Digitization and the Intelligent Enterprise

SPICE Conference 2018 Keynote Talk

Dr. Sundeep Oberoi – Tata Consultancy Services Ltd.

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TATA CONSULTANCY SERVICES
Experience certainty.

Brief Keynote Speaker Profile

Dr. Sundeep Oberoi

- Received the Ph.D. degree in Computer Science from the Indian Institute of Technology – Bombay
- With the Tata group for 25 year in several roles in software development, communications and security
- Currently Global Head – Cybersecurity Delivery with Tata Consultancy Services
- Served on the World Economic Forum's Global Agenda Council for Cybersecurity
- Responsible from TCS for execution of the Chevening-TCS Cyberpolicy programme delivered by the University of Cranfield and Shrivenham
- Currently serving as Chair ISO/IEC JTC1/SC7

The TATA Group

India's largest conglomerate

100 operating companies in 7 business sectors

Information Technology & Communication	Engineering	Materials	Services	Energy	Consumer Products	Chemicals







The TATA Group

Passionate commitment to developing the communities in which we operate

66% of Tata Sons equity held in Public Trusts

Endowments for national Institutions - higher education, medicine and sciences

Foreign scholarships for science/ engineering

Contribution to social welfare in excess of $ 100m annually

The TATA Group – International Presence

- Group companies have operations in over 80 countries
- 56.9% of revenues from outside of India

Tata Motors	Tata Global Beverages	Tata Chemicals	Indian Hotels (Taj Hotels)	Tata Steel	TCS	TATA Communications
2008 Jaguar/Land Rover	**2006** 8 O' clock Coffee	**2008** General Chemical Industrial Products	**2007** Campton Palace Hotel, San Francisco	**2007** Corus Steel	**2008** Citigroup Global Services Ltd	**2010** BT group' (BT) Mosaic Business
2004 Daewoo Commercial Vehicles	**2000** Tetley Tea	**2006** Brunner Mond Group	**2006** Ritz Carlton, Boston	**2006** Millennium Steel, Thailand	**2013** ALTI	

TATA Consultancy Services (TCS)

50 Years in Business

460000 Employees

130 Employee Nationalities

60 Countries where TCS has presence

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Digital Transformation

The Drivers for Digital Transformation

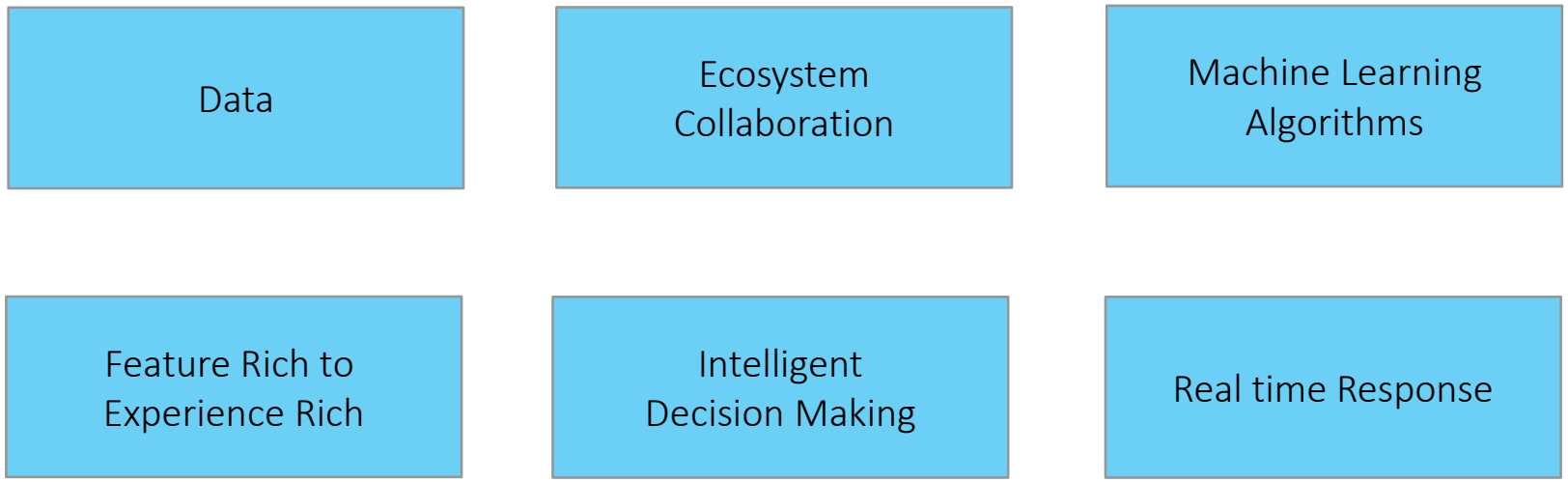
OPERATIONS VISIBILITY & MANAGEMENT	▪ ***No Real-time visibility*** *of processes* ▪ ***Inadequate/ Inaccurate information*** on processes ▪ ***Processes not optimized*** ▪ ***Reactive decision making***	*Streamlined processes with granular visibility (How, When, What & Why) at each stage enabling proactive decision making*
COMPLIANCE & REPORTING	▪ ***Difficult tracking and reporting compliance to laws, regulation and company policy*** *due to lack of visibility of operations* ▪ ***Security and Safety compromised*** ▪ ***Opportunity for fraud***	*Granular data availability for audit/regulatory compliance*
AUTOMATION	▪ ***Automation (if any) in silos*** ▪ ***Latency and error*** *in processes requiring human interaction*	*Optimized processes & workforce, real-time decision making*
NEW VALUE CREATION	▪ ***Underutilized Assets*** ▪ ***Inability to leverage existing data***	*Savings and potentially* ***new sources of revenue***

Enabling Factors and New Challenges

CONTINUOUS EVOLUTION OF TECHNOLOGY	▪ ***Many new technologies emerging*** ▪ ***Technologies are made much more effective due to the high quality connectivity enabled by the Internet of today***	• *Enabling ecosystems exist and this facilitates very rapid technology adoption* • *Obsolescence of people, process and technology can happen very fast*
VALUE DELIVERY DEPENDENT ON MATURE YET EVOLVING ECOSYSTEMS	▪ ***API-fication of enterprise platforms*** ▪ ***A complex ecosystem of entities involved in the value-delivery chain*** ▪ ***Systems rarely isolated – usually part of a system of systems***	• *Value delivery is based on collaboration of several entities* • *Collaborators can sometimes be competitors .*
EMERGENCE AND DOMINANCE OF PLATFORMS	▪ ***Big Platforms have emerged with subscriber bases larger than many nations*** ▪ ***Platforms are making decisions based on learning algorithms*** ▪ ***Learning algorithms are "sucking out the IP" of users***	• *Interoperability of platforms is becoming a serious issue.* • *Codify platform ethics and to require an explain capability for machine made decisions*
ESSENTIALLY INTERNATIONAL CHARACTER	▪ ***Technology enables a global market*** ▪ ***Each supplier has a global ambition*** ▪ ***Each consumer has a global choice*** ▪ ***National and Regional tensions on issues like privacy, consumer protection, taxation and sovereignty***	• *The technology and its underpinning are globally interoperable* • *The legal and social systems in various countries and regions are not*

The Intelligent Enterprise

Smart Enterprise is a multi-trillion dollar opportunity: N.Chandrasekaran – Group Chairman Tata Group



Softwarization of Everything

- Not a new trend but has significantly accelerated now
  - Software defined radio
  - Software defined networking
  - Software defined data centre
  - Clear trend where specialized hardware is being replaced by a commodity computing platform with functionality being implemented in software
- Impact : Many fields being transformed in terms of software efforts being put in. Tendency to reinvent things that the software development community already knows and has stadardized

Changing Nature of Software Development and Support

- The response time needed by business has dropped by an order of magnitude
  - Requirements are only partially known
  - Requirements change
  - Some requirements may be inconsistent with others
- Systems must be changed while continuing to operate
  - Granularity of change must be small and therefore ***the incremental cost of one small change*** must be very close to ***the average cost of a change when a large batch of changes implemented at one time***.
- Systems now operate in the context of many other systems that either provide enabling or collaborating capabilities
  - System of system considerations may need to be explicitly considered
  - Systems may need better abilities to “discover” the capabilities (architecture/behaviour/?) of other systems with which they may interact

Security Challenges

The Global Context

- **Increased Reliance on Internet-Connected Devices and Services -** The internet of things and cloud computing are creating new opportunities for vulnerabilities and crime while simultaneously expanding the potential devastation of such attacks.
- **Breaches and Vulnerabilities are Increasing in Frequency and Severity -** Attacks are inevitable. Over the past year, major entities from nearly every sector have suffered significant attacks and the commoditization of exploits and vulnerabilities will only enable more attacks.
- **Business and Technology Developments Outpace Security Improvements -** The speed and pace at which new products and services are being developed outpaces the ability and/ or willingness of companies to address cybersecurity risks.

Understanding Public Sector Tensions

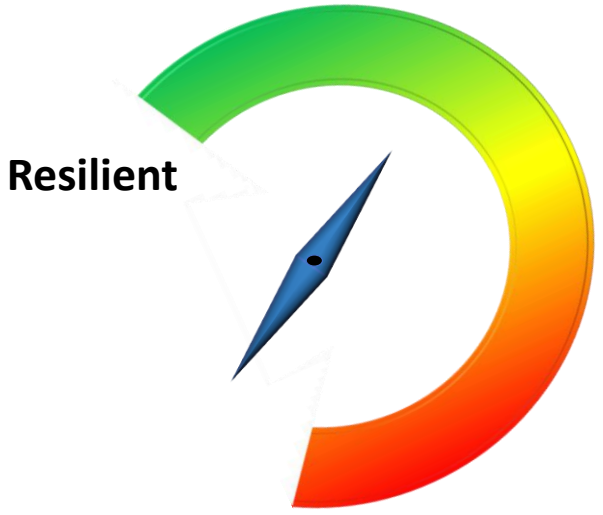
- The public sector must simultaneously play a multitude of roles with respect to cybersecurity, which can create conflicts, confusion and distrust. Governments face significant challenges as they attempt to balance those roles while navigating complex relationships with national, regional and global stakeholders.
- International Fragmentation, both legal and technical, has complicated government efforts at responding to, investigating and prosecuting cybersecurity incidents. Outdated and inadequate bilateral and multilateral mechanisms have necessitated striking a difficult balance between cooperation and confrontation at the international level.
- The public sector faces a difficult challenge of balancing the need to access information for investigations with the security of communications, privacy rights and commercial interests.

Private Sector Challenges

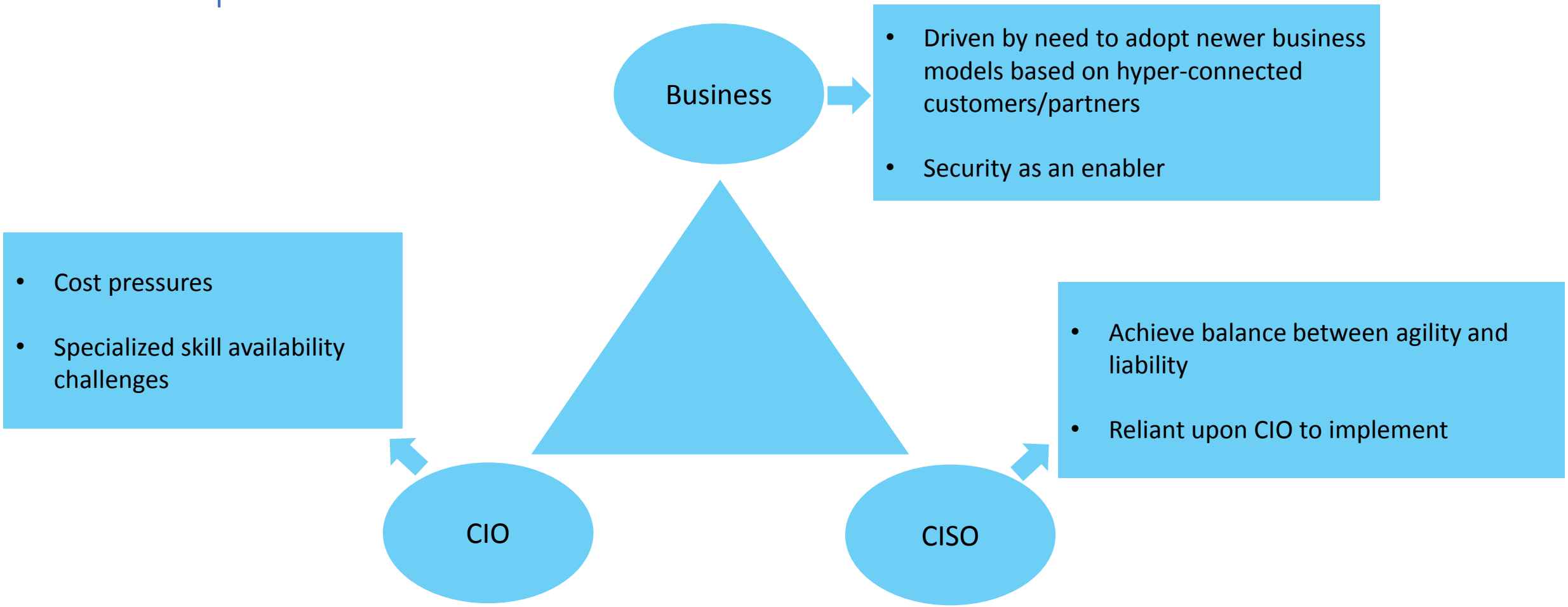
- **Resources and Knowledge Gaps** - Companies face challenging questions about prioritizing the application of financial, time and human resources, necessitating difficult trade-offs between investments in new products and features, securing their own systems, securing end-user systems and data, and securing legacy products, all within a market that rewards rapid innovation and being first to market.
- **Ecosystem Management Challenges -** Companies face difficult challenges in effectively addressing cybersecurity issues where solutions must be implemented by several independent actors who own and manage different parts of an interoperable system, and where a single product is the result of several components made by different companies or even different silos within the same company.

Securing The Future

- **Mature Cybersecurity Programmes to cope with attacks** – It is critical that organizations take steps to prepare for eventual attacks, including enhancing forensic readiness and capabilities, developing business continuity plans and developing plans for regaining user trust.
  - Loss of assets are different from loss of trust
- **Cybersecurity Failures can lead to Strategic Risk –** Board and executive oversight should be based on measurements not point in time audits.

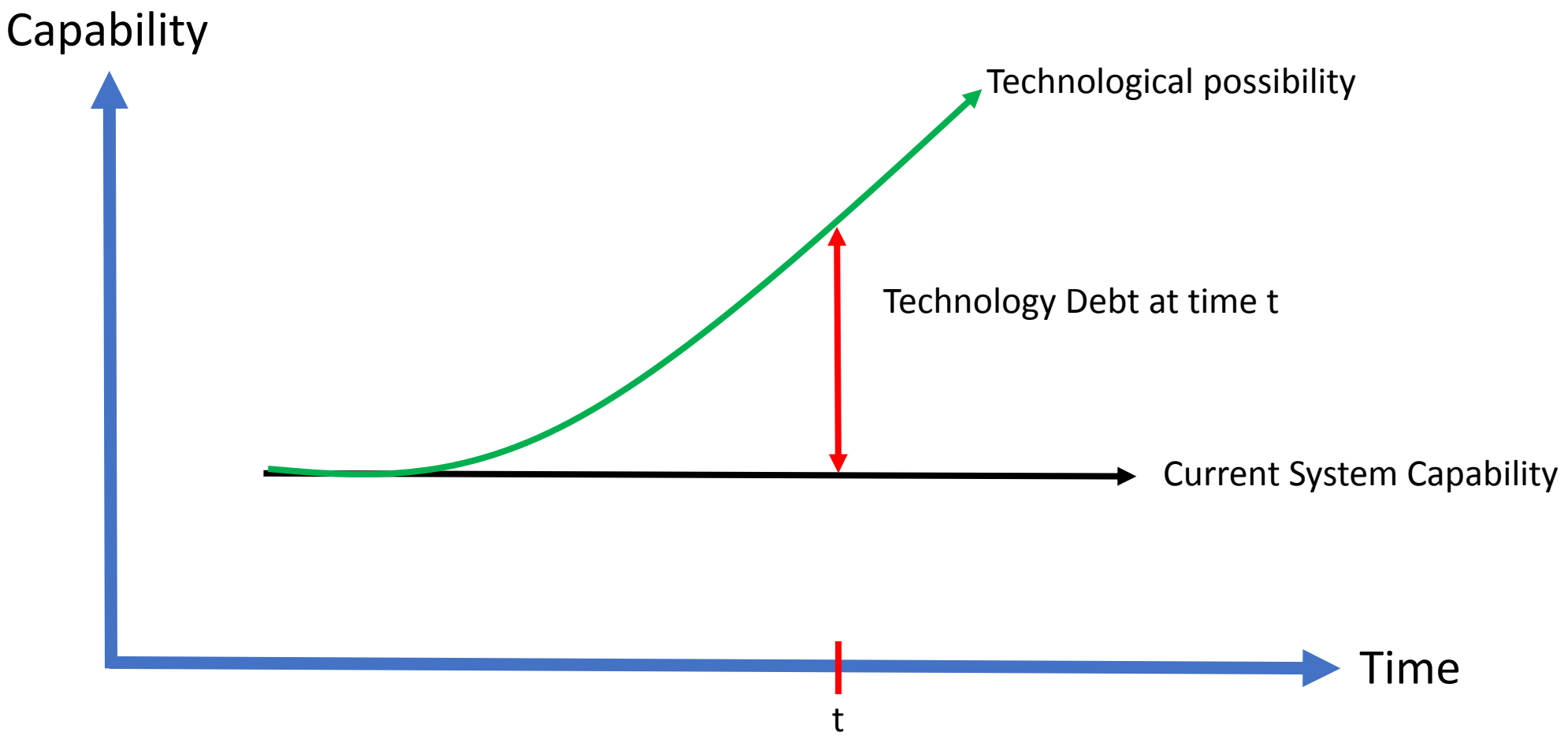


The Implications

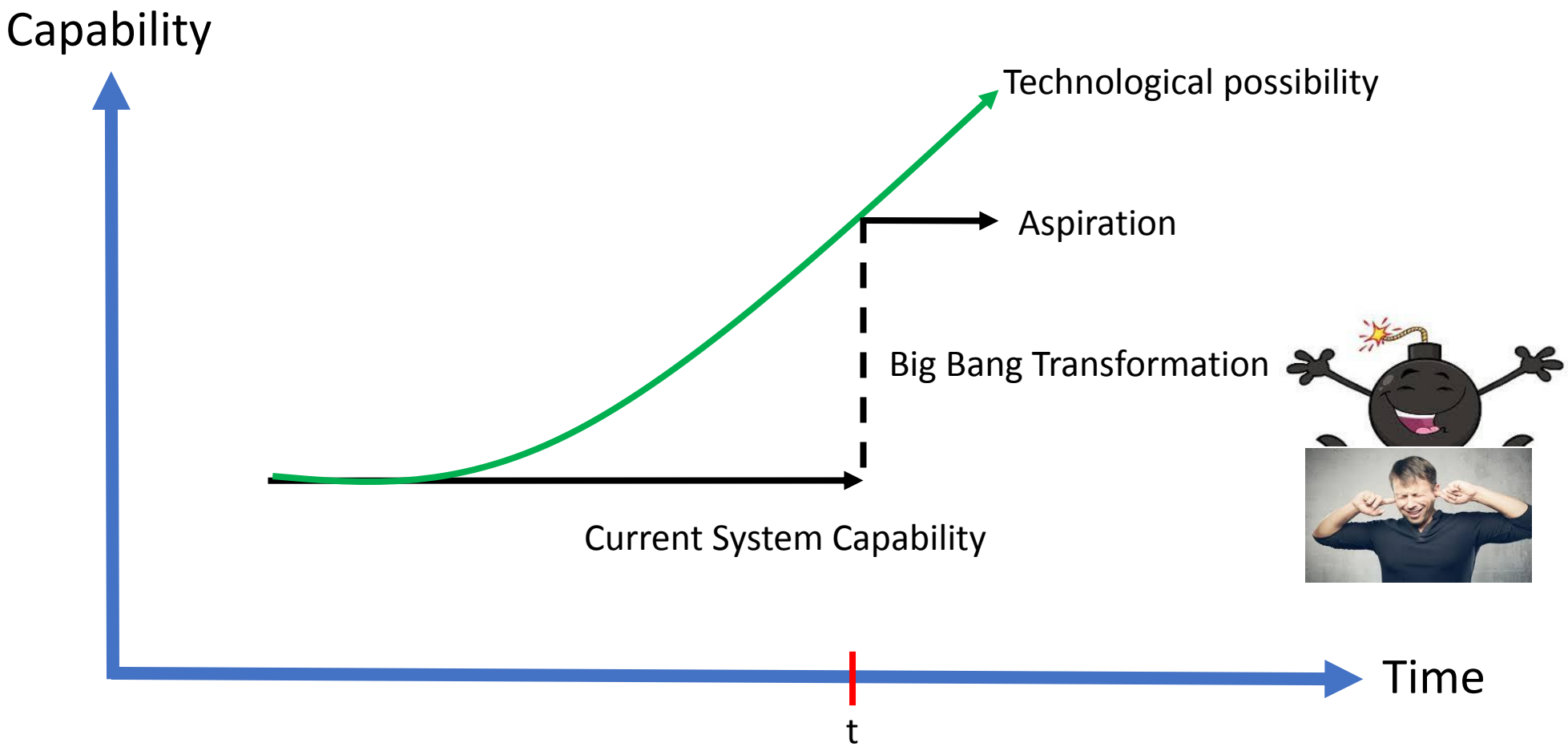


Transformation Challenges

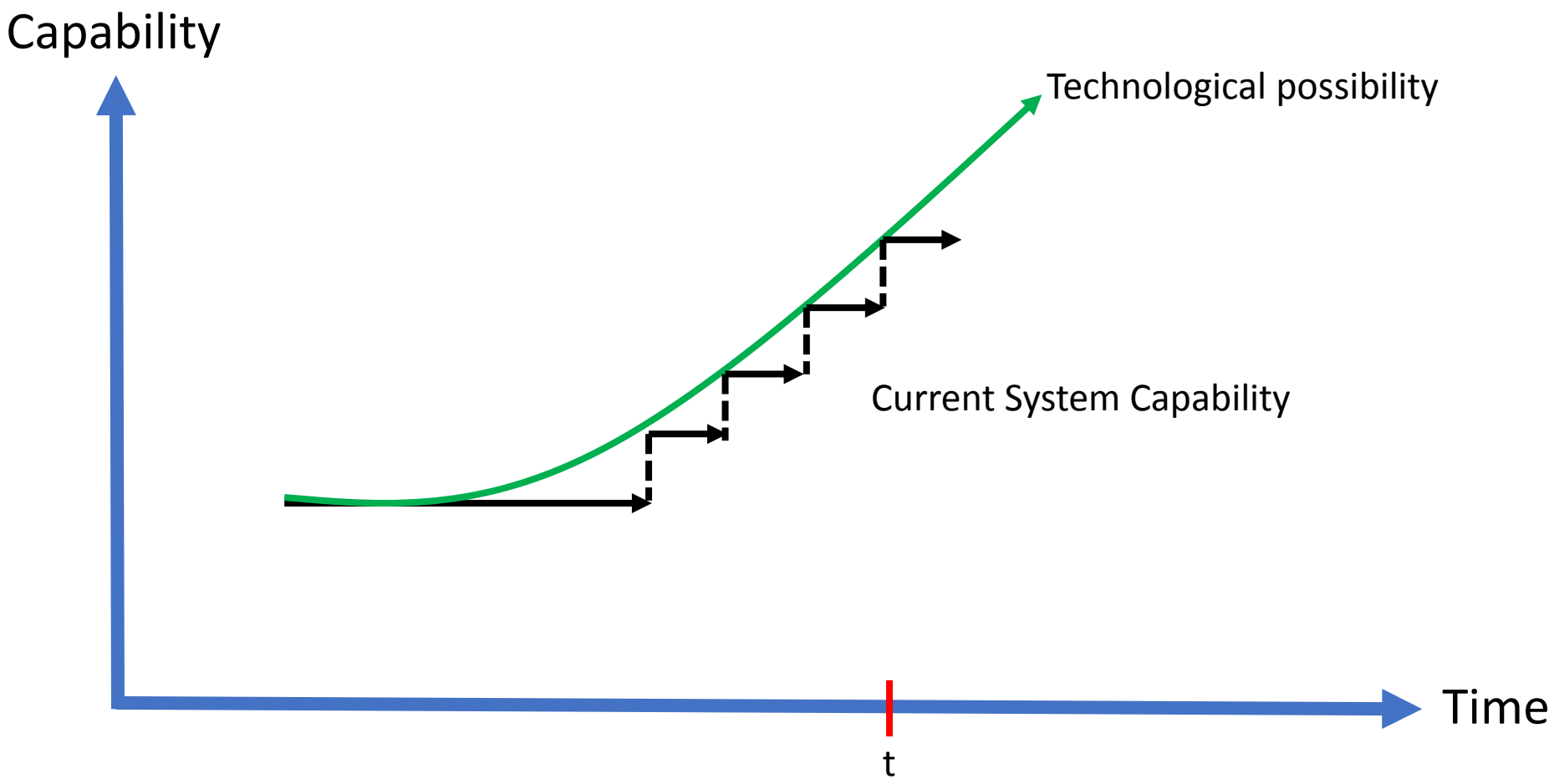
Technology Debt



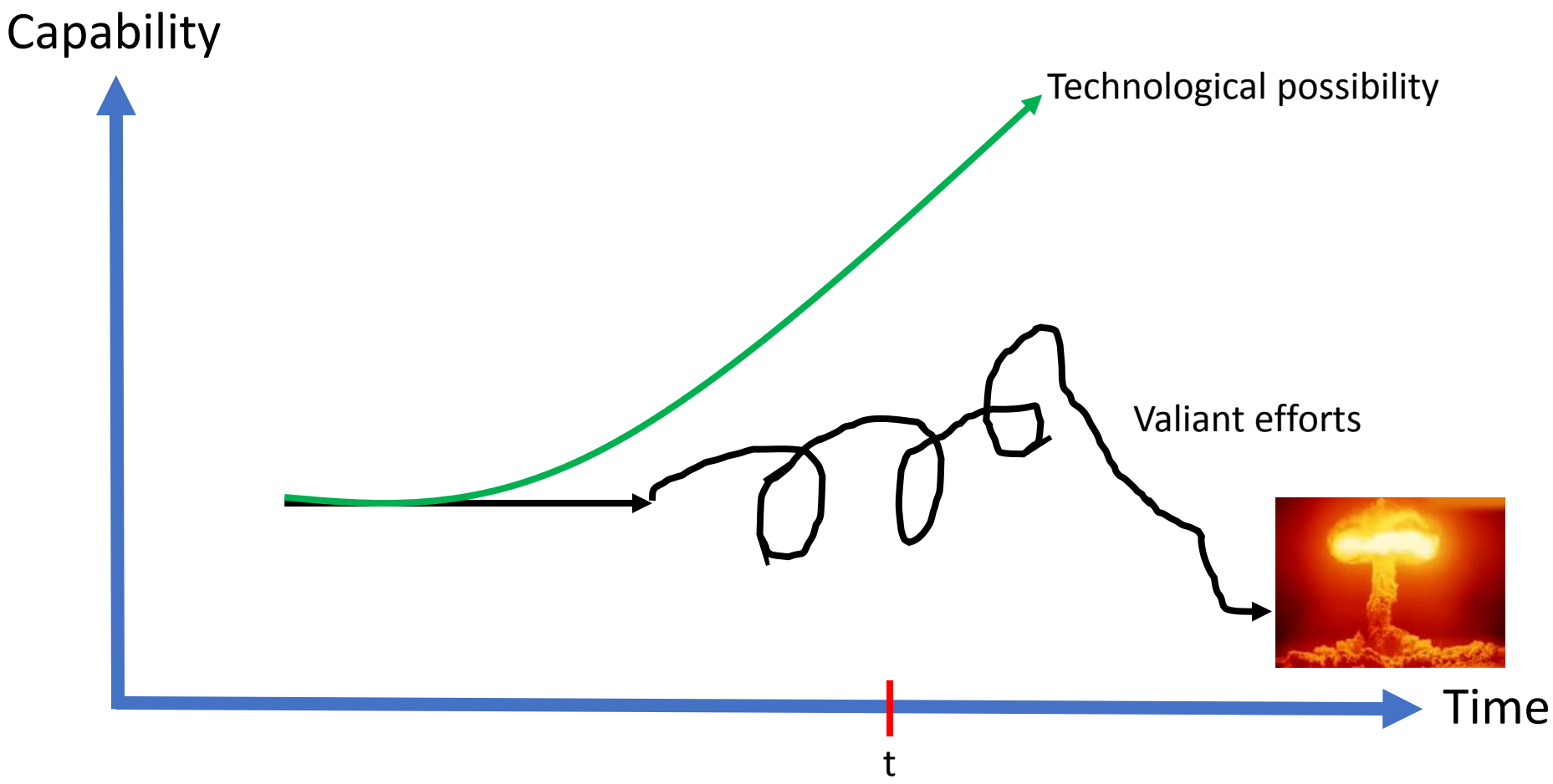
Desperation – The Catch Up Game



Agility



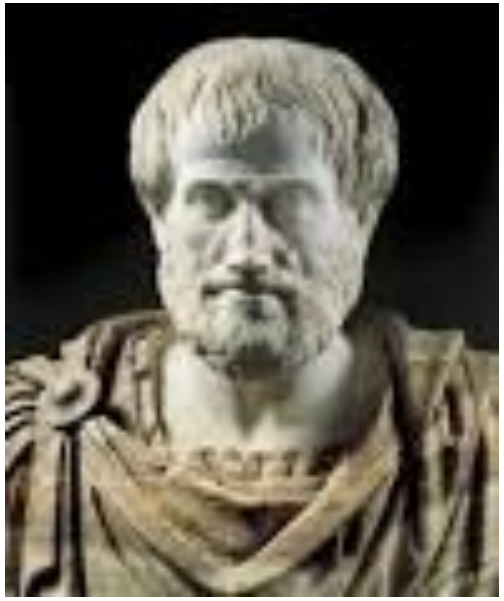
Agility gone wrong



Can I be Agile?

- Enabling “horizontal” frameworks exist that permit vertical slivers of functionality to be independently built and tested
- Reducing cost of failure
  - Large bespoke development has given way to using standard software with customization
  - A huge ecosystem of highly useful and usable software components exists
  - Deployment environments can be set up and torn down very rapidly and costs are only incurred for actual use
- For regulated and safety critical systems what does minimal viable product mean? What is partial compliance to regulation?

Consistency



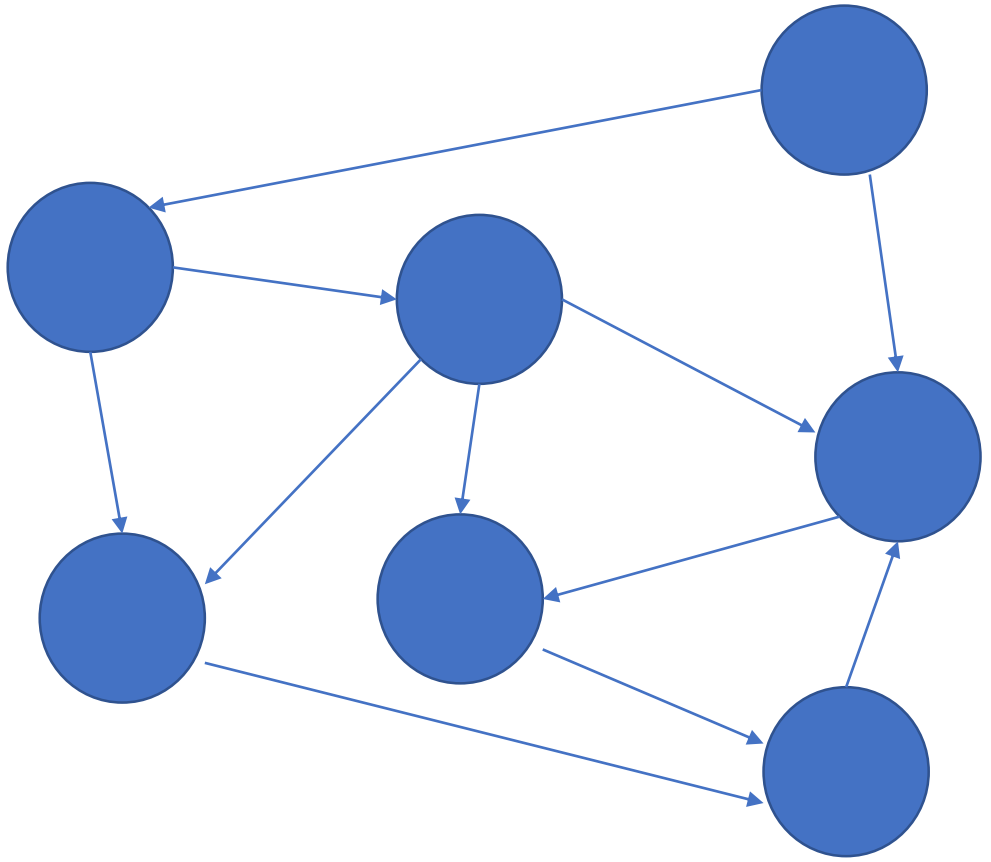
Aristotle’s Thesis

$$\neg(A \Rightarrow \neg A)$$

Maintaining Consistency

- Can we make incremental changes to a system without running into a discontinuity?
  - The “oh-no the whole design needs to be changed” moment
- Are there architectural principles that can better enable this?
  - A more fluid concept of architecture rather than a rigid framework that must either break or snap to some new equilibrium
- Is there an essential bi-modality needed to ensure consistency?
  - A higher level more slowly moving “architectural envelope”
  - A faster moving “agile” layer
- How do the two synchronize to maintain systemic consistency?

Capability



Capability Assessment

- How do I assess my own capability?
- How does a customer assess the capability of a vendor?
- How does a customer assess capabilities of various vendors?
- Can capability assessment be automated without having detailed models of the processes underlying a set of capabilities?

Thank You