Creating a Platform for Innovation

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Simplicity Itself

"40% of companies from 2000 were no longer in the Fortune 500 a decade later in 2010"

-CNN [1]

Summary

Businesses and business models are undergoing unprecedented stresses and changes as the full force of the digital revolution is being felt. Nimble competitors are innovating fast; the risk of falling behind is present.

Innovation can be encouraged within a company to ensure that the company thrives on competition, and gains strength from external stresses.

A technology platform that supports and encourages this innovation can be built on the promises of Cloud architectures and fully deliver on them, by tying the platform explicitly to delivering business value instead of solely technical merit.

This paper introduces the disruptive effects of the *Digital Revolution*, how companies can meet that disruption by generating internal competition and so thrive through *Innovation* and finally how to technically support that vision via *Innovation as a Platform*.

The Digital Revolution: Disruption

Clayton Christiansen, in his book, The Innovator's Dilemma, describes how successful, well run, forward thinking, management in established corporations are repeatedly disrupted. They make sound, sensible and rational decisions that make perfect sense even in hindsight. They continue to meet the needs of their current high-end customers and pursuing profitable developments.

As they follow this strategy their market share is gradually commoditized and eventually lost to newer, inferior, products. The disruption graph below shows how time and again superior products are replaced by cheaper, inferior, competing products that bring just-enough value to low-end consumers. A newer disruptive product is often derided by incumbents as a toy.

Figure 1: The relationship between product performance and meeting the needs of two categories of customers. Showing disruption caused by innovation occurring.

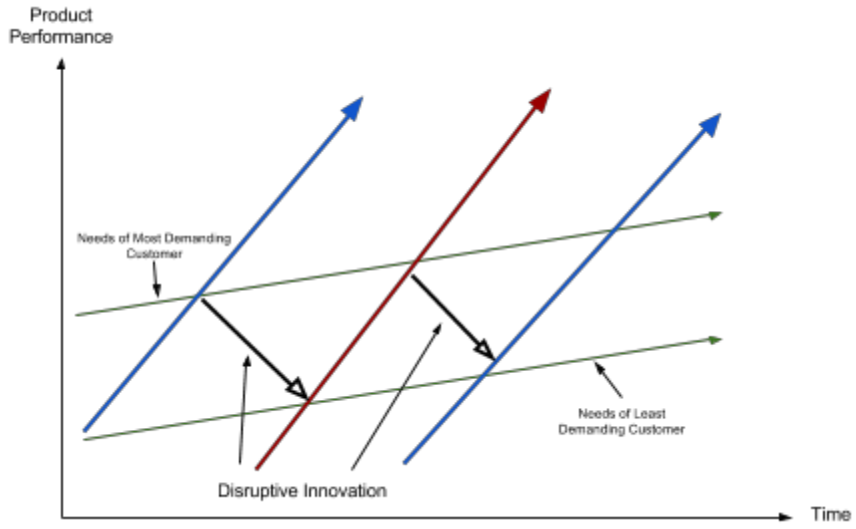

Figure 1 shows that eventually a sophisticated product evolves to have too many features and too high a price for most customer's needs. Given time, the inferior product enters into the sweet spot between features and price-point and disrupts the incumbent product.

With these low barriers for new entrants and increasingly active and engaged consumers, how can a larger company ensure that they retain their customer base and can effectively innovate in a digital environment?

Innovation: Essential for Survival

Author, trader and financial industry expert, Nassim Nicholas Taleb, described in 2012 [1] four broad types of system, or companies, on a continuum, Fragile, Robust, Resilient and Antifragile.

Fragile organisations are those that are vulnerable to competitive threats due to their own inability to compete or execute in the traditional, well understood ways.

Robust organisations are those that are strong and with deep resources. Ultimately though, their investment in strength creates a lack of agility. Once their tolerance for absorbing punishment and competition is reached, they too, will come apart under the stresses and be broken like more fragile companies.

Resilient organisations act somewhat differently in that once broken, they rebuild and reform, achieving their former glories and rebuilding themselves. This ability to rebuild themselves on the ashes of the former structure is a source of flexibility, and allows the company to survive beyond it's competition.

The last group, Antifragile, describes organisations that learn the lessons of nature. They do not merely build tolerance to risk and create an ability to hit back, they thrive on risk. Through their structure, culture and technologies, they grow stronger in the presence of a competitive threat.

Antifragile organisations do not attempt to achieve the most efficient solution to a problem, or even achieve a single solution to any given problem. They permit, encourage and thrive on generating constant *optionality* (to use Talebs term) in products, approaches and business models. This is the constant adaptation to the company environment, and brings elements of the external competition within the organisation, to enable the organisation as a whole to be more able to deal with external threats.

It is the embracing of intense variation in Antifragile companies that allows them to respond

extremely effectively to a myriad of opportunities. If any one approach fails, the company has a selection of others ready and tested in the internal competitive environment.

There are many cultural and structural changes that may be necessary for any one organisation to develop into an innovative organisation and, whether you develop an Antifragile organisation or not, a technology foundation that supports these changes can ease the move to promotion of Innovation.

Innovation as a Platform

Once the decision is made to move an organisation to fostering internal innovation, much work is required for the organisation to generate that environment. Typical work focus and streams include social, cultural, hierarchical and technical factors that together provide support for an innovative organisation to become a functional reality. This paper focuses specifically on the technical factor, which we call Innovation as a Platform.

Innovation as a Platform helps to break down unnecessary barriers in an organisation such as barriers between departments or business groups, the infamous 'silo', and promotes and supports the cross-functional and cross-departmental cultural changes needed to generate innovation.

Through our extensive work building, deploying and managing cloud ready applications, we have identified the three essential elements of a successful cloud infrastructure, *Low Friction Deployment*, *Automated Management* and *Automated Service Discovery.* When combined together to support innovation in a company, we call this concept Innovation as a Platform.

Low Friction Deployment

Low Friction Deployment refers to making services easy, quick and risk free to create, publish and upgrade. Achieving Low Friction Deployment allows teams to generate new and innovative services safely.

Automated Management

All applications and services require certain operational concerns. Managing the user load, monitoring the service health, managing security, system policies and underlying infrastructure usage and health. In many applications, these concerns are embedded in the

application itself.

Fully automating all of these concerns and extracting them from applications and services liberates them from that overhead and allows the service to solely address the business need it is created to solve.

Automated Service Discovery

We promote the maxim of 'share functionality, not code'. A service should not attempt to rebuild what already exists, instead, the platform should provide it access to the resources it needs, and allow it to provide resources for other services to consume.

This dynamic discovery mechanism is key in building a platform of this style. It gives the flexibility to move components as needed and the possibility of creating new, innovative, components that fully replace old ones, transparently.

Micro Service Architecture: Build the Innovation Platform

The challenges on a technology to underpin Innovation as a Platform are large and varied and threaten to overwhelm any technology provider or client if approached naively. We have developed an overall architecture that addresses these concerns, and calls for multiple, fine grained, services that are built to be composed, re-used and re-purposed as needed, in the same way as the Unix philosophy calls for small, independent applications composing together to deliver value. These services are generically referred to as Micro Services.

Flowing from the elements of a successful infrastructure, the platform is designed from the ground up to meet all of the non-functional requirements of services. Availability, security, scalability, deployment. These can be addressed in the platform, explicitly, as platform services.

Organise

In the first phase of design, Organise, we arrange the problem into domains that can be tackled in isolation. The business value is to deliver services, flowing from the above, we need to analyse all the various techniques and technologies that are required to do this in a scalable and flexible manner. In this case, the domains become something like Figure 2.

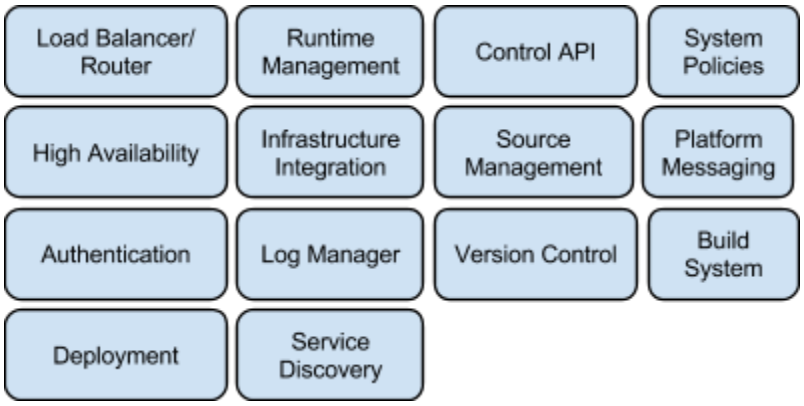

Figure 2. Example Platform Stack

This is not everything, and is quite a lot

Reduce

Next, we reduce the problem down to it's fundamentals by asking, what is the minimal supporting system needed to implement the above? The business value needed here is to run Services in a managed environment. That question could becomes generalised to, how much of the system could be extracted and implemented as one of those valuable 'services'? The answer is, surprisingly, almost all of it. This reduction into the concept of service is important, as it has the effect of stripping out the assumptions in the stack above and replacing them with the *option [2]* of using them or not. The above diagram then becomes as shown in Figure 3.

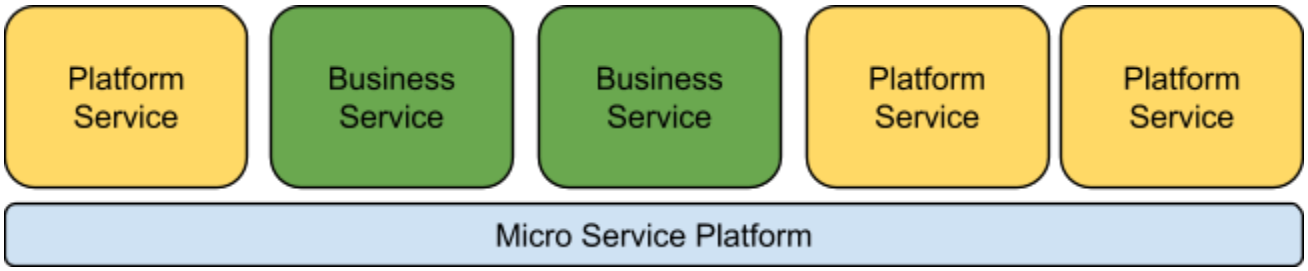

Figure 3. Micro Service based Innovation Platform.

The responsibilities above will still need to exist in the overall Innovation Platform, but they will be implemented only if they are wanted and required, and are implemented in the same

way as any other business service, as one or more Micro Services, on top of a thin Micro Service Platform.

Implications

This is the basis for Innovation as a Platform. Used correctly, it delivers on the promises of a Platform as a Service, but goes far further, as it is tied to generating specific business value, solving specific business challenges, and supporting new innovation in business models.

Applying this approach has some important implications. Most importantly, the platform itself is, as above, extremely thin, and so make very little assumption about the business environment and pressures that will be put on it. All the technical services (eg, deployment, management, monitoring etc) to create the overarching platform will be delivered in the same way as business services, and as such are open to be altered, removed or replaced by the business in response to it's environment.

Why is this good for you?

The value of a a microservices platform can be hard to convey, almost all of its benefits are those that would be considered non-functional requirements: Security, Maintainability, Availability, Scalability, Deployability, Accessibility, Compliance, Disaster Recovery, Monitoring, Testability and so on.

Typically, all of these non-functional requirements are expensive and time consuming to implement, and quality can vary wildly. Often, some of these requirements can be overlooked in the name of business agility where they are deemed too expensive to implement in comparison to the size of the project. Therefore small but potentially useful services are not able to gain budget, thus forcing existing services to grow with the new features and for existing applications to become monolithic and overly complex. The micro services platform will solve these problems once, so team can get on with solving money making functional requirements. Not costly non-functional requirements.

Utilise rich infrastructure

By not making assumptions on business needs, a Micro Services platform of this type will allow access to the underlying infrastructure and allow the Micro Services to make optimal use of it.

(Option to) Centralise Governance

While not inherent in the conceptual platform, and seemingly in contrast to what may be expected in an innovation platform, the option exists to deploy services onto the platform that create innovation in Governance; to create a Compliance framework in the platform. This could be arbitrarily complex, monitoring data usage, controlling access, even applying secure data filtering in real time.

Generate an Internal Technology Radar

When deployed, organisations can monitor the use of various technologies in use on the platform, and use that information to inform their training, technical direction, investment and recruitment, creating an internal 'Technology Radar'.

Application Trading

We create, deploy and manage applications to various cloud providers for clients. Often, the provider in question is chosen for cost purposes. When those underlying costs change, or the application changes it's runtime profile, we move the application to a new provider that is cheaper. This analyse and move process we call 'trading' and is the ongoing process of cost or technical optimisation of an application or service. This mechanism is straightforward to implement on this platform style.

Public Utility

The platform can be a public utility for the companies clients or customers to access or deploy into. If the trading option above is created, this public utility could be developed into a marketplace for applications, services and data.

What are the costs of a Micro Services based Platform?

A Micro Service Architecture is not a panacea, and there are explicit trade offs to be made in creating all of the value we have discussed.

Broadly, two effects are felt in a Micro Service Architecture, and so in any platform that rests on that architectural foundation, loss of developer context caused by *system complexity,* and potential loss of *performance,* caused by the splitting into services and introduction of latency.

System Complexity

One of the first effects your developers will notice is they will lose some of the *context* that their code runs within. They will work in a single piece of the application at a time, and moving to the others will take more work. This can be mitigated using good architectural integration patterns.

Performance

The Micro Service Architecture promotes the composition of services, indicating that potentially many services will be used to service a single business request.
Our results indicate that, implemented naively, each service added into the composition adds at least 20ms to a request through network overhead.

Next Steps

This paper is about supporting innovation through the application of technology to build a platform.
The focus must be on fostering innovation. To support that, we recommend:-

- Read *The Innovators Dilemma*, and *Antifragile: Things that Gain From Disorder*
- Research Innovative company social structure, for example, Agile Tribes.
- Adopt an Innovation Platform based on Micro Services, such as The Simple PaaS by Simplicity Itself.
- Research and learn how to build applications and services in a way that takes best advantage of a Micro Services platform.

About Simplicity Itself

Simplicity Itself is a UK spanning Technical Consultancy and Development company focusing on delivering client interventions that create high value returns, we primarily work on Application Architecture, Development Process and Cloud Infrastructure.

Our Innovation product, the Simple Platform is a Micro Services based Platform for Innovation.

[1] CNN Money Fortune 500
http://money.cnn.com/magazines/fortune/fortune500_archive/full/1999/
http://money.cnn.com/magazines/fortune/fortune500/2009/full_list/

[2] Antifragile: Things that Gain From Disorder