



Agile Applications and Digital Experiences

Transforming to a Digital Enterprise

In today's economy, software quickly shows its age in the face of "engagement"-centric, software-driven business disruptions, and legacy applications that are brittle and monolithic don't easily provide agility. Modern software-based competition is overturning entire industries and forcing companies to change how they think about their own value. The biggest changes will come not from the software applications themselves, but instead from the modern application platform and the dynamic integration of the information that powers it. This includes APIs, automation, virtualization and microservices. Enterprises must also meet the challenge of delivering seamless digital experiences to satisfy rapidly changing consumer-driven expectations. The central focus needs to be on delivering business outcomes. A modern application platform based on and supporting business measures can empower organizations to create new customer-friendly services, unlock data from older applications, and build the foundation of a digital core that will support the continuous transformation of the business and deliver ongoing measurable results.

Companies born in the digital era that have formulated an approach based on software and the internet as a way of driving business are causing massive disruptions to the traditional ways of doing things. These players can be considered “asymmetrical competition” to established businesses that were once dominant but are now finding themselves having to compete in ways they did not consider before. While asymmetrical competition is unencumbered by “technology debt” and heavy capital commitments, these pose a significant problem to more established organizations. They must contend with very large legacy IT installations built at great expense during the company’s growth, and their IT departments struggle to focus on delivering business outcomes, rather than on solving technology problems.

Consumers have become accustomed to smartphones, mobile applications and ubiquitous connectivity, and are taking their devices with them into the workplace, demanding a better user experience in their daily interactions. If a bank, for example, does not provide the services and capabilities a customer wants, it risks losing business, as the customer simply switches to a different bank. The result: a group of established players wanting to remain competitive and relevant, yet struggling to meet their customers’ expectations and demands. This is where APIs come in. APIs enable simplicity and utility by providing modular building blocks for applications, as well as access to data (external or internal). APIs enable activity-driven apps like online banking apps and support role-based experiences and, eventually, employee-customized experiences.

Even though established enterprises have to contend with the legacy assets of their technology debt, as companies embrace the cloud, physical assets are becoming less relevant, giving way to more important application services and modern application platforms that provide increased speed, flexibility and a stronger alignment with the business. IT at these organizations is rejuvenating itself, transforming from a mere cost line item to a business partner focused on adding value to the organization.

Disrupting the Industry, Disrupting the Adversary

If agile apps are a critical component of disrupting the industry, then the cybersecurity embedded in those apps is critical to disrupting the adversary. For large successful companies, digital transformation is really about turning a disadvantage into a disruptor. Freeing up business know-how (“rules”) and transactional data patterns (“insight”) in agile apps — containing “just-in-time” analytics — can enable better, faster, less expensive decision making that is at the heart of competitive advantage.

Those decisions can then result in adaptive (more effective) operations, expansive business models and partnerships, and personalized communications for customer intimacy. This kind of digital transformation requires risk management, with cyberrisk being the greatest threat to the business.

DevOps has now become DevSecOps, which has two benefits: building security into the agile DevOps construct, and using agile DevOps to build security apps. This makes sense, since orchestration and automation can lead to better built-in security for all apps. Old-school systems development life cycles too often relied on “testing flaws out” of the app rather than “building security in” — from concept, to requirements, to architecture, and through design, coding, testing, configuration and deployment. DevSecOps reduces the opportunity to

skip steps or to simply bolt security on at the end.

DevSecOps includes security tooling, constant code scanning, secure API creation, container anomaly detection, secure configuration management and automated security policy enforcement, in a way that highlights (in)security throughout the process for risk identification and “insta-remediation.” The additional benefit of this kind of security rigor is that you can constantly check for compliance against relevant regulations that will govern the implemented app.

The automated and orchestrated nature of the agile apps (essentially DevSecOps) development process provides exceptional security assurance, as well as the de facto consistency offered by automation. As secure microservices fill out the digital core, and secure containers can be leveraged as a service (CaaS), agile composite apps become “cleaner and meaner” in thwarting attacks.

There is still work to be done in terms of tools, business practices and especially culture. But if we can build security into agile apps, we can ultimately harden the attack surface and finally realize the goal of security as an enabler (no, really!) rather than an inhibitor for the business. After all, cybersecurity is, at its core, about securing real business value.

To meet strategic goals, 37% of surveyed companies say their IT functions will need to improve capabilities in application modernization.

Source: Global Digital Enterprise Survey 2016-2017, conducted by the Economist Intelligence Unit and sponsored by DXC Technology.

With the shift to cloud serving as the inflection point, the operating model is naturally shifting from infrastructure to everything as a service, with a focus on applications and business outcomes. Thus, enterprises are being challenged to launch a new generation of digital initiatives, including the creation of agile applications that provide rich digital experiences. Companies must focus on a business-wide — not merely an IT — transformation. They can do this by deploying modernized enterprise and cloud applications that drive shifts in reach, insight and responsiveness to the increased market pressures that threaten to drive them out of business.

Moving beyond IT transformation

Enterprises are moving beyond an application landscape based on service-oriented architecture to a second generation characterized by web services, microservices, APIs, analytics and a stronger emphasis on mobility and user experience. In addition, ecosystems are emerging in which asymmetrical players are establishing a niche in the fabric of an industry. Meanwhile, underlying architectures, applications and enabling technologies are quickly evolving. As companies move forward with digital transformation, the integrated functionality of these applications and services is essential. Above all, enterprises must view the digital transformation as a business-wide transformation, not just a transformation of IT.

Business leaders must not underestimate the amount of logic that lies within their legacy applications. Doing so can lead to painful outcomes, for example when attempting to move an entire SAP or Oracle portfolio into Salesforce.com. In contrast, applications can benefit from a number of maturity constructs that are happening around them, such as networks, mobility, the increasing digitization of communication and the ability to sample internet of things (IoT) data repositories.


Countless technology trends are enabling enterprises to build and integrate applications in a totally different manner. In order to meet IT's central challenge — focusing on delivering business outcomes — organizations must undergo a digital transformation. Enterprises should take the following steps.

Tap into next-gen technology

The journey to agile applications and digital experiences cannot be undertaken without a clear understanding of what technology is available and what it can do. Enterprises need to be positioned to build and deliver scalable applications that are “cloud native” and operate as microservices that can communicate via published APIs. Older applications still have value, and they need to be accessed using a service approach that is both more cost-effective and less risky than wholesale replacement.

A modern digital application platform typically includes some combination of the following technologies and methodologies:

- **Microservices and APIs:** A microservices architecture fosters software development as a suite of independently deployable, lightweight modular services. Each can serve specific business goals by running unique processes, and development can be made more efficient by smaller teams working in parallel to deploy services independently. These microservices are made accessible by language- and technology-independent APIs that facilitate consumption across a diverse set of devices and foster a way to measure use. This enables companies to determine business value and even drive fee-based consumption. Moreover, APIs open up avenues for accessing critical enterprise information locked inside disparate and closed systems, as well as for the production and consumption of a broad set of valuable user stories.
- **Agile development:** Efficiency can be gained by using an agile development approach that employs several iterative and incremental steps. This allows for improved collaboration and continuous feedback that helps refine the delivery of a software system.
- **Internet of things:** In the applications world, leveraging IoT is all about using data that comes from sensors and other connected devices, as well as building IoT applications that enhance business operations. IoT's uses are endless. For example, an airline can build an IoT app that sets off an alert when a plane's engine needs maintenance. Other possibilities include connected health, smart supply chains and automated metering of utility grids.
- **Virtualization and containers:** These scalable resources make it easier to create loosely coupled components for application composition. They are true game changers, allowing for rapid movement and scalability of services without overhead costs.
- **Artificial intelligence (AI):** AI and machine learning are opening a new world of possibilities in application development. From predictive analytics to chatbots, AI is having a strong impact on companies, such as allowing data to be utilized in better ways and contributing to more meaningful user experiences. As the use of AI grows, the core of a business's applications will become increasingly algorithmic. Applications will be built on efficient intelligence constructs, eventually becoming structural equation models that can be translated into something humans can more easily understand.



In 3 years, 55% of business apps will allow direct API access to most applications, while monolithic applications will decompose into microservices exposed via APIs.

Source: IDC FutureScape: Worldwide Cloud 2017 Predictions, Robert P. Mahowald and Mary Johnston Turner, Doc #US41863916, December 2016

LEF Perspective: Welcome to the Matrix

The “Matrix” is upon us; it is the coming together of a set of emerging technologies, such as cloud computing, the internet of things, machine intelligence, blockchain and 5G networking. With all of these technology disruptions, organizations have to completely reimagine themselves so they can unlock the value these technologies present, as well as ensure they are fit enough to fight off disruption from an ever-increasing landscape of competition.

The Leading Edge Forum uses the 21st Century Organization framework to describe what it takes for organizations to be successful in the Matrix.

When the term “digital” first surfaced, many asked, “Is this e-commerce?” Or, “Is this digital marketing?” Or maybe, “Is this e-business?” The short answer is that the digital (r)evolution subsumes all of these and more. Ideally, we should completely reimagine what our business could be in an increasingly digital world.


Meanwhile, there is an increasingly rich Matrix of capabilities outside the enterprise that present themselves as services we can easily tap into. Successful 21st century organizations focus on the right assets and capabilities, ensure they are nurturing them appropriately, and seek outside-in access to them, not always insisting on ownership.

We have gone from viewing information as a necessary by-product or lubricator of applications and transactions to an asset that has value in and of itself. Architecturally, this means making sure that information isn’t imprisoned inside a transactional system, but instead is available for other forms of exploitation and monetization. Technically, it means



using information standards and all forms of big data technology. But in terms of leadership, it means taking information seriously as an asset that generates value. In the spirit of outside-in, this also means looking to information that is generated outside the organization, possibly even outside your ecosystem.

Do you consider your ecosystem (suppliers, partners, regulators and others) as an asset, and plan to nurture it? Or do you think of it as a supply chain that you use, and periodically negotiate with to get a better deal?



Seventy-eight percent of DevOps early adopters have already invested in or plan to invest in containers and container orchestration within the next 12 months.

Source: IDC: Majority of Early DevOps Adopters Have Plans to Invest in Containers and Container Orchestration, Mary Johnston Turner, Doc #US42365417, March 2017

- **Data services:** Data services provide access to petabytes of structured and unstructured data that can reside closer to the source, reducing the need to build large centralized repositories while offering both transactional and eventual consistency options. These data sources combine to offer common, stateful requirements, as well as ongoing analytical analysis needed for today's machine learning and business intelligence requirements.
- **Open source projects:** Thousands of well-maintained programs, supported by global communities of volunteers, provide a wealth of application services — typically at low cost.
- **X as a service (XaaS):** Whether X stands for software, platform, infrastructure, storage or any number of other technologies, this pay-for-use approach to infrastructure and applications offers affordable options that can be metered, cataloged and advertised. They are services that organizations can use within their own applications, integrating to create new services while still paying only for what's actually used.

Embrace the digital core

In conversations with CTOs and CIOs, the concept of the digital core is often discussed. In short, the digital core refers to a reliable, agile and scalable foundation for business value streams in the enterprise that provides visibility and insight-driven decision making. The digital core is fueled by elements such as business networks, employees, IoT and big data. It serves as a central hub of a digital value network that is the primary driver of business transformation. For example, the digital core can help turn data into insights for making informed business decisions.

The digital core interconnects all aspects of the value network in real time to drive business outcomes. It gives companies the opportunity to bring together business processes with analytics to enable a smarter, faster and simpler enterprise.

This entire value chain, including the core, is digitized, serving as the platform for innovation and business process automation. When starting the journey to deploying modern applications, it is imperative for enterprises to understand and embrace the digital core.

Employ an integrated digital service management approach

Because digital transformation is about the business, it makes sense that business outcomes be used to measure progress. Specifically, an integrated digital service management (IDSM) approach that incorporates business experience can be used to assess business impact rather than the traditional IT service management (ITSM) approach. IDSM approaches the management of systems and services by defining success through measured business outcomes rather than technology-related outcomes. An IDSM approach requires cultural changes, such as selecting tools to facilitate business operational concerns rather than meeting engineering requirements.

Digitize, rationalize, automate, simplify

Achieving the digital core requires touching upon each of the four cornerstones of digital transformation:

- **Digitize business:** Enterprises need to extend business models using IoT, big data and analytics, and deliver digital business services through mobile and cloud applications. Business processes must be adapted to broaden service accessibility and enable digital strategy.
- **Rationalize the portfolio:** Application portfolios should be consolidated, harmonized and modernized to enable automation and digitization. Enterprises need to leverage turnkey industry solutions from the likes of SAP, Oracle and Microsoft, while maximizing the use of enterprise apps and software as a service. Where custom applications are required, they should leverage published microservices and APIs.
- **Automate operations:** Operations and business processes should be automated as much as possible using techniques such as industrialization and virtual assistants. Algorithmic business operations can be established through machine learning, artificial intelligence and cognitive computing.
- **Simplify platform:** The platform environment should be consolidated and simplified to better enable automation and digitization. This includes optimizing and standardizing infrastructure and licenses while leveraging prebuilt applications as a service.

Intelligent Analytics for Smarter Business Decisions

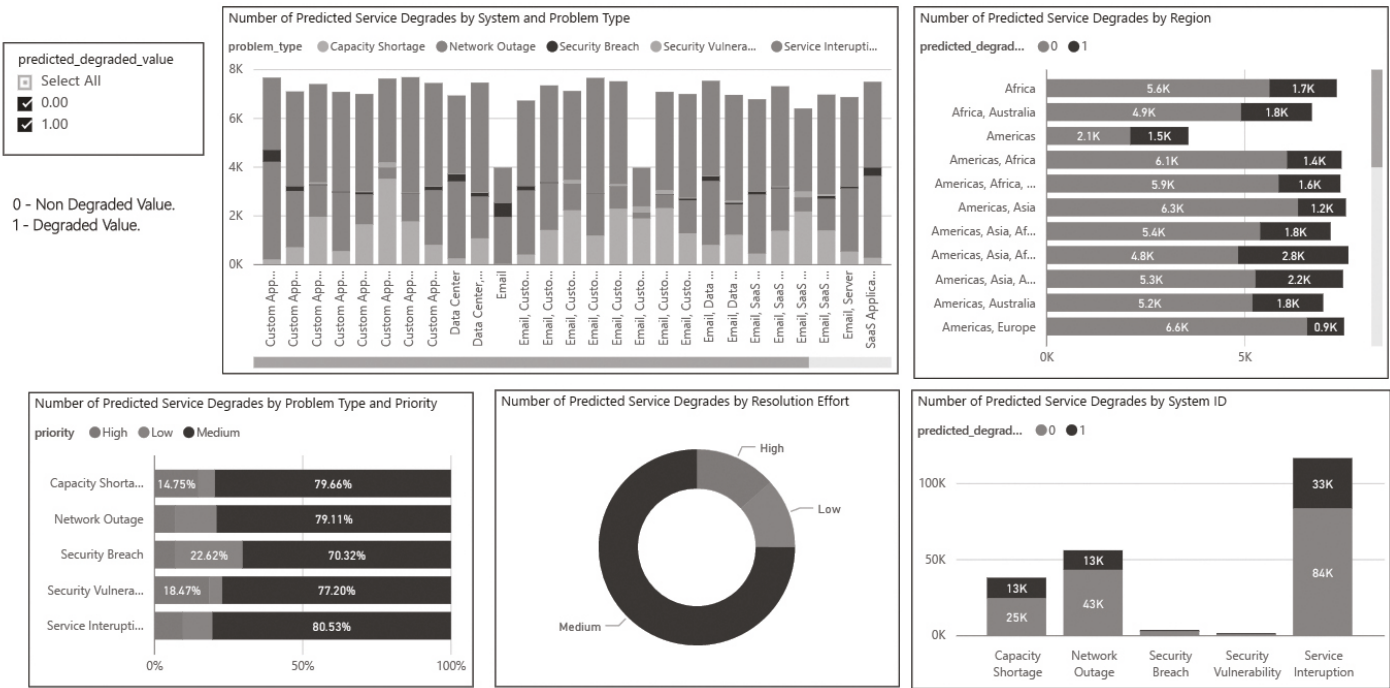
Artificial intelligence and machine learning force us to rethink the concept of modern applications. Take, for example, the goal of automating company IT operations. Just as patterns of engine wear can reveal a lot about driving habits, patterns in IT systems data can reveal a lot about the possible sources of friction in a business. Patterns of installs and systems access could reveal barriers to technology adoption and even skills gaps. Overlaps in the activities recorded for different business systems could reveal silos and redundancy, while lags between recorded activities could mean breakdowns in business communication.

The **DXC Technology Analytics** group created agile IT operations applications as part of our Industrial Machine Learning offering. Instead of prescribed logic or static business rules, these applications have algorithms at their

core. They integrate real-time streams of system logs, service call requests and remediation actions. But instead of analyzing that data using prescribed business logic, we built algorithms that predict degraded business operations and that learn and improve over time.

A big advantage of agile, digital applications is their ability to add intelligence everywhere in enterprise business operations. In IT operations, for example, agile applications can help take the friction out of business and deliver a hard-to-match competitive advantage in the marketplace. Companies with a strong **Analytics IQ** are best positioned to benefit. When we merge agile and intelligent applications with business process execution, we gain the ability to make faster, smarter business decisions.

— Jerry Overton, Data Scientist, Senior Principal, DXC Technology



Use agile applications to reduce waste, streamline workflow and improve the performance of business operations.

By 2019, 40% of digital transformation initiatives will be supported by cognitive/AI capabilities, providing critical on-time insights for new operating and monetization models.

Source: IDC FutureScape: Worldwide Digital Transformation 2017 Predictions, Michael Versace and Robert Parker, Doc #US40526216, January 2017

Understand value

Delivering business value and improving business outcomes are overriding goals, and much of the success of any digital journey depends on getting funded. This is where understanding value comes in. Simply put, if you can't understand the value of what you're trying to achieve, you are not going to get funded. It is crucial for enterprises to be able to understand and clearly define the business value a project will deliver and be cognizant of the eventual business outcomes that will be delivered.

Digital transformation is driven by business outcomes that are measurable and can be tracked. The modern enterprise is not interested in multiyear transformation projects, preferring a crawl-walk-run or prototyping approach. For example, prototyping approaches provide easy access to use-case demos, industry-specific templates and extensions. In short, applications need to support value streams. Whereas in the past, IT has not been considered an innovator, today IT needs to be seen as and treated as a value-creation center.

Build the right team the right way

Even if an enterprise has all the right technology and processes in place, it is no good without the right team. Building the right team means having people who understand the importance of creating value and positive business outcomes, and also creating compelling digital experiences for employees and customers. Modern application teams are now composed of cross-functional experience that comes from the business, multiple development disciplines — user interface, database, middleware, etc. — and operations. These cross-functional teams deliver, in smaller increments, higher quality deliverables that are better suited for introduction into a production environment in a continuous manner, thus facilitating greater speed and agility and lowering maintenance and overhead costs. Additionally, these cross-functional teams may include individuals from the open source community and elsewhere outside the business.



IDC predicts that by 2018, 45% of CIOs will focus on platformization, using DevOps for rapid development, cost reduction and enterprise agility.

Source: IDC FutureScape: Worldwide CIO Agenda 2017 Predictions, Doc #US41845916, November 2016

Being different, delivering value

Once a modern applications platform has been successfully implemented, the benefits are numerous. Agile development and an IDSM approach bring optimized operations, improved time-to-value and increased resiliency. Analytics merged with business process execution delivers the insight needed for faster and better decision making, leading to improved business outcomes. Real-time insights from the extended supply chain can be gained with IoT. And digital business is enabled in ways that foster innovation with the goal of delivering better, richer digital experiences.

The end state of deploying a modern application can be recognized in many ways. For one, measurable business results can be achieved through the adoption of adaptive operations, which helps enterprises grow by reaching new customers. Intelligent assistants can digitize business processes, and the increased automation enhances user productivity.

With all the standardization and automation going on, a key for enterprises is to retain the qualities that differentiate them from others. This begins by looking at what differentiates your business, and then building and maintaining applications that provide a competitive edge. Finally, the end state should be characterized by delivering improved customer engagement and, ultimately, delivering value to the enterprise.

The road to improved outcomes

The journey to digital transformation in the applications space begins with discovering and understanding where you are and where you need to go. Discovery means understanding the estate — analyzing and understanding the complex rules and logic that have been built in. A new generation of analyzers and tools can be used to analyze systems to understand which parts of that system are used, which parts are custom built, which parts are standard, and which components are relevant and mission-critical for the company. The results will lead to a classification of applications, and enterprises might find that many of these do not truly deliver business value. Once the components of a system are defined, the system can be thoroughly cleansed, similar to a spring cleaning. A cleansed system might be a much smaller monster than initially perceived.

While discovery is a prerequisite for any kind of organization, the time and money aspects of a digital transformation are just as important. Enterprises should begin their journey by finding slack in both time and money. For many organizations, that is a huge limitation. They lack either the appropriate funding or capabilities to make the changes necessary for transformation.

Thus, organizations should select the targets that are going to free up either time or resources. This alleviates resources of their existing burden, allowing them to focus on something new. There are two possible approaches to accomplish this. One is to alleviate technical debt by incorporating automation into existing areas that are burdensome and consuming a lot of time and resources. Another is to collaborate with an outsource provider.

Digital is changing the world, and the digital world is quickly changing. Enterprises must also change and adopt a modern digital application platform. CTOs and other IT executives must be instrumental in leading this digital transformation. Developing agile applications, defining an IDSM strategy, and creating better digital experiences are vital steps in the ongoing digital transformation journey. By aligning business and IT, you will have a strong foundation for digital transformation, continuous improvement and delivering improved business outcomes.

DXC: Tailored Solutions for Modern Application Needs

DXC Technology knows that every digital enterprise applications project is unique. Every organization faces its own blend of industry forces, customer requirements, budget pressures and technology platforms. As a result, canned solutions won't do. That's why DXC offers client engagements using proven offerings that have been tailored to clients' specific needs.

Next-generation managed services are key to how DXC helps clients. These services, including service integration and management, and API management, provide essential help to managers of digital applications. Similarly, DXC's application modernization and transformation services simplify business processes and architecture to maximize savings, extend the lives of mission-critical applications and revitalize an organization's application portfolio.

DXC delivers industry-leading solutions by working with our powerful network of partners. Together, we help clients create modern enterprise applications suited to their unique needs. Our partners deliver a wide range of valuable skills and industry expertise. They also have extensive experience delivering effective solutions with nearly every technology and industry.

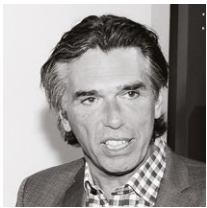
To complement partner offerings, DXC also provides in-depth consulting services. DXC's highly experienced consultants help our clients meet their needs for creating modern digital applications. Whether you need help with planning, transformation or transition, security or operational management, DXC is ready and able to assist.

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