The Role of the CTO: Four Models for Success

By

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Introduction:

With an increasing number of organizations exploiting information technology in innovative ways, many companies have been adding a Chief Technology Officer (CTO) to their executive leadership teams. One can argue that this role is among the least understood of all c-level (CEO, COO, CFO) positions in the executive suite. But given the impact of technology on business organizations over the last twenty years, it may be the most promising when considering 'competitive strategy' in the future. The Holy Grail of all competitive strategy will concern the elusive nexus of 'technology' and 'leadership.' These parallel issues converge in a unique way in the CTO role. Because the CTO is a relatively new position, there are various roles CTOs play in their organizations. On the one hand, many senior executives express confusion about what is and should be the exact role of the CTO. On the other hand, is there a way to measure the intrinsic ambiguity and complexity of a role, where research, development, technology innovation and leadership vision intersect in unpredictable ways? For example, the CTO of a multibillion dollar media company believes "I suspect it will be difficult to define *the* role of the CTO as many people attribute different functions to the CTO. To me, one common function is the ability to assess technology's strategic future impact on the corporation." The CTO role is polymorphous: it either assesses the use of an existing technology or develops a new platform, which impacts an organization in improving its competitive performance within a given industry.

This paper explores two fundamental questions: What are the current models in corporations for the role of the CTO? Which model is right for your company? This study was conducted over the past three years. It is drawn from discussions with hundreds of CIOs and CTOs as well as a written survey of approximately 30 CTOs. During the course of the research, many variations on the specific roles of the CTO began to emerge. These variations make it difficult to define a "typical" or "normal" CTO and their responsibilities. The intrinsic ambiguity of the role does not reflect its lack of power or influence given more familiar roles within the executive suite (CEO, CFO, COO). On the contrary, it concerns the single most important question of future competitive strategy: how does technology (in the widest sense possible) relate to optimal decision-making at the top, which in turn enhances competitive performance, higher margins, greater market share, and long-lasting dominance of a certain industry? In looking across many industries and companies, we can categorize different CTOs into four (4) general models.

Model 1: CTO as "Infrastructure Manager"

With the escalating complexity of information technology (IT) many companies have allocated some of the responsibilities of the traditional Chief Information Officer (CIO) to a CTO. The CIO retains the "staff" role of IT; they oversee technology strategy, executive-level relationships, budgeting, and the fusion of IT and business processes. The question—"How effective is the IT organization?"—remains in the forefront of the CIO's mind. In model 1, the CTO takes responsibility for the "line" role of IT. He/she runs the infrastructure and operations of IT: data center operations, network operations,

applications development & maintenance, security, and other line functions. Thus, the CTO's focus is to keep the IT organization operating efficiently. Additionally, this CTO generally does not determine how technology will be used to support the organization – the CIO usually retains that responsibility.

In this model, the CTO usually reports directly to the CIO, who is a senior executive in the organization, reporting to the CEO or President. Sometimes the CTO will have an "officer" title, but he/she will not be considered an officer of the company. The person who takes on this CTO role should have proven operational skills, a keen sense of managing technology, and an ability to lead a large and diverse organization. In this model the executive function and technology enabler is split apart: the CIO retains the traditional elements of executive power while the CTO is responsible for day-to-day management and operations. Splitting apart these functions has repercussions for organizational behavior, design, and integration for the company, and thus affects its ability to perform at a maximal level.

Model 2: CTO as "Big Thinker"

The CTO as "Big Thinker" spends his/her time evaluating how technology can be used internally by the business to 1) enable new business models and business lines, 2) increase revenues, and 3) preempt a competitor's attempts to use technology to disrupt or dislodge his/her company's market position. This CTO's responsibilities often include advanced technology, competitive analysis, technology assessment, prototyping lab, partnering, planning, and architecture standards. The CTO may report directly either to the CIO or the CEO, and generally has a small, elite staff. In some cases, they operate alone. Thus, this CTO works mostly from a position of influence - as opposed to direct control like the line manager. Often the CTO has been with the organization for a substantial period, and has built a strong reputation with the senior executive leadership team. The other scenario is a CTO, who comes from outside the organization but has a tremendous public reputation.

The successful CTO must be well respected within the organization. Furthermore, he/she must demonstrate the ability to influence key senior executives to consider new information or different paths to accomplish key goals. Typically this CTO is given ample room to contemplate long-term innovation, broaden the strategic horizons of the company, and envision future paths. This means alleviating the restraints on the role, which in turn generates more independence. But inversely, this CTO does not always have direct and actionable say in concrete decision-making, which is always intertwined in an intricate web of relationships within the executive suite. The CTO has the freedom to think in the broadest possible ways, but inversely must await a longer period of trial and incubation to see innovative ideas become reality.

Model 3: CTO as "Technology Visionary and Operations Manager"

The CTO as "Technology Visionary and Operations Manager" is usually found in a dot.com or other technology-oriented company where information technology is the key

ingredient in implementing business strategy. The CTO is responsible for determining how technology can be used to implement the business strategy. This informs the 'technology visionary' aspect of the role. But then subsequently, the CTO is responsible for *actually* integrating and running the technology, i.e. the role of the 'operations manager.' Hence, the CTO *must* have an excellent combination of both business and technical skills in order to successfully design the functional and technical aspects of the business strategy and then build the IT organization to execute its components. As one of the top executives in the company, this CTO is usually brought in very early in the business life cycle to help get the company off the ground. Often, the CTO is a co-founder of the business and knows his/her best role is staying tuned in with the technology. One common problem we have observed with this model is the following: some CTOs develop new strategies and move technologies rapidly, but do not have the IT management and infrastructure in place to successfully implement these new ideas and technologies. Their zeal for technology innovation outstrips the organization's capacity to manage rapid change. One of the great challenges of this CTO is to balance the initial expenditure of energy towards product research and innovation while considering the enduring business requirements necessary for building a successful company.

In model 3, the CTO reports directly to the CEO or may even be a co-Chairman of the business. The person, who assumes this CTO role, should have a strong technology vision *with* the practical ability and experience to design, build, and run the technology while managing a large organization. Larger organizations may also have a CIO reporting to the CTO. In this case, the CIO will usually fulfill the role of infrastructure manager. According to Bruce Rogow, IT Consultant, one of the pitfalls is CEOs hiring CTOs with vision but no real experience in actually creating and running an IT organization - a mismatch that can be disastrous to the future of the business. Visionary technologists are successful 'managers' of organizations when they understand how technological instruments function in complex contexts, which include relationships among other assets (human, social, knowledge, and financial capital, communications, marketing, branding, customer relations, etc.).

Model 4: CTO as "External-facing Technologist"

The CTO as an "External-facing Technologist" focuses his/her efforts on using technology to provide better products and services to external customers or clients. Nearly every major IT consulting company implements this CTO role. This brand of CTO has to be outwardly focused with respect to external trends and willing to embrace spheres of innovation, which lie in and outside of his/her company. They may not necessarily identify with their organization wholesale, but view themselves as an ether or network, which permeates multiple institutions and industries. In consulting companies, the CTO is usually an equal peer of the CIO or may be considered a higher-level executive than the CIO (although the CIO does not usually report to the CTO in this case). In this scenario, the CTO's main role is to develop the strategic technology plan for the organization by identifying, tracking, and experimenting with new and potentially disruptive technologies. The goal is to project and assess technologies'

impact on the corporation and its customers. This differs from the traditional CIO's technology plan, which most likely focuses on the technologies to support the internal systems of the organization, i.e. running the trains in day-to-day management operations.

The CTO usually has a relatively small group of people (10-50 people, depending on the size of the organization). His/her responsibilities may include technology research & development, technology transfer and change management, intellectual property, knowledge management and/or best practice management, and advanced specialized technology centers. In addition, the CTO is usually responsible for ensuring that best practices for exploiting key technologies are shared across the organization's front line to its customers. Like the second model (CTO as "Big Thinker"), this CTO may have a strong reputation with the senior executive leadership team-- either from internal relationships or external public perception. This person's success will stem mostly from a position of influence as a key advisor to the CIO, COO, CEO, and other senior executives. It is difficult to measure the sphere of influence of this type of CTO. On the one hand, he/she serves in a broad, advisory function, which may precipitate major decisions or changes in direction for the company. On the other hand, there is no clear definition of this CTO with respect to some of the more traditional functions in the executive suite.

In this model, the CTO usually reports directly to the President/COO, CEO, or other senior executives. He/she should combine a broad knowledge of the potential value in emerging technologies, and a keen understanding of how these technologies can affect the company's business and business processes. This person also needs strong communication and interpersonal skills to influence senior executives. The CTO's function is to help them evaluate different paths to achieving the business goals, in addition to being an external spokesperson for the organization. One can argue that with increasing awareness of the value-add of this CTO role, traditional industries, which are typically averse to radical innovation (i.e. disruptive technologies), will come to rely on the CTO for major corporate and organizational decisions.

Matching CTO Role to Organizational Need

Given these four broad models of CTOs, we next examine a framework for matching the CTO roles to the organization's business needs.

In Figure 1, we map the different CTO roles against two driving forces: 1) the amount of business change affecting the organization from either internal or external pressures, and 2) the percentage that information (versus physical assets) represents in the organization's suite of products and services.

Lower Left Quadrant

"Information Technology has become nearly ubiquitous in almost every customer interaction. At the same time, the ability to provide 'bullet-proof' information security has

become an ever-increasing and daunting challenge. These two factors cry out for some kind of CTO role even in a relatively slow-moving and information-sparse industry like ours." – CTO of a multibillion dollar chemicals manufacturing company.

In the lower left quadrant are organizations in relatively stable industries and thus face relatively low amounts of business change. Although companies in this space conduct mergers and acquisitions, the pace of these does not overwhelm the business as a whole. In addition, these organizations use information to help build and support their products, but it is not a critical component for their success in the market. Some general examples of industries are food services, chemicals, and raw material companies. If companies in these industries choose to add a CTO to their organization, they should consider the "CTO as Big Thinker" model. This CTO is a low-cost addition to the organization, yet can help reap potentially high pay-offs by identifying and elevating critical opportunities for the organization. Inversely, they can preempt any potential threats, which loom on the horizon.

CTO Role for Organizational Needs

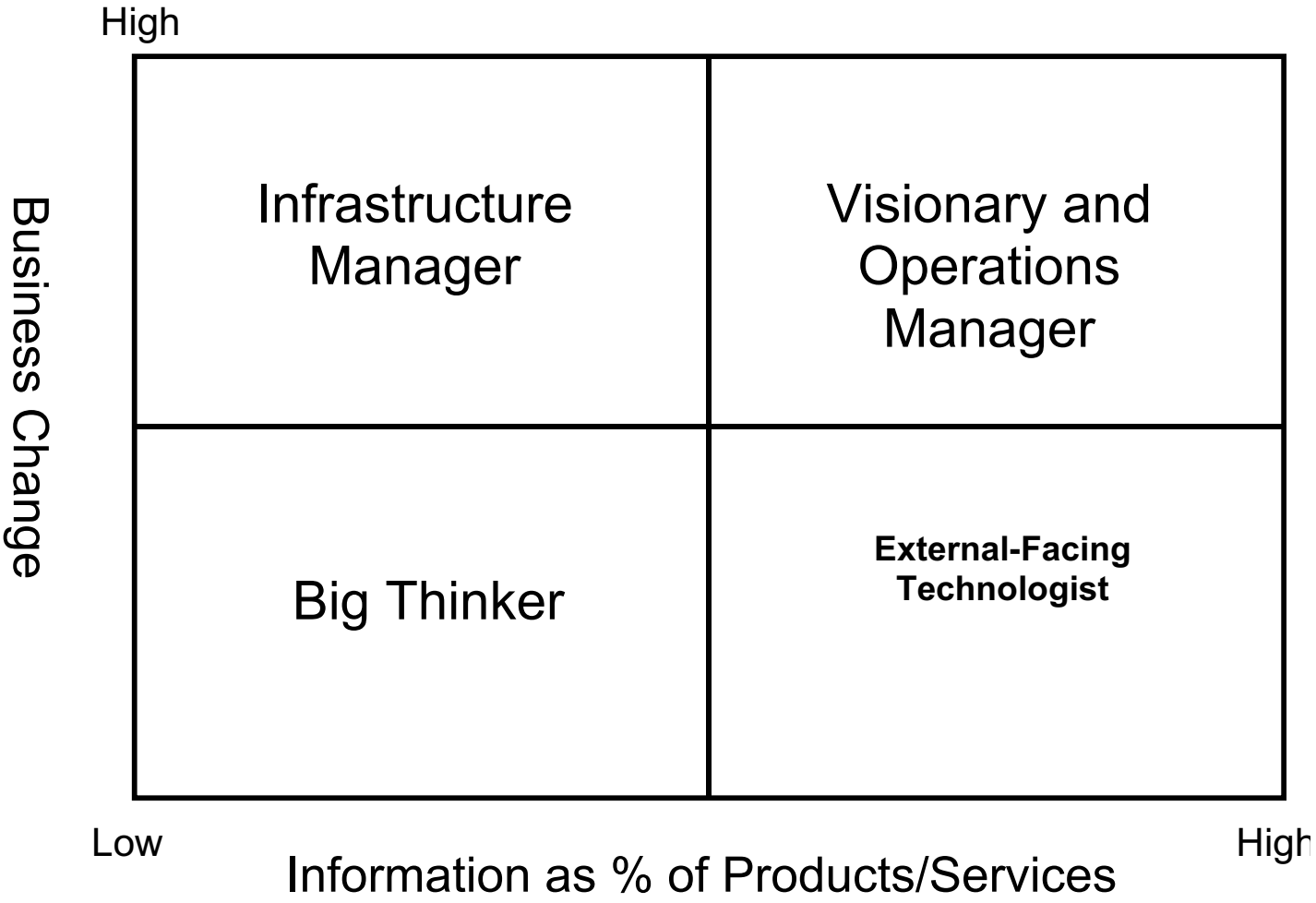

Figure 1

In the upper left quadrant are organizations engaged in a high degree of business change: many are in the process of numerous and/or large mergers and acquisitions. In addition, companies in this space may be experimenting with and launching many new products and services. However, since information is a relatively small part of the products and services, these organizations may best be served by positioning their CTO as an "Infrastructure Manager." A CTO will benefit the organization by focusing on cost-reduction. He/she can leverage the existing infrastructure across the existing and new business units. Also, by driving toward a common infrastructure, the organization will ensure better communications and collaboration across geography and business units.

In the lower right quadrant are organizations where information is a critical component of the business, yet the business is experiencing relatively little change. Established research, information technology consulting, software, and hardware companies are some good examples of organizations that might fall into this quadrant. The "External-Facing Technologist" CTO may help companies by driving future product/service, and/or

business model opportunities while providing a respected presence for clients, industry analysts, and the media.

Lastly, *in the upper right quadrant* are organizations in a high state of change, which use information as the key component of their business. These companies constantly use information technology to launch new products, enter new markets, and create partnerships and alliances. The companies often require a CTO as a "Visionary and Operations Manager" to meet the fast-paced demands of these interactions. This CTO must be adept at knowing the potential of the technology and how to make it work – with reliability, availability, and scalability.

Relative Strengths of the Different Models of the CTO

As a complement to the framework in Figure 1, the following table addresses the relative strengths of each of the CTO models. In Figure 2, we rank the relative capability of each CTO against 10 key business requirements and processes.

Business Requirements/Processes	**CTO as Infrastructure Manager**	**CTO as Big Thinker**	**CTO as Visionary and Operations Manager**	**CTO as External-facing Technologist**
Identify new technologies	LOW	HIGH	MEDIUM	HIGH
Exploit new technologies	LOW	MEDIUM	HIGH	HIGH
Integrate new technologies	MEDIUM	LOW	HIGH	MEDIUM
Leverage technology across business units	HIGH	MEDIUM	HIGH	MEDIUM
Drive the business strategy	LOW	HIGH	HIGH	HIGH
Drive Revenues	LOW	LOW	MEDIUM	MEDIUM
Reduce costs	HIGH	MEDIUM	MEDIUM	MEDIUM
Enhance client relationships	LOW	MEDIUM	MEDIUM	HIGH
Enhance communications and collaboration	MEDIUM	MEDIUM	Low/Medium	HIGH
Build out or leverage existing IT infrastructure	HIGH	LOW	HIGH	LOW

Figure 2

Conclusion

In conclusion, organizations first need to think through the IT functions, which they currently have in place. Secondly and more importantly, they must decide what additional functions they need. By understanding the way in which the role of the CTO is developing across many industries companies can create a CTO position that will best enhance their own business opportunities. Now and in the future it will be important for companies to think *strategically* about the relationship between technology and their 'leadership needs.' In other words, they must assess what *kind* of technology leadership is required for the growth or stabilization of their company. The issue is not simply the obvious need to keep apace the frightening expansion and development of disruptive technologies: of course this is just one of the factors, which play a part in general competitive strategy. Rather, engineering new types of leadership will impact how an organization maximizes its resources, strengthens its brand, and leverages internal and external relationships. This in turn will evolve industries and markets in new and exciting ways.

Biographies:

Mr. Berray is Executive Director of the CIO/CTO Practice of Cabot Consultants, an executive search firm, with over 17 years of information technology (IT) hardware, software, and services industry experience. Prior to joining Cabot, Tom was a Principal with Heidrick & Struggles in the Information Technology practice. Tom's search practice focuses on CIO, CTO, VP Engineering, and other senior information technology executives in all industries, as well as senior executives for high technology companies in the hardware, software, telecommunications, professional services, and e-business areas.

Before joining Heidrick & Struggles, Tom was with the Gartner Group a worldwide research and advisory company focused on providing information technology management, applications, and operations research to Fortune 1000 organizations. At Gartner Group, Tom was a Director with its Executive Programs group, where his primary responsibility was to act as a personal advisor to over 70 Chief Information Officer and Chief Technology Officers who were members of the mid-Atlantic and Southeast chapters. Prior to Gartner Group, Tom worked for Computer Associates and Xerox Corporation.

As an IT professional prior to entering the search industry, a sample of Tom's client list includes AARP, American Red Cross, Beers, Campbell Soup, Catholic Health East, Cigna, Cracker Barrel, Deloitte & Touche, Discovery Communications, DuPont, Fannie Mae, Federal Reserve, Freddie Mac, Fruit of the Loom, Gannett, GTE Wireless, Intelsat, Lockheed Martin, Marriott International, Mobil Oil Corporation, National Association of Securities Dealers, Provident Insurance, Sallie Mae, TVA, TRW, nearly every major agency of the US Government, Vencor, Wachovia, and The Washington Post.

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Raj Sampath works with the Global Industry and Functional Practices of Heidrick and Struggles International Group. As a thought leader, innovation architect, and strategic change catalyst, his responsibilities include the following: work with senior leadership on strategic development, new ventures, corporate innovation, new business plans, communications, knowledge management, extended research/equity analysis, and thought leadership as it relates to business development and executive search efforts worldwide.

Raj Sampath has over a decade of international experience, including the U.S., Western and Eastern Europe, Russia, the Middle East, and Asia, in academics, think tanks, university and corporate research & development, government entities, media, and

research/development for executive search with an emphasis in financial markets and technology. He began his career at the University R&D and Corporate Funding division of the University of California, Irvine Administration. There he wrote National Endowment of the Humanities, National Endowment of the Arts, and National Science Foundation grants to procure major corporate and federal funds for basic science and technology research at the University of California, Irvine. His latest endeavors include a designee for the Fulbright for recent Ph.Ds and scientists and a D.A.A.D. research fellowship in northern Germany and Scandinavia. He was awarded the Chancellor's Postdoctoral Fellowship at the University of California, Berkeley from 96-98. Sampath has lectured all over the world and published over fourteen articles in international journals. He is in the middle of composing his second major work on the philosophy of history, religion, and the new millennium, which will be published by the University Press of America (Rowman and Littlefield Publishing Group). His first major work was published in 1998: *Four-Dimensional Time: Twentieth-Century Philosophies of History in Europe*, Bethesda: International Scholars Publication, 1998.

He holds a B.A. degree in history with a philosophy minor from the University of California at Berkeley and a Ph.D. in modern European philosophical-history, with subspecializations in historiographical theory and epochal shifts, economic history, the history of science and technology, and speculative theology from the University of California at Irvine. Sampath has also conducted studies/research at the Ecole des Hautes Etudes en Sciences Sociales in Paris and the Freie Universität in Berlin. Sampath is a member of the following organizations: Silicon Valley Charter Member of The Indus Entrepreneurs (TIE), CIO Insight Leadership Panel, *CIO Insight* (Ziff Davis Media publication), Cato Institute, Commonwealth Club of California, World Affairs Council of Northern California, Society for the Philosophy of History, Society for Philosophy and Existential Phenomenology, International Society for the Study of Time, and the American Philosophical Association. Sampath is a frequent speaker at international conferences and professional organizations. Current writings, business development, and topics of interest focus on corporate leadership, vision, power, management, innovation, monetary systems and financial markets, and technology in the 21st century. Phone: (415) 291-5240. Fax: (415) 981-0482. E-mail: rsampath@heidrick.com