business value of GIS is often justified on the potential return on investment. This process is helping justify the implementation of a GIS even in difficult times, pointing to costs avoided, additional revenue gained, and improvements in efficiency.

**Bentley:** Bentley's approach is threefold; we allow organizations to increase their productivity by advancing their current GIS investments and therefore making them more suitable for infrastructure projects; we integrate GIS into mainstream IT, increasing the value of the GIS professional and we continue to integrate more GIS functionality into our mainstream software products. To summarize; Bentley helps organizations to maximize the ROI on their GIS investments. Even in an economic downturn, there is still substantial investment in infrastructure projects both in those that were ongoing before the downturn, and in those that are newly funded as part of the plethora of national economic stimulus packages. Within specific industries there are also disruptive changes underway that are making user organizations review the role of GIS technology – such as the advent of Smart Grid technologies in the electric utilities industry. Bentley is well placed to take advantage of these changes.

**Intergraph:** Certainly we have seen an increased focus on return on investment as a primary factor when organizations are determining which projects will move forward. This is true whether in a government organization – where return on investment is driven by providing new capabilities for citizens – or in the private sector, which is typically driven by the bottom line. Now more than ever in the current economic downturn, we must work closely with our customers to show how the application of geospatial technologies and geospatial best practices can help them realize a return on investment that allows them to fund new projects. We see this creating opportunities in areas as diverse as public safety and electric utilities.

In public safety, Intergraph offers advanced analytical tools that allow public safety agencies to better understand their response patterns and ultimately better deploy their resources to meet those demands. In electric utilities, Intergraph is actively participating in the Smart Grid initiative by providing an integrated command-and-control center that allows utilities to run more effectively both in terms of the manpower necessary to operate the utility and in terms of better managing the energy consumption of the utility and its customers. Both of these areas show strong returns on investment that make sense even in these difficult economic times.

**In Europe the GIS-industry is very focused on INSPIRE, GMES, SEIS and GALILEO at the moment. In the U.S. no one cares about that, but I have the feeling that GIS-industry is much more focused on what Google, Microsoft and Yahoo does and how to integrate their products. What is your opinion on this statement?**



Ton de Vries, Bentley's  
Cadastre and Land  
Development Solution  
Executive

**ESRI:** The efforts by the European Union in implementing large-scale GIS systems that support spatial data infrastructure, environmental monitoring, satellite navigation, and similar applications are important and highly commendable. Successfully implementing these projects at this scale is challenging, particularly when considering the number of countries involved.

The United States has similar national initiatives in many of our national and state agencies. While not as high profile, they are nevertheless evolving in a less-coordinated manner unique to our government organizations. While the consumer-oriented map visualization applications have significantly contributed to increasing the general understanding and appreciation of geography, their main focus has been less on professional applications and more on spatializing search. Similar to Europe, we certainly do not see these systems as a substitute for authoritative source-based Web systems.

Nevertheless, they do provide a kind of narrow view of what the future may hold. At ESRI, we have been working on a new cloud-based GIS program, ArcGIS Online, that focuses on agencies and users sharing their content, services, and applications on the Web. This promises to provide a model for how SDI will emerge.

**Bentley:** On both sides of the Atlantic organizations are looking for interoperability; whether this is channeled by legislation and standards or by de-facto industry standards. The goal is the same; the unification of silos of information into accessible formats and interfaces, allowing the integration and sharing of valuable data to support business workflows. Integration and interoperability have been the two cornerstones of Bentley's infrastructure and GIS product portfolio; so our users are well prepared for these initiatives.

**Intergraph:** What we are really analyzing here is an apparent difference in focus between large government initiatives with substantial geospatial components versus adding value to private sector geospatial platforms.

Regarding Google and Microsoft's commercial geospatial platforms, we see demand for organizations to exploit these platforms in both the United States and in Europe. In Europe, they are used not as a replacement for initiatives such as INSPIRE, but simply as a complementary set of data and technology to those managed by the organization.

In terms of commercial geospatial platforms like Google Maps or Microsoft Virtual Earth being adopted to create a de facto SDI, technologically it is possible. However, there are fundamental control issues and certainly data licensing and usage policies that need to be worked through before many organizations would consider turning this role over to the private sector.

In the case of significant EU initiatives such as INSPIRE, GMES and SEIS, any difference in focus between Europe and the U.S. is simply a function of the emphasis and funding that is behind these EU initiatives. With INSPIRE being a formal EU directive now being transitioned to law in the EU, member states are obviously having a great impact on the geospatial sector in the EU and on any companies that participate in the EU market. INSPIRE's directives surrounding Spatial Data Infrastructure (SDI) and data harmonization across EU member states are forcing data and technology providers to react to these requirements.

In the U.S., while there have been some top down and bottom up efforts directed toward the creation of a national SDI for some time, this hasn't

yet manifested itself in laws and regulations that must be followed by geospatial players such as federal departments, states or counties. As such, we have not seen the uptake of the creation of a multilevel SDI to the extent that is currently taking place in the EU.

**CAD-GIS integration is an issue that is becoming more and more important. What is your company's current solution to integrating both CAD and GIS, and how do you see the future: will we always have these two techniques or can we expect a full integration of both one day?**

**ESRI:** GIS and CAD are fundamentally different technologies: a graphic drafting system versus a database-driven system about geographic knowledge (graphics versus geography). While there is overlap in both functionality and application, the two systems were developed for different purposes, with different information models and applications. Nevertheless, there is a growing need to connect these two worlds and a need for greater compatibility between the two technologies.

While ESRI's efforts to achieve this integration began about 15 years ago, it is only recently (at ArcGIS 9.3) that our software has achieved a tight integration between the CAD workstation and GIS desktop and server technology. The integration involves three basic applications described below:

#### 1. Data Conversion

The ArcGIS Data Interoperability extension directly reads and exports many data formats including all the leading CAD formats, such as Autodesk DWG/DXF, MicroStation Design, and Intergraph GeoMedia Warehouse. This software supports complete integration with building information modeling (BIM) for 3D integration.

#### 2. Direct Read of CAD Data

ArcGIS directly reads and uses the data formats of all the popular CAD systems.

#### 3. CAD/GIS Software Extension

ESRI has recently released a free software extension called ArcGIS for AutoCAD. This product is a downloadable tool that provides seamless interoperability between AutoCAD and the ArcGIS platform. Users are provided with quick and easy access, within the AutoCAD environment, to the full geodatabase and application server supported by ArcGIS Server. In addition, ArcGIS for AutoCAD gives users the ability to prepare data for use in a GIS while working within existing CAD standards.

**Bentley:** We are so glad that you have asked this question. At Bentley Systems, CAD and GIS have always been the two cornerstones of our company and our users' businesses. We are the largest privately held CAD software vendor and – according to Daratech, the #2 worldwide GIS software supplier. Therefore



Halsey Wise, Intergraph President and CEO

we've invested a lot in bringing these two disciplines together.

And we're proud to say that 'we have done it'. We launched Bentley Map (based on MicroStation) in September 2007 and with the latest release, Bentley Map V8i, we've set new standards in CAD/GIS integration on the desktop. But probably more importantly, Bentley Geospatial Server V8i provides native access to Oracle Spatial database, ArcGIS and ArcSDE database, as well as a variety of engineering drawings and document formats like DGN, DWG, Microsoft Office documents, Adobe PDFs, etc. The Bentley Geospatial Server integrates not only the data on the desktop, but also unifies CAD, GIS and business data to support CAD and GIS workflows at an enterprise level. So, for us and for our users, CAD/GIS integration reaches beyond the desktop, addressing the workflow with a server solution that unifies CAD, GIS and business data across the distributed enterprise. So, to answer your question; the inte-

gration of CAD and GIS is available today and is called Bentley Map V8i and Bentley Geospatial Server V8i!

**Intergraph:** At Intergraph, we integrate CAD and GIS today by providing direct access to CAD data sets. This direct access allows our users to bring these CAD datasets into the GIS environment as intelligent features that can be used in the full range of GIS functionality, be it basic viewing and plotting or sophisticated spatial analysis.

In terms of future integration, it is important to look at the different roles and workflows in GIS and engineering design and determine the logical integration points. For example, it's important for an engineering designer to be able to have access to GIS data as the foundation for a design project. In today's era of 3D models, it's important to be able to bring models into the GIS environment for visualization and analysis.

However, it is not in either discipline's interest to deliver a single integrated platform that can be used for both designing an oil refinery and performing land management for an entire country. In Intergraph's experience, such an approach requires either too many compromises or introduces unnecessary complexities into everything from the basic structure of the data model to the way various tools are used to manipulate the data. Ultimately, being able to easily share the data is the most important thing. Technologies such as Oracle Spatial have certainly made the sharing of enterprise data - whether created by a CAD system or a GIS system - much easier. Standards such as CityGML are also certainly making it easier to accomplish this type of data sharing by providing a standard way to move CAD models into a GIS environment.

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Eric van Rees is editor in chief of GeoInformatics.

For more information, have a look at [www.esri.com](http://www.esri.com), [www.bentley.com](http://www.bentley.com) and [www.intergraph.com](http://www.intergraph.com)

We'd like to thank all interviewees for their kind and cooperation.