Faster, Better, Smarter: Rebooting IT Infrastructure for the Digital Age

By the Digital Transformation Institute
Organizations today succeed or fail depending on their ability to stay ahead of market and technology changes. To do so, its IT infrastructure must support a seamless flow of data, global consistency and interoperability, faster time to market, and on-demand analytics capabilities (see Figure 1).

Figure 1: How digital platforms powered by IT infrastructure accelerate business digitization

Walmart employs a data platform capable of handling 250 billion rows of data and updating 20 million records an hour. 94% of its data operations take less than 2 seconds, allowing a near-real time peek into SKU and store level data that help make proactive business decisions.

Visa opened its payments platform to third-parties and developers offering immediate interoperability with over 13,700 financial institutions in 200+ countries and over 40 million merchants around the world.

Jawwy, a digital mobile operator in the Kingdom of Saudi Arabia, partnered with cloud service providers to deliver a fully digital customer experience to a largely millennial target segment. The service took just over a year from inception to launch.

Schindler optimizes the routes taken by its service technicians by providing them instant access to data anytime, anywhere, saving 40 million kilometers of driving and prevented 4,435 tons of emissions per year.

There is no doubt that IT infrastructure and operations (I&O), often referred to as the “run” side of IT, has graduated from a function that “keeps the lights on” to a driver of digital transformation in many organizations. However, its core transformation seems to have taken a backseat. I&O takes responsibility for running the organization’s digital assets, such as data centers, cloud services, and communication networks. And companies invest massive amounts in their IT infrastructure – over 70% of IT budgets and even up to 90\(^\%\)\(^2\). However, the largest chunk of investment is operational in nature – running and maintaining existing IT systems. Very little – 15% of IT budgets\(^3\) – is assigned to transforming IT systems. In other words, modernizing IT hardware, networks and data systems to prepare these assets for the demands of the digital age and support key strategic priorities.
- **Cost efficiency:** In our research, 55% of executives believe that IT is expected to have a significant impact on cost reduction. The bar is also being raised by tech providers: Amazon Web Services has cut its prices 50 times in the last 9 years.

- **Performance:** Entire value chains rely on IT. Applications are now the face of business, and the customer experience relies on IT with any systems’ downtime leading to lost business. Estimates suggest that unplanned application downtime costs Fortune 1000 companies between $1.25 and $2.5 billion each year.

- **Agility:** Recent research shows that 60% of digital transformation initiatives will not be able to scale because they lack a strategic architecture. In other words, the long-term view of how various departments, infrastructure, and processes need to evolve to accomplish business objectives.

- **Cybersecurity:** As IT systems go global, new and hybrid infrastructures – such as open collaboration via APIs – open organizations to new risks. According to a study, just 7% of cloud services meet security, compliance and governance requirements.

The digital enterprise requires digital IT
Our 2015 research with the MIT Center for Digital Business showed how digital enterprises seize opportunities and respond to disruption much more quickly than traditional firms. They are fitter of foot at establishing partnerships, responding to customers’ needs and preferences, and detecting emerging trends. To capitalize on these strengths, digital enterprises need be adept at building relationships, highly adaptive operationally, and able to seize new business models (see Figure 2). IT needs to play a key role here:

- **Stimulating new relationships:** With internal users and partners via digital workplaces
- **Fueling new operations:** Through automation, integration of siloed systems and agile work processes such as DevOps
- **Powering new business models:** By extracting value from data and cloud-based delivery models to enable utility-based “pay-per-use” services

**Figure 2: How must IT Infrastructure & Operations help organizations address evolving business priorities**

**Source:** Capgemini analysis

In the sections that follow, we explore how to make this IT transformation possible:

- The key pillars of I&O’s digital transformation
- Putting that digital transformation into practice
- A roadmap for the transformation journey
The Key Pillars of IT’s Digital Transformation

Digital enterprises require digital IT. Drawing on our research and experience of working with large, Fortune 500 organizations across a range of industries, we believe that the digital transformation of IT must embrace four key pillars: Cloud Delivery Model, Digital Workplace, BI & Analytics Platform, and Digital DevOps Factory (see Figure 3).

Figure 3: Key pillars of IT digital transformation and business objectives they fulfill

Source: Capgemini analysis

Pillar 1: Adopt a cloud delivery model

Address data and infrastructure security concerns with the public cloud

The opportunities of the cloud – as outlined in Figure 4 – are balanced by the need to manage any risk around data and infrastructure security in the public cloud. Organizations are beginning to be more confident about the way public cloud services handle security. Recent research suggests that enterprise IT and security professionals no longer cite security as the top challenge to public cloud adoption⁹. Public cloud providers have worked hard to address security concerns and to offer state-of-the-art protection against cybercrime. Data encryption technologies are also advancing rapidly, allaying fears related to data breaches and thefts. The IT function must, however, protect apps hosted on public cloud, as some can be vulnerable as their security design is not robust enough. Leading organizations classify their applications into ones that are and are not suitable for public cloud.

Utilize a cloud orchestration platform

Cloud computing supports on-premise IT (mostly private, under full IT control) and external platforms (mostly public, outside of IT control). The future of cloud delivery will be a mix of public and private cloud services from multiple cloud providers. The challenge, therefore, is to design a service model that orchestrates these two means of delivery. Research suggests that 82% of organizations...
have a hybrid cloud strategy in 2015, up from 74% in 2014\(^1\). Integrating cloud services from different providers while considering security aspects, hybrid deployment and varying service levels is complex. This is where service orchestration comes into play. A cloud orchestration platform integrates and organizes various cloud services into a one-stop, automated catalog of services for the entire organization. Cloud services from different vendors and cloud configurations plug into the orchestration platform, hiding the complexity and integration issues from the business user. The end-user can simply consume services such as access to servers, data storage and software development tools.

**Manage non-technical elements**

The success of a cloud transformation is based on a large amount of elements that are non-technical in nature (as much as 70 to 80%). Examples are new service catalogs, new competencies and new processes. Organizations must therefore avoid a purely technical approach. When GE Oil and Gas migrated 261 applications to the cloud over a course of 18 months, for example, IT also focused on areas such as the right training to accelerate adoption. As a result of the program, infrastructure-related outages fell by 98% percent and total cost of ownership reduced by 52%\(^1\).
Pillar 2: Establish a BI & Analytics Platform

As Figure 5 shows, two of the key challenges in big data implementations are IT infrastructure issues: ‘scattered data in silos’ and ‘legacy systems’. IT infrastructure has a key role to play in establishing a BI and analytics platform that makes it possible to connect data across the enterprise. This will be essential to meet the requirements of the growing amount of data scientists in organizations. Data scientists expect IT to provide ready-to-use computing power and storage capacity for their Big Data use cases. I&O can support the data demands of the enterprise through an enterprise-wide BI & analytics platform that can store and handle massive amounts of structured and unstructured data in low-cost commodity storage (see Figure 6).

Ingestion processes extract data from all available data sources and load them in a data lake (large scale, low-cost data storage). I&O also shoulder the responsibility of providing business users with data processing and analysis tools that work seamlessly without depending on legacy systems.

Source: Capgemini Consulting, “Cracking the Data Conundrum: How Successful Companies Make Big Data Operational”, January 2015; Capgemini Analysis
I&O provides calculation servers to business for installing their Usage and Structuration tools.

Figure 6: How a BI & analytics platform helps firms better leverage their data assets

Pillar 3: Industrialize DevOps

The advantages of DevOps adoption are well established – increased agility and stability contributing to improved innovation and increased market share\(^\text{13}\). However, our research points to confusion among I&O leaders because a standard definition and approach to implementing DevOps is lacking\(^\text{14}\). We believe these challenges can be overcome with a carefully planned approach to industrialize DevOps across the organization and by fostering a culture of collaboration between development, operations and business professionals.

Follow a Digital DevOps Factory framework for a successful DevOps initiative

Organizations must abandon the traditional mindset that development teams (Dev) add new features and operations (Ops) teams endeavor to keep IT systems stable and working smoothly. Bringing the two teams together in a DevOps environment dramatically reduces deployment risk and time-to-market. A Digital DevOps Factory framework (see Figure 7) puts more focus on collaboration, new organization processes, fail fast/learn fast and creative skills. The framework propels a DevOps program by preparing it for:

- **A new generation of automation tools:** Segregate the ownership of tools deployment and management between Dev and Ops, with Dev taking the lead on app lifecycle tools and Ops on deployment & execution platforms (PaaS) and Infrastructure Services (IaaS).
- **Capabilities to develop within the organization:** This involves building new skills for both Dev and Ops but also newer ways of working, such as a new culture of collaboration. Instead of failure being forbidden, DevOps teams focus on their ability to react in the event of a failure and learn from mistakes.

Figure 7: Leverage the Digital DevOps Factory framework to structure the launch of a DevOps program

Source: Capgemini analysis
Define a clear target and transformation plan for DevOps implementation

Capgemini, a Platinum Member of the Open Group – a global consortium for proposing IT standards – recently realized a paper in association with the group to help enterprises get best results from DevOps\(^6\). It advocates that the DevOps implementation must start with defining a clear target and creating a strong business case. This enables organizations to carefully select projects and environments that are most likely to benefit from DevOps. It also proposes a maturity model that can help IT leaders to effectively plan and evolve DevOps implementations (see Figure 8).

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**Figure 8: The DevOps Maturity Model to Help Organizations Achieve their DevOps Vision**

**Level 5: Top Level**
- One team
- Dynamic process
- Near-instant deployment of changes
- No dev-related outages

**Level 4: Enhanced**
- Co-authoring of solutions
- One lifecycle
- No manual process + end-to-end managed environments

**Level 3: Co-ordinated**
- Joint and shared objectives
- Dev2ops connected lifecycle
- Limited manual processes
- Low release duration & significantly reduced outages

**Level 2: Emerging**
- Emergence of joint teams
- Starting to establish connected processes
- Some automation & isolated tools
- Medium release duration & reduced outages

**Level 1: Basic**
- Traditional siloed organization
- Separate processes
- Separate tools with many manual activities
- Typically very long release duration and high outages

Source: The Open Group, “IT4IT™ Agile Scenario - Using the Reference Architecture”, February 2016
Pillar 4: Launch a digital workplace

The digitization of the workplace is crucial for both employee satisfaction and areas such as employee productivity, efficiency and effectiveness. However, many companies have been struggling with their digital workplace initiatives. For example, only 15% of North American and European information workers are satisfied with their companies’ understanding of the tools they require to be successful in their jobs\(^\text{15}\). Getting it right can be a significant driver of efficiency. An energy service company was able to drastically improve power plant maintenance processes by leveraging cloud-based workplace productivity tools (see Figure 9). Using root cause analysis by videoconferencing, maintenance experts anywhere in the organization can now remotely supervise on-site technician intervention, resulting in increased responsiveness and productivity.

Schindler’s Digital Tool Case: An Empowering Digital Workplace

Schindler’s Digital Tool Case – a collection of digital tools and services – serves as a one-stop digital workplace for its 30,000+ installation and service technicians. As a result of the Digital Tool Case, field-force technicians can:

- Optimize their service routes, saving the company 40 million kilometers of driving and eradicating 4,435 tons of emissions per year
- Access an inventory of over 40,000 spare parts and order them directly from customer site
- Access crucial on-the-job information such as technical manuals
- Collaborate with offsite experts via FaceTime to troubleshoot issues better and faster

### Fast incident localization (incident located in site A)
- Meeting (video & audio) between engineers teams located in sites B and C to identify root causes and launch the mitigation plan (issue is due to a technical part break down)
- Co-edition of document analyzing incident root causes (each engineer can suggest an hypothesis)
- Gathering of field information (picture and videos of the incident) directly uploaded on the repository for immediate transmission to engineers

### Nearest warehouse localization with required spare part
- Scheduling on remote and on real time between centralized engineers teams and on-site A technicians to explain actions
- Maintenance contracts, incidents review sheets in site A powerplant accessible anytime on their updated version
- Inventory of spare parts, Root cause analysis file, mitigation procedure uploaded in real time
- Easiest interventions on field based on uploaded pictures, videos of the incidents and on mitigation procedure accessible anytime

###トラッキング

**TRACKING**
- EMAIL, CONTACTS, CALENDAR, INSTANT MESSAGING, VIDEO

**PRODUCTIVITY TOOL**
- FILE SHARING

### Figure 9: How digital workplace can disrupt business processes - Illustration

Source: Capgemini analysis
Formalize a Business Interaction layer to maximize customer satisfaction

An effective Business Interaction layer moves IT from a cost center to a business partner, focused on client satisfaction, business value and client relationships. This organizational layer delivers services to clients in a multimodal manner in three areas:

- Legacy, in a classical waterfall
- Agile methodologies, e.g., new digital services
- Directly with the business, e.g., workplaces and Big Data

The concept of organizing into dual-speed IT of (1) Legacy and (2) digital/agile is now well understood. Leading organizations, however, also use the direct mode, where you interact directly with business stakeholders, without any mediation from internal silos. This mode is ideal for projects such as digital workplaces or big data applications or any subjects that are new or require specific attention. When a subject reaches maturity, activities can be transferred to the Legacy & Industrialized IT layer for industrialization.
Establish a Service Integration layer to bring a step change in service quality

Most organizations source IT infrastructure from multiple vendors, benefiting from the reduced direct costs. However, this creates a complicated network of multiple technology vendors. While each supplies a portion of infrastructure that works well in isolation, that portion does not necessarily work well with other systems. Organizations often end up creating infrastructure silos, affecting the quality of IT services and customer satisfaction.

An effective service integration layer allows the enterprise to enjoy the benefits of sourcing infrastructure from multiple vendors, drawing together multiple technologies to ensure even the most complex needs are met. A general service integration layer acts as a buffer, tying the underlying technical and vendor specific aspects together and presenting a single view of IT operations to the Business Interaction layer. A service integration layer also helps organizations prioritize their IT investments by providing better visibility of IT systems.

Service integration activities represent between 15% and 30% of IT workload. Our experience shows that service integration activities can be regrouped in various proportions. For instance, with one of our clients, we were able to demonstrate that a full regrouping can translate into as much as 40% in savings within the teams involved around those topics (which usually represent around 50% of total IT services staff).

Harvest cost efficiencies through a Legacy & Industrialization layer

Best-in-class IT operations are organized by towers, such as storage, network or private/public cloud that specialize in technical domains. This enables I&O to deliver cost-effective, industrialized operations where experts can focus on their specific domain (see Figure 11). Each tower oversees the full spectrum of activities, ranging from high-value projects that are delivered internally to lower-value run activities that are outsourced. These outsourced run activities must have effective governance, such as setting up an operational committee with the outsourcing partner to manage transitions.

Figure 11: Leading firms specialize and segregate their legacy & industrialization teams into towers

Source: Capgemini analysis
A Roadmap for the Transformation

Digitizing IT is more than a technology challenge – it requires transformation of organization, culture, people and process. With people costs representing around 50% of I&O costs, neglecting these elements would undermine the transformation effort.

Drive an integrated transformation

The transformation program needs to include technical foundations, innovation drivers and cultural change (see Figure 12):

- **Transform infrastructure**: Build the technical foundations that allow you to leverage the technology fundamentals: agility, performance, cost-efficiency and cybersecurity. Telefonica, one of the largest mobile network providers globally, extensively digitized its IT organization. IT consolidated IT infrastructure spread across multiple countries at a massive scale – removing nearly 2000 legacy systems over two years, closing a legacy datacenter every month, and moving aggressively to cloud and virtual

**Figure 12: Infrastructure & Operations organization**

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**2000**

The number of legacy systems Telefonica removed over two years

**Source**: Capgemini analysis
infrastructure. These efforts have played their part in Telefonica reducing its debt burden by €14 billion and returning to revenue growth despite a troubled economic outlook.17

- **Industrialize the delivery model:** Review your sourcing policy to outsource commodity-run activities, expand your center of excellence footprint, and refocus key internal resources on business-differentiating activities.
- **Transform your organization:** Benefitting from a cloud delivery model depends on organizational transformation. Start by designing a target organizational model, then drill down to processes, tools, and ways of working and managing.

### Secure funding and support with a strategy for savings and quick-wins

Our research with the MIT Sloan Management Review revealed that lack of funding is the second biggest organizational barrier to digital transformation.18 Leading I&O organizations redirect cost savings from enhanced operations to finance transformation projects (see Figure 13). BBVA, a leading global bank based in Spain, shifted its technology investments from operational to transformational spend, while doubling its technology investment from €1.2 billion in 2006 to €2.4 billion in 2013. BBVA Chairman & CEO Francisco González said: “A substantial change took place in the proportion of funds spent to keep systems operational (“run”) to funds invested in new development (“change”), moving from the industry standard of 80%/20% to a new standard of 60%/40%.”19 At the same time, I&O must secure a few early-wins to gain support for the wider transformation, by setting up shared service centers and developing strategic sourcing. Automation can also deliver as much as 80% savings in IT personnel costs. Robotic Process Automation provides cognitive computing systems that are highly applicable for running operations such as service desks or operations monitoring, such as security monitoring.

![Figure 13: Reallocation of Savings from Operational Improvements towards Transformation](image)

### Conclusion: Next-Generation IT Infrastructure

IT&O leaders have always faced a difficult task: meeting the needs of the business while at the same time being expected to keep a lid on costs. Today, the needs of the business are changing fundamentally. Today’s digitally-driven enterprise requires IT that allows executives to harvest insight from big data, drive operational effectiveness through mobility, and meet the ever-changing requirements of today’s digital customers. By engaging deeply with the business – and driving a core transformation of IT – I&O leaders can deliver the intelligent technologies that support profitable growth in today’s digital economy.

How Digital are your IT Infrastructure & Operations?

This assessment can help you understand where your I&O organization stands on the journey to becoming digital. The questionnaire has 20 questions to assess the digital maturity of the I&O organization across four categories – overcoming organizational barriers, setting I&O priorities, adopting a new delivery model and roadmap for I&O transformation.

**How to use this assessment:**
1. For each statement, assign a score between 1 and 6 for your organization
2. Calculate the total score by adding up the scores for individual statements
3. Compare your overall score with the legend provided at the end of the survey to understand your I&O organization’s digital maturity
4. Categories which obtain lower scores than others require more attention to speed up I&O transformation.

This assessment is also available online here: [https://www.capgemini-consulting.com/resources/rebooting-it-infrastructure](https://www.capgemini-consulting.com/resources/rebooting-it-infrastructure)

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<td>IT infrastructure is not considered a barrier to digital transformation at my organization</td>
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<td>Senior management is prioritizing the transformation of I&amp;O</td>
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<td>Senior management is allocating adequate budgets to transform I&amp;O</td>
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<td>CIO/I&amp;O leaders guide senior management on key transformation issues (such as enterprise cloud strategy)</td>
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<td>Agile operations is a strategic priority</td>
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<td>I&amp;O can power the digital transformation of the enterprise with right priorities</td>
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<td>Adopting a cloud delivery model with the right mix of public and private cloud services is a key business use case</td>
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<td>Establishing a BI and analytics platform is a key business use case</td>
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<td>Launching a digital workplace is a key business use case</td>
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<td>Industrializing DevOps is a key business use case</td>
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<td>I&amp;O has formalized a business interaction layer that seeks to maximize internal and external customer satisfaction</td>
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<td>I&amp;O has established a service integration layer that presents a single view of IT operations to business</td>
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<td>I&amp;O has put in place a legacy and industrialization layer that aims to harvest cost efficiencies</td>
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<td>I&amp;O has embarked on a comprehensive transformation program aligned to boost the overall digital transformation of our organization</td>
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<td>Transforming infrastructure to build a strong foundation involving virtualization, automation and brokerage enablers is a key objective of our transformation</td>
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<td>Transforming the delivery model such as by reinforcing centers of excellence and guaranteeing service continuity and security, is a key objective of our transformation</td>
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<td>Transforming the DNA of the organization by implementing key pillars such as big data, devops and digital workplace and driving a cultural change is a key objective of our transformation</td>
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**Overall Score Legend:**

110–140
Your I&O organization is highly digital and is playing a key role in the digital transformation of the enterprise

80–109
Your I&O organization's transition is underway and requires more momentum in some of the categories to realize its full potential

50–79
Your I&O organization has been mobilized to start the transition and requires direction and support to gain momentum

20–49
Your I&O organization is struggling to initiate the transition and unclear on priorities and how to put them into action
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The Digital Transformation Institute is Capgemini’s in-house think-tank on all things digital. The Institute publishes research on the impact of digital technologies on large traditional businesses. The team draws on the worldwide network of Capgemini experts and works closely with academic and technology partners. The Institute has dedicated research centers in the United Kingdom and India.

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