

# The Changing Role of the IT & Network Professional

**Authored by**



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## Introduction

This white paper is the final white paper in a five-part series of white papers and webinars that describes the journey that IT organizations must take to go from the traditional highly manual, hardware centric IT operational model to an operational model that is highly automated, software centric and which reduces both the cost of IT infrastructure services as well as the time it takes to implement those services.

The previous white papers in this series were:

- *The Mandate for a Highly Automated IT Function*<sup>1</sup>;
- *The Promise and the Reality of a Software Defined Data Center*<sup>2</sup>
- *An SDN Reality Check*<sup>3</sup>;
- *An NFV Reality Check*.<sup>4</sup>

Each of those four white paper described some of the technology-centric components of the journey to a new IT operational model. The primary goal of this white paper is to describe the personnel and organizational changes that have to occur in order for IT organizations to get the maximum benefit out of the new IT operational model. As part of doing the research to create this white paper, two IT professionals were interviewed. One of the interviewees is a network architect and the other is a director of infrastructure engineering. As is typically the case, the interviewees cannot be mentioned by name or by company. Because of that, throughout this white paper the interviewees will be referred to The Network Architect and The Infrastructure Director.

## The Need for Speed

As mentioned, one of the key goals of the emerging IT operational model is reducing the time it takes to implement IT services. As discussed in the previous white papers in this series, to achieve the goal of a more agile IT organization, many IT organizations have adopted an agile software development process referred to as DevOps.

Some of the key characteristics of DevOps are that the applications development team writes primarily small incremental pieces of code that are tested on an architecture that reflects the production architecture. Ideally, the network on which the software is tested will reflect not just the architecture but also the same characteristics (i.e., delay, packet loss) as the production

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<sup>1</sup> [http://www.qualisystems.com/white\\_papers/the-mandate-for-a-highly-automated-it-function-2/](http://www.qualisystems.com/white_papers/the-mandate-for-a-highly-automated-it-function-2/)

<sup>2</sup> [http://ashtonmetzler.com/QS%20Paper%202%20V3%200%20\(1\).pdf](http://ashtonmetzler.com/QS%20Paper%202%20V3%200%20(1).pdf)

<sup>3</sup> <http://ashtonmetzler.com/SDN%20Reality%20Check.pdf>

<sup>4</sup> <http://www.ashtonmetzler.com/NFV%20Reality%20Check.pdf>

network. Implementing DevOps has several advantages. For example, according to a recent Information Week Report<sup>5</sup>, eighty two percent of the IT organizations that implemented DevOps saw at least some improvement in infrastructure stability and eighty three percent saw at least some improvement in the speed of application development.

A number of service providers who are attempting to become more agile have commented on the need for their organization to move away from slow, manual processes. One such provider is Deutsche Telekom. In a recent article<sup>6</sup>, Deutsche Telekom was quoted as saying: “DT [Deutsche Telekom] needs to build a team that comprises IP, datacenter, programming, and operations specialists that can work in small, empowered, and agile teams, while both the carriers and vendors need to adjust for the migration from hardware-based to software-based business models.” AT&T’s intended use of SDN and NFV is detailed in a white paper entitled “AT&T Vision Alignment Challenge Technology Survey: AT&T Domain 2.0 Vision White Paper<sup>7</sup>”. As stated in that white paper “There remains much to do before this vision [Domain 2.0] can be implemented, including pivots from networking craft to software engineering, and from carrier operations models to cloud “DevOps” models. We also see an important pivot to embrace agile development\_in preference to existing waterfall models.”

As discussed in the e-book entitled *Transforming to a Digital Business*<sup>8</sup>, having an agile IT organization is only one component of enabling the entire company to be more agile. As explained in that e-book, in order to develop more business agility, many companies have developed new, more agile processes, somewhat similar to a hackathon<sup>9</sup>, in order to more quickly develop new products and services. As part of these new, agile business processes, business units such as marketing, product sales, IT, customer service and finance work together, not separately. As a result, each group has a better understanding of each other and they collectively have a much better, more efficient working environment.

## The Ongoing Transformation

Driven by the need to support a more agile IT operational model and as well as increasingly more agile business processes, the role of network and IT infrastructure professionals is changing. Some of the key characteristics of the emerging role are:

- An increased knowledge of other IT disciplines

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<sup>5</sup> <http://www.informationweek.com/strategic-cio/executive-insights-and-innovation/state-of-devops-big-gains-elusive/d/d-id/1113307>

<sup>6</sup> <http://www.lightreading.com/ethernet-ip/routers/deutsche-telekom-a-software-defined-operator/d/d-id/706099>

<sup>7</sup> [http://www.att.com/Common/about\\_us/pdf/AT&T%20Domain%202.0%20Vision%20White%20Paper.pdf](http://www.att.com/Common/about_us/pdf/AT&T%20Domain%202.0%20Vision%20White%20Paper.pdf)

<sup>8</sup> <http://www.amazon.com/Transforming-digital-business-Forum-guides-ebook/dp/B00KY57ITW>

<sup>9</sup> <http://en.wikipedia.org/wiki/Hackathon>

In a recent blog, GE Capital's CTO Eric Reed explained the need for all IT professionals to expand their area of expertise. According to Eric, "Our experience [GE Capital's] on this journey to date has been that the small, self-directed teams required in a DevOps world require an amalgamation of skills spanning everything from IT security to database design and application architecture, plus everything in between. While each individual on the team has a particular strength (say, application design and coding), each one also needs to have working knowledge in other areas (maybe UX or network design)."

- More focus on setting policy

The emerging technologies (e.g., Software Defined Networking, Network Function Virtualization, Software Defined Data center) that were described in the previous white papers in this series enable IT organizations to implement a policy driven infrastructure in a more dynamic and granular fashion than was previously possible. It may take some time to adjust to these new capabilities, but the vast majority of IT organizations will adjust and will place more emphasis on setting policy.

- More knowledge of the business

The need for more knowledge of the business is driven in part by the need for IT and network professionals to actively participate in the type of agile business processes described above and in part by the need to implement a policy driven infrastructure that is based on the specific requirements of the business. In addition, the ability of the IT organization to justify an investment in IT is increasingly tied to the ability of the organization to concretely demonstrate the business value of that investment.

- More understanding of applications

While client server and n-tier applications are still common, as pointed out in The 2013 Application and Service Delivery Handbook<sup>10</sup>, many applications are now based on a wide range of architectures; e.g., a Services Oriented Architecture (SOA). In addition, complex applications, such as Customer Relationship Management (CRM), are actually comprised of several modules, with a range of network requirements. IT infrastructure and network professionals in particular need to better understand these new architectures and complex applications in order to ensure that the emerging set of technologies are designed and architected appropriately.

- More emphasis on programming

While it is not true that all networking and data center professionals will become programmers, it is true that many senior level IT professionals will need an understanding

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<sup>10</sup> <http://www.webtutorials.com/content/2013/06/2013-application-service-delivery-handbook.html>

of programming in order to better interact with the company's software development organization. It is also true that some network organizations will want to leverage the API functionality that the emerging technologies provide by having network professionals write programs that utilize those APIs.

## **Response from Vendors**

Vendors such as HP and Cisco are aware of the changes that are occurring and are adjusting their training accordingly. For example, HP sees that the role of the network administrator will not change dramatically but that the role of senior level network professionals, such as those who are currently CCIEs, will become much more complex. This added complexity comes in part because of the challenges associated with testing, managing and troubleshooting the emerging virtualized solutions. While these challenges are demanding within a single technology domain, they are even more demanding across technology domains. Another factor driving this added complexity is the fact that these senior level IT professionals still have to support the legacy environment while at the same time they need to support the emerging technologies.

HP has a training program called HP ExpertOne that is intended to provide training and certifications in a number of areas, including software defined networking. For example, HP has recently developed a course entitled *Developing SDN Applications* which is intended to enable network professionals to "Dynamically control network behavior for advanced value and to make deploying new solutions more efficient and less time consuming." A component of ExpertOne, called MyExpertOne, is intended to provide HP's customers and partners with personalized learning recommendations. It tracks their HP certifications and benefits, and allows them to develop customized learning plans based on their role, expertise, and interests.

HP delivers its training in a variety of ways, including:

- In person, instructor-led classroom education;
- Online instructor-led training;
- Web-based training.

In order to provide practical experience, HP supplements its training with:

- Hands-on labs in a classroom setting;
- Remote, real-time access to labs equipped with the appropriate equipment;
- Online simulators.

Cisco believes that one of the prime drivers of the new IT operational model is the dramatic growth in the number of connected devices that is forcing the infrastructure of most companies to scale to where it is not manageable using the traditional IT operational model. As a result, Cisco believes that IT organizations can no longer build a static infrastructure based on the

assumption of predictable growth. Rather, Cisco believes that IT organizations need to build a dynamic infrastructure that is flexible enough to satisfy the users who consume the growing volumes of data.

As the new operational model is adopted, Cisco thinks that network professionals will do less of the following tasks:

- Device configurations
- Problem resolution
- Hardware deployment
- CLI entries and scripting
- Reactive management tasks

Correspondingly, on a going forward basis, Cisco believes that network professionals will do more of the following tasks:

- Business and IT innovation
- End-to-End architectural design
- Programming - API-based not CLI
- Comprehensive policy management
- Proactive management tasks

To support the shift in the role that network professionals will play on a going forward basis, Cisco has enhanced the training they offer to address four industry job roles that Cisco believes will continue to evolve. Those roles are:

- Business application engineer
- Network application developer
- Network programmability designer
- Network programmability support

### **View from IT Organizations**

Part of the buzz in the industry<sup>11</sup> is that adopting new architectures such as SDN will cause a significant reduction in the number of networking jobs. The network architect believes that while the definition of what a network professional is may well change, that he doesn't believe that there will be a reduction in the number of network professionals. As he put it, "We cannot find enough people and so, nobody here is worried about holding onto their job." He did add,

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<sup>11</sup> <http://www.enterprisenetworkingplanet.com/netsp/will-sdn-annihilate-the-networking-workforce.html>

however, that the jobs of people whose role today is to follow a simple script and do a few mouse clicks to configure a device will likely be reduced or eliminated.

One of the questions that continually comes up in the discussion of the adoption of the emerging generation of software-centric architectures and technologies is whether or not network professionals need to learn to program. The network architect said that roughly half of the network professionals he runs into frequently write scripts and he concluded that “They will not be shell shocked if they now have to program in a higher level language.” He added that the practice of writing custom scripts is a “double-edged sword” in that you do end up getting exactly what you want, but the organization ends up having to support those scripts long into the future. He thought that as the new technologies get adopted that relatively few IT organizations will want to develop an extensive set of programs that they then have to support on a going forward basis.

The Infrastructure Director said that his IT organization is in the process of creating a budget that spans the next three years. The key goal driving that process is the desire of his organization to be more software-centric and automated. The example he gave was that while his organization knows that they aren’t Google or Amazon, they want to be able to spin up new services the way those two companies do. In order to achieve that goal, one thing his organization is doing is placing an emphasis on hiring people who get excited about implementing automation. Another thing his organization is doing is “Going down the path of hiring developers, some right out of school and others with years of experience.” He added, however, that not all IT and networking professionals have to become programmers, but that as a minimum they will need to understand the language of programmers in order to better interact with them. He also said that if you want to fully leverage Amazon Web Services (AWS) or SDN solutions such as Cisco’s Application Centric Infrastructure (ACI) then you need network and security professionals who can do at least some JSON coding or Python programming.

The network architect said that most of the new IT hires that his company makes are recent college graduates with a degree in some aspect of IT. His company prefers college graduates because it feels that they are more likely to be able to develop the necessary business skills over time than would someone who was more narrowly trained in technology. He said that new hires are closely partnered with someone “Who knows the ropes, has a few years of experience and perhaps some vendor certifications.”

When he thinks about the skills his organization will need on a going forward basis, the network architect isn’t that concerned about their ability to develop the necessary technical skills. His reasoning is that the people they hire generally have made a commitment to work in IT and that they will continue to take whatever training they need to evolve their technical skills. He is concerned, however, about his organization’s ability to develop soft skills in general and business

skills in particular. He said that given the size of his company (A Fortune 150 company) that they need IT professionals who can do things that are very technical and yet be able to explain it to people with a breadth of business interests as well as a variety of technical backgrounds. They also need IT professionals who can build trust and negotiate with other organizations within the company as well as deal with the internal political pressures and the ongoing shifts in direction.

The Infrastructure Director stated that as part of their three year budget that they are they funding additional training for the IT organization on the emerging software-centric technologies. They are also funding an increase in head count. His reasoning is that “The process the industry is going through [of becoming more software-centric and automated] is game changing in terms of how compute, network and storage will be delivered. It will not take place over night.” He elaborated by saying that they have just started a SDN proof of concept (POC) and that it will take headcount to do POCs like this on each of the emerging technologies as well as to deploy and support them in their production environment. However, at the same time, his organization still needs headcount to support the existing legacy infrastructure “until we can slowly let that old stuff die on the vine.”

One topic that gets discussed often relative to adopting a more agile IT operational model is the need to break down the organizational barriers (a.k.a., stovepipes) that often exist inside large IT organizations. The Infrastructure Director said that his organization has already gone through some reorganizations in order achieve their goal of being software-centric and highly automated. As part of that reorg they established a core infrastructure strategy group and a number of groups that deliver services based on that infrastructure. He pointed out that while the reorg has been successful, he anticipates that they will have another reorg in a year or so as they continue to adopt new technologies.

The network architect said that his organization has also recently gone through a reorganization. One thing they did was to form two organizations, one for support and one for engineering, and they gave each organization responsibility for a range of technologies; e.g., networking, servers. They also formed another organization for all of their architects, both those that focus on the business and those that focus on technology. As the network architect stated “I share a wall with architects in other disciplines and we talk daily.” He said that the same is true with the engineering and support groups, “Although it is a little less true with the support group.”

## **Summary and Conclusions**

The new IT operational model that IT organizations are in the process of adopting is characterized by increased speed and agility. As described in the first four white papers in this series, the shift to that new IT operational model will be enabled by a wide range of emerging technologies. However, IT organizations will not realize the full benefits of this new operational

model just by deploying new technologies. There needs to also be a change in the role of IT professionals in general and in the role of network professionals in particular.

Part of the shift in role is driven by the adoption of agile techniques such as DevOps. However, as pointed out by companies as diverse as GE Capital and Deutsche Telekom, in order to be successful with DevOps IT organizations need to build cross functional, agile teams. This is one factor driving the need to network professionals to have an increased knowledge of other IT disciplines. Other characteristics of the emerging role of a senior networking professional are more focus on setting policy, more knowledge of the business, more understanding of applications and more emphasis on programming.

Neither The Network Architect nor The Infrastructure Director believe that the adoption of an IT operational model that is software-centric and highly automated will reduce the number of jobs for IT professionals. In addition, they each spoke of the need for IT professionals to develop additional skills, both at the business and technical levels, and both of them expressed optimism that their companies will fund the necessary training. While both The Network Architect and The Infrastructure Director believe that the adoption of the emerging technologies will require at least some network and IT professionals to do programming, they viewed this situation very differently. The Network Architect thinks that companies should take a cautious approach to developing code that goes into production as they will be burdened supporting that code for a long time. The Infrastructure Director wasn't that concerned about having to maintain code in part because he felt that the only way to truly maximize the potential of some of the emerging solutions is to develop custom code.

The bad news is that it is never easy to keep doing an existing job and simultaneously learn new skills. The good news is that vendors, such as HP and Cisco, realize that jobs are changing and are adopting their curriculums accordingly. Both vendors, for example, currently offer courses and certificates covering a wide range of current and emerging technologies. Both vendors are also adding to their curriculum to give network professionals some programming skills and to better prepare network professionals to match business requirements with the appropriate technologies. In addition, the large and diverse eco-system of DevOps automation tools is rapidly innovating to deliver solutions that bridge the gap between yesterday and today's infrastructure and tomorrow's automated, software-centric IT infrastructure and network architectures.