Aligning Architectures for Sustainability

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Technologies improvement

▲ 200%

Increase in Mobile Network connections speeds from 2013 to 2018[2]

▲ 300%

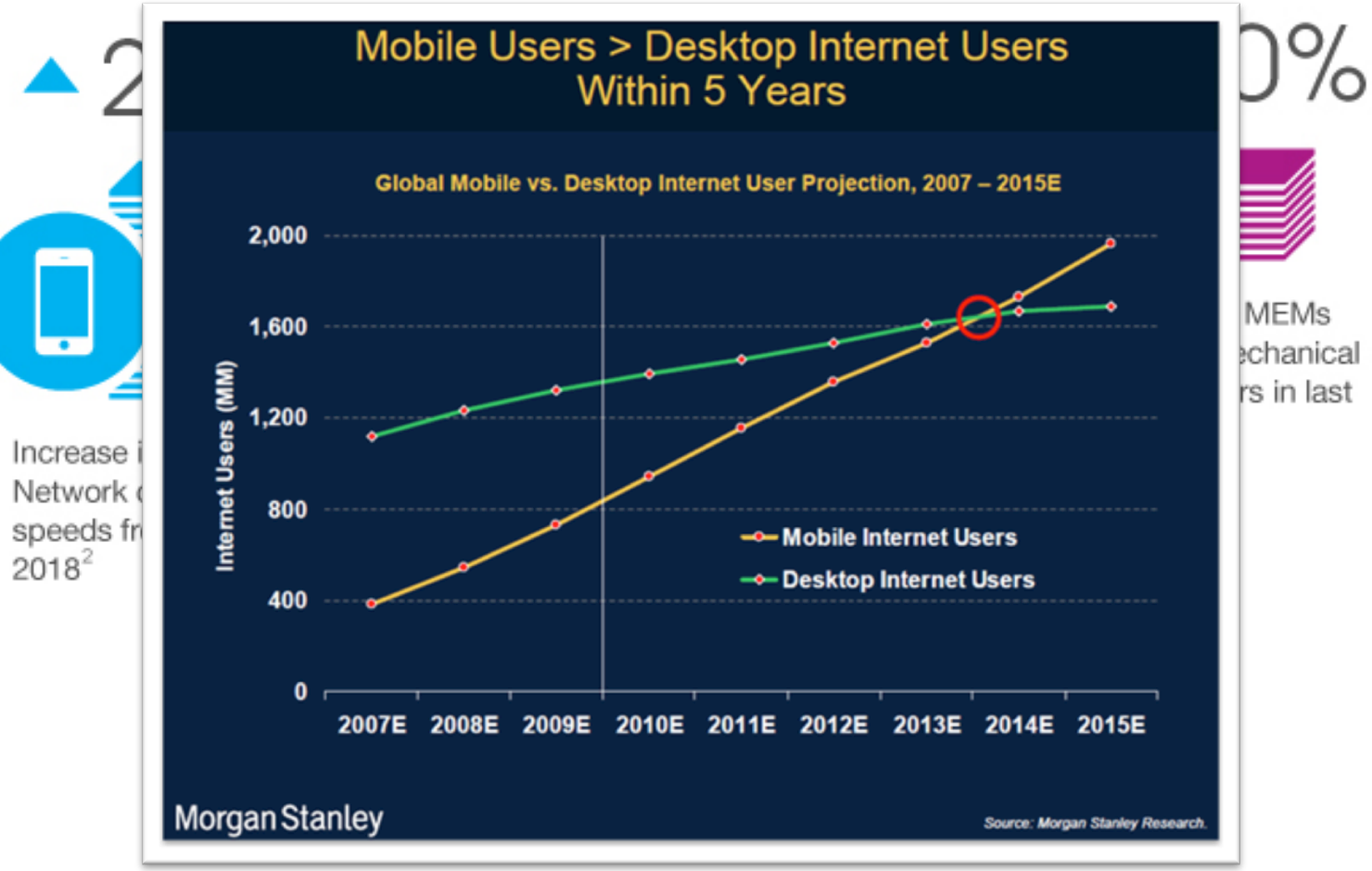
Increase in connected machine-to-machine devices over past 5 years[3]

▼ 80%

Price decline in MEMs (microelectromechanical systems) sensors in last 5 years[3]

Sources: IBM, Morgan Stanley Research, Cisco IBSG

Technologies improvement



Sources: IBM, Morgan Stanley Research, Cisco IBSG

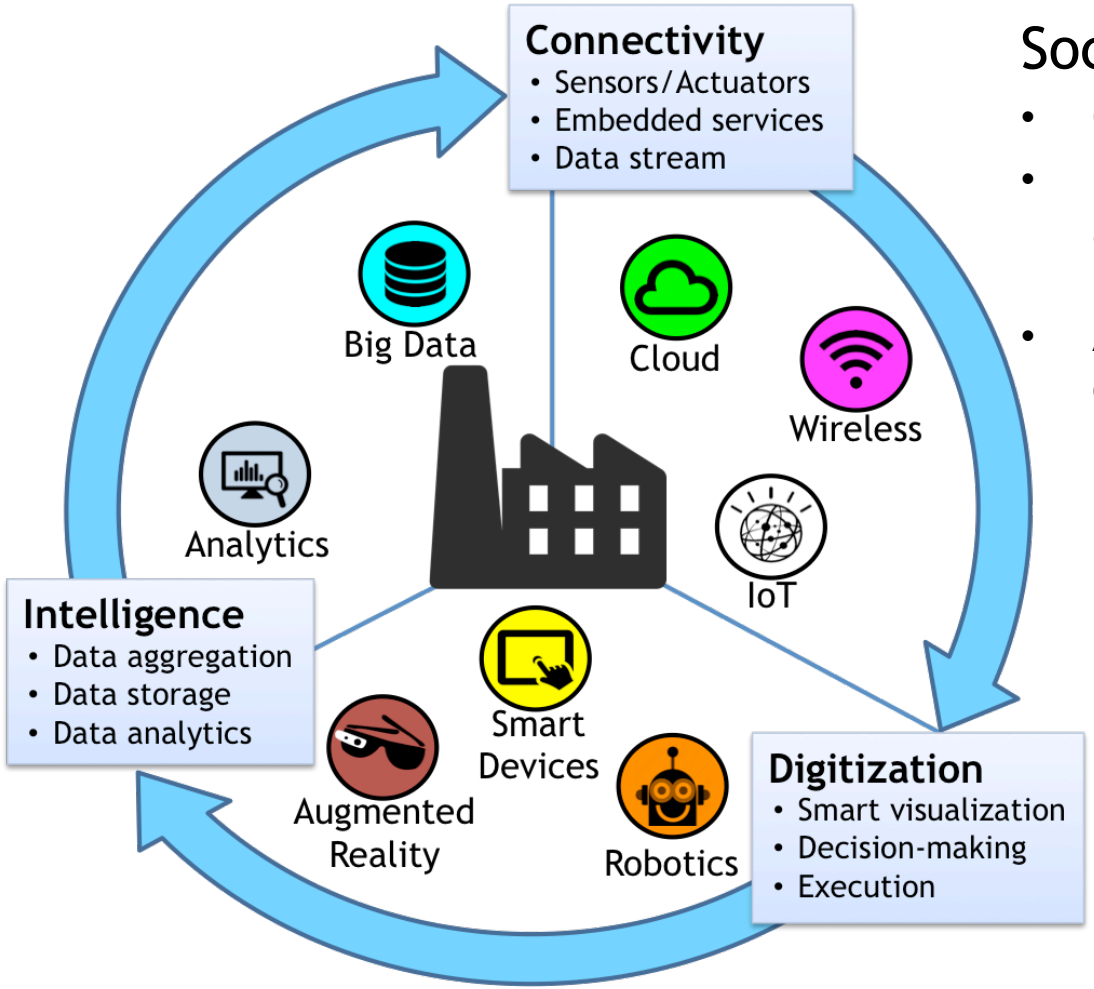
Technologies improvement

- Today there are more devices connecting to the Internet than people living in the world
- Tomorrow, everything you can imagine will wake up and connect ***people***, ***processes***, ***data*** and ***things*** anywhere and anytime

➔Open up for new ***innovative*** products and services

Sources: IBM, Morgan Stanley Research, Cisco IBSG

Industry 4.0



Sociotechnical system

- Connects **technical systems** and **people**
- Provide support for an enterprise to achieve their business goals
- Are defined to **explicitly** include operational processes and people
  - Constituents of SoS

Constituents are **autonomous**

It is in **collaboration** that opportunities and challenges emerge

Competitive Architecture

Economic architecture

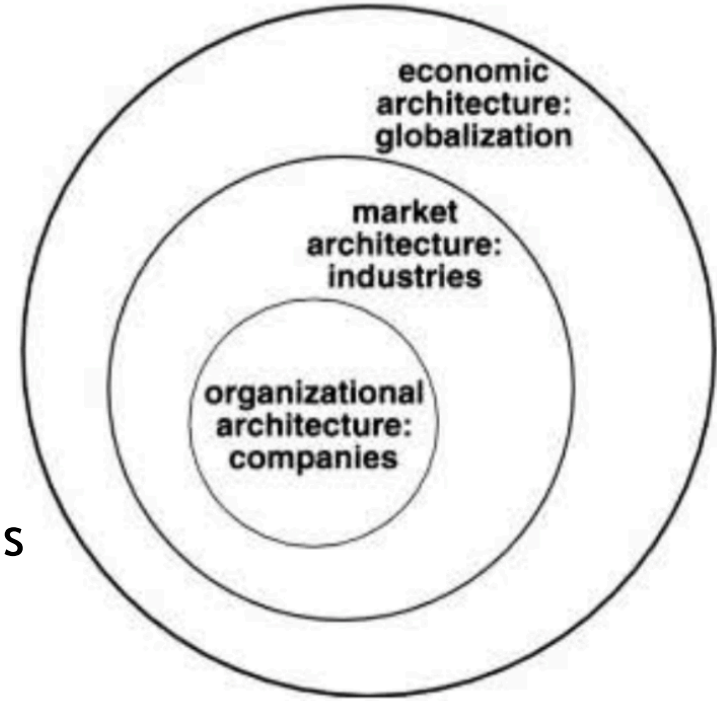
- Broad patterns of investments and development

Market architecture

- How markets evolve over time
- How different kind of markets behave in different industries, cultures, and epochs

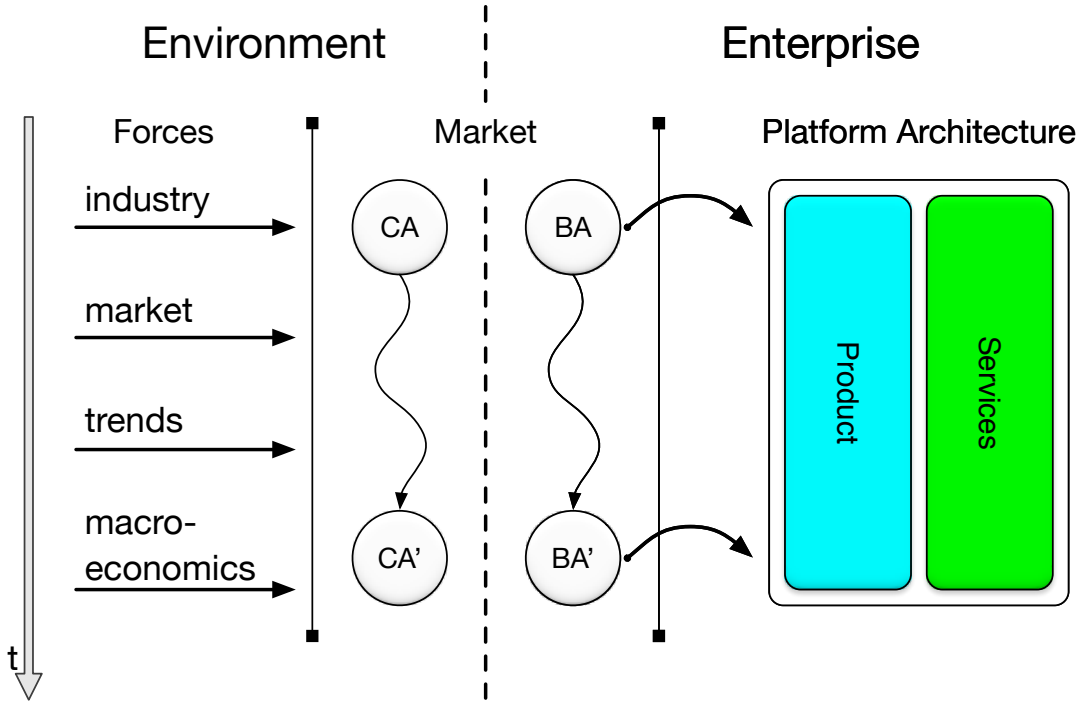
Organizational architecture

- Internal structures and relations among individuals/teams



Forces drive the velocity of change

- *Procurement*, *development*, and *deployment* are heavily influenced by an enterprise's **structure** and **processes**
- Which are affected by changes in the enterprise's **environment**



- Enterprises need to **adapt quickly** to these forces, in order to mitigate risks or take advantage of opportunities they create

Challenge

- The *platform architecture* must **sustain** continuous and rapid change to the *business architecture*
  - i.e., the changes to customer value and its creation

?? How may we better support the **design** and **evolution** of platform architectures to **sustain changes** in the business architecture?

➔ Aligning Business and Platform architectures

- Develop new organizational capability that harnesses **speed** and **specialization**, and addresses **co-evolution**
- Platform architectures that **match** the business architectures

People & Processes

Extend the team

?? Bring BA knowledge closer to the Platform architects

➔ Business architects should be **members** of platform teams

- This improves governance, which is critical for the success of architecture alignment

Open-up and Out-source

?? Specializations

➔ Take the control and open-up the platform to third-parties

- Develop services/products on top of the platform
- The third-parties are associated to niche products, while the Master is still able to create revenue from platform usage

People & Processes (contd)

Tighten the loop

?? Iterative innovation-cycle:

1. Business innovations **trigger** capability development
2. When the enterprise has **sufficient** capability to deploy the refined business strategy, platforms are developed
3. Enterprise may develop products on top of the platform

➔ Prepare enterprises and their platform architectures for ***adaptation*** and ***evolution***

Life-cycle blur

- Design and runtime blur when on-line and off-line activities intertwine

➔ Leverage evolution and adaptation

- Off-line activities change **business strategies** and **goals**
- On-line activities react to changes **in user behavior** and tune **business processes**

Technologies & Tools

Isolation and Single responsibility

?? The more responsibilities a component have, the more forces affect it
- Leads to both business and platform architecture **degradation**

➔ The architecture should consist of a set of **isolated** components that have **single responsibility** each
- Isolation makes it natural to adopt **continuous delivery**
  - component by component

Robustness, Redundancy and Diversity

?? Composition puts the system at high risk

➔ **Robustness:** improve interoperability and facilitates evolution

➔ **Redundancy**: multiple components performing the same function

➔ **Diversity**: components performing a given function must differ each other in terms of implementation

Technologies & Tools (contd.)

Fluidity

?? The architecture should be able to accommodate **continuous** structural change without aversely affecting the platform

➔ To this end, enabling properties are

1. **Loose coupling**: components are executed independently of other entities
2. **Flexibility**: components can be added and removed into the running application
3. **Dynamism**: components of interests are discovered and bound into the running application
4. **Serendipity**: unforeseen components are accommodated into the running application

Future work

"If the **parts of an organization** do not closely reflect the essential **parts of the product**, or if the **relationship between organizations** do not reflect the **relationships between product parts**, then the project will be in trouble"[1]

- How to bring business architecture closer to platform architecture?
- How to systematically open up platforms and let third-parties to develop their products and services?
- How to remove the distinct border in a platform's or product's life-cycles?
- How to combine online/offline adaptation/evolution technologies to tighten the innovation-cycle even more?

[1]J. O. Coplien and N. B. Harrison. Organizational Patterns of Agile Software Development. Prentice-Hall, 2004.

Questions??

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