



**Software may be eating the world
but APIs are giving it teeth**

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Introduction

It's not an exaggeration to say that today we're in the middle of a series of epic changes in society, the economy and technology. Seen in isolation any one of these changes would be both challenging and disruptive. When regarded in totality however we're seeing an era-defining shift.

We believe that these macro changes mean that organizations will need to revisit how they fundamentally operate. Many predict that we will see the rise of a new type of organization that displays displays new structures, processes and strategies.

In this paper we detail the changes we see occurring in society and the economy that are driving this massive shift. We identify why the status quo will no longer be viable for organization in the future and will posit what the organization of the future might look like. Finally, we'll introduce some key technologies that will enable these new sorts of organizations to thrive.

Change Is The Only Constant

We contend that macro changes in society, economies and technology result in a completely new environment within which organizations operate. In order to understand the opportunities that exist, it is necessary to understand the underlying forces of change.

Generational shifts

While it is easy to overstate the very near term impacts of so called “digital natives,” we believe that a workforce increasingly made up of individuals who have grown up used to flexible, accessible and intuitive technologies will change the expectations that workforces will have of enterprise technology. The rise of social networks such as Facebook and Twitter, the ubiquity of connectivity and smart devices, and the rise of distributed computing all result in individuals who are used to doing things differently from employees of previous generations.

The rise of the cloud

Over the past five to ten years we have seen a massive increase in the availability of cloud-based solutions. Whereas in the past individuals consumed music from local media, watched movies on physical (and local) storage, and generally stored their information locally, all of these functions have moved to the cloud. We now listen to music via Spotify, watch streaming movies on Netflix, and store our photos, files and memories on Facebook or Dropbox. As this trend moves from the consumer to the enterprise, there will be a fundamental shift in the way systems are designed and operated.

The internet of everything

Analysts predict that within a few short years there will be some 50 billion devices connected to the internet. Whereas today most connected devices are what we traditionally regard as “computers” – PCs, tablets, smartphones – in the future a host of less typical devices will be connected. From refrigerators to toothbrushes, from cars to thermostats, there will be a massive number of input devices that individuals and organizational systems need to interact with. This too will result in enterprise systems being forced to move from a siloed and ring-fenced paradigm, to one that is much more organic in nature.

Big data

One trend that not-surprisingly corresponds to the rise of the internet of things is the big data trend. With all of these connected devices, organizations are going to have to deal with a far greater volume of data than ever before. Already we're seeing examples of industrial companies inserting sensors into such varied devices as airplane engines and within concrete during construction. All of these sensors produce copious amounts of data that need to be transmitted, stored and analyzed and this will change the way systems are designed and run.

The demand for agility

The traditional paradigm where large organizations held a dominant position within a stable ecosystem have long gone. Increasingly, organizations are having to reinvent what they do on an almost daily basis. In the most basic example, this may mean having to roll out new pricing and packaging to react to changing marketplace conditions; in the most extreme case this might involve completely re-designing the products and processes an organization creates, and having to do so extremely quickly. Large organizations are increasingly having to emulate the speed and agility of startups and this is taxing their systems, culture and processes to the extreme.

Economic shifts

While the global financial collapse may have been a short term aberration, underlying it were some systemic changes which we believe are permanent. The pressure to do more with less remains. Organizations are facing seriously shortened product development cycles and lifespans and accordingly, the budgets they have are being similarly reduced. These tightened budgets and pressure for increasing productivity are driving organizations to find systems and processes that deliver better results with lower investments.

New sourcing and manufacturing approaches

Recent years have seen a marked increase in crowd-sourcing, a way for an organization to obtain outcomes from resources outside its boundaries. Crowd-sourcing is being utilized for research and design, funding, and intelligence gathering. While crowd-sourcing undoubtedly increases an organization's ability to be agile, it also creates challenges in terms of security, process and systems.

All of these changes, taken in totality, create a landscape of rapid and substantive change for organizations. Faced with such tectonic changes in the environment within which they operate, organizations are having to revisit the way they work.

With change come opportunities

While there are almost limitless examples of how these trends will enable new businesses, products, and services across industries, it's worthwhile to walk through a few examples of the ways that innovative companies will capitalize on these shifts to drive increased business value.

The efficient building site

Using a selection of these technologies, tradespeople on a building site can use mobile devices to get virtual reality overlays of building plans and specifications on top of pictures taken with the mobile device. A construction manager could hold a device up to a wall, press a button and see an overlay of the plumbing pipes, electrical wires and construction elements within the wall, effectively giving him a map of building infrastructure for more precise, efficient work.

Contextual marketing

Using location-based data and real time information feeds, a retail establishment can know when a particular customer enters their store. That customer can then be delivered personalized offers and information tailored to their buying history and personal demographics.

Health alerts

Patients can be connected to medical personnel in real time. Telemetry can deliver diagnostic data to physicians and alerts can be triggered when certain metrics (blood pressure for example) move beyond preset limits.

Optimized industrial equipment

By using sensors and big data analytics, big pieces of industrial equipment such as wind turbines and jet engines can deliver performance data to large-scale data analysis platforms. These platforms can in turn alter operational characteristics of the equipment in real time to ensure it performs at the highest levels of efficiency.

None of these examples are science fiction – they are all being used by innovative organizations today to deliver better outcomes for themselves and their customers. While these approach may today be outliers, they will move rapidly towards mainstream adoption and quickly become the modus operandi for most organizations.

The new organization

Faced with changes in the external environment, new expectations from their workforces and customers, and constraints on inputs into the operation, organizations will increasingly need to operate in a completely different manner. What will this new organization look like and how will it operate? This will vary by industry and individual company, but we believe that every new organization will exhibit a consistent set of core characteristics.

Distributed

An ever-increasing move towards globalization will mean that organizations will increasingly operate globally. Access to resources, skill shortages and the attractiveness of a global marketplace all encourage this trend to continue and increase. While this has been the norm for large organizations for decades, it will increasingly be the norm for even tiny operations. Organizations will make use of design, production and other functions that are distributed. An example might be a manufacturing organization that has a design team based in Europe, manufacturing in the Far East and distributed logistics hubs within the markets they work.

Hyper-local

Seemingly at odds with the previous trend, organizations will increasingly have to tailor their products, sales approaches and key messages to individual markets. While the previous business paradigm saw a global homogenization of business – McDonalds success was, in part, due to the fact that a Big Mac looks and tastes the same in Tokyo as it does in Timbuktu – this new paradigm will see organizations deliver something akin to the local greengrocer or butcher of old. Organizations will utilize technology to better understand individual customers and individual markets and deliver solutions that best fit with their wants. The days of the same product being sold in every market will soon be over.

Project based

Only a generation ago, employees signed on to an organization with the very real expectation that they would have a job for life. All the changes we detailed in the previous section mean that there is an unprecedented level of flux within the employee ranks. This trend will continue to accelerate and as a result, the future will be typified by “external employees,” individuals that come to the organization to work on a distinct piece of work or project, and then move on to the next opportunity.

This level of change delivers great benefits to organizations in terms of agility and innovation, but it also introduces some real challenges to the way they operate.

Remote

The days of “going to the office” are a thing of the past for many people – technological advancement in terms of mobility and cloud computing mean that individuals can work anywhere there is an internet connection. This change has two benefits - it means employees can feel empowered to work in a setting that suits them - and it reduces the footprint that an organization needs – rather than investing in massive real estate spend, organizations can instead invest in the tools to allow their people to work wherever they want to.

Flat

The traditional model of an organization is hierarchical. Taking a militaristic approach, organizations have many levels of seniority, defined organizational charts and complex reporting lines. The organization of the future will be far flatter and systems will help to replace the complex structures and reporting lines that we know today. As the organization flattens, it allows for relatively junior employees to have a large impact on the organization. In the technology world it is often said that “developers are the new kingmakers” – this metaphor extends across the organization and in the future every employee will have the systems and ability to deliver substantive change to the organization.

All of these changes are positive for the organization, but introduce some real challenges to traditional IT structure, functions and tools. The iT department of the future will be a very different thing from what it is today.

The new technology stack

Underlying these new business models and innovations is a brand new technology stack. Traditionally, organizations have largely relied on monolithic stacks delivered by one or two massive technology vendors. These stacks were a technological embodiment of the hierarchical nature of the organization - they lent themselves to rigidity, structure, process, and lines of control.

As those attributes start to come to an end within organizations, we need to find a new metaphor for IT systems, one that ensures security, reliability and control, while offering the flexibility and agility for individual users to achieve their goals.

Whereas the past was typified by an organization using a single technology for each layer of the stack (software, infrastructure or other distinct functions) the future will be wildly heterogeneous. Different business units and individuals will use a diverse set of disparate systems that best deliver the outcomes they need. This will feel to traditional IT practitioners like a state of anarchy. If everyone is using something different, how will IT ensure security, compliance and control?

We believe that the IT organization of the future will be heterogeneous but knit together into a cohesive, high-performing whole by broad fabrics. A good example is infrastructure – while individual business units might use infrastructure from many different vendors (some public cloud from Amazon Web Services, a private OpenStack cloud and some traditional on-premises infrastructure) they will do so within the context of a broad management layer. This management layer is a fabric that spans the entire organization and allows the adoption of a plethora of different technologies while ensuring enterprise-wide consistency and visibility. This technology fabric will exist in multiple areas and levels of the technology stack but prominent examples include cloud management and control, application and infrastructure monitoring, enterprise social networking and the enterprise service bus.

This fabric approach will enable the organization of the future. With a broad integration layer, for example, organizations can more readily deliver highly specific mobile applications. Rather than a monolithic stack where mobile applications have a tendency to be “one size fits all,” a broad enabling fabric means that virtually every employee can have their own application, tailored to their projects, preferences and the way they work.

The term “composable enterprise” has been coined to describe the way the new IT stack will look, but there is one critical element to enabling this composable enterprise to function, the Application Programming Interface or API.

APIs – The glue that binds it all together

The acronym API might not mean anything to most individuals, but APIs are a core enabler of new business models, product offerings and insights. An API is simply an interface to an IT application or data source that allows authorized applications or machines to easily access it. A well-defined API is the glue that ties data together the organization of the future. While traditionally used for the integration of discrete applications, APIs are now the key technology that enables all of the business and IT transformations we've discussed. Enabling software to interact with sensors, delivering contextual mobile applications, harnessing big data for analysis and insights - all are enabled by the humble API.

APIs have a myriad of value propositions within organizations.

Capitalizing on existing data

Traditional enterprise systems tend to silo data. A traditional system will have a storage layer, a processing layer and a presentation layer. Additionally, they have a number of systems that manage slices of data in discrete silos. For example, data about customers may live in the CRM system, but data about the order history of each customer lives in a discrete order management system.

New technologies are enabling the unlocking of this data, many times without the need to re-architect applications. In this way an existing organization, with its existing applications, can tap into the data locked within these systems to support new use cases. This might mean they deliver mobile applications to their employees using the data, it may mean they combine the data from these applications with other data or it might mean they monetize this data in new and creative ways.

Reaching new markets

APIs introduce the ability for organizations to reach entirely new markets and explore new partnerships. By taking core data and repurposing it in new ways, it is possible to create entirely new business models. By making data available to third parties, new business relationships can be explored. A possible example would be an e-commerce business exposing anonymized customer data via API and allowing market research companies to utilize that data. The primary organization can monetize what was previously wasted data, the third party organization can

get valuable source data, and consumers can be presented new and innovative products and services.

Enabling mobile opportunities

A plethora of opportunities exist when data is free from siloed stores and served up to mobile devices and applications. It is the role of the API to create the interface between core data and mobile devices/applications and hence the humble API can be seen as the enabler for an entirely new economy. The rise over the past few years of mobile app stores such as Apple's AppStore or the Google Play Store are directly attributable to the opportunities afforded by the API.

Key takeaways

Organizations are seeing unprecedented changes in the economy, the external environment and their internal operating situation. These changes are causing organizations to operate in vastly different ways from what they do today. As organizations increasingly move to the new operating model, they will in turn require a very different kind of IT organization to deliver upon their needs. The API is the glue and the enabler that allows organizations to leverage the opportunities inherent in these new approaches, react to constraints and externalities in their broader environment and deliver innovation, agility and ongoing business sustainability.

About Diversity Limited

Diversity is a broad spectrum consultancy specializing in SaaS, Cloud Computing and business strategy. Principal and founder Ben Kepes provides various services including:

- Commentary – Ben is a noted commentator about Cloud Computing and enterprise software – he has written for a broad selection of media outlets, and is often quoted as a subject matter expert and influencer.
- Consulting – Ben is in demand with large organizations who turn to him for advice on technology starting. He spends time with both customers and vendors advising on all aspects of their strategy.
- Advisory – Ben sits on a number of boards, both formal and informal. He enjoys helping startups get to market and grow to scale.
- Investment – Ben is an investor in a number of different companies. These investments revolve around Ben's focus of delivering technology that can make a difference in how organizations work.

About the author

Ben Kepes

Ben Kepes is a technology evangelist, an entrepreneur, a commentator and a business adviser. Ben covers the convergence of technology, mobile, ubiquity and agility, all enabled by the Cloud. His areas of interest extend to enterprise software, software integration, financial/accounting software, platforms and infrastructure as well as articulating technology simply for everyday users.

He is a globally recognized subject matter expert with an extensive following across multiple channels.

Ben currently writes for Forbes and his own blog. His commentary has been published on ReadWriteWeb, GigaOm, The Guardian and a wide variety of publications – both print and online. Often included in lists of the most influential technology thinkers globally, Ben is also an active member of the Clouderati, a global group of Cloud thought leaders and is in demand as a speaker at conferences and events all around the world.

As organizations react to the demands for more flexible working environments, the impacts of the economic downturn and the existence of multiple form-factor devices and ubiquitous connectivity, Cloud Computing stands alone as the technology paradigm that enables the convergence of those trends. Ben's insight into these factors has helped organizations large and small, buy-side and sell-side, to navigate a challenging path from the old paradigm to the new one.

Ben is passionate about technology as an enabler and enjoys exploring that theme in various settings.

