

# All Things Distributed

Werner Vogels' weblog on building scalable and robust distributed systems.

## The Different CTO Roles

By Werner Vogels on 11 July 2007 11:00 AM | [Permalink](#) | [Comments \(4\)](#)

I was putting together a short panel presentation on the role of a Chief Technology Officer in corporate innovation and I once again realized that there is quite a bit of confusion around the role of the CTO. The first thing that always comes up when you want to discuss the role of a CTO is that there is no well established definition of what a CTO actually does. The role is very different depending on the type of company and the role technology plays in the company.

Some time ago I did some digging into the history of the CTO roles and how to best classify them. I am posting it here as it might be of general interest. Some of the sources I used are at the end of this note.

When [John Brockman](#), founder of [Edge](#), interviewed [Nathan Myhrvold](#) his first question was "[What's a CTO](#)", to which Nathan replied:

*"Hell if I know. You know, when Bill and I were discussing my taking this job, at one point he said, Okay, what are the great examples of successful CTO's. After about five minutes we decided that, well, there must be some, but we didn't have on the tip of our tongues exactly who was a great CTO, because many of the people who actually were great CTO's didn't have that title, and at least some of the people who have that title arguably aren't great at it."*

*My job at Microsoft is to worry about technology in the future. If you want to have a great future you have to start thinking about it in the present, because when the future's here you won't have the time. "*

The first CTOs came onto the scene during the late eighties. A number of companies started to capitalize on the results their R&D laboratories were delivering and the directors of these labs were moved into positions where they could use technologies to provide the company with strategic advantages. The role developed into very different positions and there are several ways how to categorize them. There are good reasons for following any of the categorization models, but I believe [Tom Berray's quadrant](#) gives the best framework for reasoning about what makes CTOs successful:

**Infrastructure Manager** – In companies where the role of the CIO becomes too complex, the CTO takes on the responsibilities for infrastructure and IT operations: data center operations, network operations, application development and maintenance, security, and other line functions. The CIO retains the responsibility for how technology is actually used within the organization. This is mainly a model used in traditional businesses where IT is in a pure support role.

**Technology Visionary and Operations Manager** – This pattern is usually found in dot.com and other technology-oriented companies where information technology is key ingredient in implementing business strategy. The CTO is responsible for determining how technology can be used to implement the business strategy. This is 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.' In this pattern the CTO is often a co-founder of the business, or one of the first hires.

**External Facing Technologist** – We see this model often in companies where technology is used to provide products and services to customers and partners; the CTO is the intermediary between clients and internal development and the main influencer in the development of the product portfolio. The CTO is in constant contact with key customers and is prominently involved in market research. Some of the larger software companies have successfully used this model with multiple CTOs who are seasoned technology experts and whose main task it is to be the bridge to customers. A number of CTOs of software companies in the middleware space have also described the customer contact as their main activity.

**Big Thinker** – The CTOs in this model mainly spend their time evaluating how technology can be used internally to develop new business models and business lines, and how to preempt competitor's attempts to use technology to disrupt the markets. This CTO's responsibilities often include advanced technology, competitive analysis, technology assessment, prototyping lab, partnering, planning, and architecture standards.

In the first two models the CTO directly manages an engineering division and much of his/her influence in the organization is exerted through technology development in their own organization. I have met CTOs who manage divisions that had 500 - 1000 engineers or more.

In the last two models the CTO has a role in which he/she needs to influence other divisions to execute



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on new directions. To guarantee this level of influence the CTO is often part of or close to the executive team, often reporting to the CEO. The CTO does supervise a small team (typically 10-50 engineers, depending on the size of the company) that functions as an incubator for high risk technology directions.

Below are some sources. Not all are good, but together they paint a reasonable picture and give you a good starting point for further research.

- Aspatore Inside the Minds Series, [Leading CTOs](#)
- Mark Minevich, [The CTO Handbook](#)
- Tom Berray and Raj Sampath, [the Role of the CTO: Four Models for Success](#)
- Roger Smith, [the Role of the Chief Technology Officer in Strategic Innovation, Project Execution, and Mentoring](#)
- Roger Smith, [5 Patterns of the Chief Technology Officer](#)

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**BobGourley** • 7 years ago

Thanks Werner, for the helpful context. I've been the CTO of a large IT organization for 2 years and have found the nature of my position shifted over time-- from one that had to be more entrepreneurial (as we built a new enterprise) to one that had to be more steady-state (following process (especially CMMI and ITIL). I have read Tom Berray's model and frequently feel my job hits all the quadrants-- as if someone dropped a big ink-blot on the grid. I meet with every CTO I can and find that most share common challenges but few share common job descriptions.

Another thing all CTO's have in common, however, is that we all follow Werner Vogels.

Cheers,

Bob Gourley

CTO, DIA

1  |  • Reply • Share ›**thingles** • 7 years ago

Thanks for the article. You are absolutely correct that the CTO term is loose and means very different things depending on the organization you are in.

It is worth noting though that sometimes even in the same organization, the CTO role changes and evolves or even splits as the company grows. A company early on may need the Technology Visionary, but then grow to need more of an Infrastructure Manager for example.

One of the challenges of being a CTO over a long period of time is not just recognizing what the needs of the role are now, but also what they are a few years down the road and how they have changed.

1  |  • Reply • Share ›**CiaranG** • 7 years ago

Thanks - just in case it influences you next time you're deciding whether to post something or not, that **was** of general interest to this particular non-specific individual, though I can't speak for the rest of us.

 | 1  • Reply • Share ›**Andy** • 7 years ago

Werner, an obvious omission here is a statement about which type(s) of CTO you see yourself as...?

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**Joseph Ziegler** — Go team Astro!

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