COMPLEX SYSTEMS DESIGN AND MANAGEMENT SEMINAR (FEB 2016)

Let me begin with a poem based on internet material on something complex.

While we in CSDM ponder and dissect the nature of the Complexity Beast,
Do you know that we have already welcomed one of its kind into our midst?
I speak of English - with which we critically depend on to communicate,
Yet its use is one that generates great debate.

With its magic, great poets conjure amazing Verses,
But yet when we try to understand it, we are confounded by its Paradoxes.
For we find that in English, Quicksand works slowly and Boxing Rings are Square,
And a Guinea Pig is neither from Guinea nor a pig - in case you are not aware!

We then find no egg in eggplant nor ham in hamburger;
And neither apple nor pine in pineapple.
English patterns are unpredictable,
For we are told that we should recite at a play and play at a recital.

Complexity is certainly the Order of the Day,
When people park on a driveway and drive on a parkway.
Not to mention understanding bodily functions in English is difficult as Hell -
Since we have noses that run and feet that smell!

Speaking of Hell, trying to know if it is a hot or cold place is a real bother,
If we told that the weather is Hot as Hell one day and Cold as Hell on another!
In this perplexing language, since the plural of goose is geese,
Why is the plural form of choose not cheese?

And since the staple for a vegetarian is the vegetable,
I do hope that what a humanitarian eat is agreeable!
How is it that when the stars are out, they are visible,
But when the lights are out, they are invisible?
Or worse, when a house burns up, being burnt down in the end is possible?!

So if we can manage English, we should be able manage other complex situations. Or can we? I noted that the programme in 2014 was more technical, with emphasis on engineering, systems and modelling as approaches to deal with the phenomenon of complexity. Since there are also insights from other disciplines, such as in the softer sciences, that can be harnessed to understand and deal with it, I therefore offered to do something slightly different today - I want to suggest that leadership is a key issue in managing complexity and briefly share some ideas of what a good leader in the Complex world might look like.

In my previous life looking for disruptive concepts as a competitive advantage, one area of great interest is what we called Sensemaking –
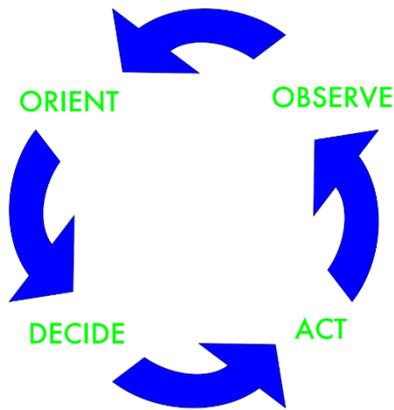
How do we secure the cognitive edge in every decision at each operational level to defeat any potential adversary throughout what airforces call the OODA – Observe Orient, Decide and Act – loops?

© Cynefin framework by Dan Snowden
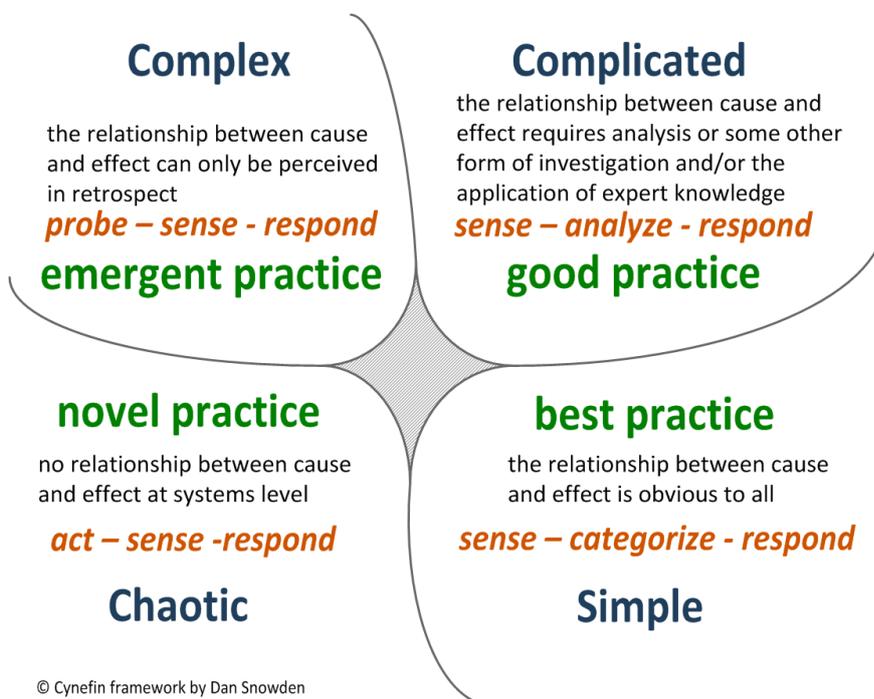
We had found the Cynefin framework, developed by Dave Snowden - who is probably somewhere here today - useful to think about decision-making approaches. In the "Simple" quadrant, the relationship between cause and effect is known. Information needed for decisions are "known". Based on these, you make a decision. In the "Complicated" quadrant, the relationship between cause and effect is "knowable" but needs to be found through collecting and analysing data before making decisions. In the "Complex" quadrant, the relationship between cause and effect is known only in retrospect while in the "Chaotic" quadrant, it is impossible to find cause and effect.

I need to elaborate the conceptual differences because the solutions required are very different. The "Simple" context don't require explanation.

An example of a "Complicated" context. On April 15, 2013 two bombs killed 3 civilians and injured 364 people in Boston. By April 18, the FBI released the pictures of 2 suspects.

What happened was that thousands of hours of video were analysed within 48 hours, with video and data analytics technology as Boston is wired with thousands of cameras. This then allowed the FBI to decide and act. The information to cause an intended

effect is "knowable", although difficult and even impossible without the technology to mine the millions of data points.

An example of a "Complex" or "Chaotic" context.

It was just 5 years ago that the world watched with amazement at the rapid unfolding of the Arab Spring and the fall of long-time strongmen Gaddafi and Mubarak. Today, Egypt is ruled by yet another dictator and most of the other Arab Spring countries have collapsed into civil war. Pro-democracy strategists are probably kicking themselves for not doing enough to prevent this outcome. But the fact of the matter is that the domino-like Arab Spring's emergence and collapse are impossible to predict beforehand.

The cause and effect relationships of decisions, actions and outcomes could not have enough reasonably anticipated. The ex-ante patterns and relationships are not definitive. There are multitudes of connections - many hidden from view, others not even evolving. Many of these may eventually cause disruptive effects, and surprise. This is the nature of decision-making in the Complex and Chaotic quadrants.

Most people, including decision-makers, mistakenly believe that they are merely in a Complicated world where cause leads to effect.

Whereas in the real world, which is a Complex one, cause does not necessary lead to effect because there may be many hidden connections interacting in ways that cannot be adequately modelled. Understanding this helps to appreciate how we make good decisions for a country or a company in such situations. Modelling, systems approaches, data analytics all can help but are not enough.

At the end of the day, we have to depend on human judgement. Why? Because in such situations, by definition, one cannot logically analyse the patterns as they are either non-existent or still emerging from the data.

This need to ultimately rely on human ability is more than well appreciated by the military. The battlefield has been the place where human ability to digest and process inadequate information had been tested time immemorial.

The general in the battlefield examines limited information about the enemy, the terrain, the operational conditions, the strengths and weaknesses of his forces and then he strategises, decides, acts and then constantly re-adjusts his strategies based on new information.
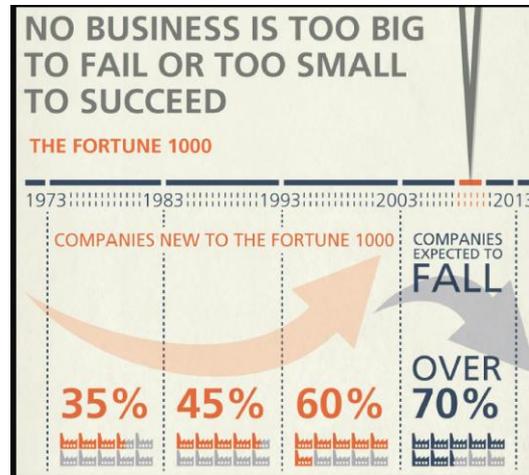
Not only is there relative paucity of information – that is why some had accurately coined the phrase "The Fog of War", the situation evolves as the enemy is also thinking and acting based on your actions. There are many war stories which illustrate successful military judgement which have been the subjects of intense study for militaries. I shall not dwell on these other than making the point that militaries essentially use good leadership to overcome Complexity.

However, while leadership seems to be one key answer to complexity, it is not so clear that the solution is so easily found. Officer training, command and staff training leadership selection, leadership promotion and grooming are all priorities of peacetime

militaries. But yet when the complexities of the real battlefield check out these untested leaders, many sadly do fail. This is the same in the corporate world. There is no company in the world that does not believe that the success of the company depends on the CEO.

Yet, the graveyard for companies is very crowded. In this study the number of Fortune 1000 companies getting out of the list every 10 years has been growing steadily.

The challenge is that things have gotten worse. For all who are gathered in this important conference, you would not disagree with me that the wisdom "Change is a constant" is not so valid any more – it is more "Complexity is a constant". By not recognizing this as a fundamental context, solutions cannot be fully found, be it in the precise framing of the problem or finding the specific remedy.

NO BUSINESS IS TOO BIG TO FAIL OR TOO SMALL TO SUCCEED

THE FORTUNE 1000

1973 1983 1993 2003 2013

COMPANIES NEW TO THE FORTUNE 1000 — COMPANIES EXPECTED TO FALL

35%   45%   60%   OVER 70%

At the macro level, we are entering a whole new world. Tectonic changes are happening rapidly in many dimensions – a multi-polar world order is emerging with China rising quickly;

The European union is at risk of breaking up even as it struggles to contain a massive refugee problem;

The world is struggling with ISIS and terrorism at a global scale never seen before;

International financial markets are reeling from repeated shocks that are hitting at an unprecedented rate – the latest being the prospects of US$20 oil;

The planet urgently needs to be saved from permanent damage by preventing the global temperatures from rising 2 degrees even as we all watch helplessly the extreme weather patterns sprouting all around the world;

International health organizations are bracing for the expected flu pandemic even as they struggle to contain new cross-border epidemics from threats like MERS, Ebola and now the Zika virus. The scary list goes on and on. And each has a fundamental impact to countries and businesses.

For businesses, things are even more complex, if this is even possible. Once upon a time, disruption happens once in a while. You make good products, you gain market share and you grow and continue to do well for a long time.

Therefore you can have companies like those described by Jim Collins as being "built to last". Now things are happening so fast that even these brilliant academics are not
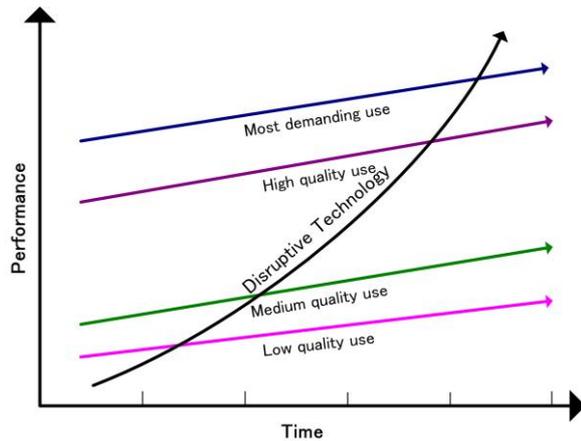
catching up – in Jim Collins' list of so called built-to-last companies, a few are already on the way down for example once upon a time stars like Sony, HP and Ford.

Ford's share price was US$35 in 2000, it is now US$15.

HP's peak share price was close to US$80; it is now around US$10;

Sony's share price dropped from 30,000 Yen in 2000 to 2500 yen now.

But that is not all.

It used to be that you get disruption because of alternative products through disruptive innovation. Therefore smartphone technologies killed Nokia. Low cost high performance phone cameras killed Kodak.

But now it is not uncommon to have disruption in fundamental business models. Look at Uber and Air BnB – there is no new physical product, just new business models tapping on sub-optimisation of existing resources. Are these niche players or will they become the main players? Who knows? The patterns are still emerging.
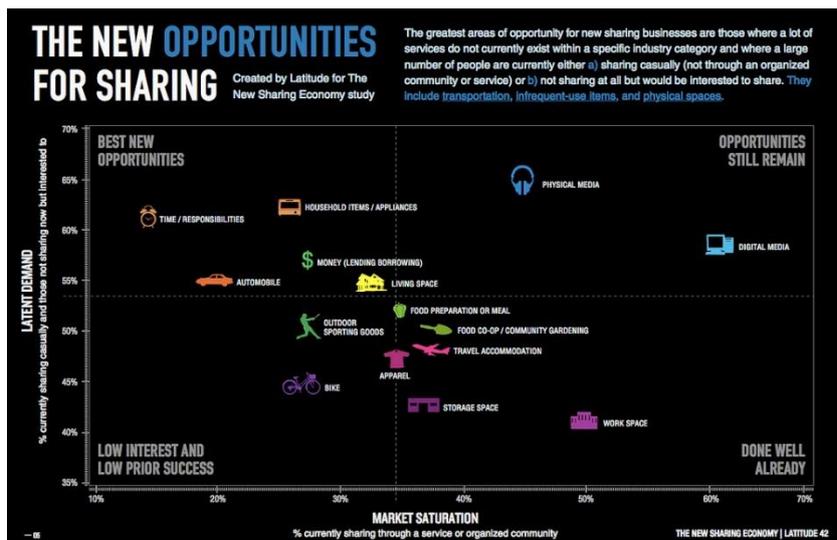
But many are already predicting the rise of the Sharing Economy.

And disruption is happening in many many industries – where I come from – the energy industry - for example. It used to be a very predictable industry dominated by large incumbents, be it the oil and gas producer or the electricity grid. However, the energy

industry at the brink of going through a traumatic change, driven by abundance of shale gas, the push for renewable energy, smart grid systems, energy storage, electric vehicles, energy efficiency technologies, just to name a few.

So, if we need good leadership in less turbulent times, we need them like never before in this new complex world.

But what sort of leaders can make it in this brave new world. I found some answers in the findings by Roselinde Torres, who was the first global head of the Boston Consulting Group's division on corporate leadership.

Torres found that in her study of 4000 companies, 58 percent assessed that there are significant talent gaps for critical leadership roles, meaning that despite corporate leadership programmes like training, off-sites, assessments, coaching etc, more than half the companies recognise that they have leadership issues.

She wondered why leadership gaps are widening even though there is more investment in leadership development. She was so consumed by this mystery that she took one year off to study the issue.

Her conclusions are that relying on traditional development practices may stunt growth of leaders and traditional assessments like narrow 360 surveys or outdated performance criteria are likely to produce false positives, lulling a leader into thinking that he is more prepared for this complex world than he really is.

She suggested that there is a new set of criteria that identifies a great leader in the 21st century. She believes that the great leaders of the 21st century have the astute ability to recognise emerging strategic trends and patterns and have the uncanny ability to discern how such developments in adjacent or even unrelated industries create disruptive opportunities. They look outwards, look round corners and they shape the future.

Torres observes that these people have an active calendar that keeps them aware of things that are not immediately related to their companies or industry. Their personal networks are typically eclectic and diverse – for it is in such networks of people that are different from themselves that they are able to understand new patterns, new solutions and even new partnerships. Finally, these leaders are courageous enough to abandon a practice that had made them successful in the past.

The last is similar to what Prof Clayton Christensen from Havard calls the Innovator's Dilemma – how successful companies may need to abandon successful formula and adopt new strategies or risk being disrupted by newcomers, creating a dilemma. You know you need to innovate but when you do, you may destroy the company.

This is a brief discussion of what could be insights from management theories and business schools that might inform us of what we need to do to manage complexity. Perhaps – since most of us have come to exist comfortably with the bewildering complexities of the English language, we will one day accept that "Complexity is a constant" does not lead to an apocalyptic ending for all.