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Education

M.S., Landscape Architecture, Graduate School of Design, Harvard University, 1969.
M.S., Urban Planning, Institute of Technology, University of Minnesota, 1968.
B.S., Landscape Architecture, California Polytechnic College–Pomona, 1967.

Honorary Doctorates

University of Hungary, 2003
City University of London, 2002
University of Redlands, 1999
Ferris State University, 1993

Selected Awards

Distinguished Public Service Award for outstanding contributions to national and international affairs, U.S. Department of State, The Secretary's Open Forum, 2002
LaGasse Medal for Excellence in the Management of Public Lands and Natural Resources in the Public Interest, American Society of Landscape Architects, 2000
Brock Gold Medal for Outstanding Achievements in the Evolution of Spatial Information Sciences, International Society for Photogrammetry and Remote Sensing, 2000
Cullum Geographical Medal of Distinction for the advancement of geographical science, American Geographical Society, 1999
EDUCAUSE Medal for developing outstanding, technology-based teaching and learning programs in geography, EDUCAUSE in partnership with the Association of American Geographers, 1999
James R. Anderson Medal of Honor in Applied Geography, Association of American Geographers, 1998
Ed Forrest Award for Excellence in Design/Construction Design Automation, A/E/C Systems International, 1997
John Wesley Powell Award, U.S. Geological Survey, 1996

Professional Organizations

Earth System Science and Applications Advisory Committee, NASA
Science and Technology Advisory Committee, NASA
National Steering Committee, Task Force on National Digital Cartographic Standards Role, International Eurasian Academy of Sciences
Executive Board, National Center for Geographic Information and Analysis (NCGIA)
National Advisory Council for Environmental Policy and Technology (NACEPT)
Information Impacts Committee, U.S. Environmental Protection Agency
Board of NCGIA—University of California at Santa Barbara
National Science Foundation: SBE Advisory Committee and AC-ERE Advisory Council
Committee on Social Science Association (COSSA)
Committee on Geography, National Academy of Science
President's Engineering Advisory Council, University of California at Berkeley
Editorial Advisory Board, *GIS World*
Editorial Advisory Board, *Geo Info Systems*

BIOGRAPHY: Jack Dangermond

Jack Dangermond is the founder and president of ESRI, the world's fourth largest privately held software company. Founded in 1969 and headquartered in Redlands, California, ESRI is widely recognized as the technical and market leader in geographic information system (GIS) software, pioneering innovative solutions for working with spatial data on the desktop, across the enterprise, in the field, and on the Web. ESRI has the largest GIS software install base in the world with more than one million users in more than 100,000 organizations representing government, NGOs, academia, and industries such as utilities, health care, transportation, telecommunications, homeland security, retail, and agriculture. He fostered the growth of ESRI from a small research group to an organization of 2,700 employees, known internationally for GIS software development, training, and services. ESRI now has 16 subsidiaries as well as more than 72 distributors worldwide. ESRI also has 11 regional offices throughout the United States and continues to grow at a rapid rate.

Mr. Dangermond is recognized not only as a pioneer in spatial analysis methods, but also as one of the most influential people in GIS. Over the last 30 years, Mr. Dangermond has delivered keynote addresses at numerous international conferences, published hundreds of papers on GIS, and given thousands of presentations on GIS around the world.

He is the recipient of a number of awards, honorary degrees, lectureships, and medals including the 2000 LaGasse Medal of the American Society of Landscape Architects, the Brock Gold Medal of the International Society for Photogrammetry and Remote Sensing, the Cullum Geographical Medal of the American Geographical Society, the EDUCAUSE Medal of EDUCAUSE, the Horwood Award of the Urban and Regional Information Systems Association, the Anderson Medal of the Association of American Geographers, and the John Wesley Powell Award of the U.S. Geological Survey. He is a member of many professional organizations and has served on advisory committees for U.S. agencies including the National Aeronautics and Space Administration's (NASA) Science and Technology Advisory Committee, the U.S. Environmental Protection Agency, the National Academy of Sciences, the National Science Foundation, and the National Center for Geographic Information and Analysis (NCGIA).

Mr. Dangermond graduated with a bachelor of science in environmental science from California State Polytechnic University in Pomona, California. He holds a master of science degree in urban planning from the Institute of Technology at the University of Minnesota and a master of science degree in landscape architecture from the Graduate School of Design, Harvard University, where he worked in the Laboratory for Computer Graphics and Spatial Design. He holds honorary doctorates from The City University of London, University of Redlands, and Ferris State University.

GIS Is Just Getting Started...

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The Inter-Relationship between Things

We live in a rapidly changing world: population growth combined with urbanization; the process of globalization; the ever present need for economic development; the resulting environmental impacts; exponential growth in knowledge especially in scientific and technological advances. And our behaviors have become insensitive to the fact that we live in a system – behaviors that are not sustainable in the long term. More and more, decisions taken at a local level can have consequences beyond a local scope. Conflict is often a result. How does one achieve a balance or compromise when there is even difficulty in understanding the underlying processes?

Consider global warming. Empirical evidence supports that we are experiencing a rise in the ambient temperature of the planet but there are polarized opinions about the underlying causes. Is it the result of the destruction of the rain forests? Is it industrial emissions? In other words, is the root cause man-made? Or is it the result of normal cycles that we are just beginning to understand? This paper doesn't intend to answer this question, or any others of such controversial nature, but it offers the notion that Geographic Information Systems (GIS) are a fundamental tool that can be used to assist in our collective understanding of such issues.

We are visual creatures. Seeing promotes understanding. If GIS helps us to see what is happening in a larger, graphical context; and helps us to model and estimate change; perhaps more collaboration and compromise will result.

GIS is not a particularly new science from a certain perspective. GIS-like techniques have been applied for centuries, obviously in a non-technological fashion. Yet these earlier efforts combined with the technological state we have achieved at the beginning of the 21st century lead me suggest that GIS is just getting started.

Let's look at need for achieving a sustainable balance from a utility perspective.

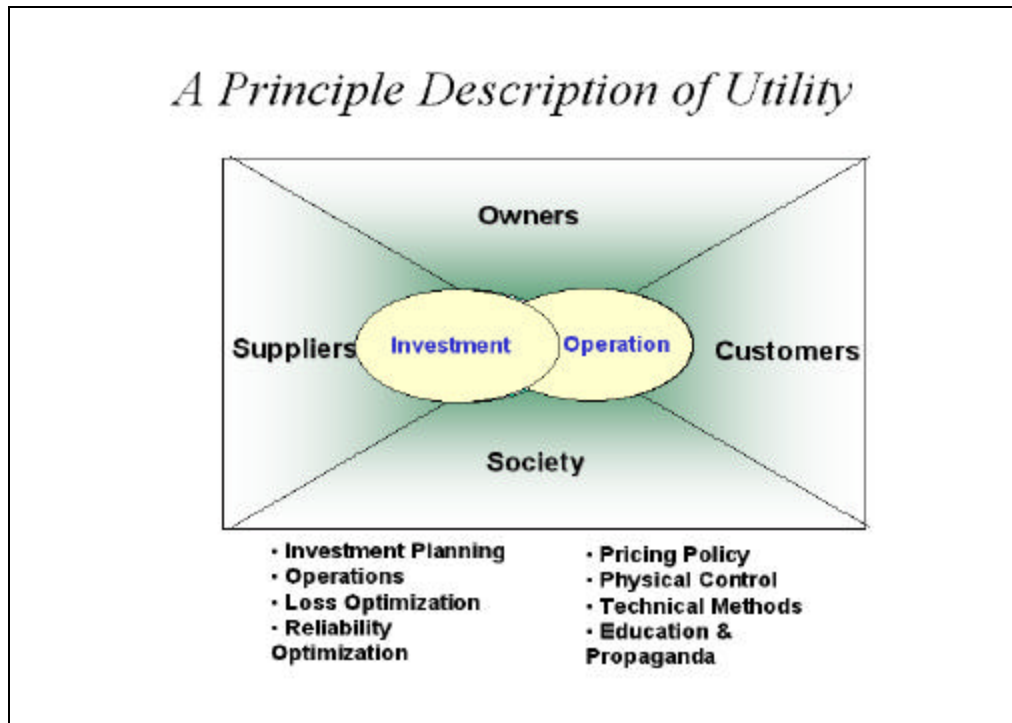
Achieving Sustainable Balance

Utilities represent a unique enterprise in most economies in the world today. The typical utility has an obligation to serve the public, it may have shareholders to whom it has responsibilities. It most likely will have some regulatory oversight to which it must respond. It has customers with expectations of a reliable and affordable product. And it

has employees. The needs and expectations of each of these forces on the utility often represent basic conflicts.

New regulations like NERC emergency rulings 1200 and 1300 (the latter is forthcoming and will be out by the time this paper is released) or the Pipeline Integrity Act, or Sarbanes-Oxley, all represent costs to a utility without a single element of revenue generation coming from compliance. Where rates are set by regulatory bodies, the utility has to turn to efficiencies in operations as they cannot practically lower pay to employees, significantly reduce dividend payout without undue affect on cost of capital, etc. to provide a dramatically simplified overview of reality.

In developing areas of the world, reliable utilities are perhaps the key to economic development. While a utility in such an economy may have short term benefits in that it can operate in a non-sustainable economic fashion as investment into the plant and people provide a greater benefit to society as a whole than can be repaid by customers. But at some point, a quasi-steady state (significant baseline with single digit growth) will be reached and operations must then evolve to a sustainable model. This happens more quickly when the utility is privatized but the notion of sustainability will likely affect all utilities at some point in the ir existence.



So where does GIS fit into this discussion? As this audience is already very familiar, spatial characteristics underlie virtually every aspect of most businesses and especially utilities. You are already familiar with how GIS provides the technology to understand how things related to one another. That GIS also provides the tools to model the underlying processes will also be familiar. It is the extension of these familiar tools, first to the overall

enterprise (ie, the complete utility) and then the societal context within which the utility operates that GIS provides special value.

Let me offer a small example. In Europe and US, investment in electrical transmission has been neglected and new construction is arguably needed. (I'll avoid a wider scope of discussion by ignoring distributed generation whether fossil fuel, hydrogen, thermal, etc. for the sake of clarity here.) Working with a university, the consulting arm of an Austrian utility has developed a GIS-based tool that incorporates a construction cost model. This model is supplemented with a social-cost model that permits different stakeholders to use their own values for the impact (expressed as a cost) on those affected by a proposed transmission route. And GIS provides also a 3D visualization tool for "seeing" what the proposed routes may look like using light-of-sight models, etc. This is a simple example but one that shows how GIS provides a common language for different groups with different goals to collaborate.

Let's talk a little about GIS as a language.

The Language of Geography

We should all be familiar with the definition of geography: it is the science that deals with the Earth and its life, especially the description of land, sea, air and the distribution of plant and animal life including man and his industries. [Webster's New Collegiate Dictionary] Geography is the framework for understanding, conceptualizing, modeling and visualizing our world. It is a way of integrating what we know. We are also familiar with using language to describe our world.

Languages reflect our experiences and interaction with the world. Mathematics, Art, Music as well as written words are languages. Most of you know about computer languages like C++ or C# or even Fortran (if you're old enough). Formal languages help structure societies. We use them to record and describe, think and conceptualize, communicate ideas, create agreement, and collaborate. Languages are most often living, evolving and expanding in response to change.

Where geography embodies formal concepts, theories and methods for understanding our world, GIS is emerging as a new language building on the theories of geography and other sciences. GIS provides a common means for many people to record and describe, think and conceptualize, communicate ideas, create agreement, and collaborate about the serious problems our world faces today.

Now let's consider the same processes in a larger societal context. At this level, GIS supports the public review process, taxation, rate setting, high consequence area assessment, etc. Spatial considerations are a core component of every stakeholder's area of interest. These considerations are geographic in nature and GIS provides the language through which they communicate. It is worth noting that while the stakeholders will have greatly differing perspectives and goals, GIS itself is agnostic: the same tool that an environmental group might use to oppose a transmission line can be used by those who are proposing the line. And, just as in spoken language, the one who has mastery of rhetoric is the superior has the advantage.

Bringing It All Together

What makes the scenarios I've described above actually happen with respect to GIS? I suggest that it is in large part due to the natural applicability of GIS to understanding and attempting to manage the complex problems of today's world. GIS let us model our understanding of the world, let us play what-if games and to evaluate possible outcomes. You might say GIS is the logical solution.

If we are to succeed in our understanding of the system *Earth* and to achieve the sustainable balance we need for long term survival, several components are essential.

First and most important is you, the GIS practitioner/professional. Your work is the most important because you are the ones applying the technology. It is you that tell the technology provides what is needed. Sometimes we vendors offer our own contributions but it is you, our users, that guide us. And we need domain knowledge experts who work to understand the problems in their fields. It is we users and vendors who need to help them with the spatial aspects.

In the end, the benefits will accumulate for all of us.