All Along the Watchtower

The art of mapping in corporate warfare

Very Early Draft Notes

By
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Introduction

This is provided as a very early draft of the notes to the book that I'm writing on behalf of the Leading Edge Forum.

This work is in note form and so don't expect it to be tidy, easy to read, grammatically correct or even free of spelling mistakes. The final structure of the book will be radically different in composition however this work provides a general interest point of view.

Simon Wardley, Leading Edge Forum
March 2013

With Thanks

With special thanks to: -

James Duncan (former CIO of Fotango)
Liam Maxwell (Chief Technology Officer, HM Government)
Doug Neal (Senior Fellow, Leading Edge Forum)
David Moschella (Director of Research, Leading Edge Forum)
Mark Thompson (Judge's Institute, Cambridge)
Adrian Seccombe (Senior Fellow, Leading Edge Forum)
Jerry Fishenden (LSE)
Edd Dumbill (O'Reilly)
Adrian Cockcroft (Netflix)
Simon Crosby (Bromium)
James Urquhart (Enstratus)
Tony Fish (Innovation Warehouse)
Bob Harris (Channel 4)
Jim Hawkins (Unrenco)
Samantha Buck
Harry Simon Wardley-Buck

Without whose advice and encouragement then I would never have started writing.

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There must be some way out of here

On being lost

This story is my journey, from a newly minted yet confused CEO caught like a rabbit staring helpless into the oncoming headlights of change to more recently being voted one of the most influential people in IT within the UK.

Along the way I failed copiously, experienced lots of painful lessons and generally bumbled along from one catastrophe to another. What I learned during the process, I dearly wish I had known at the beginning but such is the nature of experience, someone has to first experience it before you can learn and then you still need a way of learning.

So in the forlorn hope of helping the reader - I am mindful that the one thing we never learn from is the past especially when it belongs to others - I've taken it upon myself to write down those experiences. If you are like I once was, a confused CEO struggling to cope with the change around them, then this might help you progress in your journey. If however you are a master strategist looking for some new insight, some new form of competitive advantage then let me stop you there and save you time.

The models and techniques that I'll describe are at least seven years old, they have been taught to hundreds of thousands of people and there is little or no advantage contained within. This story is more about survival in today's competitive landscape rather than gaining some new tactical advantage over a competitor.

Throughout this story, I'll talk about the importance of maps. It's the lack of any method of mapping change that often causes most of our problems along with our greatest blunders. Maps have been critical in all forms of competitive engagement throughout history; they are necessary to understanding why we take action, how we can defeat foes and where our escape

routes are when things go wrong. Mapping is therefore where we should probably start.

After examining the importance maps and why this might matter to business, we we'll look into the wider environment that business exists within including the critical elements of change and how economies undergo cycles of upheaval. We will examine how this creates many common business problems along with modern day effects such as cloud computing and big data.

With a general picture of the landscape and an appreciation of the importance of mapping, we will then look into how can we map this change and exploit such maps to our advantage. Finally, we will examine some of the organisational impacts of this and some common strategies for survival.

The importance of maps

Ball's Bluff is not commonly cited as one of major engagements of the American Civil War but it was not only one of the largest in 1861, it involved the utter rout of Union forces. Most saliently Ball's Bluff is an abject lesson in the importance of maps and situational awareness.

Through misinformation and miscalculation, 1,700 Union troops were caught in disadvantageous terrain and in effect slaughtered (with an 8 to 1 kill ratio) by Confederates. A thousand men were lost because the Union Generals had no awareness of the landscape and marched blindly to their deaths on vague ideas of *"because the Confederates are somewhere over there"*.

Throughout time, understanding and exploiting the landscape has been vital in battle as it acts as a force multiplier. Probably the most famously cited example is the battle of the pass of Thermopylae where the Athenian general Themistocles used the terrain to enable 7,000 Greeks to hold back a Persian Army of 300,000 for seven days with King Leonidas and the "three hundred" reportedly holding them back for two of those days.

Maps and situational awareness are always vital to the outcome of any conflict. Maps enable us to determine the **why** of action – cut off an enemy supply route, gain a geographical advantage over an enemy position or restrict an opponent's movement. The **what** (capture this hill), the **how** (bombard with artillery followed by ground assault) and the **when** (tomorrow morning) all flow from this, though the specifics change as no plan generally survives first contact intact.

Military maps are traditionally thought of in terms of describing a geographical environment, the physical landscape in which the theatre of battle operates. However, business is equally a competitive engagement between "opponents" but in this case

fought over a business landscape of consumers, suppliers, geographies, resources and changing technology. But how do you map this and does it really matter?

The first hint I had that mapping might be important in business was when I was asked to examine alignment issues in a number of business and IT strategies for a major fast moving consumer goods company. The questions ranged from whether the strategies were aligned to did these strategies make sense and was the company heading in the right direction?

What was noticeable in both cases of strategy is they clearly detailed the What, When and How of action but weakly described the **Why?** I was struggling to make sense of many of the decisions back then and almost two decades later, I still commonly see this problem - strategies strong on the **what**, **when** and **how** but weak on the **why**.

- **What** we're going to do … "*we going to build a cloud*"
- **When** we're going to do it … "*this year*"
- **How** we'll achieve it … "*with this technology stack*"
- **Why** are we doing this … "*because everyone else is?*"

The **why** is often reactive and hand waving, the responsibility of choice maybe passed onto others (e.g. the common mantra of IT was "*the business wanted it"*) and in the worst cases the reason given is simply others are doing it (e.g. "*the market is moving towards more services*").

In essence this vagueness in the strategic why is no different from the vagueness behind the actions of Ball's Bluff - *"because the Confederates are somewhere over there"*. The cause in both cases is poor situational awareness, lack of a map of the environment and the opponent's position.

What has became transparent over these many years, is that in

Business and IT we almost never have a map of the landscape and therefore we cannot know **where** to attack. Without this, our reasons for action (the **why**) can only ever be vague and hand waving unlike the actions of Thermopylae.

This supremacy of **what** over **why** is shown most clearly in technology and business fads as exemplified by Gartner's hype cycle. New technology trends are promoted because other's are doing it, the focus is on what is done - cloud, social media, customer relationship management etc - followed invariably by the skeptics questioning of why?

The military equivalent would be a hype cycle of new technology - bow, muskets & cannon - with generals clambering to use the latest technology. Whilst it is certainly true that new technology has created advantage and beneficial new military structures - bronze spears resulted in the infantry phalanx, stirrups provided new tactics for cavalry - in the case of Ball's Bluff, it would be like the Union buying up the latest to artillery to fire in some vague direction.

Corporal: "New Cannon arrived sir, as per orders we installed them and fired them this morning"

General: "Excellent news. Apparently the latest thing is mortars, that's what all the high tech militaries are using. Let's get some of those and fire them as well"

Corporal: "Certainly. Where should we fire those?"

General: "Apparently 67% of successful Generals are bombarding hills, I've got a report and case study on this. Let's bombard a few hills!"

Corporal: "Yes, Sir!"

The assumption that high tech always wins the day is equally flawed. Low tech can be used to overcome a high tech opponent that has poor situational awareness. A famous example of this would be the U.S. Seventh Cavalry, with access to gatling guns and “hi-tech” weaponry suffering a severe defeat at the Battle Of The Little Bighorn against bows, arrows and stone clubs.

So given the importance of situational awareness e.g. mapping the environment and your opponent’s potential positions and movement - in any form of competitive engagement, then why don’t the equivalent maps exist for business?

In 1996, I needed such a map to determine whether the strategies made sense. It is in pursuit of business maps that my journey of discovery began.

Chapter 2

There's too much confusion

A first glimpse

My goal seemed simple; in order to understand whether the strategies made sense then I needed to first map out the business landscape. Problem was, how do I do this? How do I map out an organization and the competitive environment? What is an organization anyway?

No matter how much I read on the subject, more questions were raised. After six months of trying to find a known way of mapping a business landscape, I was now befuddled over the simplest terms. Everything was a mess, well certainly in my mind, everything was in a state of confusion.

I understood an organization was a living thing, comprising a network of people, things that are done, and reserves of capital. It consumes, it produces, it grows and it dies. Like all organisms, any organization exists within a number of ecosystems in which it competes and co-operates with others; it's shaped by and shapes its environment, and hence needs to constantly adapt merely to survive[1].

People come and go, the things organizations do change and hence all firms are in a constant state of flux. In any industrial ecosystem, new activities (*innovations*) appear as a consequence of competition and those that are useful will spread throughout the ecosystem often becoming more of a commodity. This constant change creates a paradox, identified by Salaman and Storey[2]

> *"Survival requires efficient exploration of current competencies and 'coherence, coordination and stability'; whereas innovation requires discovery and development of new competencies and this requires the loosening and replacement of these erstwhile virtues"*

[1] Leigh Van Valen. (1973). "A new evolutionary law". Evolutionary Theory 1: 1—30.

[2] Salaman and Storey, 2002, Managers' Theories about the process of innovation, Management Studies, 39, 147-166.

These two extremes of survival (*today and tomorrow*) appeared to have diametrically opposite concerns with different techniques, tactics and methods needed to manage each. Those who manage organizations are therefore caught on the twin horns of a dilemma: how is it possible to be standardised and efficient as well as innovative and new, without prejudicing your survival - either today, or tomorrow?

The effects of this on business can be seen in their constant restructuring to cope with new paradigms, and in the yo-yoing of popular management theories between opposites in a scramble to maintain order – Six Sigma vs Agile, Networked vs Hierarchical, Push vs Pull, Innovation vs Efficiency.

How on earth was I going to map this? I had to start by untangling the mess with some very simple concepts and observations and building from there. I needed to first deconstruct the organization.

Deconstructing Organization.

An organization consists of many things including sources of capital: -

- Financial e.g. money in the bank
- Physical e.g. buildings, stock, plant and equipment
- Human e.g. people, their skills, their networks
- Social e.g. goodwill, reputation, connections
- Knowledge e.g. information and capability

These sources of capital exist within that organization for one purpose - to get stuff done - and it's the act of getting stuff done which changes the reserves of capital that an organization has i.e. we consume physical capital in the creation of things which we sell to others to increase our financial capital.

It’s the getting stuff done bit that helps distinguish groups of companies e.g. *“We’re a building nuts & bolts company”* vs *“We’re a building light bulbs company”*. We will call this the **activities** of the company as it represents what the company does.

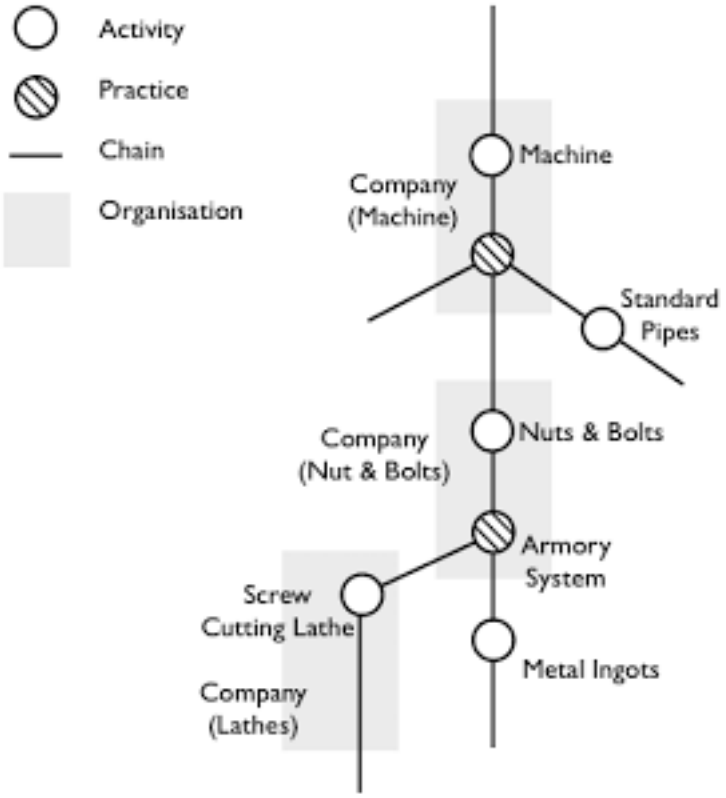
Naturally, organizations don’t work in isolation and the output of one company’s activities maybe the inputs to another company e.g. the nuts and bolts manufactured by one are inputs into the making of engines by another.

Activities can also be broken down into discrete component activities e.g. building a machine may requires components such as nuts and bolts and pipework. The collection of components in effect creates a chain and we can therefore describe an organization by these **value chains**, each consisting of many activities (things which are done) to create an output.

However, what we do isn’t enough to fully describe a company because you also need to consider the way in which we do it. For example, whilst the output of two companies manufacturing bolts maybe the same (e.g. a standard bolt) and the inputs of raw material may also be equivalent (e.g. metal ingots), the practices (i.e. the way) by which inputs (ingots) are converted to output (bolts) may vary.

Hence our organizations consist of value chains that are built from activities (what we do) and practices (how we do it) that are working in concert and it is the variation in these that distinguishes one organization from another e.g. an insurance company from a pharmaceutical company. I've given a rough visual and highly simplistic summary of this in figure 1.

Figure 1 - Value Chain, Activities, Practices and Companies.



By examining organizations in the context of their value chains, I now had a method of distinguishing companies and a way of examining competition in a very primitive sense. If two companies had the same value chains (e.g. their output was standardized bolts), then differences including operational efficiencies can be explored by examining the constituent components of the value chain and the associated practices.

A company that had more efficient practices or used a specific activity may gain an operational or differential advantage over another when it came to the output e.g. a more consistent, reliable or standardized bolt.

A historical example of this would be Maudslay's screw cutting lathe in 1800. The lathe enabled production of more standardised and repeatable nuts and bolts which had previously been hand made for each other with interchangeable components being rare

i.e. one nut fitted one bolt and no other.

The lathe allowed for new practices of mass manufacture (e.g. the Plymouth system of manufacturing which later became the Armory method) and hence whilst the output of two companies may have been nuts and bolts, those using screw cutting lathes and associated practices created them more reliably, more efficiently and in a more standardized and interchangeable manner.

Whether this was beneficial to end consumers of the nut and bolt is another question of competition but it's enough to note that this made a difference.

But, that was in the 1800 and obviously industry has progressed. New activities and practices have since appeared and become common. So whilst I had an early technique for examining a company and connections to the environment, it provided no concept of how the landscape was changing and what was beneficial. It was far from the map that I needed to determine whether any given strategy would work but it was at least a starting point.

What I now needed was a method of examining change.

Evolution

The problem with examining companies by value chain is that nothing stands still. Take for example, the multinational Finnish company Nokia. Originally founded in 1865 as a paper mill, the company has undergone many transformations through various close calls with bankruptcy. From paper mill to rubber manufacturer to consumer electronics to telecommunications. The value chain of Nokia in recent years is radically different from its past.

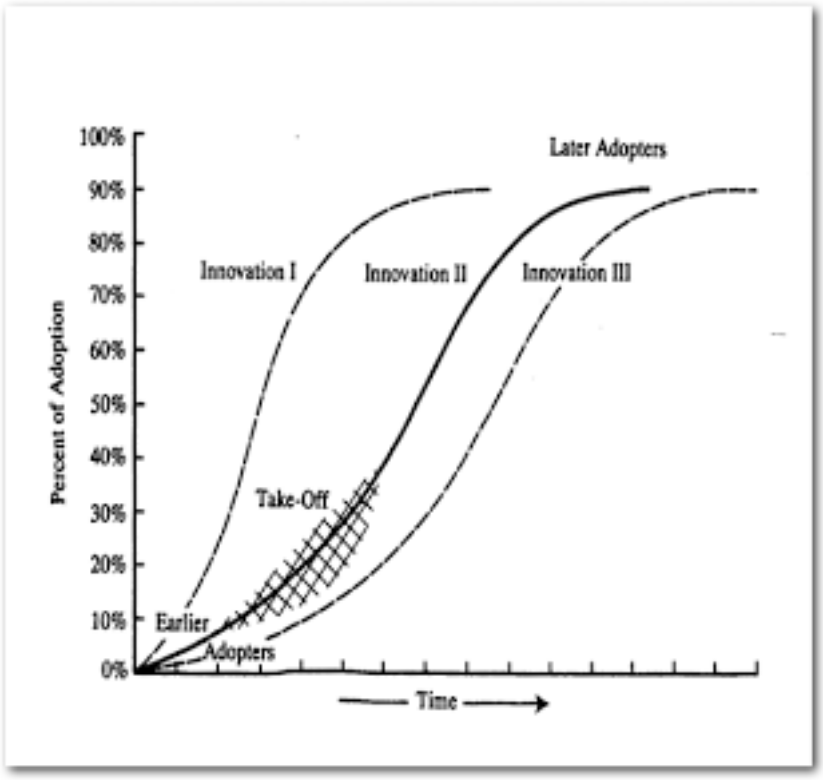
So, if we map out the value chain of a company does that tell us anything about the future? At first glance the answer would appear to be a resounding "no". Popular literature seems to imply we live in an environment of innovation that spreads and changes the world. This innovation can come from any direction, it's often accidental and somewhat random and its impacts range from nothing to paradigm shifting.

Is this really the case though? My first concern with this image was the word innovation itself. A feature improvement to an existing product (such as a phone) is often called an innovation. However, the first ever phone was also called an innovation and the introduction of rental services for pre-existing phones was also called an innovation. Are they really all the same, do they have the same impact, do they operate in the same way?

Everett Rogers[3] explained how "innovations" are communicated over time through various social structures and are consequently either spread through adoption or rejected in a society. Figure 2 provides a graphical illustration of this process, showing the cumulative adoption of an innovation over time until saturation is reached, with each stage governed by different social groups (e.g. innovators, early adopters, early majority) through a regular S shaped pattern.

[3] Everett Rogers, Diffusion of Innovations, 4th Edition, Free Press, 1995

Figure 2 - Diffusion of Innovation



However, whilst this pattern of adoption over time has a common shape, it is rarely the case that two innovations when drawn on the same time axis will match - some S curves are more stretched or distorted than others. Several considerations need to be recognized: -

The rate of diffusion is not constant: comparisons over time provide a wide range of adoption curves and a general observation that the diffusion of innovations is accelerating.

Not all innovation spreads: even where an innovation has usefulness, a number of factors can influence its adoption. As Geoffrey Moore[4] noted there is a chasm between the early adopters of an innovation and the early majority.

[4] Geoffrey A. Moore, Crossing the Chasm, Harper, 1991.

Diffusion is not continuous: highlighted by Christensen's work on disruptive innovation[5], the diffusion of one innovation can be disrupted by the introduction of a new technology that offers different performance attributes from those established in existing value networks.

Diffusion consists of multiple waves: innovations tend to spread through waves of improved versions. In the early stages of a technological change, this rate of improvement tends to be slow and then accelerates until reaching a more mature and slow improving stage.[6]

The prospect I faced in 1999 was any map was impossible. Whilst value chains could be described, these were impacted by innovations whose source often appeared random, which diffused through society at different rates, in many cases were not continuous and had varying impacts. Take for example the innovation of electricity or computing infrastructure which both had profound and widespread effects. How could these impacts possibly be predicted?

Three pieces of information then came to light that helped change my worldview on the impossibility of mapping.

The first piece was that one of the consequence of the diffusion and maturing of a technological innovation is that increased information about the technology reduces uncertainty[7] about the change. Each improved version increasingly adds definition, eventually providing a system that can be considered feature complete, mature and generally well understood.

The second piece was a Harvard Business Review paper published

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[5] Clayton M. Christensen, The innovator's dilemma. Harvard Business Press, 1997

[6] D.Sahal, Patterns of Technology Innovation, AddisonWesley, 1981

[7] Rogers and Kincaid, Towards a new Paradigm of Research, 1981

by Nicholas Carr[8] in 2003. This paper demonstrated that as certain aspects of IT became widespread and common they had diminishing differential value and became more of a cost of doing business.

The third piece was the work of a great and often under acknowledged economist Paul Strassmann who showed there was no correlation between IT spending and the value it created for business. What Strassmann's[9] work demonstrated was IT wasn't one thing but instead consisted of many activities, some of which appeared to create value whilst others did not.

In isolation the three pieces were interesting to note but in combination they implied something remarkable but obvious in hindsight about activities.

- **They matured;** they evolved from novel to well understood and commonplace.

- **Their characteristics changed;** as they became more commonplace they had diminishing differential value and became more of a cost of doing business.

- **They were not uniform;** a function of an organization such as IT could contain multiple activities which were at different stages of evolution, some having value whilst others being more cost of doing business.

This journey of evolution is one from the innovation of a new activity (its genesis) to provision as a more ubiquitous and standardised item. Along this journey many iterations of the activity may appear (i.e. functional improvements) which diffuse in society.

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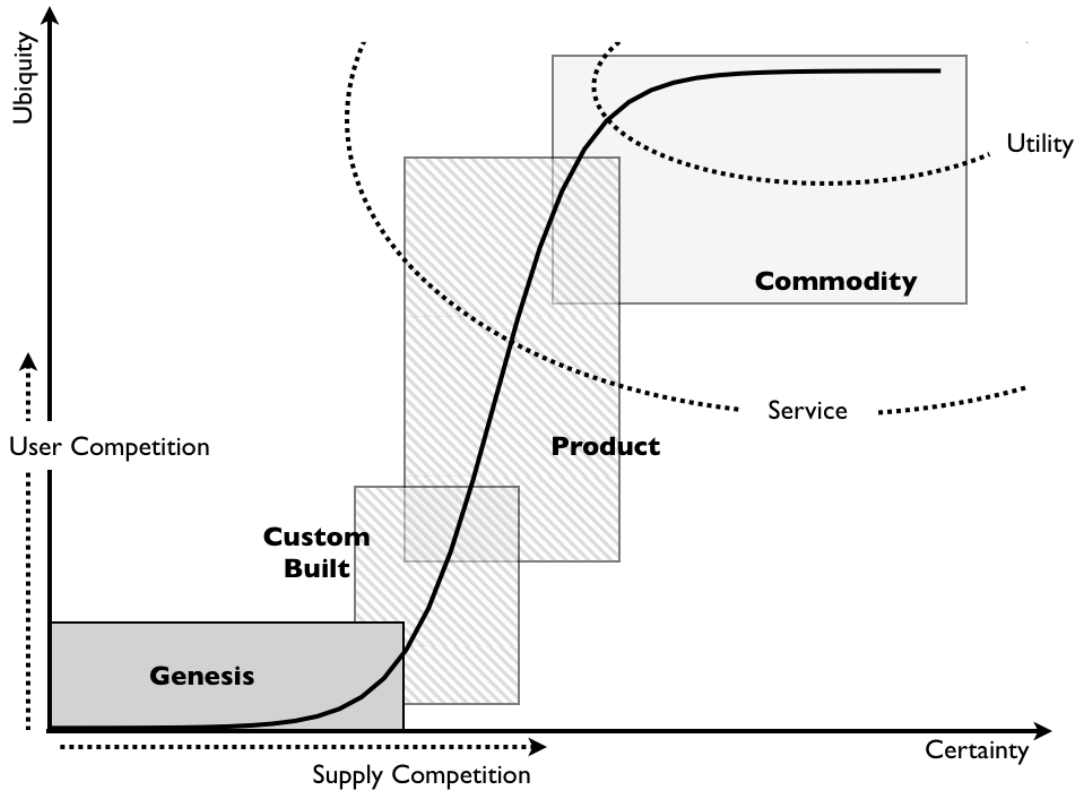
[8] N. Carr, IT Doesn't Matter, HBR, May '03

[9] Paul Strassmann, The value of computers, information & knowledge, 1996

In 2004, I started to collect data in order to try and map out this process of evolution. After several false starts I eventually stumbled upon a model that the initial data supported by mapping evolution over two axis - ubiquity (how commonplace something was) and certainty (how well understood, defined and standardized something was).

It wasn't until 2006 that I was finally able to collect enough data to thoroughly test the model. By then I had over 6,000 data points representing a wide variety of activities mapped across these axes that demonstrated the pattern shown in figure 3.

Figure 3 - Evolution of Activities



The pattern is not one of diffusion (i.e. adoption vs time) but evolution (ubiquity vs certainty). Despite both patterns having the same shape (S-Curve), they are not the same.

Evolution shows how we start with the genesis of an activity (e.g.

the first battery, the first phone, the first television, the first computer) and then how custom built examples are made, followed by a stage of product development (constantly improving generators, phones, televisions, computers), the introduction of rental models for the activity, commodity provision and finally (where appropriate) utility services for provision.

We commonly use the term **commoditisation** to describe this path of evolution and every activity I examined throughout history mapped to the path.

- *From the Parthian battery, to the Hippolyte Pixii to Siemens Generators to Westinghouse utility provision of AC electricity.*

- *From the Z3 computer, to custom built examples such as LEO (Lyons Electronic Office) to the first products (IBM 650) to rental services (Tymshare) to commodity provision of computing infrastructure.*

Correlation however is not enough; I needed to understand why the pattern occurred. The cause of the pattern turned out to be simple competition - consumer and supply competition, drove the model.

Consumer competition was the desire for anything that made a difference and gave an advantage; it drove ubiquity (i.e. anything useful spreads).

Supply competition was the desire of providers to supply an activity to a consumer. This competition drove feature completeness and improvement of an activity.

As an activity evolves along the path, the improved iterations themselves diffuse through society - as per Everett Roger's work -

with early adopters and laggards of each new iteration.
What began as something novel and potentially a source of differentiation became commonplace and more of a commodity (as per Nicholas Carr).

IT itself was simply a mass of activities in the various value chains of an organization which were all evolving along this path. Some of these activities will create a differential value whilst others being merely acommodity won't. Hence you cannot associate aggregate spending on IT with business value (as per Strassman's work).

When it came to "innovation" - the genesis of something was clearly distinguishable from a feature improvement of a product or the introduction of a rental service model for a pre-existing activity.

Overall, the model had correlation (ubiquity vs certainty) and cause (competition), it explained many of the phenomenon that had been observed and showed how some changes aren't quite as random as they first seem. Some "innovations" were genuinely new activities whilst others were simply improvements to existing activities and part of a visible process of evolution that was driven by competition.

I now had two methods that when combined were enough to put together a rudimentary map: -

- A method of describing value chains which enabled me to explore an organization and its environment.

- A method to describe how the component activities within a value chain evolve.

A first map

In 2005, I was the CEO of a Canon owned Software Company known as Fotango. The company was profitable, it had reasonable reserves of cash and had built an outstanding team but we also had a problem. Our business model wasn't scaleable and mainly consisted of consultancy revenues from the parent company i.e. we were highly dependent upon the parent. This situation had arisen out of past necessity, in other words survival.

When I had joined Fotango many years earlier, it was one of the leading online photo services in Europe. However the technology was in a poor shape, the company was making a significant loss, we had burnt through millions of VC funds and the internet bubble had burst. We were facing bankruptcy in six months and we were looking like a certain casualty.

We managed in short order to get the technology sorted, the site more stable and useable, reduced the burn rate and went looking for a buyer. We were lucky, Canon bought us literally weeks away from us hitting the wall. However, we were still haemorrhaging cash, so we had to borrow just to stay afloat.

Over the next two years, we built a consultancy arm, beefed up our internal engineering talent (by poaching from the open source world and London's strong Perl community), turned profitable and paid of our debts. The company had survived, it was growing but the consultancy model was constraining.

By 2004, we had introduced a variety of techniques to give us more breathing room to look at developing new products and services. The old Fotango photo service had floundered and been superseded by other sites and we became aware of a new threat heading our way. The parent company had taken the decision to outsource all IT activities and Fotango's future (this time as a

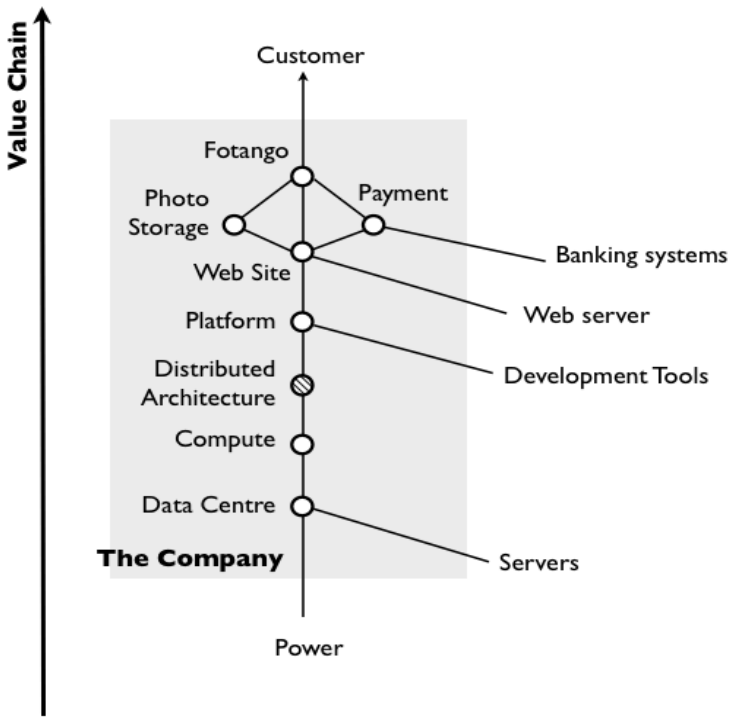
development shop) was in peril again.

We needed a new route for the company, a way of creating external revenue such that we could cope with the oncoming storm. It was at this point, I turned to that mapping technique that I had developed to see if it could help.

I examined the old Fotango model that still underpinned most of our consultancy work. As an online photo service, Fotango had developed a value chain based around numerous online activities from large scale photo storage, a web site, a standard development platform, online payment system (for customers of photo based products), fulfillment services, internal administration systems, a data centre and significant compute resources. Many of these components we had re-used in numerous of our consultancy projects.

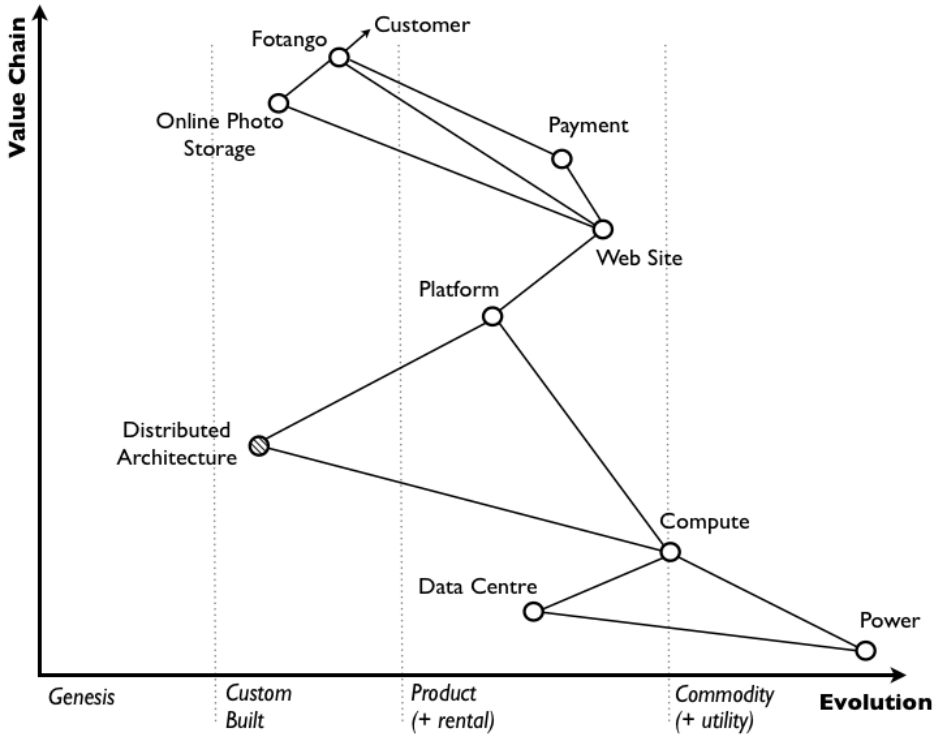
The following figure provides a simplistic value chain of the main components related to our online photo service.

Figure 4 - Value



Whilst some of the activities were custom built, many had become available as fairly standard products (e.g. servers, databases). Hence, I examined the components and mapped out at what stage of evolution the components were. An overview of the above value chain mapped against stage of evolution is given in figure 5.

Figure 5 – Value Chain vs Evolution



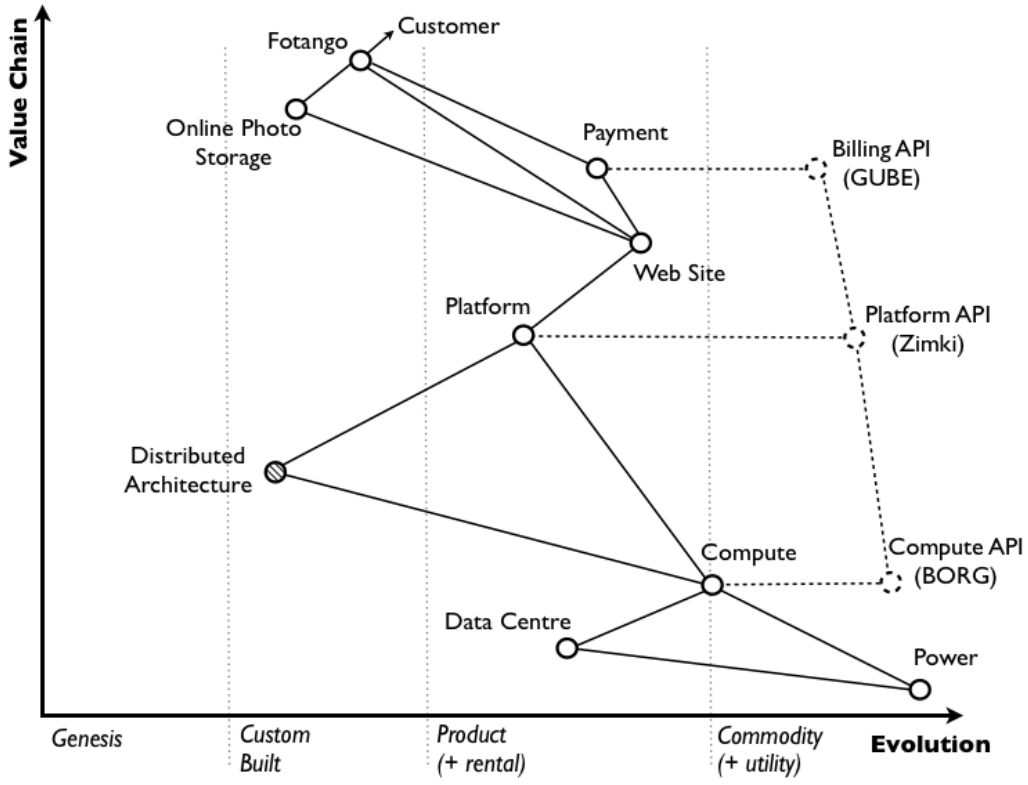
I understood that these component activities would continue to evolve towards more of a commodity through simple competition (both consumer and supplier). Hence the team went looking for components that were currently provided as products but could be provided as more standardised, even utility like services. We were hunting for things to commoditise.

I understood that industry often has inertia to change (more on this subject later) and hence there were likely to be a number of activities that should be provided as more of a commodity but wouldn't be. The team ran a number of internal experiments and came up with numerous potential areas.

Figure 6 provides a rudimentary overview from 2005 of parts of our value chain mapped against the state of evolution with three of those potential new service areas identified - an infrastructure as a service offering (based upon an internal technology known as BORG), a platform as a service offering (known as Zimki) and a generic utility billing engine (known as GUBE).

Whilst there were numerous opportunities, I'll concentrate mainly on two of the three marked – infrastructure and platform – with an emphasis on platform which is where we targeted.

Figure 6 - A rudimentary map



We had limited set of chips to bet with, so we diversified ourselves from the old Fotango model (we were soundly beaten in this space) and focused in on the platform as a service space (part of what we commonly call "cloud" today) with a project known as Zimki.

Zimki was designed to be an online development platform where anyone could build any application online and be charged on a utility basis for consumption of the underlying compute resources. It supported one language throughout – JavaScript – it was simple to get started with and provided a range of useful features from a NoSQL like object store, detailed metrics on consumption, code libraries and templates.

By 2006, we had launched Zimki, one of the world's first platforms as service offerings. The speed of development was fast, entire systems being built and released in days or hours. We anticipated how the market was going to change, the future need for exchanges and competitive markets due to concerns over lock-in and the importance of open source in order to make this happen. We also understood the educational and adoption barriers to "cloud".

The service rapidly grew and as Amazon entered the fray with EC2, we knew we had found a rich goldmine. The map had pointed the way and certainly made decisions easier.

Today, some seven years later, the anticipated changes to the market have all turned out to be true. Zimki was unfortunately caught up in the internal politics of the parent and its future quashed, a salient lesson in the importance of political capital. However, since those days we have seen Google, VMware and Salesforce follow similar paths into the platform as a service space.

Am I really saying that the maps allowed us to anticipate how the cloud industry was going to develop some seven years in advance? Yes.

The figures above are of course simplistic representations and what the reader is missing is many of the details on how to read, understand and use the map i.e. how did we know about the

inertia industry would have, the need for exchanges, the educational challenges to be faced and the importance of open source?

Gaining a better understanding of what the map means is what we're going to explore in the next few sections. At this moment in time, it's enough that the reader is aware that a map of value chain vs evolution can be created and used to anticipate changes to an industry.

Chapter 3

Businessmen they drink my wine

Changing characteristics

Organizations consist of value chains that are comprised of components that are evolving from genesis to more of a commodity. It sounds fairly basic stuff but it has profound effects because that journey of evolution involves changing characteristics.

For example, let's take the genesis of an activity, the first implementation. Let us choose computer infrastructure and wind the clock back to 1943 and the Z3, the first digital computer.

By definition the activity was scarce as there was only the Z3. It was poorly understood and we were still in the process of discovering what a digital computer could do. The act was uncertain as we had little idea of what it could lead to and as such it was unpredictable and rapidly changing.

But the activity differed from what had been before and had the potential to make a difference between companies, it was a source of differential value and competitive advantage and as such it had economic value. There was however no market to speak of, customer were on as much a journey of exploration as the producers.

Computing infrastructure did diffuse, custom built systems such as LEO (Lyons Electronic Office) were built, eventually products released with diffusion of ever more functionally complete systems and more recently computing infrastructure has become treated as a commodity.

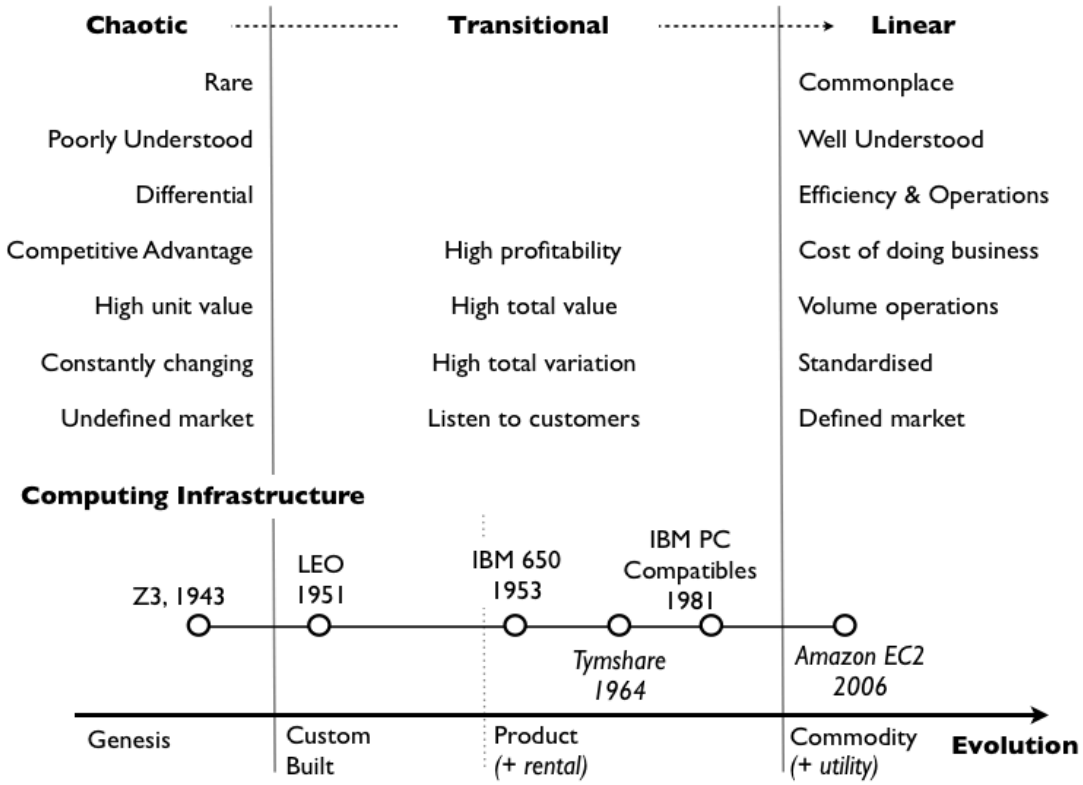
Today, computing infrastructure is commonplace and its purpose and use is well understood by a large number of people. We tend to focus less on what a digital computer can do but instead what we can do with vast numbers of fairly standardized units. The use of computing infrastructure is not a differential between companies and it tends to be nothing more than a cost of doing

business. You will rarely hear a CEO holding a press conference on how their company has just bought their first computer. The market is predictable; customer demands for large volumes of more economically efficient units are well understood.

A single activity has evolved from rare to commonplace, from poorly understood to well defined, from competitive advantage to cost of doing business, from rapidly changing to standardized.

This change of characteristics is common for all activities as they evolve. They shift from a **chaotic state** (rare, constantly changing, source of differential, poorly understood) to a more **linear state** (commonplace, standardized, cost of doing business, well understood). This progression is shown in figure 7 with the example of computing infrastructure.

Figure 7 - from chaotic to linear



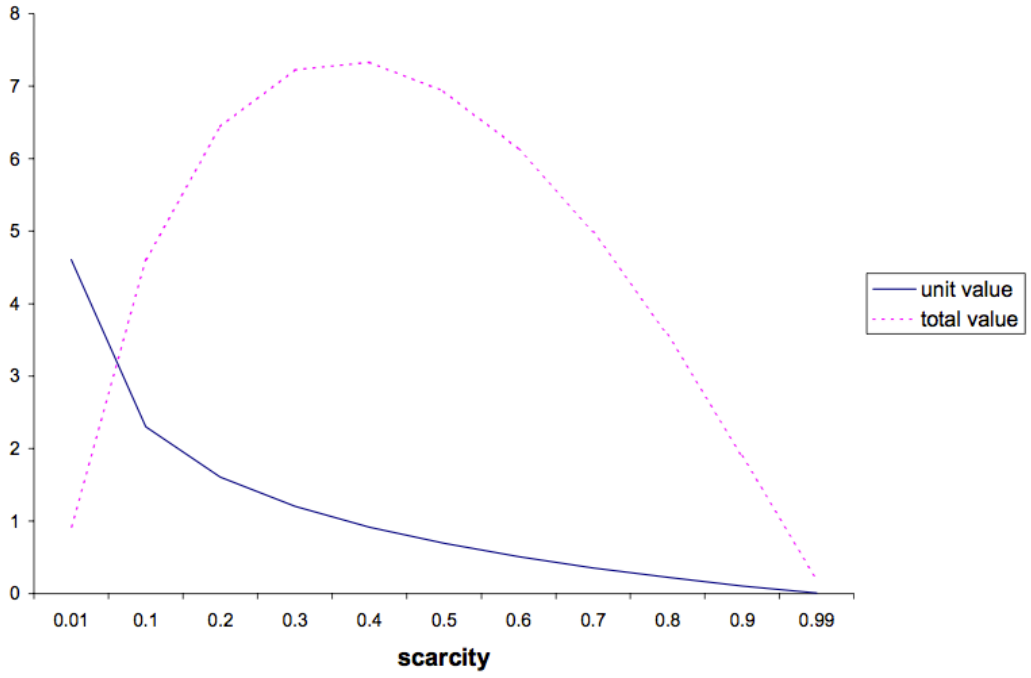
Now, a couple of areas are worth paying special attention to: -

Value

The genesis of an activity may provide a differential between companies (if it is useful) and as such it will have an economic benefit or value. As that activity evolves, the various iterations will diffuse through society until the activity becomes commonplace and its differential benefit reduces to close to zero i.e. what started with a high differential value results in almost no differential value and becomes more of a necessity, a cost of doing business.

On one hand you have declining differential value due to diffusion but on the other hand a volume increase in the number of instances of that activity. Hence whilst the unit value tends to decline as it becomes less scarce, the total value tends to increase during the transitional phase between chaotic and linear. This is neatly summarized in Jin Chen's an Entropy Theory of Value and the relationship between value and scarcity (see Figure 8).

Figure 8 - Unit and Total value variation with scarcity.



Equally, the cost of production of each unit of that activity tends to reduce with volume. The cost of production per unit for a commodity is vastly less than the cost of production of the first ever instance (e.g. the cost to research and create it). As a result the transitional phase (the time of custom built and products) also tends towards the most profitable with the highest total value and declining production costs.

In practice, this area of highest profitability tends to extend further than anticipated because the economic value associated with an activity tends to exceed the differential value it brings us due to effects such as branding, confusion of choice, poor information and our inability to determine actual differential value. For example, even today we tend to view systems such as financial ERP (Enterprise Resource Planning) as providing some form of differential value despite the commonplace use of ERP systems and wide spread copying of customization. Hence we often associate more economic value to ERP than we should.

Variation

Whilst the genesis of an activity is a time of experimentation and rapid change, as the activity starts to diffuse then more suppliers tend to become involved. Hence the total amount of variation tends to increase during the transitional phase until such time as the activity becomes commonplace enough that defacto (and in some cases dejeure) standards appear.

Customer

During the genesis of an activity (i.e. the first SMS, the first car, the first phone), there is no market to speak of – the market is yet undefined. In most cases, listening to customers can be unhelpful and gut feel tends to rule the day. Genesis is hence always a gamble.

As the activity starts to diffuse, more suppliers become involved,

the activity evolves and the market becomes more defined. Listening to customers becomes essential for refinement and improvement over competitors.

In the later stages of evolution, the customers often have inertia to change (more on this subject later) due to existing norms of operating. Hence listening to customers can also become counterproductive and what becomes important is a detailed analysis of where a defined market is heading.

For example, the provision of computing infrastructure as a utility service by Amazon was often dismissed in the early stages as not meeting enterprise customer needs. Utility provision simply represented an evolution of a pre-existing activity from products towards standard components and provided benefits including volume operations. However, this was often countered with inertia to change through concerns over ownership, changes to existing operating practices, trust, questionable needs for customization and other associated “risks”. Today, many of those same customers are now adapting to this world. The same resistance to change is a common factor throughout history for any shift towards more commodity and utility provision.

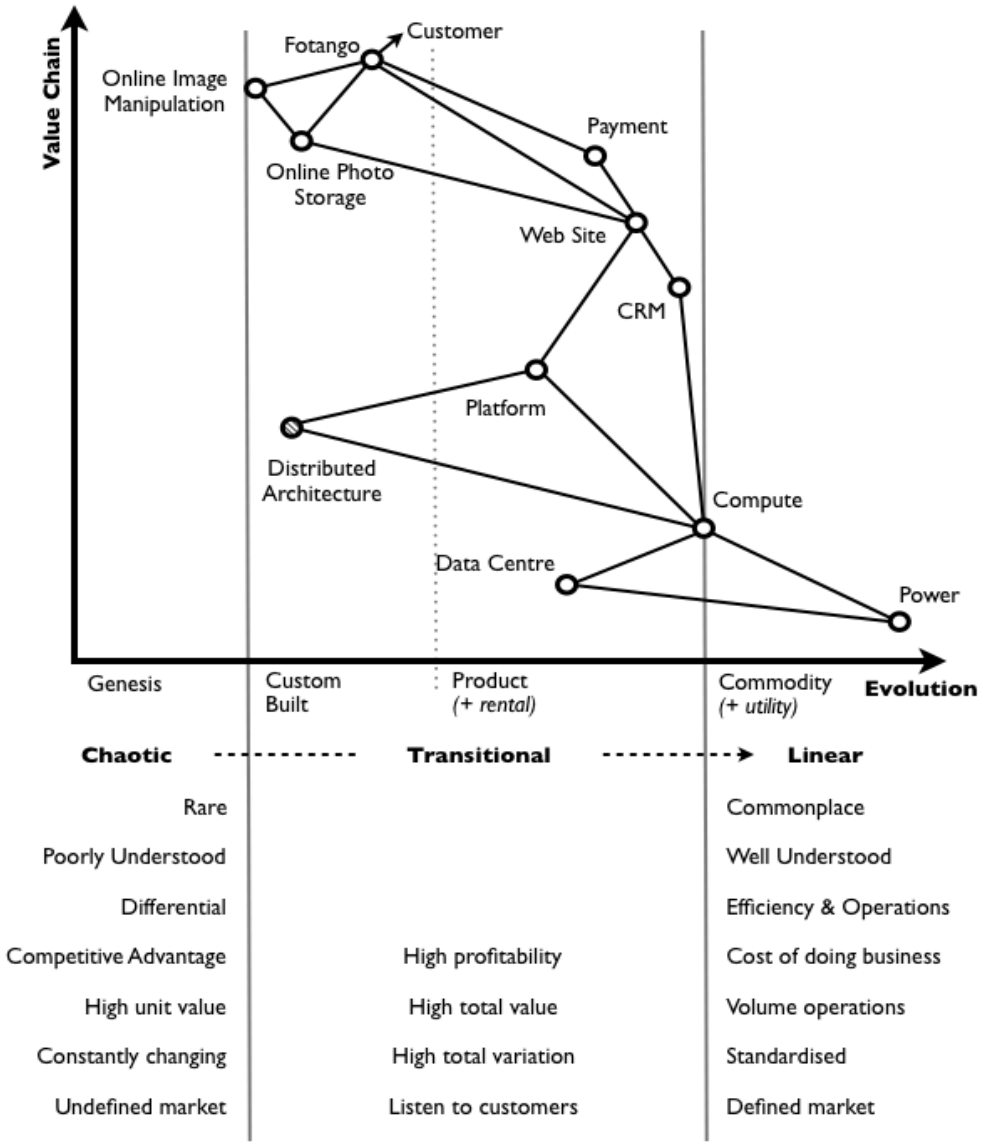
It is critical for the reader to understand that the characteristics of an activity (i.e. a thing we do) change as the activity evolves. In other words the general characteristics of computing infrastructure in the early days are fundamentally different from the general characteristics of computing infrastructure today.

This change of characteristic from a chaotic stage (rare, uncertain, deviation, source of differential) through transitional to a more linear stage (common, well defined, standardized, cost of doing business) appears to be universal.

Why one size never fits all

So let us take two of the graphs we've created so far - value chain vs evolution and the changing characteristics of activities as they evolve – and compare them together (see figure 9)

Figure 9 – Value Chains vs Evolution vs Characterstics



At first glance it looks fiendishly complex but in reality it's rather simple. An organization consists of many value chains (such as the one shown above) which contain many different components all of which evolving. As those components evolve their characteristics change from a more chaotic to a more linear

state.

Many of the components will be common to different value chains i.e. a company producing multiple online software offerings each with their own value chains will find common components such as compute resources and power between them.

Now, not all parts of the value chain are equally visible to all. For example, from a consumer perspective, the parts of the value chain that are visible describe what is being offered. Hence in the case of Fotango this consisted of a web site, photo storage, payment systems and image manipulation. Many parts of the value chain - such as what servers were used to provide compute, the electricity supplier for power - are invisible to the consumer.

Let us now consider the online photo service which was Fotango. There were many equivalent sites at the time of its operation in 2001 that provided a means for the capture and sharing of digital photos. Many of these competitors were simple storage services and the provision of a web site, storage and payment system cannot not be viewed as a differentiator with these competitors.

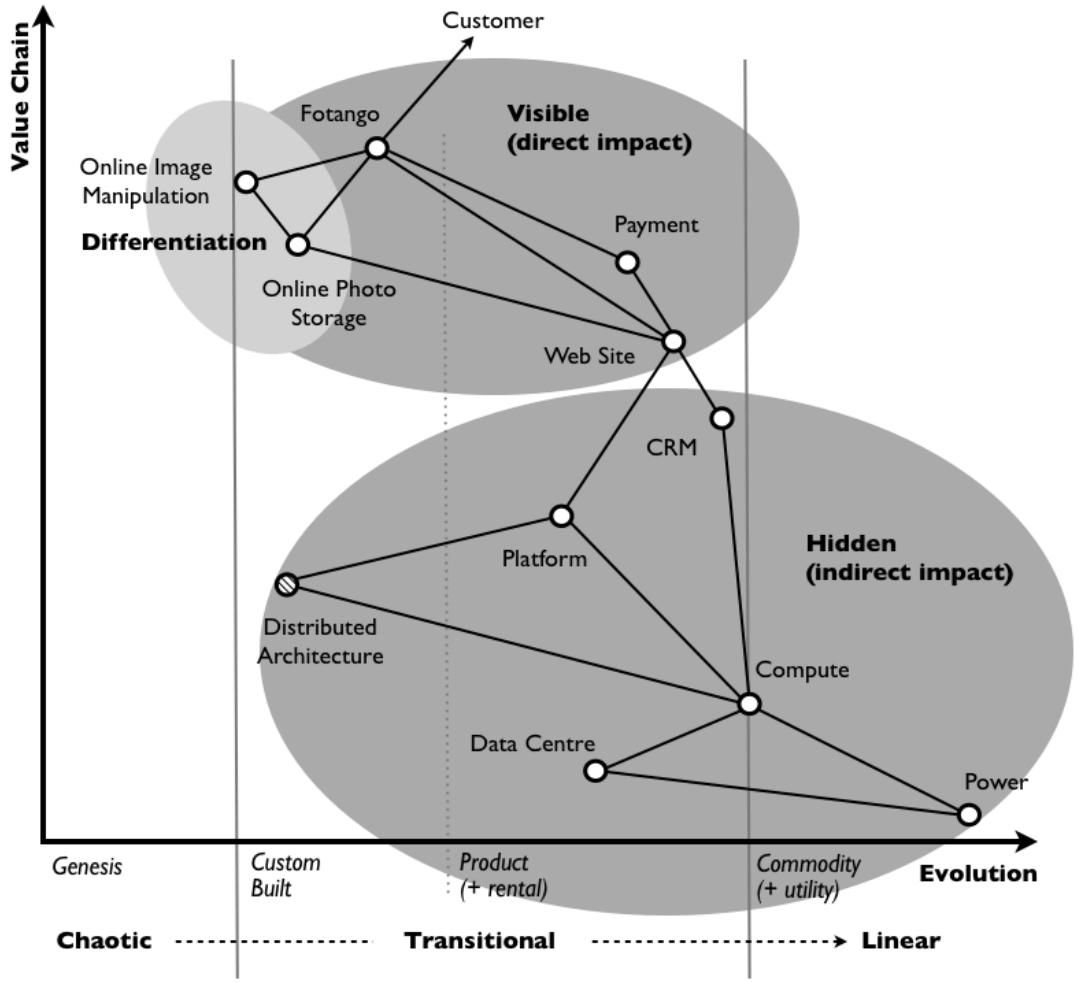
However, the photo storage system (designed specifically for resizing and storage of images to useful photo sizes) and the image manipulation system (for removal of red-eye, filtering and various digital effects) whilst not unique were uncommon enough that they could be considered as differentiators with many competitors.

These differentiating photo storage and image manipulation activities were more chaotic (scarce, poorly understood, deviating from what existed before) and had to be so because if they were common and well understood then they would not be differentiators. It is always the more chaotic activities (and

practices) that directly differentiate competitors in terms of what they provide.

However those less visible, lower order (i.e. further down the value chain) and more linear components such as compute resources still have an impact but in this case it is indirect. Take two competitors with identical value chains and service offerings. If one competitor had a much higher cost of provision of a lower order components such as compute then this is likely to manifest itself in the price of the overall offering. Hence there is an indirect impact of these less visible (to the consumer) components from cost to reliability. This distinction between direct and indirect impacts on the offering is shown in figure 10.

Figure 10 – Value Chain, Visibility and Offering



From the supplier perspective (i.e. Fotango) then all the components of the value chain are visible. The consumer might be concerned about the offering, how it is differentiated from competitors, its cost and reliability but the supplier is concerned with all the components that create this effect (e.g. what supplier chooses to use to provide compute resource).

From the supplier's perspective, the more linear activities are a necessary cost of doing business (e.g. computer resource or electricity) assuming they are not some form of wasted effort related to a bygone age which should be eliminated (e.g. provision of teletyping services). The focus has to be on operational efficiency. Any inefficiency or waste will impact the company's ability to compete on price and therefore to survive in today's market.

Those more chaotic activities (e.g. image manipulation) that are potential differentiators influence the value that the consumer will place on the service in comparison to competitors. Any inability to effectively manage and create those components would limit the ability to differentiate. The offering would be seen to lag behind the market and hence survival tomorrow is compromised.

Any supplier therefore has to strive to be more efficient with those linear, cost of doing business activities whilst simultaneously differentiate with those more chaotic activities. The supplier has to be both efficient and "innovative".

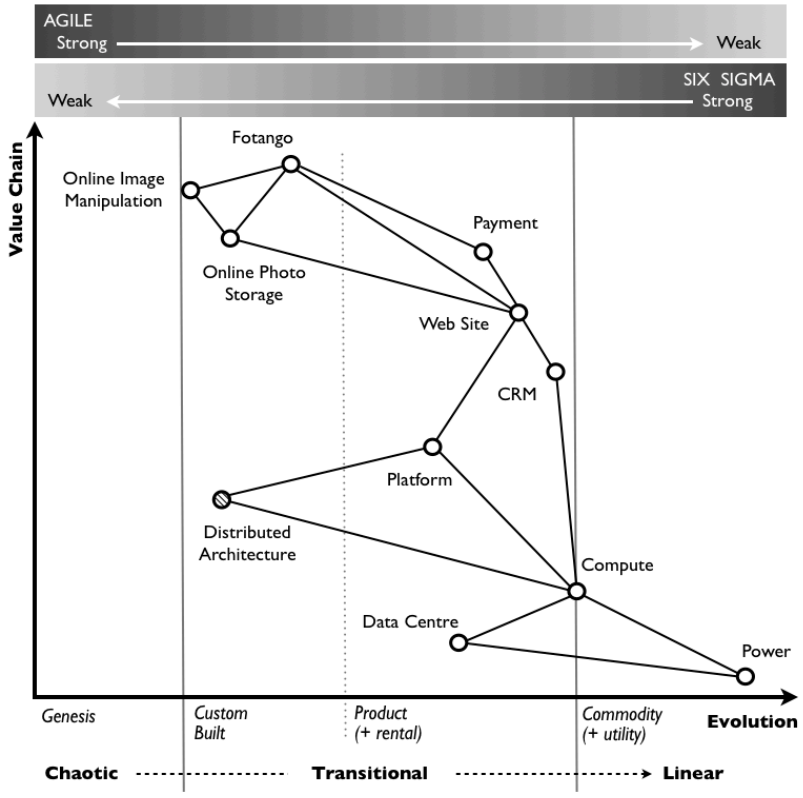
The fiendish part comes into play when you think about how do you manage this spectrum from chaotic to linear. For example, take the online image manipulation system that Fotango created. Being a new concept for which few other examples existed, it was constantly changing, deviating from the past and experimentation was the order of the day. Any management technique had to allow for this and hence a project management

technique such as Agile development was most suited.

Conversely, if you take the implementation of Fotango's customer relationship management system (CRM), then this was in a more linear phase. It was more commonplace, many companies had done this and the concepts behind CRM were well understood. In this case a more structured technique that attempts to eliminate deviation and repeat past success is desirable. Candidate techniques would be Six Sigma or Prince 2.

The polar opposite characteristics of chaotic and linear means different techniques should be used. A technique that attempts to eliminate deviation (such as Six Sigma) will never be as effective as one that enables change (such as Agile) for an activity in the chaotic phase and the reverse is true for the linear phase (see figure 11)

Figure 11 – Management Techniques and Evolution



Hence in order to survive today (by being operationally efficient) and to survive tomorrow (by creating enough differentiation through novel activities) then polar opposite techniques are required. This is the cause of the Salamon and Storey Innovation paradox that was mentioned earlier.

Unfortunately, we have a tendency in management towards a one size fits all solution. If we find that Agile development is successful in some quarters (such as an image manipulation project), we assume it is suitable for all (such as installing a CRM system). This pursuit of the one size fits all causes endless debates in industry of the form Agile vs Six Sigma when the solution is always both.

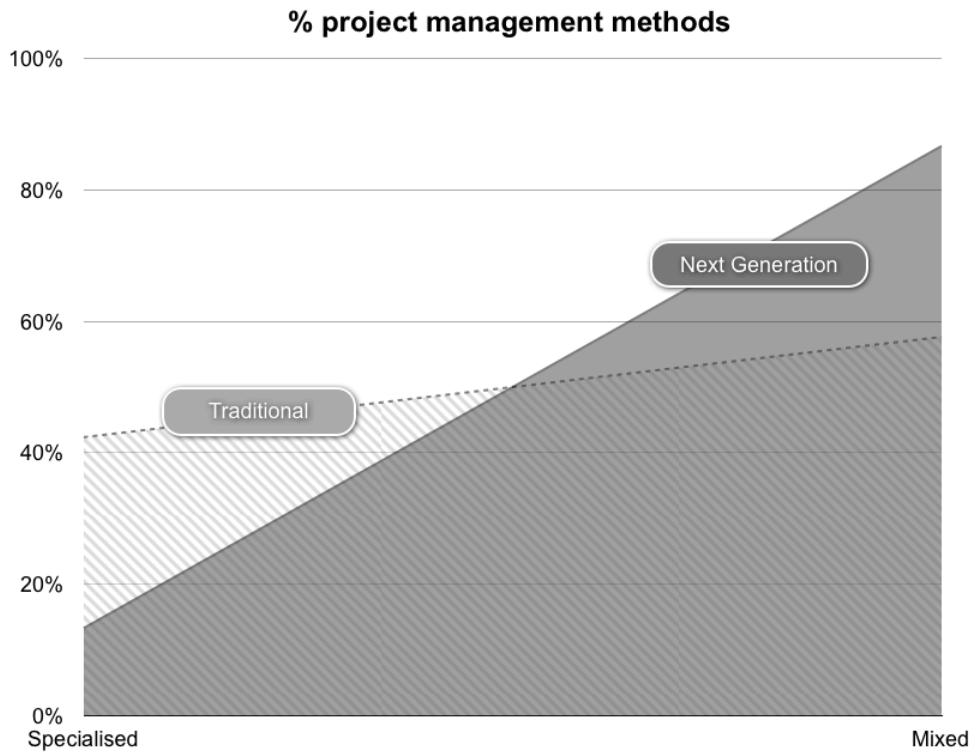
This problem of changing techniques is only compounded by activities themselves not remaining static but evolving. Hence a technique that was once suitable for a specific activity at some point in the past may not be so today. For example, if we roll the clock back on CRM there was a point when it was not commonplace, not well understood and provided more through custom built systems. In those past days, an Agile approach would have been more suitable for CRM unlike today where a more structured method is required.

There is a reason why we probably tend towards this belief of one size fits all, it's our desire for simplicity. Ashby's Law of Requisite Variety (a staple diet of those interested in cybernetics) describes how a management system needs to have as much variability as the system being controlled in order to be effective. There are two solutions to this problem, either you enable the management system to be complex (using multiple techniques depending upon what you're dealing with) or you pretend that what is being managed is simple (i.e. one size does fit all). Our desire for uniformity points to our tendency to do the latter.

Fortunately competition is our saving grace. Whilst adopting one-size fits all approach will negatively impact either efficiency or "innovation", the impact is nullified if our competitors make the same mistake. The disadvantage only becomes clear when a competitor uses multiple techniques and becomes effective at both extremes. The above was one of those general lessons that we learned in the software industry almost a decade ago. With Fotango, we had undergone the typical yo-yo from highly structured methods to more agile techniques in 2002 and the realization that both were needed by around 2004.

Though debates of the Agile vs Six Sigma still occur, most companies have learned to apply both. In a survey of over 100 companies undertaking in 2011[10], only the most traditional companies have a tendency to single techniques (see figure 12).

Figure 12 – Single or Multiple methods by company type.



[10] LEF survey on Learning from Web 2.0, undertaken 2011.

Over 85% of Next Generation companies (the leading edge of what are commonly called the web 2.0) use multiple methods i.e. they were neither Agile nor Six Sigma but both.

In the above section, I have mainly talked about software activities, similar one size fits all approaches can be found throughout other functions of the organization. This is despite each function (whether HR, Finance, Marketing or Operations) containing a mass of evolving activities.

Before we leave this section, it is worth reiterating some of the main points.

1. Organisations can be described as a set of value chains that contain multiple component activities and practices.

2. Those component activities are evolving from genesis to commodity and this is driven by competition (both consumer and supplier).

3. As those component activities evolve their characteristics change from more chaotic to more linear.

4. The techniques needed to manage an activity vary as those characteristics change which is why one size never fits all.

5. Failing to manage those components effectively can impact our chance of survival today (due to cost inefficiencies) or survival tomorrow (due to lack of differentiation).

Of Perils & Alignment

So far we've examined the concept of a business map based upon examining value chain and evolution combined with how characteristics and techniques change as components of that map evolve. Before exploring some of the wider impacts of this and how to exploit the map to create an advantage, I'd like to take the reader on a short detour to explain some common phenomenon we see in today's business.

The two issues I wish to examine before getting us back on track are the perils of outsourcing and the issue of business alignment.

The perils of outsourcing

Outsourcing is a global practice that is often disparaged in the popular press due to associations with excessive costs and failure. The problems are generally not with outsourcing per se but instead with what is outsourced.

The concept of outsourcing is based upon a premise that no organisation is entirely self-sufficient nor does any have unlimited resources and some work can be conducted by others at a lower cost. The organizational focus should not therefore be on the pursuit of capabilities that third parties have the skills and technology to better deliver with economies of scale.

This practice is common in all industries; the machine manufacturer doesn't have to make its own nuts and bolts and can instead buy those from a supplier. Anyway, that is the theory but what about the practice?

A case study research project undertaken by Lacity[11] which examined data on the success rates of IT based outsourcing projects showed that only 50% of respondents rated their outsourced IT projects as satisfactory or better whilst other

[11] Lacity, M. C. & Willcocks, L. P., 2009. Information Systems and Outsourcing: Studies in Theory and Practice, Macmillan.

studies have shown that only 5% of organisations have achieved the high level benefits from outsourcing IT projects that they expected.

These failures are not just an IT phenomenon, the manufacturing industry has several high profile cases where outsourcing component manufacture has led to excessive costs and delays. Boeing's 787 Dreamliner is an often-quoted example.

So what is going wrong, the premise seemed sound enough?

In IT, it is not uncommon to treat entire projects as single things. For example, we will take the Fotango value chain and imagine that we had decided to outsource the development and maintenance of Fotango to a third party on the assumption that the entire Fotango system was a single thing and someone else could provide it with economies of scale.

Being a consumer of these outsourced services, we'd want to ensure that we're getting value for money and the features we require are delivered when they are expected. Hence the process of outsourcing often requires a well-defined contract for delivery based upon our desire for certainty i.e. we're getting what we expect and paid for.

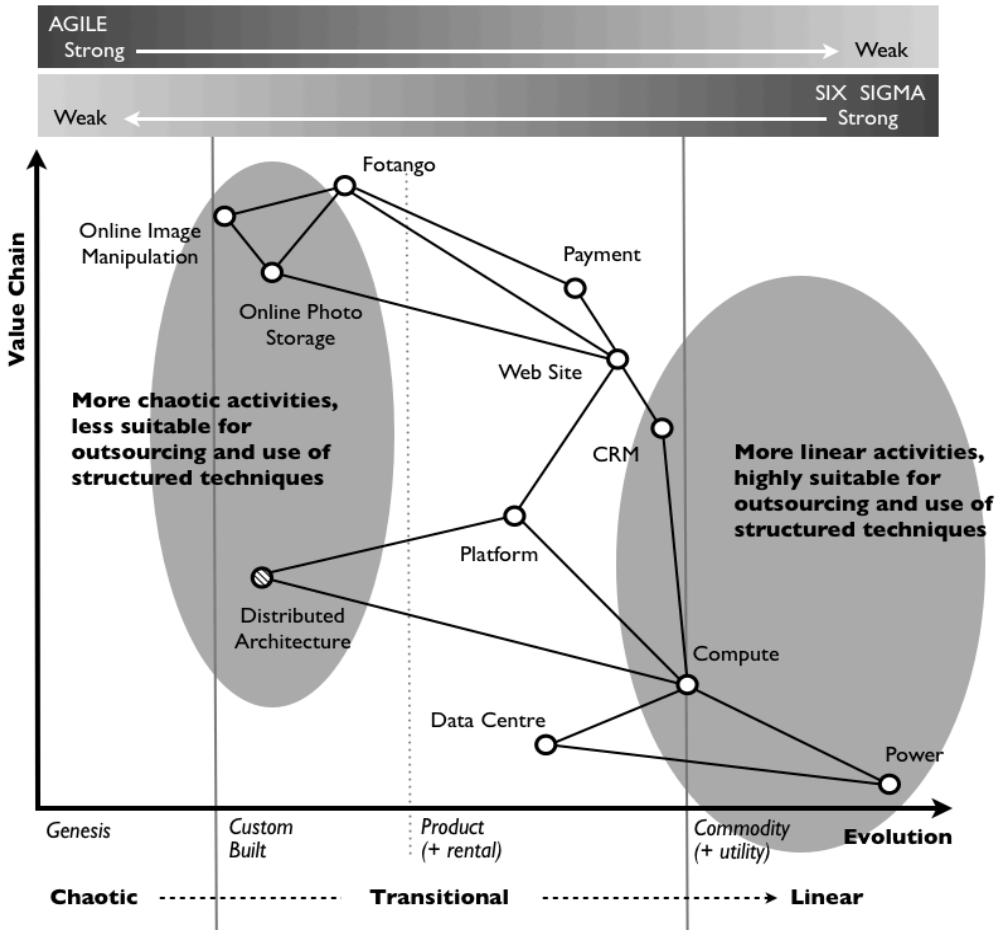
As a result both parties will tend to treat the entire system as more linear and hence structured techniques are often applied with formal specifications and change control processes designed to minimize change. However, looking at the Fotango system through the lens of value chain vs evolution, we can see that whilst some components are linear (e.g. compute resource, installation of a CRM system), other components are clearly not (e.g. image manipulation system).

The more chaotic components will inevitably change due to their uncertain nature. But the overall governing technique is designed

to minimize change and hence our chaotic activities will incur associated and often excessive change control costs. In a review of various studies over the last decade, the most common causes of "outsourcing" failure have been cited as buyer's unclear requirements, changing specifications and excessive costs – all are symptoms of this problem.

It's the very act of treating large-scale systems as one thing that tends to set up this unfavorable situation whereby the more linear activities are treated effectively but the more chaotic activities cause excessive costs due to change. In any resultant disagreement, the third party can also demonstrate this by showing that the costs were incurred due to client's changing of the specification but in reality those more chaotic activities were always going to change (see figure 13).

Figure 13 – Outsourcing, value chain and evolution



A better approach would have been to subdivide the large-scale project into its components and outsource those more linear components.

In today's world, this is in effect happening with well defined and common components such as compute resource being "outsourced" to utility providers of compute (known as IaaS – infrastructure as a service). Equivalently, well-defined and common systems (such as CRM) are "outsourced" to more utility providers through software as a service.

The more chaotic activities offer no opportunity for efficiencies through volume operations because of their uncertain and changing nature and hence they are best treated on a more agile basis with either an in-house development team.

The reader should note, that outsourcing itself is not an inherently ineffective way of treating IT, on the contrary it can be highly effective. However, it's important to outsource those more linear components that are suitable for outsourcing.

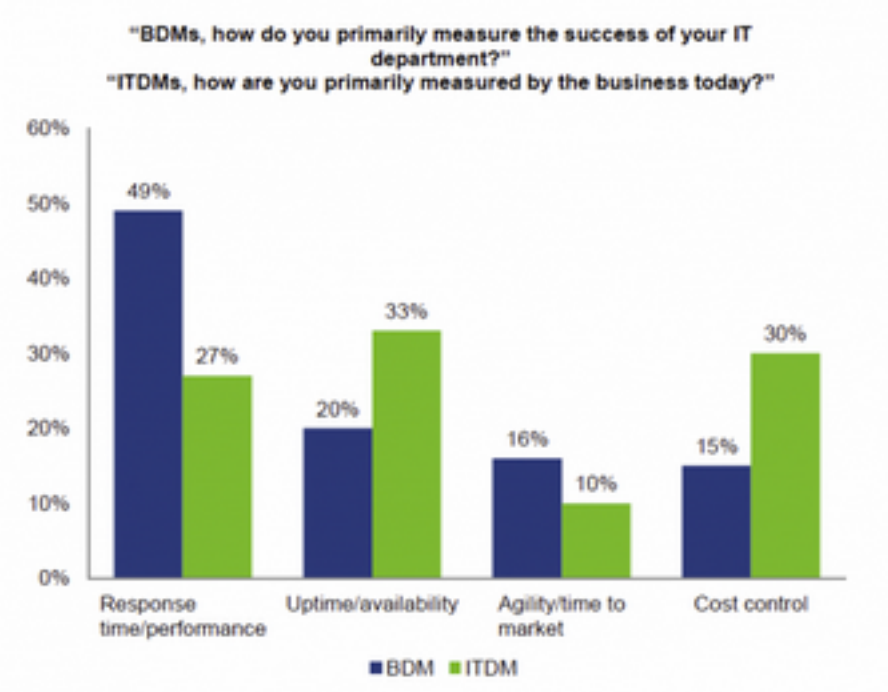
On Business Alignment.

One of the more popular questions in management articles is how to maintain alignment between IT and the business and other functions of the organization such as marketing or finance. IT departments are frequently described as being "too slow" or "not innovative enough" or "unreliable and inefficient".

In a recent Forrester study[12], not only were IT departments found to be considered too slow for the business but a distinction existed on what each group thought the other was measured on (see figure 14)

[12] Forrester, IT Department too slow for business, Jan 2013.

Figure 14 – IT and Business Development views on measurement.

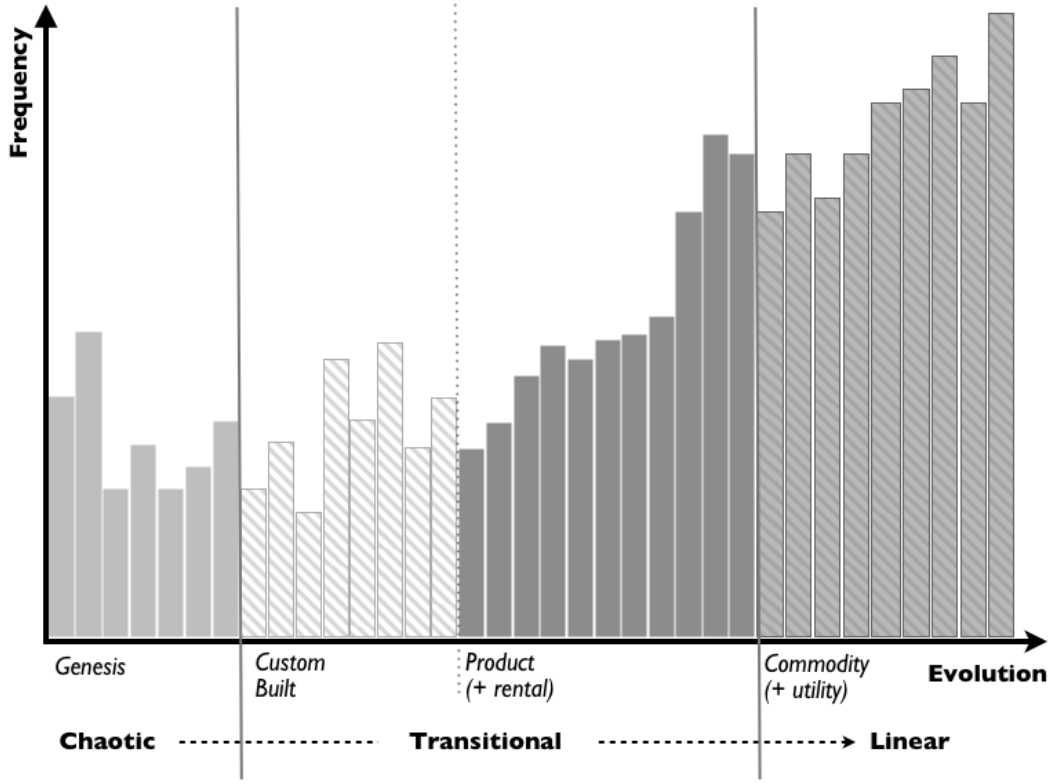


The problem again appears to stem from a lack of understanding of evolution and the resultant way we treat activities. Consider any reasonably sized company with various value chains consisting of hundreds of component activities. The component activities will all be evolving and so the organization is best viewed through the lens of a profile i.e a plot of the frequency of activities at various stages of evolution (see figure 14).

Now, I will return to profile later in the book to describe industry differences but for the time being let us consider how we organize these component activities. We tend to organize by **type** i.e. we group components based upon what function they fit most nearly into whether IT, Finance or Marketing.

As a result we create siloed departments each having a profile i.e. containing a spectrum of activities with characteristics varying from more chaotic to more linear.

Figure 14 – Profile of an Organization



Typically, IT provides components that are consumed by other groups whether compute resources for a Marketing micro site or a Financial reporting system.

Now, as activities evolve, new activities appear and this change happens at different rates in different industries. In one year, Finance is all the rage for new and innovative concepts such as credit default options. In another year, it's Marketing and social media. Hence not only do profiles change over time but the balance between chaotic and linear changes and varies between departments.

Recently the focus has been on marketing innovation with social media, sentiment analysis and large-scale analytics whereas the Financial and Operational focus is more on cost, reliability and repeatability. Over a decade ago, a quite different focus existed with an emphasis on Financial and Operational innovation through process re-engineering and the introduction of global

ERP whereas Marketing was slanted towards regular, reliable activities such as large scale email broadcasting and newsletters.

Since a tendency towards a one size fits all approach exists, then these consuming departments will lurch from an emphasis on innovation to efficiency and back again. For a group such as IT which is serving multiple departments then it will constantly be pulled in both directions and it will always be out of alignment with one group i.e. “too slow” or “unreliable and inefficient”.

Hence today, IT is pulled towards cost control and reliability by the Finance group and towards innovation and rapid change by Marketing and Business development. The issue of alignment is an artifact of the way we organize ourselves (i.e. grouping by type) and the interaction of this structure with the constant evolution of activities and our predisposition to one size fits all.

There are solutions to both problems but for the time being it is enough for the reader to recognize that the perils of outsourcing and alignment issues have a common cause – the inability of the organization to deal with the impacts of evolution.

Neither symptom can be alleviated without first dealing with this cause.

Chapter 4

No reason to get excited

Everything Evolves

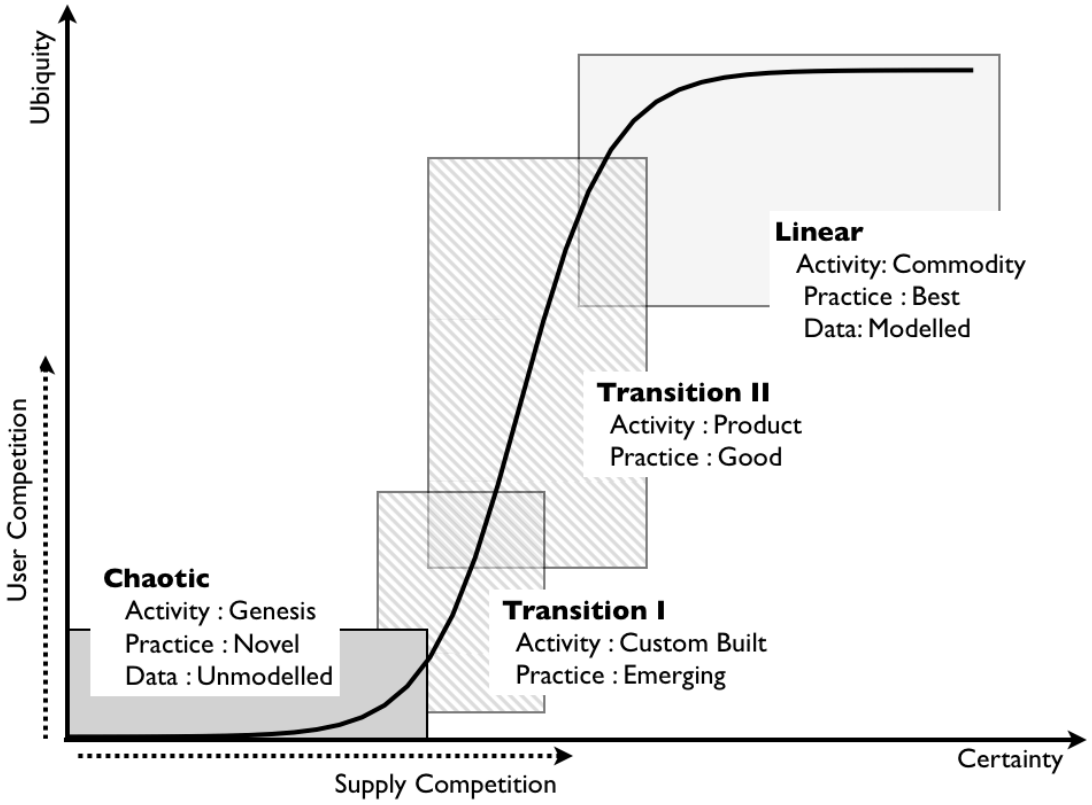
In the previous sections, I've mainly concentrated on the evolution of activities in the value chain. However, value chains consist of more than this as they also include practices and data.

It turns out, that everything evolves. By everything, I mean: -

- Every activity (**what we do**)
- Every practice (**how we do something**)
- Every mental model (**how we make sense of it**)

All appear to evolve from chaotic (**poorly understood, rare**) to more linear (**well understood, commonplace**) and the data I collected back in 2006 mapped all three to the same pattern (see figure 15).

Figure 15 – Evolution of Activities, Practices and Data



Hence: -

For **activities** we have the evolution from genesis to custom-built examples to products (with rental services) to commodity (with utility services). We normally refer to this as **commoditisation**.

For **practices** we have the evolution from novel to emerging to good to best practice.

For **data** we have the evolution from **un-modelled** (e.g. we don't know what the structure is) to **modelled** (i.e. the data and its structure is understood). Even with **scientific pursuits** we have an equivalent evolution from concept to hypothesis to theory to law.

It's important to emphasis that the process of evolution is **common to all** and can be graphed over the axis of ubiquity vs certainty. The process is also unavoidable because it is driven by consumer and supply competition i.e. a single actor (e.g. a company) cannot prevent it from happening as it is results from the interaction of all actors in a market.

Around 2009, I was also introduced to Dave Snowden's Cynefin[13] framework that describes the transition of practices from novel to emergent to good to best practice. The similarity in pattern appeared so close that I've adopted these four classifications rather than my original terms. Snowden's recent and independent work also appears to be converging on similar axis (see figure 16) and structure.

For example, he discusses

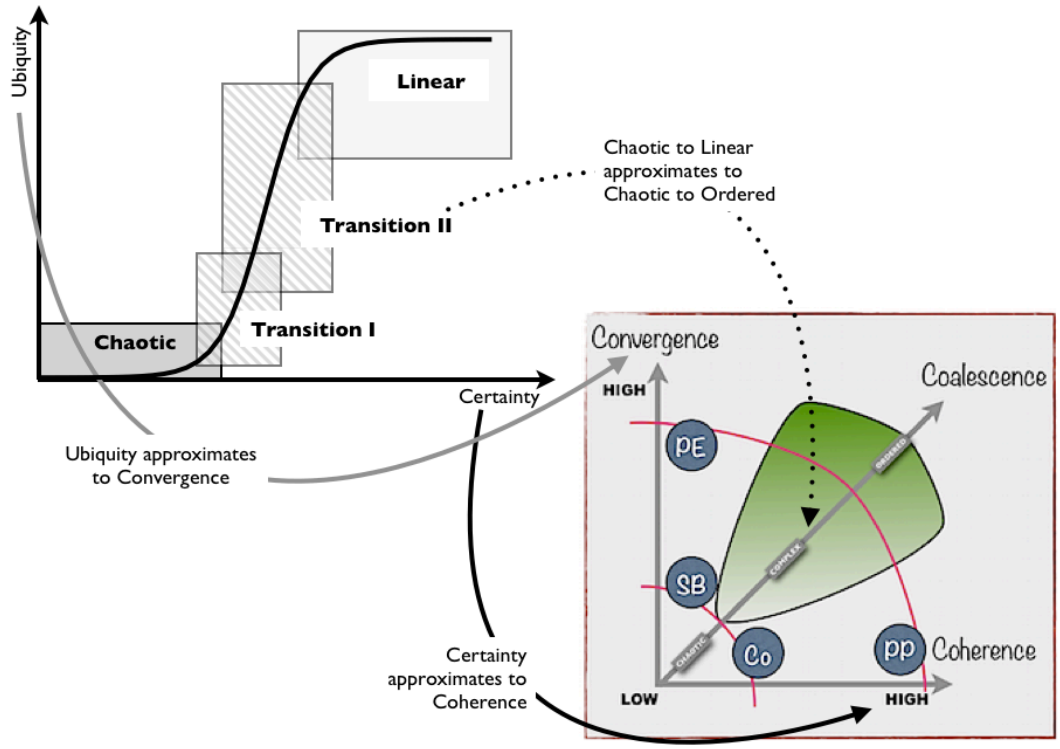
- The shift from chaotic to ordered which is akin to the shift from chaotic to linear.

[13] Dave Snowden, 'Cynefin, A Sense of Time and Place: An Ecological Approach to Sense Making and Learning in Formal and Informal Communities', *Conference Proceedings of KMAC at the University of Aston*, 2000

- **Convergence** in terms of overall group thinking which is similar to **ubiquity** or how commonplace something is.

- **Coherence** in terms of the degree to which any need or requirement is structured, defined and understood which is similar to **certainty**.

Figure 16 – From Chaotic to Complex to Ordered



Whether these two pieces of work will continue to converge is of great interest to me, because cause, correlation and data is one thing but nothing validates work more than independent discovery of common patterns. Which leads me neatly onto my next topic.

Independence and Co-Evolution

Consider the provision of an ordinary window. While a window is a standardized building commodity, the practices used to

manufacture them have evolved dramatically from blast furnace and grinding to Pilkington's float glass method. In other words, the way we make windows (the *practice*) has evolved but the window (the result of *activity*) remains roughly the same. Here we have independence in the evolution of practice and activity.

However, in many cases as the activity evolves then the associated practices tend to co-evolve. For example, consider computing infrastructure. When infrastructure was primarily a product, novel architectural practices appeared for capacity planning which relied mostly on the use of more powerful machines ('scale-up'). For system resilience we also had novel architectural practices that heavily relied on 'n+1' designs. Theses architectural practices were based primarily on better products (i.e. hardware) and they diffused and evolved becoming emerging, then good then best practice for the product world.

However as the activity of computing infrastructure itself evolved becoming more of a commodity that is these days provided through utility services (such as Amazon EC2) then novel architectural practices appeared based not upon hardware but on software.

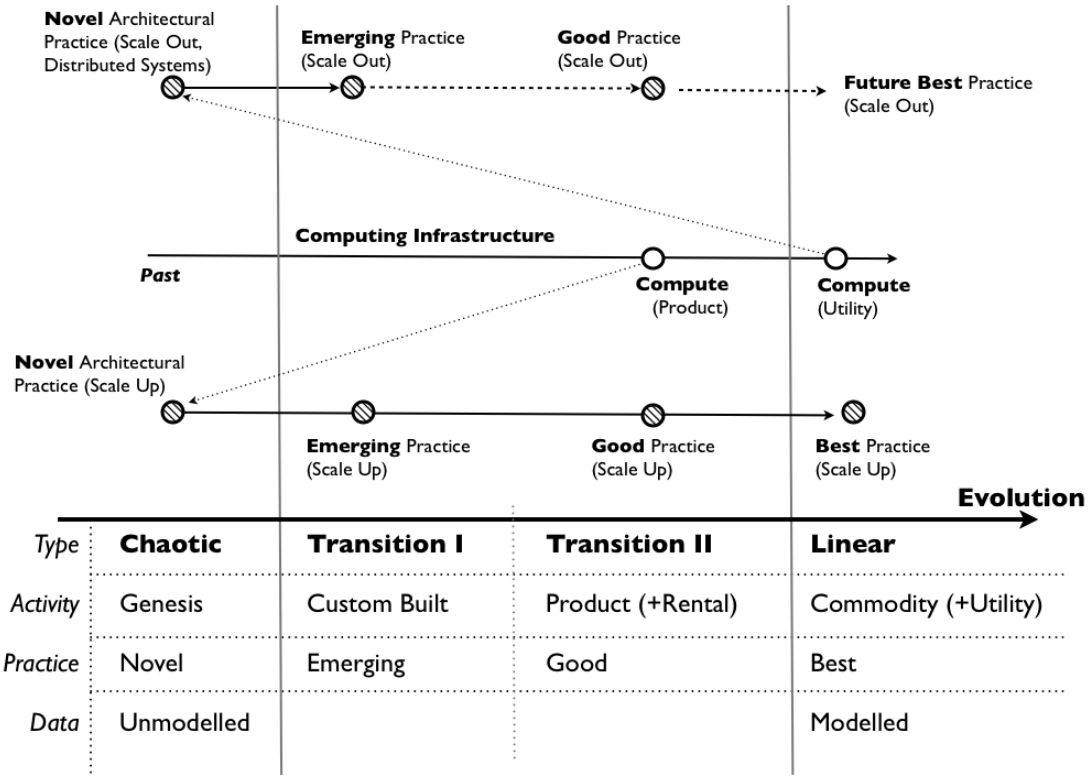
For capacity planning we now had the novel practice of 'scale-out' i.e. the use of large numbers of small and good enough virtual machines. This practice started to diffuse and evolve becoming emerging and then good practice for the utility world. For resilience, we also had the novel practice of design for failure[14] that started to diffuse and evolve becoming emerging and then good practice.

Hence, as infrastructure has evolved, the practices of infrastructure management have also evolved. This inter-

[14] Simone Brunozzi, *Architecting for the Cloud: Demo and Best Practices*, Slideshare presentation, AWS Tour Australia 2011

relationship of practice and activity is shown in Figure 17.

Figure 17 Co-evolution of Practice and Activity.



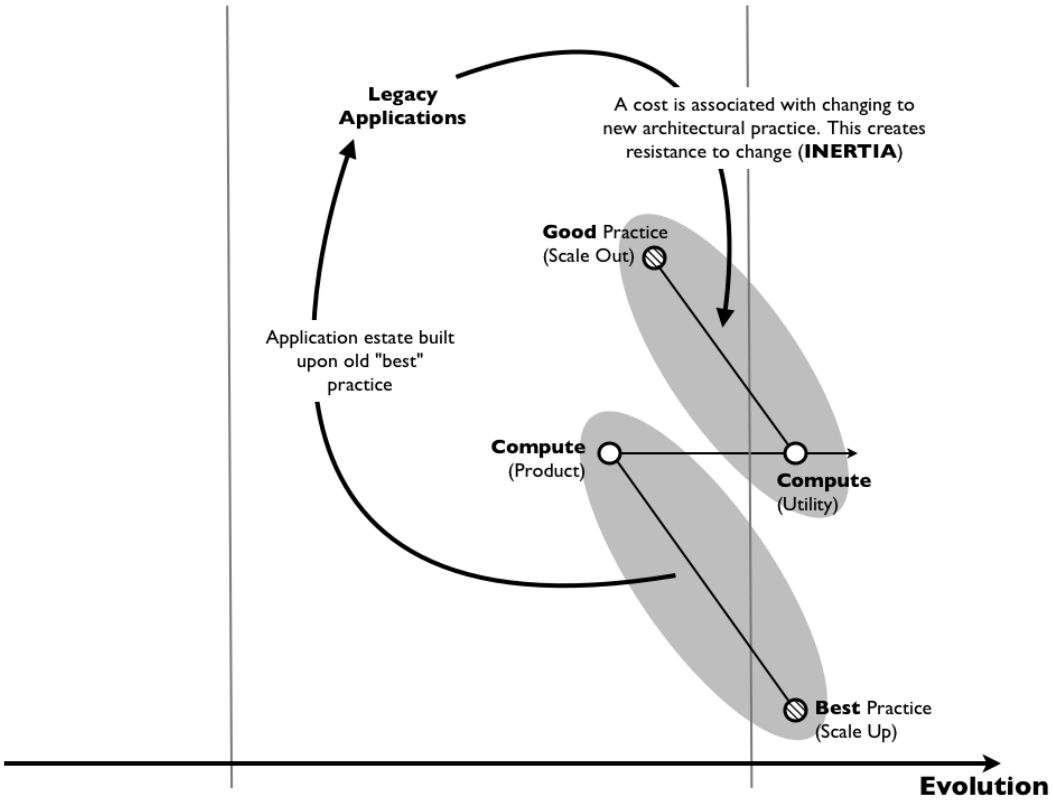
This co-evolution of practice and activity can create significant inertia to change for consumers of the activity. In the case of infrastructure, if the consumers of large powerful servers had developed estates of applications based upon the practices of scale-up and N+1, then as the activity evolved to more utility services those consumers would incur significant costs of re-architecture of the "legacy estate" to the new utility world.

Our current way of operating often creates resistance (or inertia) to change due to the costs of changing practices (see figure 18). In many cases we attempt to circumnavigate this by applying the "old" best practice to the new world or we attempt to persuade the new world to act more like the past.

Today, cloud computing is an example of this as it represents an evolution of parts of IT from product to utility services and the

“legacy” is often cited as a key problem for adoption or for the creation of “enterprise grade” services which mimic past models.

Figure 18 Inertia due to co-evolution of Practice with Activity.



By now, the reader should have some appreciation that

- Organisations can be described through value chains of activities, practices and data.
- All the components of that value chain are evolving and sometimes co-evolving.
- Plotting value chain vs the state of evolution can create a map of this landscape.
- As those components evolve their characteristics change which is why one size fits all techniques are ineffective.

- Our inability to see and to deal with evolution causes common problems such as the perils of outsourcing and business alignment

- The co-evolution of practice with an activity can create resistance (i.e. inertia) to change due to the costs associated with it.

In comfort to the reader, I will now tell you that we are slowly getting to the good stuff and all of this is necessary to understand it. But before we do, we have a few more hurdles, as we need to explore the relationship between genesis and evolution along with macro and micro economic effects.

Evolution begets Genesis begets Evolution

I've talked about the genesis of activities (i.e. new things) and how they evolve to become more of a commodity but does any relationship exist between the two? The answer is yes.

Componentisation

In the Theory of Hierarchy, Herbert Simon showed how the creation of a system is dependent upon the organisation of its subsystems. As an activity becomes commoditised and provided as ever more standardised components, it not only allows for increasing speed of implementation but also rapid change, diversity and agility of systems that are built upon it.

In other words, it's faster to build a house with commodity components such as bricks, wooden planks and plastic pipes than it is to start from first principles with a clay pit, a clump of trees and an oil well.

Bricks, planks and pipes along with other architectural building blocks have led to a faster rate of house building and a wider diversity of housing shapes. This is the same with electronics and every other field you care to look at. Commoditisation to standard components leads to increased agility, diversity and speed of creation for higher order systems that are built with it.

This doesn't mean that change stops with the standard components. Take for example, brick making or electricity provision or the manufacture of windows, there is a still significant amount of improvement hidden behind the *"standard"*.

However the *"standard"* acts as an abstraction layer to this. Just because my electricity supplier has introduced new sources of power generation (*wind turbine, geothermal etc*) doesn't mean I wake up one morning to find that we're moving from 240V 50Hz to something else.

If that constant operational improvement in electricity generation were not abstracted behind the standard then all the consumer electronics built upon it would need to continuously change as operational improvements were made. The entire system would either collapse in a mess or at the very least technological progress would be hampered.

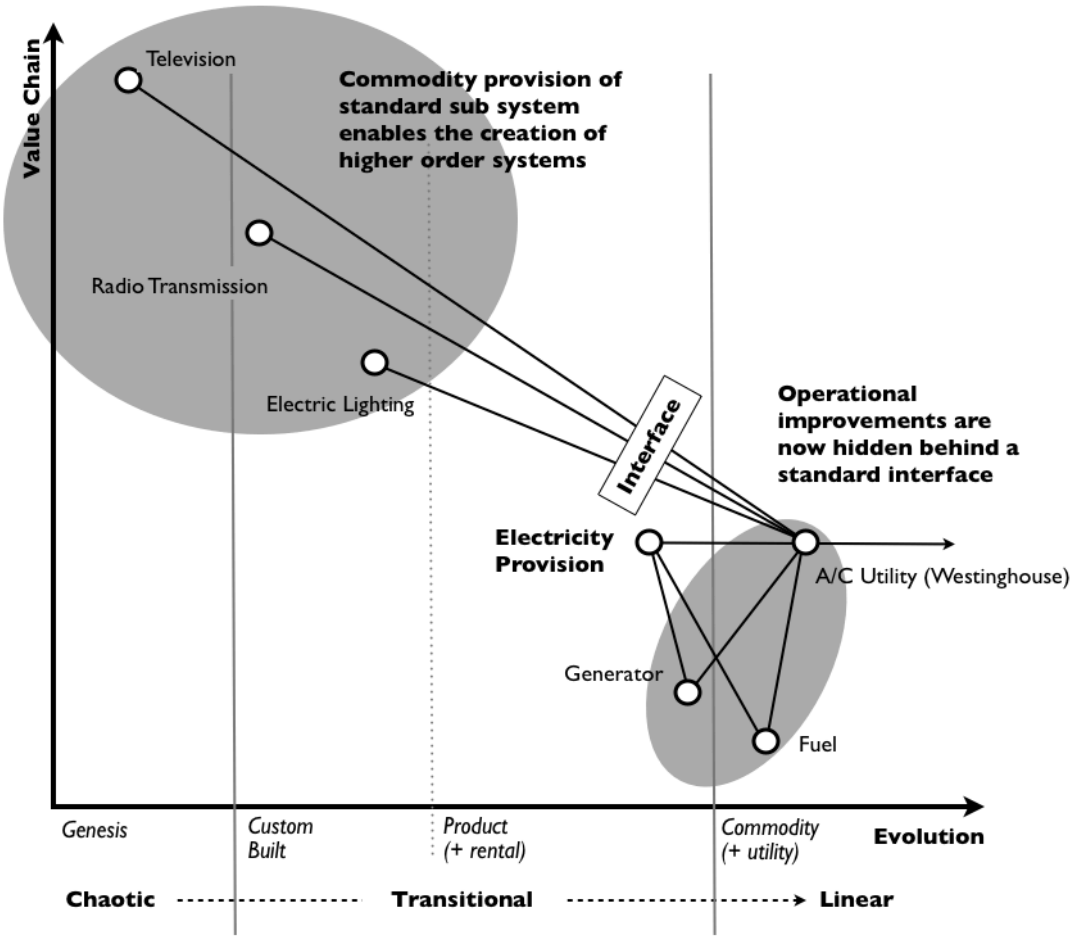
Now as an activity evolves to a more standard, good enough commodity then to a consumer all this improvement is normally hidden behind the interface. Any changes are ultimately reflected in a better price or quality of service but the activity itself for all sense of purpose will remain as is e.g. a standard but cheaper brick or power supply or wooden plank.

There are exceptions to this but it usually involves significant upheaval due to all the higher order systems that need to change and hence Government involvement is usually required e.g. changing electricity standards, decimalisation and the changing of currency or even simply switching from analogue to digital transmission of TV.

Hence, activities evolve to more of a linear commodity and those that become components act as an interface boundary between the higher order systems that consume them and operational improvements that happen to the activity. Change to the interface can happen but it's costly (see figure 19).

This is no different with biology. The rapid growth and diversity of life is a function of the underlying standard building blocks that have evolved to allow higher orders of complexity. If there weren't underlying components from DNA to RNA messaging to transcription to translation to even basic cell structures within more complex organisms then you and I would never have appeared in the time frame. Those building blocks also provide a standard interface, a separation from the evolution of higher orders to evolutionary improvements of lower orders.

Figure 19 Componentisation



Obviously not everything becomes a component of something else but IT systems often are and IT is no exception to the effects of commoditisation and componentisation. The cloud represents the evolution of many IT activities from product to utility services (**commoditisation**) and through provision of good enough, standard components it is causing a rapid rate of development of higher order systems and activities (**componentisation**).

This isn't the only effect, there are others.

Volume Effects

In an earlier section, I mentioned Jin Chen's Entropy Theory of Value and how as activities evolve to more of a commodity they

have declining unit value assuming no effects such as monopolies. The total value tends to be highest during the transitional (i.e. product) phase.

This can often be misconstrued as meaning that when something becomes more of a commodity then total revenue declines. This is not the case because of volume effects.

In the 1850s, William Stanley Jevons observed *"England's consumption of coal soared after James Watt introduced his coal-fired steam engine, which greatly improved the efficiency of Thomas Newcomen's earlier design"*

In other words by increasing the efficiency and hence reducing the cost for provision of an activity (in this case steam power), a large number of new activities which might have once not been economically feasible became economically feasible. This led to an increase in the consumption of the underlying subsystem i.e. coal.

In general, as an activity becomes more of a commodity it can increase in total volume of units produced through a number of routes, including: -

a) There existed an unmet demand for the activity in the market that a lower cost enabled e.g. general price elasticity.

b) As it becomes a standard component it enables the rapid generation of new higher order activities (and industries) that consume the component e.g. transistors giving rise to calculators, computers and a wide variety of electronic devices which all consume transistors.

c) A lower cost of providing or a more efficient use of a component activity enables new consuming activities to

become economically feasible e.g. more efficient steam engines cause more coal consumption.

These volume effects above can also be recursive throughout the value chain e.g. evolution of a higher order system to a standard component of other more higher order systems will also lead to increased consumption of any lower order system.

For example, in 1947 Raytheon introduced the first commercially available microwave oven (the "Radarange") at an equivalent price today in excess of $50K. As the microwave became more of a commodity and also integrated into other components - today, microwaves are a common component of modern - this has caused a growth in consumption of underlying subsystems from power to microwave generators.

Commoditisation also creates and is affected by the **co-evolution** of higher order activities through componentisation. As an activity becomes a component within another activity, then the growth of the latter can drive commoditisation of the former. An example of this can be seen in the evolution of the electronic switch.

The first electronic switches we considered marvels and became the basis of many novel machines. Switching however evolved from Flemming's valve to complex products containing multiple switches e.g. the Intel 4004 which contained 2,300 electronic switches. These devices enabled the growth of new industries *(e.g. digital calculators, digital computers)* based upon these components that provided more commoditized switching.

These new industries in turn drove the demand for more switching and hence further commoditisation of switching. As a consequence industry created ever more powerful components (*now containing millions of switches*) and these in turn enabled further industries (*e.g.* the personal computer, *the mobile*

phone) which then drove the demand for even more switching. Today, the once marvel of the electronic switch can be found In its billions in the average CPU which are built in volumes of billions themselves.

When we examine the last forty years of computing infrastructure then as it became more standardised and lower cost per unit (measured in price per transistor) rather than seeing a decline in revenue we have seen a growth in volume and new activities to offset any efficiency gains. Hence today, even though I can buy a million times more compute resource for a $1,000 than in the 1980s, this does not mean that IT budgets have reduced a million fold in that time. In fact, we've just ended up doing vastly more stuff that consumed more and more compute resources.

Hence whilst the differential value of computing infrastructure (and underlying components like the electronic switch) has declined to almost nothing, the volume of consumption has massively increased and the revenue (i.e. total IT budgets) associated with it remains reasonably constant.

To emphasize this point, let's look at something relatively new - the iPad. The average consumer has no or little knowledge of the vast number of components that make up an iPad. Any differential value is associated with the device itself whereas the components are all, more or less, invisible.

Even the most ardent Apple watcher would be hard pressed to describe the 39 screws (of various standard types) in the iPad 2, nor which of those 39 are common with the iPad mini or alternative tablets such as the Samsung Galaxy Tab 10.1.

There are however multiple manufacturers of these screws and the rapid increase in the volume of tablets whilst resulting in price pressures on component costs has increased the volume of

components and associated revenues both directly and though secondary markets such as Alibaba.com. There might not be a lot of differential value in small screws but there's quite a bit of volume and revenue. It's the same with electronic switching.

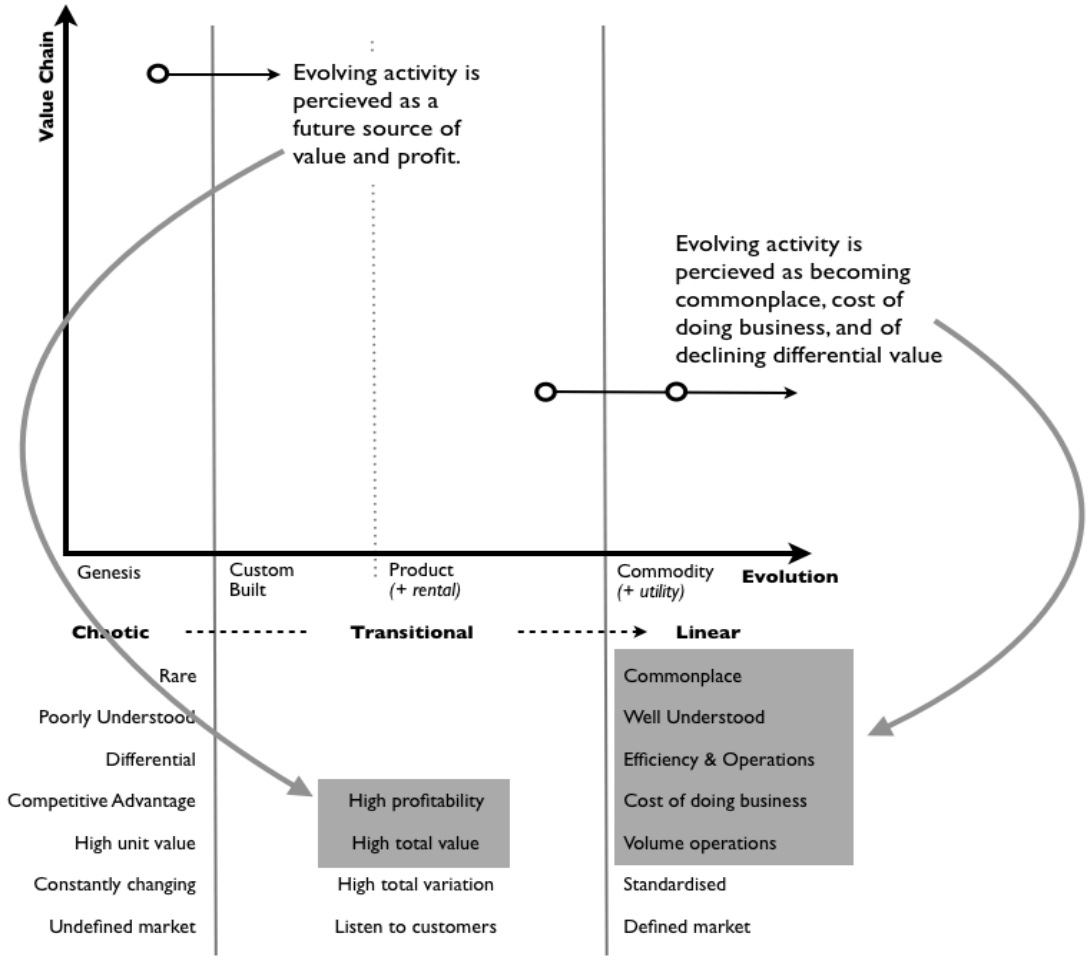
Componentisation and co-evolution can be powerful forces for the creation of new industries and increasing volume in lower order systems. In general, commoditization of activities to component subsystems of other activities can led to rapid increases in volume which can offset any decline in revenue per unit despite the actual component activity having little or no differential value.

One final impact that the declining differential value caused by commoditisation has, involves the flight of capital known as creative destruction.

Creative Destruction

Capital tends to chase perceived value i.e. those activities that are associated with future value and future high margins. Hence looking at our change of characteristics from chaotic to linear, it is those relatively new activities that are starting to spread and are evolving into the transitional phase that will tend to be considered high future value unlike pre-existing activities that are becoming more of a commodity (see figure 20).

Figure 20 – Perceived Value and Evolution



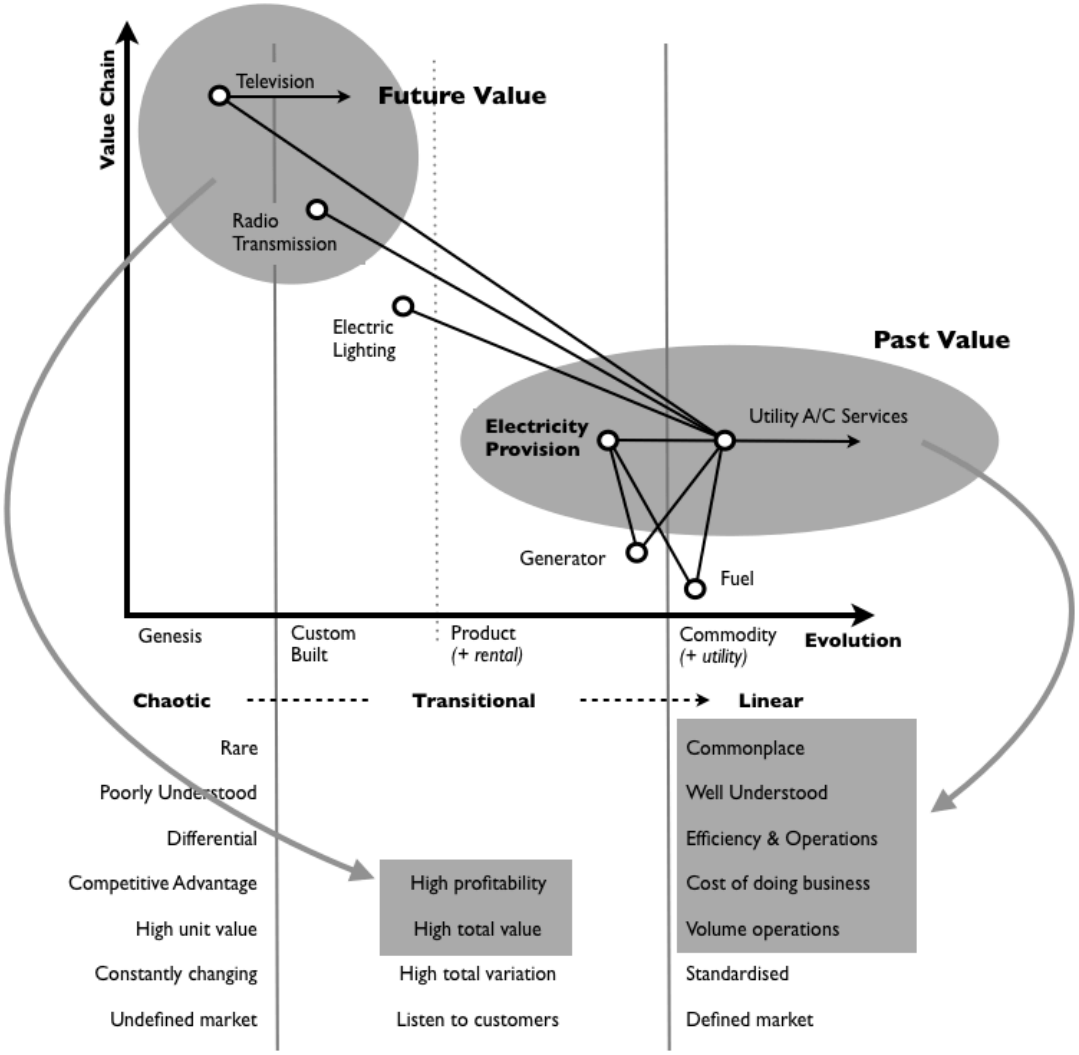
For example, as electricity became provided as a utility service having been previously provided as products, such as the original Siemens Generators of the 1860s, the perceived value drifted towards the higher order systems.

It was those novel things that consumed electricity and started to spread from radio to televisions to fridges to computer that were perceived as high value. This is where the capital flowed.

Equally today, in the world of computing the capital focus is not on provision of computing infrastructure and the sale of products such as servers but instead those new, higher order systems that consume more utility services e.g. Instagram, Netflix, Big Data etc.

This flight of capital, from once industries that were perceived as "value" generating to new higher order systems that are now perceived as "value" generating is known as creative destruction[15]. The commoditization of one set of industries to standard components (destruction of past value) enables these new industries to flourish (creation of future value). I've combined figures 19 and 20 into figure 21 to illustrate this point.

Figure 21 – Evolution, Componentisation and Perceived Value.



[15] Joseph Schumpeter

In some cases, the destruction is actual and direct, sometimes indirect but to survive this change companies have to adapt to a sequence of events. For example, with electricity: -

1. The commoditization of electricity production from generators to modern A/C based utility services started with Tesla and Westinghouse in 1886.

2. **Componentization** effects enabled the rapid growth in creation of higher order systems such as electric lighting, radio, television, consumer electronics and even computing.

3. These higher order systems became the focus of future wealth generation and capital flowed into these industries whether TV manufacturers or TV broadcasters (**Creation**).

4. Electricity itself was viewed as a commodity. Manufacturers of electricity generators were directly affected by existing customers switching to utility provision (**Destruction**).

5. Being a component of these new higher order activities, the consumption of electricity increased rapidly as those activities in turn evolved e.g. as TV's evolved from a novelty to commonplace then more and more electricity was consumed (**Volume Effects**)

6. Manufacturers of generators had to redefine themselves either as components for utility providers, as utility providers themselves, as "backup" systems for customers with concerns over the new suppliers or they had to focus on niche areas (**Adaptation**)

7. Other past industries were **indirectly** affected, often suffering more damage than those who could see the change coming. These included gas lamp lighting companies

who were disrupted by the diffusion of electric lighting or music halls that were impacted by television and radio.

Similar patterns to this can found throughout history. For example, more recently the commoditization of the means of mass communication brought about by the Internet has: -

- Enabled rapid generation of higher order systems from search engines to social network sites (**componentization**) with associated companies that were seen as the new sources of value (**Creation**).

- Caused **direct** disruption of companies that had built products that previously filled such roles from local newspapers to media to catalogues (**Destruction**). These companies have been forced to **adapt** to the visibly changing environment.

- Caused **indirect** disruption of companies due to replacement of their services by higher order systems or reduced barriers to entry. For example, electronic retail, booksellers, grocery and holiday booking agents. Many of these companies would not have seen the changes coming, as they were indirect.

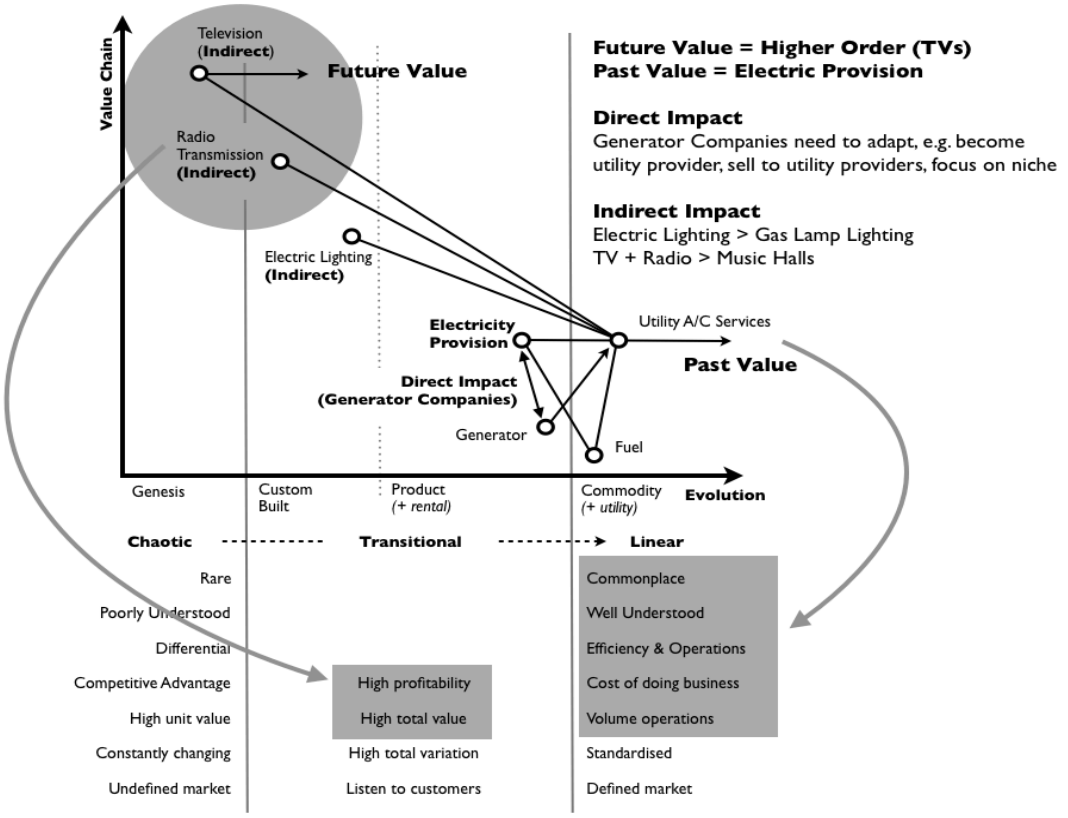
- There has been a rapid increase in the volume of data communicated (**volume effects**).

It's worth noting that commoditization can also impact control mechanisms within an organization. Newspapers once held a privileged position due to access to expensive physical capital assets such as printing presses and distribution systems which were essential to mass communication. Access to these assets limited the number of competitors and were also a significant point of control; if a person wanted to be a journalist then they had to work for a company with access to those assets.

Aggressive commoditization of the means of mass communication (through the internet and digitization of content) undermined both the barriers of entry into the media industry and the points of control. Today, journalists can now build their own News channels.

I've summarized many of the effects we have talked about in this section into figure 22.

Figure 22 – Componentisation, Creative Destruction and Direct, & Indirect Change.



By now, the reader should understand that organisations consist of value chains that are comprised of multiple components all of which are evolving due to user and supply competition. As the components evolve their characteristics change and they can enable new higher order activities to rapidly appear either extending the value chain or creating new value chains. The

dynamics of an industry are thus changed by the destruction of past sources of value and flows of capital into new value generating areas. In due course, these new activities evolve due to competition and the cycle repeats.

Commoditisation begets the genesis of new higher order activities that then commoditise begetting the genesis of even higher order activities that then commoditise. Standard nuts and bolts beget generators beget electricity beget computing beget big data.

Evolution begets Genesis begets Evolution.

This cycle of change is a constant result of evolution, which itself is a constant result of consumer and supply competition i.e. if you don't like change then simply get everyone to stop competing. The same goes with biology. Business, as with life, is a cycle of change.

Whilst I have talked principally about activities, the above applies to practices and data. Alas, despite its inevitability, people and organisations often act as though they don't like change even when it is clearly visible that it's going to happen to them. Which is why in the next section, I'm going to look at inertia.

Inertia

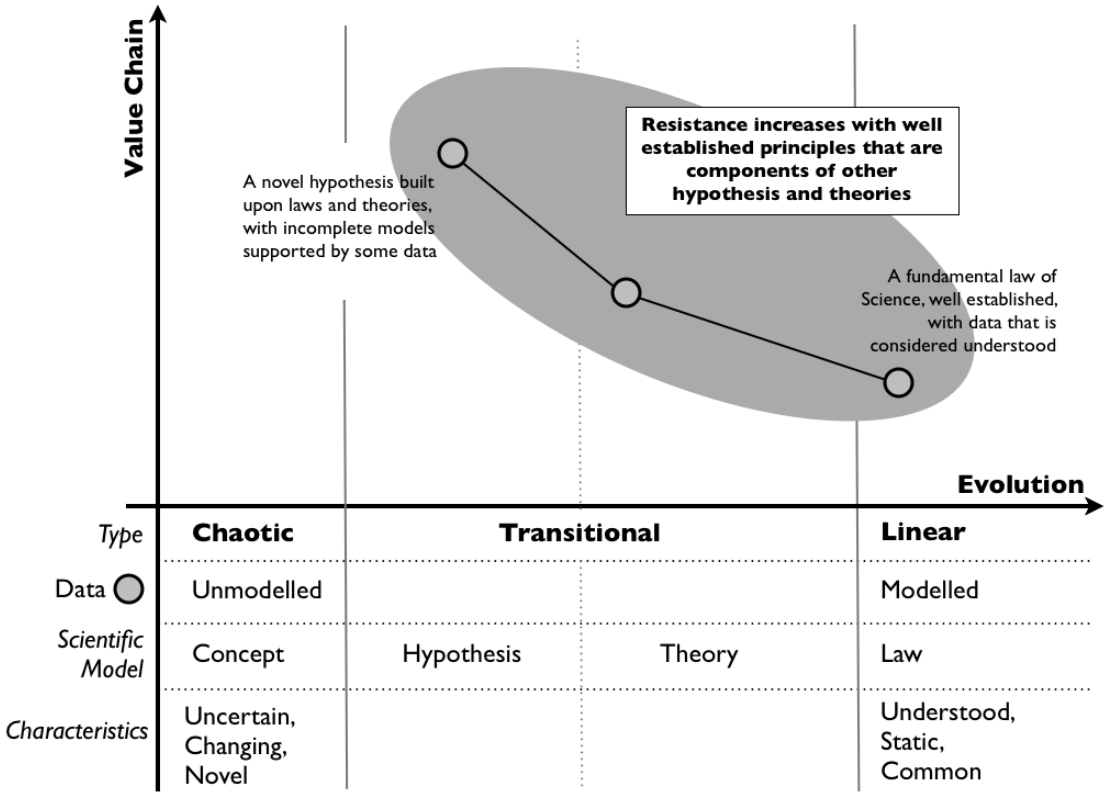
In the previous section, I discussed the importance of interfaces for activities that commoditize and become components of higher order systems e.g. standard electricity supply, standard units of currency. There is a significant cost associated with changing these interfaces due to the upheaval caused to all the higher order systems that are built upon it i.e. changing standards in electrical supply impacts all the devices that use it. This cost creates resistance to the change.

A similar cost also occurs with practices when they co-evolve with activities. From the earlier example on computing infrastructure, if the consumers of large powerful servers had developed estates of applications based upon the practices of scale-up and N+1, then as the activity evolved to more utility services those consumers would incur significant costs of re-architecture of the "legacy estate" to the utility world. This cost creates resistance to the change.

You also find similar effects with data or more specifically our models for understanding data. As Bernard Barber[16] once noted even scientists exhibit varying degrees of resistance to a scientific discovery. For example, the cost associated with changing the latest hypothesis on some high level scientific concept is relatively small and often within the community we see vibrant debate on such hypotheses. However changing a fundamental scientific law that is commonplace, well understood and used as a basis for higher level concepts will impact all those things built upon it (see figure 23) and hence the level of resistance is accordingly greater.

[16] http://web.missouri.edu/~hanuscind/8710/Barber1961.pdf

Figure 23 – Graphical illustration of Scientific Resistance.



Such monumental changes in science often require new forms of data creating a crisis point in the community through unresolved paradoxes and things that just don't fit our current models of understanding. In some cases, the change is so profound and the higher order impact is so significant that we even coin the phrase "a scientific revolution" to describe it.

The costs of change are always resisted and past paradigms are rarely surrendered easily – regardless of whether it is a model of understanding, a profitable activity provided as a product or a best practice of business. As Wilfred Totter[17] said "the mind delights in a static environment".

Alas, this is not the world we live in.

[17] W. Trotter, Collected Papers (Humphrey Milford, London, 1941).

So what makes up inertia and this resistance to change in Business? That depends upon the perspective of the individual and whether they are a consumer or supplier.

The Consumer

From the perspective of the consumer of an activity or a practice or a model of understanding that is changing then inertia tends to manifest itself in three basic forms - **disruption to past norms**, **transition to the new** and **the agency of new**.

To explain this, let us consider the evolution of an activity (driven by user and supply competition) from being provided as a product to one of utility services. Examples of which could include the past shift of electricity provision or more recently the Cloud and the evolution of components of IT to utility services.

The typical concerns regarding the **disruption to past norms** include: -

- Changing business relationships from old suppliers to potentially new suppliers.

- A loss of financial or physical capital through prior purchasing of a product e.g. the previous investment needs to be written off.

- A loss in political capital through making a prior decision to purchase a product e.g. “what do you mean I can now rent the billion dollar ERP system I advised the board to buy on a credit card?”

- A loss in human capital as existing skillsets and practices change e.g. server huggers.

- A threat that barriers to entry will be reduced resulting in

increased competition in an industry e.g. even a small business can afford a farm of super computers.

The typical concerns regarding the **transition to the new** include: -

- Confusion over the new methods of providing the activity e.g. isn't this just hosting?

- Concerns over the new suppliers as relationships are reformed including transparency, trust and security of supply.

- Cost of acquiring new skillsets as practices co-evolve e.g. designing for failure and distributed architecture.

- Cost of re-architecting existing estates which consume the activity. For example, the legacy application estates built on past best practices (such as N+1, Scale-Up) that assume past methods of provision (i.e. better hardware) and will now require re-architecting.

- Concerns over changes to governance and management.

The typical concerns regarding the **agency of the new** include: -

- Suitability of the activity for provision in this new form i.e. is the act really suitable for utility provision and volume operations?

- The lack of second sourcing options. For example, do we have choice and options? Are there multiple providers?

- The existence of pricing competition and switching between alternatives suppliers. For example, are we

shifting from a competitive market of products to an environment where we are financially bound to a single supplier?

- The loss of strategic control through increased dependency on a supplier.

These risks or concerns are typical of the inertia to change we see with Cloud today. But it's not just consumers that have inertia but also suppliers of past norms.

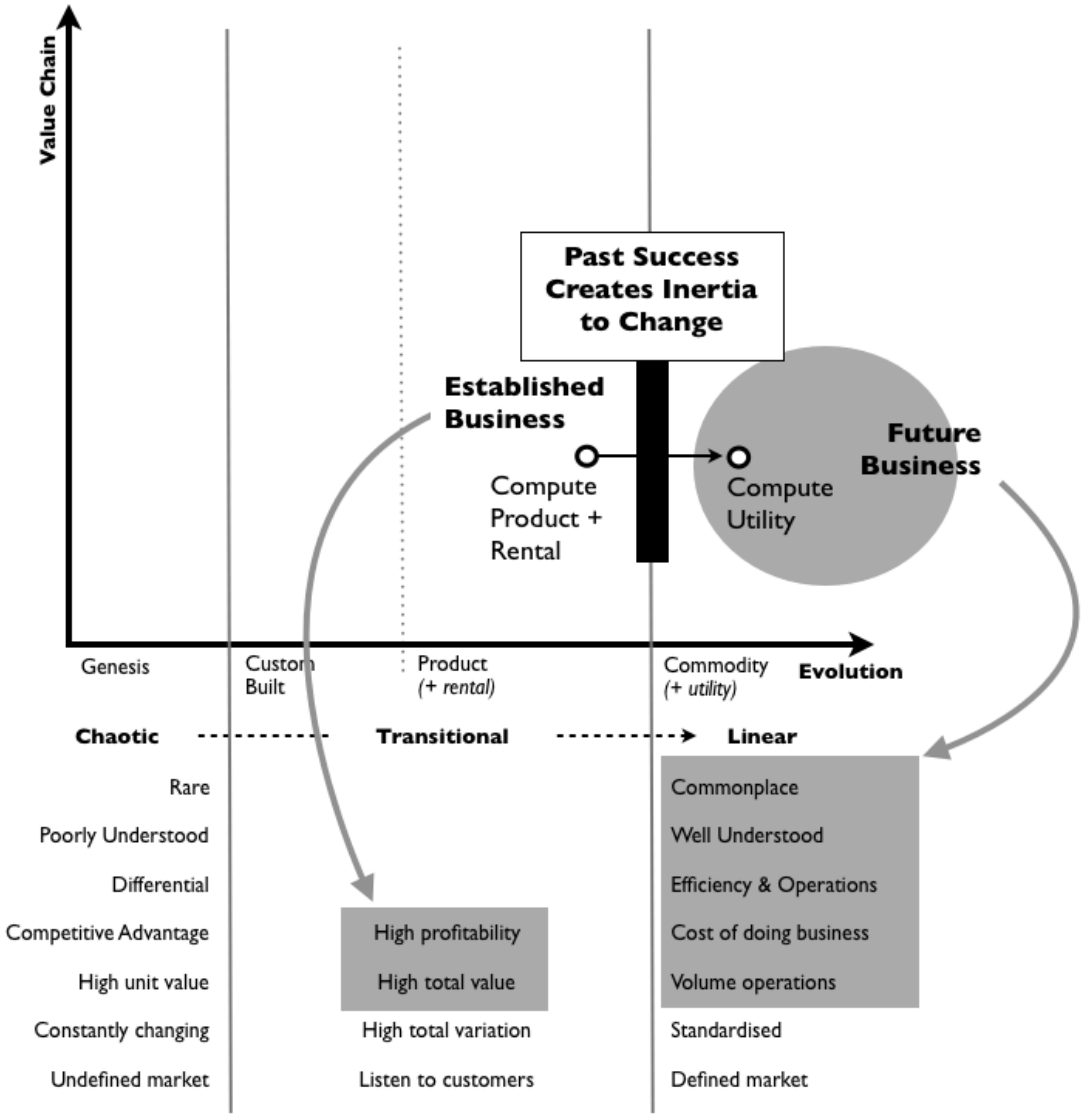
Suppliers of past norms.

The inertia to change of suppliers inevitably derives from past success. For example, let us focus on the part of the cloud which represents the shift of computing infrastructure from products to utility services i.e. infrastructure as a service (IaaS).

Amazon started this industry change in earnest in 2006 with the launch of Amazon EC2. As a company, Amazon had no prior business model in the sale of hosting (rental model of products) or servers (products) to business consumers. As such, Amazon was not encumbered by any past business models and had no inertia to introducing this change. However, hosting companies and hardware manufacturers had significant inertia to the change caused by their past and successful business models.

From Figure 24, the shift from product to utility services is a shift from high value to one of volume operations and declining unit value. Hence the existing suppliers would have needed to adapt their existing and successful high margin business models to this new world in order to initiate it.

Figure 24 – Changing from Product to Utility Services



Such a change is problematic for several reasons: -

- All the data the company has demonstrates the past success of current business models and concerns would be raised over cannibalisation of the existing business.

- The rewards and culture of the company are likely to be built on the current business model hence reinforcing internal resistance to change.

- External expectations of the financial markets are likely to

reinforce continual improvement of the existing model i.e. it's difficult to persuade shareholders and financial investors to replace a high margin and successful business with a more utility approach when that utility market has not yet been established.

For the reasons above, the existing business model resists change and the more successful and established it is then the greater the resistance. This is why the change is usually initiated by those not encumbered by past success.

This resistance of existing suppliers will continue until it is abundantly clear that the past model is going to decline. However, by the time it has become abundantly clear and a decision is made, it is often to late for those past incumbents.

Why we're often too late in making decisions to change

In the case of product competition (i.e. during the transitional phase) where competitors replicate and compete on new features, change is often a case of constant gradual improvement. In this environment sustaining change tends to exceed disruptive change and a method such as fast following is appropriate.

However the shift from product to utility i.e. the crossing of the boundary from transitional to linear is a significant shift. In this case, disruptive change tends to exceed sustaining.

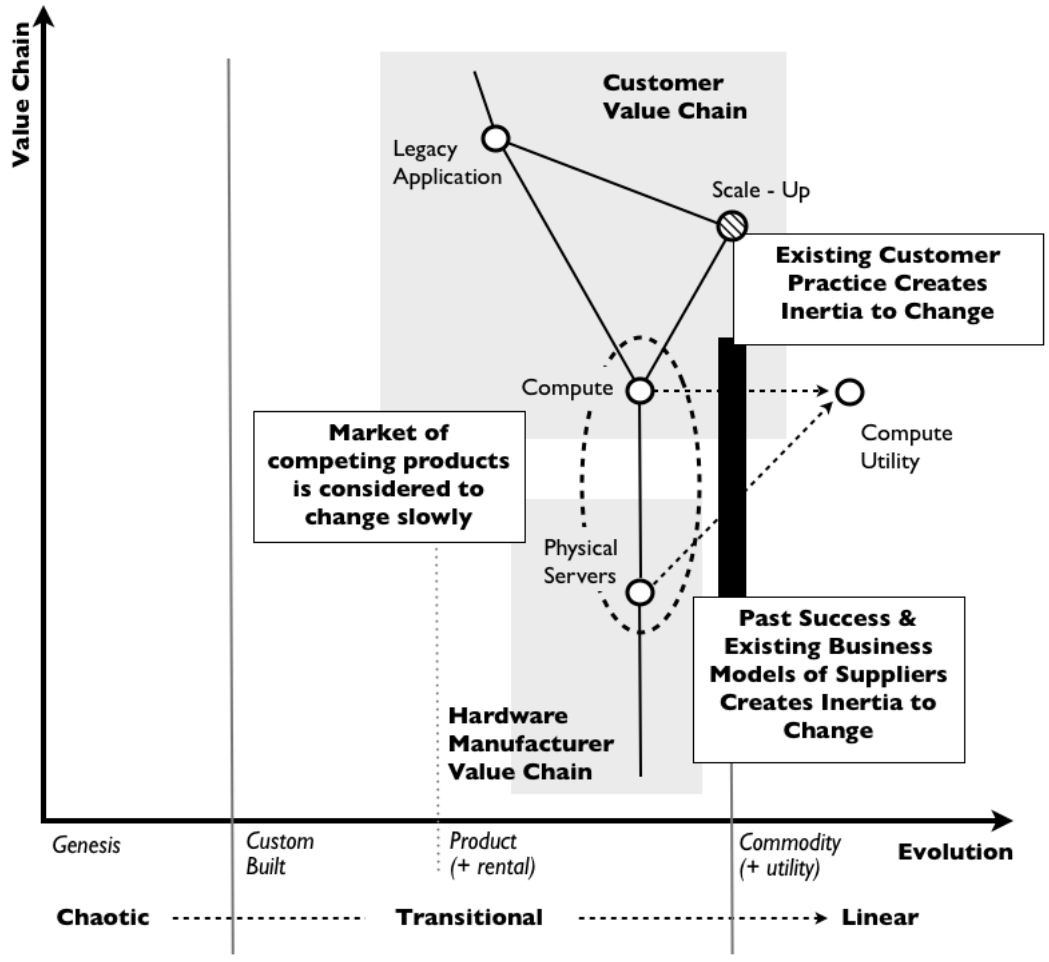
Why is this so? Well, for the existing supplier, they not only have to contend with their own inertia to change but also the inertia their customers will have. Unfortunately, the previous model of competition (e.g. one of product vs product) will lull these suppliers into a false sense of gradual change, in much the same way that our existing experience of climate change lulls us into a belief that climate change is always gradual. This is despite ample evidence that abrupt climate change has occurred

repeatedly in the past, for example at the end of the Younger Dryas period, the climate of Greenland exhibited a sudden warming of +10°C within a few years.

We are much a prisoner of past expectations of change as past norms of operating.

Hence suppliers, with pre-existing business models, will tend to view change as gradual and have resistance to the change which in turn is reinforced by existing customers (see figure 25)

Figure 25 Inertia and Past experience



Unfortunately for these suppliers, the shift towards utility services has significant competitive effects for customers: -

- Increasing efficiency for provision of an activity through volume operations (**economies of scale**)

- A shift from capital to operational expense and payment for that which is actually consumed

- Provision of high volumes of more standard, good enough components that enables high rates of agility and genesis of new activities (**componentization**)

- Flight of capital to the new higher order systems that are enabled and represent the future source of value (**creative destruction**)

As companies compete in ecosystems with others, then as any activity evolves they will need to adapt accordingly. This is the organisational equivalent of the Red Queen Hypothesis[18] and the constant need for organisations to evolve in order to stand still relative to a surrounding and competing environment.

The above effects of increasing efficiency, agility, innovation (as in genesis of new activities) and new sources of wealth for the consumers of the more evolved activity will tend to turn a trickle into a flood as the pressure to adapt increases as more competitors adopt the change.

In the case of Infrastructure as a Service, we see all of these effects.

- A change in industry from products to utility services initiated by a company not encumbered by a pre-existing model e.g. Amazon.

- High levels of resistance to the change by existing consumers (i.e. businesses) because of past norms of

[18] Leigh Van Valen. (1973). "A new evolutionary law". Evolutionary Theory 1: 1—30.

operating and existing legacy estates.

- Rapid growth in new high value activities based upon these utility services and a shift of capital towards this. Most VC's now expect new companies to build with cloud services.

- Increased awareness of the competitive benefits from agility, rapid creation and efficiency of using the services.

- A trickle turning into a flood with exponential growth in Amazon EC2.

It's the exponential growth part that catches most past suppliers out and that's due to this expectation of gradual change due to the previous competitive stage.

To explain why this catches people out, I'll use an analogy from a good friend of mine, Tony Fish. Consider a big hall that can contain a million marbles. If we start with one marble and double the number of marbles each second, then the entire hall will be filled in 20 seconds. At 19 seconds, the hall will be half full. At 15 seconds only 3% of the hall, a small corner, will be full.

Since 15 seconds having passed and only a small corner of the hall is full, we could be forgiven for thinking we have plenty more time to go. We can easily believe that we have vastly more than the fifteen seconds it has already taken to fill up the small corner. If 15 seconds filled up 3% then surely the remaining 97% will take about eight minutes? We have plenty of time! We haven't. We've got five seconds.

Hence for a hardware manufacturer who has sold computer products and experienced gradual change for thirty years, it is understandable how they might consider this change to utility services will also happen slowly. They will have huge inertia to the change because of past success, they may view it as just an

economic blip due to a recession and their customers will often try to reinforce the past asking for more “enterprise” like services. They will believe they have time.

Worst of all they will believe they have time to transition, to help customers gradually change, to spend the years building and planning new services and to migrate the organization over to the new models. Our customers can’t adapt, what about their legacy?

They forget, their customers must adapt due to competition and will either change or dump the legacy or die.

By 2011, Amazon was estimated to have $1bn in cloud revenue. By 2012 it was estimated at $2bn and current predictions for 2013 are almost $4bn. If that growth rate continues, then by 2016 they will be in excess of $30 billion in revenue. They also have rapidly growing competitors such as Google.

The cold hard reality that many existing suppliers probably don’t comprehend is that the battle will be over in three to four years and for many the time to act has already passed. Like the rapid change of climate temperature in Greenland, our past experience of change does not necessarily represent the future.

In industry, we have a long history of such rapid cycles of change and inertia is key to this. These cycles we call “revolutions” as in industrial, mechanical and the revolution of electricity. During these times, change is rapid not gradual and disruption is widespread.

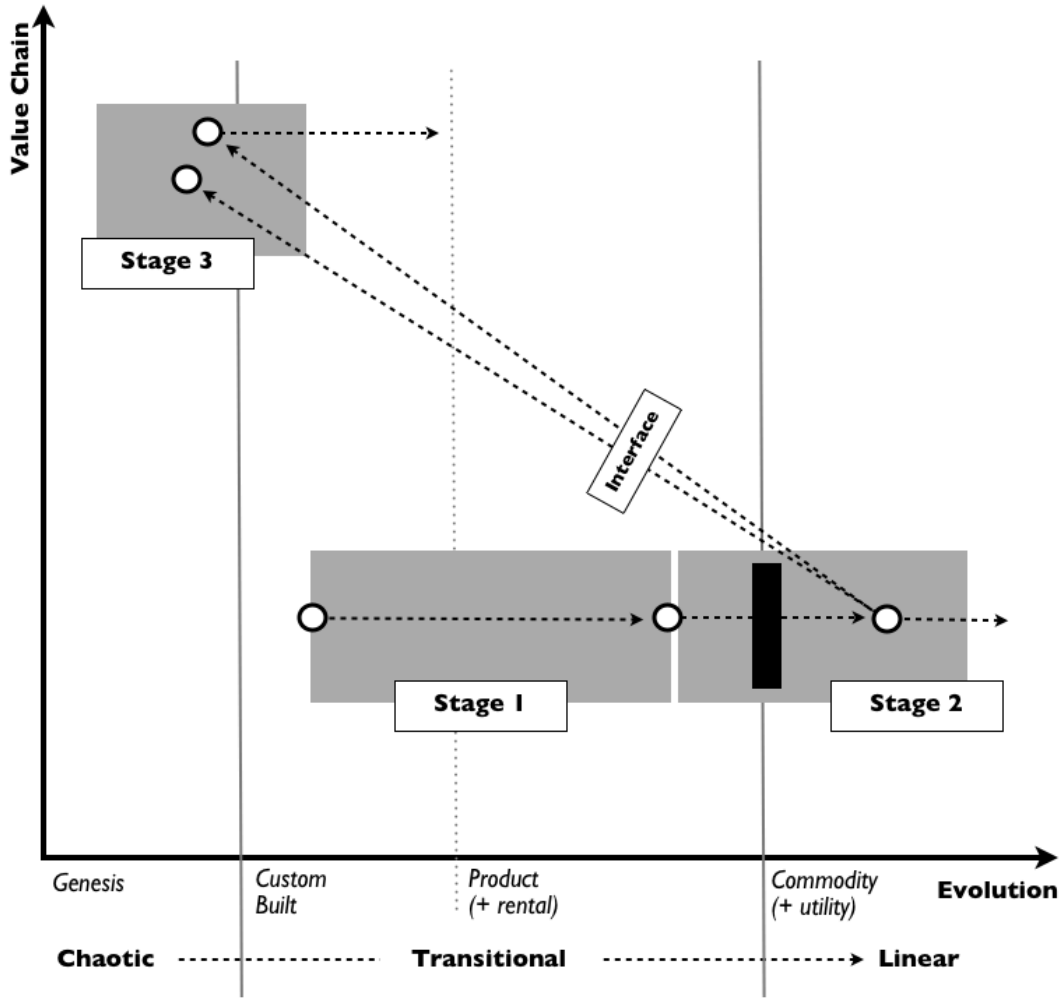
In the next section we will explore these “revolutions” more after which we can take all that we have discussed and apply it to that first Fotango map.

Revolution

I've used the word "revolution" a couple of times so far, both "scientific" and "industrial". However, what do I mean by revolution? To understand what is a "revolution" we need to examine the interplay of change, competition and inertia.

Figure 26 illustrates an example of an activity that is evolving to ultimately become a component of higher order activities. I've marked onto the map an inertia barrier to change for suppliers of products and three separate stages of competition.

Figure 26 – Change, Competition and Inertia



Now, let us examine these three separate stages of competition.

In **stage 1**, competition is between suppliers of products with constant feature improvement. Whilst disruptive change and new entrants do occur (e.g. a new component of the value chain appears and former products are substituted), the majority of change is gradual and sustaining of those competing companies. It is a time of high margin, increasing understanding of customer needs, the introduction of rental services and relative competition i.e. a jostle for position between giant competitors.

Because of success, inertia to change builds up within those giants whilst the activity itself continues to evolve becoming more widespread, better understood and declining in differential value. In the latter stages customers can even start to question whether they are getting a fair benefit for what they are paying but overall, this is a time of relative **Peace** in that industrial ecosystem.

In **stage 2**, the successful activity has now become commonplace and well understood. It is now suitable for more commodity or utility provision. However, the existing giants have inertia to this change and so it is new entrants that are not encumbered by pre-existing business models that introduce the more commodity form. These new entrants may include former consumers who not only gained enough experience to know that this activity should be provided in a different way but also the skills to do it.

This more commodity form (especially utility services) is often dismissed by most existing customers and suppliers of products who have their own inertia to change. Customers see it as lacking what they need and not fitting in with their norms of operating. However, new customers appear and fairly rapidly the benefits of high rates of agility, innovation (as in genesis of new higher order activities) and efficiency spread. Novel practices and norms of operating also co-evolve and spread.

Customers who were once dismissive start to trial out the services, pressure mounts for adoption. A trickle rapidly becomes a flood. Past giants who have been lulled into a sense of gradual change by the previous peaceful stage of competition see an exodus. Those same customers who were only recently telling these past giants that they wouldn't adopt these services, that it didn't fit their needs and that they needed more tailored offerings like the old products have adapted to the new world.

The new entrants are rapidly becoming the new titans. The former giants have old models that are dying and little stake in this future world. There is little time left to act. The cost to build equivalent services at scale to compete against the new titans is rapidly becoming prohibitive. Many past giants now face disruption and failure. Unable to invest, they often seek to reduce costs in order to create the past profitability they once experienced in the **peace** stage of competition. But the past has gone, it is no more, their decline accelerates.

This stage of competition is where disruptive change exceeds sustaining, it has become a fight for survival and it is a time of **War** with many corporate casualties.

In **stage 3**, the activity that is now provided by commodity components has enabled new higher order activities and things that were economically unfeasible a short while before. This new activities spread rapidly. Nuts and bolt begets machines, electricity begets television.

These new activities are by definition novel and uncertain. Whilst they are a gamble and we can't predict what will happen, they are also potential sources of future wealth. Capital rapidly flows into these new activities. An explosion of growth of new activities and new sources of data occurs. The rate of genesis appears breathtaking. For an average gas lamp lighter there is

suddenly electric lights, radio, television, teletyping, telephones, fridges and all manner of wondrous devices in a relatively short time span.

There's also disruption as past ways of operating are substituted – gas lamps to electric lights. These changes are often indirect and difficult to predict, for example those that are caused by reduced barriers to entry.

The fear that the changes in the previous stage of war (where past giants fail) will cause mass unemployment often lessens because the new industries built upon the new activities we could not have predicted will form.

Despite the maelstrom it is generally a time of marvel and of amazement at new technological progress. Within this smorgasbord of technological delights, the new giants are being established. They will take these new activities into the peace phase of competition. It is a time **of Wonder**, growth and of bountiful creation of the novel and new.

This pattern of **peace**, **war** and **wonder** repeats throughout history whenever activities evolve to become commodity components of other higher order systems.

Sometimes these changes are localized and the impacts are only felt by those industries that contain the activity as part of their value chains such as commoditization of will writing and the upheavals in the legal profession. In other cases the change is much broader impacting the entire economy (a macro-economic effect) because the activity is common to many value chains e.g. nuts and bolt, electricity, computing resources.

The macro economic pattern

These states of war, wonder and peace can be seen at a macro economic scale depending upon how widespread the activity or

groups of activities that are undergoing transformation are. We commonly call these macro economic cycles Ages. These ages are not initiated by the genesis of some new activity but always the commoditization of a pre-existing activity to components of higher order systems.

For example, the Age of Electricity was not caused by the introduction of electrical power that occurred with the Parthian Battery (sometime before 400 AD) but instead utility provision of A/C electricity with Westinghouse, almost 1500 years later.

The Mechanical Age was not caused by the introduction of the screw by Archimedes but by the commoditization of standard mechanical components through systems such as Maudslay's screw cutting lathe.

The Age of the Internet did not involve the introduction of the first means of mass communication such as the Town Crier but instead the commoditization of the means of mass communication.

Whilst born out of commoditisation, each of these **Ages** is centered on a major cluster of "innovations" (i.e. genesis of new activities) that are built in the time of W**onder** from the components delivered in the last **War**.

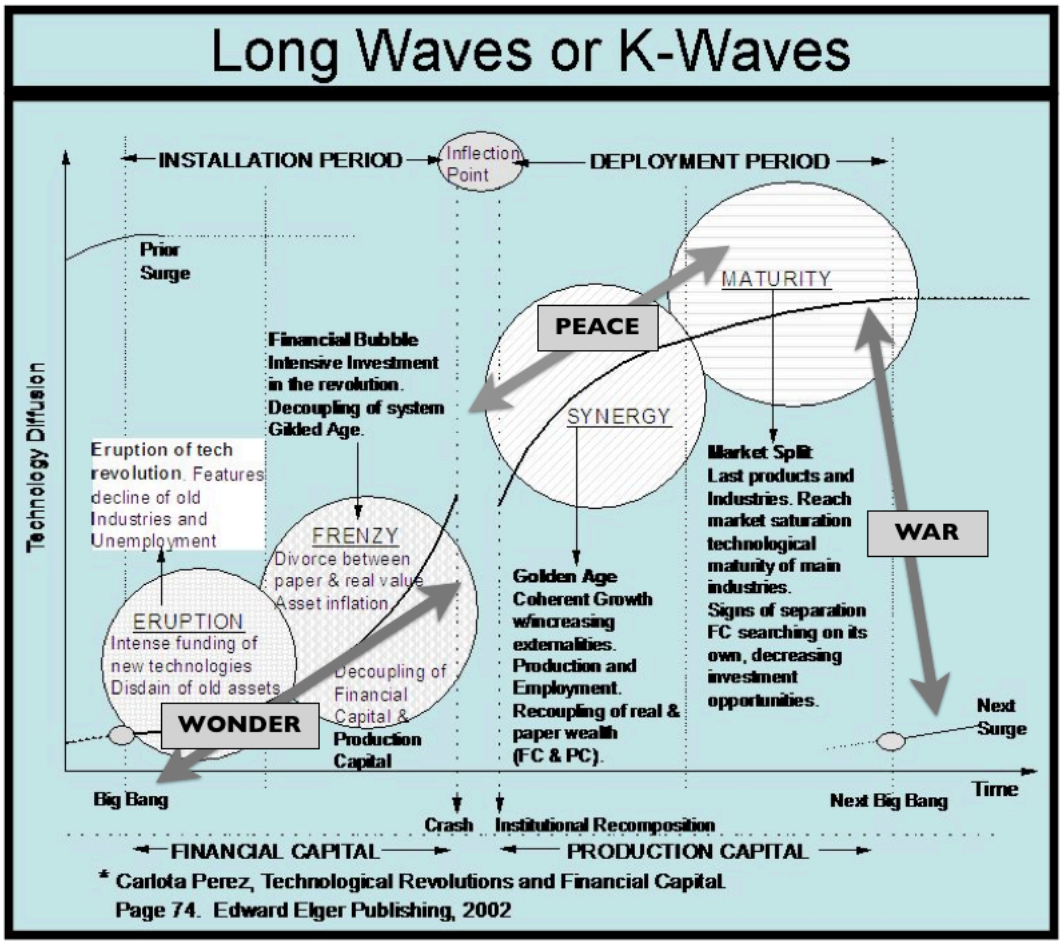
Each "innovation" then undergoes a cycle of incremental improvement until reaching a plateau of diminishing returns with widespread diffusion of the new paradigms (**the time of peace**). Inertia to change builds up, the next **War** is started and the next **Age** begins

The existence of these ages or super cycles of economic development was first proposed in 1925 by Nikolai Kondratiev and are given the name Kondratiev or K-Waves. More recently Carlotta Perez has characterized these K-Waves around

technological and economic paradigm shifts. For example the Industrial Revolution included factory production, mechanization, transportation and development of local networks whereas the Age of Oil and Mass Production included standardization of products, economies of scale, synthetic materials, centralization and national power systems.

In figure 27, I've annotated onto Carlotta Perez's graph of technology transformation the stages of war, wonder and peace.

Figure 27 – Wonder, Peace, War and Technology Waves



The same transformation is occurring today with cloud computing. The "cloud" represents the shift of a range of IT activities that are widespread in many value chains from products to utility services. As such those effected industries

have moved from a stage of peace to war and these utility services have enabled a rapid growth of new higher order systems.

Cloud computing is the beginning of a new time of wonder, and as an economy we are entering a new age. Before leaving this section, a final few comments are worth mentioning.

On Evolution and Organizations

Since organizations consist of many value chains each with a multitude of evolving components then most large organizations can find themselves simultaneously in a macro economic climate of change but also local states of wonder, peace and war.

Hence, on one hand the provision of some activities will be relatively peaceful with known suppliers in a state of fierce but relative competition of continual improvement e.g. competition around tablet devices, Samsung vs Apple. This example is not part of any larger macro-economic effect.

Whilst at the same time, other activities will be in a state of war with disruption, changing practices and a fight for survival against new entrants e.g. competition around computing infrastructure with new entrants such as Amazon EC2. This example happens to be causing a larger scale macro-economic effect through commoditization of IT.

Further still, other activities will be in a state of wonder, with rapid creation, uncertainty and potentially new sources of future value e.g. big data systems. This example happens to be a consequence of the larger scale macro-economic effect caused by the commoditization occurring in IT.

In many cases these activities are linked through value chains for example the explosion of big data systems is a direct result of commoditization of aspects of IT through systems such as Amazon

EC2. As with the changing in characteristics as activities evolve from chaotic to linear, the strategic games a company should play change with the state of competition.

On Co-Evolution of Organisations

As each age follows a war and the commoditization of pre-existing activities, each age is also associated with a new set of practices that have co-evolved with those activities.

This often appears in the form of new organisations. For example the Mechanical Age involved the appearance of the American System of Engineering. The Age of Electricity involved the appearance of Fordism. The Age of the Internet led to the Web 2.0 and Cloud Computing is itself creating a new form of organization. In later sections we will examine this new form, however for the time being it's enough to note the association.

On Evolution and Time

The path of evolution can be graphed over ubiquity and certainty and it is not a time-based sequence i.e. the speed at which things evolve is not constant. For example, the nut and bolt took 2000 years to evolve to a commodity, electricity about 1500 years whereas computing infrastructure took about 65 years.

Whilst each age has a time of wonder where we see an explosion in the genesis of activities (the novel and new), it is often asked whether we are becoming more innovative as a species? Certainly the systems we build today are higher order than the past and certainly each age appears wondrous and magical to previous generations but I've yet to find any evidence that the rate of genesis has varied i.e. is the current day any more magical than the time of wonder associated with the Age of Electricity?

However, what is clearly happening is the speed of evolution i.e. the time taken for a novel activity to become a commodity has accelerated and this appears mainly to do with increased

communication especially as means of communication become more commoditized. This is not a new phenomenon.

For example, on the 1st May 1840 a revolution in communication was started by the introduction of the Penny Black. This simple postage stamp caused a dramatic explosion in written communication from 76 million letters sent in 1839 to 350 million by 1850. It wasn't a case that postal services didn't exist before but the Penny Black turned the act of posting a letter into a more standard, well-defined and ultimately ubiquitous activity.

The introduction caused a spate of copycat services throughout the world, with the US introducing their first stamps in 1847. The 125 million pieces of post sent through their system in that year mushroomed to 4 billion by 1890. From stamps to street letter boxes (1858) to the pony express, railway deliveries (1862), money order and even international money orders by 1869. A huge array of new activities was created that quickly spread.

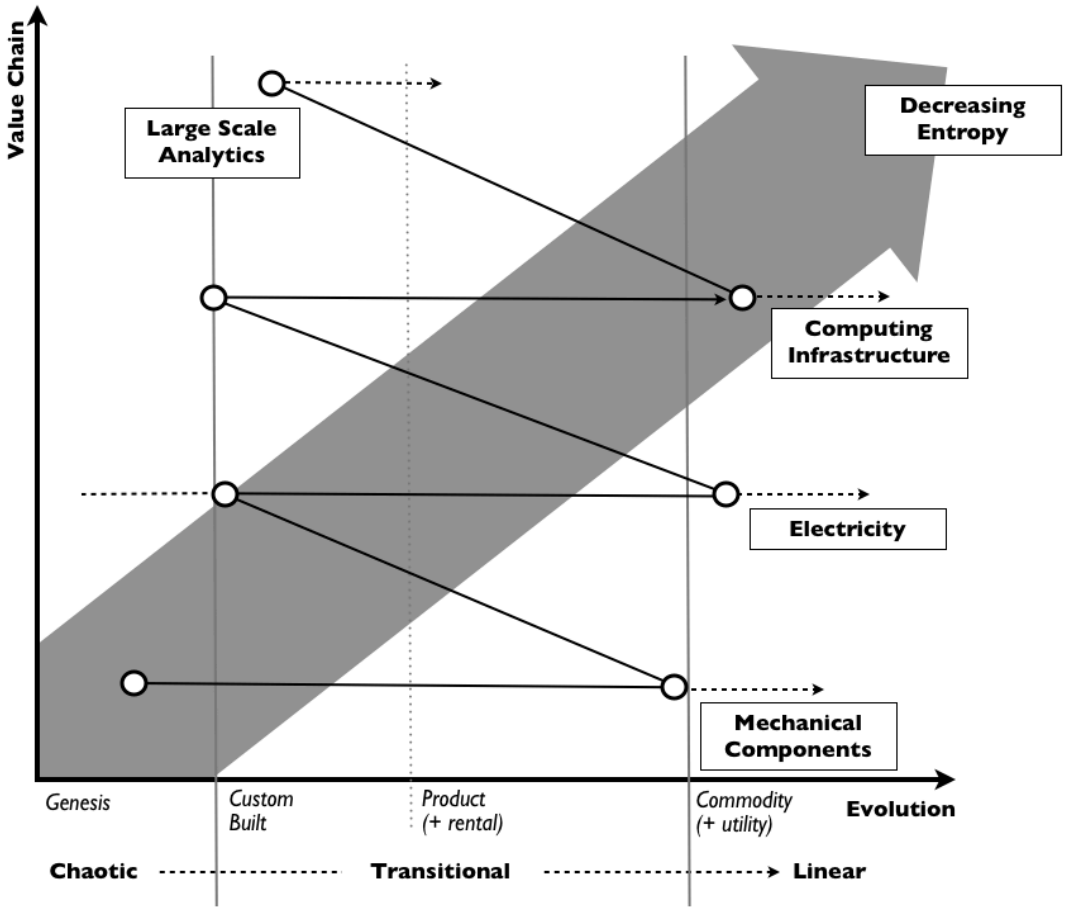
However, the lasting effect appears to have been that as the speed of communication accelerated the rate of evolution of other activities correspondingly accelerated. The printing press, postage stamps, telephony and the Internet have all accelerated the general rate of evolution of all other activities by increasing communication and participation.

So whilst, we as a species may not have become more “innovative”, the speed at which new activities evolve and new ages begin certainly appears to be accelerating.

On Evolution, Energy, Entropy and Vulnerability

The constant snake like progress of our economy through those Kondratiev waves of the industrial age, the age of steam, the age of electricity each with its own time of wonder, peace and war is driving us further up the value chain with higher order systems continuously evolving from chaotic to linear (see figure 28).

Figure 28 – Evolution and Entropy



We are continuously moving away from a disordered, primitive and information poor position to a highly ordered, sophisticated and information rich position. Now ignoring the fact that we waste energy in abundance, the shift to a more highly ordered position means decreasing entropy and hence always requires more energy than the previous position. Even if we could eliminate waste, our economic progress would continually demand more energy.

However, there is another consequence. As we move to a higher order environment, we are not only dependent upon the lower order systems but they become increasingly less visible. This exposes us to all forms of new vulnerabilities. For example, the solar storm of 1859 known as the Carrington event had fairly

minimal impacts on the society of its day. A similar storm today would impact many of those invisible, taken for granted, lower order subsystems that our society relies upon for its supply chains, production and computing. It would have a far greater impact.

However, this dependency and potential doom also walks hand in hand with our salvation. It is those very same higher order systems that are exposed to these vulnerabilities that enable us to identify and potentially negate threats whether it's the Apophis asteroid, detection of solar storms or exceeding the carrying capacity of world agriculture.

Evolution is the constant progress towards higher ordered systems that create new capabilities, consume more energy, exposes new vulnerabilities and protects against threats.

On Prediction and Disruption

The final comment I wish to add is on the commonly perceived random nature of "innovation" and disruption.

The genesis of novel activities is chaotic and uncertain. These cannot be predicted with any degree of accuracy, any more than the gas lamp lighter could have foreseen the creation of radio, television and the broadcast industry. Since the activity is new we generally don't describe this as disruption as there is nothing to directly disrupt however indirect disruption occurs, for example radio contributed to the decline of the music hall.

The substitution of one product with another product because of some changed characteristic is also extremely difficult (though not impossible) to predict. An example of this would be the substitution of gas lamps with electric lights or electric refrigeration and ice making machines replacing naturally harvested ice or more recently one format of hard drives replacing another. In this case, pre-existing suppliers are often

dismissive of the change that will subsequently disrupt them. They are caught flat-footed by the change in the market because they focus too much on existing customer needs. This is what is commonly known as the Innovator's dilemma.

However, the evolution of an activity from product to commodity and utility services is entirely predictable. For example, the changes as a result of cloud computing were first described forty years ago in Douglas Parkhill's book on the challenge of the computer utility.

Since evolution cannot be mapped over time (the pattern is over ubiquity vs certainty), we cannot say when the change will happen precisely. It depends upon the actions of actors in the market and someone making the first step.

But we can look for weak signals that it's about to happen in much the same way that a Navy could look for when an opposing Navy's submarines were about to set sail by watching for when the sailors all rapidly hung out their laundry on clothes lines. Key to identifying when an activity is about to switch from product to utility is how commonplace it is, how well defined it is and the level dissatisfaction with the current form (i.e. those grumblings over cost).

Nevertheless despite it being entirely predictable, hardware manufacturers could have written a plan of "what to do when computing infrastructure starts to commoditize to utility services" some twenty years ago, existing suppliers are still disrupted by this change.

It is important to understand that unlike the classic case of disruptive change (Christensen) where the market moves in an unexpected way, this form of disruption because it is entirely visible should have been prevented. Though those suppliers will have had inertia caused by past success, it is the role of the CEO

to see this clearly visible storms coming and move the organization out of its path despite the organization's stubbornness. Disruption in this instance is not an example of the Innovator's Dilemma but is simply a matter of failure in executive strategy.

In the next section, we will revisit that first Fotango map and use all we have covered to explain its meanings.

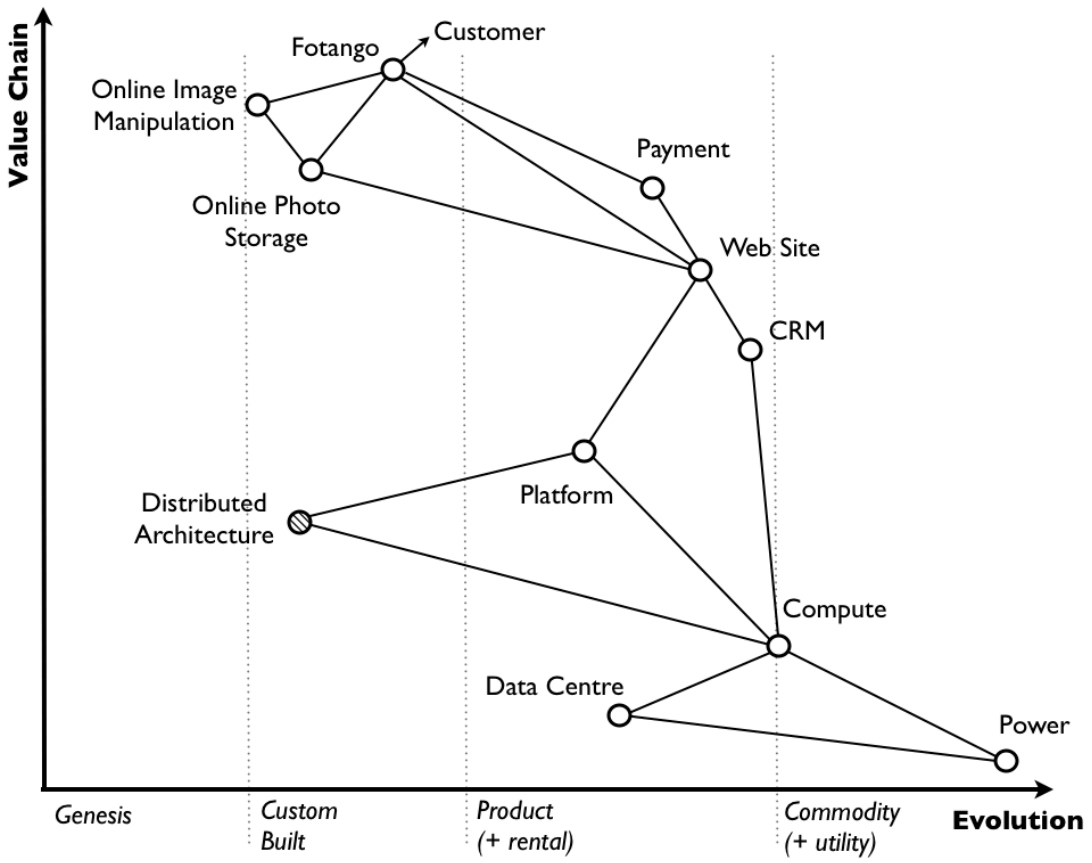
Revisiting our Map

Let us now return to 2005 and put ourselves in the shoes of the CEO of software subsidiary that has a consultancy based business model that won't scale due to parental headcount restraints and an uncertain future due to planned outsourcing.

It has an existing value chain, it is profitable, it is highly efficient and it has a highly talented engineering team. This is easy for me to imagine, since it's my story.

I've replicated that same value chain (or parts of it that will we examine) mapped against the state of evolution in figure 29

Figure 29 – Value Chain vs Evolution of Fotango



We already know that: -

- All the activities, practices and data on the map are evolving due to user and supply competition.

- Existing suppliers and consumers will have inertia to change and any change is likely to come from new entrants, often consumers of the past products.

- Commodity activities are suitable for outsourcing to utility providers and volume based operations. Novel practices will develop to deal with this change of activity.

- The shift from products to utility services would initiate a change of competitive state from peace to war. Many of those past giants will fail to act in a timely fashion lulled into a false sense of gradual change whilst others will make catastrophic choices by implementing strategies such as cost reduction in a hope of recreating the more profitable world of the past. Few will realize the past has gone and act correctly.

- Component activities that become more commodity-like will accelerate the genesis of higher order systems (componentization) and benefit from volume effects.

- The combined benefits of increased agility, efficiency and the flow of capital towards new higher order systems will turn a trickle of adoption into a flood.

From our map, two of the components stood out as being of immediate interest – infrastructure and platform. In both cases there was a large existing market mainly served by products. In both cases the activities were widespread and fairly well defined. In both cases business consumers were grumbling over the cost associated and no-one seemed to consider either activity

as providing a differential value. All the weak signals were there that both sets of activities were ripe for provision through utility services.

However, whilst we had some capital we didn't have the investment capability to build a large-scale infrastructure service, though we did ran our own small private virtual data centre and we had the technology to do this. But even if we couldn't afford this, the existence of large-scale computer utility would be useful to us. If we focused on the platform layer then many of the capital costs would be taken care of if we built on top of an infrastructure utility.

I talked to a couple of huge hardware manufacturers about this computer utility idea, even offered them the basic technology we had for infrastructure services which was known as BORG and unsurprisingly I was given the cold shoulder.

Fortunately, I knew that because the weak signals were there it was likely that someone would play that game soon. That someone wouldn't be an existing hosting or hardware company (both with inertia) but instead a former consumer. In 2005, I expected that player to be Google but in 2006 it turned out to be Amazon.

Hence in anticipation of these changes we focused on commoditizing the platform space. We knew that consumers would have inertia to the change, so we looked for means of mitigating this.

The fastest approach was to simultaneously offer a trial service (a public platform service) and allow businesses to build the system in their own data centres (a private platform service). This would give us time to build a customer base whilst we solved those concerns over lock-in, security of supply and pricing competition by creating a competitive market of suppliers with

easy switching between them.

Such switching would require semantic interoperability i.e. you needed to be able to take your code and data from one platform supplier to another and know that it works. In order to make this happen, all the suppliers would have to be in effect running the same core system with competition based not on differentiation in features but in operation.

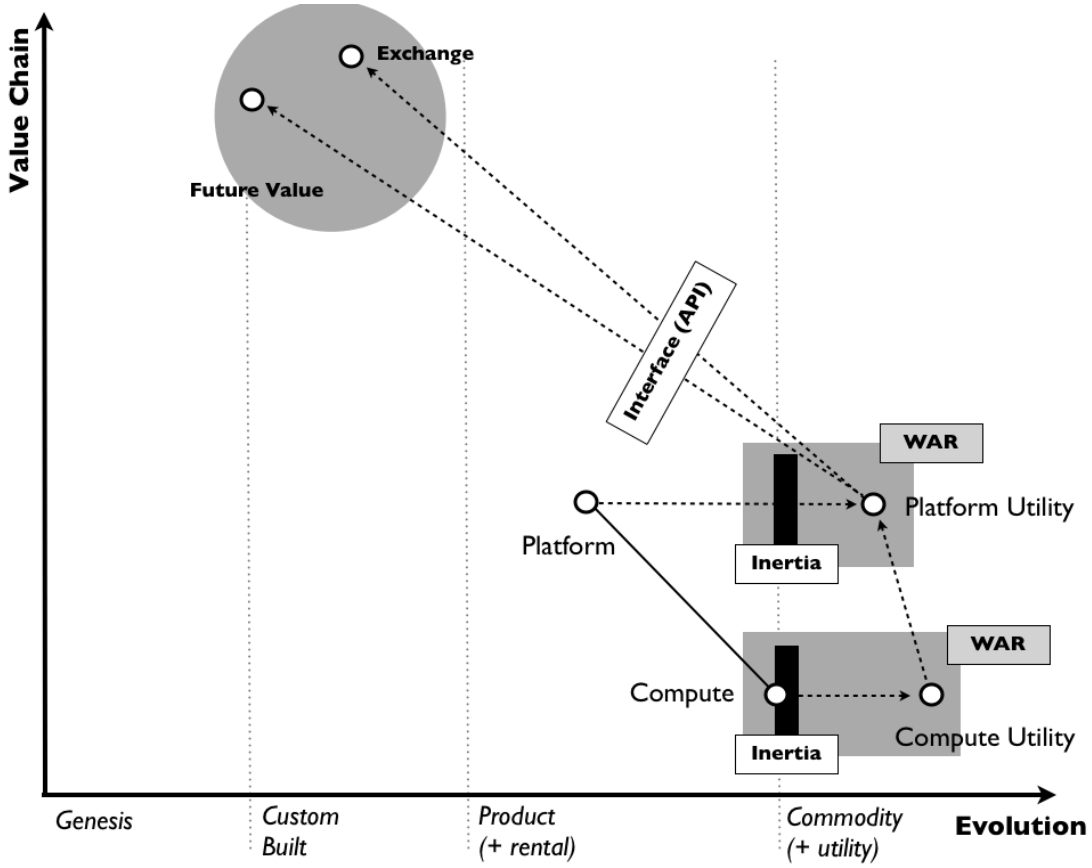
To achieve this, we would have to open source the system and provide some means of monitoring to ensure the suppliers were complying with the standard. We could play this assurance game with a trademarked image to show compliance.

Hence the plan was an open source platform play focused on creating a competitive market of suppliers with a higher order exchange that built upon lower order components supplied by future utility providers of infrastructure. We knew that inertia of existing platform suppliers would be high, so we had little to fear there and the competitive market would help reduce consumer concerns.

We also knew the importance of building a wide ecosystem of consumers and tools (more on ecosystems later), so everything had to be provided through APIs. This would also help with the exchange concepts.

I've plotted many of these changes in figure 30 showing inertia barriers, higher order components and anticipated actions.

Figure 30 – Examining the map and change



Finally and most critical in this was speed of creating higher order systems, it had to be fast, it had to be accessible, it had to be easy, it had to provide useful metrics and it had to cover as wide a range of potential consumers as possible. However, developers (like everyone else) have inertia to change and there were going to be huge educational barriers. We needed a hook.

In 2005, the team started exploring and building out this space. It took three weeks until a sunny afternoon when I was sitting in the boardroom plotting various plays for two engineers to walk in and give me the hook.

These two outstanding engineers (they were all outstanding) walked in and said they could build a platform that used one language – JavaScript. The idea was developers would build

entire applications front and back end in this single language.

The CIO promptly came in to lend hia support expecting some sort of fight over this “crazy” idea. A fight happened but not the type they were expecting. The hook of JavaScript was perfect and our argument stemmed from me pushing them to open source everything from the get go. Rather than resistance they found enthusiasm.

The JavaScript hook was essential because whilst many developers would have inertia, there are a vast number of front-end developers with JavaScript skills who considered the back end a world of mystery. By taking this away, giving them one language, removing all the unpleasant tasks of building a system (what is commonly called Yak Shaving) then we had a new audience who could embrace whilst others adapted.

We could give the world a commoditized platform built on APIs with a single language, entirely open sourced with a competitive market and exchange. We could remove all those horrible yak shaving tasks of capacity planning, worrying about scaling etc. We could give the world “pre-shaved” Yaks.

And so, Zimki was born.

In the above I’ve written amply about **What** we were doing but didn’t we start this whole mapping exercise on the question of **Why**?

Why were we doing this?

Well, we knew our existing consultancy base value chain was going and we could see from the map how the markets associated with our value chains would evolve. We were positioning ourselves to exploit this, to create new revenue streams around platforms and to take advantage of anticipated

actions of new entrants and the inertia of past giants.

Our map gave us the ability to see our choices and where we needed to be. The **why** was the easiest part in fact it was the obvious thing to do.

Go back and look at figure 29 and ask yourself what would you do? Would you try and build some highly risk and uncertain new activity, would you continue knowing your model was dying or would you exploit the weak signals to commoditize an industry provided by products and with a huge market full of suppliers who were suffering with inertia to change?

The why is the easiest bit once you have a map.

The biggest problem for me at the time was the map had taken two of us (James Duncan, the CIO of Fotango and myself) about fifty-five minutes to draw up on a whiteboard and provided embarrassing riches of information about the future of the market. Yes, the actual map was slightly more complex but we had successfully written down the core parts of the next seven years of cloud computing before it had even happened.

I kept on looking at it going, this can't be right? It can't be that easy? It was.

We weren't some clumsy general bombarding a hill because every other general in every other battle was bombarding a hill, we had precise and clear situational awareness, we knew where to attack. The **why**, well that was … obvious.

Now, whilst I've mainly talked about IT (principally because this story is based around a software company), the same exercise of mapping can be done with an insurance company, a law firm to a car parking company. All have activities, practices and data that are evolving.

So what happened with Fotango?

By 2006, a utility platform as a service provided through APIs was built. Libraries for common routines were created, a simple NoSQL like object store developed, templating systems added, detailed metrics on pricing right down to individual functions, automatic conversion of new routines to web services, a GUI, exchange capabilities and a host of useful stuff was ready.

The speed of development was lightning fast. One system, a new form of wiki, was built and delivered live on the web from scratch in under an hour. Nothing came close in terms of speed and flexibility. We launched.

At the same time Amazon launched and we couldn't be happier. Not only had this big player immediately re-affirmed the market but also we could start to reposition the system to run on EC2. Our open source plans were announced in late 2006 and everything was timed for OSCON 2007.

Our map also told us what to watch for. We knew that some of the higher order systems to be built would become highly valuable. Our platform actually gave us a way of determining diffusion and success through customer consumption, so we had the opportunity to spot these new sources of value.

We knew that practices would change (co-evolve) because of more utility provision and we had to keep an eye out for this and adapt rapidly. We knew the existing industry would resist and be dismissive. Education was going to be key to turn the trickle into the flood.

We knew that the techniques used to build utility services were fundamentally different from genesis of the novel and new, so we re-organised around this. In fact we re-organised the entire

business around the flow of evolution but more on that later.

By early 2007 we were riding high. Zimki was rapidly growing and the engineering team had done the first installation of Zimki onto EC2. The open source plans were ready and we had demonstrated the exchange capabilities and how you could switch from private to public supplier. We had the keynote at OSCON and our last event had been packed 5 or 6 layers deep around our booth. It was insane. We had hit a home run and we were ready to take on those past giants and become the new Titans.

But we failed.

Not because the strategy or map was wrong, it wasn't. Today, the growth of services in the platform space shows this. We didn't fail because of the engineering team or because of weaknesses in the technology as we were far ahead of any competitor and the team was outstanding. We didn't fail to anticipate future customer needs or competitor actions - all of this was spot on.

We failed because I failed.

I had estimated in 2005 that this future utility market (nee cloud) would be worth $200 billion by 2016, something that more recent analyst reports have born out. However in 2005, it seemed like a crazy concept for many people that the world could change so rapidly. Some of those people included my board.

It was too far out of their comfort zone, it seemed incredulous and despite running a profitable company I lacked the political capital to pull this transformation of. In their minds, IT was best dealt with through outsourcing whilst the parent company concentrated on their core products along with new products like TVs. They were uncomfortable with the whole notion, our

tactical use of open source was counter to their normal experience of IP and they were set on their own path.

By the time of the keynote at OSCON, the open sourcing of Zimki was stopped, the plans to outsource the group became clear, Zimki and any notions of a management buy-out were a dead duck. These were perfectly rationale decisions based upon the parent company's focus on their current core, internal messaging and changes at that time.

This is where the power of mapping comes into play, because as Nokia has showed repeatedly – today's core is not tomorrow's.

Would Zimki have succeeded if it continued? Well, ask VMware's CloudFoundry, SalesForce's Heroku or Goole's AppEngine which followed much later. The answer is … we will never know. That time has passed.

By now, I'd hope the reader has some idea of the value of mapping, how activities (and practices and data) evolve, how economies move through cycles, how characteristics change, why different techniques are needed at different stages of evolution, why companies have inertia and why change isn't quite so random and unpredictable as is often implied.

In terms of progression, well there's this book and then there's the wider field of strategy. Let us imagine a karate grading system for strategy. If we accept that in the outside world there are black belts (1st dan and above) then assuming this was all new to you at the beginning, we've probably just earned our third junior belt (7th kyu, Yellow). We at least have some idea of how to map the environment, some notions of what an organization is and how things change.

We have a long way to go and even at the end of this book, we will be barely scrapping past 5th kyu (purple belt). However, I

cannot emphasize enough that this book won't make you a master strategist and these people do exist – I work with several at the Leading Edge Forum who are truly frightening in terms of capability.

This book might help you and the companies you work with survive in today's battles. So, I hope you'll continue the journey.

In the next sections I'm going to use the mapping techniques and fundamentals we've developed to explore new forms of organization, the fundamental importance of ecosystems, use of open as a tactical weapon, numerous strategies from defensive strategies such as **tower and moat** along with attacking strategies and the basics of putting together a battle plan.

The mapping technique is important because it will help us see **why** this stuff matters rather than the usual unclear and hand waiving notions that abound when people often talk about concepts like ecosystems.

Chapter 5

There are many here among us.

A Frequently Repeated Cycle

By now, the reader should understand that things are created (genesis) which are uncertain, rare, constantly changing and hence chaotic by nature. These things diffuse through society through various constantly improving iterations (evolution) driven by competition (consumer and supply). Ultimately they become a more common, well-defined and standardized (i.e. linear) commodity.

This process of evolution impacts activities (things we do), practices (how we do things) and data (through models of understanding).

Where those things can become components of higher order systems (e.g. nuts and bolts with machines) then as they evolve (become more linear) they accelerate the genesis of those higher order systems through componentization. This extends our value chains. Hence evolution is associated with increasing efficiency (of what is evolving) and increasing rates of speed and agility in creation of higher order systems. Genesis begets evolution begets commodity components begets higher order genesis ad nauseum.

The process is a continuous cycle that we commonly describe as “progress”.

The new higher order systems are sources of future wealth and hence we see flows of capital from the past to the new (creative destruction). However, the process is not smooth because practices tend to co-evolve with activities and hence we see inertia to change due to legacy constraints.

Equally suppliers have inertia due to past success, so the later stages of evolution (in particular the switch from product to utility) are associated with new entrants.

However, the change is inevitable as consumers are in constant

competition and the benefits of efficiency, increased agility in building higher order systems and new sources of wealth turn a trickle into a flood. All companies have to adapt just to stand still relative to an evolving and surrounding environment (Red Queen).

This pace of change will often catch out suppliers as they are lulled by consumer inertia to the change and the previous more peaceful, slow moving stage of relative competition. Hence we can describe the transition of competition around an activity as one of relative peace to one of war to one of wonder and creation of new higher order marvels.

The peace state can be characterized as one of incumbent giants with relative competition where sustaining change exceeds disruptive change. The war state is one of new entrants, a fight for survival and where disruptive change exceeds sustaining.

However the progress from peace to war is not unexpected and there is no reason (from culture to inertia) for why the past giants cannot be prepared. Disruption, unlike the case of unexpected changes in the market, is entirely preventable but rarely is prevented.

Of course, the change reduces barriers to entry and allows for new things that can impact value chains in unexpected ways (from gas lamps to light bulbs, from naturally harvested ice to ice making machines). Hence some indirect disruption is unpredictable and the innovator's dilemma runs rampant.

This cycle of changing states (wonder, peace, war) created by the interaction of inertia and the economic pressures of evolution (efficiency, agility and new sources of wealth) which is itself driven by competition (user and supply) and the need to adapt to competition (Red Queen), appear at both a local and macro economic scale.

The macro economic scale we tend to call Ages as in Industrial Age, Mechanical Age, Internet Age. Each has a time of Wonder, Peace and War.

In certain cases that which is evolving can accelerate the entire process for all things by improving communication e.g. postage stamp, telephone, printing press, the Internet. In all cases, the drive towards more evolved and higher order systems consumes greater quantities of energy (though our waste vastly outweighs this).

Beyond creating inertia, the co-evolution of practice with activities will result in new organizational forms from Fordism (the age of electricity) to Web 2.0 (the age of the Internet). In all cases, these new organizational forms are more adapted to this changing world of higher order systems and are more effective at managing the flow of change from chaotic to linear.

Each age can be associated with the evolution of organisations themselves.

However, our systems are far from perfect. Our tendency to one size fits all (one of the solutions of Ashby's Law of Requisite Variety) tends to create a yoyo between extremes. Whether project management (agile vs six sigma) to marketing (push vs pull) to structure (networked vs hierarchical). A better balance can be found through embracing both and as organization evolve we tend towards this balance.

Our confusion over this simple pattern stems mainly from terminology and our inability to see it. We use the word innovation to mean genesis, a feature differentiation of a product or even utility provision of a pre-existing model. Our use of the word hides the obvious pattern of evolution in a fog of "Everything's an Innovation".

The same problem extends to other parts of our language. The process of evolution (often called commoditization) is different from the process by which an idea gains economic value by implementation into a tradable thing (i.e. idea or concept turned into something real). Alas, the process that represents a conversion of social (idea) to financial (tradable thing) capital is called commodification and whilst it is entirely different from the process of evolution, the terms of commodification and commoditization are often used to mean the same thing. It's a bit like using the word chalk to mean cheese.

Hence in a world where obvious patterns are clouded by the misuse of terms, where companies often compete without any means of understanding the landscape that they exist within, we often believe they things are a lot more random than they are.

Strategy often becomes one of "do what others are doing" and vague hand waving notions. We grasp at concepts like inertia and disruptive innovation as though this explains all - "We couldn't help ourselves it was an unexpected change, we were caught by the Innovator's dilemma".

In some cases you are, in many cases you are not. You could have survived.

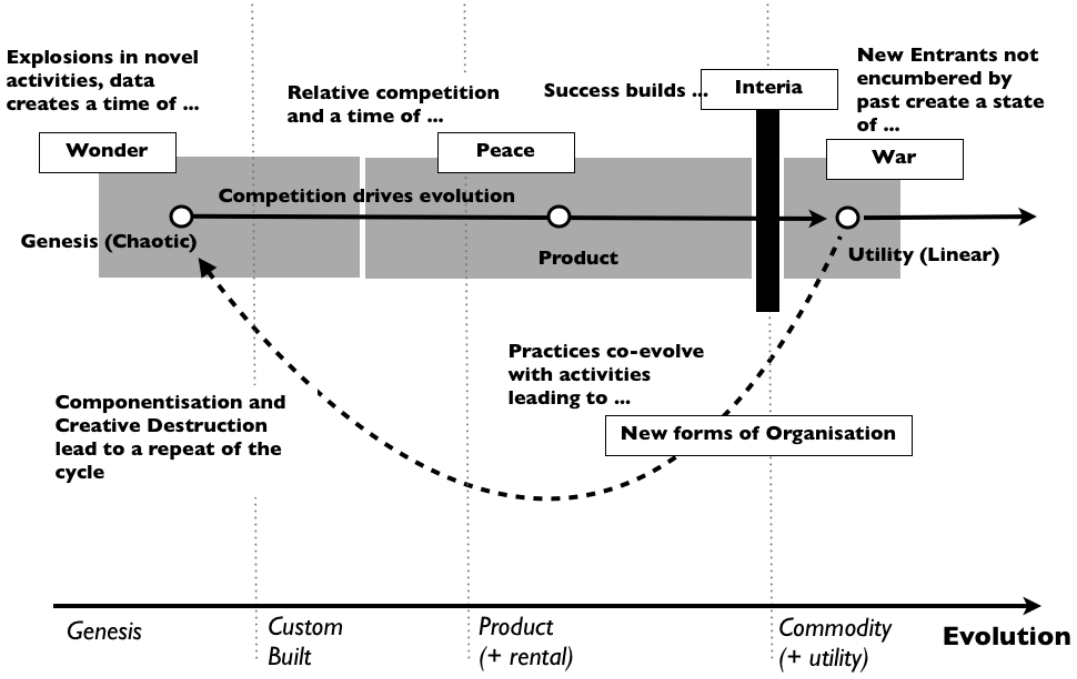
And so the cycle continues, new activities that appear evolve creating new inertia barriers (due to success) and a new war results from the inevitable march of competition. The same lessons are repeated, new forms of organization appear and we marvel at the changes.

The plethora of new activities created also results in new forms of data we have yet to understand, it is unmodelled or unstructured (if you insist). We stare in amazement at our progress as though somehow this time of wonder was any more

wondrous than any previous time of wonder. The cycle continues.

The cycle has occurred numerous times over the last three hundred years. Alas "the one thing we learn from history is that we never learn from history". In the hope that we learn this time, I've drawn the cycle in figure 31 and I've taken the liberty of removing the axis of value chain and drawing it as cycle. Each time we move through the cycle, value chains extend.

Figure 31 – A Frequently Repeated Cycle



So, let us bring ourselves to our modern day.

Driven by consumer and supply competition, the activity of computing infrastructure has evolved from products to more of a utility. It is so widespread and so well defined it can now support the volume operations needed.

New entrants not encumbered by pre-existing business models (such as Amazon) have initiated this change and a resultant state of war has developed in an environment that was once governed

by relatively peaceful competition between incumbent product giants (Dell, HP, IBM).

We see an explosion in the genesis of novel higher orders systems created on these utility services, a flow of capital into the new higher order systems and we marvel at the speed and agility of creation. Endless books are written on creative destruction, componentization and change.

As expected, practices have co-evolved with the activities. We talk of distributed systems, design for failure and chaos engines (or monkeys if you like). An entire movement known as “devops” has developed around these changes.

Consumers of the past models of provision (i.e. computing products such as servers) have also shown inertia to change. Citing all the typical risks and the issue of the legacy estates, they want all the benefits of agility, efficiency and new sources of wealth but without the cost of transition due to re-architecture. They want the new world but provided in an old way. They want the old dressed up as the new. They talk of enterprise clouds that are more rental services than utility.

Many of these consumers are oblivious to the issue that those benefits (efficiency, agility, wealth) are also pressures for adaption which will force them to change as competitors do. It’s not a question of “If”, it never has been. It’s a question of “When”.

Their suppliers encumbered by past business models race to provide this “old” world dressed up as new. They, suffering from their own inertia, are unaware that the trickle to the new world will become a flood at a pace they are not expecting. They watch Amazon thinking it will tail off, that it’s really only for new start-ups and green field sites. This is wishful thinking.

Along with changing practices and movements such as “DevOps”, new forms of organization appear. New structures, new ways of operating diffuse and evolve. Tomorrow’s Fordism has been with us for many years and it’s spreading.

As expected, for any student of history, we have also seen an explosion (as in genesis) of new data. Whilst the scramble to provide “big data” systems focuses on the issues of volume, it is the un-modelled nature of the data that is key. It wasn’t simply the volume of natural history data or the explosion in the number of books through printing presses that changed our world; it was the models of understanding that altered us.

This data will become modeled and we will progress in understanding but not without arguments of the Structured vs Unstructured or Dewey Decimal vs Cutter type beforehand. We blissfully ignore that all data starts as unstructured and it is through modeling that the structure is found.

It’s like our assumptions of innovation. It’s never the innovation of something that changes the world; it’s commodity provision as good enough components (e.g. nut and bolts, electricity, computing).

It’s not the volume of data that matters; it’s our model of understanding.

So, cloud is all about utility provision of pre-existing activities to commodity components, explosions in the creation of higher order systems, new sources of wealth, new practices, new forms of organisations and disruption of past models stuck behind inertia barriers and indirect disruption through changing value networks and lowering barriers to entry? Yes.

This was all perfectly clear in 1966 when Douglas Parkhill wrote the book the “Challenge of the Computer Utility”. It was only a

question of when.

By 2005, the weak signals of “when” were screaming loud. The “when” was NOW!

None of this should come as a surprise.

The CEOs of the past giants should have leaned over their shoulders and pulled down from their bookcases their “What to do when Computing Infrastructure is ready to be a utility” playbooks. These playbooks should have been crafted and refined over the decade beforehand when the weak signals shouted “getting closer”.

By the time Amazon launched, the past Giants should have prepared to launch at a massive scale. Culture is gameable and should have been gamed. Inertia is manageable and should have been managed.

By 2010, Amazon should have been crushed. The past giants should have dominated the market. They had all the advantages they needed. But that’s not what happened. Those past giants hadn’t mapped this change.

They were not prepared for the expected.

Many will suffer the same fate as previous companies who have failed to prepare for the expected from Blockbuster to Kodak. But before the normal round of excuses begin, the inevitable rush to safety of executives behind the “innovator’s dilemma” and claims of unexpected changes, let me blunt.

Those companies failed because their executives failed. Not culture, not inertia, not unexpected changes but instead a total failure of strategy. They were simply not up to the job or as Gandalf might say “fool of a Took”.

As I said in the beginning, this work is not about gaining advantage but about surviving and mostly that's surviving the expected. The cycle continues today, as it has in the past and as it will tomorrow.

So on the assumption that you're not one of those facing oblivion through some gross failure of past executive play, let us turn to the new forms of organization and practice that you'll need to deal with today.

The Next Generation

In 2005, I had the basics of evolution and mapping. By 2007, I had enough supporting data to call it a weak hypothesis (*correlation, causation and thousands of data points*). What I lacked beyond the use of the mapping technique in predicting market and competitor changes were more general predictions.

However, the cycle of change was pretty clear on the co-evolution of practice and how new organizations formed. The industry was already going through one change caused by the commoditization of the means of mass communication (e.g. The Internet) that had all the normal patterns plus a new form of organization, the Web 2.0.

What I wanted to know is could we catch the next wave. Would the shift of numerous IT based activities to more utility services create a new organizational form? Could I catch this?

Timing was critical and unlike my earlier work in genetics where populations of new bacteria are grown rapidly, I had to wait. So wait, I did.

By 2010, the signals were suggesting that this was happening, so at the LEF (Leading Edge Forum) we undertook a project in 2011 (published in the same year) to examine this. Using population genetics techniques, we were looking for whether a statistically different population of companies had emerged and their characteristics (phenotypes) were starting to diffuse. It was a hit or miss project, we'd either find the budding population or it was back to the drawing board.

We already knew two main populations of company existed in the wild - the **Traditional** enterprise and the **Web 2.0**. The practices from the Web 2.0 were already diffusing throughout the entire environment. Most companies used social media, they thought

about network effects, used highly dynamic and interactive web based technology and associated technology practices. The two populations were hence blurring through adoption of practices (i.e. the Traditional were becoming more Web 2.0 like) but also partially because past companies had died. But was there now a Next Generation budding, a new Fordism?

In early 2011, I interviewed a dozen companies that we thought would be reasonable examples of Traditional and Web 2.0 and where a couple of highly tentative Next Generation might exist. We developed a survey from those companies, removed them from the sample population to be examined and then interviewed over 100 companies divided roughly equally among those that described themselves as **Web 2.0** and those who called themselves more **Traditional**. We examined over 90 characteristics giving a reasonable volume of data.

From the cycle of change and our earlier interviews, we had guessed that our Next Generation was likely to be found in Web 2.0 group and in terms of strategic play they would tend to be focused on disruption (the **war** phase) rather than profitability (the **peace** phase). From our earlier interviews we had developed a method of separating out into candidate populations.

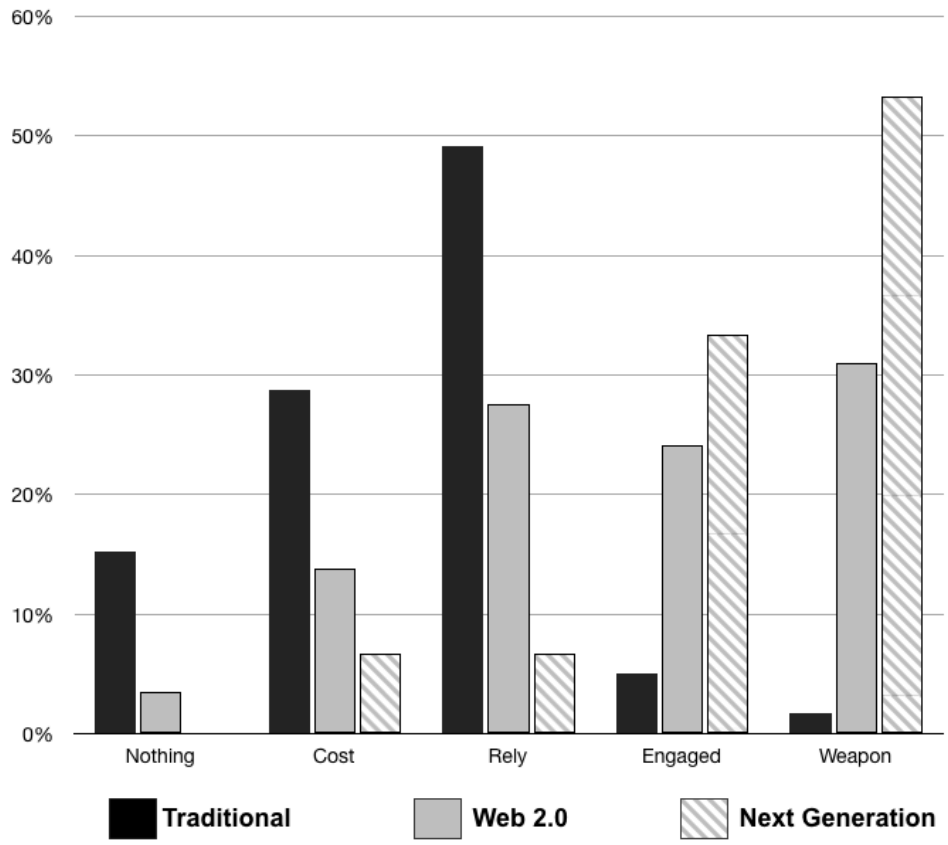
So, we separated the population sample out into these categories and looked at population characteristics - means and stand deviations. Were there any significant differences? Were the differences so significant that we could describe them as a different population i.e. in a sample of mice and elephants then there exist significant characteristics that can be used to separate out the two populations.

I ran our analysis and waited. It was an edgy moment, one of those I'm well used to. Had we found something or as per many attempts before had we found nothing? I tend to assume nothing and when there is something, I tend to doubt it.

The populations all contained a mixed of medium and huge companies and within this we found statistically significant population differences across a large number of the characteristics. I re-examined, looked through my work, tested, sought the advice of others and tested again - but it remained.

For example, I examined each company's view on open source and whether it was primarily something that means relatively little to them, a mechanism for cost reduction, something they relied upon, something they were engaged in or whether open source was viewed as a tactical weapon to be used against competitors. The result is provided in figure 32 with the subdivision by population type. Whilst the traditional companies mainly viewed open source as a means of cost reduction and something they relied upon, this Next Generation viewed it as a competitive weapon and something they were heavily engaged in. The Web 2.0 group had a broader view from cost to weapon.

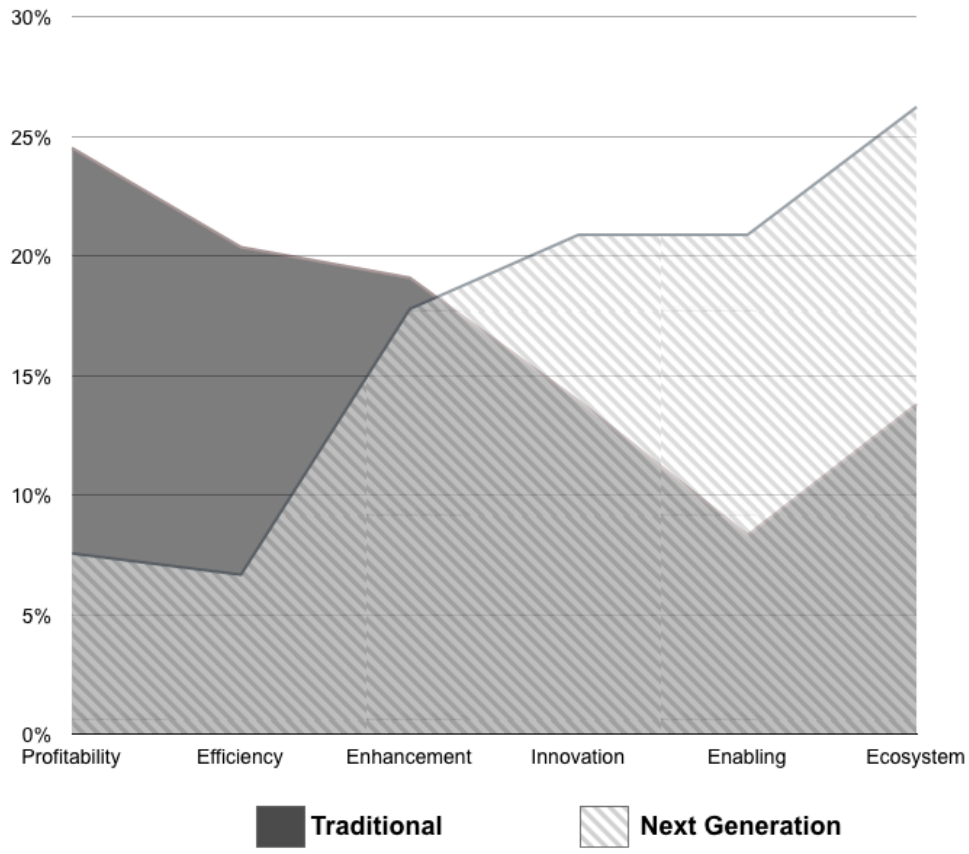
Figure 32 – Views on Open Source by Population type



This difference in population was repeated throughout many characteristics spanning strategy, tactics, practice, activities and form. The odds of achieving the same results due to random selection of a single population were exceptionally low. We had found our candidate **Next Generation**.

To describe this Next Generation, it is best to examine them against the more **Traditional**. Some of the characteristics show overlap as would be expected. For example, in examining the highest priority focus for provision of technology by a company whether it's profitability, enhancement of existing products and services, innovation of new products and services, enabling other companies to innovative on top of their products and services or creating an engaged ecosystem of consumers then overlaps exists (see figure 33).

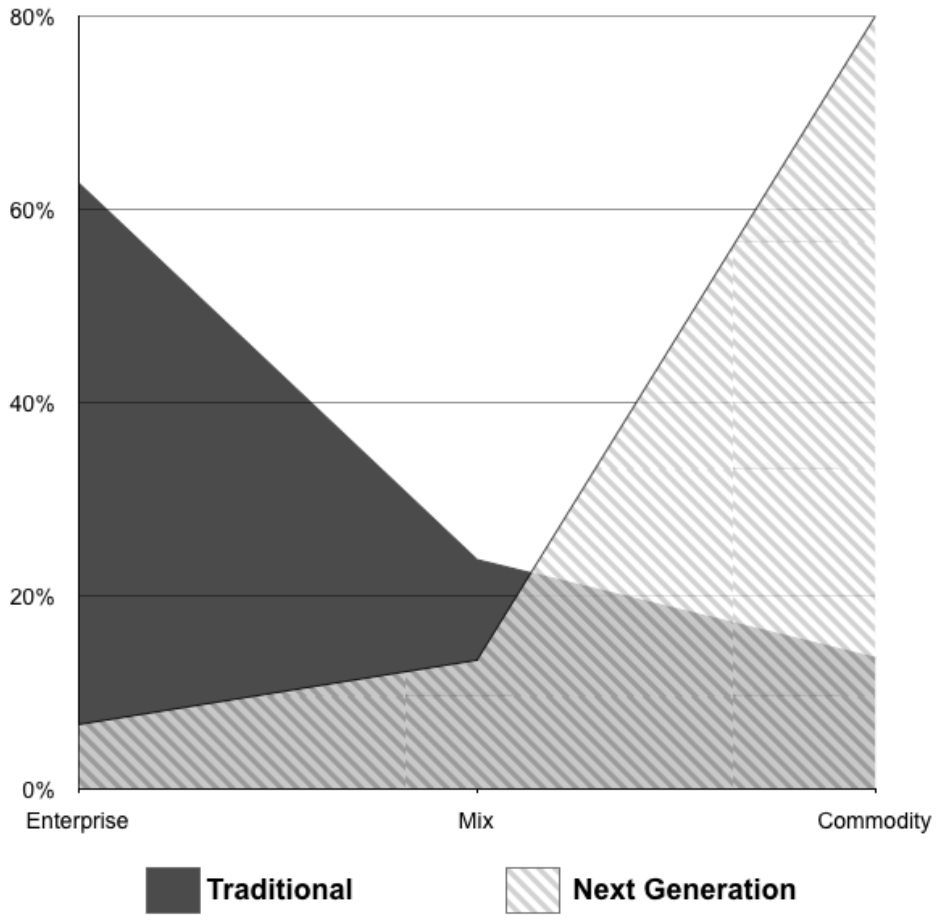
Figure 33 – Percentage of Companies ranking the following focus as high priority by population type.



Traditional companies were mostly focused on profitability (a **peace** phase mentality) whereas the Next Generation are mostly focused on building ecosystems.

In other areas, the differences were starker. For example, in an examination of computing infrastructure and whether the company tended to use enterprise class servers, more commodity servers or a mix of both (see figure 34)

Figure 34 – Type of Servers used by Population Type.



However, it should never be expected that there are no common characteristics or overlap but instead a significant difference in specific characteristics (i.e. Mice have two eyes, same as Elephants).

Using these populations, we then characterized the main differences between Traditional and Next Generation just to highlight the differences. There is also significant differences between Next Generation and Web 2.0 but naturally they are lesser than in comparison to Traditional Enterprises which formed in an earlier cycle of change.

Figure 35 gives the main differences (though not all) and we'll go through several of these differences in turn.

Figure 35 – Difference between Next Generation and Traditional

		Traditional	Next Generation
Type	Organisation		
Structure		Departmental	Service / Cell
Culture		Inertia	Fluid / Gameable
Corporate Focus	Strategy / Tactical	Profit	Disruption
Open source		Cost Reduction	Weapon
Learning		Analysts	Ecosystem
"Big" Data		Used	Driven By
Resilience		N+1	Design For Failure
Failure Testing		Disaster Recovery	Chaos Engines
Capacity	Practice	Scale Up	Scale-out
Technique		Single	Mixed
Deployment		Change Control	Continuous
Infrastructure	Activity	Enterprise Class	Commodity

Organizational Form

Structure

Traditional organizations used a departmental structure often by type of activity (IT, Finance, Marketing) or region. The next generation used smaller cell based structures (with teams typically of less than twelve) often with each cell providing services to others cells within the organization. Each cell operated fairly autonomously covering a specific activity or set of activities. Interfaces were well defined between cells.

Culture

In traditional organizations culture is seen as relatively fixed, difficult to change and often a source of inertia. In next generation the culture is viewed as more fluid and gameable.

Strategy / Tactical Considerations

Focus

Traditional organizations tend to focus on profitability (a peace phase mentality) whereas the Next Generation is primarily focused on disruption of pre-existing activities (a war phase mentality). This is not considered to be a long-term distinction.

Open Source (including Open Data, Open APIs etc)

In traditional organizations, the use of open systems (where source, data, APIs or other) is viewed primarily as a means of cost reduction. In some cases technology or data is provided in an open means.

In Next Generation, open is viewed as a competitive weapon, a way of manipulating or changing the landscape through numerous tactical plays from reducing barriers to entry, standardization, eliminating the opportunity to differentiate, building an ecosystem and even protecting an existing value chain.

Learning

Traditional organizations tend to use analysts to learn about their environment and changes that are occurring. The Next Generation use ecosystems to more effectively manage, identify and exploit change (more on this in the next section).

"Big Data"

Traditional organizations use big data systems and are focused primarily on the data issue. The Next Generation is run by extensive use of modeling and algorithms. Whilst the focus is not on the data per se but the models, these systems are not simply used but run the company.

Practices & Activities

Architecture and Infrastructure

Traditional organizations tend to use architectural practices such as scale –up (bigger machines) for capacity planning, N+1 (more reliable machines) for resilience and single, time critical disaster recovery tests for testing of failure modes. These architectural practices tend to determine a choice for enterprise class machinery.

The Next Generation has entirely different architectural practices from scale-out (or distributed systems) for capacity planning, design for failure for resilience and use of chaos engines (i.e. the deliberate and continuous introduction of failure to test failure modes) rather than single, time critical disaster recovery test. These mechanisms enable highly capable systems to be built using low cost commodity components.

Development

Traditional companies tend to focus towards singular management techniques for development (e.g. Agile or Six Sigma) and often operate on a change control or regular process

of updates. The Next Generation tends towards mixed methods depending upon what is being done and the process of development of novel aspects is usually continuous with no specific time period for releases.

The LEF published the work in Dec 2011 and since then we have observed the diffusion of many of these changes. I very much however don't want you to read the above list and go, "this is how we create an advantage!" but instead to be realistic. The above characteristics are already diffusing and evolving, tens if not hundreds of thousands of people and their companies are well aware. You'll need to adapt simply to survive. Any real advantage has already been taken and the only advantage to be gained is over those who are slower to adapt.

However, the point of this exercise is not what are the new organizational forms (many books have or are being written on this subject by others) but that a new organizational form could be predicted to emerge in the first place.

The model suggested this in 2005 but I had to wait until 2011 to confirm this in its first instance (such is the slow nature of experimentation with companies). The above appear to be the characteristics of the New Fordism though it'll take a decade or more to confirm.

By which time, if the model holds then the next wave of change (related to commoditization of the manufacturing process itself) will itself have created a new Next Generation, a "New New Fordism" so to speak. In much the same way every previous wave has created its own Fords – the Systeme General, the Plymouth and the American System, Fordism etc.

Now, who are the New Fords and is there any pattern to where this evolution is heading? Well, the former I'll keep to myself whilst the latter I'll discuss briefly when we talk about the

future.

For now, it’s enough to know that co-evolution of practice can lead to new organizational forms and this is happening today. In the next section, I want to turn my attention specifically to the subject of ecosystems and open source, after which we can revisit our map and get on with the really interesting stuff.

Ecosystems

When you consider an organization and the value chains that describe it then there are five groups of other organizations and individuals that any company interacts with.

There are the inputs into the value chain **(suppliers**), the outputs of the value chain (**consumers**), the people that operate and manage components of the value chain (**employees**), equivalent organizations that the company competes and co-operates with (**competitors** and **alliances**) and sources of learning or potential improvement to the value chain (wider **business and academic** environment).

These groups are the company's ecosystem.

Each of these ecosystems provides many opportunities for discovery, improvement and manipulation of the landscape. The techniques of which often change depending upon how evolved the activities, practices and data models are and how they are used.

For example, let us consider a company whose output is more of a completed product (e.g. a Kettle) rather than a component product (e.g. Nut and Bolt) and the product is sold to the public.

The consumer ecosystem (in this case public consumers such as you and I rather than other organizations) can provide information on improvement, quality control, reliability and price sensitivity. This is normally achieved through secondary sources i.e. not directly derived from interaction with the product itself but instead surveys, warranty cards, sales volume, customer services and it can even extend to co-creation of the product.

The ecosystem can also be influenced through marketing,

branding and association of the product with other values (e.g. buying this kettle will make you look cool, save a rainforest etc).

An ecosystem of consumers provides ample opportunities for manipulation and learning. There exist plenty of learned tomes on this subject and so I will assume the reader is familiar with this already.

The same opportunities also exist with all the other ecosystems and various models exist for benefiting from this such as the whole Enterprise 2.0 approach, use of wikis and internal social media tools with the employee ecosystems.

In this section, I want to concentrate on four specific issues with ecosystems – one is a model known as ILC, the others are two factor markets, alliances and the focus of competition.

The ILC model

This model is most frequently used when the output of a value chain is a component of other value chains (e.g. in the technology industries - a software development suite used by other companies to develop other software products or provision of a software API which is consumed by multiple other systems).

The operation of the model is fairly simple. The supplier provides the component that others consume in their value chains hence creating an ecosystem. Through efficiency in provision, the provider encourages the ecosystem to create new activities (i.e. genesis) by reducing the cost of failure. Genesis by its natures is highly uncertain and risky; hence reducing the cost of failure becomes a way of encouraging innovation.

As any of these new activities spread, the supplier can detect this diffusion through consumption of the underlying component thereby leveraging the ecosystem to spot future sources of wealth. The supplier then commoditizes these newly detected

activities to components hence enabling the development of new higher order systems.

In effect, the supplier eats part of the ecosystem (i.e. those diffusing higher order activities) in order to provide new components that help the ecosystem to grow.

For example, the provider of a software development environment as a product can monitor the rapid growth in consumption of the product (i.e. buying licenses) and investigate those industries to identify any new activities being built. This is not actually that effective a technique because the cost involved in monitoring is high and there are significant time delays.

But let us suppose you were a provider of utility computing infrastructure services (e.g. something like Amazon EC2). Then not only does the provision of these services enable rapid creation of higher order systems by encouraging experimentation through a reduction in the cost of failure but also the supplier has direct access to information on consumption.

Let us suppose that one of these new higher orders systems (e.g. “big data” systems built with hadoop) started to diffuse. Through consumption of the component infrastructure service you could detect this diffusion in close to real time and hence rapidly decide to commoditize any new activity to your own component service e.g. in this case by introducing something like Amazon Elastic Map Reduce.

Naturally, you’d be accused of eating the ecosystem if you did this repeatedly but at the same time your new component services would help grow the ecosystem and create new higher order services.

The operation of the model is shown in figure 36 to 38 and it exploits componentization effects as well as the changing

characteristics of activities as they evolve.

In essence the supplier encourages others to innovate (take the high risk gamble associated with chaotic activities), leverages the ecosystem to spot diffusion of successful changes and then commoditizes rapidly to component services. The cycle of Innovation – Leverage – Commoditise (ILC) is then repeated for subsequent higher order systems.

Figure 36 – A Standard View of Evolution

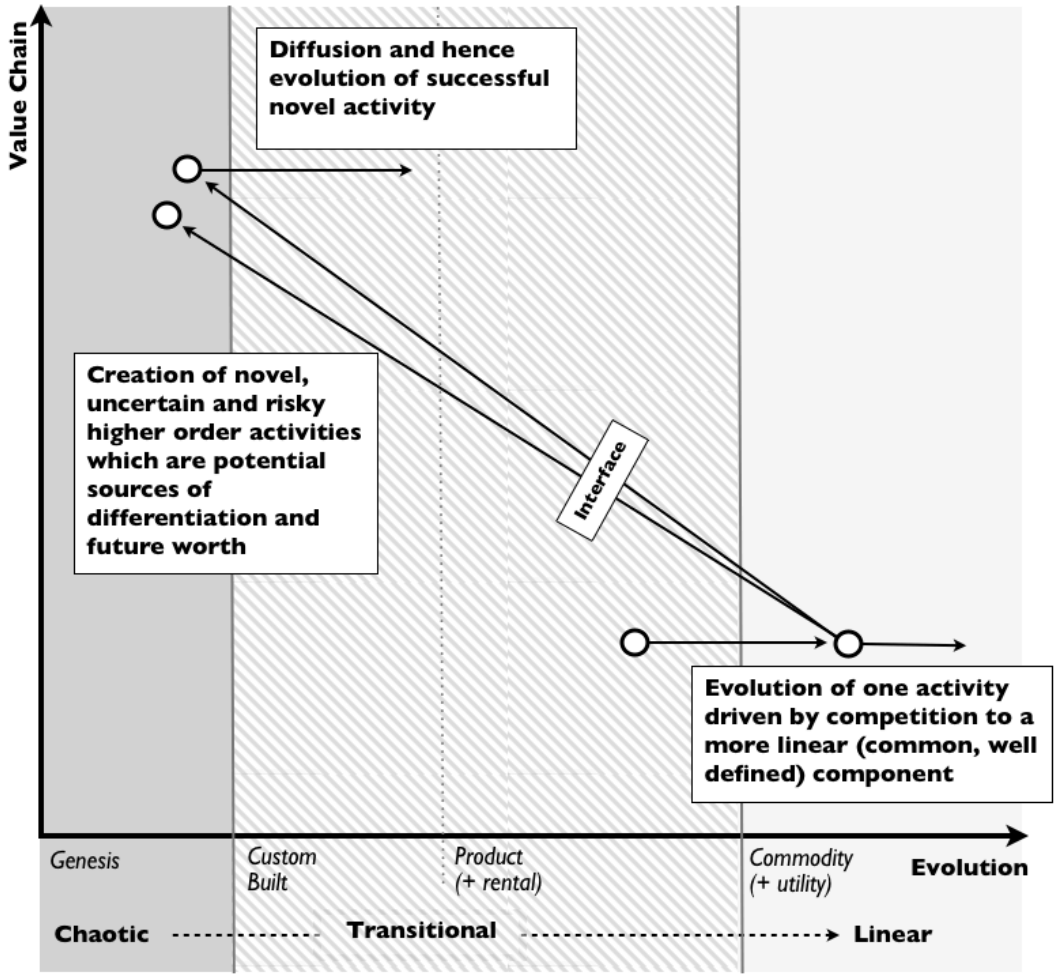


Figure 37 – Ecosystems and ILC

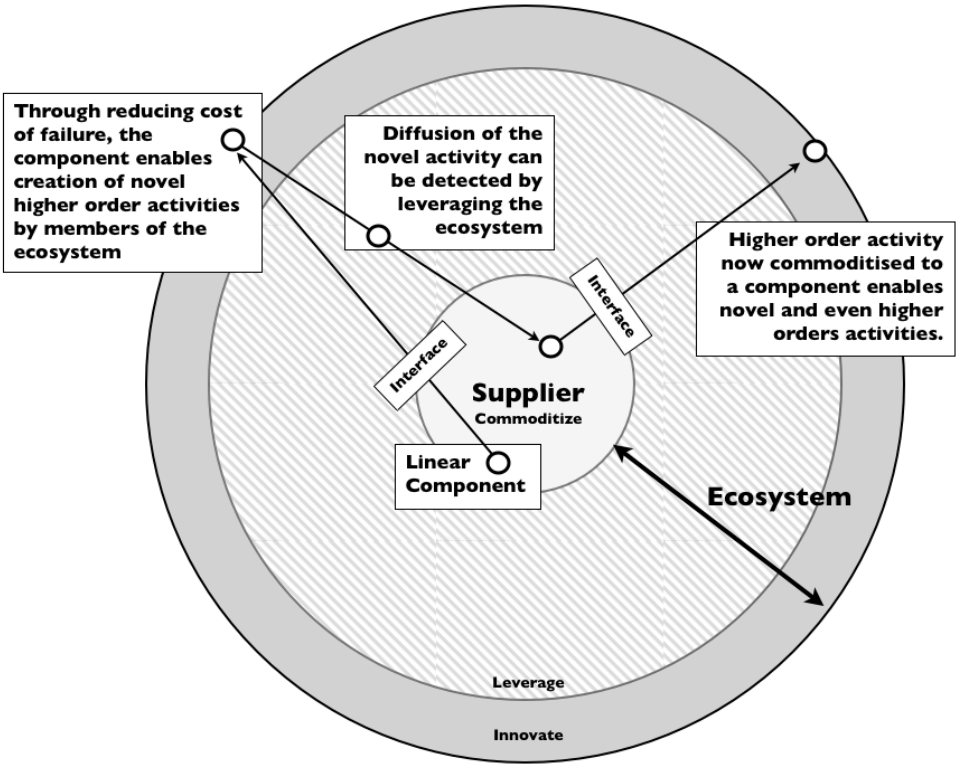
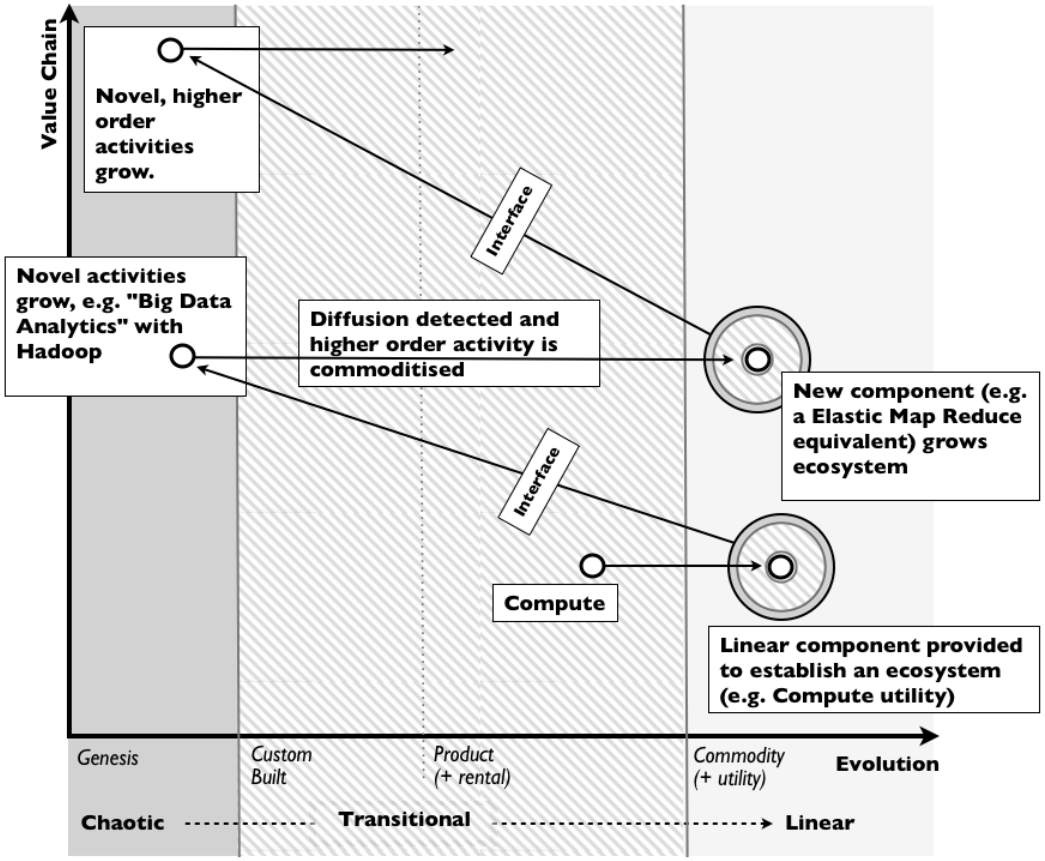


Figure 38 – A Map View of ILC



The component services are in effect your “platform” (though I prefer the term “garden”) around which you carefully nurture and grow an ecosystem. Like any gardener you’d have to balance this eating (or harvesting) of the ecosystem with the benefits that new components bring in growing it and the overall health of the garden (i.e. level of disquiet over the occasional munching session).

The effectiveness of this model depends upon a wide range of different factors: -

Scope of the component: how broadly useful the component is. Is it a specialized component (e.g. a software service given train times for a specific train station) or used in a wide variety of value chains (e.g. a nut and bolt or electricity or computing infrastructure). The essential measures here are volume (how much it is used) and variation (i.e. the number of value chains consuming it).

Speed of feedback: ideally information needs to be captured directly on consumption of the activity rather than through secondary sources such as surveys. For this reason, it’s ideally suited to the world of utility provision where the supplier can directly detect the consumption of a component.

Ability of the supplier to act: is the supplier able to capture the information and are they willing to leverage the ecosystem to its benefit?

Efficiency of provision: how efficiently is the underlying component provided? Critical to this game is reducing the cost of failure within the ecosystem and hence encouraging experimentation and creation of new activities by others. Certainly provision of a former products as utility services will gain benefits for reduced capital expenditure by consumers, however efficient provision will also exploit volume effects and

the larger the ecosystem the higher the rate of genesis.

Management of the ecosystem: the act of commoditizing to new component services is one of eating the existing ecosystem (either through acquisition or copying). The purpose is to provide new component services that help the ecosystem to grow and increase the usefulness of the entire range of components provided by the supplier. Care should be taken not to too aggressively eat the ecosystem otherwise organizations may become wary of developing with the components.

The effects of this model are extremely powerful but it needs to be managed carefully. For the supplier, the rate of innovation (i.e. genesis of novel activities) is no longer dependent upon the physical size of the supplier but the size of the ecosystem of consumers.

Equally, the ability to spot new and useful activities is extended beyond the supplier and its interaction with its consumers to an ecosystem of consumers who in turn supply activities to other consumers i.e. this much wider ecosystem are all consuming the base component activity and providing information on diffusion. Finally, the efficiency of provision depends not only on the volume required by the consumers but also this wider ecosystem where consumers themselves are suppliers to other consumers.

Hence the rate of innovation, customer focus (i.e. spotting new and useful trends) and efficiency of the supplier all increase with the size of the ecosystem itself rather than the physical size (as in number of employees) of the supplier.

Through the use of a model like ILC, it's entirely possible for a company to appear to be simultaneously innovative, customer focused and efficient which is counter to the popular management doctrine of choose one. Furthermore the rates of each (if properly managed) can increase with the size of the

ecosystem which itself can increase at faster rate than the physical size of the company.

In other words, the bigger the company gets the more innovative, efficient and customer focused it becomes.

For many of the followers of my writings over the last decade this will be a “where’s the good stuff?” moment. However, for others this model might be quite surprising and hopes of competitive advantage might appear. So, I want to once again bring things down to earth because ILC can overexcite some people.

The origin of the technique above started around 2002. It was an essential part of the Zimki strategy in 2005 and so well described by 2010 that I included it in part in “The Better for Less” paper that in turn had some influence in formulating UK Government ICT strategy.

ILC and techniques of exploiting ecosystems are powerful but becoming increasingly common. Using and growing them is more of survival today, not of gaining advantage.

There are three other aspects of ecosystems that I also want to mention.

Two Factor Markets

The two-factor market is a special case of ecosystem that brings suppliers and consumers together (hence two factor). Examples would include a farmers market, an exchange and Amazon’s online retail site. These not only provide ample opportunity for exploitation but they have powerful network effects as the consumers attract suppliers and the suppliers attract consumers.

Alliances

In the cases where you're either competing or may compete against a large and threatening ecosystem or if you simply want to prevent this scenario occurring or want to nullify any advantage then the only way to do this is to build a bigger ecosystem. However, you don't have to do this alone but can operate in an alliance with a view of taking a "small piece of a big pie" rather than a "big piece of a small pie".

In the case of Zimki, the stated purpose of open sourcing the technology was to create a large pool of suppliers that competed on service with switching between them in order to overcome consumer concerns on lock-in. The focus for Fotango was to take "a small piece of a big pie" whilst building an exchange (a two factor market) of Zimki suppliers and consumers.

Now, creating such alliances can be tricky because individual suppliers (especially those with a product mind-set) will attempt to differentiate on features rather than service which in turn will limit switching hence raising consumer concerns whilst weakening the overall ecosystem. Equally suppliers will also be concerned over any loss of strategic control or dependency upon a third party i.e. a captured rather than a free market.

Hence with Zimki, the technology could have been provided as a proprietary offering but each Zimki supplier would then have been dependent upon Fotango. We would in effect have exerted a tax on the market both in terms of the licensing of the technology and also in controlling the future direction, furthermore we would increase barriers to adoption due to the constraints. The upside is we would limit any differentiation by suppliers.

By open sourcing the technology, we would remove the constraints, barriers to adoption and any tax on the market. However, we would open the door to differentiation by the

suppliers on feature rather than service thereby weakening switching and the overall ecosystem.

To balance this, we needed to use a technique of assurance through trademarked images.

By open sourcing the entire platform technology, we would enable other competitors to become Zimki providers, remove barriers to entry and help establish a market. The trademarked image was only to be available for those who would comply with our monitoring service and hence we could provide assurance that this provider hadn't differentiated the service by function in a way that any consumer would now be unable to switch.

This mix of open sourced technology and assurance through monitoring and a trademarked image is a way of balancing the needs of suppliers (i.e. low barrier to entry, a free rather than a captured market controlled by one player), the needs of consumers (a competitive market with switching) and the needs of the company forming the market (a wide and healthy ecosystem which can compete against alternatives).

Recently, similar examples of such play have appeared e.g. CloudFoundry, a platform as a service offering provided by VMware, is not only open sourced but provides a trademarked assurance service through CloudFoundry Core.

Equally, Google whose value chain around data was under potential threat from Apple and the walled garden created by IOS has an open source technology (Android), a trademarked image on Android, the Open Handset Alliance and a mechanism of assurance through Android's compatibility test suite. The Android ecosystem has rapidly risen to now dominate the smartphone market.

The importance of the control mechanism and careful

management is in negating any effective “collective prisoner dilemma” when the members of an alliance in act of self-mutilation attempt to differentiate in their own immediate interests weakening the entire ecosystem and their own long term interests in the process.

The game is also highly nuanced. For example, when facing an existing and effective competitive ecosystem it is often better to co-opt rather than differentiate from it in the first place, a model of “***embrace and extend***”.

Hence in the case of utility infrastructure provision, if you were to go up against Amazon and its well-developed and highly effective ecosystem then co-opting the ecosystem would be the first order of the day. Since the ecosystem (and all the higher order activities created) are built upon the standard interfaces (APIs) of Amazon this means in effect providing identical APIs in both form and function.

Fortunately, under both European and US Law, APIs are not currently copyrightable (being principles) whereas the code that implements it is (being expression). Hence APIs can be re-implemented through reverse engineering. This practice we’ve seen with groups such as Eucalyptus and CloudStack (a Citrix project which is part of the Apache Foundation) who have both clearly stated directions of emulating the Amazon APIs.

Creating a competitive alliance is not a simple task neither is competing against an established ecosystem. There are plenty of pitfalls including the breakdown of an alliance through a collective prisoner dilemma. However, as in the case of Android, when it works it’s a highly powerful tool.

The focus of competition

The last thing I wish to mention is the focus of competition. The process of evolution is driven by consumer and supplier competition and those consumers and suppliers can either be individuals (as in the general public) or companies. This is not a static situation but it is fluid.

For example, let us consider the use of computers. To begin with both the suppliers and consumers of computers were companies. The sale, provision and competition around computers with the first products (such as the IBM 650) were all focused on business to business (B2B).

However, computers were made of components such as processing, storage and then networks that were evolving and becoming more of a commodity. The rate of evolution of those different underlying components affected the path that computing took. For example, because processing and storage commoditized faster than the network, the industry went through a transition of Mainframes to Mini computers to PCs to Tablets. However, had networks commoditized faster relative to processing and storage then an entirely different path of Mainframes to Personal Terminals to Tablets would have been possible. The rate of evolution of components can alter the path that higher order systems take.

However, what also happened is that the focus of competition in part shifted from being governed by B2B to being governed by Business to Public Consumers (B2C) as companies sold personal computers. In the same way, email (which started as primarily an academic and then business focused tool) shifted to the public consumer market with the introduction of services such as AOL.

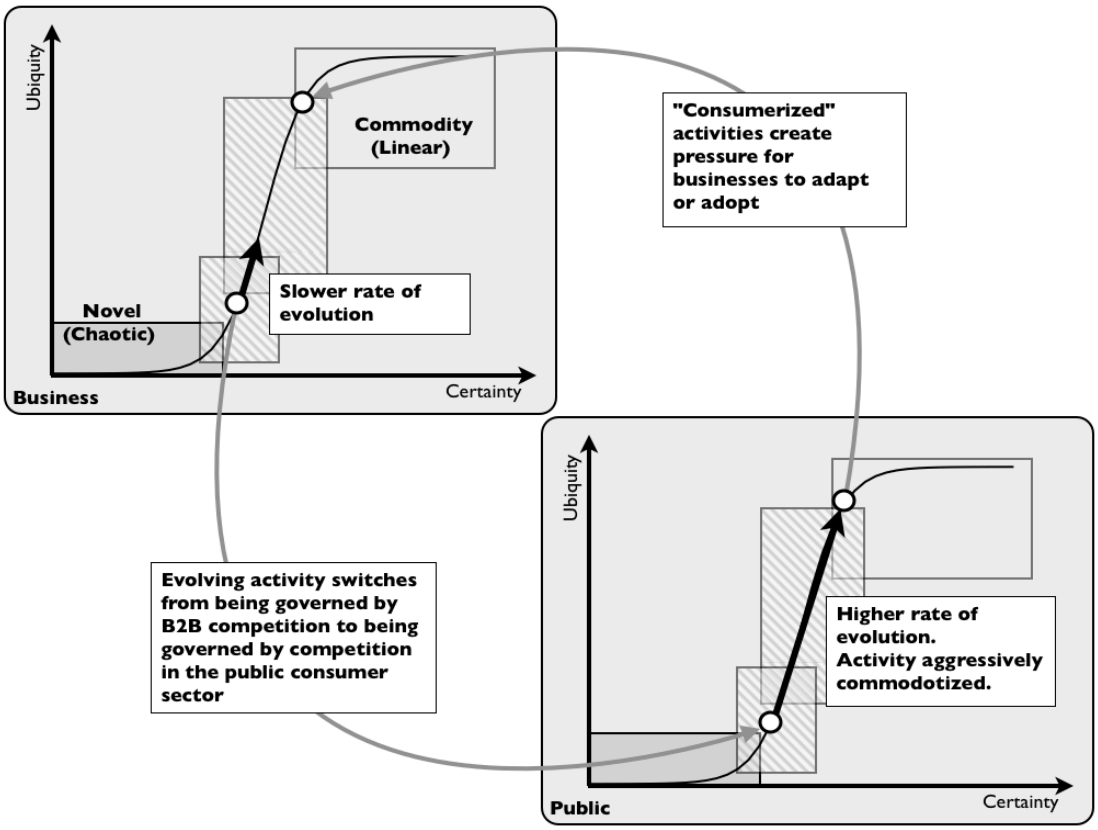
What is important to understand is the rate of evolution is not uniform between the business ecosystem and the public consumer ecosystem. Hence as the competition around email

shifted to the public consumer market (with the introduction of services such as Yahoo and Google Mail) then the public consumer market developed highly commoditized email services. In many cases these were vastly more commoditized and efficient than the equivalent activity in the business ecosystem, which was often provided by products.

Pressure mounted for those business consumers of email to adapt (and in many cases adopt) these more “consumerized” services available to the members of the public.

This shift of competition and hence evolution from being governed by B2B, where companies represent both the suppliers and consumers of the activity, to one governed by competition in the public consumer space is known as “Consumerization” (as described by Doug Neal, LEF in 2001). See Figure 39.

Figure 39 Consumerization



Now, not all activities undergo this process. Many activities remain governed by competition in one ecosystem i.e. between companies with companies representing being consumers and suppliers. An example of this would be Financial ERP systems.

Equally, consumerization is not a one-way street. Activities that evolve and are governed by competition in the public consumer space can be forced into the business ecosystem. An example of this would be radio broadcasting equipment, a once vibrant and rapidly developing activity in the public consumer space with many public hobbyists creating and sharing capabilities which was forced under the control of companies through the legislative control of the radio frequency spectrum.

The point to note is that the rate of evolution can rapidly change if competition around an activity switches focus from the business to public consumer ecosystem. Now, I won't detail all the aspects of ecosystems mainly because there are numerous books covering Enterprise 2.0, use of Social Media, Supply Chain relationships and the above should provide the reader with the basics for the mapping exercises latter in this work.

It's enough to be aware that various forms of ecosystem exist, exploitation can have powerful effects, the rate of evolution of components can effect the path that higher order systems follow and the rate of evolution can rapidly change as the focus of competition around an activity switches from one ecosystem to another. By now, you should have a good appreciation of the complexity of change and also why without maps it's no wonder that strategy becomes vague hand waving.

One final note, you should also have some understanding of the difference between the terms **Consumerization** (the process by which the focus of competition shifts from business to consumer ecosystem), **Commoditisation** (the process of evolution for activities) and **Commodification** (the process by which an idea

with social value becomes instantiated as an activity with economic value). Endless confusion abounds because those entirely different concepts are constantly jumbled together as though they are the same.

Since I've already mentioned open source in this section, I will now turn our attention to the use of open as a competitive weapon.

Open

When Linus Torvalds launched the Linux project in 1991, few people could have imagined that free software developed by open communities would ever match, let alone surpass, the efforts of industry giants such as IBM and Microsoft. Yet in a wide range of areas this has been precisely the case.

The full market value of this open technology is however impossible to calculate because it is not formally accounted for. How can we measure the value of Wikipedia's commons of open content? In one study by O'Reilly Media, the global value of open source to just the computer hosting market was estimated at over $100 billion, and this is only a part of the overall open technology industry. According to the Black Duck Research, there are over 600,000 open software projects using over 100 billion lines of code and drawing on 10 million person-years of effort.

Studies have also shown that roughly 90% of large organizations already use open source (and the rest probably don't realize that they do) and 75 percent of the world's top 10,000 websites are built on open-source technology. Whichever way you look, open technologies are having a powerful impact.

Along with these extraordinary achievements, it has also long been speculated that the 'open' *meme* would eventually spread to non-IT sectors. There are three main reasons why this was likely. First, software has become increasingly important in virtually every industry, and thus it seems logical that the dynamics of the software industry would spread to other sectors. Second, as the Internet is now the backbone of most modern businesses, much more open forms of community innovation are now possible in just about every industry. Third, cost and innovation pressures are now so great in so many sectors that new approaches must increasingly be considered.

While these forces have existed for some time, it appears that

open approaches are now starting to become widespread across the broader economy. In addition to many open source software projects, we have recently seen a growing emphasis in universities on open science and open curricula; increasing government commitments to open data; and perhaps most intriguingly, impressive demonstrations of the power of open-manufacturing designs when combined with 3D printing. There is now ‘open’ activity at virtually every level of business and IT.

However, for many, the word ‘open’ as in ‘open source’ still conjures up concepts of hippy idealism where people give away their work to others for nothing in a spirit of generosity and passion. In today’s world, this view is increasingly naive. An open approach is a powerful weapon in the hands of experienced strategists. It can be used to remove barriers to entry into an opponent’s business, encourage standardization around your own practice, develop an ecosystem to strengthen your position, as part of a land grab for new sources of value, and even as a source of new talent.

I use the term *open technology* above because these ‘open’ approaches are not limited to open-source software but also open data, open hardware, APIs, open science and open processes.

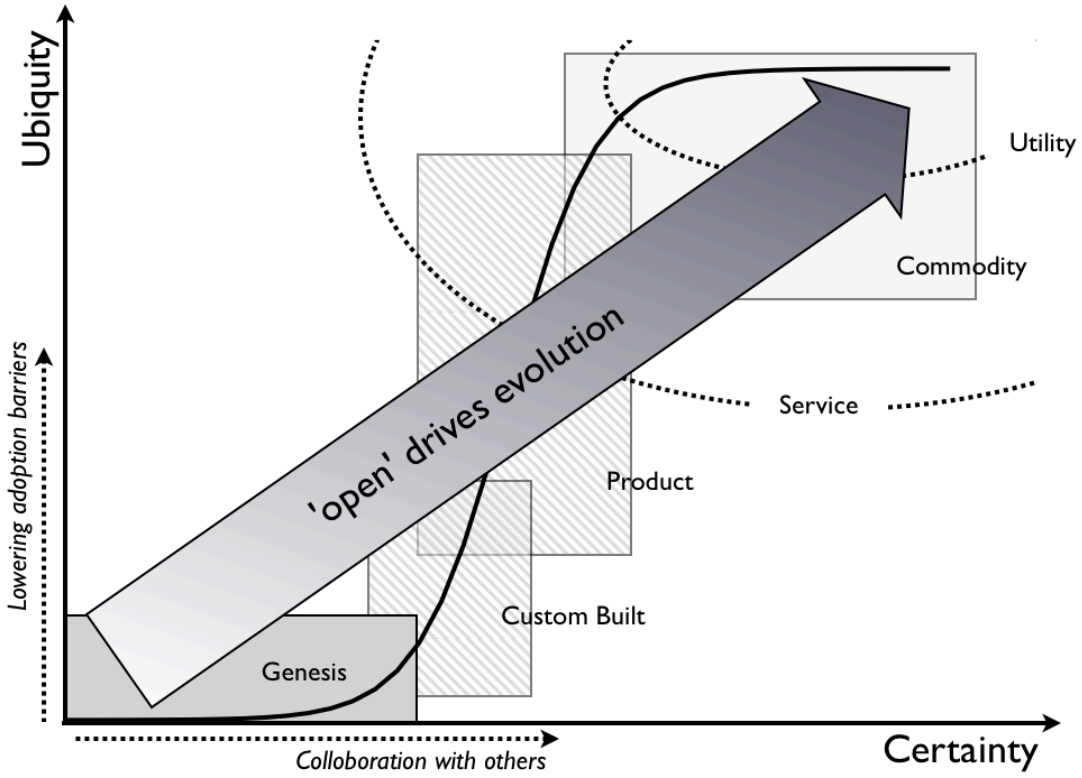
But how did something that began two decades ago with a simple bulletin board message inviting people to collaborate on operating system project have such a powerful and transformative impact?

It is essential to understand that when Linus Torvalds posted that message he asked others to contribute and comment. By doing so, Torvalds created a community of contributors and launched a new ‘open’ method of community development.

The key is not only the openness of what is created (in terms of

licensing of the code or data) but also the collaborative approaches to working. These two aspects when combined drive the evolution of any activity, practice or data. The openness drives ubiquity by removing barriers to adoption, the collaborative working drives feature completeness, understanding and hence certainty (see figure 40).

Figure 40 Impact of Open



The consequences of evolution should by now be familiar to the reader. As anything evolves it becomes more efficient and can enable rapid development of higher order systems through componentization effects. Hence the effects of making something open are four fold – rapid adoption, improved feature completeness, higher efficiency and rapid genesis of higher order systems.

Whilst these are entirely separate effects, they are often lumped together under the single term *innovation*, such as product

innovation (feature completeness), marketing innovation (adoption) and the genuine creation of something novel and new (i.e. genesis). It's worth keeping these separate and I'll explain why in the next section.

Openness, Innovation and Maps.

In an examination of the 500 most active open-source projects, Krzysztof Klincewicz calculated that 99 percent of them focused on an existing technology or modification for a new market whilst only 1 percent represented the creation of a genuinely new idea i.e. the rates of genesis are little or no different to proprietary approaches.

BUT, since evolution results in the development of new low-cost building blocks (components), it does increase the genesis of higher-order systems as a secondary effect, and open technologies are seen to substantially increase "*innovation*" overall by providing platforms on which the novel and new is created.

An example would be the Apache Web Server that has, by providing a low-cost building block (component) for web serving, accelerated the genesis of higher-order systems such as web sites. In effect, Apache has provided a 'platform for web innovation'.

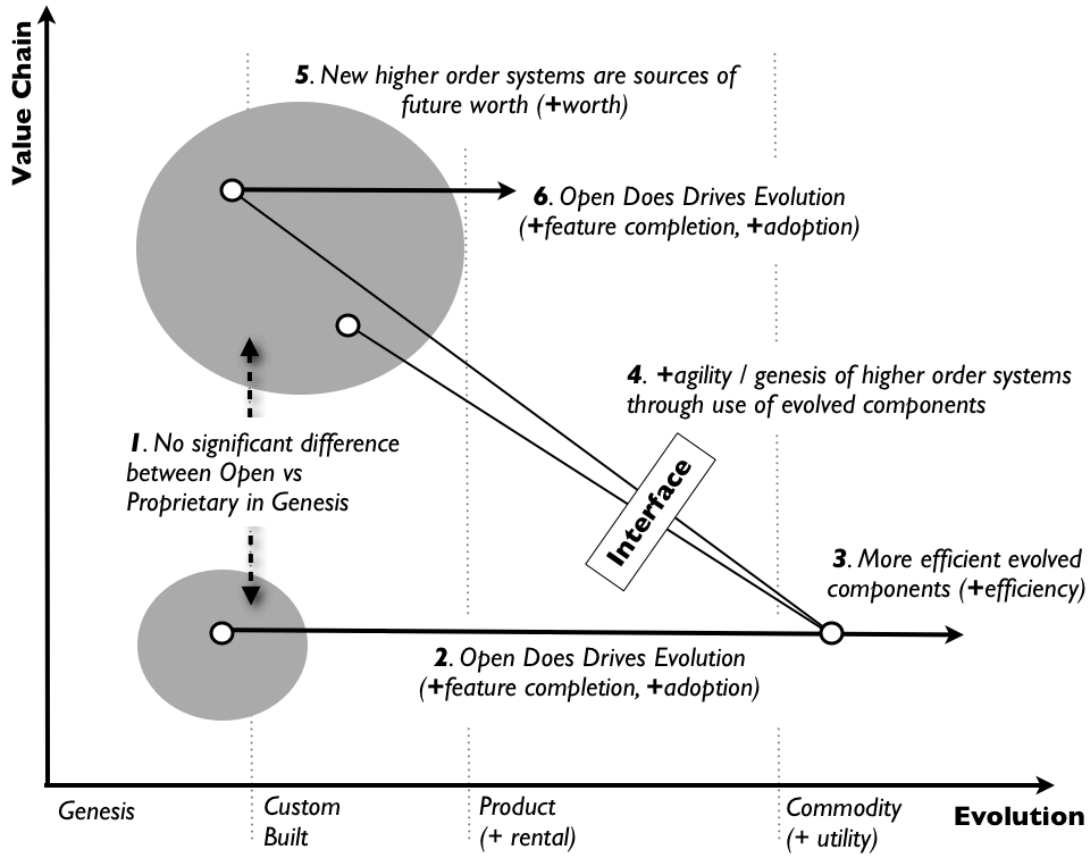
However, there is little difference between open vs proprietary approaches on those higher order systems that are created with this component and many "innovative" web sites are proprietary despite consuming underlying open components. Naturally, the use of an 'open' approach will drive the new higher order system rapidly to a more evolved state.

Hence an 'open' approach is not associated with increased rates of genesis for an activity but rapid evolution including feature completeness (through collaboration), market adoption (through reduced barriers to adoption) and genesis of higher order systems (a 'platform for innovation'). The problem with the term 'innovation' is that it is used to mean all of these things. An open approach enables some forms of 'innovation' (product, market and genesis of higher order systems through a platform) but does

not make any significant impact on other forms of 'innovation' (i.e. the genesis of an activity).

If we look at our map, the effect of open can be more clearly seen and how driving an activity to a more evolved state along with efficiency can result in rapid generation of higher order systems (see figure 41)

Figure 41 Mapping view of Open's impact



However, there is more to open technology than just this. Open technology approaches can be used to solve semantic interoperability issues by creating a standard and in turn can enable competitive markets of suppliers, associated exchanges and assurance industries. By driving evolution it can also be used to undermine a competitors barrier to entry or remove a differential a competitor may have. 'Open' can be used as a powerful recruitment tool, a negotiation tool or to

circumnavigate an existing obstacle such as purchasing procedures. It can even be used to protect an existing value chain.

Google's core business is based upon its data value chain. It accesses data from many sources and then uses it to more accurately sell advertising space associated with specific words and actions. The company seeks to expand into just about any market where data can be modeled to its advantage. Dominating the data value chain, the algorithms to model the data and the systems needed to run the algorithms are all critical to Google's success and highly proprietary. While Google has been heavily involved in open technology and enabled ecosystems to flourish on its APIs, Google's core systems and algorithms are guarded secrets. In general, Google uses open approaches when they help keep the data flowing.

The rapid growth of smart phones posed a threat to Google's business. The iPhone's dominance meant that a significant part of the data value chain was being locked away in a 'walled garden'. But by not open-sourcing iOS, Apple exposed itself to a counter-play around a common mobile OS and an ecosystem of hardware manufacturers. This is what Google's Android has achieved, gaining the majority of the global unit market share, although Apple still makes the great bulk of the profits.

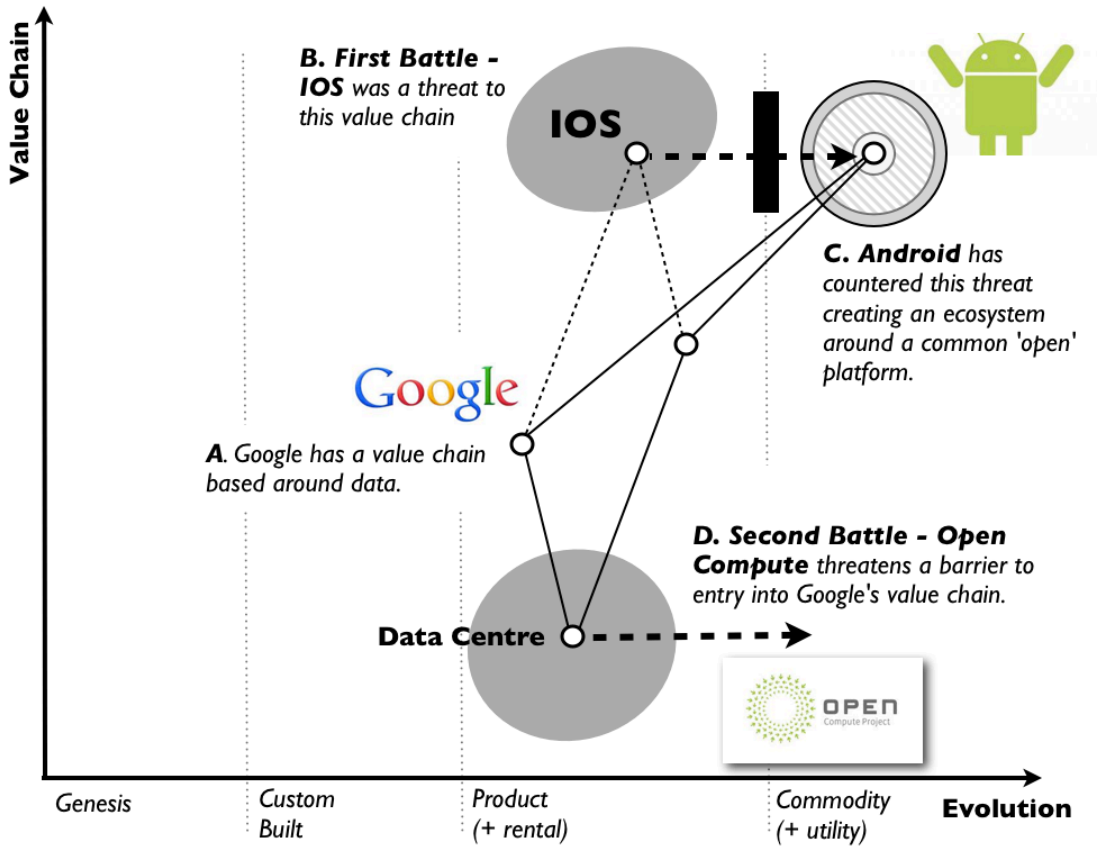
As with other ecosystems, this market benefits from higher rates of "innovation" over a single supplier. Apple, a company that once could have been thought of as leading the pack, today increasingly looks like a fast follower.

Whilst Android can be seen as a highly successful counter through open technology, it's governed and developed through a company-controlled process. Google uses its Compatibility Test Suite (CTS) to ensure interoperability of devices and limit a collective prisoner's dilemma scenario, where members of the

Open Handset Alliance (OHA) all differentiate and thus weaken the core. CTS is behind the current Acer vs. Google row in China over Acer's plans to offer a 'forked' version of the Android platform for the Chinese market. However success in limiting one threat to Google's data value chain has also created a new and probably unanticipated threat as Amazon has taken Android and used it to create another 'walled garden' based on tablets: the Kindle Fire.

At the same time as this one battle is occurring, Facebook's open technology project on building large data centres (known as open compute) can be simultaneously seen as driving efficiency, a tool for negotiation with its own suppliers and a means of weakening any company that depends upon highly efficient data centres as a barrier to entry into its own business. One such company is Google (see figure 42).

Figure 42 Playing the Game with Open Technology



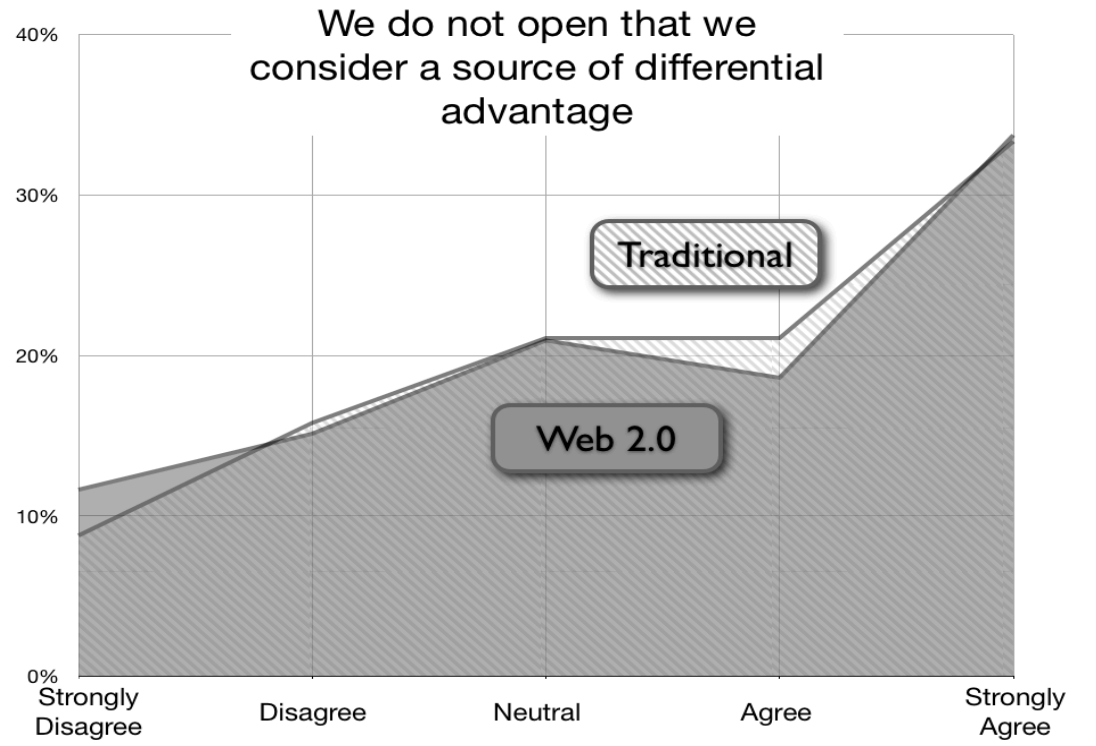
The point to note is that open technology approaches can be used for more than just building a platform or encouraging efficiency. One question we should be asking is who actually thinks in these terms?

Openness Vs Strategy

Most companies today consume open technology and many have some form of open technology policy on whether they open technology. This is not just related to the software industry, from Banking (Deutsche Bank's Lodestone project) to Governments (Department of Veterans Affairs with VistA), the provision of open technology is quite widespread.

In interviews and surveys with over 160 different companies, we found similarities and differences between companies and their approach to open technology particularly when those companies were categorized into groups of Traditional Vs Web 2.0 (which includes the Next Generation). For example, both groups had formal processes for opening technology and were unwilling to open a source of competitive advantage. Figure 43 provides the percentage of companies within a particularly group (Traditional or Web 2.0) responding to a particular question (from strongly disagree to strongly agree)

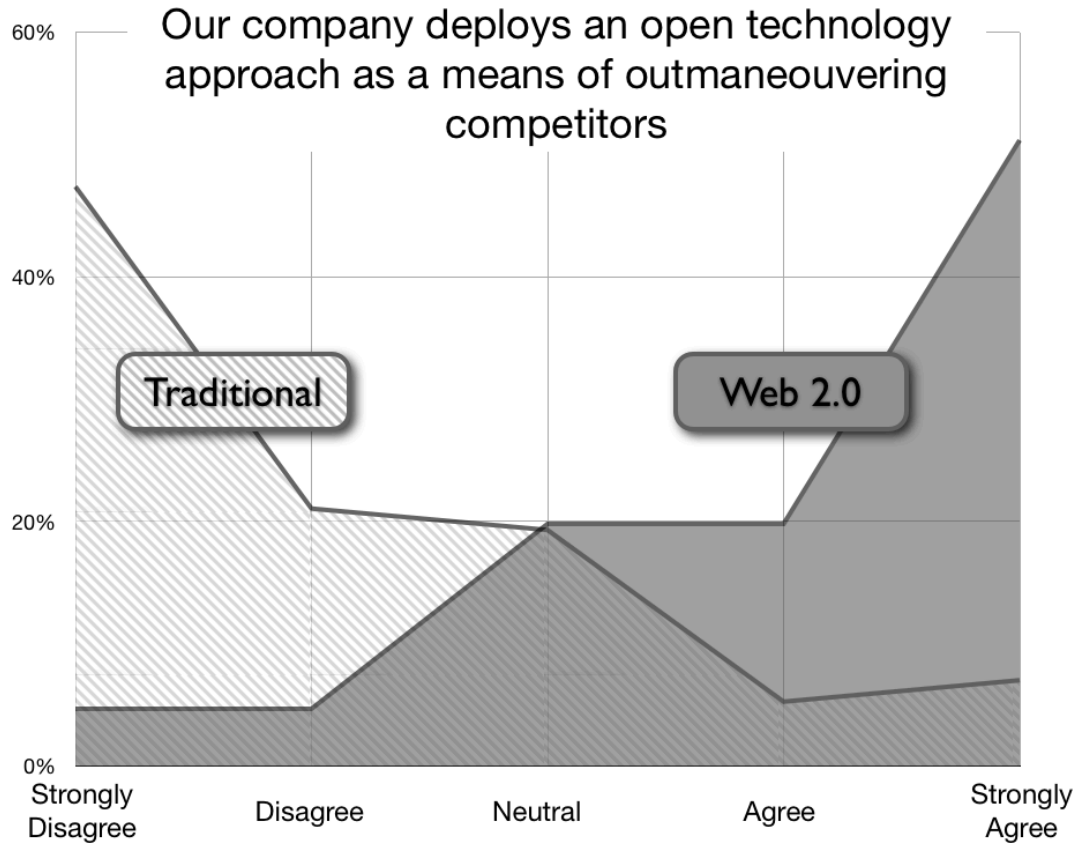
Figure 43 Open a source of competitive advantage?



However, when it comes to providing open technology in order to

compete with others, there is a marked difference between the two populations (see figure 44).

Figure 44 Use of Open as a means to compete.



This at first appears odd. If both groups consumed open technology and both groups were similar in having formal process for open technology, why would one group be more willing to use open technology as a means of competing? Examination on market cap revealed similar sized groups, so this wasn't just a question of whether one group was start-ups. Something else was a foot.

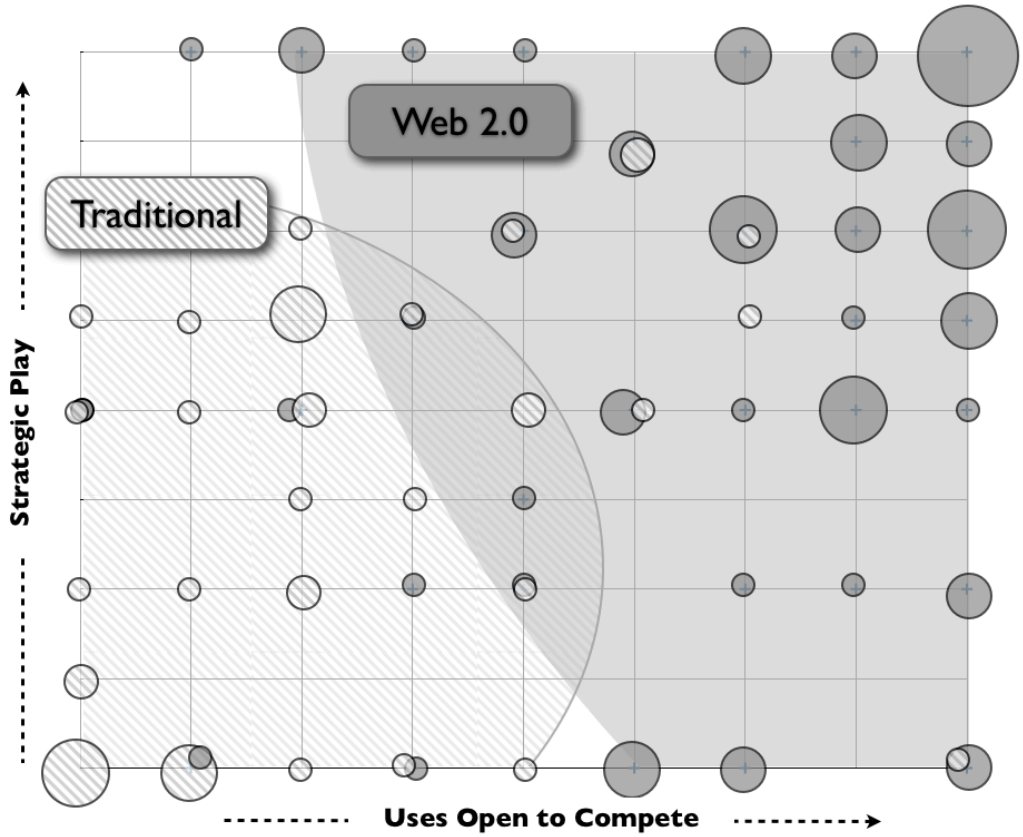
After further investigation, it turned out the difference was strategy or more specifically the ability of the company to consider its own and competitor's value chains in formulating strategy. A large group of the Web 2.0 (including the Next Generation) had some means of modeling the environment, even if this was just a mental model rather than a map. They would

consider the impact of open on this model. They appeared to exhibit a higher level of strategic play. Hence, the LEF examined the level of strategic play (i.e. consideration of own and competitor's value chains in determining strategy) against the willingness to use open as a means of competing. The results are provided in figure 45 which a form of heat map where the size of the bubbles represents the number of companies involved, categorized by whether they were more Traditional or more Web 2.0. The axes are: -

Level of Strategic Play is an index derived from a set of questions covering understanding and consideration of own and competitor's value chains in determining strategy.

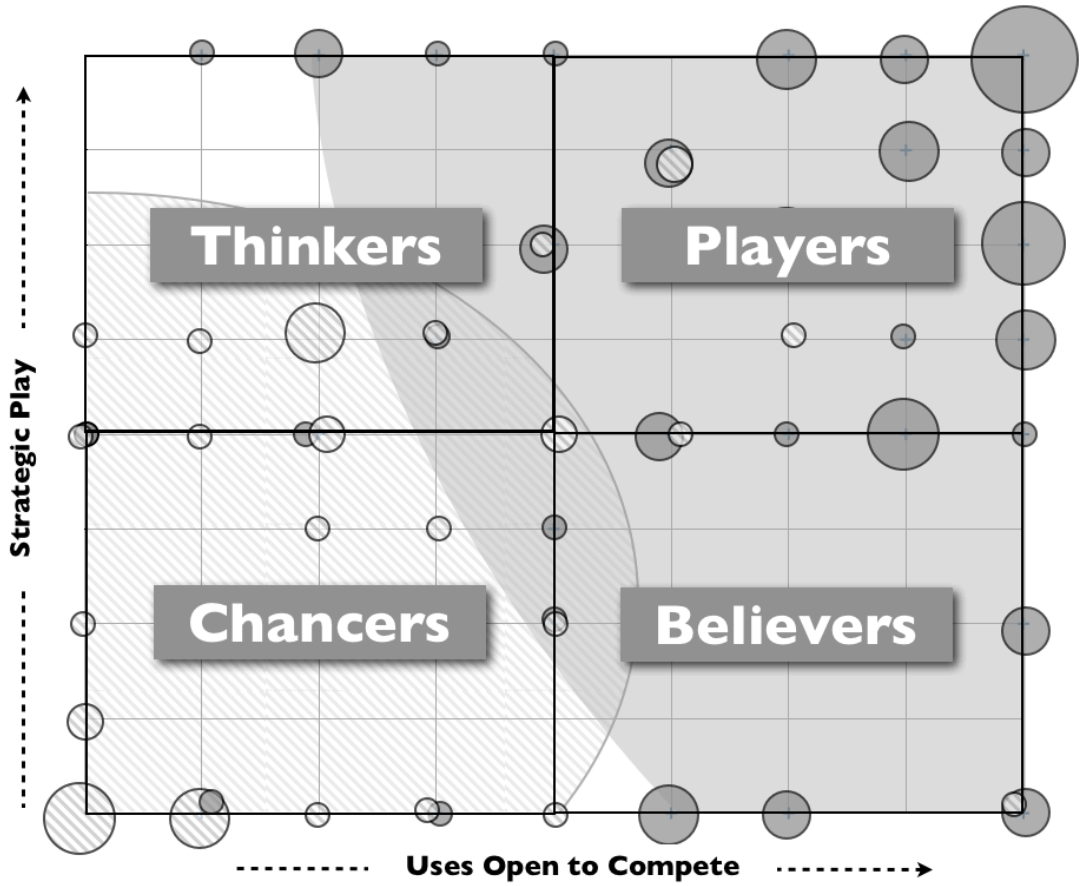
Uses Open to Compete is an index derived from the willingness of a company to use open as a means of competition (whether open source, API or data) in terms of statement of intent and action.

Figure 45 Level of Strategic Play vs Willingness to Use Open



You can consider one axis the level of strategic thought, the other axis a willingness to execute and act on this with an appropriate tool. On examining sizes of companies and changes in market cap over the last seven years we then categorized four different sections of the graph (see figure 46) with each section containing a general type of company – Players, Thinkers, Believers and Chancers.

Figure 46 - Players, Thinkers, Believers and Chancers



A description of each type is as follows: -

Players. These organizations use open technology where appropriate as a means to compete and think clearly about its impact on their value chains and those of competitors – in other words they think strategically and act. This group shows a high affinity for the more advanced strategic plays (undermining

competitors barriers to entry, removing points of differentiation, protecting existing value chains and recruitment) and is dominated by organizations identifying themselves as 'Web 2.0'. They tend to be large firms and market leaders in their respective segments with strong market cap growth over the last seven years. They are neither "open" nor "proprietary" companies but a blend of both and they tend to exhibit many of the characteristics of the Next Generation of companies.

• **Thinkers.** While these organizations tend not to use open technology as a means to compete, they do consider the impact on their value chains and those of competitors. This group appears to understand the game but chooses not to engage seriously now – in other words, they think strategically but don't act. It includes Web 2.0 and Traditional medium- and large-sized firms. They show moderate changes in market cap over the last seven years and tend to exhibit a few of the characteristics of the Next Generation of companies. Many of these companies tend to be "proprietary" in nature rather than mixed.

• **Believers.** This group uses open technology as a means of competing but does not show any affinity for strategic play – in other words they act but don't tend to think strategically. Their attitude tends to be one of 'open by default' and they are just as likely to reduce a barrier to entry into their own business as to create an advantage over others. This group is more "open" in nature and is far more willing than the general population to open up sources of differential advantage. They tend to be smaller firms, often start-ups with mixed fortunes. They tend to exhibit some of the characteristics of the Next Generation of companies.

• **Chancers.** This group neither uses open technology as a means of competing nor shows any affinity for strategic play – in other words they neither think strategically nor do they act. Whilst they often know their competitors are using these strategies

against them, they do little in these areas other than basic consumption. Traditional companies and market laggards mainly populate this group, with poor and negative market cap growth. They exhibit almost none of the characteristics of the Next Generation and tend to be “proprietary” in nature.

In terms of market cap change, what the results showed clearly was the importance of strategic play (thinking) over use of open as a competitive tool (acting) i.e. it’s better to be a Player or a Thinker than a Believer or a Chancer. The strongest group is the Players; the weakest group is the Chancers.

The reason why I wish to emphasize this is that having an understanding of the landscape, how it is changing, where your opponent is and good situational awareness (i.e. high levels of strategic play) tends to be far more important for a company’s health than simply acting (as in competing with open).

Yes, open can be a powerful weapon in the hands of an experienced strategist but that strategist needs to know the landscape before they fire.

This is why Maps are so important.

Chapter 5

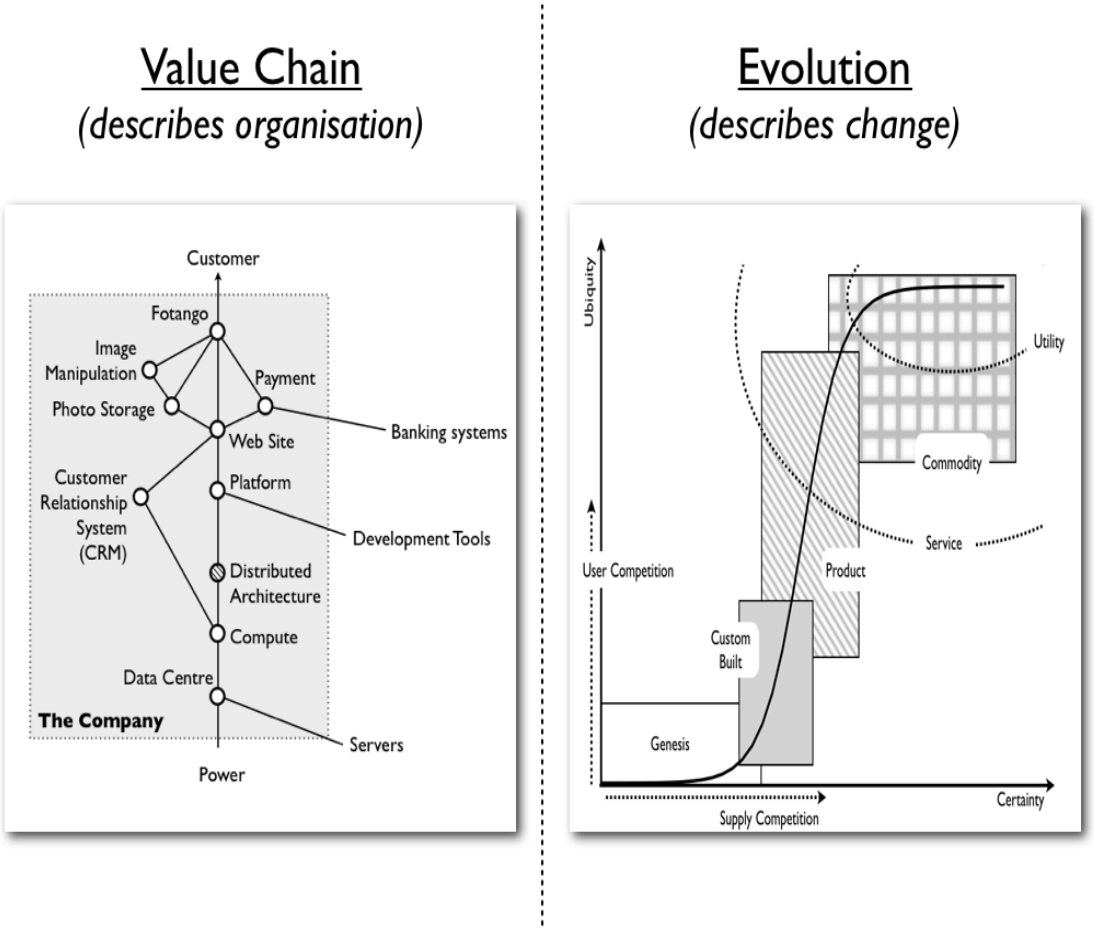
All Along the WatchTower

Mapping a company

We've covered a lot of the basics about mapping but in this section, I'd like to cover the elements of building a battle map - companies are after all engaged in combat with each other.

The elements of the map are the value chains of organization (which describe the organization) and the state of evolution of components (which describes change). Both these elements will need to be combined (see figure 47)

Figure 47 – Components of a Map.



Step 1 - How to write a value chain.

The value chain itself can be determined first by asking the question “what is the consumer need” and then determining the components and subcomponents required to meet that need.

For example, in the case of Fotango’s photo service the user need was for an online service to store, modify and retrieve digital photos (the Fotango site). One these needs are known, the visible components of the service can be described from a web site, to image manipulation, to image storage to payment. Once visible components are determined then underlying components can be drawn from CRM to compute resource to power.

The best way of doing this, from practice, is to get a group of people together with some post-it notes and write down every consumer need. These should be placed on a huge whiteboard (ideally a wall) in fairly random order. It’s quite common for new unmet needs to be described at this point, don’t add them to the wall but instead take a note as these represent **new opportunities**.

Then for each need, using a different colour set of post-it notes, the group should write down the top-level components that meet the need. From this list any subcomponents that the top-level component will use including any data or practices or activities should be written down. For each subcomponent further subcomponents should be identified until a point is reached that the subcomponents are outside of the scope of the company. For example power as a subcomponent doesn’t need to be broken down any further for a company that consumes power from a power company.

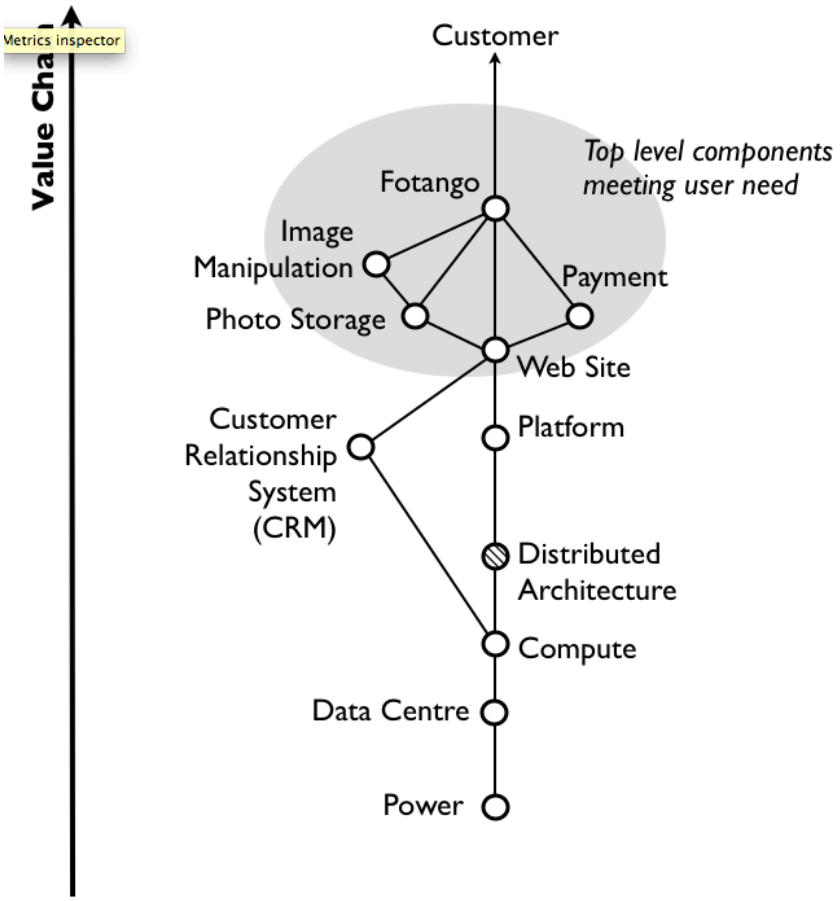
Hence for example, to store digital photos requires some sort of digital photo storage component that in turn requires compute resources, storage resources, an operating system, network, power etc. There is no need to break down an operating system

further for most companies as this is something that is acquired from others.

These components will make the value chain and any component needs only to be written once. When the group is satisfied that the components for all needs have been written, then take the needs of the wall and discard them.

Now write on the wall, a single vertical line and mark it value chain. The top-level components should now be added to the wall at the top of the value chain and the subcomponents placed underneath with lines drawn between components to show how they are linked (see figure 48).

Figure 48 – Needs to Value Chain



More components maybe discovered during this process, they

should added to post-it notes, added to the wall and links drawn. Once the group is satisfied that they've successfully described the value chain then take a picture of the wall and remove everything.

Step 2 - Adding Evolution

On the wall, now draw two lines - a vertical line for value chain and a horizontal line for evolution, marking on lines for genesis, custom built, product and commodity. Start to add the value chain that you previously created to the wall beginning with the top-level components. For each component the group should ask itself the question of how evolved is this activity?

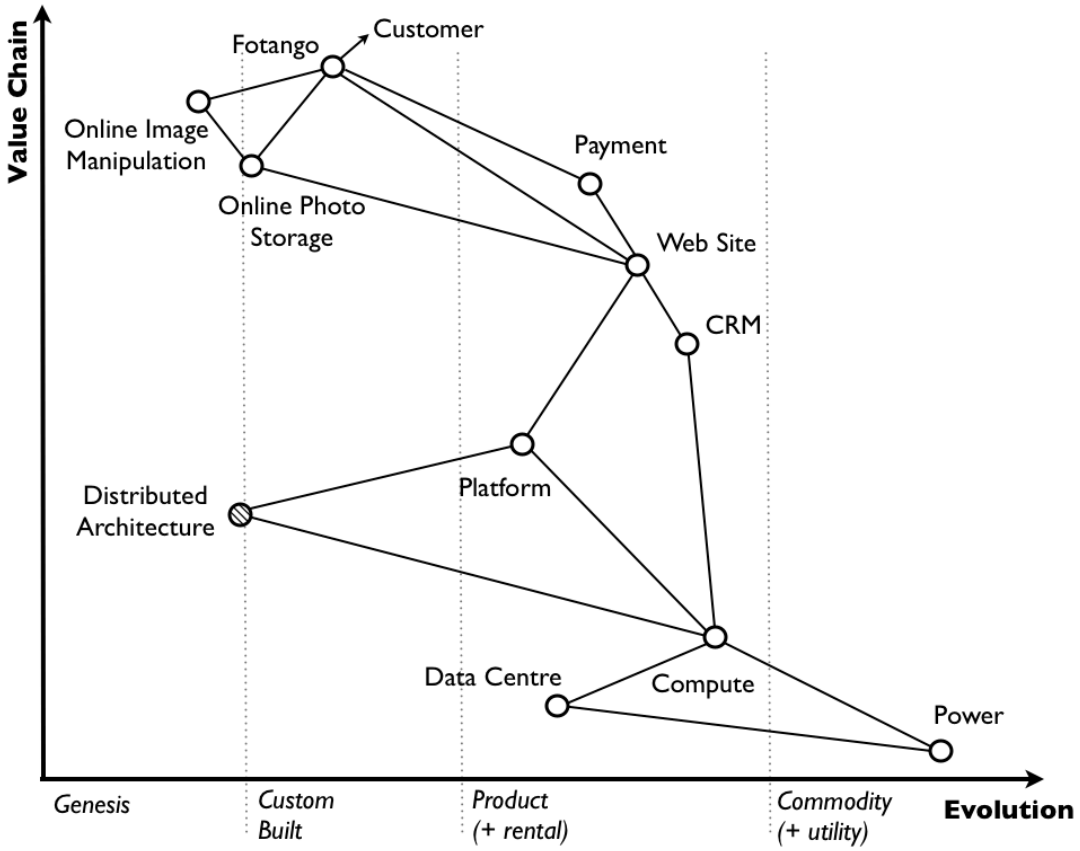
In practice the best way to do this is to examine the characteristics of the component, hence ask yourselves:-

- How ubiquitous and well defined is the component?
- Do all my competitors use such a component?
- Is the component available as a product or a utility service?
- Is this something new?

Once you've determined, add the component to wall, positioning it along the evolution axis in what the group agrees is the right place. Keep on repeating the process, moving down the value chain, drawing links between components as you go. What you're aiming for is a battle map as shown in figure 49

From experience, the writing of the battle map for a single value chain (area of customer need or line of business) starting from writing down the needs to finishing the map, should take between 30 minutes to an hour once you get the hang of it.

Figure 49 – A Battle Map



Step 3 - What to do next?

Once you have a battle map, write another. For every line of business that the company has then a battle map should be written. In this case, more is better.

Battle maps should then be compared for common components and a list created for what should be **shared** i.e. do we really need 15 different CRM systems or would one do? If there is a delta in how components are treated between battle maps, for example one group says CRM is a commodity but another says CRM should be a custom-built system then this needs to be challenged and the question "why?" asked.

Often it is the case that where there is a disagreement over a component, then it can be broken into two or more

subcomponents, many of which are actually commodity.

Alternatively it can be a simple case of inertia. It's not uncommon for companies to mistreat components (whether activities, data or practices) and to overspend on customizing something that should really be a commodity. Where there's a plain disagreement between groups on an identical component always treat it as the more evolved. These deltas are useful in determining areas of **efficiency**, so keep a note of them.

With enough battle maps, you should now have an idea of what should be **shared** components across business, new **opportunities** and areas of **efficiency** to investigate. Given a company with say forty different value chains of reasonable size, even if you assign a small group to do this in a serial fashion it should take around a week to complete.

Once you have the maps, I'd recommend sending one team to examine the opportunities, shared components and areas of efficiency whilst you turn your attention to look at the components in more detail.

Differentials, Barriers and Constraints

We now need to turn to those battle maps and identify specific roles and constraints for the various components before we start to attempt manipulate the environment through some form a strategy.

The first role we need to identify are those visible top-level components that act as differentials i.e. they provide to the consumer a qualitative difference between our offerings and most of our competitors. Such components will be in the genesis or custom built stage and in the case of the Fotango service, this was image manipulation.

You also need to identify those components that act as a barrier to entry into your value chain through high levels of capital (either physical, financial, knowledge or social). These tend to be hidden further down the value chain and are mainly invisible to the consumer. In the case of the Fotango service, our engineering skill and knowledge in building large-scale distributed systems capable of coping with millions of registered users was such a barrier.

Finally, you need to identify constraints and in particular the balance of power between consumers and suppliers. I tend to use Porter's five forces here. For those unfamiliar with five forces, these are:-

Rivalry within industry: this can be assumed to be a given though the type of competition changes e.g. from relative competition in the peace phase to a fight for survival during the war phase.

Threat of New Entrants: increases as an activity evolves from the peace stage of competition to the war stage.

Threat of Substitution: often the most difficult to spot and

manage, tends to occur in the peace phase of competition e.g. replacement of cable excavators with hydraulic.

Bargaining Power of Suppliers Vs Consumers: the balance of power between the groups affects a range of areas from pricing to dependency to strategic control. For example, in a value chain if one supplier provides one component, then that supplier can exert considerable pricing pressures on your entire value chain.

The balance between these forces tends to change as anything evolves. It also isn't static within a stage of evolution. For example, when an activity becomes more of a commodity or provided as a utility we will often experience a yo-yo between centralization and decentralization (with a corresponding yo-yo between Supplier and Consumer bargaining power).

With commoditization (i.e. evolution for activities), it is often assumed that the shift towards utility provision means centralization but this is not the case.

Whilst the interaction of ALL consumers (demand competition) and ALL suppliers (supply competition) drives the process of evolution, the question of whether a specific activity or data set centralizes or decentralizes depends upon the actions of individual actors (suppliers and consumers) in this market.

Hence for example, with Cloud Computing and specifically Infrastructure as a Service (IaaS), the shift from product to utility is simply a process of evolution driven by market competition (ALL Supplier and ALL Consumers).

On the question of centralization, it would have been relatively trivial for the hardware manufacturers to create a price war in the IaaS space around 2008-2010 in order to fragment the market by increasing demand beyond the capability of one vendor to supply. The fact they didn't is their own fault and also one of the

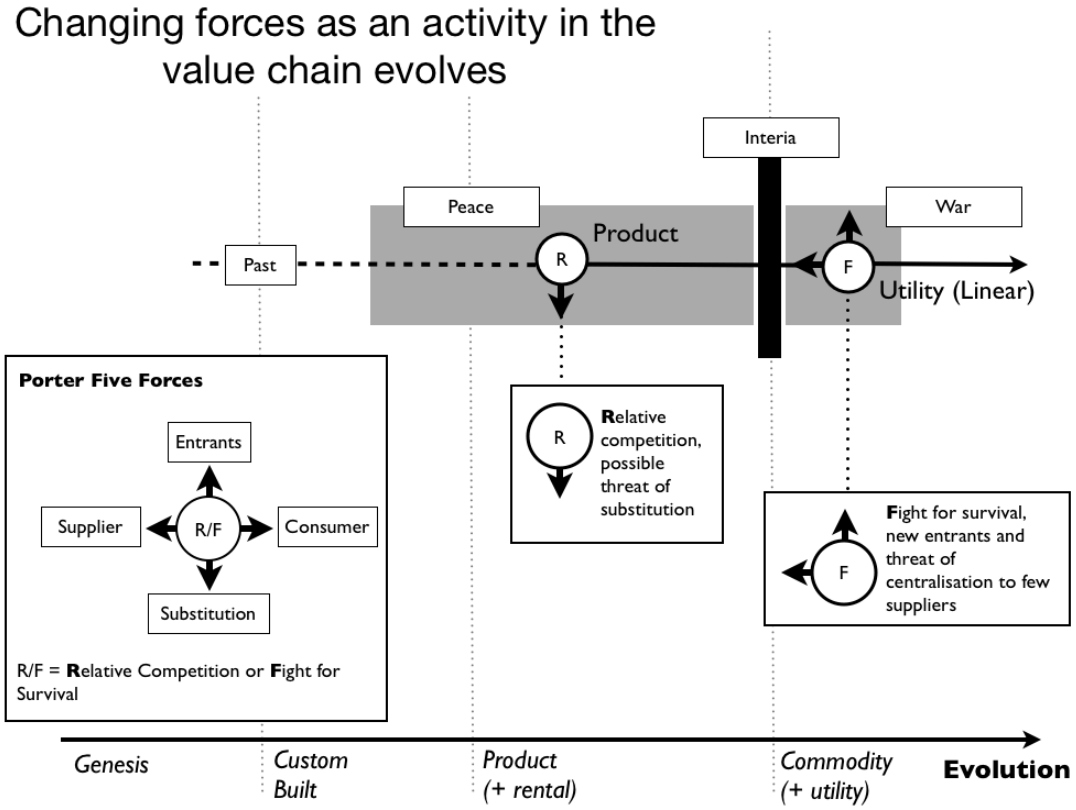
major factors why we might see centralization in the IaaS space. Hence centralization depends upon the actions of specific actors (in this case the inaction of hardware suppliers and hosting companies).

In the future, this may in fact yo-yo from centralized to decentralized or find a balance between the two (as with electricity provision and self generation). Of course this is a change in the means of production and the interfaces themselves are unlikely to change i.e. a shift from central to self-generation does not mean a change in voltage / frequency for domestic power provision.

The interface can often hide a complex market. For the average home consumer of electricity you have sockets and a power supplier. You could be forgiven for thinking your home electricity supplier actually generates the power. However their value chain includes components such as the National Grid where they consume and purchase power from multiple power generators (their suppliers) through a complex market including spot and derivatives. There is no reason your actual home electricity supplier has to own any actual power generation capabilities themselves and are instead acting more like a broker. In the UK, such distinctions are licensed through OfGem with suppliers, generators and non-physical traders.

Hence, you should always be careful about assuming that as an activity evolves to more of a utility it will centralize into the hands of a few suppliers. There is a danger this can happen but it all depends upon the individual actions of specific players in the market. In figure 50, I've provided an example of some general changes in the five forces.

Figure 50 – General changes in the five forces



During the Peace phase of competition then substitution tends to be something to watch for but new entrants are relatively rare, competition is often relative between big suppliers and a yo-yo between supplier vs consumer bargaining power can exist but is often relatively minor.

As the activity evolves to more of a utility, hence the shift from peace to war, then competition becomes more of a fight for survival as new entrants appear. The balance of power can shift towards suppliers (centralization) if other potential suppliers such as past product vendors fail to act appropriately.
Beyond peace and war, the state of wonder also tends to be an aggressive fight for those new activities but in this case it is more a case of a fight to become established, to prevail over other equivalent attempts to provide the existing activity with many new entrants.

All competition is a fight but it's worth emphasizing (and repeating) the different economic states for any component.

Wonder: New activities appear and a fight to become established occurs in an uncertain and un-established market. Consumers hold the balance of power and you're competing against other entrants with no idea of whether any will be successful. Everything is a gamble and a huge risk with rapid change.

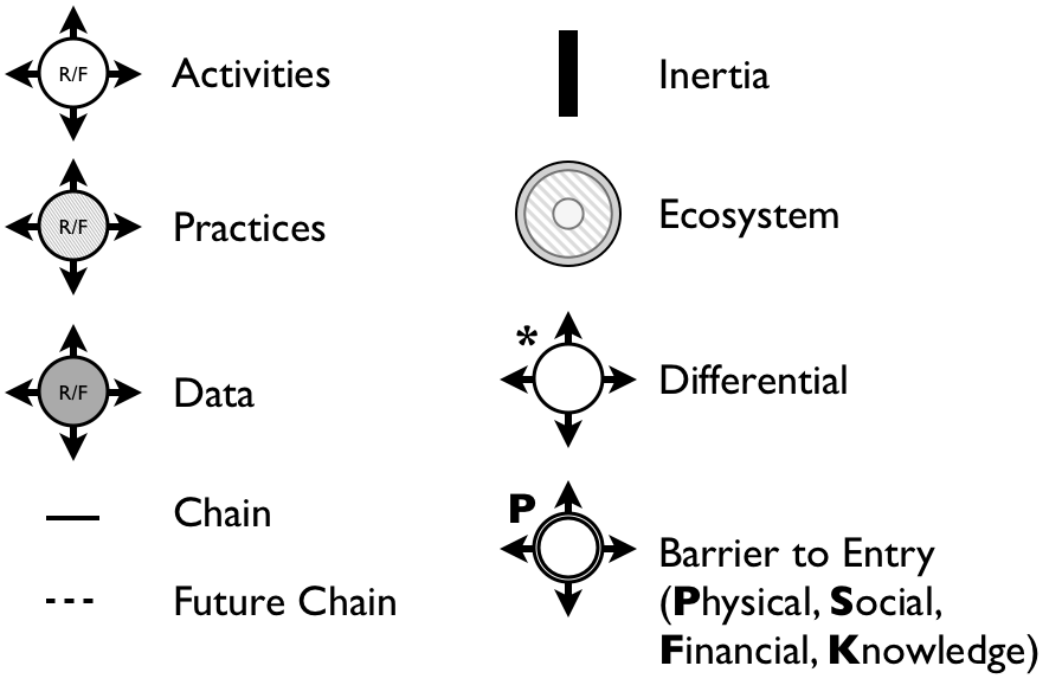
Peace: Activities are provided in a relatively well-defined, widespread and established market. Large competitors jostle for relative positions and to maintain profitability. Inertia to change builds due to pass success. There is often a balance between consumer and supplier bargaining power. New entrants see an almost impossible mountain to climb and must look to substitute and disrupt existing suppliers often by changing the value chain. Whilst difficult, this can be achieved by adding to or altering the visible components associated with a product (e.g. smaller hard drives, more energy efficient) and then establishing these components in an alternative market. The occasions were the giants are disrupted are relatively few as sustaining change tends to exceed disruptive, however disruption can occur due to changes in the value chain. This is hard to predict and hence defend against and is compounded by inertia.

War: Activities evolve to more of a commodity (or utility), new entrants take up the charge into the space with past giants having inertia to the change. For these giants a fight for survival for their massive established business occurs, many will be disrupted by what is entirely predictable and could be defended against. Due to the speed of change and depending upon how well the game is played, the balance of power can shift to large centralized suppliers.

At this point, I tend to mark up the map with the following legend (see figure 51) covering differentiators, barriers to entry

and five forces. I also include future changes i.e. what happens as activities (or data or practices) evolve and add inertia barriers to change (i.e. caused by past success).

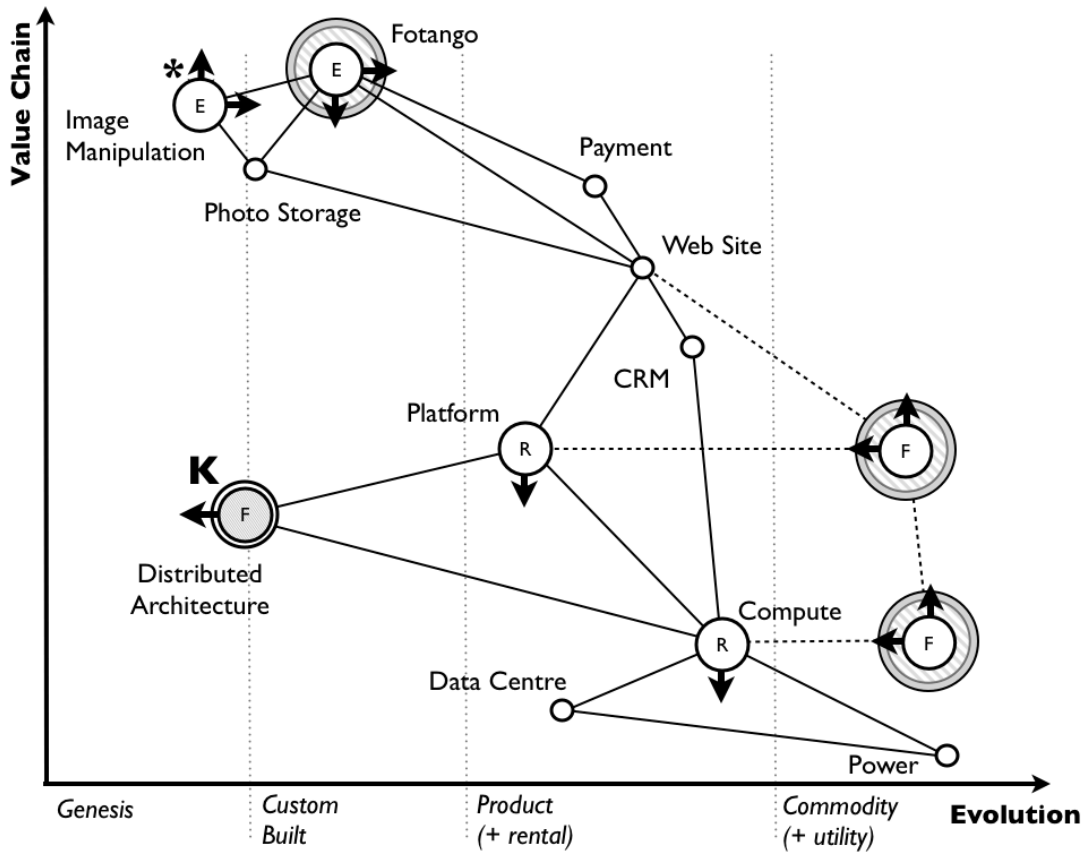
Figure 51 – Legend



Using the above legend, I've updated the Fotango Battle Map (see figure 52). From the map, the reader should by now be able to read that Fotango had a value chain of many components at different stages of evolution. The Fotango service itself was building an ecosystem of end users and was in a maturing field that was moving from a fight to become established towards more relative competition. Consumers currently held the power and substitution was a threat.

The provision of image manipulation was a differentiator though we had no idea whether it would be successful. Consumers again held the bargaining power and new entrants providing image manipulation services were common.

Figure 52 – Battle Map of Fotango, 2005



Platforms, which were used to build the Fotango site, were in a relatively peaceful state of competition with well-established platform players and the only main threats being substitution. This activity (like all) was evolving and becoming suitable for utility provision (PaaS). New entrants were likely to take up the charge and establish broad ecosystems that also led to a danger of centralization. Past players were likely to suffer inertia barriers to the change.

Infrastructure was even more of a commodity and was also suitable for provision as a utility (IaaS). It currently existed in a relatively peaceful market of large players with the only main threat being substitution. Those players would have inertia to the change and the new entrants could build broad ecosystems and potentially centralize if the existing giants failed to act.

The future IaaS world could power the PaaS world.

One of the barriers to entry in Fotango's space was the ability to build large-scale architectures dealing with large volumes of users. This was a highly skilled engineering task and such knowledge could be considered a barrier to entry into the business.

Writing these maps is a big undertaking. A fully-fledged battle map for a value chain can take up to two hours of efforts. Given 40 or so value chains in an organization, you could be looking at two weeks effort to get a clear understanding of the environment.

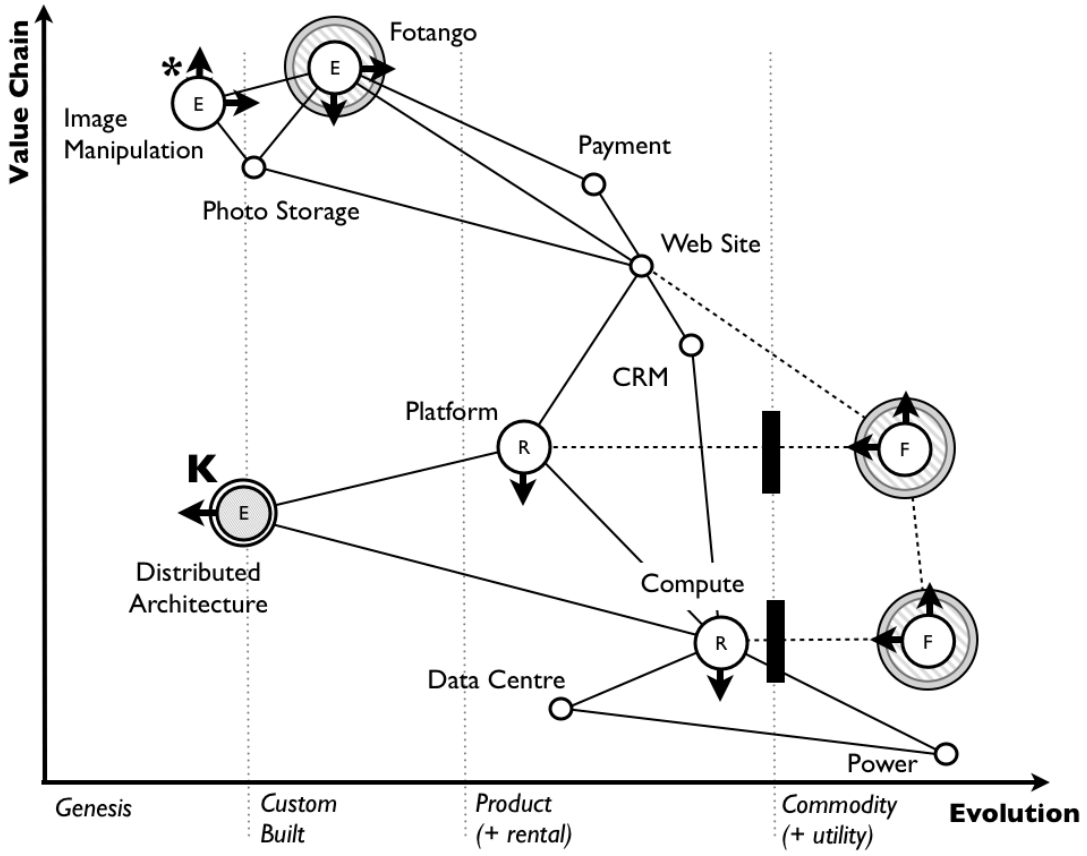
But it's worth it because now that we can write and read maps then we're finally getting ready to start playing the strategy game.

The Strategy Game

Now you have a map, you can start to look at how to manipulate the environment to your advantage. This is the essence of what strategy should be about.

To start with, I'll use an example - the Fotango Battle Map (Figure 53) – and explain why we took the actions we did, then we will look at the subject more broadly. I'm often asked why do I use that example, well because the company is now dead and so it's ok to talk about the games it played. I don't generally talk about active companies.

Figure 53 – Fotango Battle Map



The company's service (online photo storage) was shifting to

relative competition with players becoming established. We were losing that battle because we had to focus internally on the parent company needs and lacked the investment. Alternative services such as Flickr were rapidly dominating the space.

Our differential was in image manipulation but being uncertain we had no way of foretelling its future. We certainly were unable to predict the rise of Facebook and Instagram and what would happen, this was 2005. We also knew our existing business of meeting our patent company's need was to be outsourced.

The platform and infrastructure plays looked the best option due to established markets and inertia that incumbents had, as both were suitable for utility provision. Infrastructure was capital intensive and we could assume that some other new entrant would play the game, so we could build a PaaS and exploit IaaS as it developed. However, it was probable that an IaaS play would develop a strong ecosystem and we would see centralization, hence to strengthen our position we planned to open source all our IaaS technology in 2007 to encourage a competitive market.

The PaaS play also suited us because the skills to build large-scale distributed architectures to support it would be scarce and a barrier to entry. We had that capability.

By open sourcing the PaaS technology itself we would overcome many of the adoption barriers and rapidly drive towards creating a standard. Our goal was not to be a PaaS provider ultimately but to build the exchange, brokerage and assurance industries on top of this.

Our strategy was developed from the above map and our understanding of it. The strategy was all about the why with the how, what and when coming after.

There are multiple ways of using maps to gain an advantage. You can use a map to see how components can be combined to create new activities (i.e. genesis) but I tend to avoid this. Genesis is a high risk and uncertain activity hence it is better to get others to do this for you and to exploit an ecosystem under a model like ILC.

You can also look at links within the value chain. For example take something as trivial as a desktop role out. You might for find that you're forced to treat the operating system as more of a product than a commodity because of some link to another component (such as a line of business app). By forcing the app into a browser you can often treat wide numbers of components as a commodity.

My preferred technique though, is to take advantage of competition driving any component to a more evolved state (i.e. more of a commodity or a utility).

Hence I tend to look at those components that are put down as being in the product stage especially those that are put close to being a commodity and ask the question "Is this suitable for commodity provision?"

You can check by looking at the market for weak signals such as consumers questioning why this thing costs so much. Take financial ERP, the constant business grumble combined with its ubiquity tells you one thing - it's ready for the game. Components that are consumed as products and which are suitable for provision as a commodity specifically via utility services are a gold mine.

One of my favourite ways of double checking this is when we identify such an opportunity then to ask a group of people familiar with the subject to pretend we have built such a service and what we need them to do is to write the press release. If

they can do this well - clearly and precisely – and without recourse to heavy investigation of the opportunity, we can be pretty sure we've got something widespread and ubiquitous enough to be suitable.

You should then aim to create new services with ecosystems around them. You can be fairly confident that existing players will have inertia and won't see the expected change coming (the shift from peace to war) and if your service can become a component of higher systems then you can benefit from volume effects. These are huge opportunities which if you've been consuming the product you've probably built some of the necessary skills to make happen – as was the case with Fotango and platforms.

Obviously at this time people can raise the notion of focusing on core and that is what happened with us. Unfortunately maps don't solve internal politics but generally these days I point to Amazon and say, go explain to them that they should have stuck to selling books online. Amazon is without doubt my favourite example of a company that commoditizes existing industries through building ecosystems and utility based platforms. They've repeated this model successfully in industry after industry.

The process of building battle maps should provide you with a fairly hefty list of target opportunities, areas of efficiency and shared components. Once you've added the details (constraints, differentials and barriers to entry) you can then start to look at manipulating the environment and creating new advantages.

From this you can decide where you're going to attack and what you're going to try and protect. You can now start applying tools to help make this happen e.g. use of open technologies to drive something to a more evolved state or any of the dark protective arts such as branding, IP or legislation to protect a barrier to entry or to slow a change.

For example, if I want to drive a component to more of a commodity but I don't want to build my own service in that space, I might simply use open source to do this.

Or instead, if I have data on travel habits but want to create an ecosystem (so other companies can innovate for me) or to undermine some competitor business by destroying an area of value, I might create an open data service for aggregated market data (i.e. how many times do people travel from one destination to another).

There is a long list of techniques here and I'll cover some defensive and attacking strategies in the next section but the point is once you have the maps, it becomes a lot easier to see the potential games and to explain why you're going to do something.

Once you start getting competent at doing this, you can also start to turn your attention to competitors. Even if they don't have battle maps, there is nothing preventing you from creating them. Examining their value chains can often highlight potential points of weakness.

For example, any half decent strategist with a map would have seen the shift of computing infrastructure from product to utility services almost a decade ago. If you were a hardware provider of computing products (e.g. servers) you would have known it was coming along with the inertia you would have to the change. You could have prepared for this well in advance.

When the market signals were shouting for the change, you should have been on watch, building highly efficient and commoditized data centres but selling them as high cost rental services along with your products (thereby extracting maximum value in the peace phase of competition).

When the new entrant appeared i.e. Amazon launched EC2, you would be prepared to hit the market fast. Within a year of launch, once it was clear that the change was growing you could have announced a massive utility investment and reveal your new services (i.e. selling those highly efficient but high cost rental services as utility services).

Your goal would have been simple, flood the market with volume at low cost and stimulate demand. The reason for this is that you would know, if you had a map, that your competitor would have to build data centres to meet the demand and this is both capital expensive and time consuming (a constraint).

Since computing resources has been elastic for the last forty years, stimulating demand beyond your competitor's ability to supply is an excellent way of fragmenting a market. You could let them led the way for the first year and then swamp the market. By 2009 this market should have been very different with Amazon a minority player.

What happened of course was deafening silence, as the competitors were unprepared. Many have huge rental services, excellent skills along with large capital reserves but they failed to react to an expected market change. Certainly they would have inertia to the change that would have become embedded in their culture but this could have been managed. Disruption by expected and predictable market change is unfortunately quite common.

The game of strategy is all about preparation, creating an advantage and situational awareness. In the next sections I'll look at common defensive and attacking strategies.

Attack, Defend and the Dark Arts

First of all, clear your mind of the notion of there is any such thing as the "one strategy". Instead a strategy consists of multiple parts in a game of chess between companies. You manipulate the entire map to create an advantage and you may act in entirely opposite ways on different parts of the map e.g. you may use an open technology approach on one part of the map whilst simultaneously using a closed approach on another.

Many of the techniques we've already covered in this series, for example: -

Shared components

The exercise of mapping should provide you with a list of **shared components**. These should be treated as such. Obviously you need to consider single points of weakness and systemic failure along with whether you can buy in external services but equally you can look at providing these common components as services yourself (an opportunity). What you want to avoid is duplication of effort and waste.

Efficiency reforms & Rationalization

The exercise of mapping should hopefully have highlighted some deltas in how groups treat activities. These are opportunities for efficiency gains i.e. questioning why we need to customize oue operating system? Detailed investigation may also provide areas of wasted effort i.e. things which aren't used. It's always surprising how much of the legacy estate does nothing but continues to be maintained. Lastly once you have maps you should be seriously asking why any late product stage or commodity components aren't provided either through open source or utility provision.

Driving a system to a more evolved state though an open approach

There are numerous reasons for using an open technology approach but the basic principle of driving an activity to a more evolved state, enabling greater efficiency and feature completeness should always be considered.

"Platforms for Innovation" and exploiting ecosystems through ILC

Any activity or data you consume or generate (whether currently considered core or not) has the potential to become a platform for innovation and an ecosystem grown around it. Building ecosystems around components is a great tool for increasing efficiency, innovation (as in genesis of novel and new) and improving customer focus.

Reducing barriers to entry

Equally open approaches can be used to reduce barriers to entry into opponents' value chains. When you're competing with someone, never hesitate to give your opponents an additional headache.

Land Grab

Sometimes you can see an activity is evolving and you haven't quite worked out how to exploit it yet. Land grabbing the future buys you a lot of time. Take Ubuntu vs RedHat, on the server market that was an uphill struggle but Ubuntu walked in and took over the cloud space with relative ease. Even today, Ubuntu is still the dominant operating system used on Amazon and other equivalent clouds as well as being entrenched in platform projects like CloudFoundry and open source efforts such as OpenStack.

Creating a centre of gravity

Open approaches (whether source or APIs) are excellent means of creating ecosystems through which a centre of gravity around a topic can be built and maintained. If you're at the heart of this, these are excellent sources of recruitment. As a small London based company, I successfully used the Perl Community to recruit some of the best and brightest. Never miss this opportunity, as

talent is rare.

Exploiting constraints

If you're up against another company, look for constraints e.g. the example of Hardware Vendors vs Amazon. If you can find a constraint then exploit it without mercy, as these are often time-limited opportunities.

Creating constraints

When an opponent doesn't have a constraint, you can always create one for them by buying up key parts of their value chain (i.e. the suppliers). Fairly risky, capital intensive and obviously suffers from stimulating demand in the component you've just attacked (which means new entrants).

Building value not wasting it.

Look at your components and ask can I turn this into value if it isn't already? A good place to examine is those more commodity components (which can be turned into utility services) or your data assets and in particular if the data is unique (like purchasing behaviours) whether this is true of aggregated data and can an open data approach be useful?

Changing the characteristics of a component

A tricky game to play as you're looking for a way to change the value chain associated with a specific component. This sort of technique can be used against an entrenched large player, you're aiming to develop in an alternative market, get big before they react and then hopefully move into their market. This game depends upon exploiting your opponent's inertia to change.

Slowing down evolution

A dark art that involves either the use of intellectual property to prevent competition or lobbying of Governments to create protective barriers for your value chain.

Misdirection

One of my favourites and one I've used successfully in the past. If you're under attack from a new entrant and are not prepared

then you can buy yourself some time by encouraging them to focus on the wrong thing. With start-ups, the best way is to fund them to do something that absorbs engineering talent and is completely useless. They often jump at the chance of a paycheck from a well-known company name and lose sight of the prize.

Hence, if you're a management product vendor and a start-up builds a utility management service then fund them to build a version that integrates with your product. Even better, if their utility service is planned to be open source, make sure the integration version isn't. Whilst they are focusing on building the integrated system and sending confusing messages over licensing to the market then use this time to build and then launch your own utility services.

Your actual strategy may include many if not all the techniques described (and this is not an exhaustive list). However, there are some specific techniques I'd like to look at in more detail using a play vs counter format.

Play: Differentiation

A typical play is differentiation; as in create a functional difference between your offering and those of competitors. This is not about being more operationally efficient but provision of something that most of your competitors don't have. When looking at the top-level components that serve the needs of the consumer, you're looking for something novel and new which can be bundled into the offering (either tightly or more advantageously loosely coupled). The mapping exercise may have already given you several of these unmet needs. This sort of play depends upon your ability to experiment, to gamble and to guess right. It's highly risky due to the chaotic nature of the novel and new.

Counter: Ecosystem

A good way to counter a differentiation play is not to face it head on as this pits your company's ability directly against the competitors. If they've got more talented people or they're just plain luckier than you then it's a battle you can lose. A better approach is to build an ecosystem of company's and individuals (an alliance) to compete against the company with sharing and collaboration between them. This necessitates the use of an open technology approach, for example open source or alternatively provision of an API (all APIs being open) for a common component and the use of a model such as ILC.

Counter: Tower and Moat

Rather than attempting to compete directly on differentiation, you can aim to eliminate any value in differentiation. For example let's imagine you're the CEO at Salesforce, a company that provides a more commodity form of CRM. When a competitor (in the product space) attempts to differentiate you can simply acquire an equivalent function and provide it freely as part of your core offering. The purpose of this is that you aim to make revenue through your core offering (e.g. CRM) and then eliminate any differential value competitors might gain through additional activities (social CRM, chatter, analytics etc).

The core revenue is your Tower with the void of differential value around it is your Moat. This approach is particularly useful if you occupy the future battleground i.e. you're the commodity player vs the incumbent product players. By growing your business and eliminating any differential value in the space, when your competitors eventually realize they have to switch it becomes almost impossible for them to compete with you.

Play: Standardize

A typical play is to attempt to standardize an activity around your offering. The principle reasons tend to be that your

competitors will incur a cost of transition to the standard and / or you're aiming to create a competitive market and exploit opportunities such as exchanges, assurance or brokerages. Open technology plays can be a powerful tool in making this happen.

Counter

The route by which you may counter depends upon relative positions of each player, consumer vs supplier power and which ecosystem governs the evolution of this activity.

For example, if the dominant public defacto plays a standard game then you need to either rapidly adopt it or build a larger alliance against it or attempt to use standard bodies / legislative barriers to prevent it.

Equally, if the activity is mainly governed in the Enterprise ecosystem you can look to pushing this towards the more public consumer ecosystem (and exploit consumerization effects).

If the player initiating the path is smaller and less established, you can immediately counter with your own standards effort and directly engage in a battle over standards. This will require overcoming some internal inertia due to past success.

If you're the dominant and have the supplier power then you can often ignore such standard efforts.

Play: Creating a level playing field

Let us suppose your value chain consumes an activity that is provided by a captured market (i.e. it's is constrained to a few suppliers). You maybe locked-in to a particular approach and wish to disentangle yourself in order to find more efficient ways of consuming the activity particularly if the activity is really a commodity but you're consuming a high cost product.

The ability to play this game depends very much on your

consumer power in relation to suppliers and normally requires multiple lines of attack. If your consumer power is weak then you'll need to form alliances.

Let us assume you're a large consumer with strong power i.e. you're a Government agency such as the Department of Veteran's Affairs purchasing electronic healthcare record systems. Your primary goals are to create pressure on the suppliers and open up the market, hence you can: -

1. Change purchasing policies so that when renewing, a cost of exit is calculated and added to the system being offered. Hence if you have some form of proprietary database and the renewal is $100M and the cost of transition to another systems is $150M, the then the renewal quote is considered as $250M. If an alternative more open system would cost $120M but the cost of exit from it (due to use of open standards) is $40M then its quote is considered as $160M. The purpose of this approach is to drive pressure onto the suppliers to enable switching. This is counter to the normal way of operating when the cost of exiting a system is added to the system that you're moving to and hence encourages incumbents to increasingly raise exit costs.

2. Adopt open standards. Making a clear preferential for more open standards (i.e. Royalty Free) is a blunt tool but especially effective when combined with changing purchasing policies.

3. Make the system open source. This can have two roles, one in part as leverage against the suppliers, the second is to encourage new entrants into the market especially future providers of utility services that are unlikely to come from incumbent providers due to inertia they suffer.

4. Componentization and strong coupling. Often elements of a system will be commodity whilst some activities are genuine differentials e.g. even Electronic Health Care record systems will

contain novel components. You should aim to break the system into components with defined interfaces being careful to avoid strong coupling. Example of strong coupling can be found in most desktop rollouts where components such as the device to operating system are all commodity but a line of business application has strong links to a specific operating system forcing you to treat it as a product. You should aim to break these links i.e. applications are delivered through neutral browser interfaces where possible.

Counter: Creating a level playing field

The best long-term approach is to adapt to the environment and look towards operationally efficient provision of more open systems. In particular, by adopting this model you can aggressively look to provide utility services (where applicable) and re-use these for other markets. However, this does require overcoming significant internal inertia which will often been couched in terms such as “cannibalization of existing business”

If you decide not to adapt then against a determined opponent this is difficult to counter because you’re trying to persuade them that living in a gilded cage is better than no cage. Much of this has to be achieved through lobbying and weakening the effort through fear, uncertainty and doubt. Again a multiple line attack is required.

Attack the purchasing policy changes. It’s critical to emphasize that change in policy will incur additional cost as decisions to move towards more open and interoperable environments will incur the cost of exit.

Reduce pricing. Often allies can be found within the company that is executing this play particularly those people who benefit from having an association with your company. Provide them the means to counter the effort by reducing pricing and showing more efficient provision.

Bundling. The breaking of a system into components is particularly dangerous as it allows new entrants that may erode your market. Provide favourable terms for bundling.

Confusion. One of my favourite dark arts is to exploit the confusion of choice. In this case, you would emphasize the management overhead of dealing with different components and suppliers, ask who would test the components, offer your own system interfaces as being the "open standards" and play on the company's own inertia (concerns over skill set changes, disruption of existing practices etc).

The overall goal is to create enough uncertainty and doubt that a gilded cage looks like the better option especially when combined with price reductions.

Play: Sweat and Dump

This play is used when you have something of value that you know will diminish and hence need to get rid of the costs associated with it.

For example, lets suppose you're the CEO of EMC and you've seen how VMware (a subsidiary) has grown however you suspect that as infrastructure gets commoditized further towards utility services then proprietary software plays are going to have a tough time. You can't open source the technology because of the write offs involved. One way to play the game is to continue with it as is, milk it as much as possible whilst building a new line of business further up the value chain (e.g. platform, management line).

If you can exploit the market (e.g. the current enterprise demands for private clouds) then you can spin out the future business (e.g. Pivotal initiative) with a view of getting the past existing business (hypervisor) either acquired by another or

floated on the market. Such a move is always tricky because timing and messaging needs to be perfect as you have to convince the market that you're letting go of the business because of some conflict or other reason and not because you think it's a future dead duck. Leo Apotheker had a good strategy for HP but the messaging was awful.

The icing on the cake, is when you can re-invest the capital into what was disrupting you in the first place e.g. EMC making a huge utility computing play.

Sweat and dump is also a way of dealing with legacy estates. If you suspect that financial ERP will become a utility (many large companies are looking to provide such services) then what do you do with your legacy? Well, first keep investment minimal and look to minimize future commitments whilst you plan to move. Enterprise clouds for example provide a way of doing this. Rather than re-architect for utility services based upon commodity components, find someone willing to provide you with utility services for non-commodity, high-end server infrastructure. Get someone else to load up the capital-intensive infrastructure costs (and ideally utility based application licensing) whilst you plot your move to a modern SaaS environment.

Your Strategy

Once you've look at the opportunities, the "where" to attacks, you can then start making trade-offs and choices. Your strategy is the result of this.

You might decide to drive some components of the map to a more evolved state in order to increase efficiency whilst using an open approach to undermine a competitor's barrier to entry and simultaneously building an ecosystem around a new utility service from a commodity component in order to generate future revenue streams whilst misdirecting a start-up. You might combine this with sweating and dumping a legacy estate through

an enterprise cloud and creating a level playing field around another. The point is your strategy will have many different parts but each part you should be able to articulate precisely why you're doing it.

After this it's all **how** (open source XYZ, use marketing to help establish a community), **what** (hire a team of software engineers, hire a community manager, launch a community event, create a public repository) and **when**.

Oh, and if you're assuming no-one thinks like this, well, I'm afraid they do. This is what strategy is all about. It's not about bland statements of becoming more innovative or more efficient or being nimble. It's about playing the game.

On Structure

Once you have built maps for an organization and used this to decide a strategy, the next question is how do we go about doing this? How do we organize ourselves?

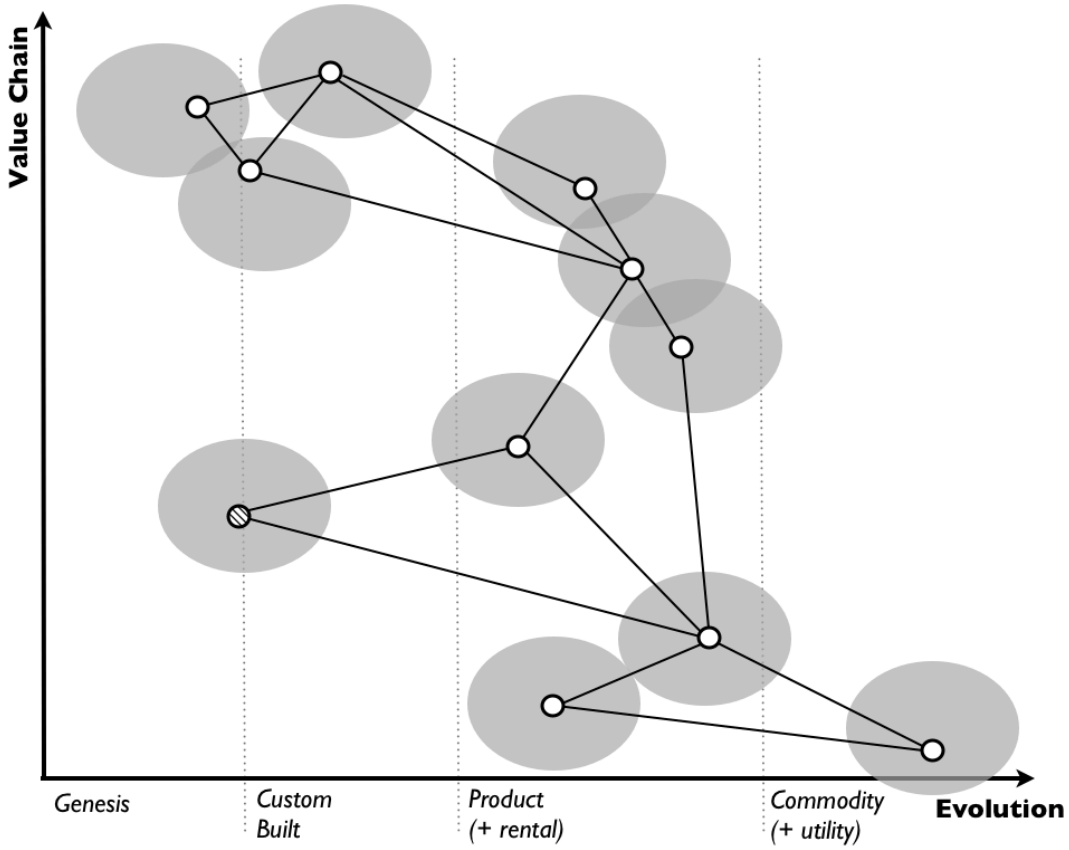
Many of the issues that businesses suffer with, from business alignment to various forms of inertia to one size fits all to the perils of outsourcing are a consequence of how we organize ourselves. Most the time we break companies down into silos grouped around type – i.e. type of activity, practice or data. Hence we have Finance departments, IT departments and Marketing departments.

Each of these silos consist of many activities all of at different stages of evolution. It is easy for a single department to adopt a one size fits all technique that invariably creates alignment issues with other groups. “We need IT to be more efficient” will be the chant of one group whilst another declares, “We need IT to be more innovative”. The more silos of this type, the more likely that alignment issues will occur.

A more effective approach (used by the Next Generation companies) is to break the organization into cells connected by services. As show in figure 54, the cell-based approach based around grouping components in small teams resolves the problems of one-size fits all and many alignment issues.

An example of this can be found with Amazon’s two-pizza model of working in which no team is bigger than can be fed by two pizzas (12 people). Such cell-based approaches are diffusing but are still infrequent in occurrence.

Figure 54 – Cell based approach to organizational structure.



Now, a two-pizza approach takes advantage of componentization with each group not only providing components to others but also relying on components provided by others. Because each group has unknown demands for what it produces and because the inputs may fail, each group is required to build using distributed approaches and to anticipate failure. Concepts such as degeneracy, where once component can be switched for another become important and reinforcing mechanism including the constant introduction of random failure are often used e.g. a master of disaster or in Netflix's case a chaos monkey.

Is a cell-based approached therefore the limit of organizational design? No.

The components continue to evolve and as they do so their

characteristics change. Which leads to a question. Even if an organization is broken down into small cells, are the right people involved?

In other words, do the people you need to deal with a component, such as an activity in the genesis stage the same as the people you need at the more commodity stage? Are there people who are more comfortable with a highly chaotic and uncertain environment with high rates of failure and flashes of brilliance? Are there others who are more skilled in a world that is more ordered, highly metric, highly reliable and efficient?

One way to resolve this potential dichotomy is to not attempt to do both but to simply focus on one side. For example, to focus on provision of highly efficient utility services and enable others outside the group (an ecosystem) to innovate and then exploit that innovation as it diffuses - the ILC model.

The term ecosystem refers to the collection of people, activities, practices and data which creates our environment and for which we have influence over. Each company is its own ecosystem. The provision of utility services and use of models like ILC is simply about widening our ecosystem to include others.

When we look at a company operating an ILC model with an external ecosystem that is growing faster than its physical size, we see that the company appears to be super linear for innovation (genesis), customer focus and efficiency with physical size i.e. as the company grows then it become more innovative, customer focused and efficient. The reality is the company is in effect vastly larger than its physical size i.e. it’s borders have extended beyond the company.

Within this wider ecosystem we often have a separation of concerns between the company focused on efficient provision of core services, outside companies innovating (taking the uncertain

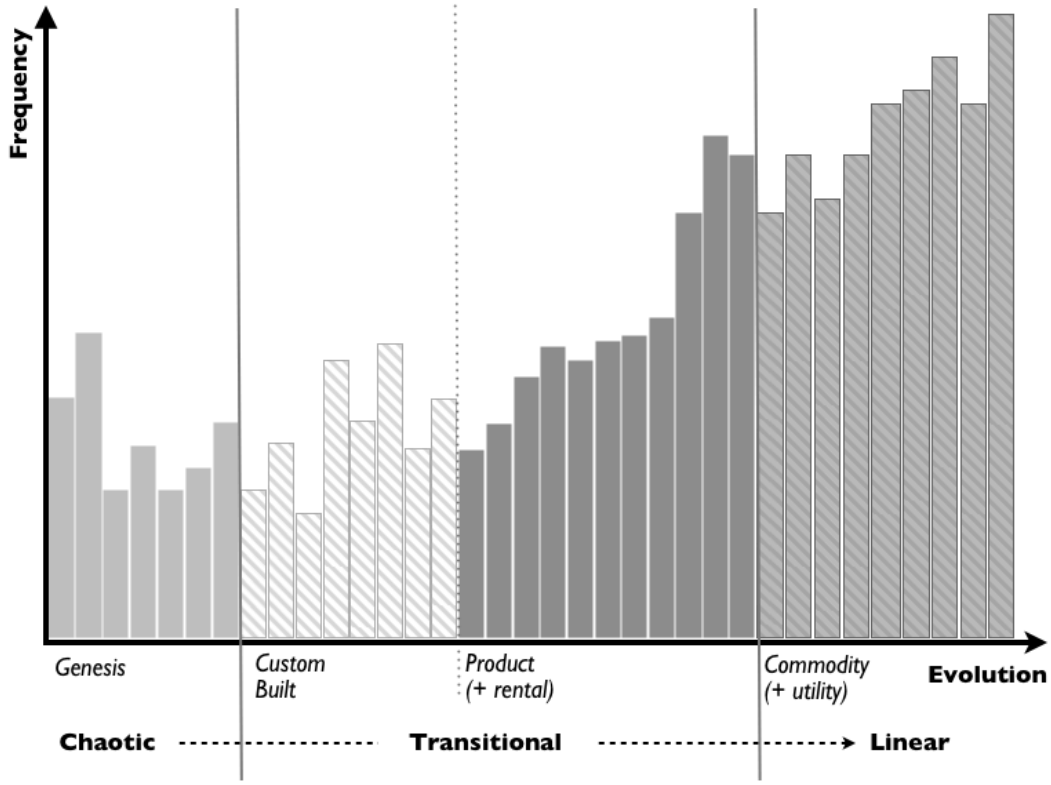
gamble in pursuit of novel and new) and the ecosystem being leveraged to identify successful diffusion. Can this three-part structure be replicated within an organization?

This is the purpose of a structural model known as Pioneers, Settlers and Town Planners where and organization is broken into these three distinct phases. To explain the model, we first need to examine another concept known as Profile & Flow.

Profile & Flow

Take your maps and count the frequency of activities, practices and data at each stage of evolution (e.g. number at a specific stage / total number at all stages). This is what creates the **profile** chart in figure 55.

Figure 55 – Profile of an Organization



All components are evolving (due to consumer and provider

competition) from genesis to commodity. At the same time there exists genesis of the novel and new including higher order systems through componentization effects. Finally the more evolved components tend to become provided by external suppliers. The overall effect is we have a constant **flow** from left to right and the graph is not static.

The exact **profile** and rate of **flow** will vary by company and its value chains along with industry. Hence some industries will tend towards a more commodity focus with efficiency in provision being critical whilst others we tend towards genesis and the creation of novel and new. Within any industry there will also be companies that choose to play a certain role, so in the pharmaceutical industry you may have companies focused on generics and others focused towards novel drugs.

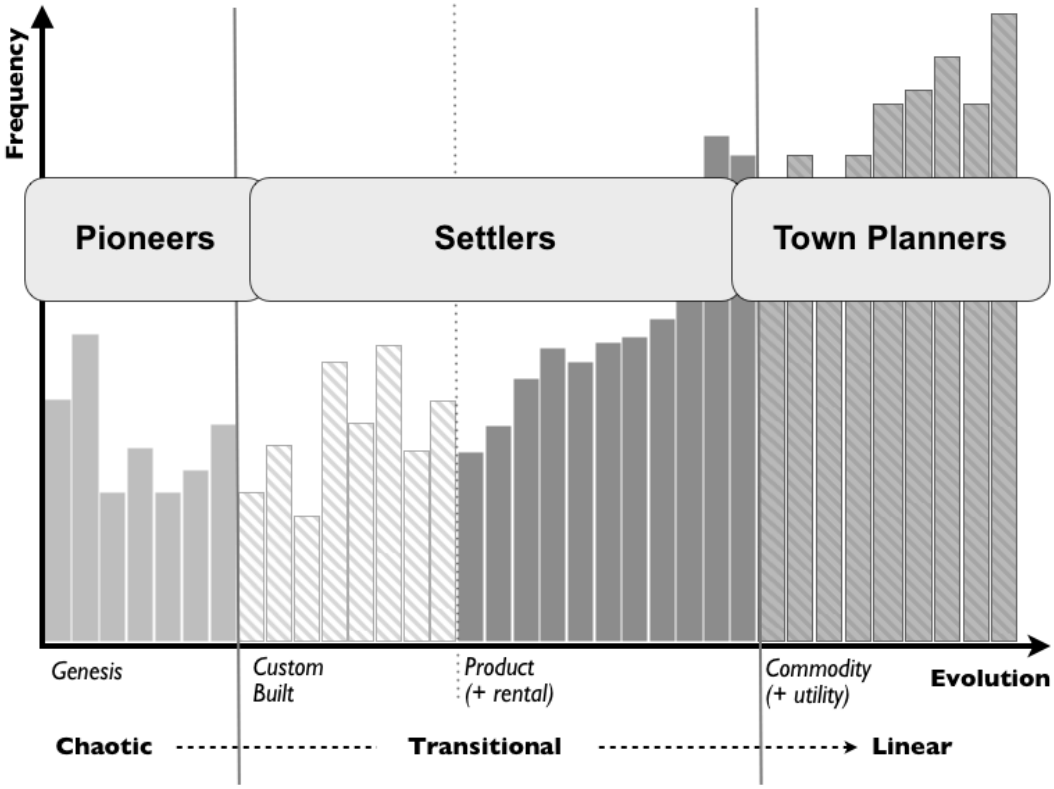
Getting the balance right is important for long-term stability. The more commodity components are highly predictable and when you're a provider of these create a base line of revenue. Genesis is by nature highly uncertain and risky but also provides the highest rewards. This is also why ecosystems are powerful tools because by focusing on the base line revenue and enabling others to do the gambling for you and then leveraging the ecosystem to exploit any success (commonly called "eating the ecosystem"), you can reduce some of the uncertainty whilst gaining a higher revenue than simply focusing on commodity.

When it comes to internal organization, rather than breaking the profile into type (such as IT, Finance, Marketing) and creating many smaller profiles leading to all the issues of one-size fits all and alignment, we will instead structure by profile.

Pioneers, Settlers and Town Planners

To structure around profile and the flow of evolution in an organization, we will use a structure known as Pioneers, Settlers and Town Planners. (see Figure 56)

Figure 56 – Pioneers, Settlers and Town Planners



The **Pioneers** will deal with the chaotic and uncertain world of genesis (or the "**innovation**" of novel and new). They are our artisans, our "creative" minds. They use appropriate techniques such as agile, rapid development, minimal viable system with a focus on experimentation and trying things out. The group understands implicitly that the future value of something is inversely proportional to the certainty we have over it, gambling is a must. As there is no defined market, there are no customers to listen to only gut. Failure is accepted as a norm, rewards are built on future successes and rapid change is the "standard operating procedure". In order to achieve the speeds necessary, use of component sub systems becomes essential.

The **Settlers** cover the custom built to product stage and focus on **leveraging** what exists. This group steals from the Pioneers

whether internal or external (in the wider ecosystem). The act of stealing (or eating the ecosystem) forces those Pioneers to get on with the act of Pioneering. The Settlers in the mean time concentrate on productisation or provision as rental services. The Settler's focus is on listening to customers and meeting their needs, developing metrics and feedback, incremental improvement, driving a component to feature completeness, maximizing profitability and reducing cost of production. They grow ecosystems, they nurture them and they exploit them. This group is where most of the games of strategy are played e.g. do we open source a component to undermine a competitor or do we slow down evolution through a dark art (branding etc)?

Settlers tend to use a blend of methods, part science / part art, they are more "cunning" than "creative" and are rewarded on profitability. They tend to be very good at spotting patterns (a necessary requirement for productisation of the novel and new). Similar games are played whether the component is something produced for sale or consumed by the organization. When consumed the focus is on driving down cost, driving it to more of a commodity etc.

The **Town Planners** cover the commodity and utility stages and focus on **commoditization** and building of "platforms for innovation". This group steals from the **Settlers** and builds the common components that the **Pioneers** use. The act of stealing is essential due to inertia that Settlers will build up through past success. Hence stealing forces them to move onwards. The Town Planners are almost exclusively metric driven - it's all about volume, efficiency, resilience, cost and performance and woe betide anyone who turns up without data. Methods are about minimizing deviation, repeatability and continuous operational improvement. Six Sigma and Kaizen rule the roost.

Don't confuse this with a lack of "creativity", the people you need are exceptional and able to turn your humble product into a

towering beast of efficiency. When it comes to listening to customers, this group is focused on providing volume operations of exceptionally efficient good enough standard components. They know what is needed better than the customer does. They also know how the customer suffers from inertia and becomes deluded over the need for customization. They know how if left to customers then everyone would want their very own highly customized nuclear power plant for their individual needs, there would be no standards and the world would progress at a much slower pace. In my experience, they can be quite a cynical crowd.

Rewards for Town Planners should be based on operational performance, cost efficiency and reliability. As a business you want to accept this is going to be a low margin but stable area.

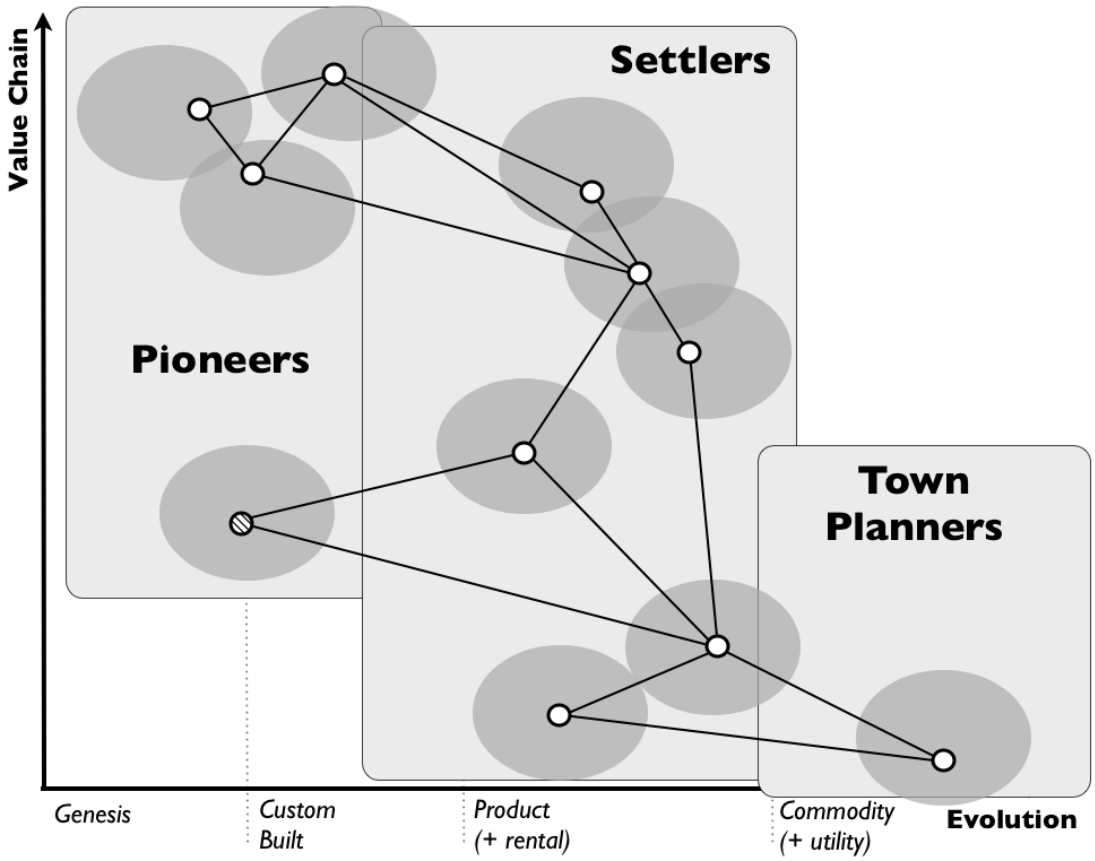
The balance between Pioneers, Settlers and Town Planners (**PST**) should vary with profile and flow. The rewards mechanism, techniques and means of operating for each group are different. Even the culture can be different.

The PST structure should be used in a cell-based structure (see Figure 57) as it requires activities, practices and data to be broken down into the different evolutionary states.

Whilst departmental structures are common and cell based structure are infrequent, the PST structure is exceptionally rare.

However, the point to note is that cell based structures aren't the end of the story. There is ample room for improvement beyond the current practices of today's Next Generation of companies.

Figure 57 – PST and Cells



Chapter 7
Outside in the distance

What not When and Vice Versa

The game of business is not played alone but against others. Predicting changes in the market and competitors move is an important part of this game. The use of maps is simply a visual tool that helps enable this but it is important to understand the limits of what can and what cannot be predicted.

Genesis (Unpredictable)

The genesis of the novel and new is, by its very nature, highly uncertain and hence unpredictable. You can make reasonable guesses by looking at components that are commoditizing and how they may be used to create other things but this is more about narrowing down a potential wide field to what is more likely. For example, today with ubiquitous and well-defined components for computer infrastructure, data capture through devices, voice recognition and complex search capabilities then you could guess that "intelligent software agents" will arise. In fact this is already happening with tools such as Google Now.

In general genesis is extremely hard to predict. It's like being able to predict the rise of television when Westinghouse introduced utility provision of electricity. The odds are not in your favour.

Solution to the Genesis Problem

Other than normal means of experimentation with fail quick, the only effective way of solving this problem is to get others to create the novel and new for you. The approach of using an ecosystem under an ILC model is specifically focused on this.

Substitution (Unpredictable)

Many products provide for numerous needs of consumers. Such products often have complex value chains with many high level visible components. Competing products also often differentiate

with novel and new components. The substitution of one product with another (e.g. cable vs hydraulic excavators) often occurs because of changes in the value chain such as a new component becoming important. This is also extremely hard to predict. Unfortunately the change is often compounded by inertia caused by pre-existing business models selling one form of the product to established customers (e.g. cable excavators). The market is seen to move in an "unpredictable" or "unexpected" manner with existing vendors often suffering from inertia. The existing vendors are likely to be "disrupted" in a classic case of the Innovator's Dilemma.

Solution to Substitution

Alas, protecting yourself against such "unexpected" market change is extremely difficult. Given some new characteristic or a change in the value chain then the opponent can often establish themselves in other underserved markets before attacking the main market. Being able to see that hydraulic will replace cable excavators requires incredible foresight. The best option is again access to information (as per the ecosystem model) combined with a willingness to understand that existing models can be replaced. Often a method of buying up smaller companies that are growing and which could provide alternative approaches is relatively sound but predicting substitution / the innovator's dilemma is extremely hard.

Evolution (Predictable)

Unlike the creation of the novel and new (genesis) or the substitution of one value chain with another, the evolution of any activity, practice or data is highly predictable. For example, the shift from genesis to custom built to products (and rental services) to commodity (and utility services) is a well-trodden path.

The process of evolution is governed by competition between all

actors (consumers and suppliers) however the timing depends upon the actions of individual actors. Hence whilst evolution (the "what") is predictable, "when" it will occur is not.

An example of this is cloud computing and the shift towards utility services. This was a highly predictable change in terms of "what" which was first described in 1966 in Douglas Parkhill's book the challenge of the computer utility. The precise "when" however depended upon individual actors and hence was not predictable.

The difference between changes that result from the interaction of all actors (e.g. the "what" of evolution) vs. changes that result from individual actors (e.g. the "when" of evolution) is essential in understanding many broad economic effects. For example, whilst Cloud Computing was an inevitable consequence of evolution, the question of centralization vs decentralization very much depends upon the game play between the individual actors in the market.

Solution to Evolution

The issues caused by evolution, such as disruption of past business models and inertia to change can be prepared for well in advance due to its highly predictable nature. However, the "when" of action needs to be resolved by looking for weak signals such as consumer dissatisfaction with the cost associated with an activity. Changes such as cloud computing are often associated with the Innovator's dilemma however given this class of change is neither "unexpected" nor "unpredictable" there exist little reason why any corporation should be disrupted by such a change (other than through executive failure).

Economic Cycles (Predictable)

As evolution is predictable, the corresponding economic phases of peace, war and wonder are also predictable. This means the

style of competition and types of approaches needed for each phase are also predictable.

The "war" phase is all about operational efficiency, volume operations and provision of good enough components. The "wonder" phase is all about experimentation, the rush to become established and rapid rates of genesis. Though "what" is created is unpredictable, the "when" is predictable i.e. during this phase, novel and new creations will appear which will dominate our society over time. The "peace" phase is all about maintenance of profitability and the status quo.

Solution to Economic Cycle

The solution is simply to understand the style of competition, type of leadership and the methods that are appropriate change with evolution of any activity, data or practice. This occurs both at the macro and the micro economic scale.

Hence at the macro scale, different methods such as Hayek or Keynesian approaches are required depending upon the overall phase of the economy. Obviously, different industries are in different phases at the same time e.g. computing maybe in the "war" but elements of manufacturing are in the "peace" phase. The old line of "one size doesn't fit all" applies equally to the micro and macro scale and hence approaches should vary by industry. A balance of both is always required.

At the Micro scale, the same rules apply. Hence a single value chain will have some components suitable for highly structured approaches (i.e. six sigma) whilst other components will be in an earlier state of evolution and therefore more agile techniques are appropriate. If you aggregate this then a balance of highly structured and less structured techniques will be the result.

Mapping itself is a useful technique in visualizing the environment onto which the above rules can be applied,

techniques can be determined and inefficiencies found. In Boyd's OODA loop (observe, orient, decide, act) the use of mapping is focused on the first step of observation and hence increasing situational awareness. Without this any action or strategy is akin to shooting in the dark or reduced to simply observing what others are doing with little or no understanding of the environment. When it comes to prediction, I find the following table useful: -

Table 1 – Types of Predictive Capabilities.

Act	Predictable What?	Predictable When?	Solution	Example	Notes
Genesis	No. Highly uncertain	No. NB. broad increase in Genesis due to a phase of "wonder" can be predicted.	Experimentation, Fail Quick, Get others to "innovate" for you.	First telephone	
Substitution	No. Highly uncertain	No. Highly uncertain	Willingness to react and disrupt existing model	Hydraulic vs Cable excavators	Classic case of innovator's dilemma
Evolution	Yes. Highly predictable.	Broadly predictable by examining weak signals.	Disruption of existing models can be planned many years in advance.	Cloud Computing	Often confused with Innovator's dilemma but not an unexpected market change.
Cycle	Yes. Highly Predictable.	Broadly Predictable.	Be aware that different phases require different approach.	Kondratiev waves	Change is often seen as "random" whereas much is predictable in term of either "what" but not "when" or "when" but not "what"

Falsifiability and Secondary Predictions

The work I have presented here is no more than weak hypothesis. In this section I wish to describe what I mean by this and some of the limits of the work.

Scientific knowledge evolves through a similar pattern of **concept** (Genesis) to **hypothesis** to **theory** to **law** (widespread, well defined and well understood). The characteristics of the knowledge change as it evolves with the results becoming more predictable and models of understanding more "modeled".

Concepts themselves are simply ideas with little or no supporting data. By the time something becomes a hypothesis you would expect to see significant sets of data, correlation and causation and some predictive capability.

The evolution graph itself (from which the rest of this body of work is derived from) has correlation over thousands of data points and causation through consumer and supply competition. It is however not directly predictable over time and one of the axis is certainty.

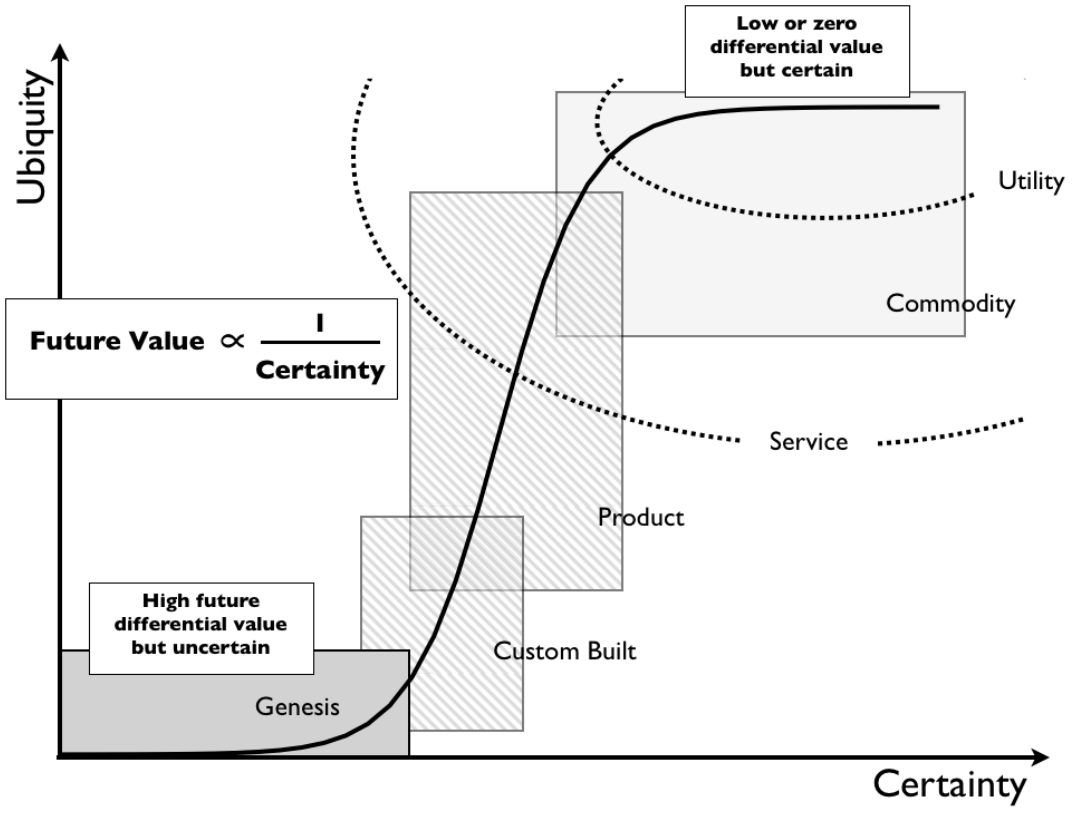
The certainty axis creates a problem as we can define something as a commodity with a high degree of certainty but in early stages it is more difficult to determine what something is e.g. is this a custom built system or an early stage product for an activity that will become a commodity?

Hence the data collected has been applied retroactively i.e. the past history of today's commodities is what has been used to generate the evolution graph. Prior to something becoming a commodity we can only guestimate what it is e.g. use aggregated expert opinion. The more evolved something is (i.e. the more certain) then the more accurate our guesses are likely to be.

When something is novel and new, we cannot determine whether it or something else will become the commodity for that activity. Whilst we know that the highest value is created in the product stage and therefore a system may represent a source of future value, our certainty over this is very low. As the system evolves then our certainty increases but also the future value declines as it becomes more ubiquitous.

There is unfortunately an inverse relationship between future value and certainty and we have no way of peering into the future. We have no crystal balls and certainty acts as an information barrier to the future (see figure 58)

Figure 58 – Future Value, Evolution and Certainty



You can however may secondary predictions, so as something evolves then we should see co-evolved practices, new forms of organization which appear and then diffuse along with changing styles of competition (from “peace” to “war” to “wonder”).

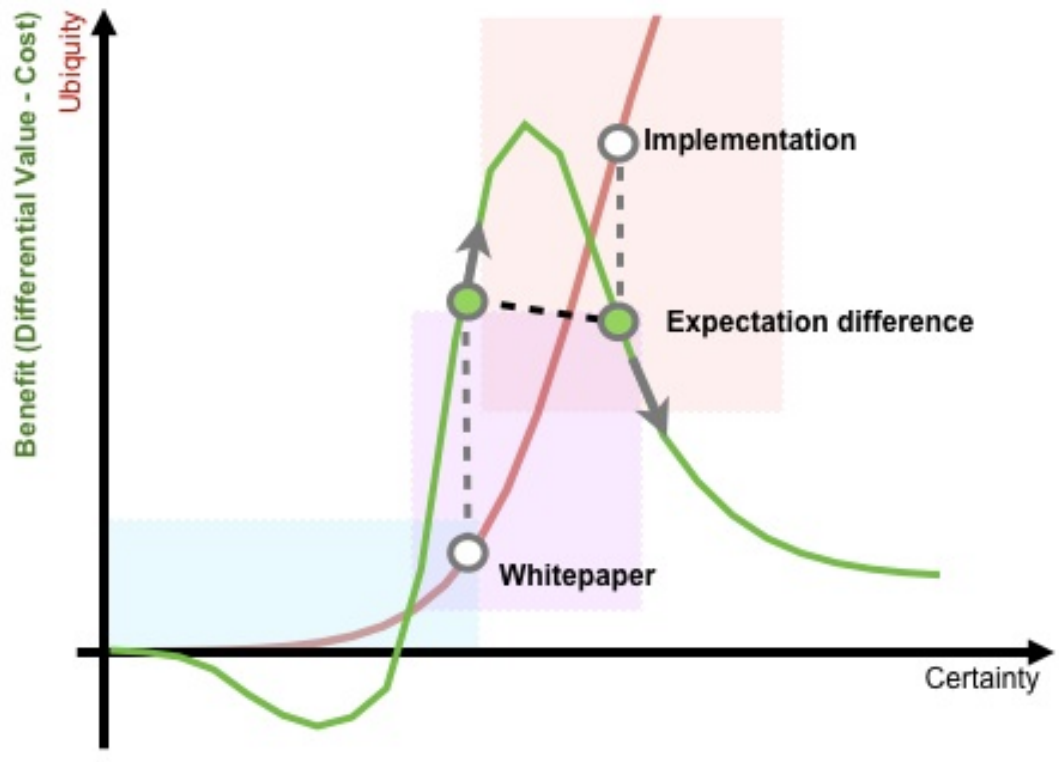
Hence along with correlation, causation and past historical data then we have also been able to conduct some secondary prediction tests. So far we haven't broken the model. It is however only weak hypothesis but albeit an apparently useful one.

Expectation curves

The model was also used to examine the change of expectation over time. By looking at the differential benefit created by some novel thing minus the costs associated with it, we plotted a benefit curve over the evolution curve (see figure 59).

From this curve, something novel and new tends to incur costs (Research & Development) that exceed initial benefit, as the activity matures the benefit rapidly increases until a peak is reached. Then the benefit declines reach some form of plateau (minimal selling price).

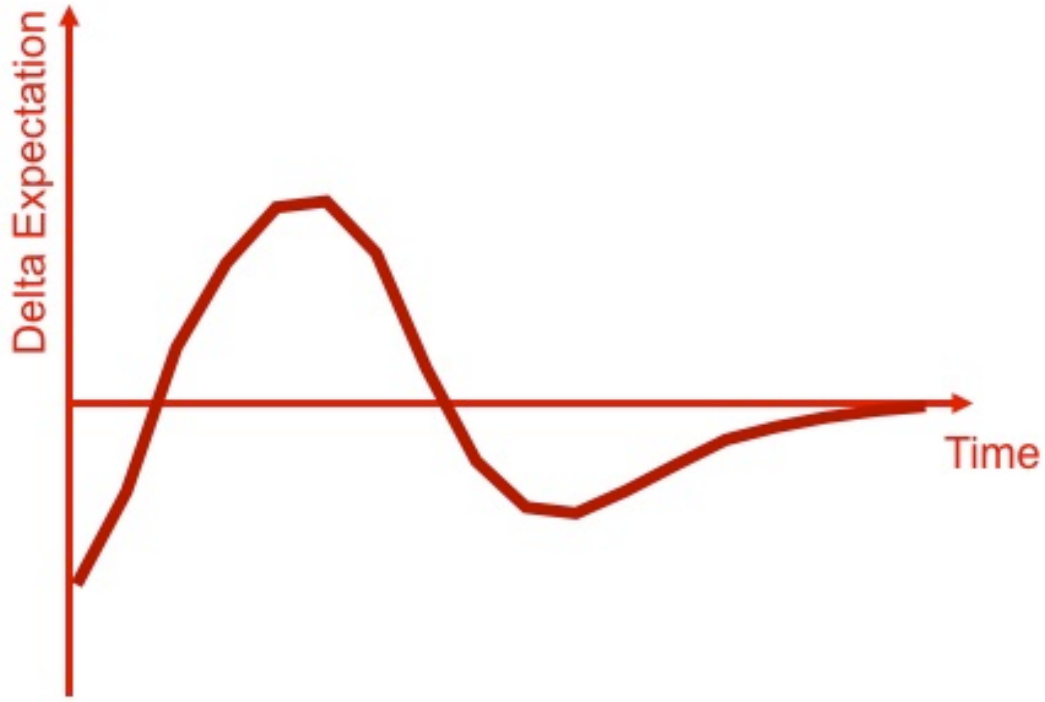
Figure 59 – Differential Benefit over Evolution



However, what's interesting is to view the delta in expectation of the benefits for the consumer. For example, the consumer (as in business consumer) will often read some whitepaper describing the system and how it is changing things but there is a lag between when the paper is written, the decision to purchase and implementation. What was relatively novel when the whitepaper was written maybe commonplace by the time a company implements.

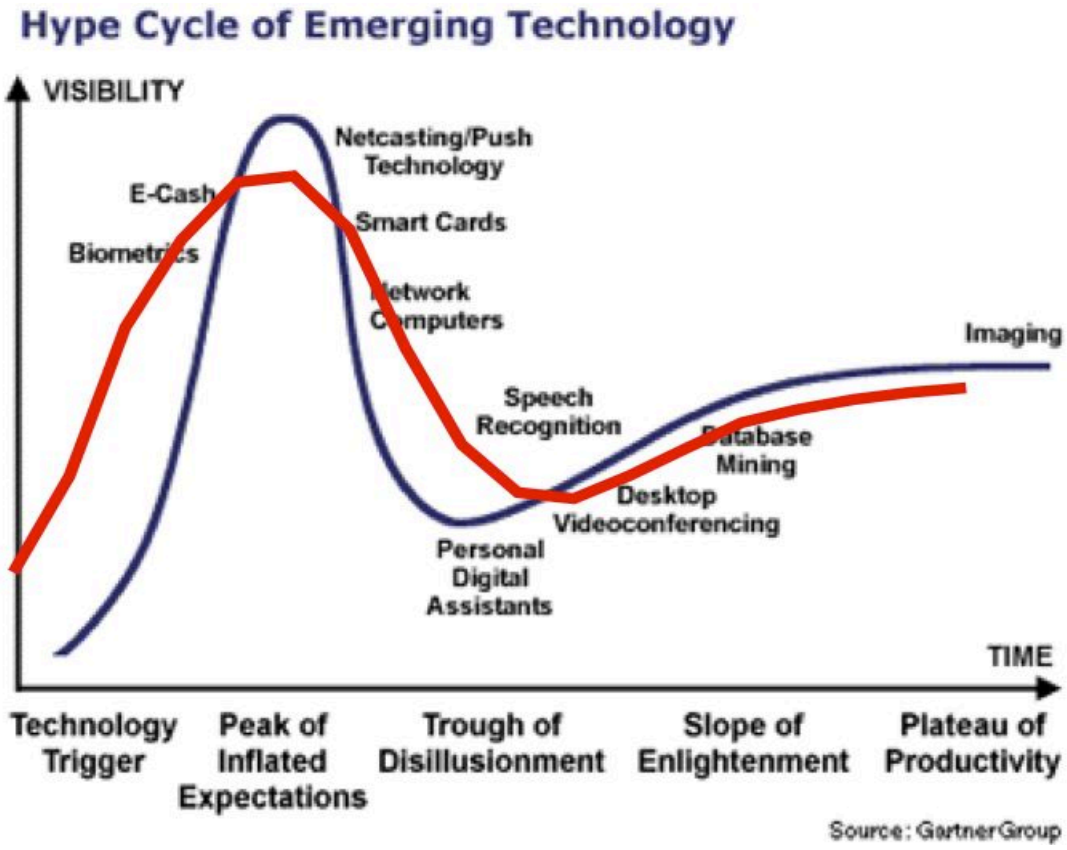
This creates a delta in expectation, as a company may believe that such a system will create a "differential" only to discover that "everyone now has it". This delta in expectation was modeled over time to provide a generalized average "shape" (see figure 60).

Figure 60 – Expectation over Time.



The expectation curve starts from a low base, has a peak of expectation, a trough of low expectation and then plateau's to a level. This is similar to Gartner's Hype Cycle (see figure 61).

Figure 61 – Expectation vs Hype Cycle



So, what does this tell us about the Hype Cycle?

Well, a number of things if we assume that the expectation curve and the hype cycle are the same phenomenon and the evolution curve represents change.

If the assumptions are correct then: -

1. From the benefit curve we can determine the period of highest differential and future value is in the technology trigger / peak of inflated expectations where the act is highly uncertain. The slope of enlightenment and plateau of productivity is where little or no differential or future value exists.

2. If the Gartner curve is based upon physical measurement, we should be able to reverse the process to identify where something is accurately on the evolution curve i.e. we should be able to say where something that is uncertain is on the certainty axis. This, of course, by definition is impossible. Hence the Gartner curve cannot be based upon physical measurement but must instead be aggregated subjective opinion.

Overall

The evolutionary model used throughout is simply a model, not the truth. It is weak hypothesis at best but has some supporting data with causation, correlation and secondary prediction tests. It does appear to be useful and makes some interesting observations on current management tools (e.g. hype cycles). It is falsifiable but as yet we haven't managed to break it. As it currently stands, it is the best model we have to explain regularly observed phenomenon.

Future

In this section, I wish to use all that we have discussed to examine the future to see if we cannot make some reasonable guesses as to what will happen. This will also serve as a reference point to test the predictive capabilities of the work.

There are two main areas I wish to discuss: -

- A highly predictable change in terms of “What” i.e. the commoditization of a pre-existing activity. For this I will use 3D printing.

- A highly predictable change in terms of “When” i.e. the impact of cloud computing in enabling an age of wonder and the development of intelligent agents.

I will avoid the general discussion on the genesis of the novel and new which is both unpredictable in terms of what and when. I tend to cheat with my predictions, using pre-existing trends.

What not When

I have had a long history with 3D printing, having written my first research report on the subject in 2001. I’m not going to concern myself with the mechanics of additive manufacturing techniques and the potential for hybrid printing of both physical and electronic structure, as there are now many works that cover this. I will instead concentrate on the consequences of this change.

First, 3D printing is part of a range of techniques that cover the commoditization of the manufacturing process itself i.e. factories are shifting from being custom built environments that consume large numbers of products to more digital environments that use increasingly commoditized methods to create objects. 3D printing is best thought of as part of the digital factory and in

some cases this will be used in the home and in others in large scale manufacturing environments.

The impacts of 3D printing (and the related technologies such as printed electronics, hybrid printing) will be the same as the commoditization of any activity. Hence we should see a standard set of consequences that I first wrote about in 2006.

These include: -

- Commoditization of the manufacturing process will result in an explosion of new activities (higher order systems) as the means of manufacture become ubiquitous. This will create a time of wonder and new industries but what those new things are and what new industries form, well we don't know yet because they're uncertain.

- The manufacturing industry will shift from a state of "peace" where relative competition exists and sustaining change tends to exceed disruptive change to a state of "war". It will become a fight for survival, where many past giants who have created inertia to change due to past success fail to adapt and subsequently collapse. During this "war" disruptive change will exceed sustaining change and new entrants (not encumbered by past business models) will lead the charge.

- We will see a flood of capital from the past manufacturing industries to these new industries.

- As the activity of manufacturing changes (from custom built factories to ubiquitous 3D printers) then practices in manufacturing will change. Practices often co-evolve with activities. The growth in new practices of more “Agile Manufacturing” will result in a yo-yo between more unstructured and structured techniques, a manufacturing equivalent of Agile vs Six Sigma.

- The new practices will result in new forms of organization as per electrical age (Fordism), Internet age (Web 2.0), Cloud (Next gen) and every other age.

- At the height of this change concerns will be raised how commoditization of the manufacturing process will lead to mass unemployment etc. This will overlook every other example of the same phenomenon (Hawkins and the electrical age) and how each time we fail to anticipate the new activities (higher order systems) and related industries that will form.

- In a desperate attempt to save existing business models, past industries will promote the importance of physical DRM to prevent people stealing copyrighted ideas or making dangerous items. Security and the threat of people being able to manufacture items like guns will be used to explain why this change is dangerous for us all and must be stopped. Furthermore Government officials pushed on by lobbyists will start to talk about the needs for certification of designers, architects and the like on the grounds of "consumer benefit".

- Along with disruption of past giants many secondary industries will discover that their industries will be disrupted due to rapid reduction in barriers to entry.

- Because of the reduced barriers to entry there will be a rise in competitors that were once former consumers

- The trickle of adoption to these new manufacturing techniques and practices will become a flood as the combined forces of efficiency (through commoditization of the activity), increased agility in building higher order system (componentization) and future sources of worth

(Schumpeter) kick in. This will take everyone in the industry by "surprise" due to the previous “peaceful” phases of competition.

- As commoditization of the manufacturing process spreads and the explosion in higher order systems and new industries accelerates there will be a corresponding explosion in un-modeled data. This is data which we don't know how to model yet but will eventually be modeled as we understand it more.

- As hardware becomes more malleable like software, it will be realised that the function of a device consists of digital and physical elements both of which can be described by code and hence a new language will form. In this new language you will describe the function of the thing you want and a compiler works out which bits should be code and which bits should be bits to be printed.

- The open meme (e.g. open source, open hardware, open data, open APIs) will happily continue its symbiotic relationship with the Internet and grow rapidly in this space. The patent system will become hopelessly outmatched for this world and will become as harmful for manufacturing as it has been in the software industry.

- Google, Amazon and other “players” are likely to adapt quickly to the change and attack with their normal two factor market and platforms plays to grab the developing ecosystems in this space. Many manufacturing, architectural and construction companies will find themselves now competing with the likes of Amazon backed by huge ecosystems of companies selling designs for direct printing.

The above “what” is highly predictable though the exact “when”

depends upon the actions of individual actors and is hence unpredictable. However, we can assume the above changes will significantly hit the manufacturing industry between 2020-2030 based upon the original predictions in 2006.

In the last seven years, we have already seen the start of this process gather momentum including some of the dark arts such as concerns over printing dangerous items.

When not What

In this section I wish to cover a change that we know will happen (in terms of time) but just not what it will entail. This change relates to the commoditization of IT to components provided as utility services and how it will enable the rapid creation (nee Genesis) of higher order systems.

We know that our industry is going to experience a time of wonder but due to uncertainty we don't know what those new higher order systems will be.

We can however make a reasonable guess by looking at the common components that are now provided as more ubiquitous and well-defined utility services and extrapolate what possible higher order systems can form. By reasonable guess, I mean we can confine our focus to a specific area but it should be noted that this time of wonder is highly uncertain and so we don't actually know.

I'm going to focus on a piece of work I presented in 2005 called "Any Given Tuesday". This work described a future with more intelligent software agents that understood both my network of things, my routine, my continual "exhaust" of data and my relationship between other networks.

The work highlighted two scenarios: -

In the first scenario, I wake up at 6:45 am, spend 10 minutes trying to find my watch, leave the house at 7:15 am, drive like a madman to the station, spend 30 minutes waiting for a train due

to cancellation, get to London bridge at 9:15 am, get soaked because it is raining, rush to work missing my coffee, arrive at work 9:35, discover my CFO has been trying to call but I've left my phone at home, realise I have football today but no boots as I threw them away last week, my partner calls to remind me it's Mother's day and my Sister's birthday tomorrow - both of which I've done nothing about.

Overall: I'm wet, late, had no coffee, I've annoyed my CFO, I'll miss out on football and I've still got to work out what to do about Mother's day and my sister. I'm hardly in the best mindset for work.

In the second scenario, I wake up fifteen minutes earlier at 6.30 am, pick up my watch and phone that are on the kitchen table, leave the house at 6.50 grabbing an umbrella from beside the door, arrive at the train station at 7:10 am and catch the 7:15 am, arrive at Canon Street at 8:20 am, pick up pre-ordered football boots from the sports store, grab a coffee, walk to work putting up my umbrella when it starts to rain, arrive at work 9:15 am, tell my CFO the reports been done and when my partner calls explain that I've sent my Mother flowers and my sister has a new ipod which will be delivered tomorrow as her last one broke.

Overall: On time, dry, plus coffee, I'll be able to play football, mother and sister's presents are sorted and reports done. I'm in the right mindset for work.

Ok, so what happened between the two scenarios? Did I become Mr. Organized or learn the twenty-seven secrets of successful people? No, it's all done with technology and asking a few simple questions.

First, everything is tagged, everything is online and everything is a network. My network of things knows it's a Tuesday, how long it takes me to get ready and what things I need for work. It knows

where those things are and the weather forecast. It can interrogate the train stations network to get times and cancellation information and it knows where I need to be. It knows I play football on Tuesday and that I threw my boots away. It knows I like to drink coffee and that its Mothers day tomorrow and that I bought flowers last year. It can ask my Mother's network what sort of flowers she has and whether anyone is buying her flowers? It knows it's my Sister's birthday tomorrow, it can ask her network for suggestions. It now knows she broke her ipod (remember this was written in 2005), that she hasn't replaced it and what her favourite songs are and where she will be tomorrow. My network knows my CFO was in a meeting where they discussed a new way of analyzing value from users.

My network of things can now, find a shop with the boots I need and pre-order, find a coffee shop and calculate a route to work to pick up both. Calculate time for journeys and dynamically deal with cancellations. Sort out ipod and flowers. Analyze the CFO meeting and determine most probable research to be collated and who to contact.

All it now needs to do is ask me some basic questions: -

- Do I want to buy some new boots for £35 so I can play football tomorrow?

- Do I want to send my Mother flowers for Mother's day?

- My Sister's ipod is broken, do I want to buy her a new one for her birthday?

- The CFO is after an examination of user spending patterns vs latency on the site, do you want me to prepare an initial analysis with the latest research on the subject?

Then it needs to calculate my journey and wake me up when I

need to be woken up. This is what I called augmented intelligence and it likely to be provided through intelligent software agents that ask the questions and take care of the details. The agents will depend upon commoditized means of providing computing infrastructure, large-scale data analytic systems, extensive and modeled search and voice analysis, ubiquitous sensors and networks. Back in 2005, the capabilities were already there but it was economically unfeasible, the recent round of commoditization in IT is bringing many of these into reach.

In 2005, we could be sure that IT would enter an age of wonder (after the war) and intelligent software agents was a reasonable guess as to one of the higher order systems that were created. Today, we have MindMeld, Google Now, SIRI and EVI.

The Cycle of Change

The above demonstrates how examination in terms of evolution is not only useful for creating maps and competing with others but also for providing some level of forecasting over the future. Alas, such forecasting is limited to “What” just not “When” or “When” just not “What”. However, the use of weak signals and componentization can help narrow down the uncertainty to likely areas of probability.

We can already see what the impact of 3D printing will be (probably sometime around 2020-2030) and how a time of wonder will occur in IT over the next five years (probably involving some form of intelligent software agents).

Those newly created activities in the time of wonder will themselves evolve and eventually become a commodity initiating a new cycle of change in that industry. So, we can use these cycles to predict probable areas of interest well in advance.

However, the cycles of changes themselves are not linear but

impacted by commoditization of the various means of communication. Whilst the evolution from Archimedes screw to standard nuts and bolt (brought on by Maudslay's screw cutting lathe) took 2,000 years, the Parthian battery to utility provision of electricity was 1,400 years, the evolution of the first phone to telephony itself being a commodity was over one hundred years and computing infrastructure took a mere sixty years.

Whilst it is doubtful that we have become more "innovative" as a species (i.e. our ability to create the novel and new has accelerated), the speed at which things commoditize and the next cycle starts certainly appears to be accelerating. The printing press, postage stamps, telephony and the Internet have all accelerated the general rate of evolution of all other activities by increasing communication and participation.

So it is probably reasonable to say that along with being able to predict "What" not "When" or "When" not "What", the one other thing that evolution teaches us is the cycle of change is likely to become more rapid.

Hopefully by now the reader is fully aware that things aren't quite as random as people make out and the importance of understanding evolution and mapping in competition.

If so, well, I've done my job.