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The Roles of CIOs and CTOs

- Posted by Andy Gravatt on September 8, 2011 at 5:09pm
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Introduction

The role of the Chief Information Officer (CIO) has been in existence for many years in the government and its ultimate definition was finally settled by the Clinger-Cohen Act of 1996. At this time the position of the Chief Technology Officer (CTO) is being instituted across federal government departments and agencies, but the role is still evolving. This paper is a brief introduction to the current state of the two roles and provides a model for how CIOs and CTOs can effectively work together in a government organization. Much like the CIO role prior to Clinger-Cohen, each agency/department is defining the position description of their CTO to meet the needs of their organization. There is a lot of common ground and after reviewing several cases in the literature, the following definition of the role of the CTO was developed. To conclude the discussion there is an overview of a model for how the CIO and CTO can interact to best serve their organizations.

Chief Information Officer's Role

The primary role of the CIO is to provide policy direction, maintain the IT infrastructure of the organization, ensure proper security measures are followed, and to evaluate and control capital expenditures to facilitate the portfolio management of the organization. The graphic below illustrates a more detailed list of the functions of the CIO. Clinger-Cohen defines the general responsibilities as follows:

"(1) providing advice and other assistance to the head of the executive agency and other senior management personnel of the executive agency to ensure that information technology is acquired and information resources are managed for the executive agency in a manner that implements the policies and procedures of this division, consistent with chapter 35 of title 44, United States Code, and the priorities established by the head of the executive agency;

(2) developing, maintaining, and facilitating the implementation of a sound and integrated information technology architecture for the executive agency; and

(3) promoting the effective and efficient design and operation of all major information resources management processes for the executive agency, including improvements to work processes of the executive agency."
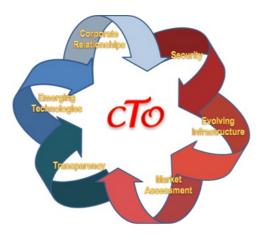
Chief Technology Officer's Role

The CTO's responsibility is to provide overall awareness of technologies that can be used to advance the mission of the organization. This role is illustrated in the graphic below and the primary functions of the CTO are described below:

- **Emerging Technologies** – Must be aware of emerging technologies to select the proper capabilities to infuse into the organization
- **Market Assessment** – Must be prepared to review the market to find technologies that can most efficiently meet the needs of the agency
- **External Relationships** – Must work closely with government agencies and private industry to ensure that the government's needs are addressed and that the organization is aware of the latest technological innovations
- **Evolving Infrastructure** – Agency's infrastructure is constantly changing and the CTO must be aware of these changes and bring technologies to the organization to enhance the agency's capabilities
- **Transparency** – With the current requirement to increase transparency across the government, the CTO must understand the issues surrounding open government and seek technologies that can be used to enhance agency communications with the public
- **Security** – Must be aware of security issues and what technologies are available to secure the agency's networks, data, and IT assets

CIO and CTO Interaction

When the two roles are put together in an organization, the initial relationship is often adversarial, but most organizations are now finding a strong synergy between these positions. This graphic illustrates a model of how these two roles can support one another to maximize their contributions to the organization. The CIO's role is mandated by legislation and focuses on the internal aspects of maintaining and enhancing the infrastructure of the organization. In contrast, the CTO role is still evolving and has, so far, been able to remain adaptable to the emerging technologies in the private and public sectors. This flexibility allows the organization to use the CTO to concentrate on major technological issues that are impacting the organization or may impact the organization in the future. The CTO can focus on the external relationships and act as the liaison between the private sector or other government agencies and their agency in support of the CIO mission. This synergy between the CIO and CTO allows the agency to glean the best practices and innovations from the technological landscape of today for future planning within their agency.

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Comment by Michelle McClellan on October 26, 2011 at 3:49pm
Many orgs I've worked for have phased out the CTO position and replaced it with a CIO, incorporating more knowledge and information management into the role, as opposed to the old school managing the technology only.

Comment by Teri Centner on October 24, 2011 at 4:34pm
And somewhere in here falls Knowledge Management ;-)

Comment by Dennis Hall on October 5, 2011 at 10:47am
Is there a legislative foundation for the CTO similar to Clinger-Cohen for CIO's?

Comment by David Fletcher on September 15, 2011 at 10:09am
I have seen various attempts to define the difference in roles between the CIO and CTO and Andy's delineation is a pretty good one. As one of the first CTO's in state government and the first CTO for the state of Utah, I had the opportunity to somewhat define my role and what I would do in conjunction with our CIO. Primarily my focus has been on three areas: Innovation and Emerging Technologies, Digital Government (I wanted this regardless of my working title), and Architecture. I guess those are all fairly consistent with Andy's definition, but I don't oversee security although I work closely with the Chief Information Security Officer because of the importance of security to eGovernment. A few other states have added CTO positions that I'm aware of, but it seems that the position is still evolving within government.

Comment by Andy Gravatt on September 14, 2011 at 4:48pm

Allison, your question might need to be a whole new article :-). When you look at the CIO wheel and the CTO functions (above) you see a huge range of competencies. I've met a lot of CIOs and CTOs and their backgrounds generally have an IT flavor, but they come from all over their organizations and have extremely diverse educations. You can make a whole career out of any one of the competencies and I've never met anyone who master them all (if you have, please post here!!!!).

Comment by Andy Gravatt on September 14, 2011 at 3:51pm

Martin, that's a great question and at this point, all of your scenarios are implemented somewhere. That's why I was vague on the reporting chain in the posting. In my research, I have found the following statements to be generally true:

1) In the government, the CTO usually works for the CIO, but is sometimes a peer. I think this is caused by the Clinger-Cohen Act which was put in place in 1996 and gave overwhelming responsibility for all IT to the CIO. Since the CTOs are pretty new to the table, they usually join the CIOs existing team. Jeff gives a great example below of how they do things in Canada (Thanks for your insight, Mr. Braybrook)

2) In the private sector, the CIO and CTOs are normally peers. When this isn't the case, it's split about equally on who reports to whom.

I spent most of my career at NASA and the CTOs there are not limited to IT-related matters. It seems to depend on the business the organization is in and if they have a major technology focus beyond their IT functions.

Comment by Martin R. Waszak on September 14, 2011 at 11:28am
The relationship of the CIO and CTO to the next level up and their peers is a bit unclear to me. Are the CIO and CTO peers in the senior leadership team? Do both report to higher level management (e.g., Director, Administrator)? Is the scope of the CTO limited to IT related issues or does is cover the entire scope of technological issues facing the organization?

Comment by Lux Phatak on September 14, 2011 at 9:46am
Very well explained. Information worth keeping to explain the difference and similarity of CIO/CTO to others.

Comment by Allison Primack on September 14, 2011 at 9:46am
I really liked this article as well! The diagrams really helped me understand as well. A question for you Andy - what kind of experience do you need to become a CIO or a CTO? What kind of education do you need or past work to make you qualified?

Comment by Jeff Braybrook on September 14, 2011 at 9:40am
Thanks Andy. Good article. Your comment that the initial relationship between CIO and CTO is often adversarial is interesting. In the Government of Canada the federal CTO position reports to the federal CIO. As former Deputy CTO for Canada, I found that this relationship worked extremely well. This is mainly because, as you point out, the role of the CTO is supportive of the CIO's mission and mandate in so many ways.

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