

What's in a name?

Chief technology officers: Architects, technologists or visionaries?

BY WAYNE HALL

As governments become more dependent on technology and deliver an increasing number of services using technology, states are looking more closely at the role of “chief technology officer.”

The CTO is part of a growing trend that embraces a raft of “c-level” executives (such as chief operating officers and chief information officers) devoted to developing, maintaining and securing system-wide information networks.

Although the notion of a “chief technologist” has developed slowly and there have been widely different understandings of how the position varies – if at all – from that of chief information officer, CTOs are gaining ground.

“Disruptive technologies” have contributed to the position’s development, because governments and businesses need to manage technologies that affect them from the outside. Like the emergence of the Internet – and before that, the personal computer – new wireless technologies have created disruptive forces that must be managed and incorporated into state government for it to function well.

CTOs in the public and private sectors

Governments, not the private sector, may be leading the trend of using CTOs. Recent research from NASTD – the Association for Telecommunications and Technology Professionals Serving State Government indicates that a substantial minority of states employs a CTO. A “Quick Survey” of NASTD members shows that of 35 states responding, 16, or 46 percent, have a chief technology officer.

According to research published in April 2002 by *ComputerWorld* magazine, less than 10 percent of Fortune 500 com-



panies have such officers – due in part to a lack of agreement about just what a CTO does.

Indeed, the available scholarly research proposes several roles for the CTO. Tom Berray, author of *The Role of the CTO: Four Models for Success* describes the following types:

- In the “Infrastructure Manager” role, the CTO reports directly to the CIO, who in turn reports directly to the chief executive. As the title suggests, the CTO’s primary responsibility is to make sure the communications infrastructure functions well. He or she has relatively little influence in determining how technology will be used.
- The “Big Thinker” works with very new (“bleeding edge”) technologies to determine their usefulness to the organization. This person conducts prototyping and testing, and thinks strategically about the technology in question. He or she works from a “position of influence” rather than as a line manager of an agency.
- The “Technology Visionary and Operations Manager” usually works for an organization where technology is the “chief ingredient in implementing business strategy.” This type of

CTO combines elements of the first two roles – infrastructure manager and technology conceptualizer. Technology and business skills are the hallmark of this executive, who reports directly to the chief executive.

- The “External-facing Technologist” is somewhat similar to the “visionary and operations manager,” but he or she works in a more traditional industry or organization that must use technology to provide better products and services to external customers. He or she usually has cross-agency influence and reports directly to the CEO.

Berray also suggests that the term “CTO” is the least understood of the “c-level” designations. Nevertheless, this ambiguity should not be confused with a lack of power or influence. According to an *InfoWorld* compensation survey published in 2002, 87 percent of CTOs report directly to the company’s chairman, CEO or president.

First federal chief technologist

At the federal level, Norman Lorentz is the first chief technology officer. Lorentz, former CTO of the U.S. Post Office, is the “chief of electronic government” for the federal government. He works in the Office

CIO or CTO: What's the difference?

Some generalized differences between a CIO and CTO

Chief Information Officer	Chief Technology Officer
Uses capital (policy development)	Invests capital (technology development)
Internal focus on enterprise	External focus in support of the enterprise
Somewhat less technology focused	A little more technology focused
Responsible for the IT business	Responsible for infrastructure, technology
Knows legislature	Knows architecture

of Management and Budget and reports to the associate director for information technology and e-government.

He also thinks big. As the president's chief technologist, he has outlined the administration's IT priorities. Among them is a Federal Enterprise Architecture, which he articulated at the "Federal CTO Forum" last November. The goal of the five-step FEA program is to unify federal IT systems into a single architecture across agencies – and to integrate "state and local enterprise technology architectures into the FEA."

According to Lorentz, the CTO must be included in the strategic planning processes. He pointed out that the federal CIOs, which federal agencies are required by law to employ, recently invited chief technologists into the federal CIO Council. Lorentz said this is one step toward a needed "community of practice." This "community" manages close to \$50 billion in federal IT investments, according to OMB data.

Lorentz has also articulated a vision of an "interstate system for homeland defense," which he compares to the nation's interstate highway system. This concept is in its infancy.

The Bush administration has also published a national policy paper called "A National Strategy to Secure Cyberspace," designed to provide a framework for thinking about IT security. Draft versions of the document called on the private sector to create "corporate security councils" that included the CIO, CTO and a "chief information security officer" or CISO. Chief security officers (CSOs) now regularly appear in business executive suites.

Managing "disruptive" technologies

Some have called the CTO's role one of managing "disruptive technologies" – those technologies that can transform a business or the business environment, like the personal computer did in the 1980s and the Internet did in the 1990s.

In the coming decade, wireless and mobility technology will constitute a third wave of dramatic change. The development of technology standards such as 802.11, commonly called "Wi-Fi," will contribute to the explosive growth of small, localized wireless networks for local wireless computing and Internet access.

New name reflects changes

As a recent article in *Government Technology* so accurately depicted, the nature of telecommunications networks is changing:

"Telecom has become so finely intertwined with IT in Massachusetts that its vocabulary has changed along with its purpose. What happened there also has happened, or is in the process of happening, throughout state government. Many telecom departments have been folded into state IT agencies; names and titles have changed as well. Telecom directors are now directors of either network infrastructure or integrated communications.

"What was once separate, both organizationally and technologically, has become intermingled. 'It's hard to tell the difference between the beginning and end of a network these days,' said David Ballard, executive director of Infrastructure Services for the Commonwealth of Kentucky. Ballard has watched as separate functions merged with changing times. 'Today, we combine all of the infrastructure: voice, data, servers, routers and so on,' he said."

—Tod Newcombe, "Going Up," *Government Technology*, November 2002.

In order to reflect the changing nature of telecommunications networks, NASTD has a new name. Formerly the National Association of State Telecommunications Directors, the group is now called NASTD – the Association for Telecommunications and Technology Professionals Serving State Government.

NASTD members oversee a technology infrastructure critical to the business of state government. They generally have chief responsibility for the combined network or infrastructure in the executive branch.

While these networks provide users with invaluable information, they also create a daunting management environment. *CIO Magazine* reports that an estimated 20 percent of companies studied by Gartner Group have Wi-Fi networks that their IT executives know nothing about.

In addition, wireless networks pose security problems, which national and international technology standards-setting bodies are working to address.


These concerns are unlikely to subside. The federal government's current policy is to free up radio spectrum to encourage development of wireless technologies, including more high-speed, or broadband, wireless local networks and wireless Web access.

Another important new corporate technology is "instant messaging," which enables users to create and hold private conversations. Typically, the instant-messaging system alerts the user whenever someone on their private list is online, so they can initiate a private chat session.

Brought to consumers by AOL, companies such as Sprint are working to make instant messaging a business tool. Not only will workers have instant access to colleagues, they will also have real-time access to corporate or government resources and applications.

Although the technology itself is impressive, such developments are also noteworthy for their economic impact. Mobile commerce, sometimes called "m-commerce," was expected to generate \$50 billion in revenue worldwide in 2002, according to United Nations data.

These "disruptive" technologies pose unique challenges for large organizations – including state governments – and their management structures. Technology can no longer be managed as a resource to be understood only by high technologists inside an organization, or created and applied to certain business problems at the organization's discretion. Now, more than ever, network and infrastructure managers need to know and understand these new technologies.

Like the PC before it, technology – especially mobility technology – is creating amazing dynamics that will affect state governments, whether or not they are ready. 

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