POLITECNICO DI MILANO

Leadership and Innovation

Module on Innovation

What is Innovation

Mariano Corso

Most companies die not because they do the wrong things, but because they keep doing what used to be the right things for too long

Mikko Kosonen,
Former CIO Nokia

© POLITECNICO DI MILANO

Agenda

- What is innovation
- Types of innovation
- What are the challenges
- Bibliography and further material

© POLITECNICO DI MILANO

Join by Web **PollEv.com/mcorso**

What is innovation? Say the words that are linked to innovation for you

Nobody has responded yet.

Hang tight! Responses are coming in.

Join by Web **PollEv.com/mcorso**

What is innovation? Say the words that are linked to innovation for you

Nobody has responded yet.

Hang tight! Responses are coming in.

Join by Web **PollEv.com/mcorso**

Would you say the 132 years old Coca Cola is an Innovative Company?

Yes definitely 0%

Not sure 0%

Definitely not 0%

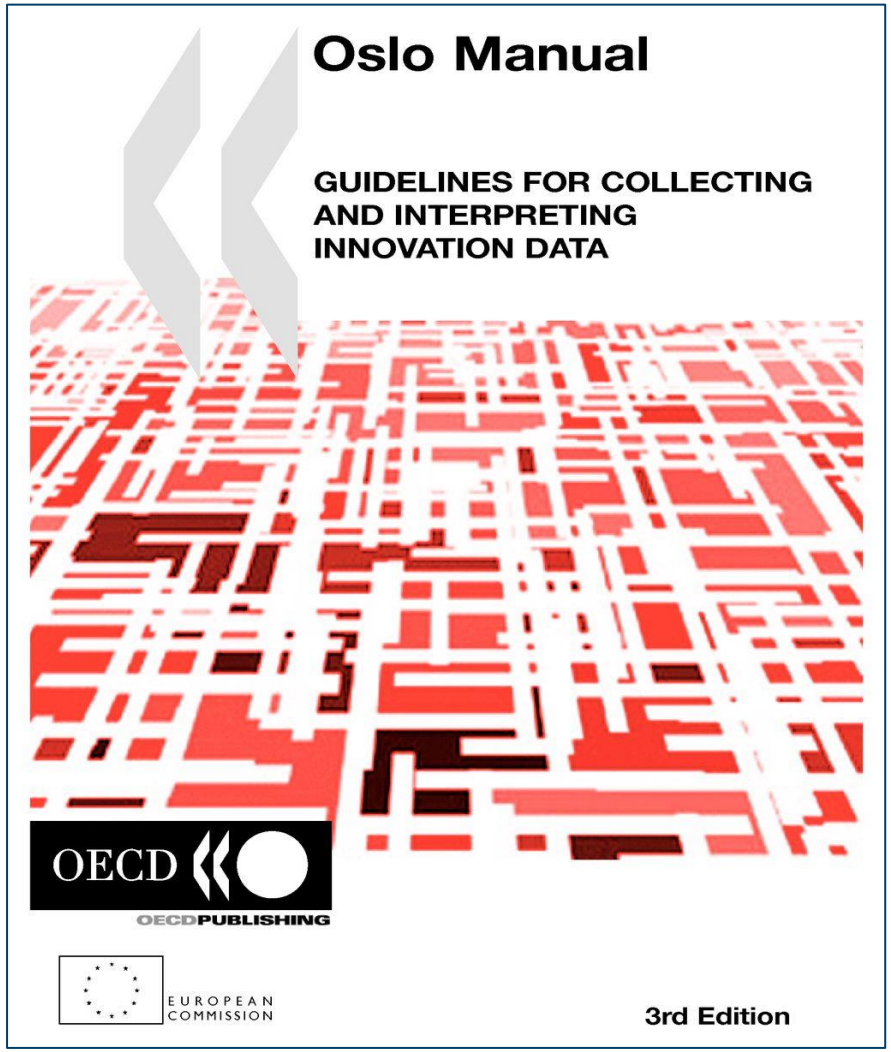
© POLITECNICO DI MILANO

What is Innovation

© POLITECNICO DI MILANO

A definition from the Oslo manual (2005)

An Innovation is the **implementation** of a **new** or **significantly improved** product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations



http://epp.eurostat.cec.eu.int

© POLITECNICO DI MILANO

Innovation

Schumpeter (1934) = innovation is the implementation of new combinations. Innovation is a source of competitive advantage and the main source of progress through a process of "creative distruction"

Freeman (1974) Innovation is different from Invention! Invention is "an idea, a sketch or a model for a new or improved device, product, process or system".
Innovation (in the economic sense) = "it is accomplished only with the first *commercial transaction* involving the new product, process"

Managerial point of view: innovation is to shift the trade-off among performance to better fulfill existing needs or to generate new performance dimensions for new needs

© POLITECNICO DI MILANO

What is innovation?

1. Inventors vs. **Innovators**

Meucci's Phone

Inventor

Bell's 1st Phone

Bell's bakelite Phone

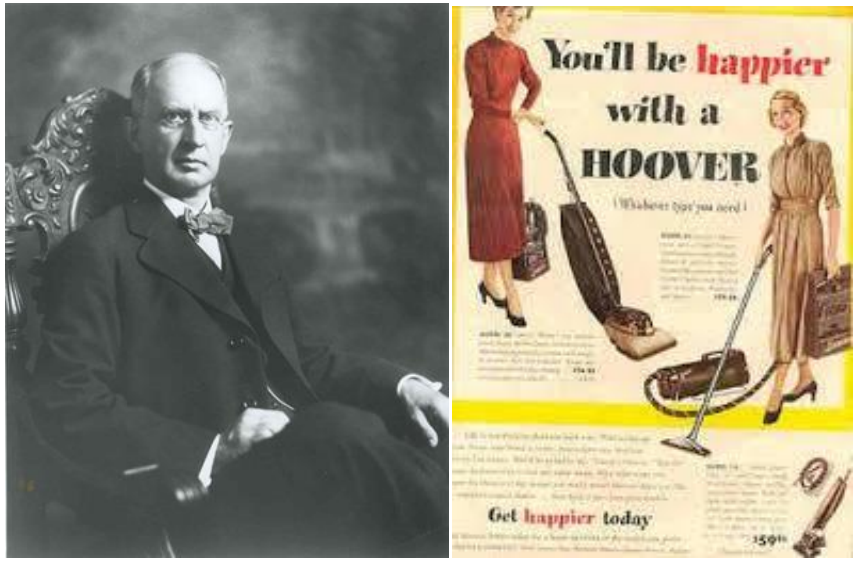
Innovator

© POLITECNICO DI MILANO

What is innovation?

1. Inventors vs. **Innovators**

Inventor
James Murray Spangler, 1908
“Suction cleaner”

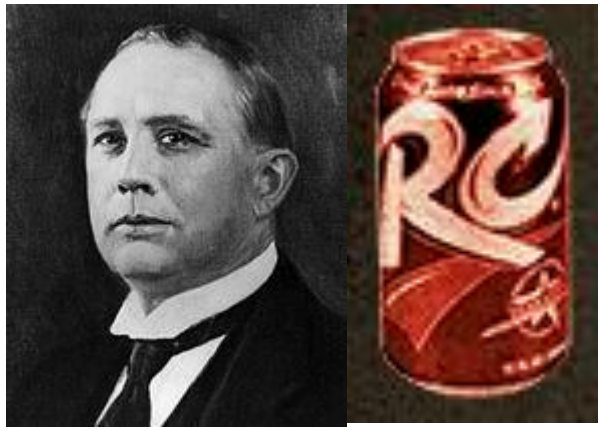


Innovator
William Henry "Boss" Hoover,
“Vacuum cleaner”

© POLITECNICO DI MILANO

What is innovation?

1. Inventors vs. **Innovators**



Inventor

Claud A. Hatcher, RC Cola, first canned, first caffeine free, first sugar free

Innovators

Coca Cola Light **Diet Pepsi**

© POLITECNICO DI MILANO

What is innovation?

1. Inventors vs. **Innovators**

- Many times the Innovators are nothing more than (very) smart **Technology**/Solution **Brokers**

In 1866 Mr Sholes (a mechanical Engineer form Milwaukee) creates the first **TYPEWRITER** by combining (brokering) existing technologies:

- Forward movement (one step for each pressed key): from **watches**
- Back movement leverage: from **sewing machines**
- Keyboard: from **telegraphs**
- Hammer mechanical movements for printing each letter: from **Pianoforte**

© POLITECNICO DI MILANO

What is innovation?

1. Inventors vs. **Innovators**

2. Many times the Innovators are nothing more than (very) smart **Technology**/Solution **Brokers**

In december 2001 the serial inventor **Dean Kamen** the **SEGWAY HUMAN TRANSPORTER** a self-balancing, two-wheeled scooter, based
on an elaborate combination of:

- motors
- Gyroscopes
- motion control algorithm

The Segway HT was based on the 1999 invention of **IBOT Mobility System**, an extremely advanced wheelchair incorporating a sophisticated balancing system that enabled users to climb stairs and negotiate sand, rocks, and curbs.

© POLITECNICO DI MILANO

Self Learning task: Analyse the distinctive traits of *Dean Kamen* a well known inventor

1) Anayse the following on line resources:
   - Dean Kamen Biography on wikipedia [link]
   - Dean Kamen Ted

2) Go on by yourself searching more information on line

3) Try to understand and summarise the 3 most important distinctive traits of Dean Kamen as an inventor

4) Compare the list with the one you prepared in the last lesson for Elon Musk and Jeff Bezos:
   - How the list is similar or different?

© POLITECNICO DI MILANO

What is innovation?

1. Inventors vs. **Innovators**

2. Many times the Innovators are nothing more than (very) smart Technology/**Solution Brokers**

ZARA

DELL

© POLITECNICO DI MILANO

What is innovation?

1. Inventors vs. **Innovators**

2. Many times the Innovators are nothing more than (very) smart **Technology/Solution Brokers**

3. The innovator is able to **learn and Replicate** the innovation process

Apple II

Apple III

Machintosh

© POLITECNICO DI MILANO

What is a product system?

Do the market want **just** products?

Do the market want products **and** services?

May be ... the market wants a **Product System**?

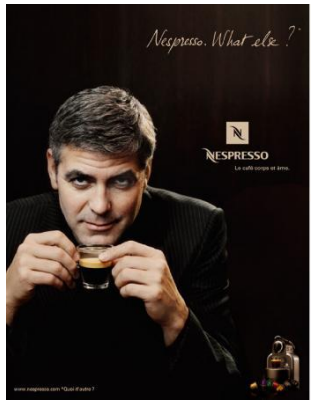
Product System = Product + Service + Communication

Device

+

Shopping online

+



commercials

© POLITECNICO DI MILANO

What is a product system?

Do the market want **just** products?

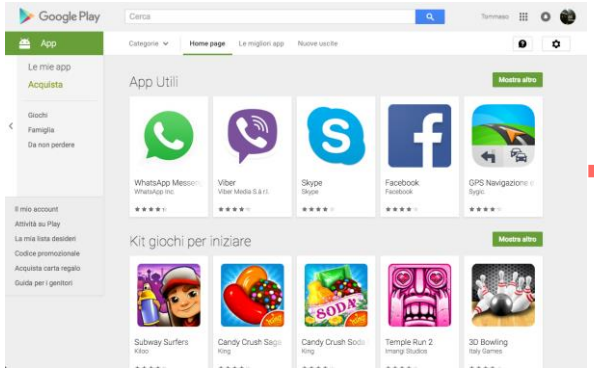
Do the market want products **and** services?

May be ... the market wants a **Product System**?

Product System = Product + Service + Communication

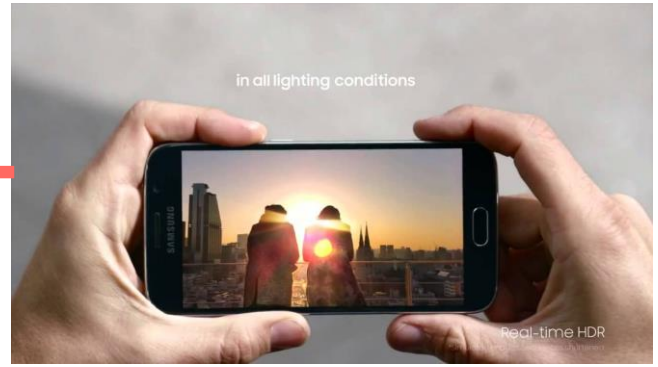
Smartphone

+



Application Store

+



commercials

© POLITECNICO DI MILANO

Join by Web **PollEv.com/mcorso**

Can you think about other product-service systems? Write them down like Smartphone+APPstore+commercials

Nobody has responded yet.

Hang tight! Responses are coming in.

Agenda

- What is innovation
- Types of innovation
- What are the challenges
- Bibliography and further material

© POLITECNICO DI MILANO

© POLITECNICO DI MILANO

© POLITECNICO DI MILANO

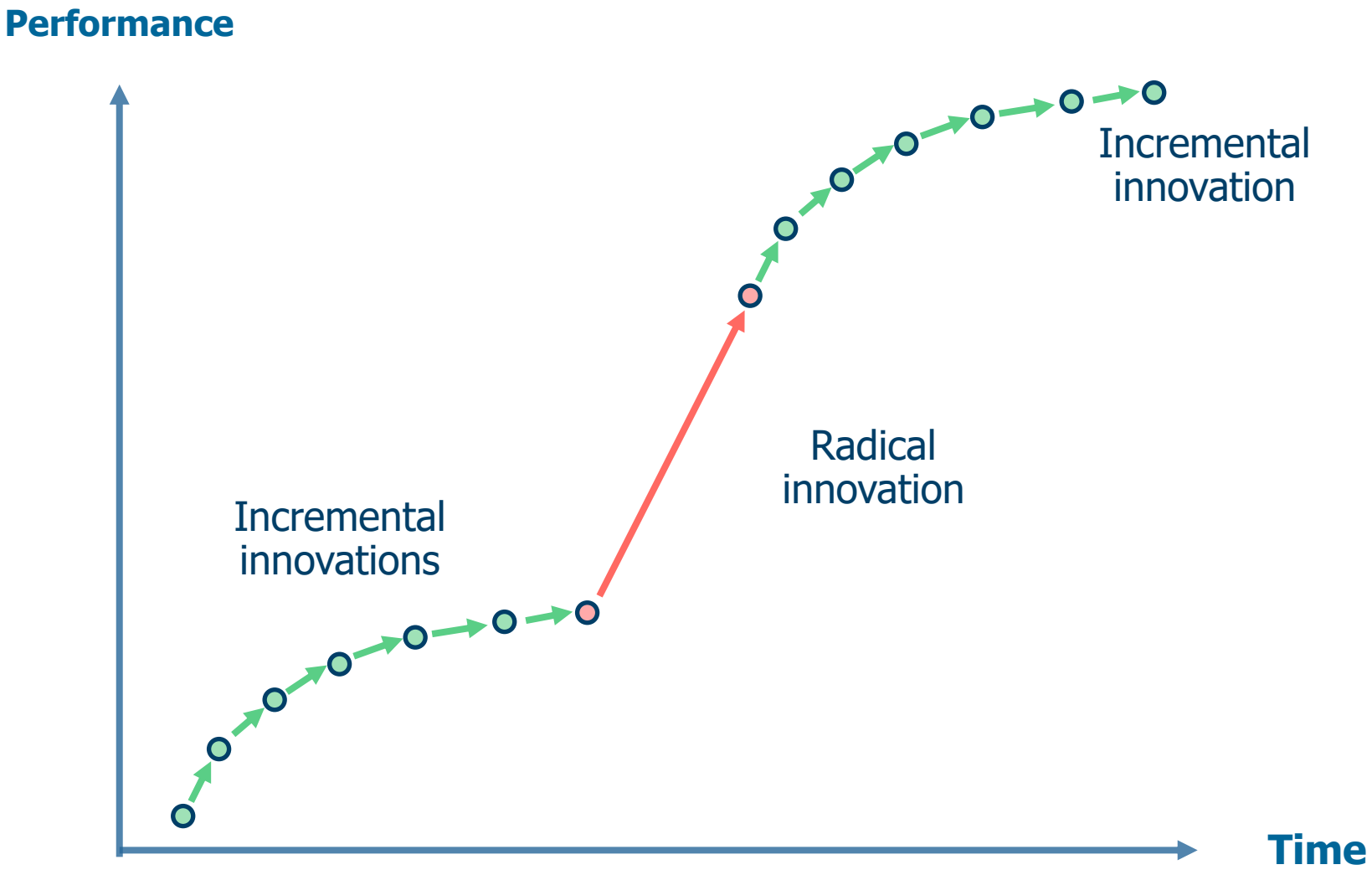
Radical and incremental innovations

Incremental

Radical

© POLITECNICO DI MILANO

Relations between radical and incremental innovation



© POLITECNICO DI MILANO

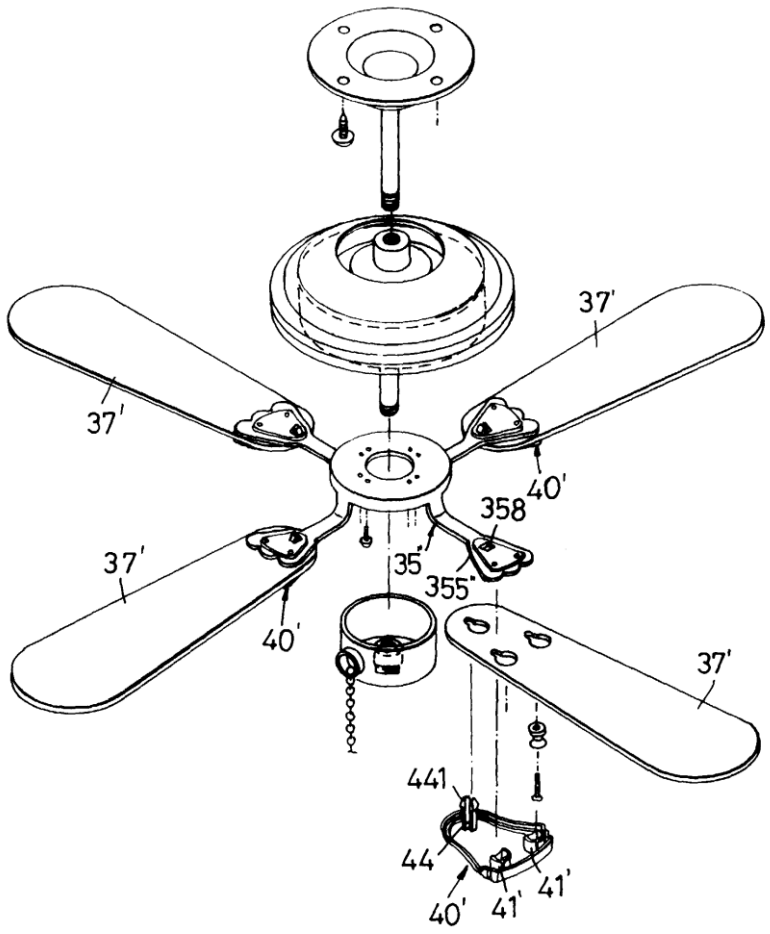
Join by Web **PollEv.com/mcorso**

What do companies like the most? Radical or incremental innovation?

Radical innovation incremental innovation

Product architecture

The distinction between the **product as a whole** -the system- and the products in **its parts** has a long history […]. For example a room fan's **major components** can include the blade, the motor, the blade guard, the control system and the mechanical housing. The overall architecture of the product lays out how the components work together



[Henderson and Clark, 1990]

© POLITECNICO DI MILANO

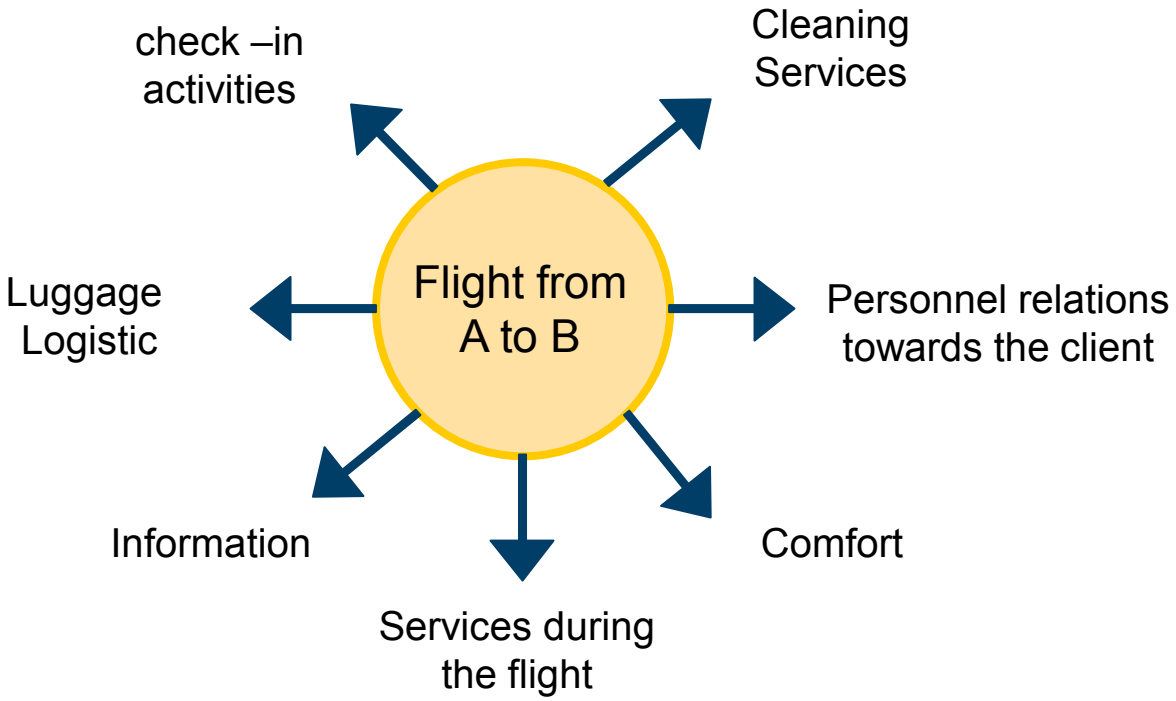
© POLITECNICO DI MILANO

Architectural vs. component innovation

© POLITECNICO DI MILANO

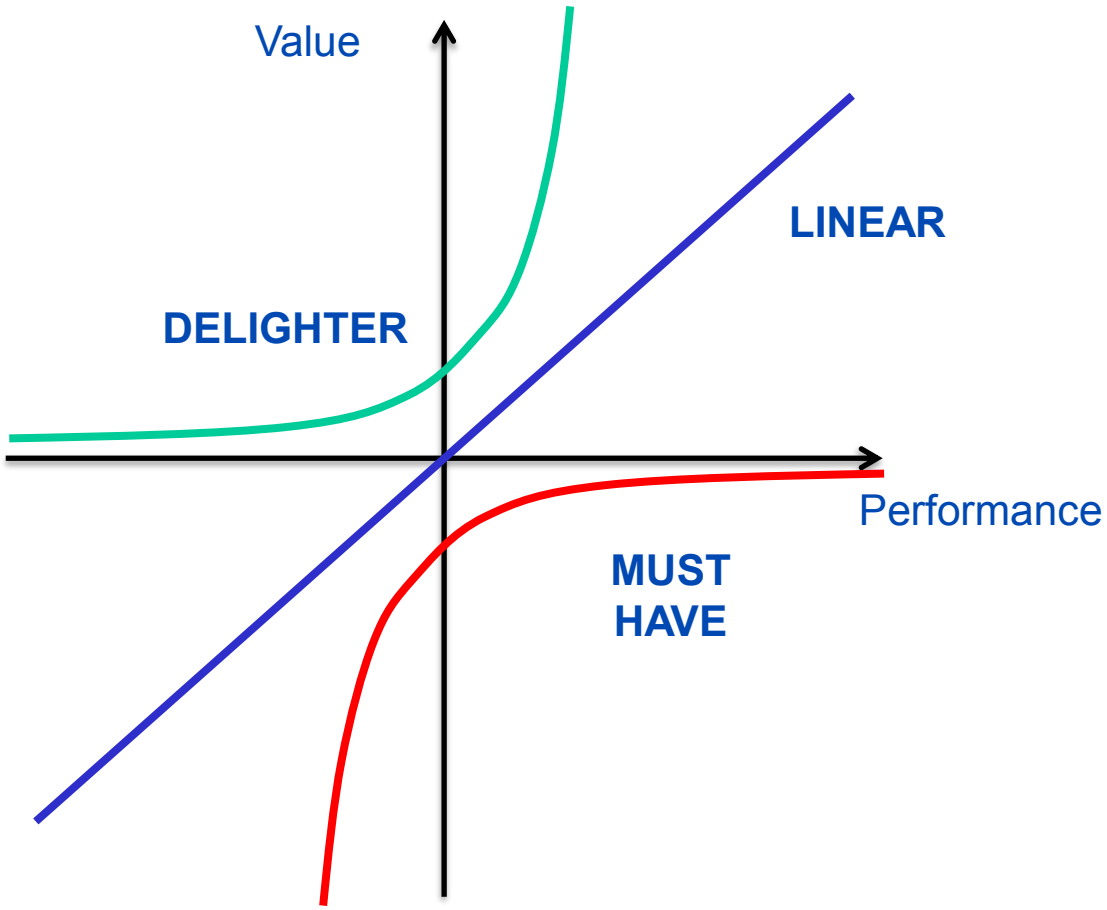
The service package

Many times, the Service Concept requires the additional definition of a group of components (products and services)



© POLITECNICO DI MILANO

Value vs Performance: Kano's Model



© POLITECNICO DI MILANO

Innovation and competences

© POLITECNICO DI MILANO

Innovation and competences

© POLITECNICO DI MILANO

Join by Web **PollEv.com/mcorso**

What's the difference in how the two men use the technology?

Nobody has responded yet.

Hang tight! Responses are coming in.

Competence enhancing vs destroying

We saw the user perspective but it originally was defined from the company perspective

- **Competence-destroying** discontinuities require new skills, abilities, and knowledge in either process or product design. The skills needed for the core technology shift, causing power and structure shifts in organizations. They are usually initiated by new firms

- **Competence-enhancing** discontinuities are "order-of-magnitude improvements in price-performance that build on existing know-how within a product class". These discontinuities tend to consolidate industry leadership

[Tushman and Anderson, 1986]

© POLITECNICO DI MILANO

Wrap-up: typologies of innovation

- Incremental vs. radical
- Architectural vs. component based
- Competence enhancing vs. competence destroying

© POLITECNICO DI MILANO

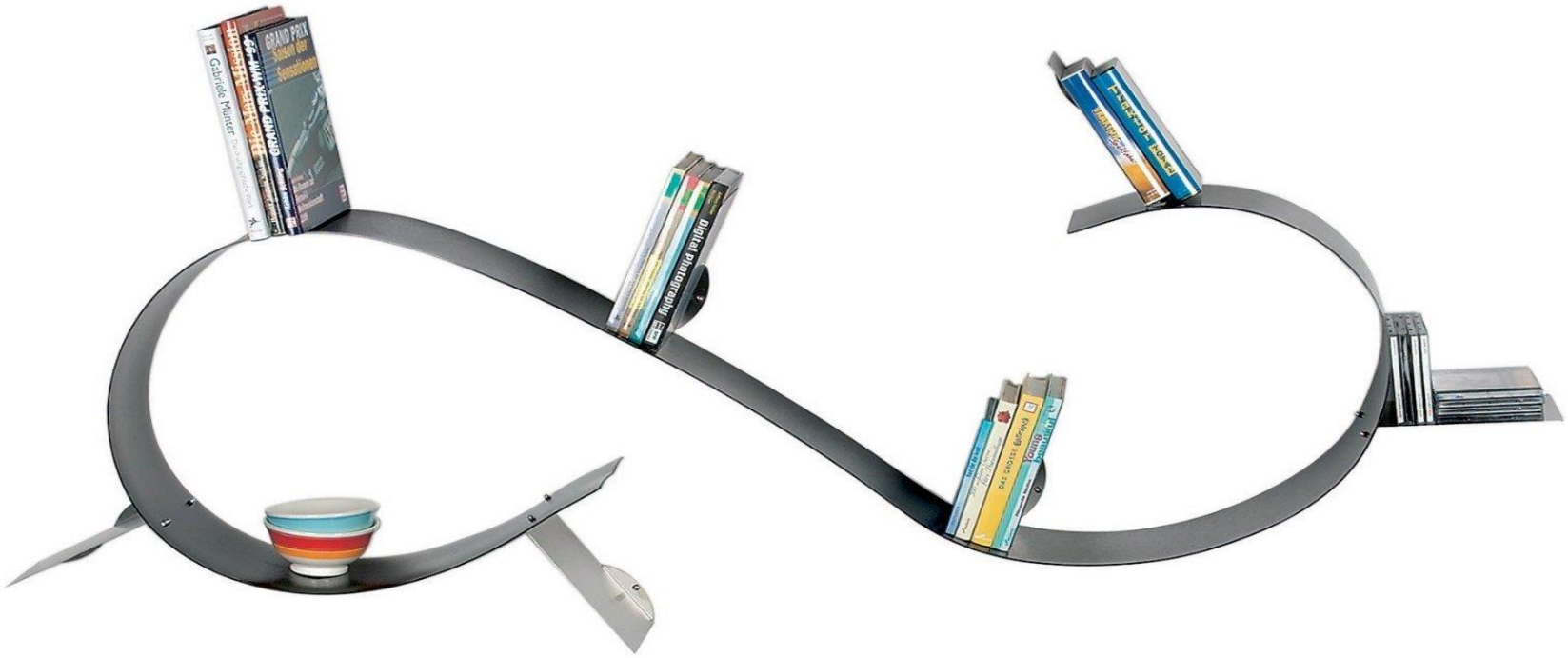
Join by Web **PollEv.com/mcorso**

Is innovation mainly pushed by technology or pulled by the market?

Design Driven Innovation: Alessi Families Follow Fiction

© POLITECNICO DI MILANO

Kartel worm

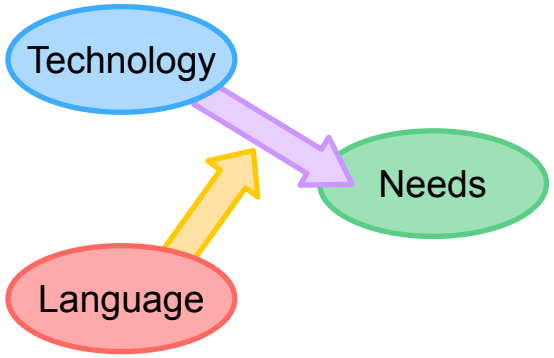


© POLITECNICO DI MILANO

Artemide

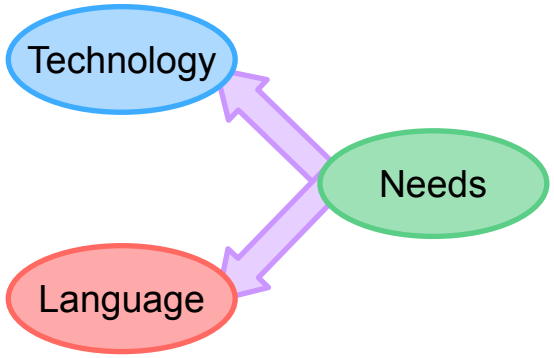
Innovation strategies

Technology-push



Process driven by **scientific or technological competencies**
Product/process innovation that typically revolve around the **physical attributes** of the product

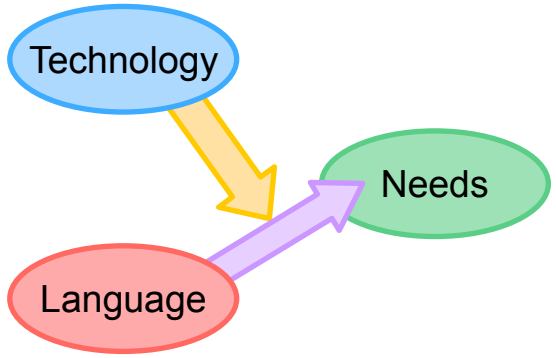
Market-pull



Innovations that typically **involve the way in which the product is commercialized** in terms of organization, distribution and/or advertising:

- Product presentation
- Distribution channel innovations
- Incremental product performance innovations
- Sales process innovations...

Design-push



Process driven by **socio-cultural and semantic competencies**
Product/process innovation that typically revolve around **intangible attributes** of the product

[Verganti et al., 2009]

© POLITECNICO DI MILANO

A traditional thermostat

Energy Savings — Program to save up to 33% on annual heating and cooling costs.*

#1 Choice of Homeowners — Honeywell is the leading brand in temperature control.

Effortless, Menu-Driven Programming — Simplifies programming by responding to your choices.

Precise Comfort Control (+/-1°F) — Maintains consistent comfort to the highest level of accuracy.

Programmable Fan — Offers increased indoor air quality when combined with a Honeywell Whole-house Air Cleaner.

Change/Check Reminders — Let you know when to service or replace filters, batteries, etc.

Large, Clear Backlit Digital Display — Easy to read in various lighting conditions.

Real-Time Clock — Keeps time during power failures and automatically updates for daylight savings.

Touchscreen Interaction

"Built-In" Humidity Sensor — Displays current humidity and allows you to con dehumidification.

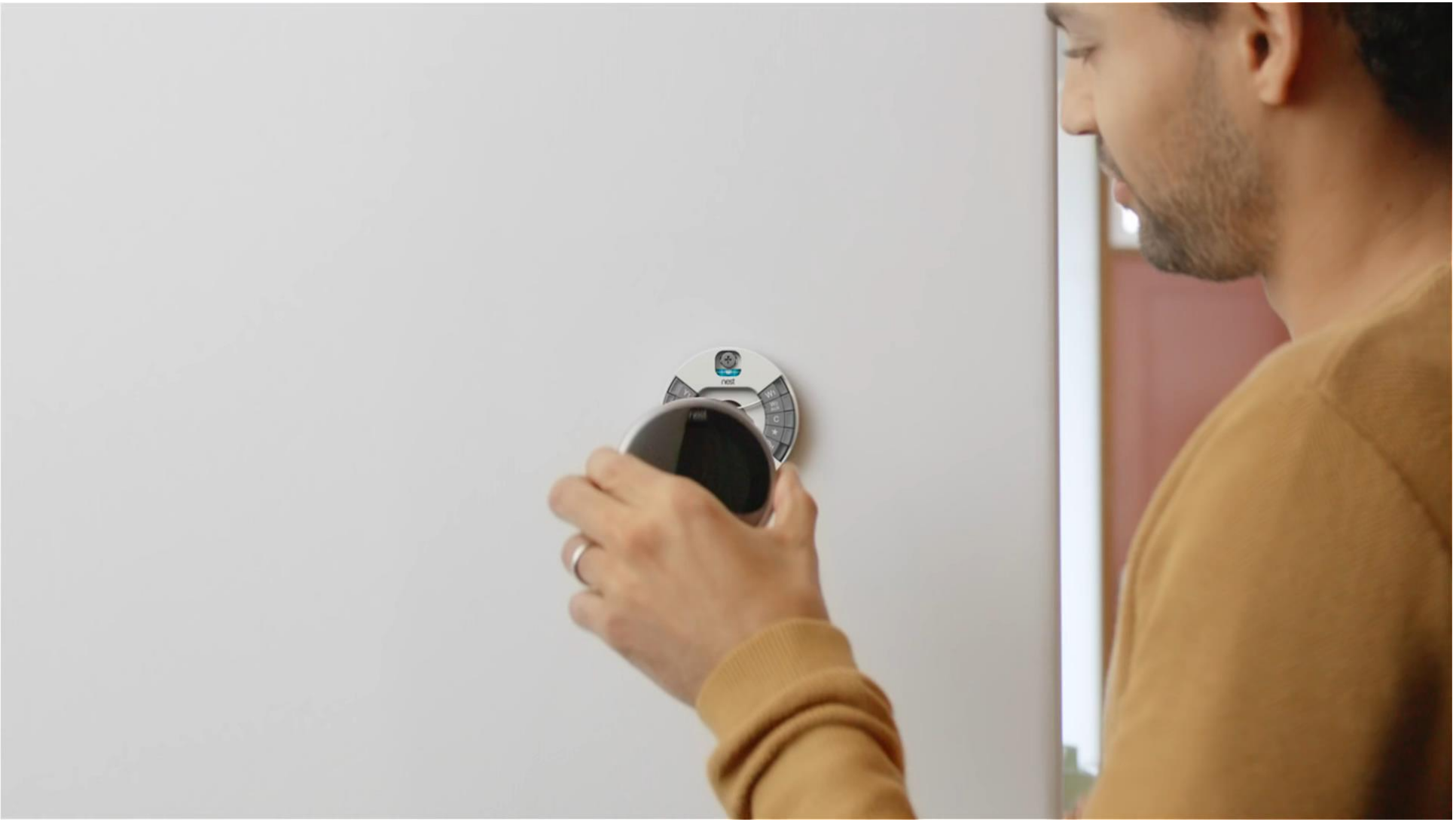
Multiple HOLD Options — Allows you to override the program schedule as desired, with temporary and vacation hold settings.

5-Year Warranty

A new thermostat: Nest

© POLITECNICO DI MILANO

A new thermostat: Nest



© POLITECNICO DI MILANO

Google closes $3.2 billion purchase of Nest

The acquisition brings with it the Learning Thermostat and the Protect smoke and CO detector as Google looks to make its mark in the smart home.

Internet

February 12, 2014
5:00 AM PST

byLance Whitney
@lancewhit

Google has closed the books on its $3.2 billion purchase of Nest Labs.

In a filing with the Securities and Exchange Commission, the search giant said that the deal closed on February 7. Last month, Google revealed that it would acquire the maker of the Learning Thermostat and the Protect smoke and carbon monoxide detector as part of its goal to make its mark

The Nest Learning Thermostat.

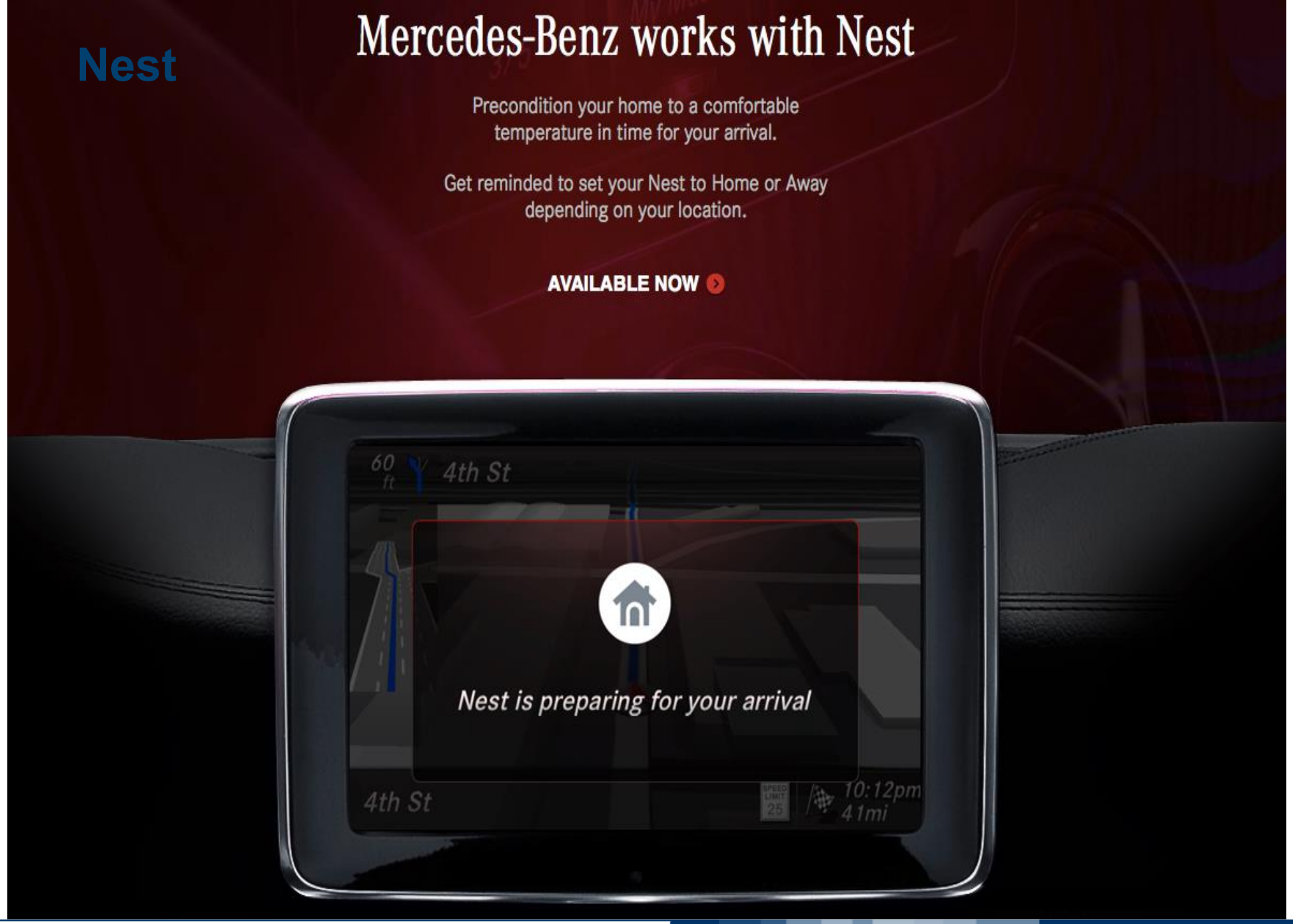
© POLITECNICO DI MILANO

Innovations can be combined

works with nest

© POLITECNICO DI MILANO

Nest



© POLITECNICO DI MILANO

Discussing An Innovation case: *Nest*

- Read carefully the description of the Nest case. You can start from the description on the company web site, wikipedia and YouTube and then go more in depth searching more information on the web
- Describe Nest as a *Product System*
- Reflect on the following points:
  - Would you rate Nest as a successful example of innovation? Why? Which specific measures would you use to support your evaluation?
  - Is *Nest* a real innovation and of what typology?
    - Incremental or radical
    - Architectural or component based
    - Competence enhancing or competence destroying
    - Technology-push, Market pull or Design Driven
  - Which factors in your opinion can determine the diffusion and market success of nest, which could be instead its limitations?

© POLITECNICO DI MILANO

Join by Web PollEv.com/mcorso

Which kind of innovation is Nest (1/4)?

0

Join by Web PollEv.com/mcorso

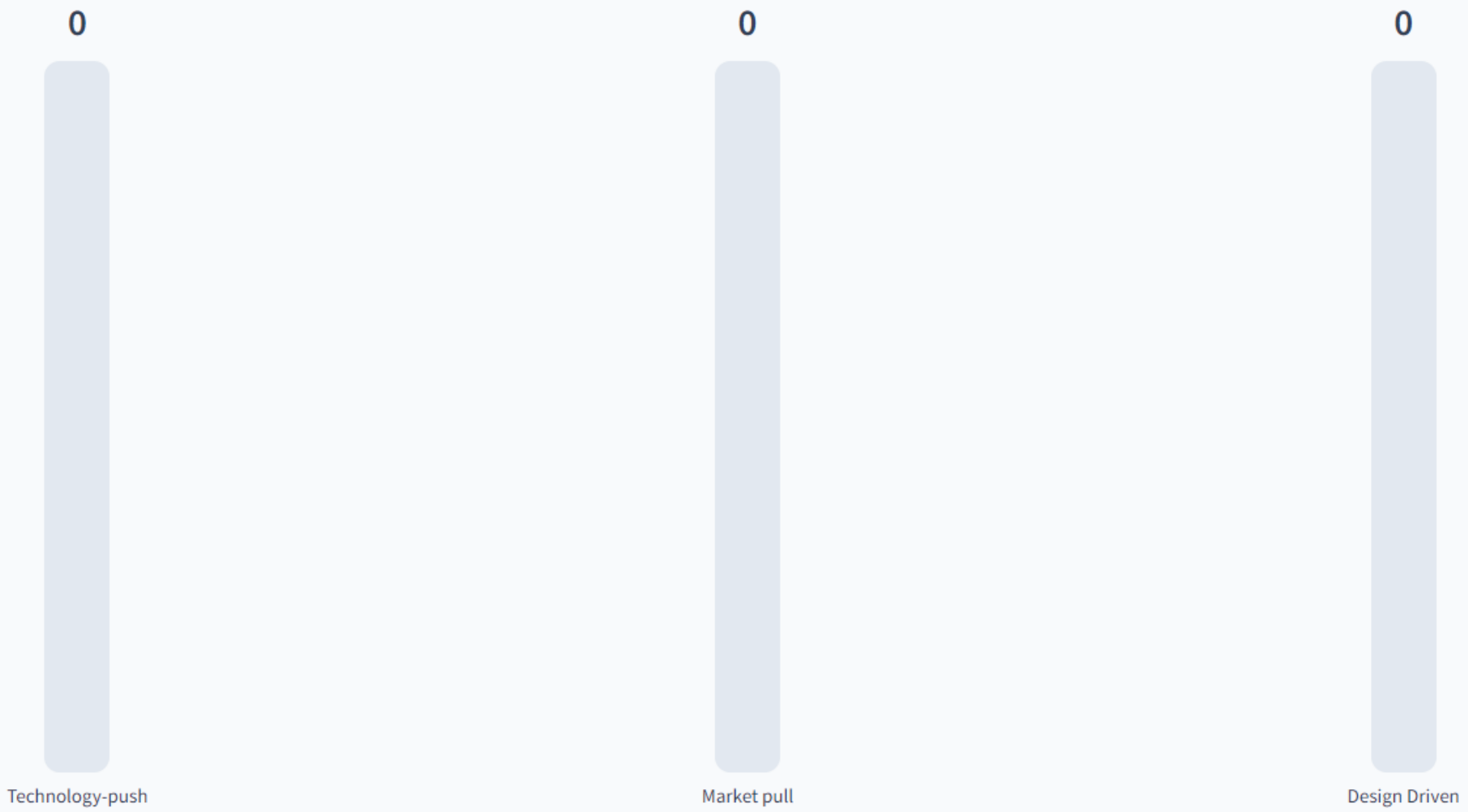
Which kind of innovation is Nest (2/4)?

Join by Web PollEv.com/mcorso

Which kind of innovation is Nest (3/4)?

Join by Web **PollEv.com/mcorso**

Which kind of innovation is Nest (4/4)?



Agenda

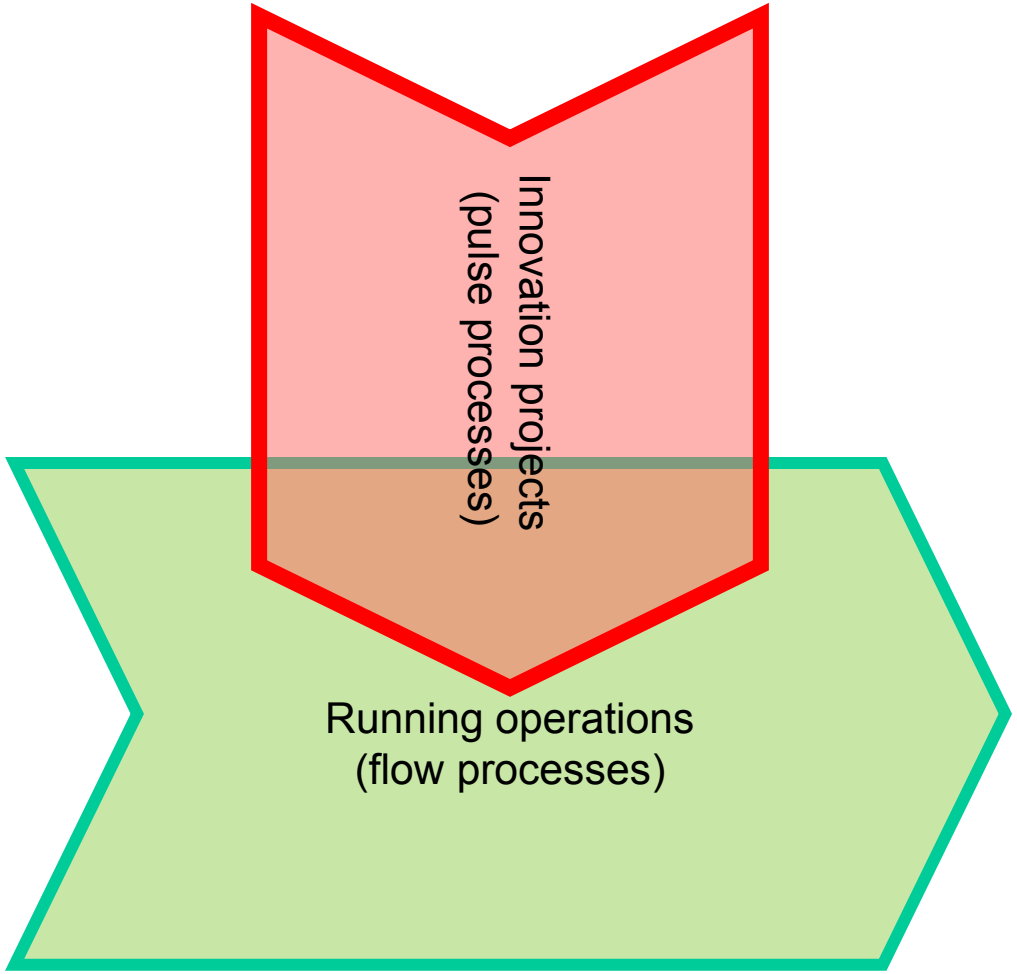
- What is innovation
- Types of innovation
- What are the challenges
- Bibliography and further material

© POLITECNICO DI MILANO

Why innovating is a **tough** challenge today?

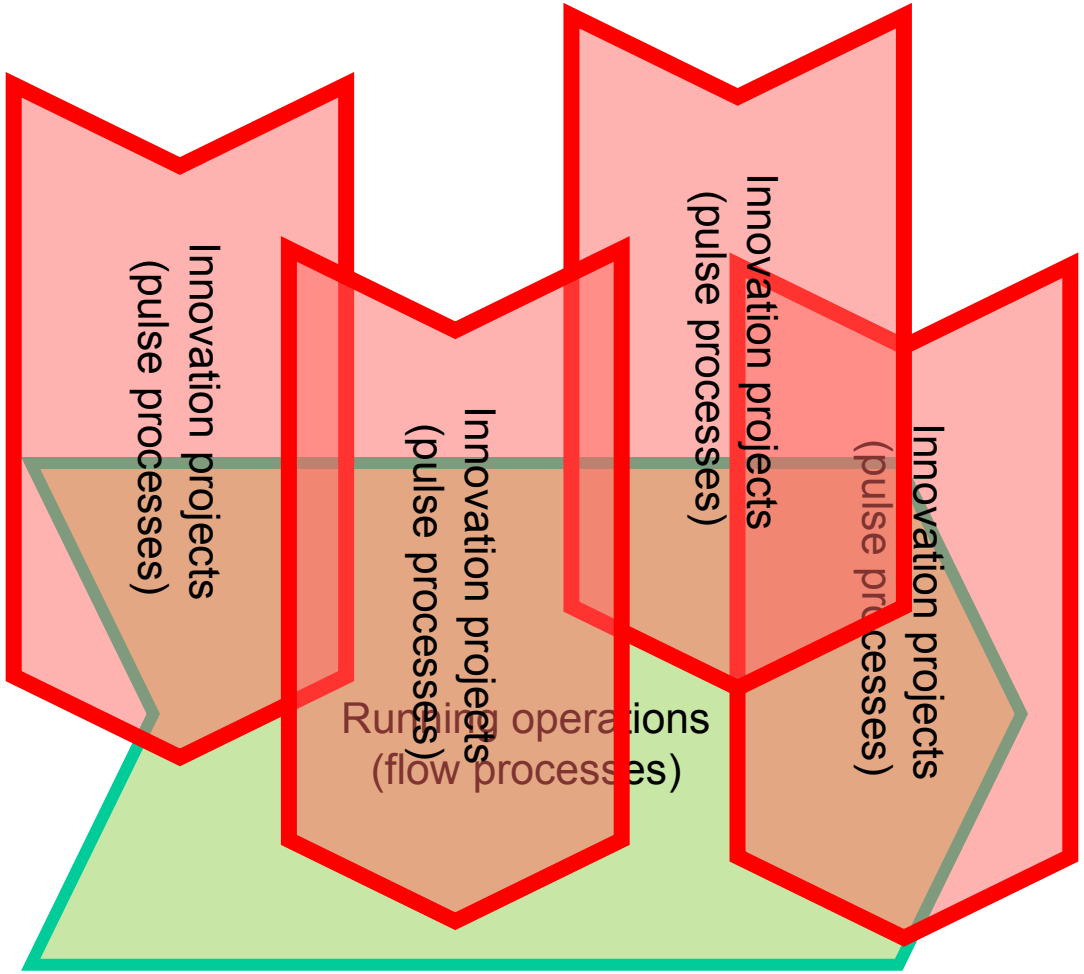
© POLITECNICO DI MILANO

What is new today?



© POLITECNICO DI MILANO

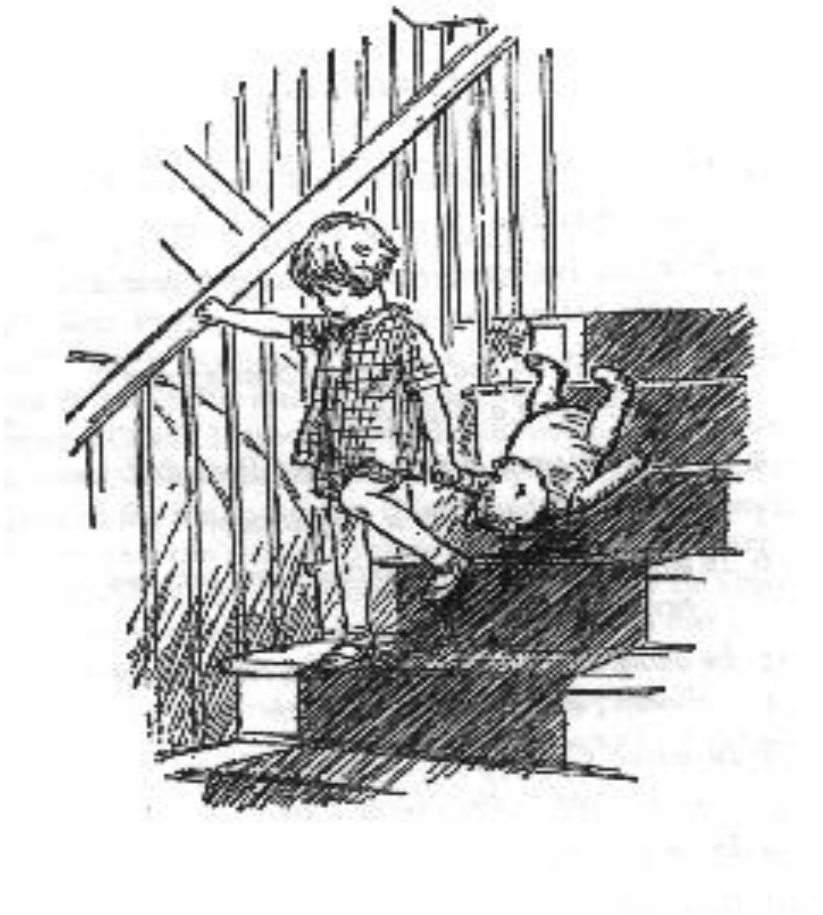
What is new today?



Innovation and change as an everybody and every day challenge!

© POLITECNICO DI MILANO

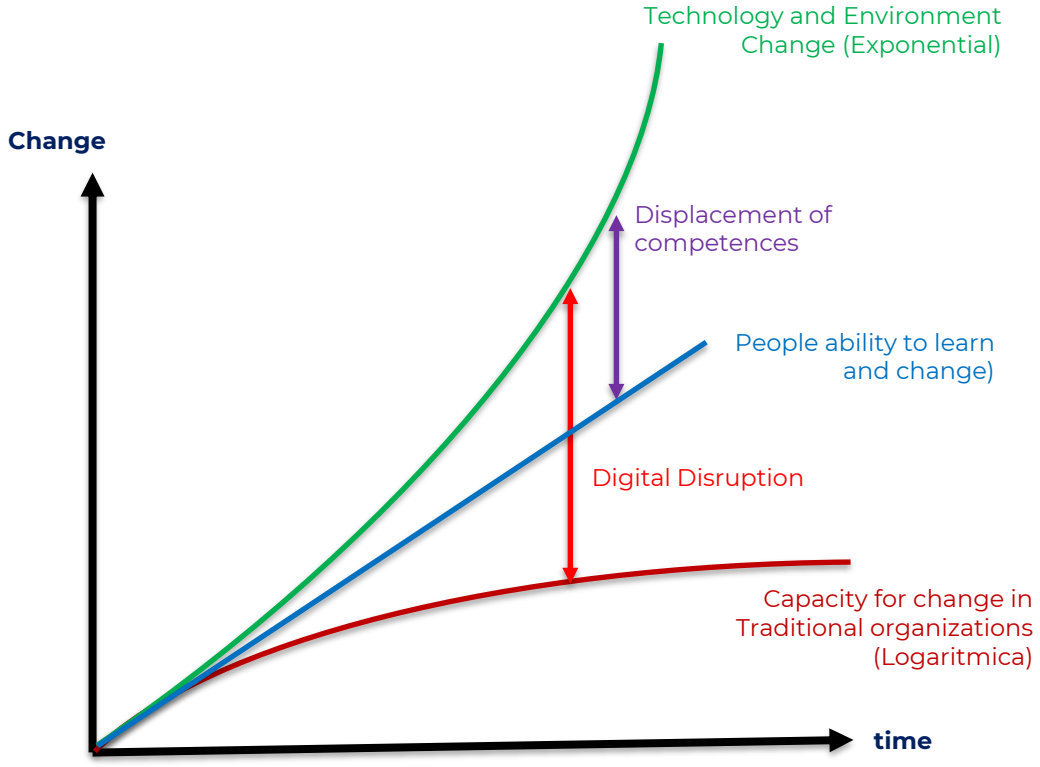
Innovation today requires learning and ambidexterity



"… Here is Edward Bear, coming downstairs now, bump, bump, bump, on the back of his head, behind Christopher Robin. It is, as far as he knows, the only way of coming downstairs, but sometimes he feels that there really is another way, if only he could stop bumping for a moment and think of it …. "

© POLITECNICO DI MILANO

People and companies find themselves inadequate



Technologies **and** context **change** faster**…**

…of **organizations,** but also of **people**

© POLITECNICO DI MILANO

Watch the ball

Agenda

- What is innovation
- Types of innovation
- What are the challenges
- Bibliography and further material

© POLITECNICO DI MILANO

Bibliography

- Schilling M.A. (2012) *Strategic Management of Technology Innovation (4th Edition)*, New York (NY): McGraw-Hill — Chapters 2, 3 and 5
- Verganti R. (2008) Design, Meanings, and Radical Innovation: A Metamodel and a Research Agenda, *Journal of Product Innovation Management*, Vol. 25, No. 5, pp. 436–456

Further Material

- De Maio A., Bellucci A., Corso M., and Verganti R., (1994), *Gestire l'Innovazione e innovare la gestione*, Etas, Milano.
- Henderson R.M., Clark K.B. (2008) Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms, *Administrative Science Quarterly*, Vol. 35, No. 1, pp. 9–30
- Lavie D., Stettner U., Tushman M.L. (2010) Exploration and Exploitation Wihtin and Across Organizations, *Academy of Management Annals*, Vol. 4, No. 1, pp. 109–135
- March J.G. (1991) Exploration and Exploitation in Organizational Learning, *Organization Science*, Vol. 2, No. 1, pp. 71–87
- OECD (2005) *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data (3rd Edition)*, OECD Publishing http://epp.eurostat.cec.eu.int
- Olson M.S., van Bever D., Verry S. (2008) When Growth Stalls, *Harvard Business Review*, Vol. 66, No. 3, pp. 1–14
- Tushman M.L., Anderson P. (1986) Technological Discontinuities and Organizational Environments, *Administrative Science Quarterly*, Vol. 31, No. 2, pp. 439–465
- Ulrich K. (1995) The Role of Product Architecture the Manufacturing Firm, *Research Policy*, Vol. 24, No. 4, pp. 419–440

© POLITECNICO DI MILANO

Leadership and Innovation

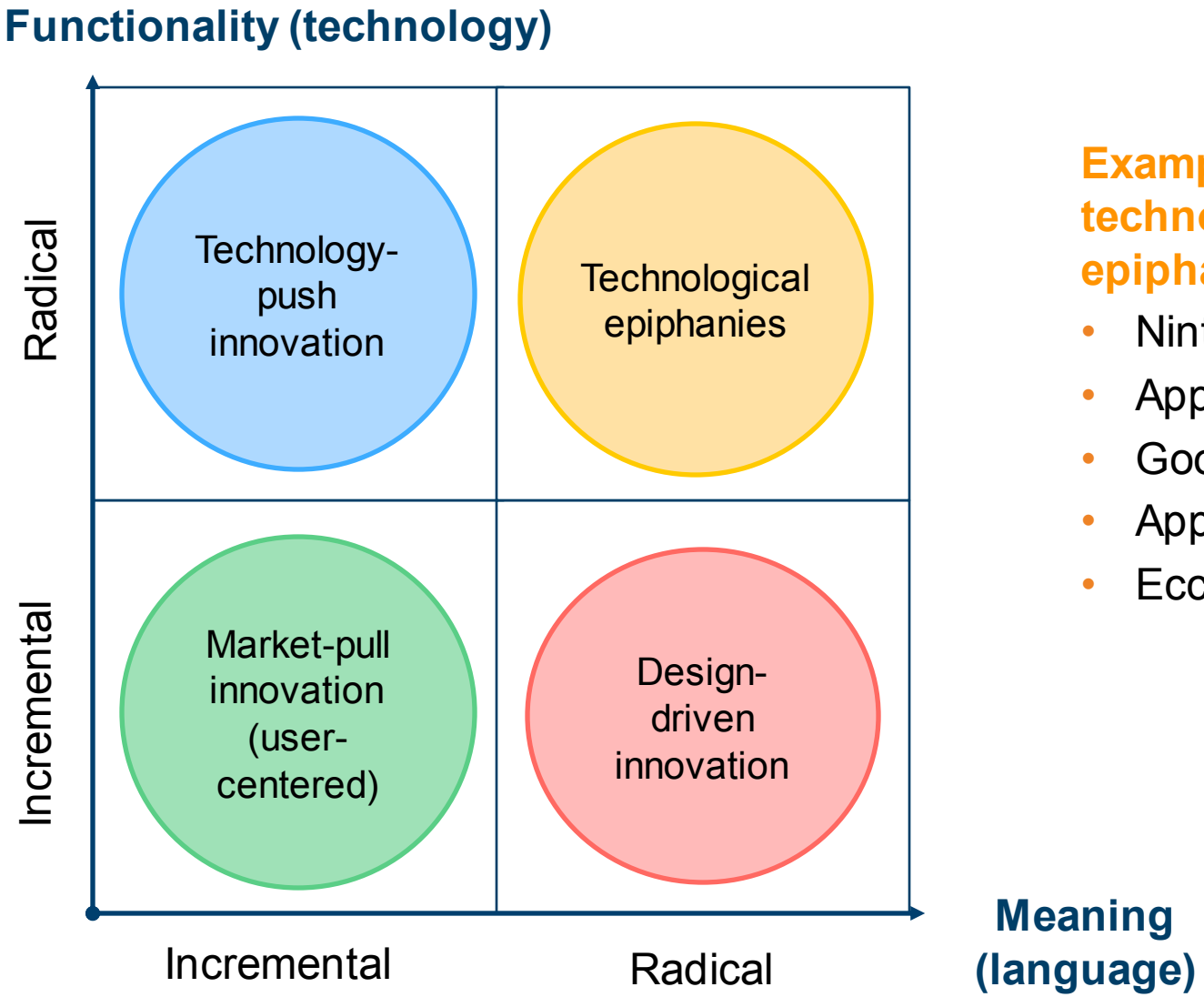
POLITECNICO DI MILANO

Module on Innovation

Market-push and user innovation

Luca Gastaldi

Recap: 3 (+1) innovation strategies



Examples of technological epiphanies

- Nintendo Wii
- Apple iPhone
- Google Nest
- Apple iPad
- Ecc.

© POLITECNICO DI MILANO

Let’s start with a real example: Amos Winter’s wheelchair

© POLITECNICO DI MILANO

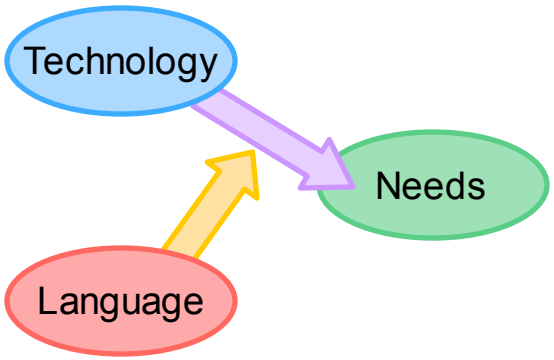
70% to 80% of new product development that fails does so not for lack of advanced technology, but because of a failure to understand users' needs

Eric von Hippel, MIT

© POLITECNICO DI MILANO

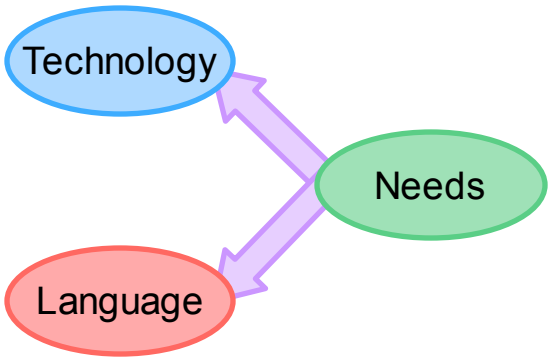
Focus of today's class

Technology-push



Process driven by **scientific or technological competencies**
Product/process innovation that typically revolve around the **physical attributes** of the product

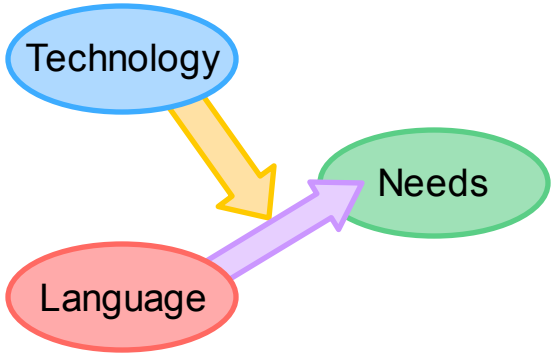
Market-pull



Innovations that typically **involve the way in which the product is commercialized** in terms of organization, distribution and/or advertising:

- Product presentation
- Distribution channel innovations
- Incremental product performance innovations
- Sales process innovations...

Design-driven



Process driven by **socio-cultural and semantic competencies**
Product/process innovation that typically revolve around **intangible attributes** of the product

[Verganti et al., 2009]

© POLITECNICO DI MILANO

Agenda

- Innovation process
- Market-pull innovation
- Analysis of user needs
- Bibliography and further material

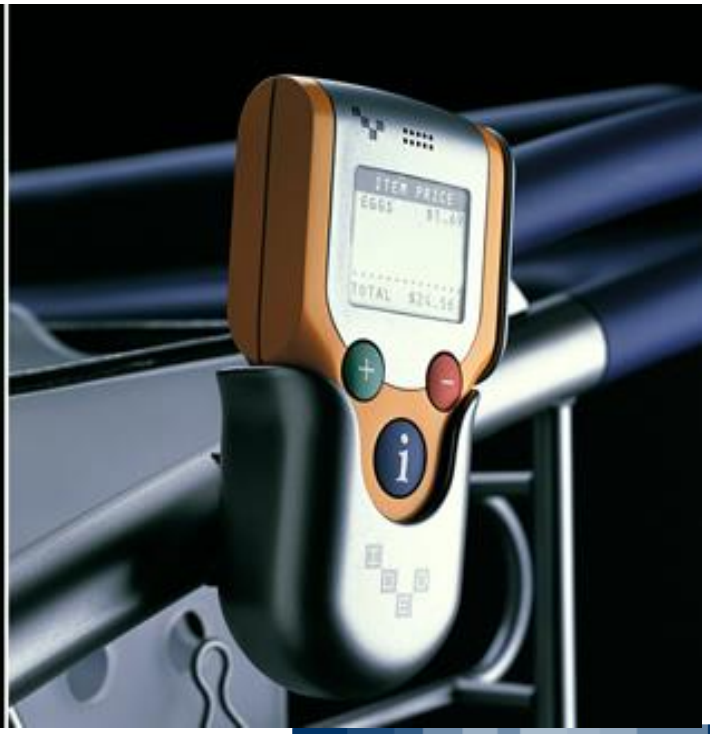
© POLITECNICO DI MILANO

Agenda

- Innovation process
- Market-pull innovation
- Analysis of user needs
- Bibliography and further material

© POLITECNICO DI MILANO

The IDEO shopping cart

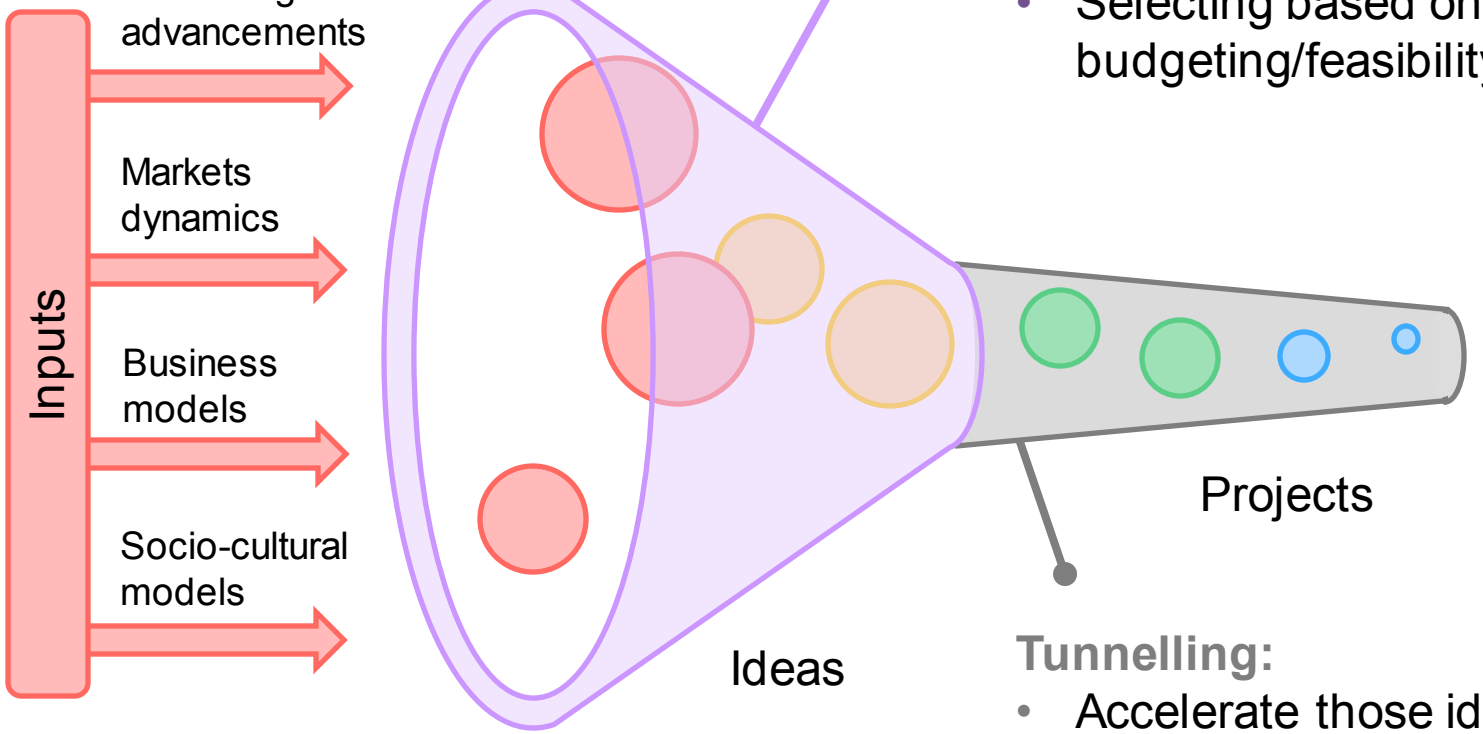


© POLITECNICO DI MILANO

From IDEO shopping cart to…

© POLITECNICO DI MILANO

Innovation process as a funnel



Filtering:

- Screening against goals/targets
- Selecting based on budgeting/feasibility evaluations

New solution
+
Business process
+
Knowledge

Tunnelling:

- Accelerate those ideas that are expected having more potential
- Speed up their development to launch them early in the market

© POLITECNICO DI MILANO

Team-based activity

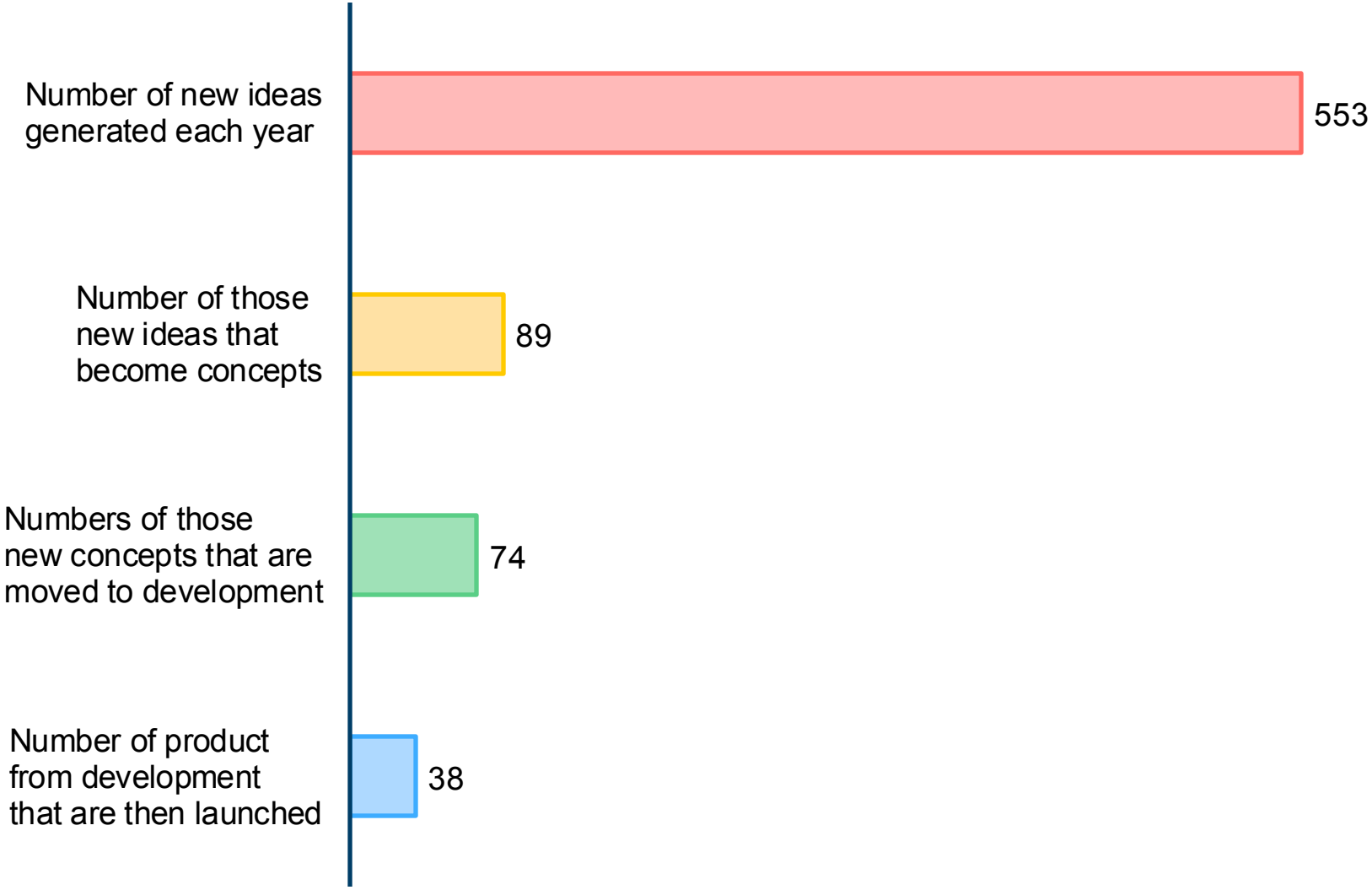
- Jointly reflect on two different companies (**it is not valid proposing one company for both options**):
  - One that is excellent in filtering
  - One that is excellent in tunneling

- Breifly explain/justify why did you made the specific choices

8 mins

© POLITECNICO DI MILANO

Importance of an effective innovation process



[Accenture, 2014]

© POLITECNICO DI MILANO

Phases of an innovation process

Innovation process: a set of coordinated activities to create a new solution (product or a service) that has value for the customer

[Ulrich and Eppinger, 1995]

© POLITECNICO DI MILANO

Human-centered design

© POLITECNICO DI MILANO

Definition of human-centered design

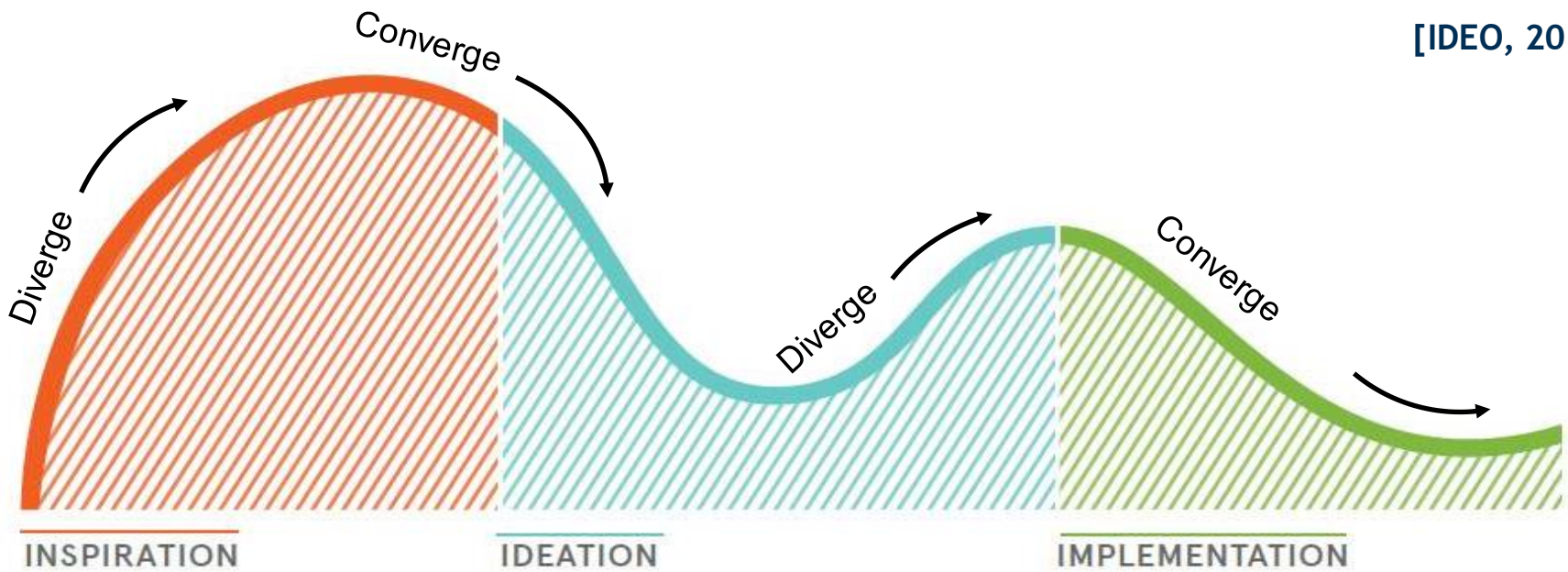
- Human-centered design is a **creative approach to problem solving**
- It's a process that **starts with the people** you're designing for and ends with new **solutions** that are tailor made to suit their needs
- Human-centered design is all about building a deep **empathy** with the people you're designing for:
  - Generating tons of ideas
  - Building a bunch of prototypes
  - Sharing what you've made with the people you're designing for
  - Eventually putting your innovative new solution out in the world

[IDEO, 2015]

© POLITECNICO DI MILANO

Phases of human-centered design

[IDEO, 2015]



- Choose a Design Challenge
- Plan Research Methods
- Build Interview Guide
- Additional Research Methods
- Capture Learnings

- Generate Ideas
- Select Promising Ideas
- Determine What to Prototype
- Make Prototypes
- Test & Get Feedback
- Integrate Feedback & Iterate

- Understand Target
- Create an Action Plan
- Launch Solution
- Keep Getting Feedback and Iterating
- Scale Towards Impact

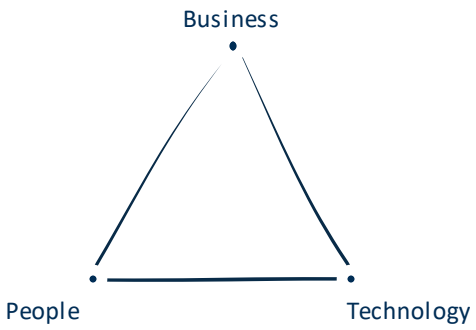
© POLITECNICO DI MILANO

TED: https://www.ted.com/talks/tim_brown_urges_designers_to_think_big

© POLITECNICO DI MILANO

Design Thinking

From

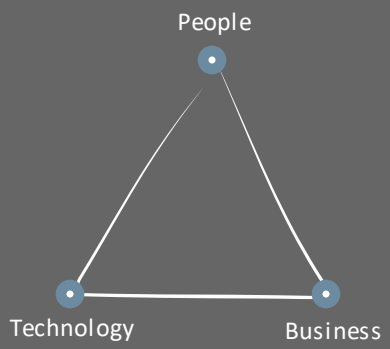


Business as purpose

Technology as driver

People as means

To



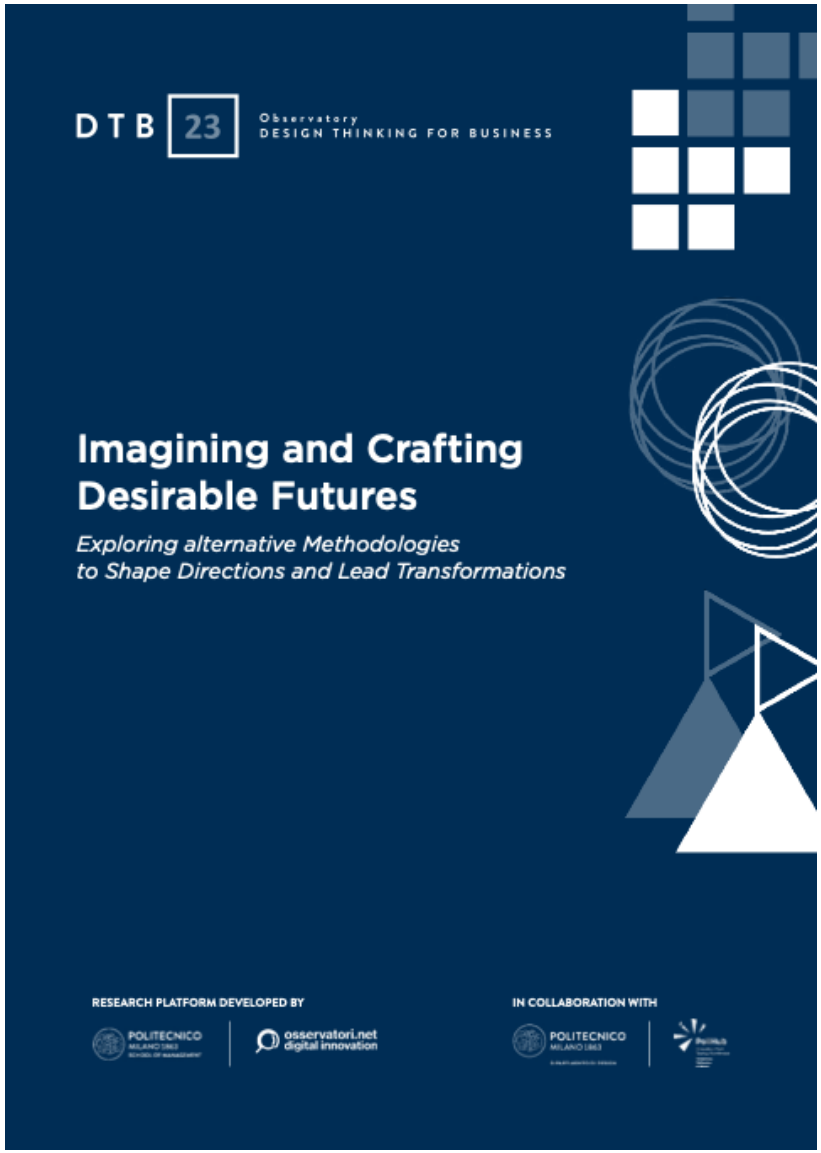
People as purpose

Technology as means

Business as consequence

© POLITECNICO DI MILANO

Design Thinking for Business Observatory



- Download freely the latest report from: https://bit.ly/DTB_2023
- In the upcoming months the Observatory will organise a **free event** in which we'll made available an **updated report**
- The website of the **Digital Innovation Observatories** contains several material that can be useful for framing the innovation project
- **Do not buy the reports!** Ask the tutors for received them freely
- **Do not exagerate!**

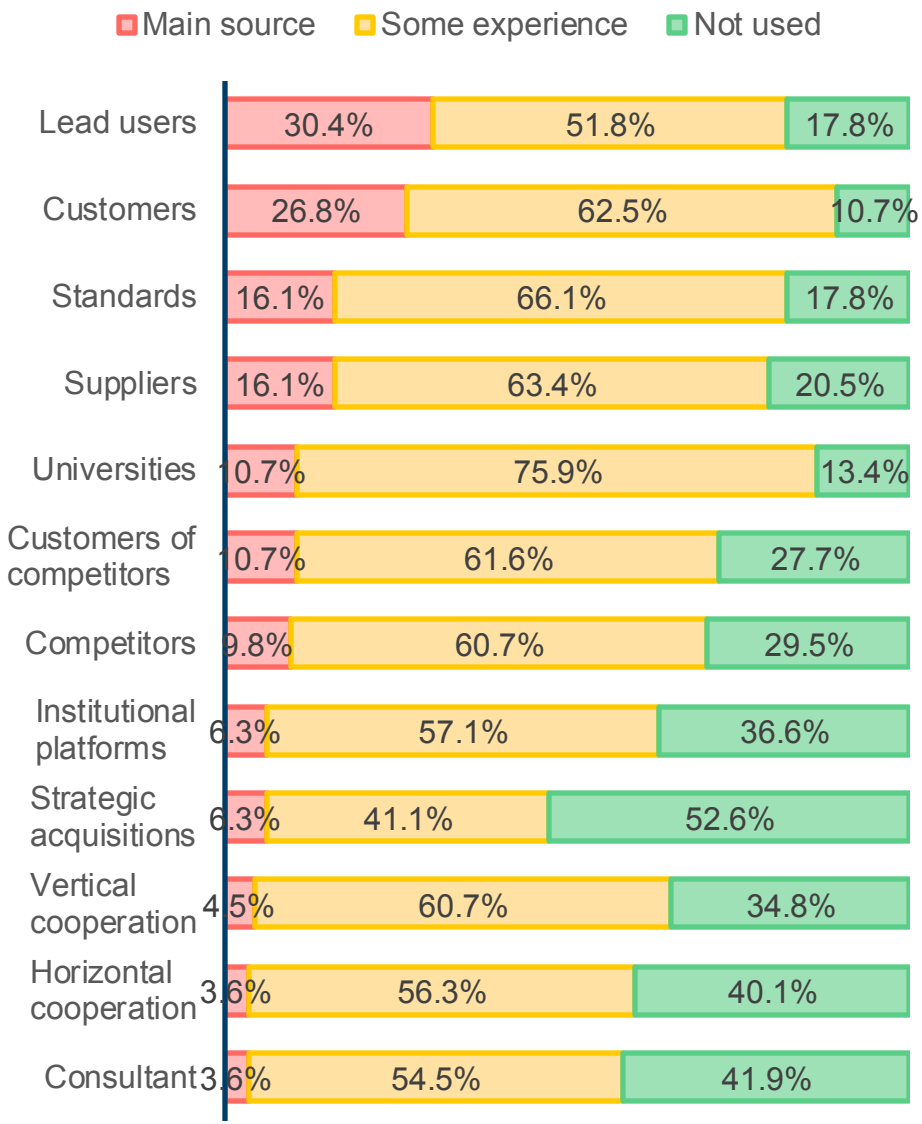
© POLITECNICO DI MILANO

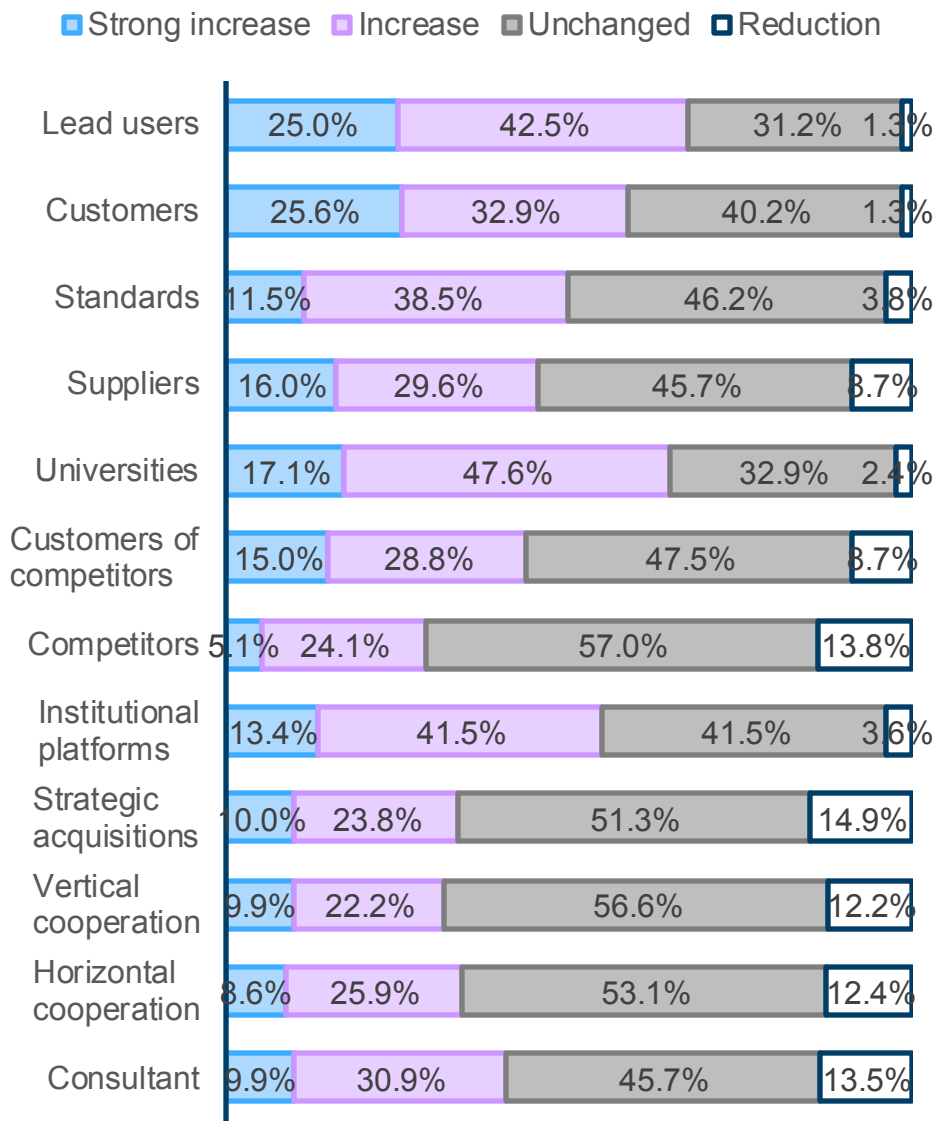
Agenda

- Innovation process
- Market-pull innovation
- Analysis of user needs
- Bibliography and further material

© POLITECNICO DI MILANO

Relative importance of external sources of innovation





[Pichler, 2006]

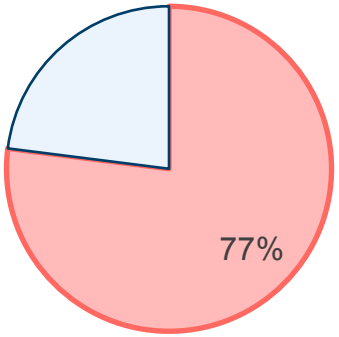
© POLITECNICO DI MILANO

Users as a source of innovation

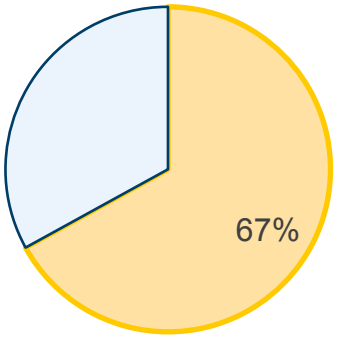
© POLITECNICO DI MILANO

% of major innovations originally developed by users

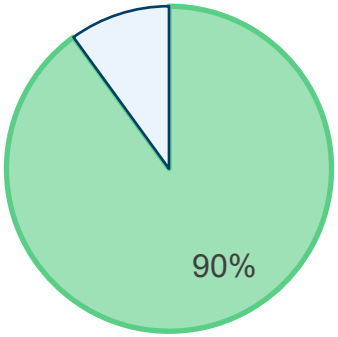
Scientific instruments
[von Hippel, 1976]



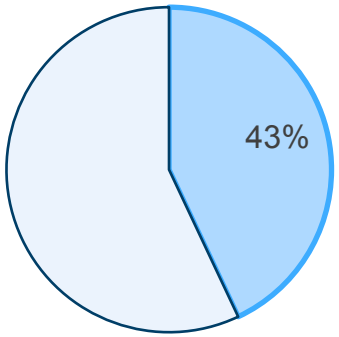
Semiconductor industry
[von Hippel, 1977]



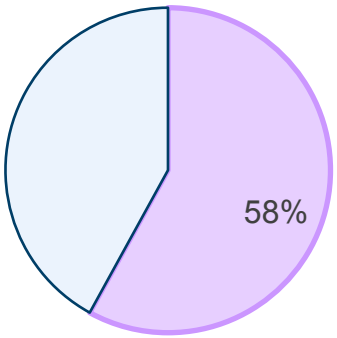
Pultrusion processing
[Lionetta, 1977]



Petrolium processing
[Enos, 1962]



Snowboard/Skateboard/Windsurfing
[Shah, 2000]



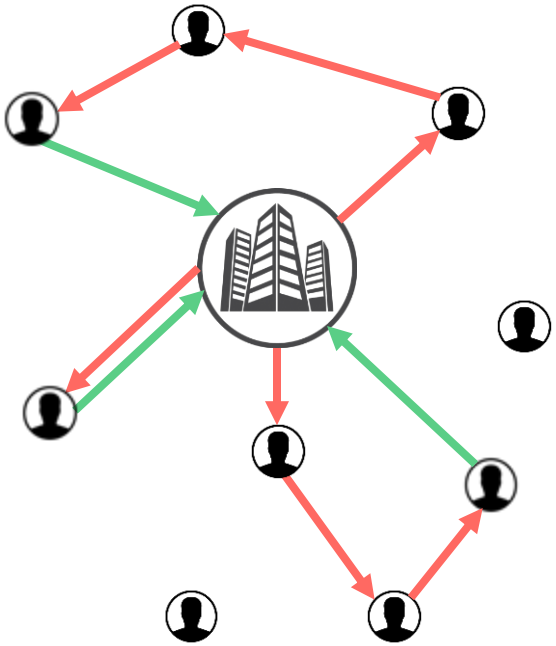
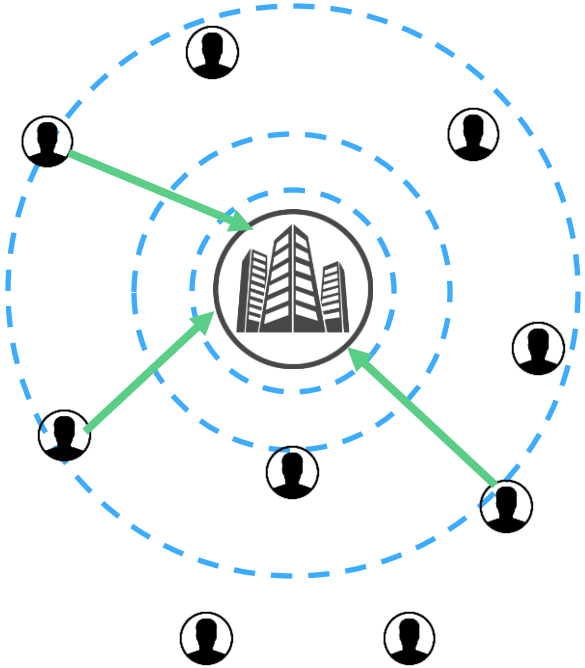
© POLITECNICO DI MILANO

Who are users

- Directly benefit from using (utility maximizers)
- NOT manufacturers/sellers (who benefit from selling – profit maximizers)
- NOT customers only
- Consumers with use experience in a specific product category
- Consumers in a specific product category, that are already customers of the company (in B2C markets)
- Consumers in a specific product category, that are (so far) not costumers of the company
- Companies (in B2B markets) who are (potential) users of the product
- Users from analogous domains

© POLITECNICO DI MILANO

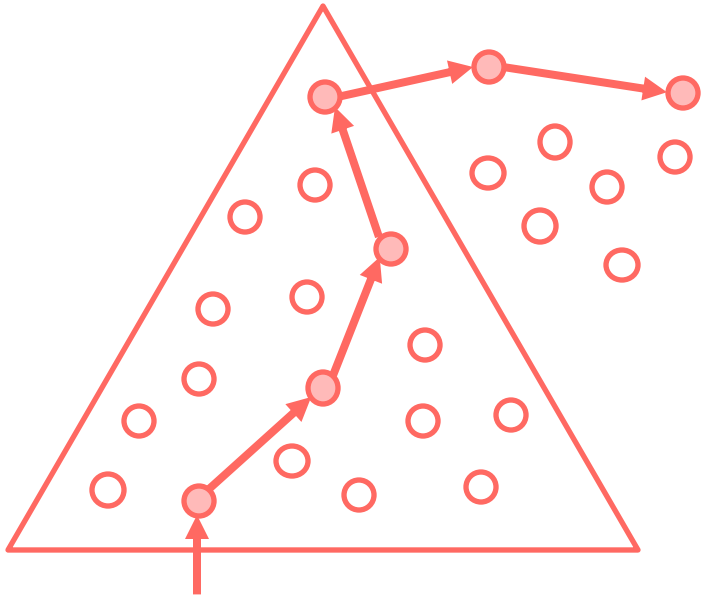
Search for innovative users

Direct search: active company-driven search	Method	Indirect search: activating self-selection
	Logic	
[von Hippel et el., 2009]	Reference	[Lakhani et al., 2007]
Pyramiding	Main application	Broadcasting

© POLITECNICO DI MILANO

Search for innovative users

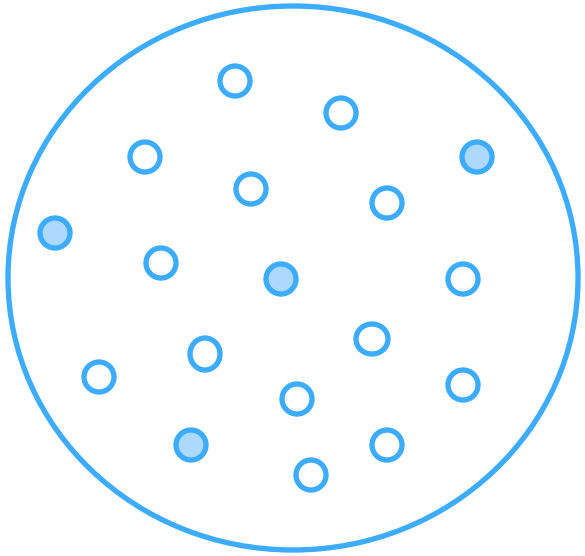
1. People → 2. ideas



Using references of interviewees to identify the target the top expert, getting stepwise to the target person by referral system

Pyramiding

1. Ideas → 2. People



Broadcast questions/problems to a crowd of potential problem solvers to identify promising ideas and the people behind them (self selection)

Broadcasting

© POLITECNICO DI MILANO

Search for innovative users

1. People → 2. ideas

- **Strength 1:** possibility to adapt and refine search questions during the search
- **Strength 2:** ability to cross domain-specific boundaries (reduced local search bias)
- **Strenght 3:** potential to interact with interviewees and get detailed insights
- **Weaknesses:** time/resources needed (e.g. highly skilled interviewers), local optima due to opportunistic behavior

Pyramiding

The two approaches can be combined

1. Ideas → 2. People

- **Strength 1:** easily accessible and observable if a few rules are respected (community culture)
- **Strength 2:** fully documented search process without any extra efforts
- **Strength 3:** attracting solutions from diverse solvers (reduced local search bias)
- **Weaknesses:** dependence on problem description, lower communic bandwidth (e.g. mainly written communication) and reach

Broadcasting

© POLITECNICO DI MILANO

Agenda

- Innovation process
- Market-pull innovation
- Analysis of user needs
- Bibliography and further material

© POLITECNICO DI MILANO

Let’s start with an example

- Let’s imagine of being the creative team of Netflix
- We want to exploit the emergency related to COVID19 to strenghten the relationship with our Italian users
- We have the upcoming week to assess their needs and deploy specific initiatives in order to better engage them in our platform through tailored contents
- How would you analyse these needs? Which tools would you employ?

NETFLIX

© POLITECNICO DI MILANO

Let’s start with an example

15 mins

- Let’s work in the groups of the innovation projects
- Jointly reflect on how you would analyse the needs of Italian subscribers and which tools would you imply to analyse these needs
- Breifly explain/justify why did you choose these tools
- Be ready to briefly discuss your choice in plenary session

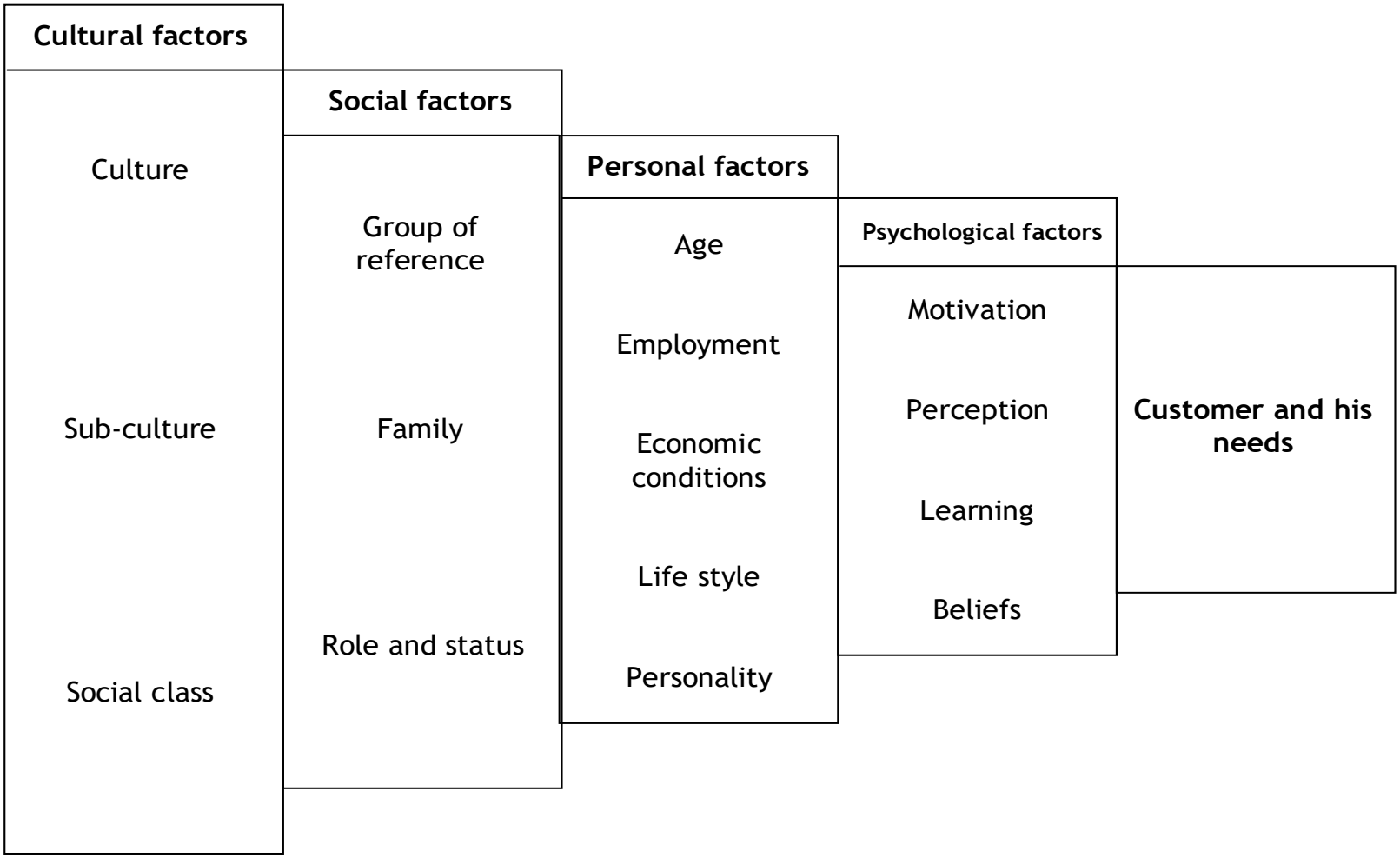
© POLITECNICO DI MILANO

Why analyzing user needs?

- To better understand the **current underlying context**
- To **reduce the uncertainties** inherent in the innovation process
- To **better satisfy the explicit and latent needs** of our consumer
- To **streamline and optimize the costs**, duration and quality of the innovation process
- To **generate knowledge** that will allow the company to survive in tomorrow's markets

© POLITECNICO DI MILANO

Understanding user needs



© POLITECNICO DI MILANO

Issues in analyzing user needs

Evaluating customer needs is a **subtle process** and even companies with **elaborate processes** in place to gather consumer input **are not always successful**

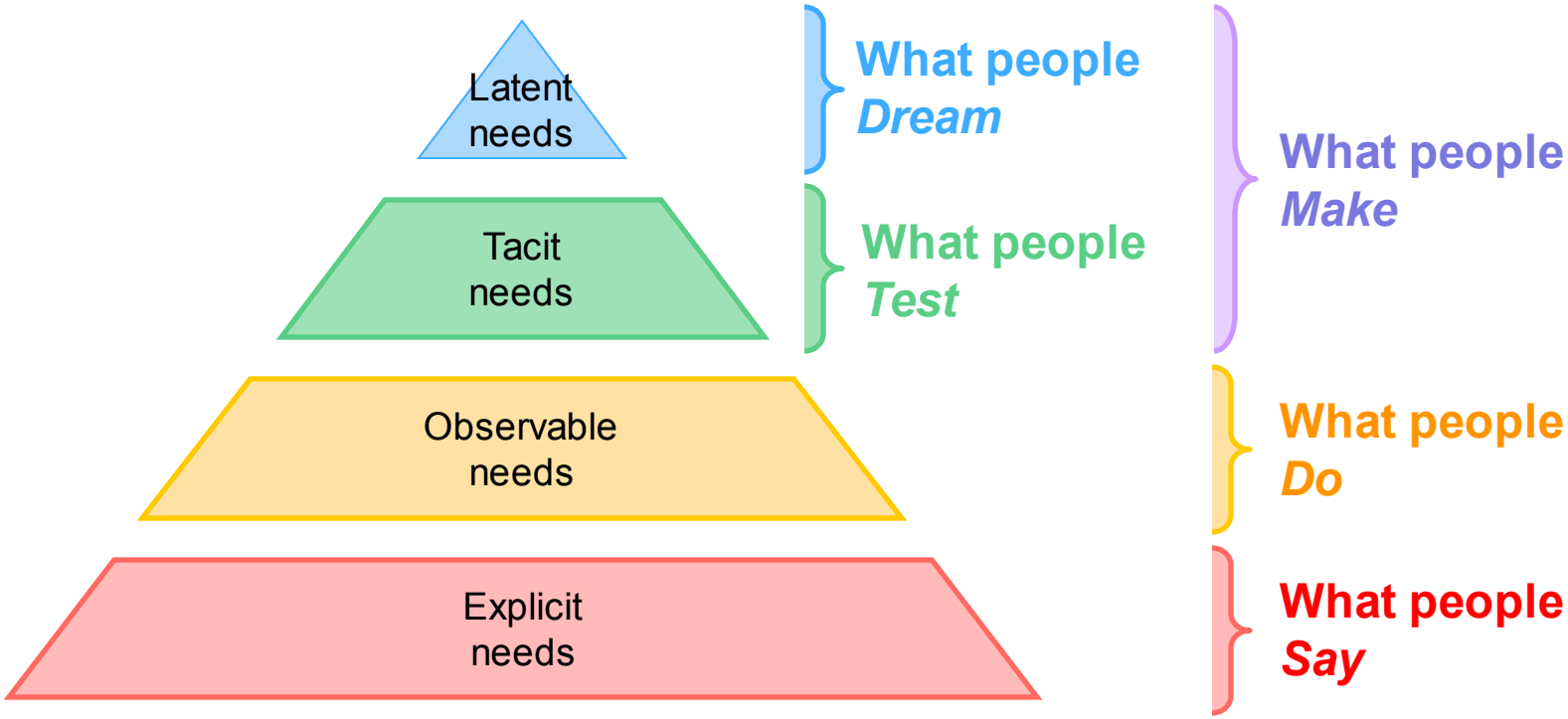
Why? What happens?

The **issues** may lie in:

- The **information** that was accumulated
- The **methods** used to accumulate information
- How it was **translated** into product requirements
- The **timing** of the user investigation

© POLITECNICO DI MILANO

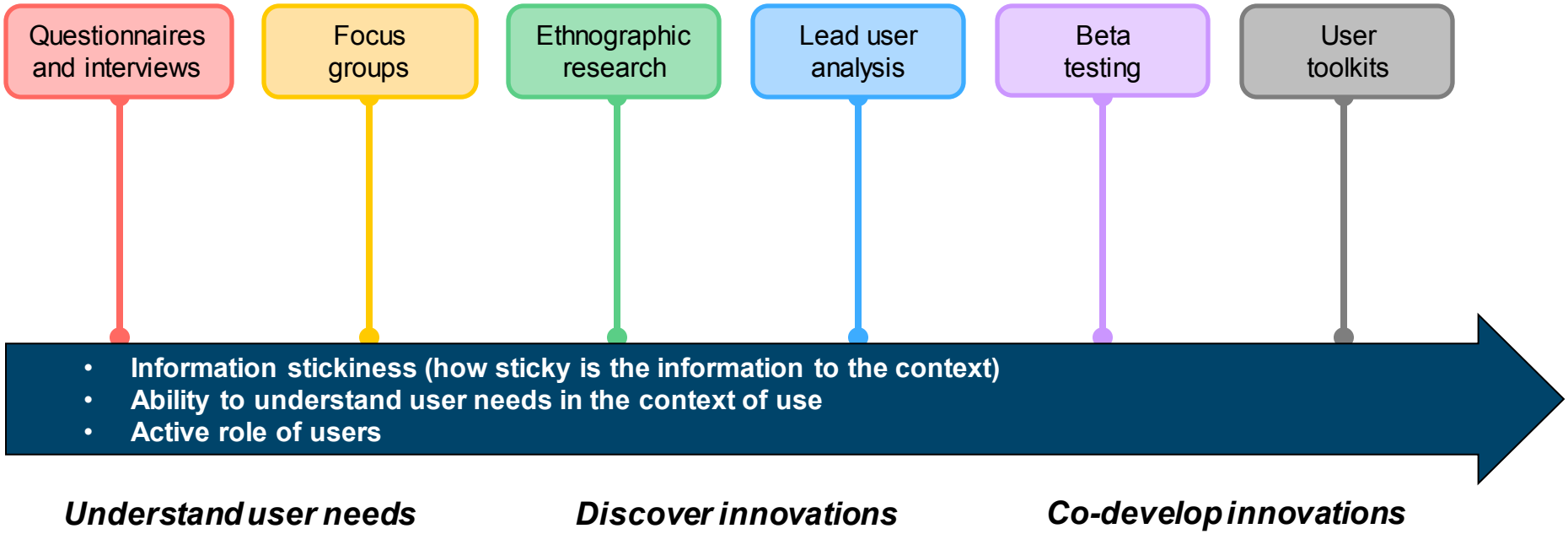
Understanding user needs



What people *Say*	What people *Do*	What people *Make*
▪ Questionnaires ▪ Interviews ▪ Focus groups	Ethnographic research	▪ Lead user analysis ▪ Beta testing ▪ Open source (user toolkit)

© POLITECNICO DI MILANO

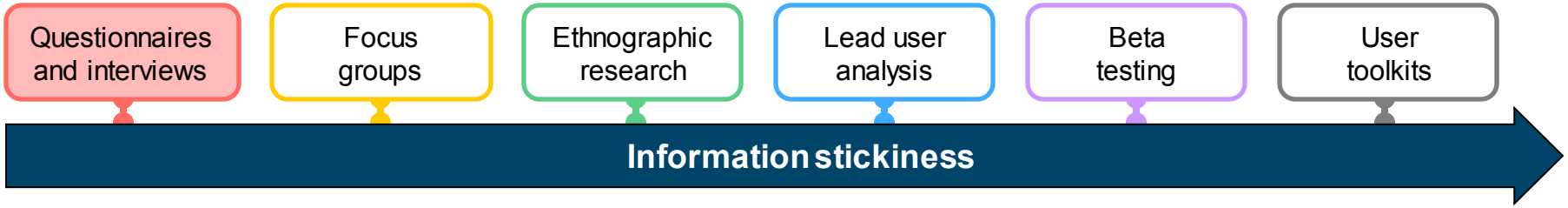
Methods for innovating with users



© POLITECNICO DI MILANO

Questionnaire and interviews

- Personal | Email | Telephone interviews
- Choice is based on the **type of information** and the **allocated budget**
- **Questionnaire design** is fundamental to minimize biased information
  - Start with defining the sections of the questionnaire in order to:
    - Make rational trade-offs between the length and necessity of various sections
    - Ensure all necessary information is collected
    - Eliminate redundancy in the questionnaire
    - Construct a smooth flow of responses throughout the questionnaire
    - Check ordering requirements
  - Develop the questionnaire in order to maximize response rate and minimize information bias
  - Pre-test the questionnaire with a sample group of experts
  - Conduct a pre-analysis to identify if the data gathering and data analysis can be conducted as defined in the design of the questionnaire
  - Issue the questionnaire to the chosen sample



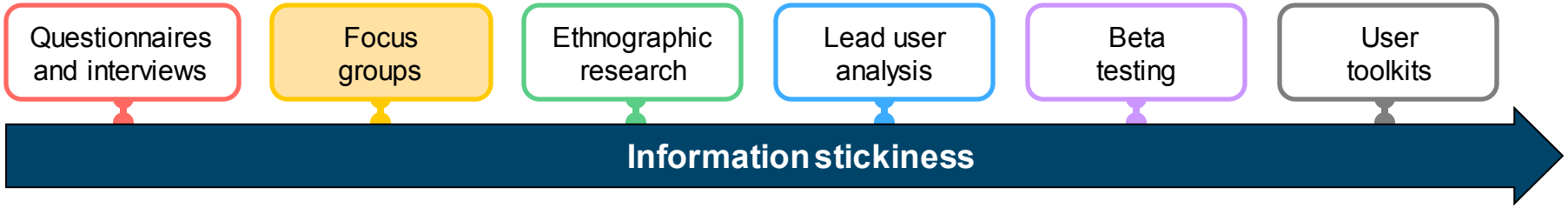
© POLITECNICO DI MILANO

Focus groups

- Focus groups are fundamentally different from quantitative survey/questionnaire methods in their purposes, dynamics, procedures and results

Aspect	Focus Group	Quantitative analyses
Purpose	Produces insight	Produces rules
Dynamics	Social	Individual
Procedure	Flexible	Standardized
Results	Words	Numbers

- Despite this technique constitutes a notable improvement in comparison to the interviews, it introduces three strong limitations:
  - The choice of the representative sample is very critical
  - The target customers must be well defined and known
  - The observations happen in a controlled context that differs from the daily context of the single consumer

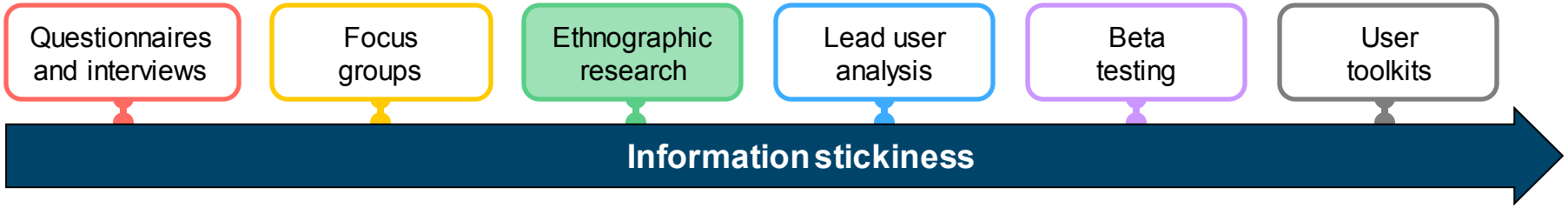


© POLITECNICO DI MILANO

Ethnographic research

By looking at what users do, we learn how to design a better shopping cart

David Kelley, IDEO

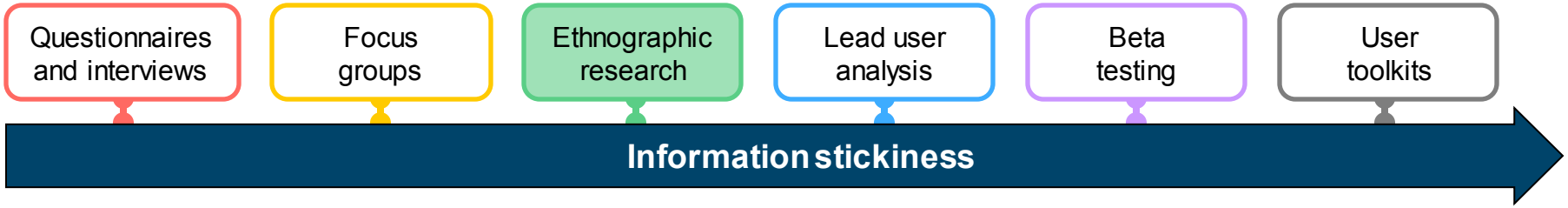


© POLITECNICO DI MILANO

Ethnographic research

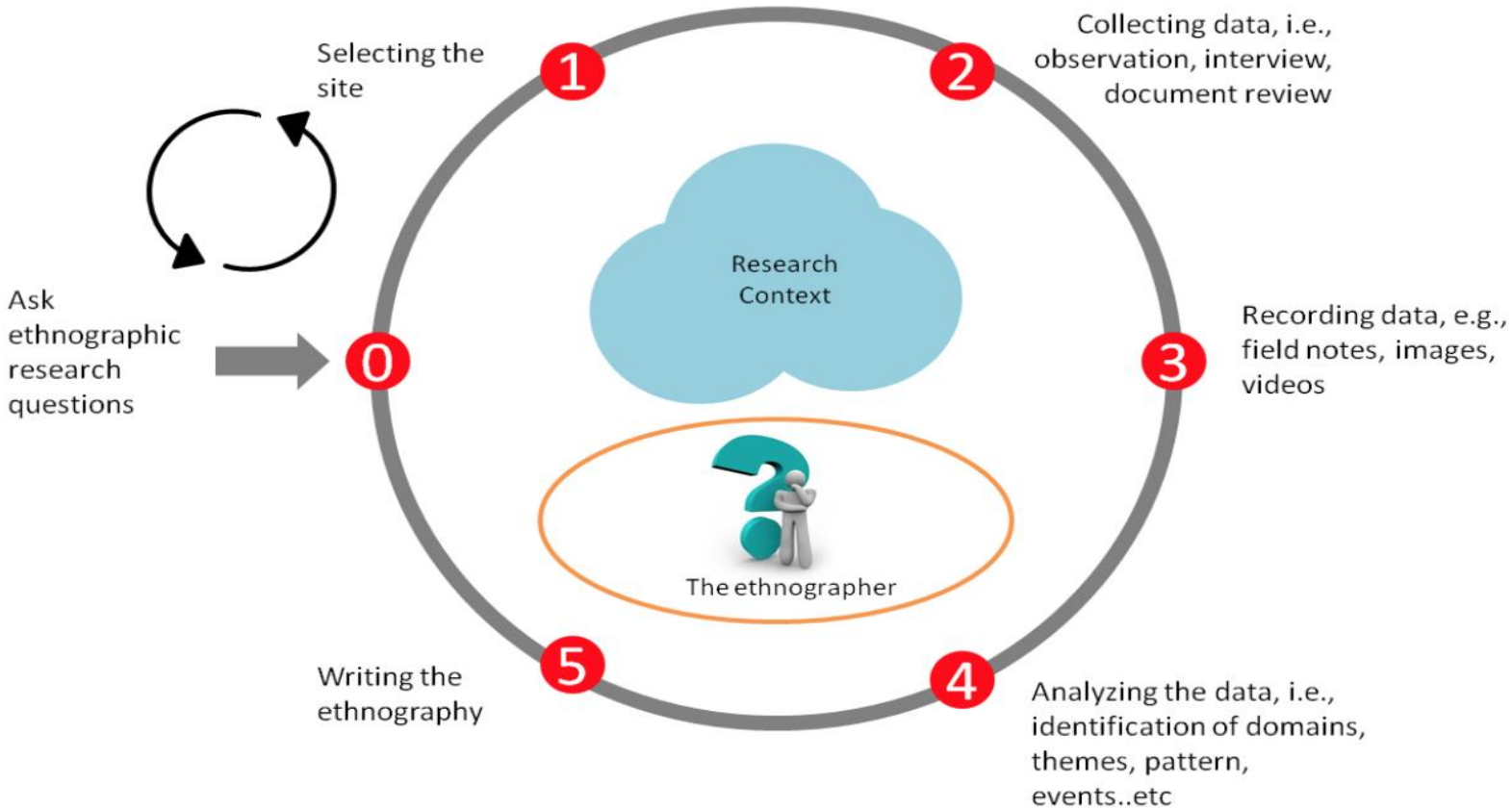
- Rooted in the fields of anthropology and sociology
- Based on naturalistic or participant observation or study of the native aspects of a culture

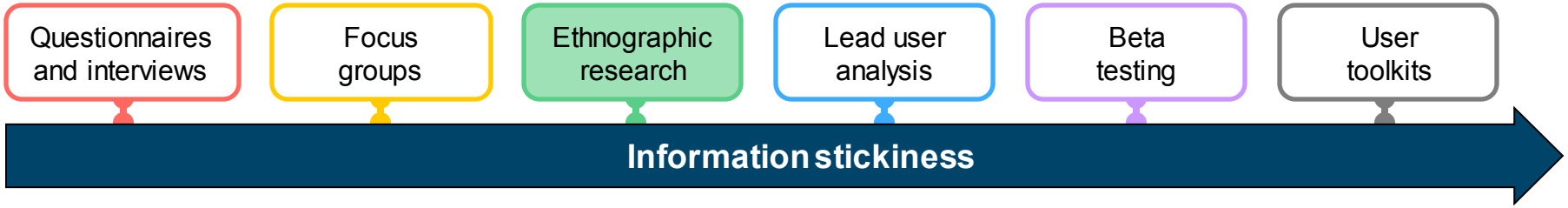
- Characteristics of an ethnographic research:
  - **The orientation of the ethnographer:** which is to passively and subjectively observe a given context (the researcher must become part of the research situation)
  - **Objectives not hypotheses:** even though an ethnographic researcher needs only a general question as a starting point, she must be well versed and documented in the art and science of ethnographic observation
  - No statistics
  - **Highly descriptive and qualitative data:** interviews, artifacts, contextual descriptions and the triangulation of data
  - **No desire to be generalizable:** the strength of an ethnographic research is to be specific and detailed



© POLITECNICO DI MILANO

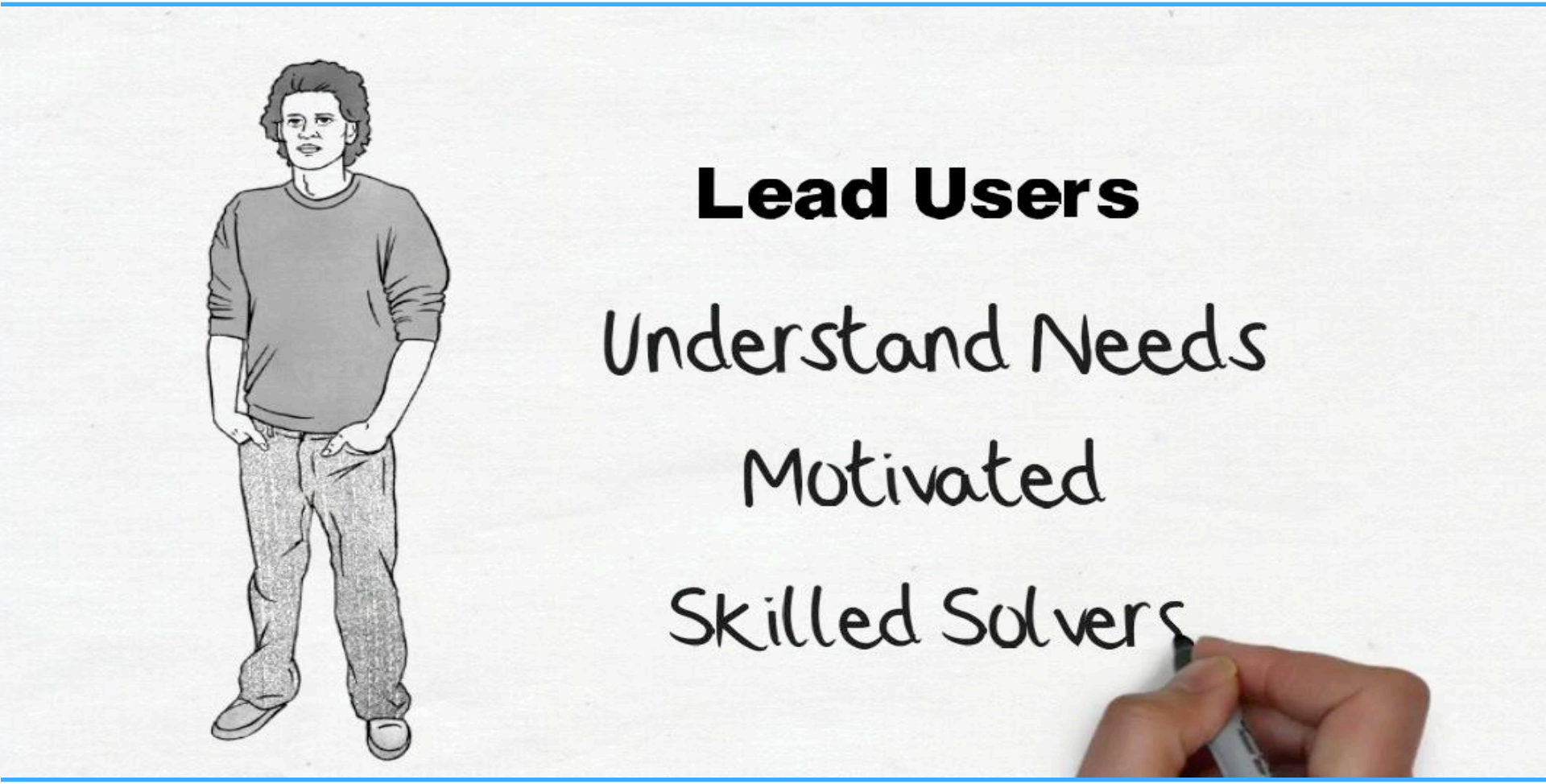
Ethnographic research





© POLITECNICO DI MILANO

Lead user analysis



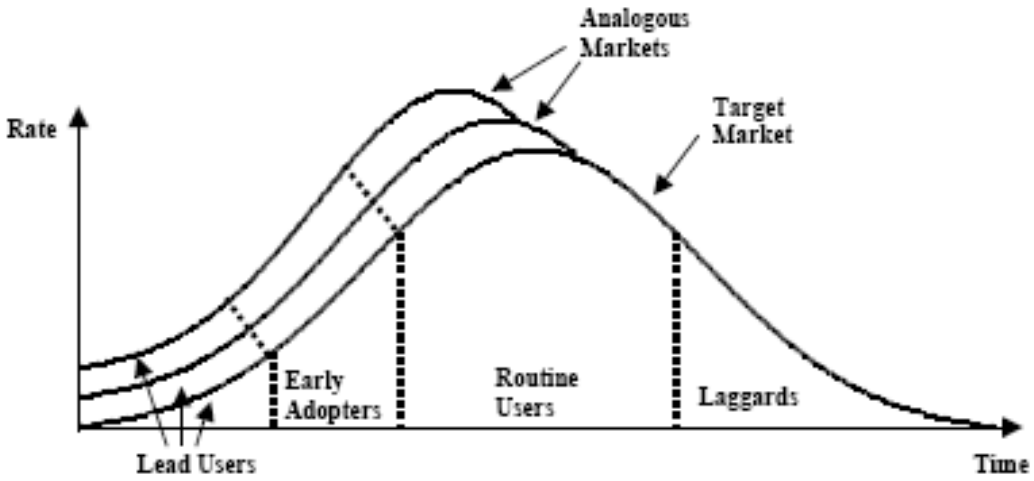
Questionnaires and interviews → Focus groups → Ethnographic research → Lead user analysis → Beta testing → User toolkits

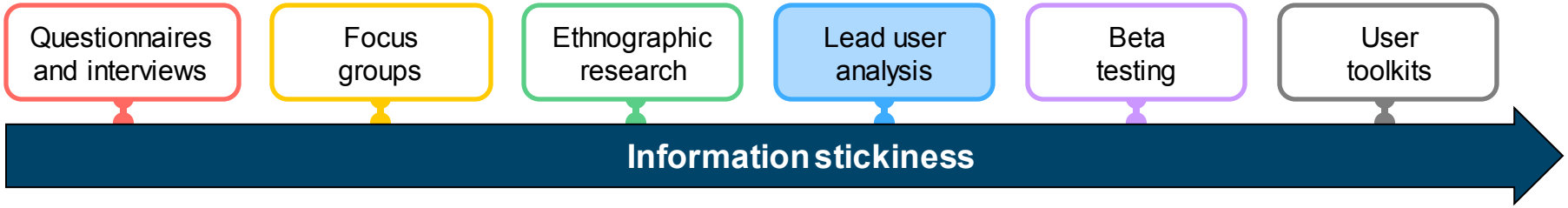
Information stickiness

© POLITECNICO DI MILANO

Lead users

- Face needs that will be commonplace in a marketplace — but face them ***before*** the bulk of the marketplace encounters them
- Have a strong economic motive to innovate, since they expect to benefit significantly by obtaining a solution to their needs
- Have capability to innovate
- Lead users are not the same as *early adopters*— lead users are facing needs for products and services that *do not exist* on the market

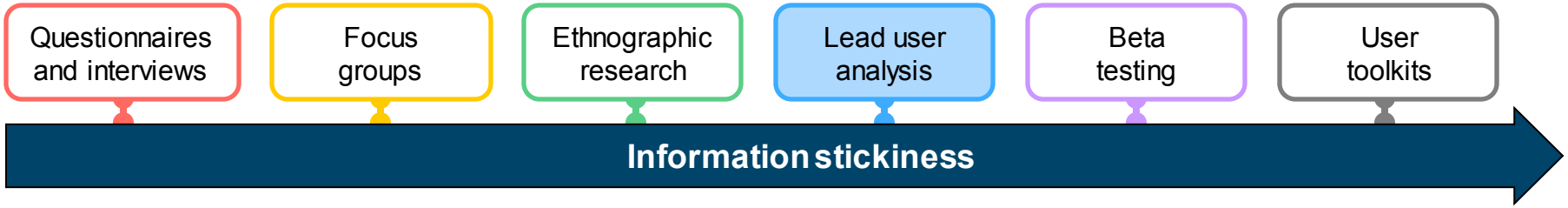




© POLITECNICO DI MILANO

Examples of innovations introduced by lead users

Category	Example
Health Products	Gatorade
Personal Care	Protein-base Shampoo Feminine Hygiene
Sports Equipment	Mountain Bike Mountain Climbing-Piton
Apparel	Sports Bra
Food	Chocolate Milk Graham Cracker Crust
Office	White-out Liquid
Computer Application Software	Electronic Mail Desk Top Publishing



© POLITECNICO DI MILANO

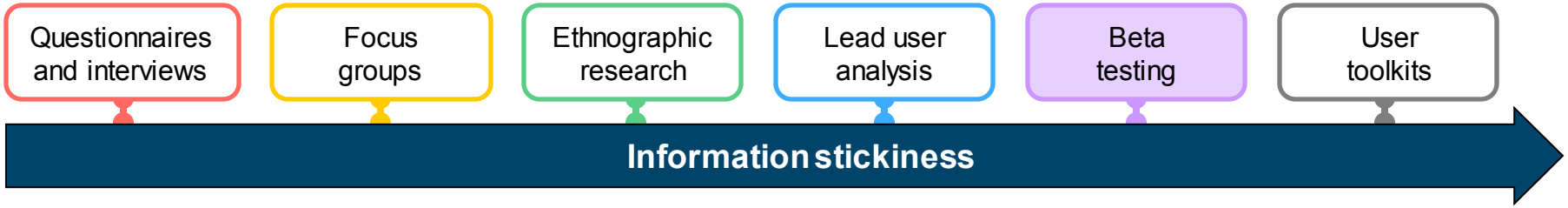
Beta testing

Main characteristics

- Direct involvement of the customers in the project cycles
- Feedback from the customers

Limits

- Customers have to be skilled
- Data gathering (feedback) can be articulated

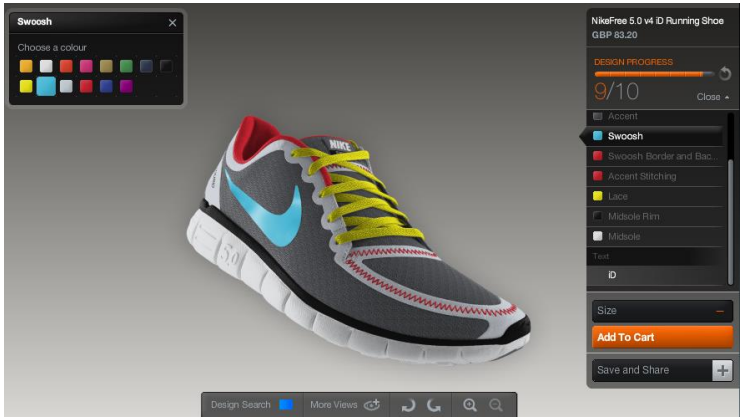


© POLITECNICO DI MILANO

User toolkits

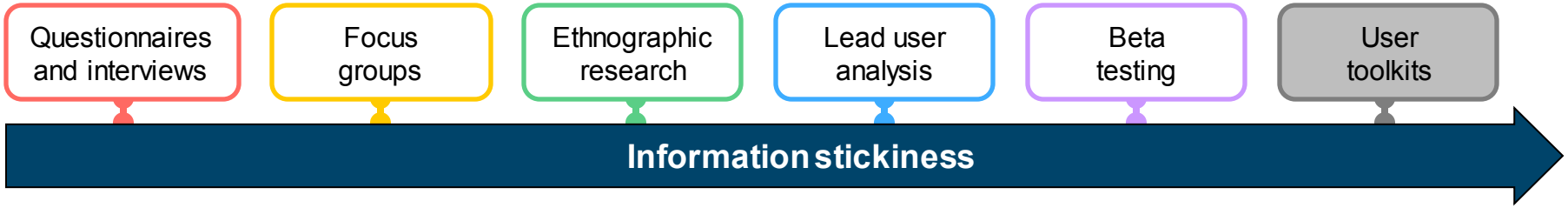
Main characteristics

- Overlapping between user needs analysis and concept generation
- Customer = Designer



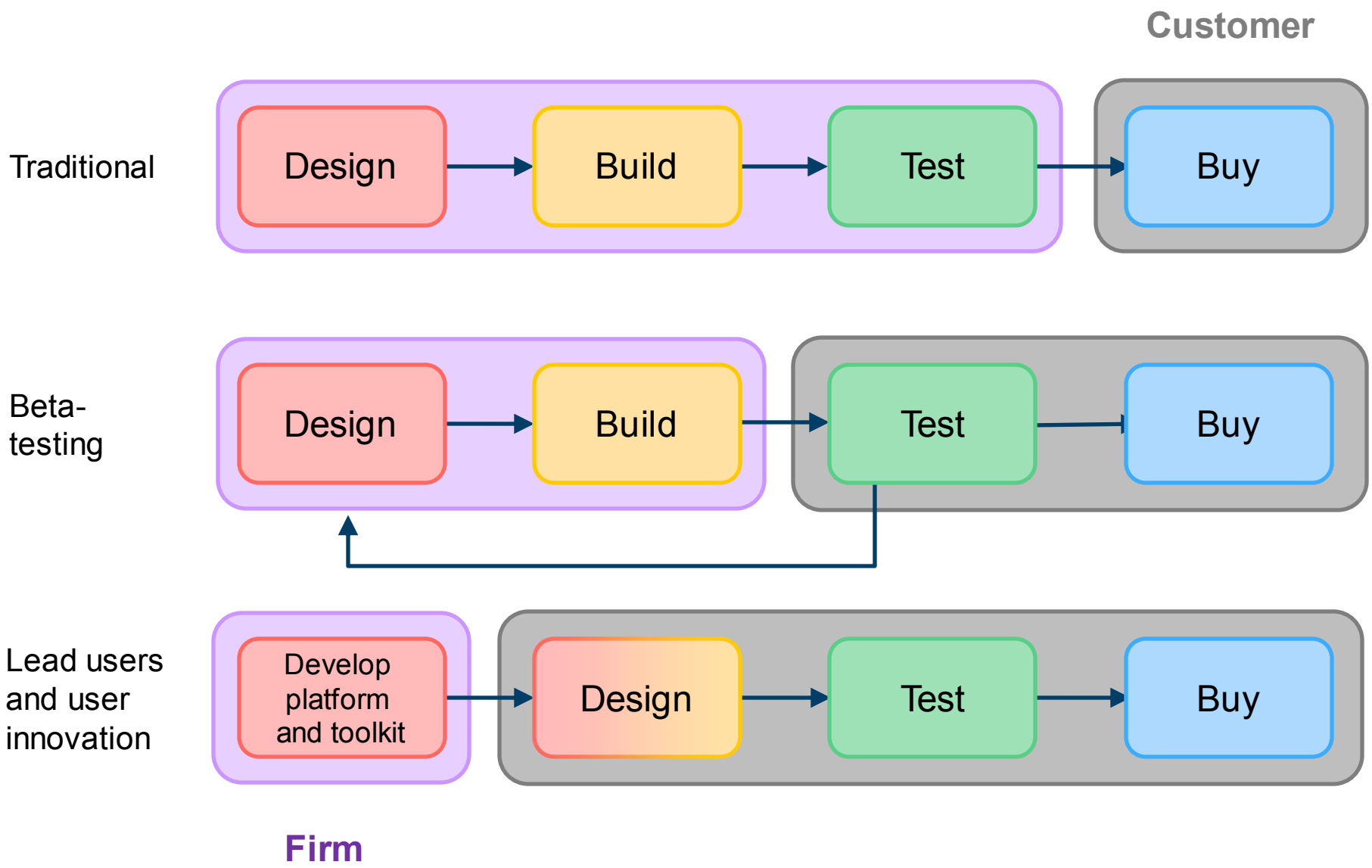
Limits

- Customers have to be skilled
- Data gathering (feedback) can be articulated



© POLITECNICO DI MILANO

Co-developing innovations



© POLITECNICO DI MILANO

Agenda

- Innovation process
- Market-pull innovation
- Analysis of user needs
- Bibliography and further material

© POLITECNICO DI MILANO

Bibliography

- Bogers M., Afuah A., Bastian B. (2010) Users as Innovators: A Review, Critique, and Future Research Directions, *Journal of Management*, Vol. 36, No. 4, pp. 857–875
- von Hippel E. (2005) *Democratizing Innovation*, Cambridge (MA): MIT Press — Chapters 2, 3, 10 and 11

Further Material

- Churchill J., von Hippel E., Sonnack M. (2009) *Lead User Project Handbook: A Practical Guide for Lead User Project Teams*, freely available at http://evhippel.mit.edu
- IDEO (2015) *The Field Guide to Human Centered Design*, freely available at www.designkit.org
- Design Thinking for Business Observatory (2019) *Mapping Design Thinking: Transformations, Applications and Evolutions*, freely available at https://j.mp/DTB_Report_2019
- Harhoff, D. et al. (2003): Profiting From Voluntary Information Spillovers: How Users Benefit by Freely Revealing Their Innovations, *Research Policy*, Vol. 32, No. 10, pp. 1753–1769
- Lakhani K.R., Jespersen L.B., Lohse P., Panetta J.A. (2007) The Value of Openness in Scientific Problem Solving, *Working Paper*
- Ulrich K.T. Epping S.D. (2015) *Product Design and Development (6th Edition)*, New York (NY): McGraw-Hill
- Verganti R. (2008) Design, Meanings, and Radical Innovation: A Metamodel and a Research Agenda, *Journal of Product Innovation Management*, Vol. 25, No. 5, pp. 436–456
- Von Hippel E. (1994) "Sticky Information" and the Locus of Problem Solving: Implications for Innovation, *Management Science*, Vol. 40, No. 4, pp. 429–439
- Von Hippel E., Franke N., Prugl R. (2009) Pyramiding: The Search for Rare Subjects, *Research Policy*, Vol. 38, No. 8, pp. 1397–1406
- Von Hippel E. (2015) User Toolkits for Innovation, *The Journal of Product Innovation Management*, Vol. 18, No. 3, pp. 247–257

© POLITECNICO DI MILANO

POLITECNICO DI MILANO

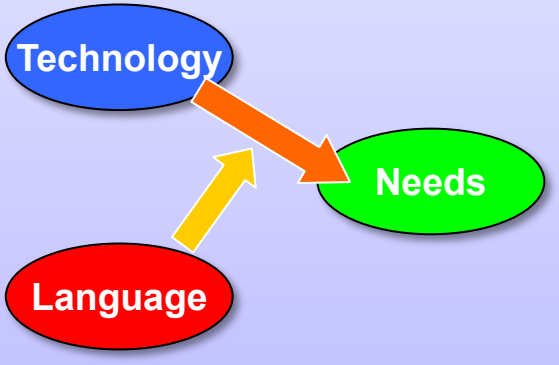
Module on Innovation

Technology Push Innovation

Mariano Corso

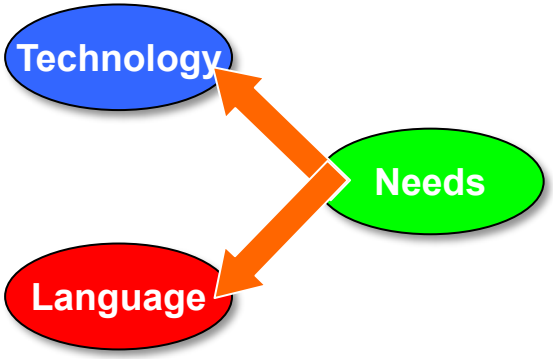
Innovation strategies

Technology-push



Process driven by **scientific or technological competencies**
Product/process innovation that typically revolve around the **physical attributes** of the product

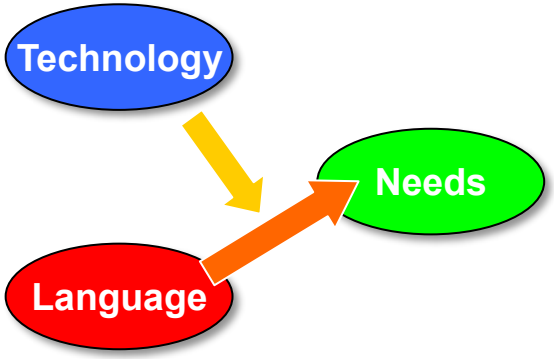
Market-pull



Innovations that typically **involve the way in which the product is commercialized** in terms of organization, distribution and/or advertising:

- Product presentation
- Distribution channel innovations
- Incremental product performance innovations
- Sales process innovations...

Design-push



Process driven **socio-cultural and semantic competencies**
Product/process innovation that typically revolve around **intangible attributes** of the product

Adapted from Dosi (1982) and Verganti (2003)

© POLITECNICO DI MILANO

Technology

Dosi 1982 = "… a set of practical and theoretical knowledge, Know-how, methods, procedures, success and failure experiences and, obviously, of physical assets and machineries…"

Zeleny 1982: set of hardware, software, brainware and their sustain network

© POLITECNICO DI MILANO

S- Shape Curves

© POLITECNICO DI MILANO

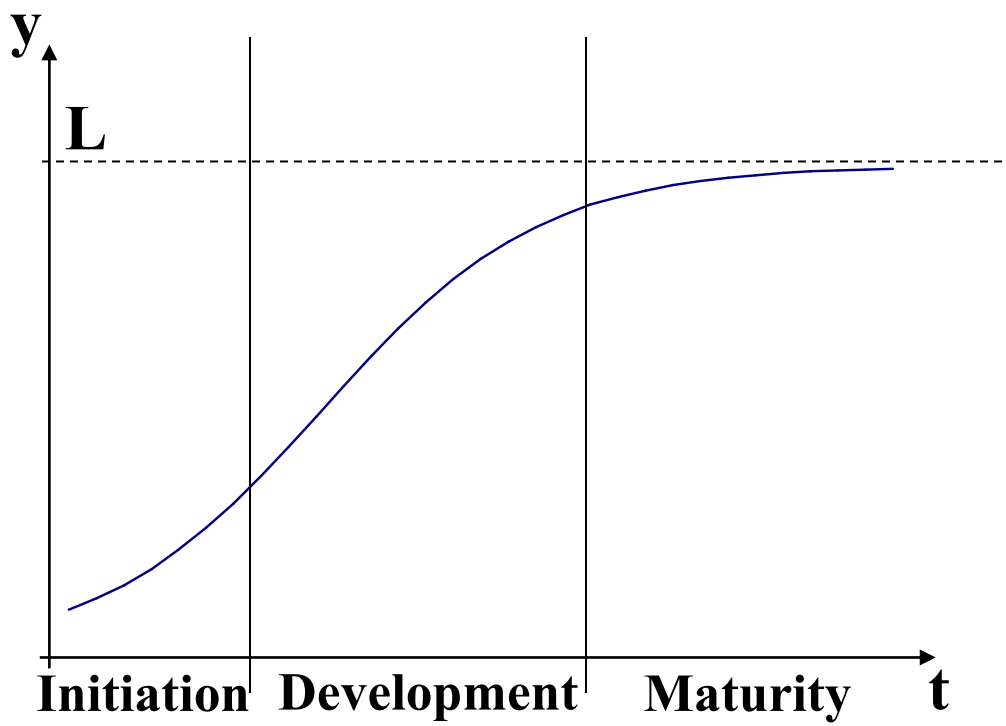
The typical dynamic of Technology Innovation: S-Shape curves

S-Shape curves

- Time based evolution of a single parameter of a technology

Assumptions:

- Limited growth (L)
- 3 Phases
- Constant innovation effort (b)



$$\frac{dy}{dt} = b \cdot y \cdot \left(1 - \frac{y}{L}\right) \Rightarrow y = \frac{L}{1 + a \cdot e^{-b \cdot t}}$$

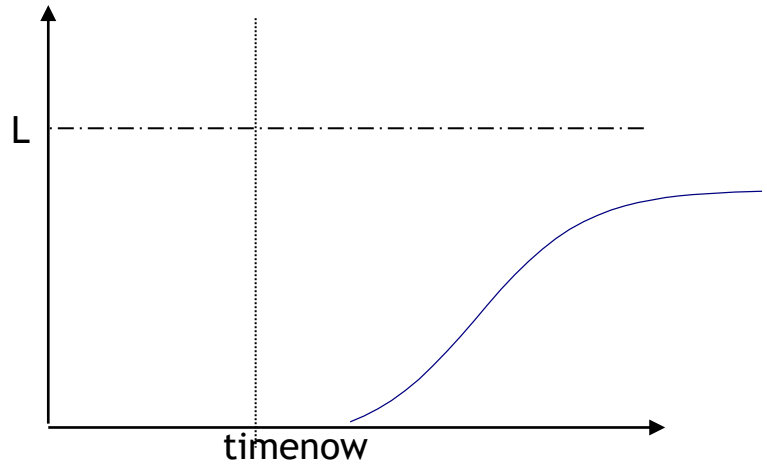
© POLITECNICO DI MILANO

S-shape curves: possible uses

To understand the development stage for a technology

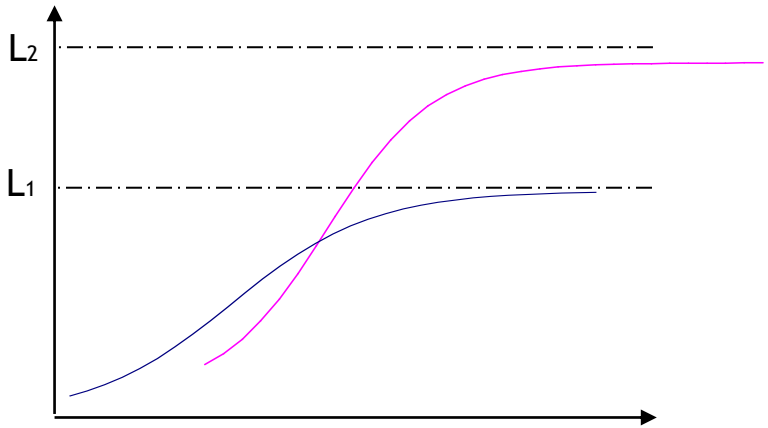
- **Investment policy**

To foresee L



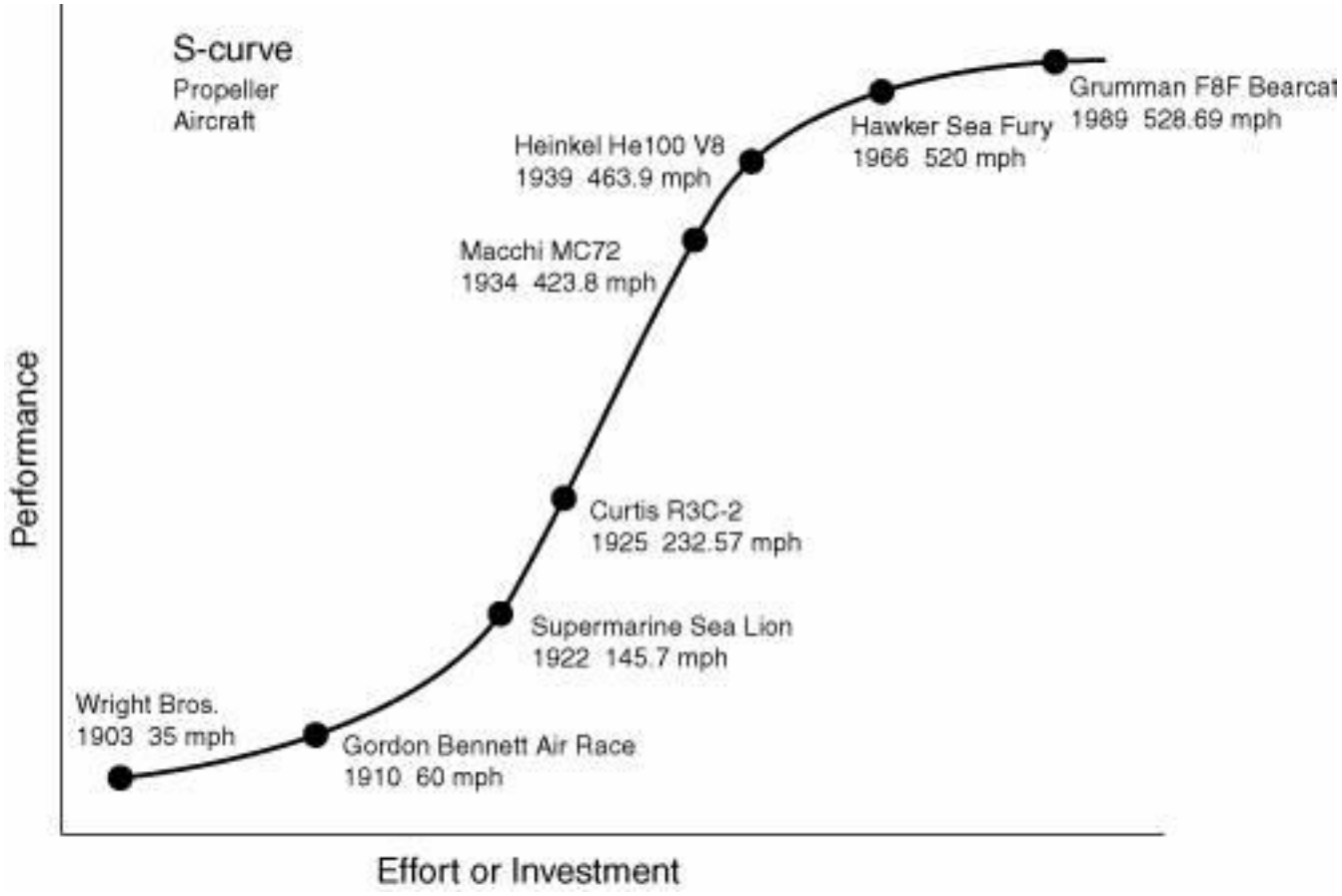
Foresee when a given technology will reach a specific level

To drive the technology switch



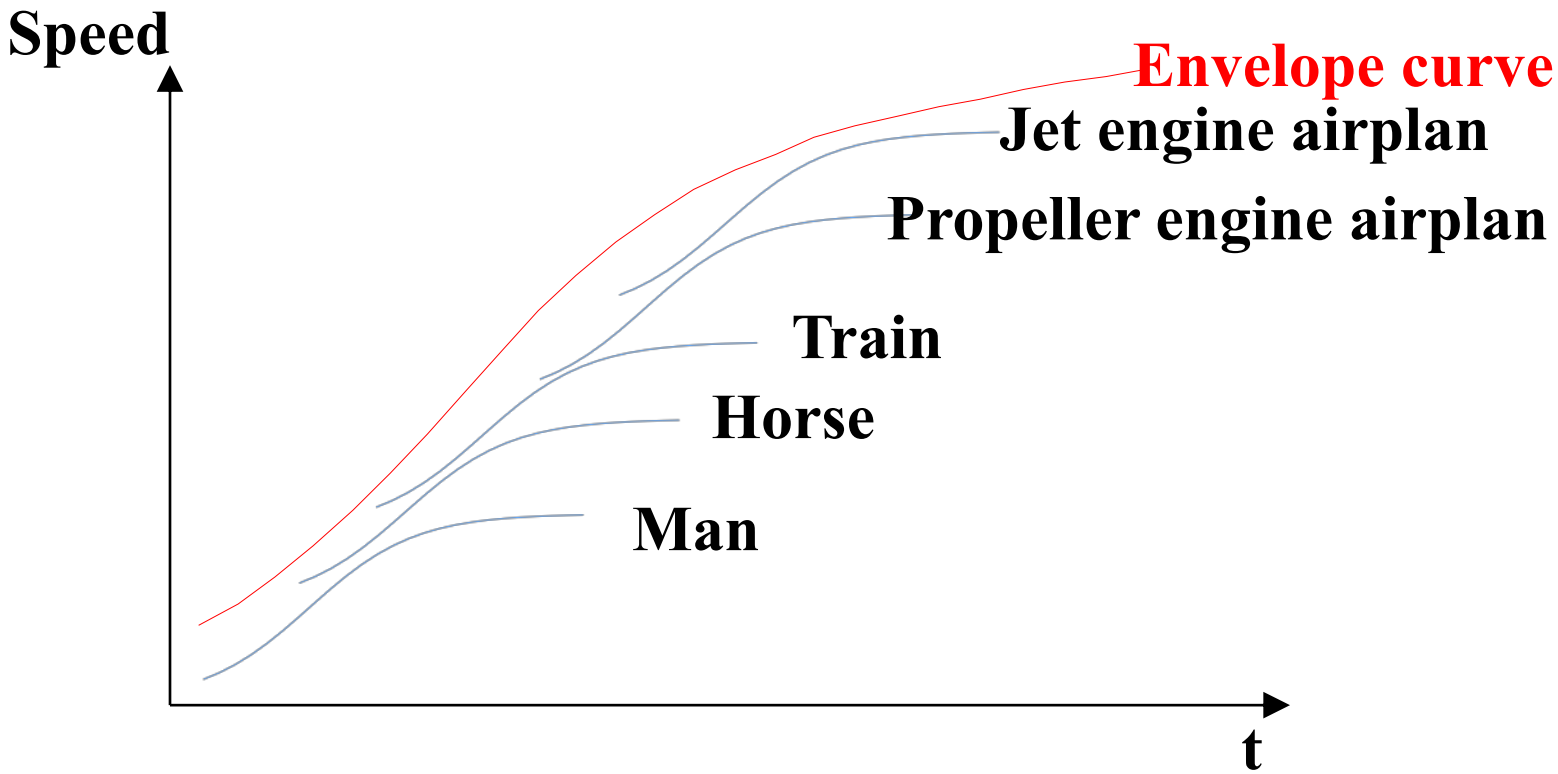
© POLITECNICO DI MILANO

S-shape curve - example



© POLITECNICO DI MILANO

S-shape curves: long period

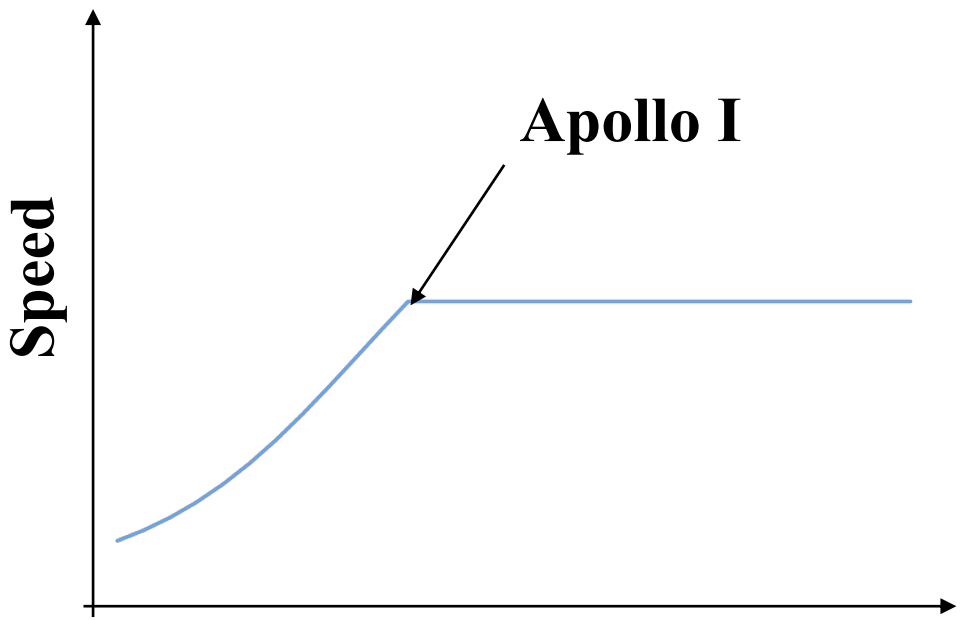


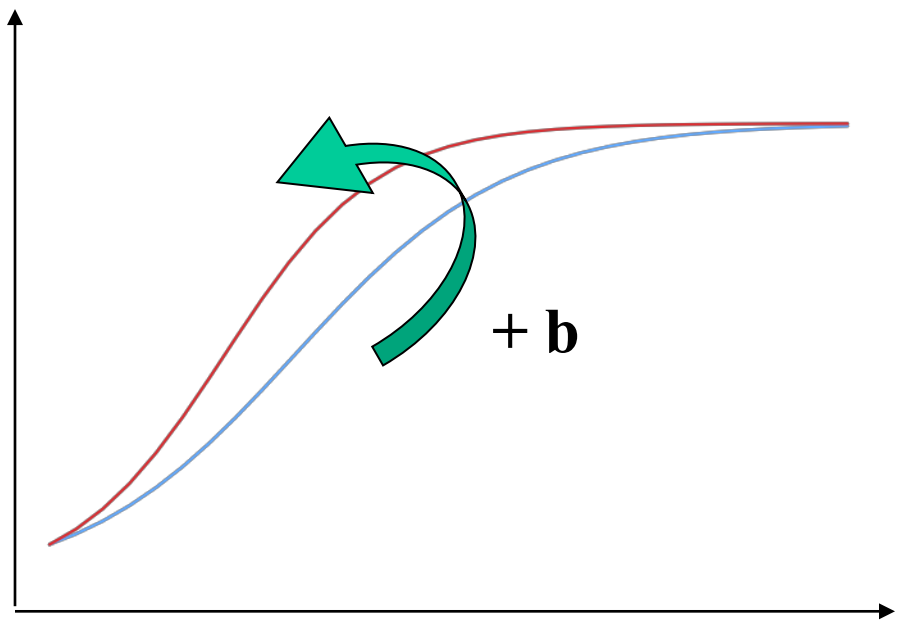
© POLITECNICO DI MILANO

S-shape curves: limits

S-shape Curves

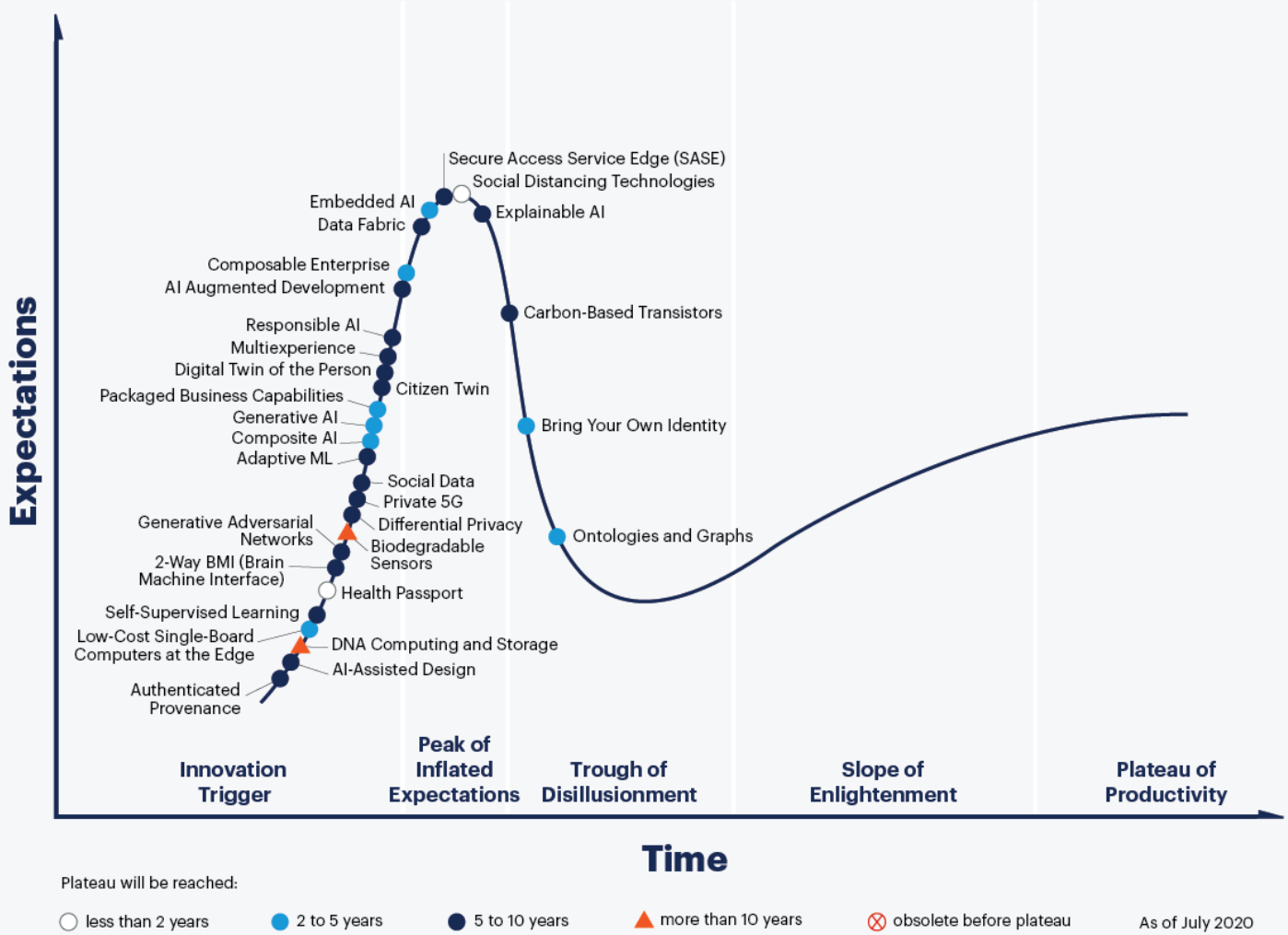
- **b** = f(Investments, Innovation Effort)





© POLITECNICO DI MILANO

Hype Cycle for Emerging Technologies, 2020



Plateau will be reached:

○ less than 2 years ● 2 to 5 years ● 5 to 10 years ▲ more than 10 years ⊗ obsolete before plateau

As of July 2020

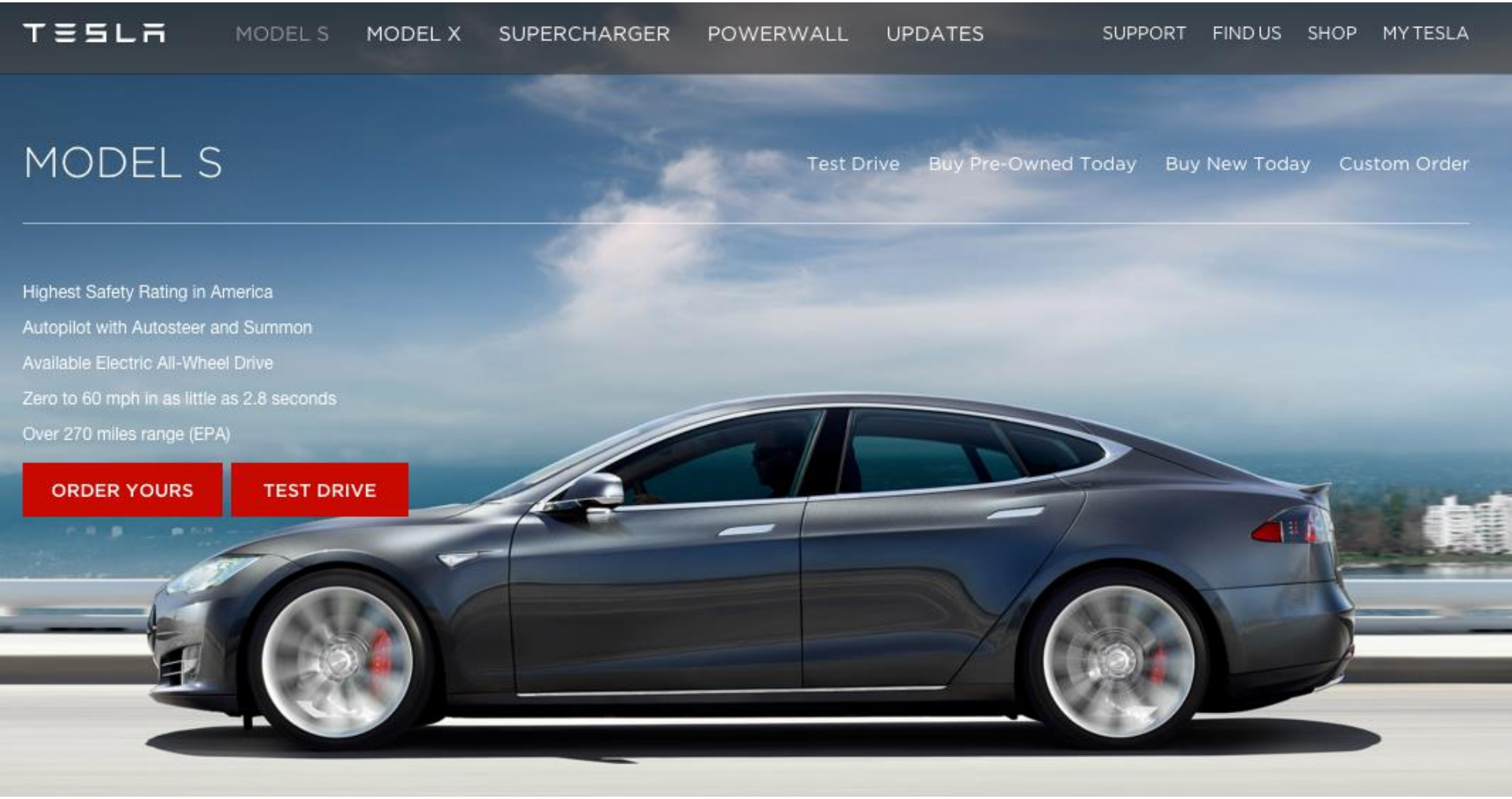
gartner.com/SmarterWithGartner

Source: Gartner

© 2020 Gartner, Inc. and/or its affiliates. All rights reserved. Gartner and Hype Cycle are registered trademarks of Gartner, Inc. and its affiliates in the U.S.

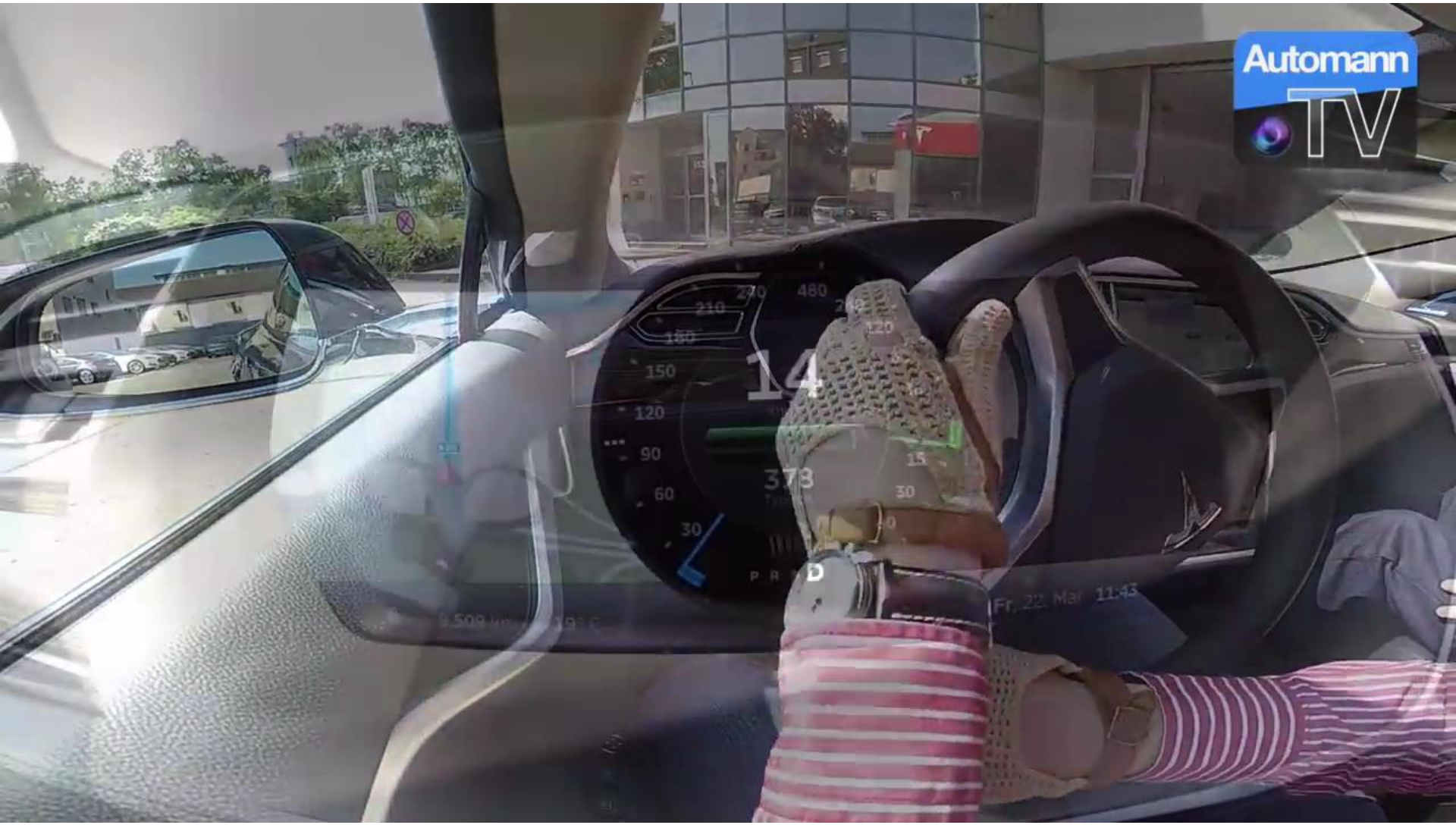
Gartner

Electric vs. Petrol engine in automotive



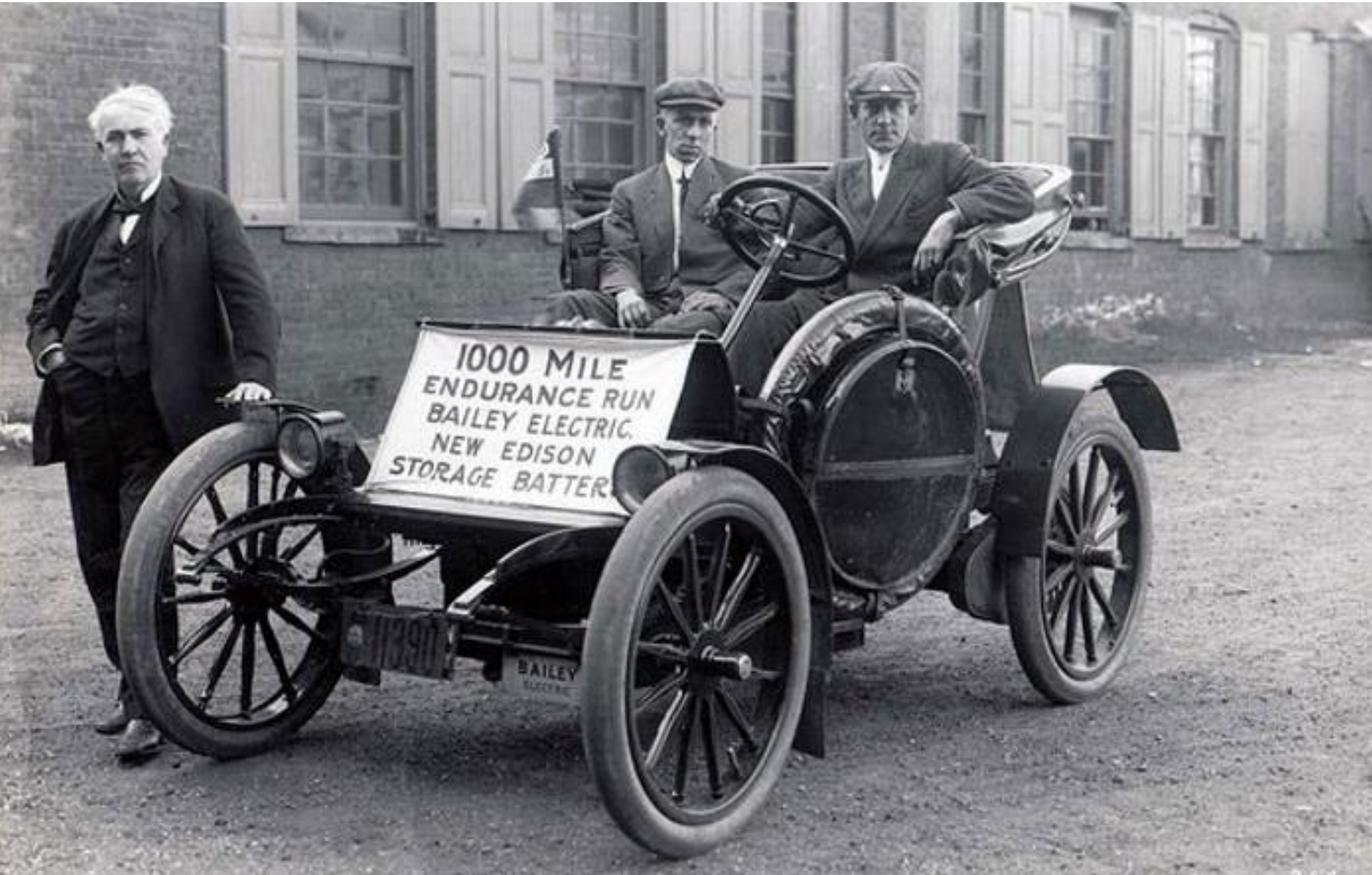
© POLITECNICO DI MILANO

Electric vs. Petrol engine in automotive



© POLITECNICO DI MILANO

Electric vs. Petrol engine in automotive



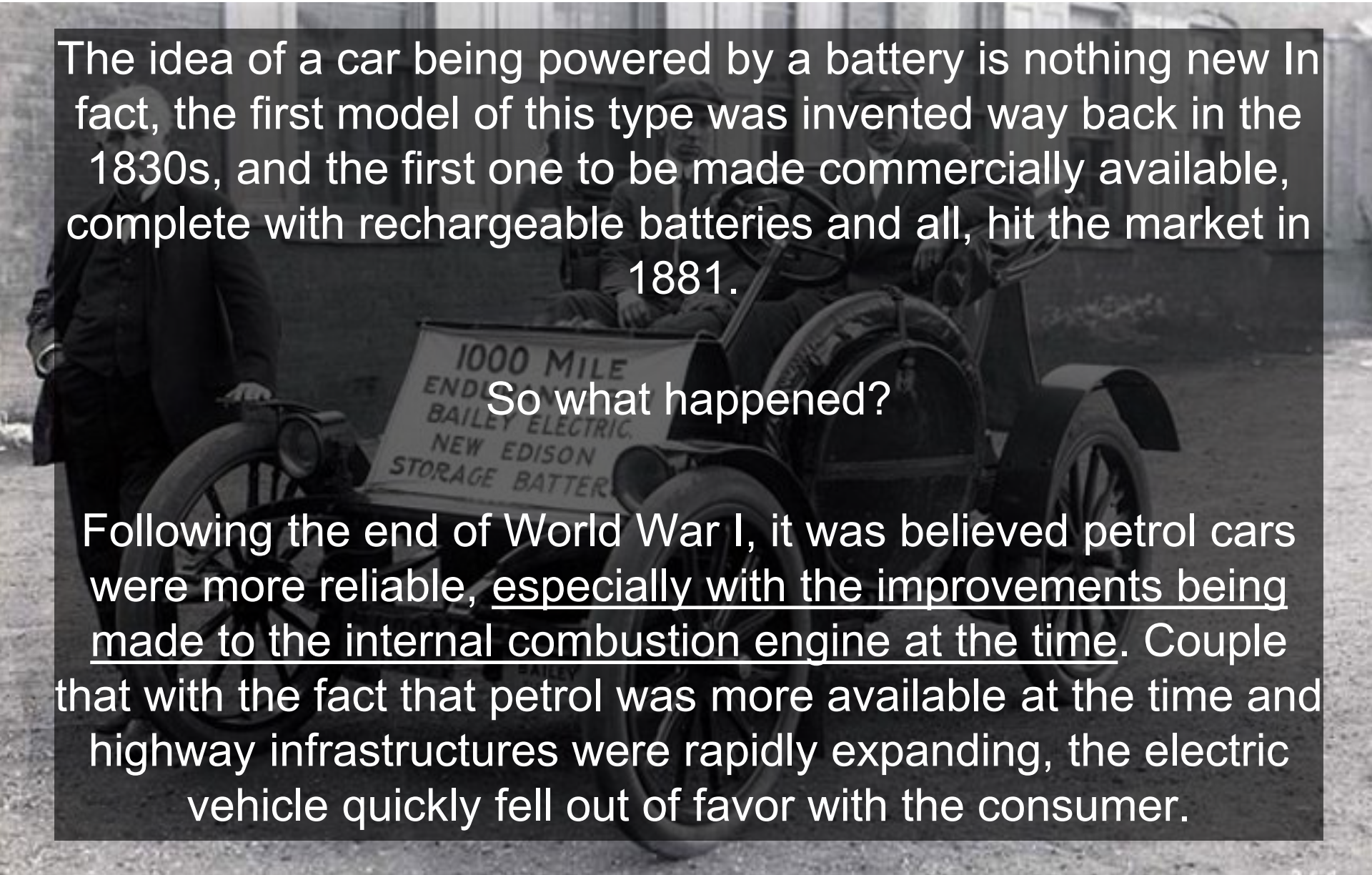
Respond at **PollEv.com/mcorso**

Why do we have petrol cars instead of electric ones even if the latter are a lot more efficient?

No responses received yet. They will appear here...

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

Electric vs. Petrol engine in automotive

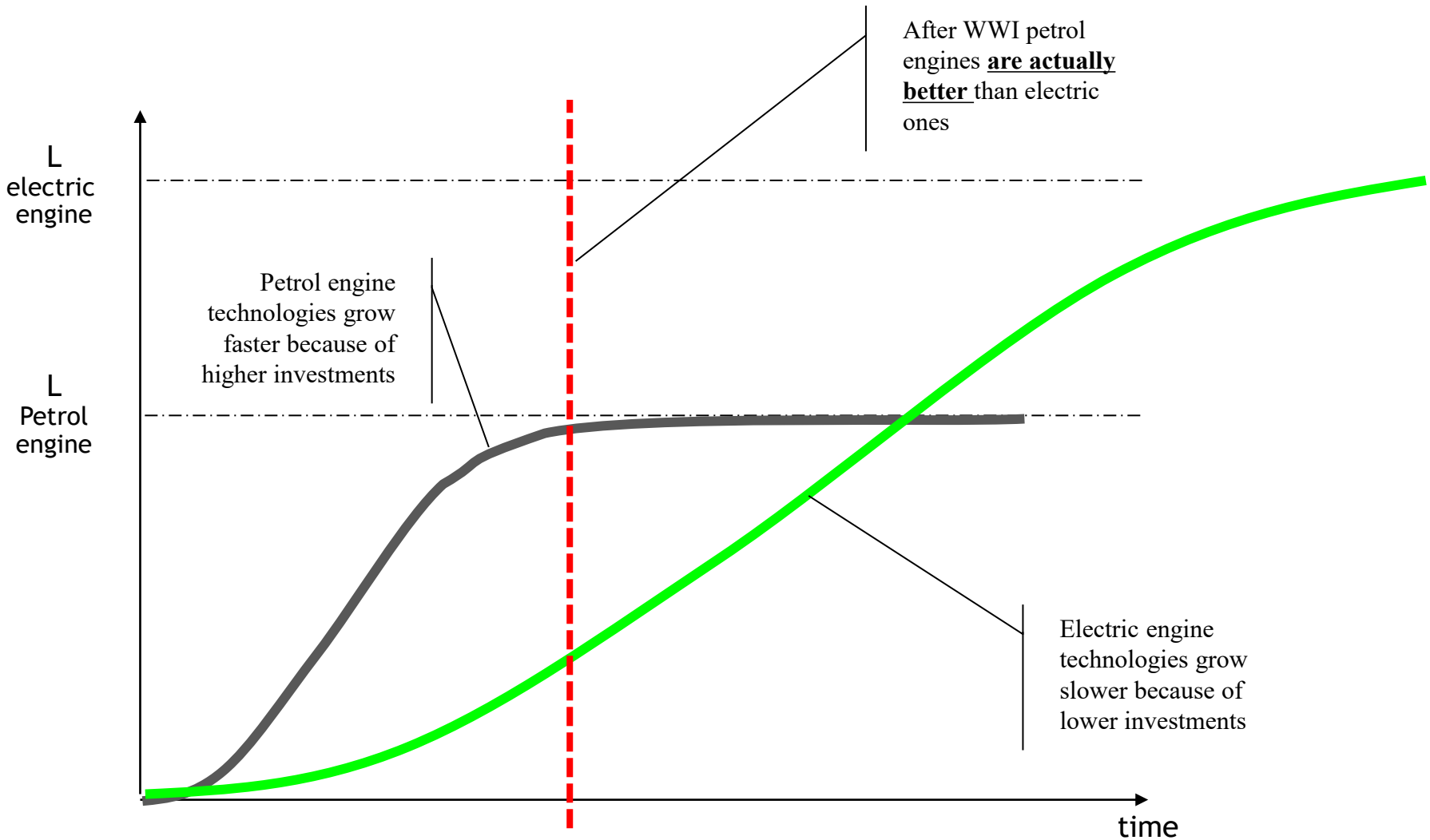


The idea of a car being powered by a battery is nothing new In fact, the first model of this type was invented way back in the 1830s, and the first one to be made commercially available, complete with rechargeable batteries and all, hit the market in 1881.

So what happened?

Following the end of World War I, it was believed petrol cars were more reliable, <u>especially with the improvements being made to the internal combustion engine at the time</u>. Couple that with the fact that petrol was more available at the time and highway infrastructures were rapidly expanding, the electric vehicle quickly fell out of favor with the consumer.

Electric vs. Petrol engine in automotive



© POLITECNICO DI MILANO

Riepilogo mercato > Tesla

809,87 USD

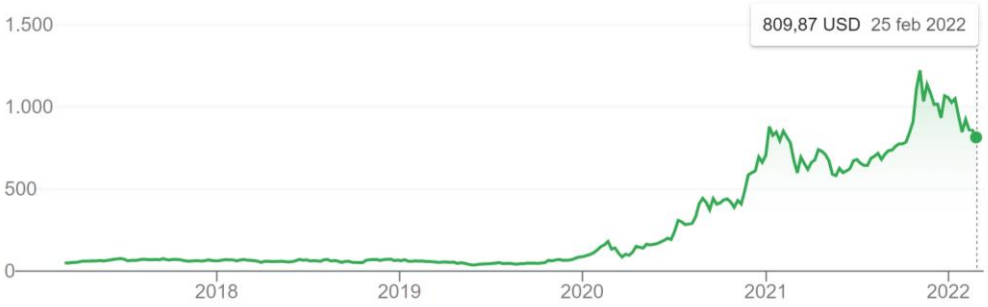
NASDAQ: TSLA

+759,56 (1.509,76%) ↑ ultimi 5 anni

+ Segui

Chiuso: 25 feb, 19:59 GMT-5 • Limitazione di responsabilità
After hours 811,10 +1,23 (0,15%)

1G | 5G | 1M | 6M | YTD | 1A | 5A | Max



Riepilogo mercato > Ford

17,83 USD

NYSE: F

+5,18 (40,95%) ↑ ultimi 5 anni

+ Segui

Chiuso: 25 feb, 19:59 GMT-5 • Limitazione di responsabilità
After hours 17,77 −0,060 (0,34%)

1G | 5G | 1M | 6M | YTD | 1A | 5A | Max

Innovation Markets' Dynamics

© POLITECNICO DI MILANO

Innovative Markets dynamics

Technology push, market pull innovation

Product, process innovation

Radical, incremental innovation

How do they interact?

© POLITECNICO DI MILANO

Typewriter case: birth of an industry

1866 Mr. Sholes (a mechanical Engineer form Milwaukee) creates the first TYPEWRITER by combining (brokering) existing technologies:

- Forward movement (one step for each pressed key): from watches
- Back movement leverage: from sewing machines
- Keyboard: from telegraphs
- Hammer mechanical movements for printing each letter: from Piano

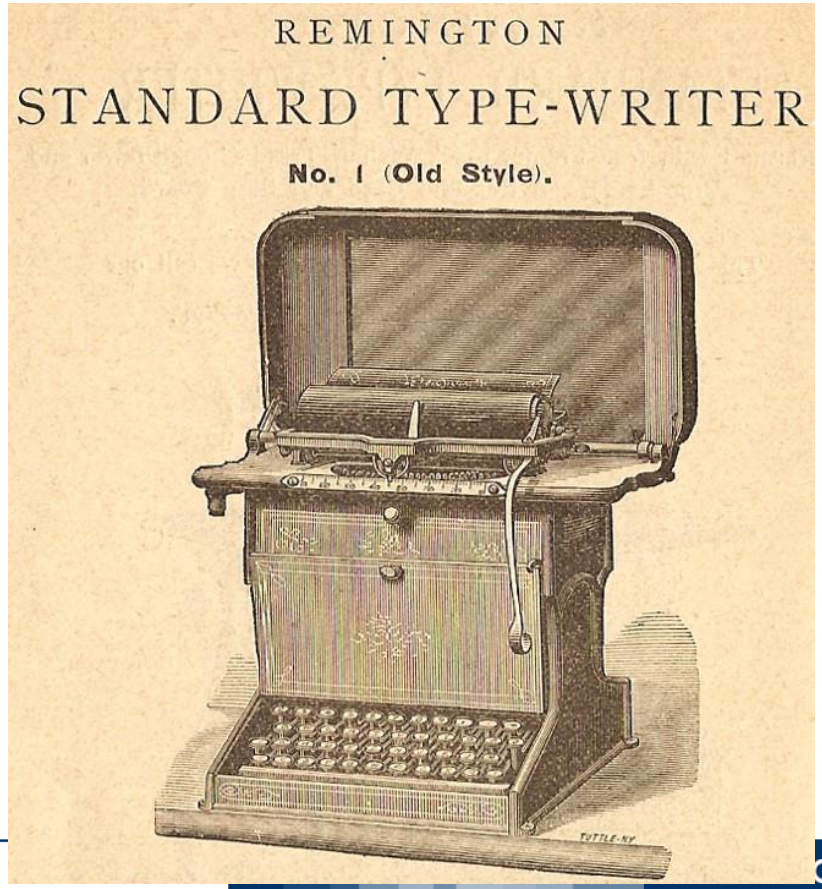
1873: Remington (weapon producer looking for diversifying) buys the exclusive license

© POLITECNICO DI MILANO

Typewriter case: first Remington products

Remington N°1 (1874):

- Hammers hit the paper inside the typewriter body
- Only upper-case letters
- Hard to use (75 words/min., handwriting 30 words/min., stenography 70 words/min.)
- 4000 units sold



Typewriter case: first Remington products

Remington N° 2 (1878):

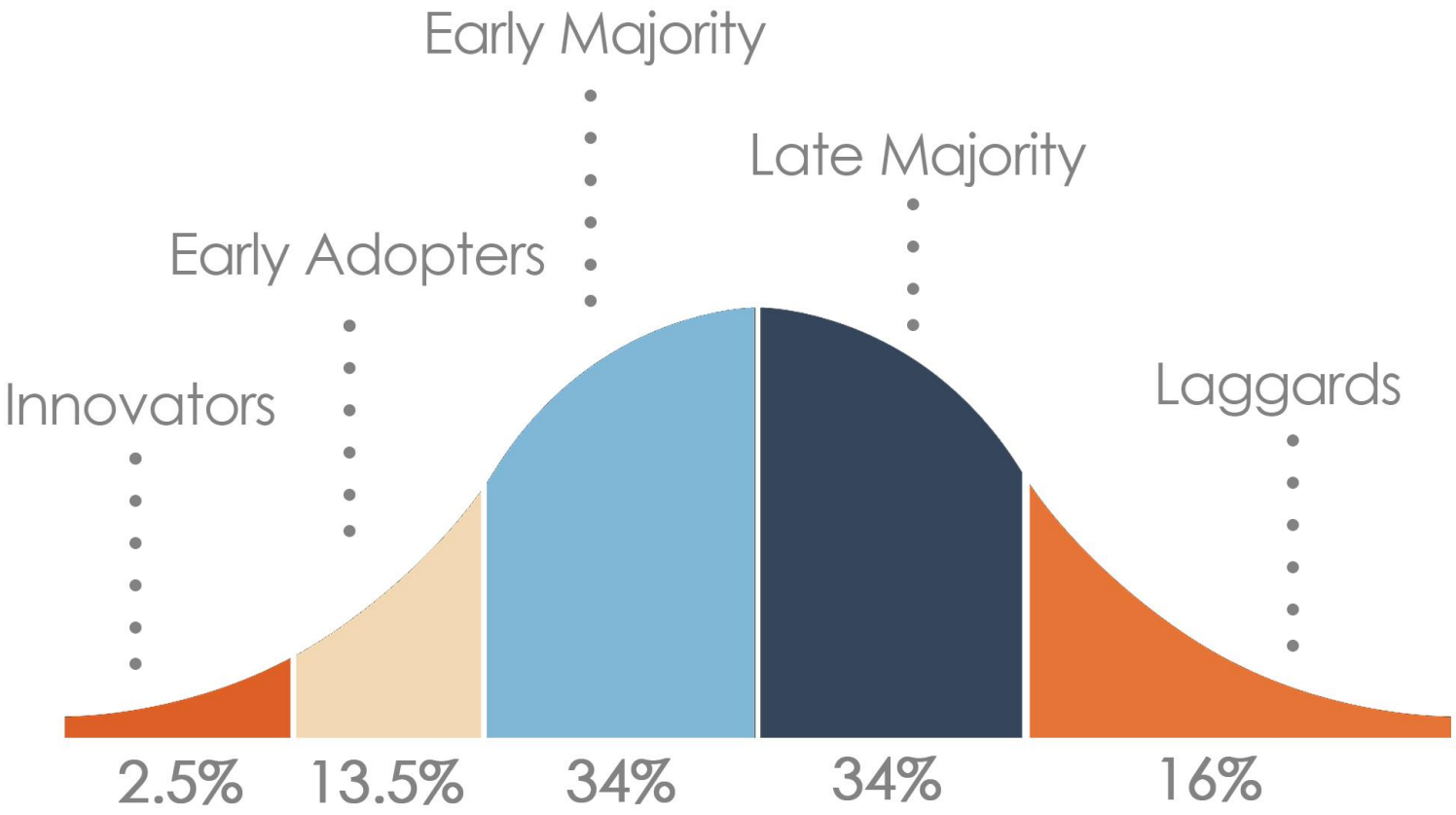
- Upper and Lower case letters (shift key)
- 100,000 units sold

Why Remington 2 sold units was much higher to Remington 1 (100,000) compared to (4,000)?

Top

No responses received yet. They will appear here...

Rogers Diffusion of Innovation



© POLITECNICO DI MILANO

Rogers Diffusion of Innovation

Innovators

- Innovators are willing to take risks, have the **highest social status**, have financial liquidity, are social and have closest contact to scientific sources and interaction with other innovators. Their risk tolerance allows them to adopt technologies that may ultimately fail. Financial resources help absorb these failures.

Early adopters

- These individuals have the **highest degree of opinion leadership** among the adopter categories. Early adopters have a higher social status, financial liquidity, advanced education and are more socially forward than late adopters. **They are more discreet in adoption choices than innovators**. They use judicious choice of adoption to help them maintain a central communication position.

Early Majority

- They adopt an innovation after a varying degree of time that is significantly longer than the innovators and early adopters. **Early Majority have above average social status**, contact with early adopters and **seldom hold positions of opinion leadership** in a system.

Late Majority

- They adopt an innovation after the average participant. These **individuals approach an innovation with a high degree of skepticism** and after the majority of society has adopted the innovation. Late Majority are typically skeptical about an innovation, have below average social status, little financial liquidity, in contact with others in late majority and early majority and little opinion leadership.

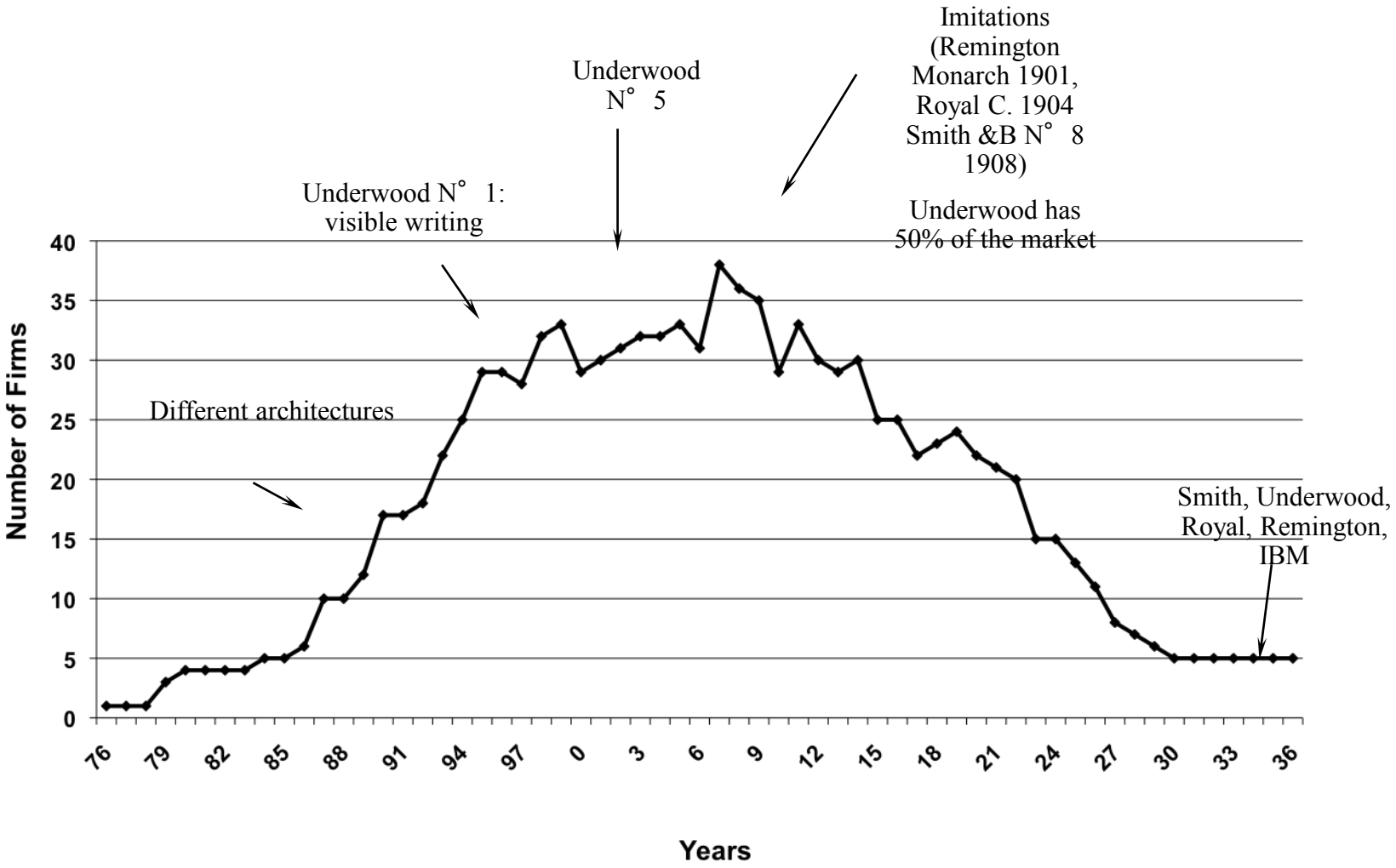
Laggards

- They are the last to adopt an innovation. Unlike some of the previous categories, **individuals in this category show little to no opinion leadership**. These individuals typically have an aversion to change-agents. Laggards typically tend to be focused on "traditions", lowest social status, lowest financial liquidity, oldest among adopters, and in contact with only family and close friends.

© POLITECNICO DI MILANO

NIAGARA

Competition



From: Utterback (1994)

© POLITECNICO DI MILANO

Underwood N°5: Dominant Design

© POLITECNICO DI MILANO

Underwood N°5: Dominant Design

QWERTY Keyboard (Remington) STANDARD

Hammer mechanical movement (Remington N°1)

Upper/lower case letters and Shift key (Remington N°2)

Visible writing (Underwood N°1)

Tab key (Underwood N°5)

"The dominant design product has features that competitors and innovators must adhere if they hope to command significant market share following"

From: Utterback (1994)

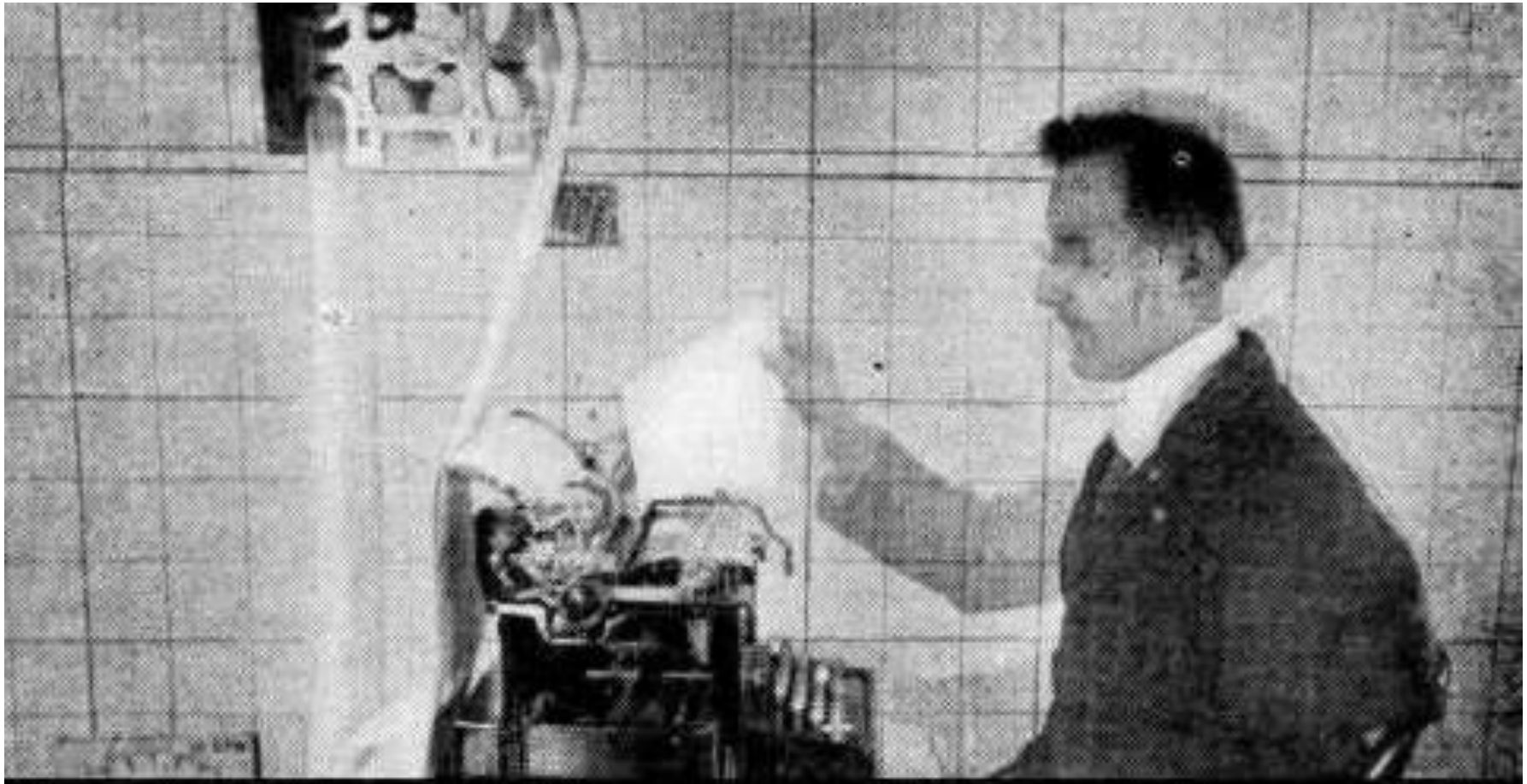
© POLITECNICO DI MILANO

Respond at **PollEv.com/mcorso**

Letters on QWERTY keyboard are distributed to serve a purpose. what that purpose is?

No responses received yet. They will appear here...

Dvorak Keyboard



Gilbreth *Motion Study for the Handicapped* London: Geroge Routledge & Sons, 1920

© POLITECNICO DI MILANO

VHS-Betamax

Beta

VHS

VHS vs β

© POLITECNICO DI MILANO

Respond at **PollEv.com/mcorso**

How could VHS win against BetaMax?

No responses received yet. They will appear here...

Dominant Design

It is the architecture winning on the market

- Winning architecture able to **summarize innovations introduced by previous products**
- **Archetype of the product** in both the designer and the user imagination
- It gives an answer to the need of a **large number of people**
- It **reduces the number of requirements** to be satisfied
- It may imply **constraints**
- It normally **freezes the socio-economic context**

© POLITECNICO DI MILANO

How does the DD emerge

Different technology opportunities (different architectures)

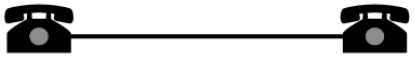
Hardly one outperforms the others along each possible performance

Driver:

- Complementary assets: distribution, brand, services, capacity…
- Strategic Manouvering (e.g. externalities)
- Better understand of the customer needs
- Rules and laws

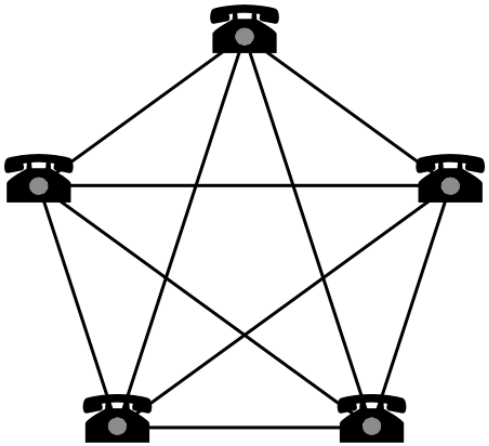
© POLITECNICO DI MILANO

Networks effects in Technology based Innovation



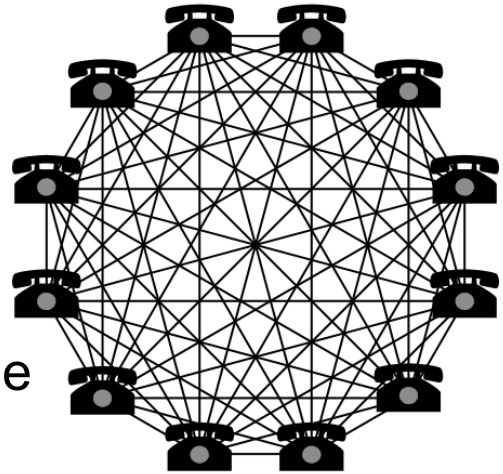
Metcalfe's Law

- Number of unique connections=n*(n-1)/2



Network Externalities

- Network externalities are the effects on a user of a product or service of others using the same or compatible products or services. Positive network externalities exist if the benefits are an increasing function of the number of other users



Lock-in effect

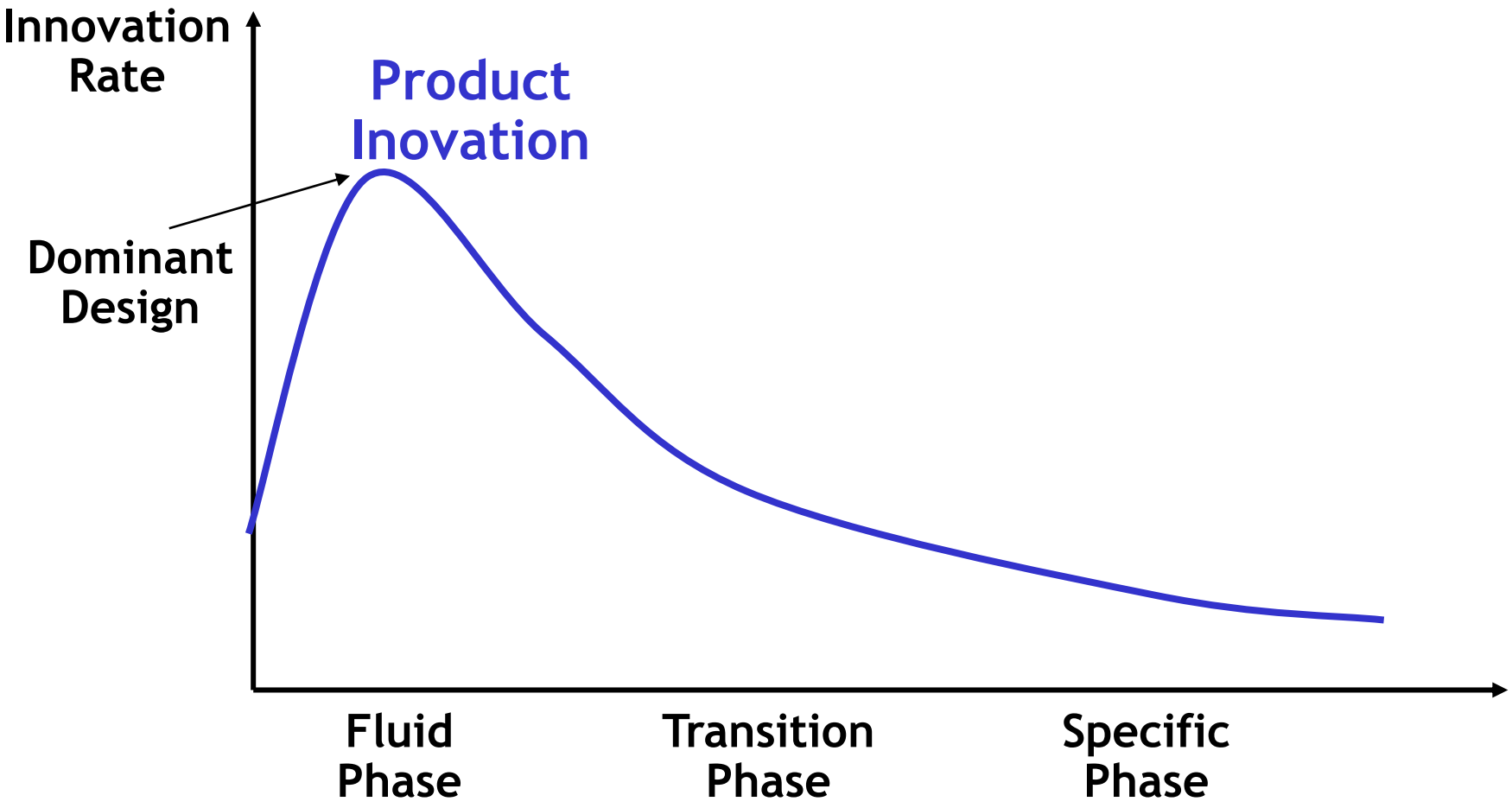
- When the cost for switching is higher than the benefit

Critical mass-bandwagon effect

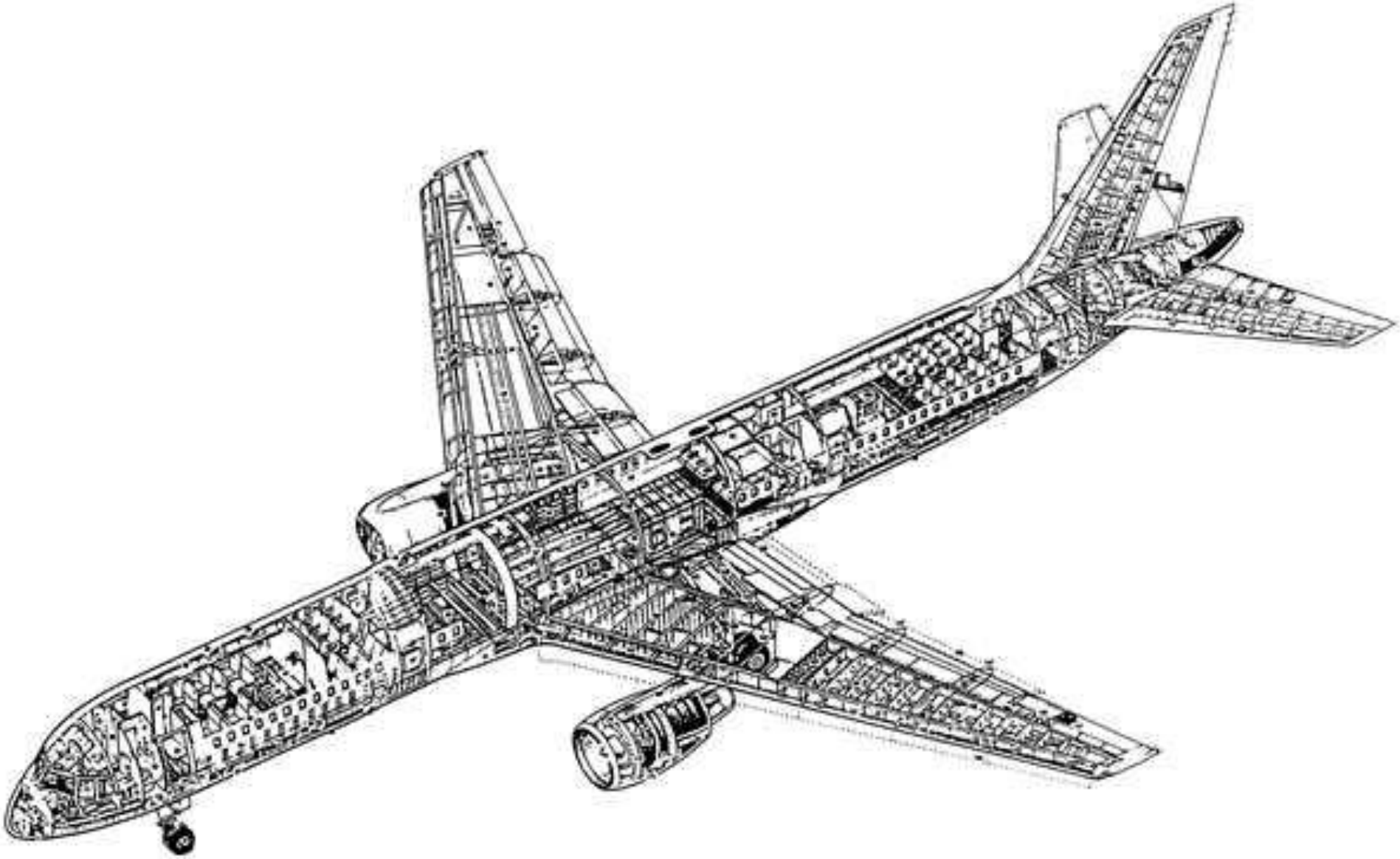
- When the benefit from externalities outperforms the benefit from product usage

© POLITECNICO DI MILANO

Innovation dynamics: Abernathy-Utterback

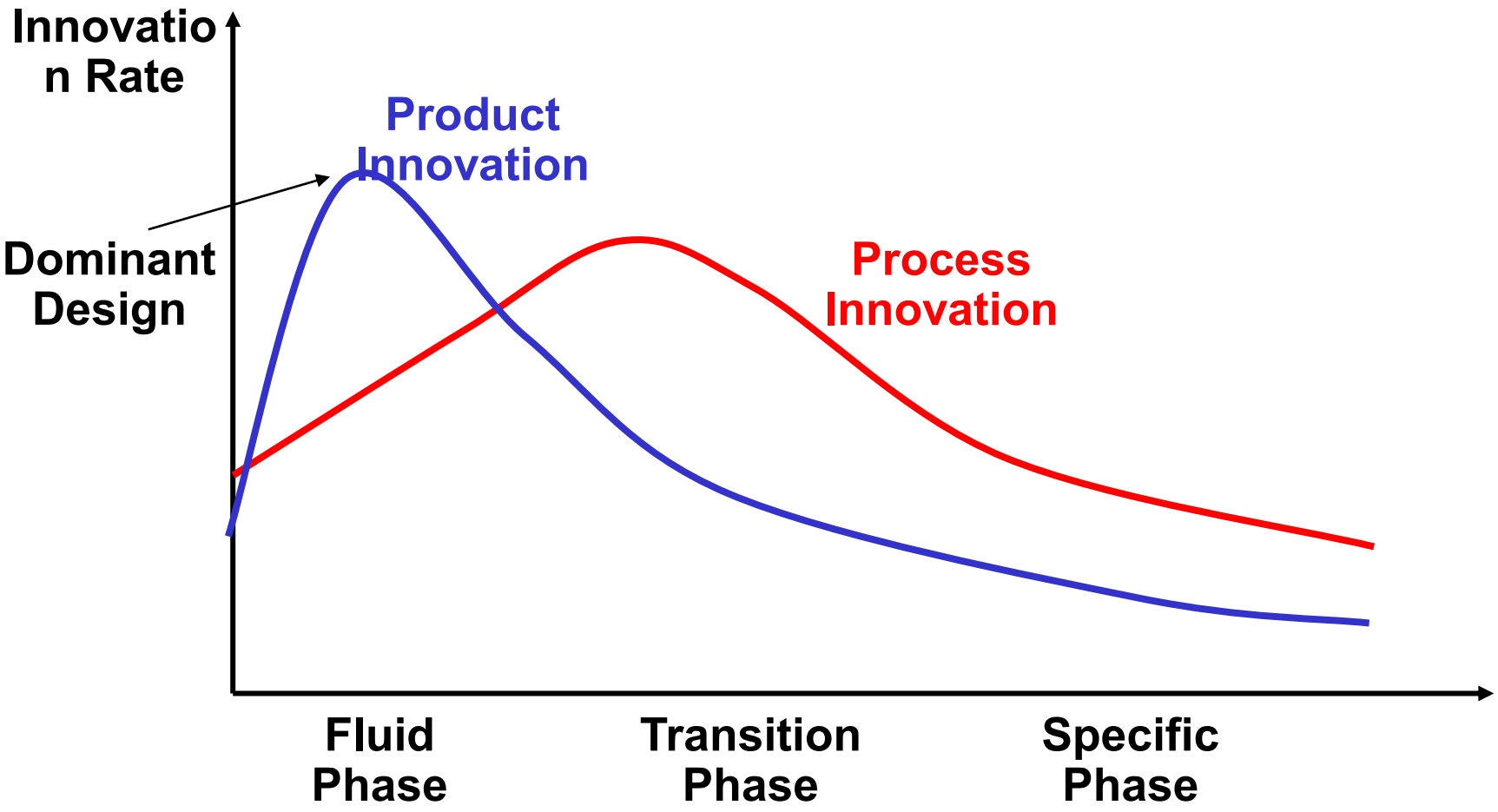


© POLITECNICO DI MILANO



© POLITECNICO DI MILANO

Innovation dynamics: Abernathy-Utterback



© POLITECNICO DI MILANO

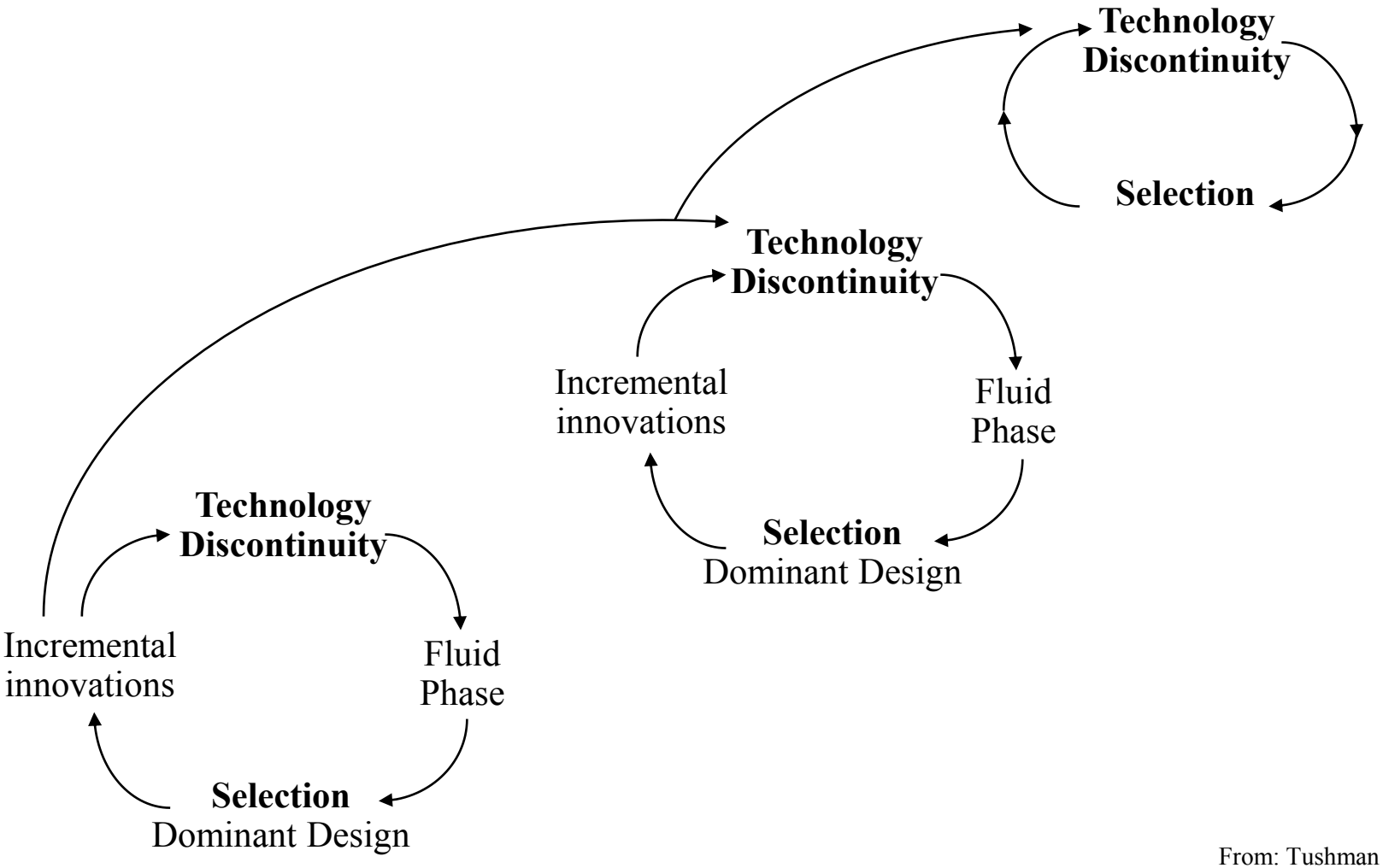
Innovation and competition dynamics

	Fluid Phase	Transition Phase	Specific Phase
Product	Different architectures	Dominant Design	Standard products
Process	Qualified Manpower, general purpose equipment	More rigid equipment	Unskilled manpower and automated equipment
Organization	Organic	Projects, Teams	Hierarchical based
Competition	Functions and performances	Performances, customization, price	Price
Competitors	Many SMEs	Concentration	Oligopoly
Innovation	Radical on products	Radical on Processes	Incremental
Innovation surces	New Entrants and lead Users	Firms and users	suppliers

From: Utterback (1994)

© POLITECNICO DI MILANO

A cyclic model for Innovation

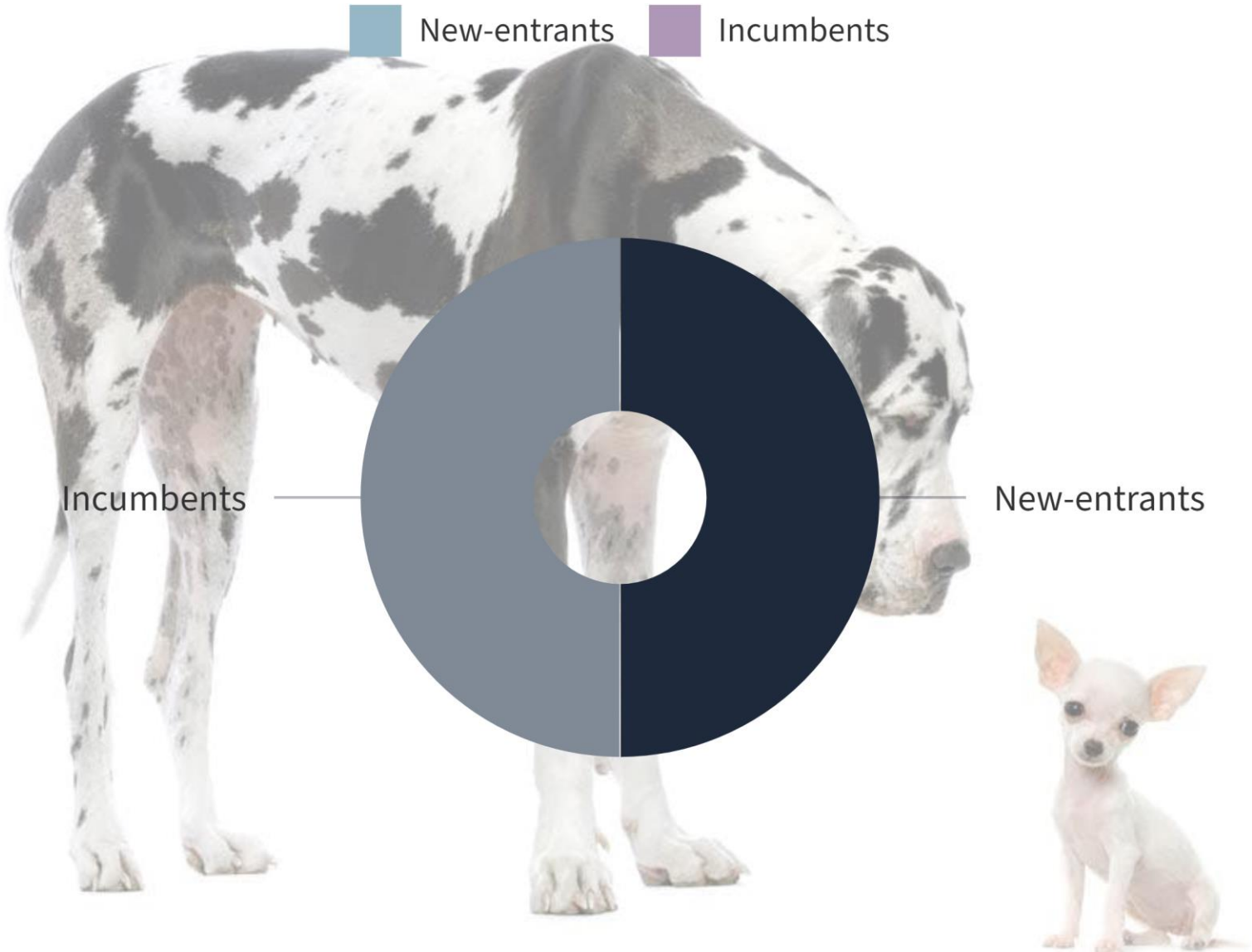


From: Tushman *et al.* (1997)

© POLITECNICO DI MILANO

Respond at **PollEv.com/mcorso**

Who introduces the radical innovation more often: Incumbents or the New-entrants?



Who introduces radical innovations?

Valve (RCA, GE, Philco)

Transistor (Motorola, Fairchild, TI): none of the former top ten

Processors (Intel, AMD, STM)

Typewritiers: Remington (weapon)

Electric Typewriter: IBM (No Remington)

PC: Apple (No IBM)

© POLITECNICO DI MILANO

Respond at **PollEv.com/mcorso**

Why is it more difficult for incumbents to do innovation?

No responses received yet. They will appear here...

Incumbent Curse

WHY ARE RADICAL INNOVATIONS SO DIFFICULT FOR THE INCUMBENTS ?

Marginal Costs (path dependency)

Uncertainty about feasibility and profits

Over estimation of the technology potential (technology Myopia)

Innovation implies change management

INCUMBENT REACTION

Olivetti and Wang

© POLITECNICO DI MILANO

Wang 1200 (1974) and Olivetti ET2500 (1988) Typewriters

© POLITECNICO DI MILANO

Incumbent Curse VS First Mover DISADVANTAGES

Research and Development Expenses

Undeveloped Supply and Distribution Channels

Immature Enabling Technologies and Complements

Uncertainty of Customer Requirements

Product	First Mover	Notable Follower(s)	The Winner
8-mm video camera	Kodak	Sony	Follower
Disposable diaper	Chux	Pampers Kimberly Clark	Followers
Float glass	Pilkington	Corning	First mover
Groupware	Lotus	AT&T	First mover
Instant camera	Polaroid	Kodak	First mover
Microprocessors	Intel	AMD Cyrix	First mover
Microwave	Raytheon	Samsung	Follower
Personal computer	MITS (Altair)	Apple IBM	Followers
Personal computer operating system	Digital Research	Microsoft (MS-DOS)	Follower
Smartphones	IBM (Simon)	Apple Nokia	Followers
Social networking sites	SixDegrees.com	MySpace Facebook	Followers
Spreadsheet software	VisiCalc	Microsoft (Excel) Lotus	Followers
Video game console	Magnavox	Atari Nintendo	Followers
Web browser	NCSA Mosaic	Netscape Microsoft (Internet Explorer)	Followers
Word processing software	MicroPro (WordStar)	Microsoft (MS Word) WordPerfect	Followers
Workstation	Xerox Alto	Sun Microsystems Hewlett-Packard	Followers

© POLITECNICO DI MILANO

Disruptive Innovation
(Christensen and Rosembloom, 1995)

14” disk drives dominated the market

- large storage for mainframe computers. Could hold a lot of data

© POLITECNICO DI MILANO

Disruptive Innovation
(Christensen and Rosembloom, 1995)

8-, 5.25-, 3.5-, 2.5-, 1.8- and 1-inch HDDs

© POLITECNICO DI MILANO

Disruptive Innovation
(Christensen and Rosembloom, 1995)

8” drives next generation, based on similar technology, similar architecture, similar organizational capabilities

- yet, companies that dominated 14” market failed to transition to 8”

why?

- they looked at 8” as inferior to 14”
- their customers (mainframe computer makers) had no interest in 8” because 8” had less storage capacity
- But, 8” drivers were VERY much of interest to the emerging market of MINI-COMPUTER MAKERS

Over time, the 8” drives developed all the storage capacity of 14” drives, and drove them out of the market

© POLITECNICO DI MILANO

Disruptive Innovation
(Christensen and Rosembloom, 1995)

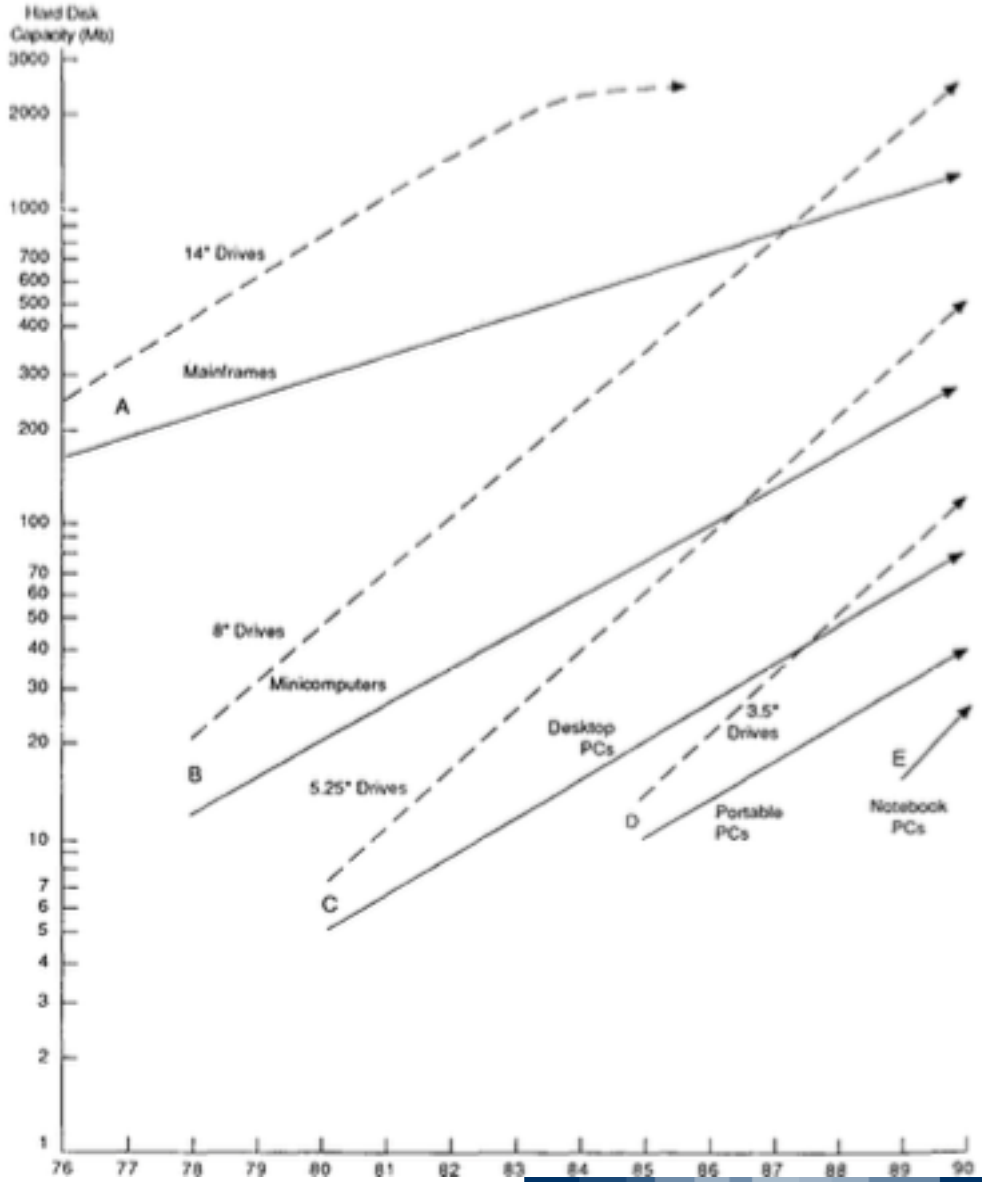
5.25” drives: story repeats

- the 8” players miss the transition
- 5.25” drives lacked the capacity of 8” drives, viewed as inferior (in terms of storage)
- because minicomputer makers were not interested in buying these, the established disk drive suppliers were not interested in making them
- however, there WAS a market: the new PC makers wanted 5.25” disk drives because they were smaller
- and new suppliers entered to fill the needs of that market

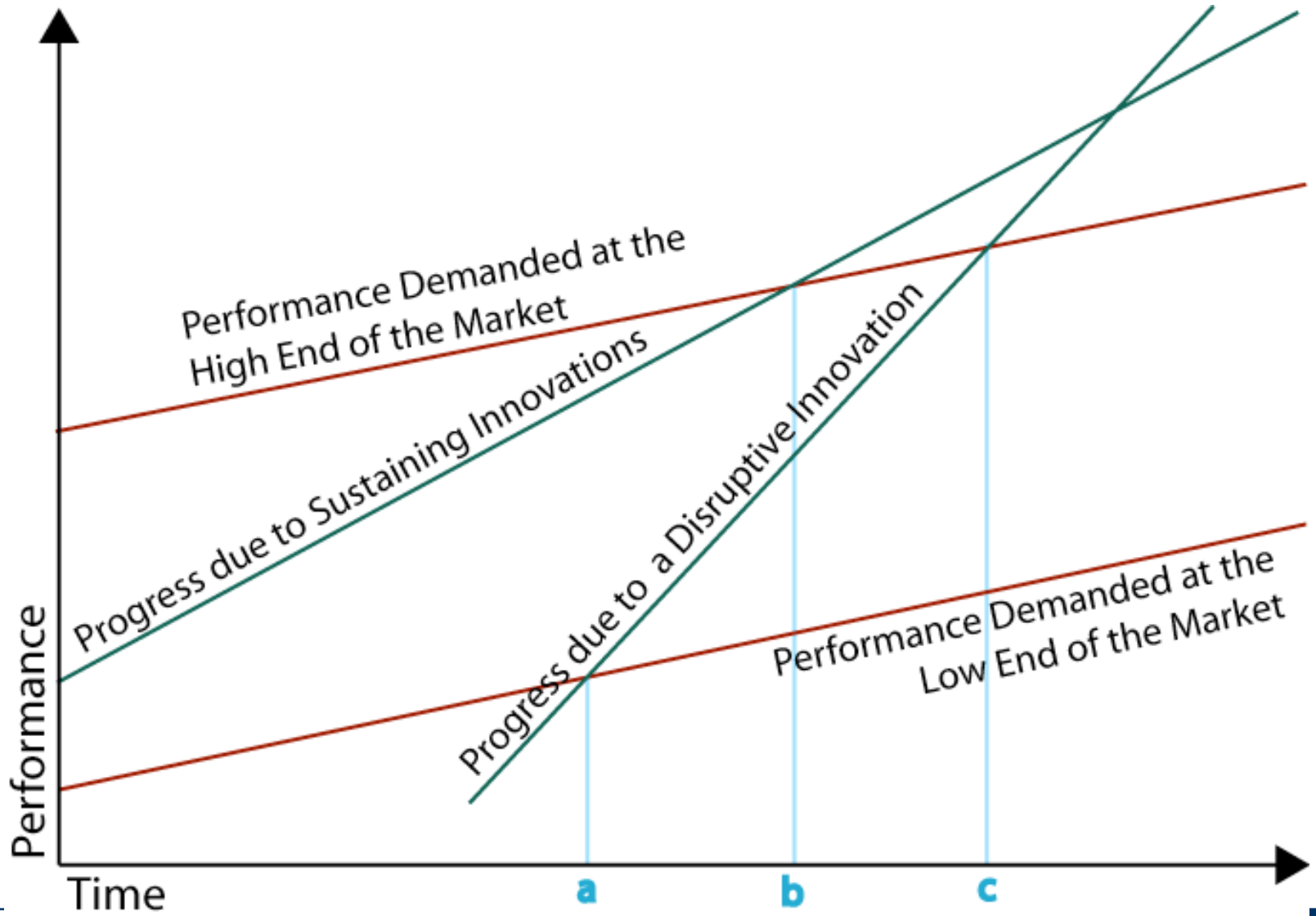
Eventually, the 5.25” drives improved enough so that their capacity matched and surpassed 8” drives

© POLITECNICO DI MILANO

Disruptive Technologies
(Christensen and Rosembloom, 1995)



Disruptive Technologies
(Christensen and Rosembloom, 1995)



© POLITECNICO DI MILANO

A few key points on disruptive innovation

Disruption is a process

Disrupters often build business models that are very different from those of incumbents.

Some disruptive innovations succeed; some don't.

The mantra "Disrupt or be disrupted" can misguide us

© POLITECNICO DI MILANO

Respond at **PollEv.com/mcorso**

What can incumbents do to save their business from a disruptive innovation?

No responses received yet. They will appear here...

Bibliography

- Christensen, C., Raynor, M. and McDonald, R. " What Is Disruptive Innovation?" Harvard Business Review (2015) https://hbr.org/2015/12/what-is-disruptive-innovation
- Downes, L. and Nunes, P. " Big-Bang Disruption" Harvard Business Review (2013) https://hbr.org/2013/03/big-bang-disruption
- Tushman, M. L., Anderson, P. C., & O'Reillly, C. (1997). Technology cycles, innovation streams, and ambidextrous organizations: organization renewal through innovation streams and strategic change. Managing strategic innovation and change , 3-23.

Further readings

- Christensen, C. (2013). *The innovator's dilemma: when new technologies cause great firms to fail*. Harvard Business Review Press.
- Downes, L., and Nunes, P. (2014). *Big bang disruption: Business survival in the age of constant innovation*. Penguin UK.

© POLITECNICO DI MILANO

Leadership & Innovation

2023/2024

Leadership and Innovation of Meaning

Emilio Bellini

LEADIN' LAB – Leadership Design and Innovation Laboratory

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

LEADIN'LAB
LEAdership Design and Innovation Lab

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

FOUNDERS

Emilio Bellini

Tommaso Buganza

Claudio Dell'Era

Roberto Verganti

CORE TEAM

Daniel Trabucchi

Stefano Magistretti

Paola Bellis

Federico Artusi

Camilla Barone

Silvia Castellazzi

Silvia Magnanini

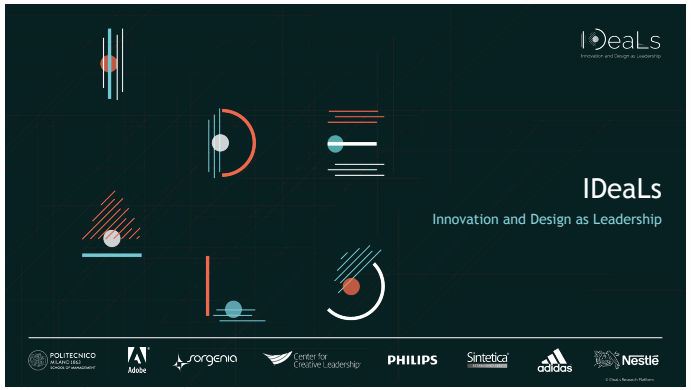
Cristina Pham

Alessandro Sala

Federico Zasa

Diletta Di Marco

Alessandro Biffi

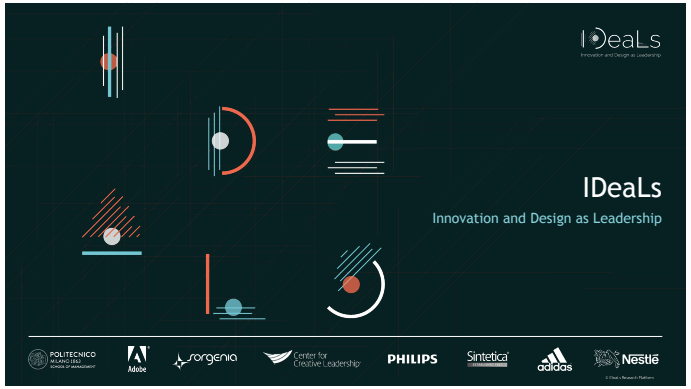


Thesis with Leadin'Lab

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

If you wish to continue exploring the topics of this course you can consider to take do your thesis within our research group:

https://leadinlabtheses.wordpress.com/



Authorized Dealer

STMicroelectronics

WINDTRE

MEDIASET

ORACLE

KERING

sorgenia YOUR NEXT ENERGY

PRADA MILANO

GUCCI

CISCO

ALFA ROMEO

3M

APOTECA NATURA

la Feltrinelli

vodafone

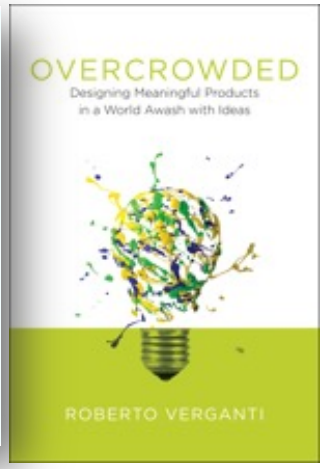
ALIDAYS

moneyfarm

PRACTICE

LEADIN'Lab -Research and Practice in "Service and CX Innovation" 2010-2024

RESEARCH



Partners

Supported by

PRADA Group

Designing an Omni-Experience to Save Retailing

Lessons from an Italian Book Retailer*Retailers can achieve competitive advantage by creating an omni-experience, a novel customer experience innovation strategy.*

Federico Artusi, Emilio Bellini, Claudio Dell'Era & Roberto Verganti

ARTICLE

Check for updates

From vision to innovation: new service development through front-line employee engagement

Federico Artusi and Emilio Bellini

Department of Management, Economics and Industrial Engineering, Politecnico Di Milano, Milan, Italy

ARTICLE

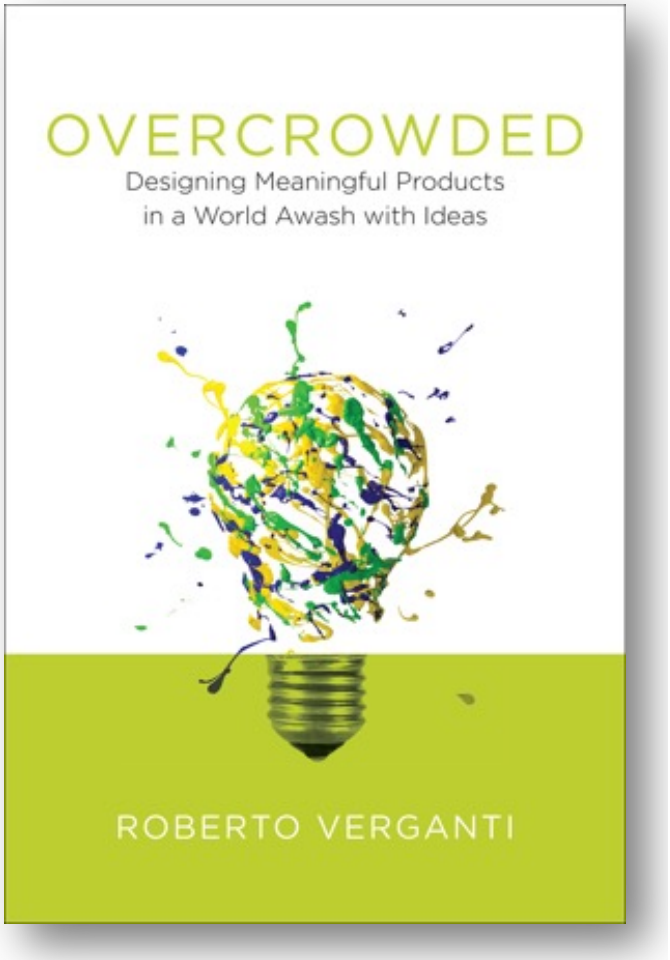
Design and the customer experience: The challenge of embodying new meaning in a new service

Federico Artusi | Emilio Bellini

The Metacognition Underlying Radical Business Model Innovation: Four Case Studies of Individual Criticism

Emilio Bellini and Silvia Castellazzi

LEADIN'LAB - REFERENCES



Agenda

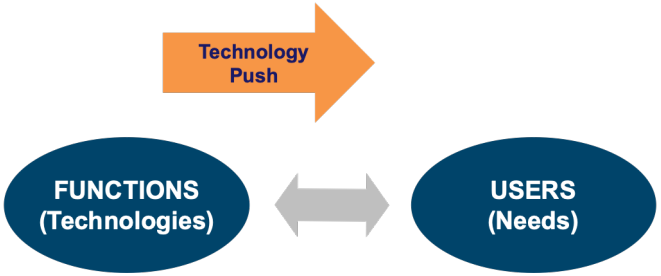
POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

- Innovation of Meaning and Value Creation
- Technology Epiphanies
- Leadership and Innovation of Meaning: the Process
- Leadership and Innovation of Meaning: the Principles

Innovation Strategies

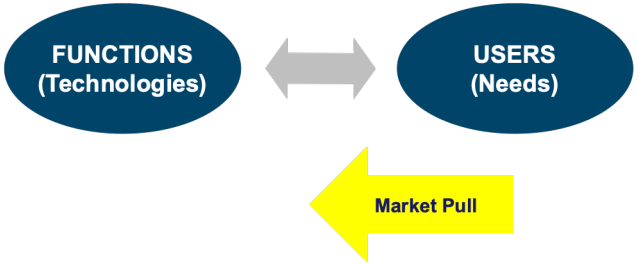
POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

Technology Push



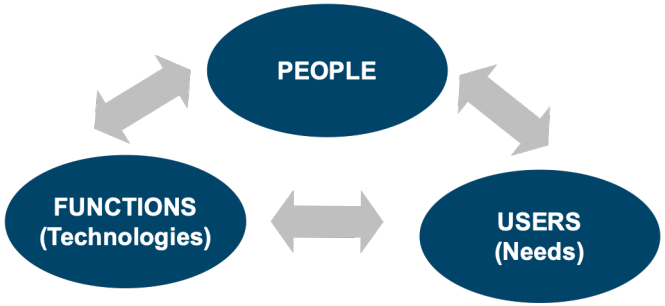
Process driven by **scientific or technological competencies**
Product/process innovation that typically revolve around the **physical attributes** of the product

Market Pull



Innovations that typically **involve the way in which the product is commercialized** in terms of organization, distribution and/or advertising:
•Product presentation
•Distribution channel innovations
•Incremental product performance innovations
•Sales process innovations...

Design Driven



Process driven **socio-cultural and semantic competencies**
Product/process innovation that typically revolve around **intangible attributes** of the product

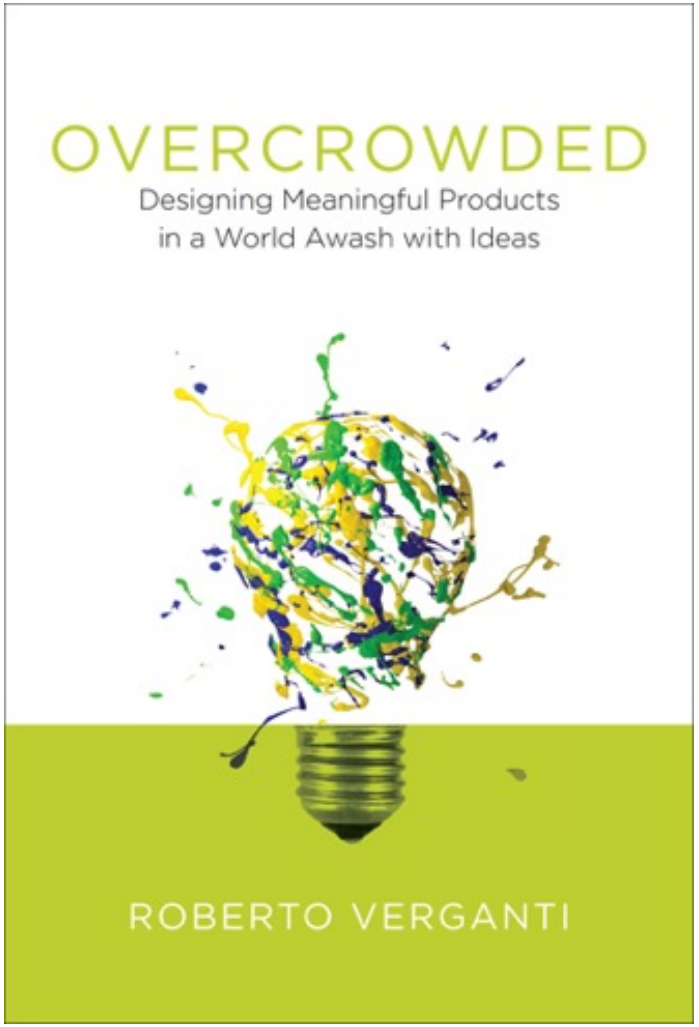


Table of Contents

Series page
Title page
Copyright page
Dedication
A Gift Note
1 Innovation of Meaning
Part I The Value
2 The Search for New Meaning
3 Competing through Meaning
Part II The Principles
4 Innovation from the Inside Out
5 The Art of Criticism
Part III The Process
6 Envisioning
7 The Meaning Factory
8 The Interpreter's Lab
Appendix: New Meanings Are Everywhere
Design Thinking, Design Theory: About the Series
Index

Leadership and Innovation: Problem Setting

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

Innovation Leader

Proposal

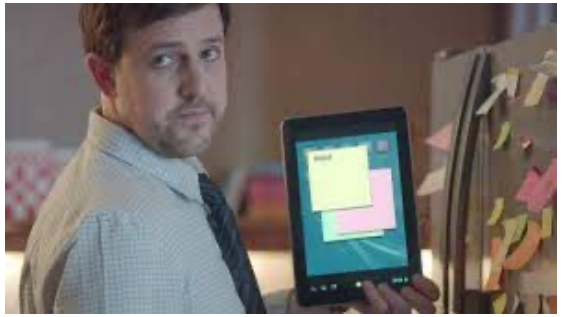
Decision

Organization

Learning with Innovation Leaders

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

The Emma's Husband



Steve Ballmer

Ballmer in 2014

Born	Steven Anthony Ballmer March 24, 1956 (age 63) Detroit, Michigan, U.S.
Nationality	American
Alma mater	Harvard University (AB) Stanford Graduate School of Business
Net worth	US$51.9 billion (October 2019)[1]
Spouse(s)	Connie Snyder (m. 1990)
Children	3
Awards	Legion of Honour[2]

Steve Jobs (and Steve Wozniak)

Benedetto Vigna

Born	22 May 1969 (age 52) Pietrapertosa, Italy
Occupation	Business executive Physicist

Howard Schultz

The L&I Challenge

Innovation Leader

Proposal

Decision

Organization

"What is the Object of their Cognitive Work?"

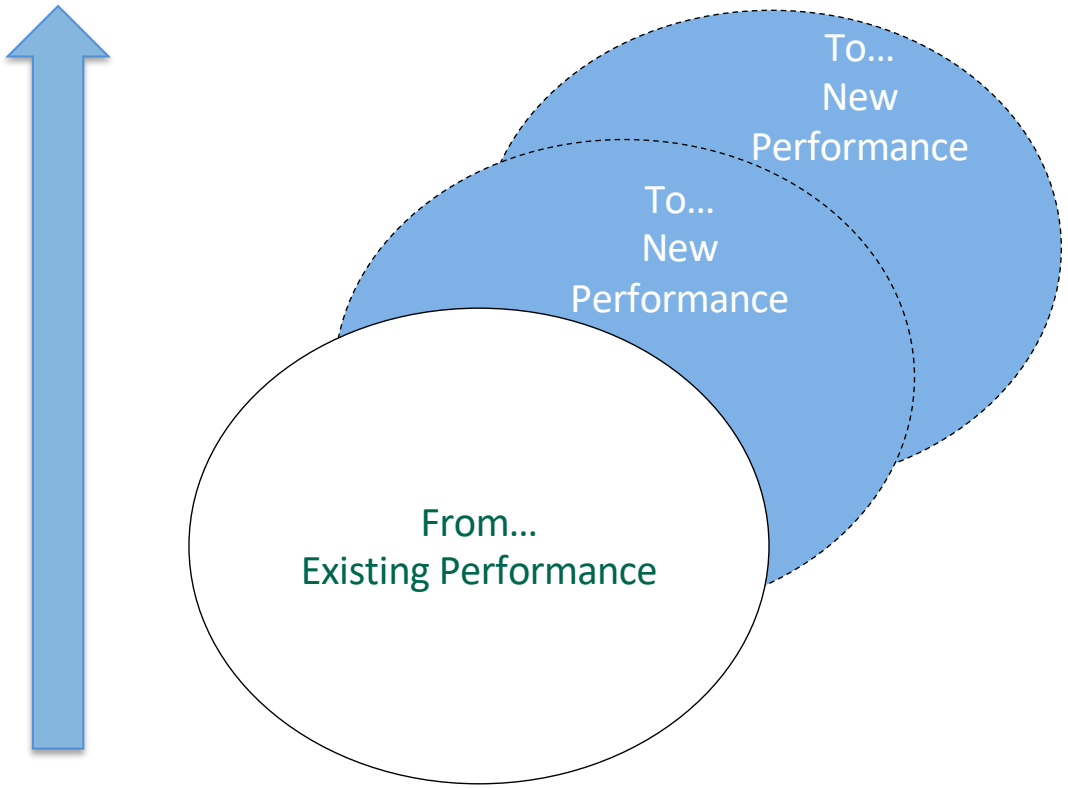
What is innovation?

What are the most significant innovations recently launched on the market?

What is not innovation?

The Challenge of Innovation: Better Performance?

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



Definition of Innovation
(3 Characteristics of Innovation)

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

OECD Oslo Manual (2005)

An Innovation

is the **implementation**

of a **new**

or significantly **improved** product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations

3. Happens

1. Novelty

2. Value

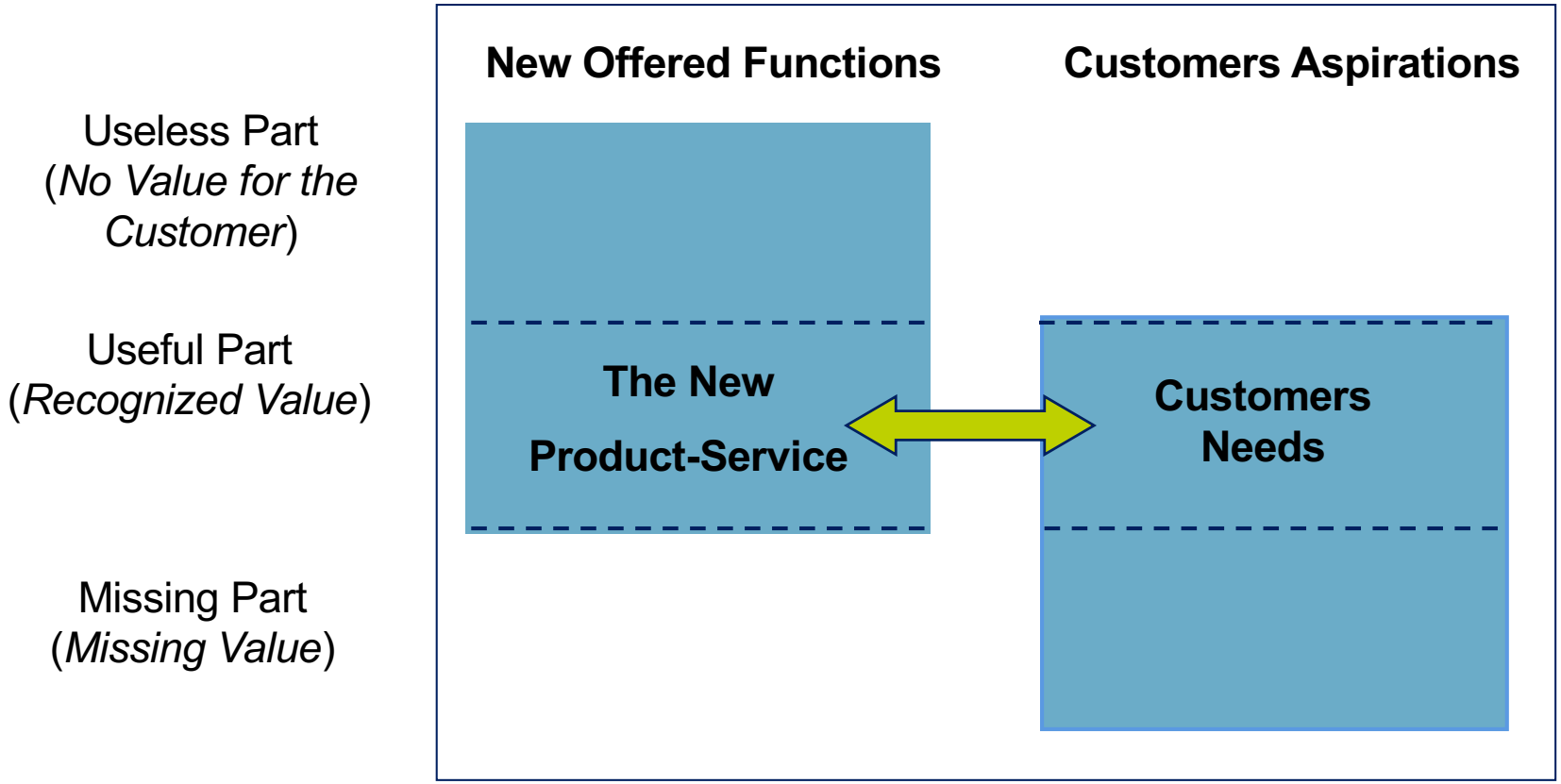
Value for the Innovator/Entrepreneur: Value Creation and Value Capture

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

The profitability of an innovation to the innovator depends on the value created by the innovation and the share of that value that the innovator is able to appropriate (Grant, 1996)

Value Creation for the User/Customer: Offered Functions, Expected Benefits, Perceived Benefits

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

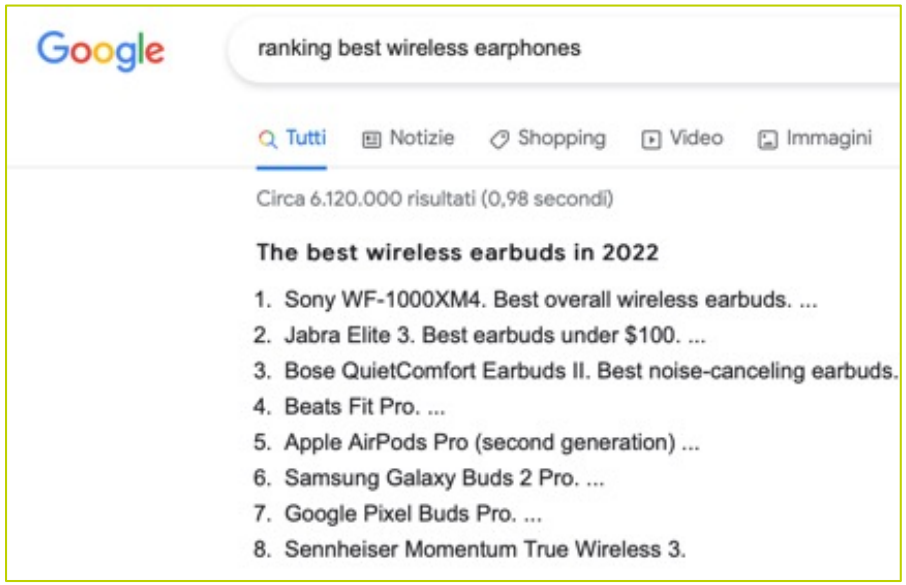


Value: *The extent to which a good or service is perceived by its customer to meet his or her needs or wants, measured by customer's willingness to pay for it.*
It commonly depends more on the customer's perception of the worth of the product than on its intrinsic value.

Apple AirPods

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

1 Best all-round: Samsung Galaxy Buds	**2** Best sounding: Sony WF-1000XM3
3 Best non-isolating: Apple AirPods 2	**4** Best for size: Earin M-2
5 Best for sport: Beats PowerBeats Pro	**6** Best budget option: Creative Outlier Air
7 Runners up	**8** Not recommended

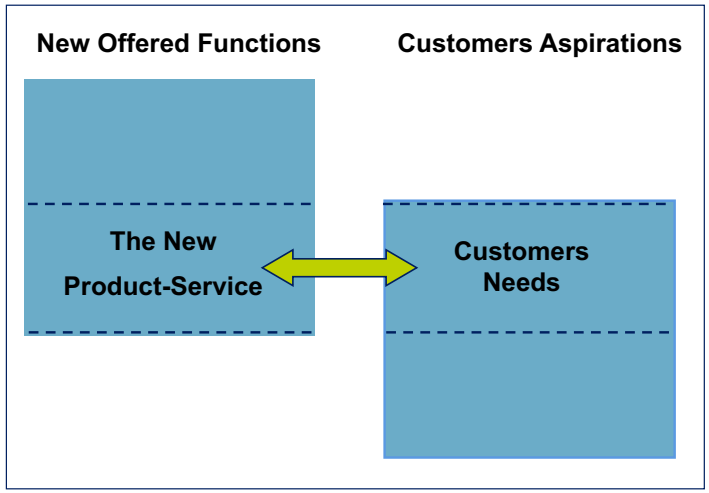


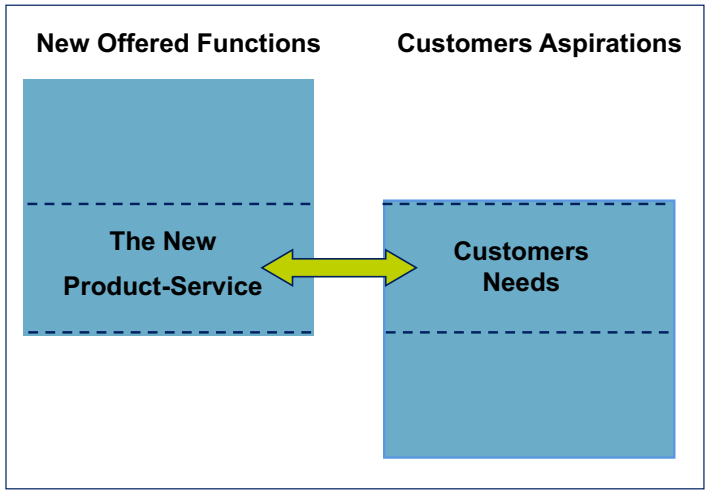
The Challenge for Leaders: Innovation and Value Creation

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

From Existing Value Drivers…

To New Value Drivers





Example – Category of Product-Service "Mobile Phone"

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

From Existing Value Drivers…

To New Value Drivers

What is Value for Business Clients, Customers, Users?

Understanding Value Drivers?

Some Examples?

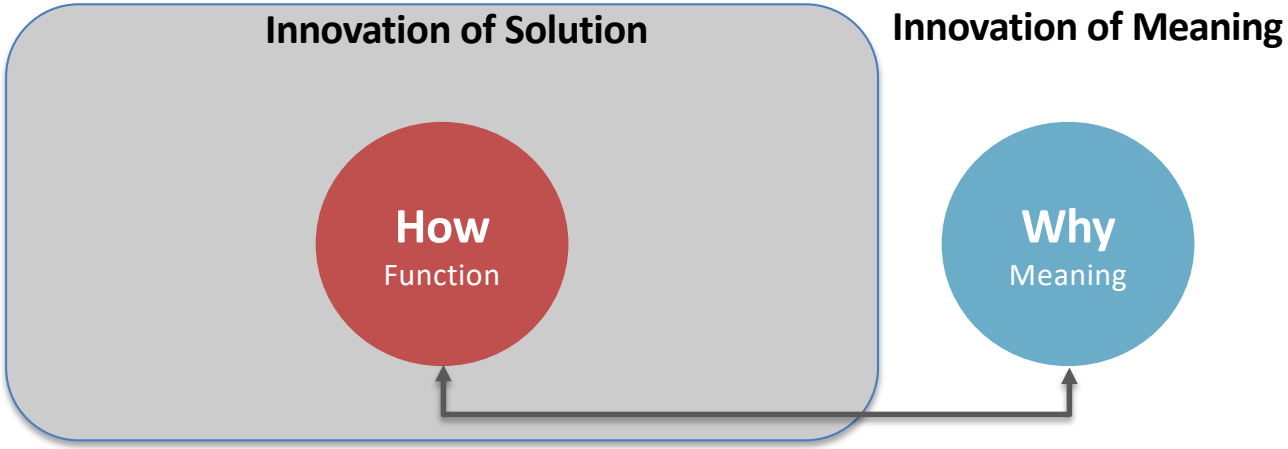
Harvard
Business
Review

INNOVATION

Designing Breakthrough Products

by Roberto Verganti

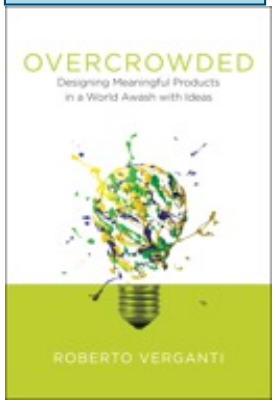
FROM THE OCTOBER 2011 ISSUE



Leadership, Design and Innovation of Meaning

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

DESIGN:
The (New) Meaning of Products, Services, Business Model



LEADERSHIP:
A (New) Meaningful Direction for People

"The etymology of design goes back to the Latin **de + signare** and means making something, distinguishing it by a sign, giving it significance…

Based on this original meaning, one could say:

design is making sense (of things)."

Klaus Krippendorff, *Design Issues*, 1989

BusinessWeek

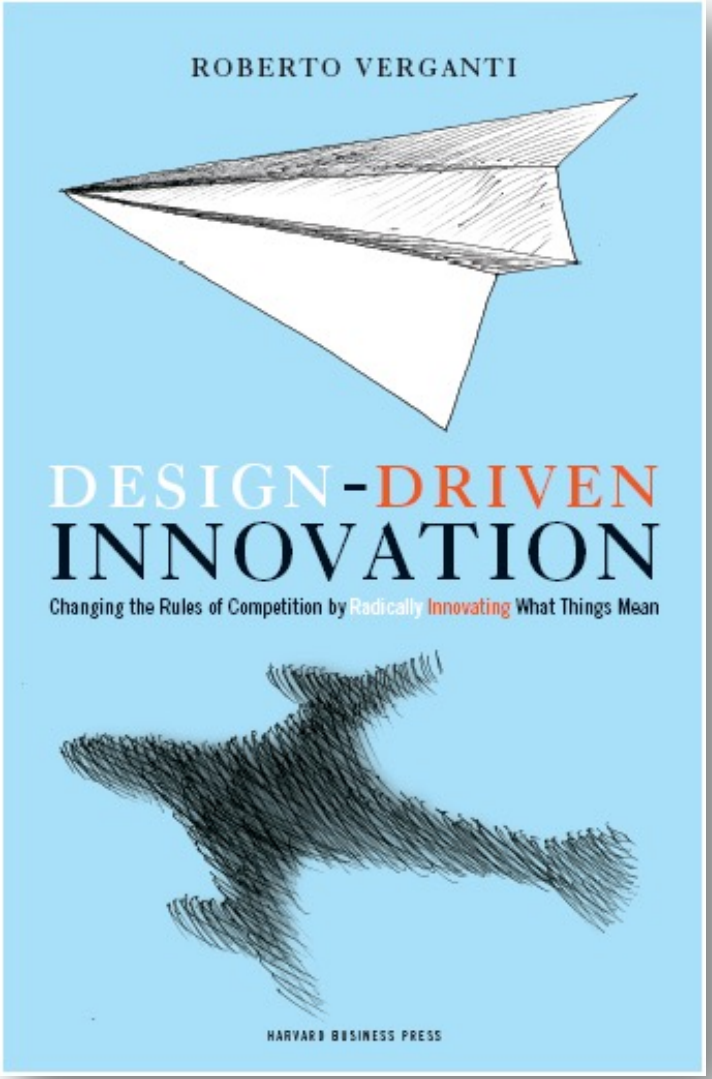
DESIGN PRIMERS FOR BUSINESSPEOPLE | The latest trend in design is books on design thinking

Change By Design
Tim Brown
Businesses can devise radical yet realistic ideas by first looking for patterns in customers' behavior.

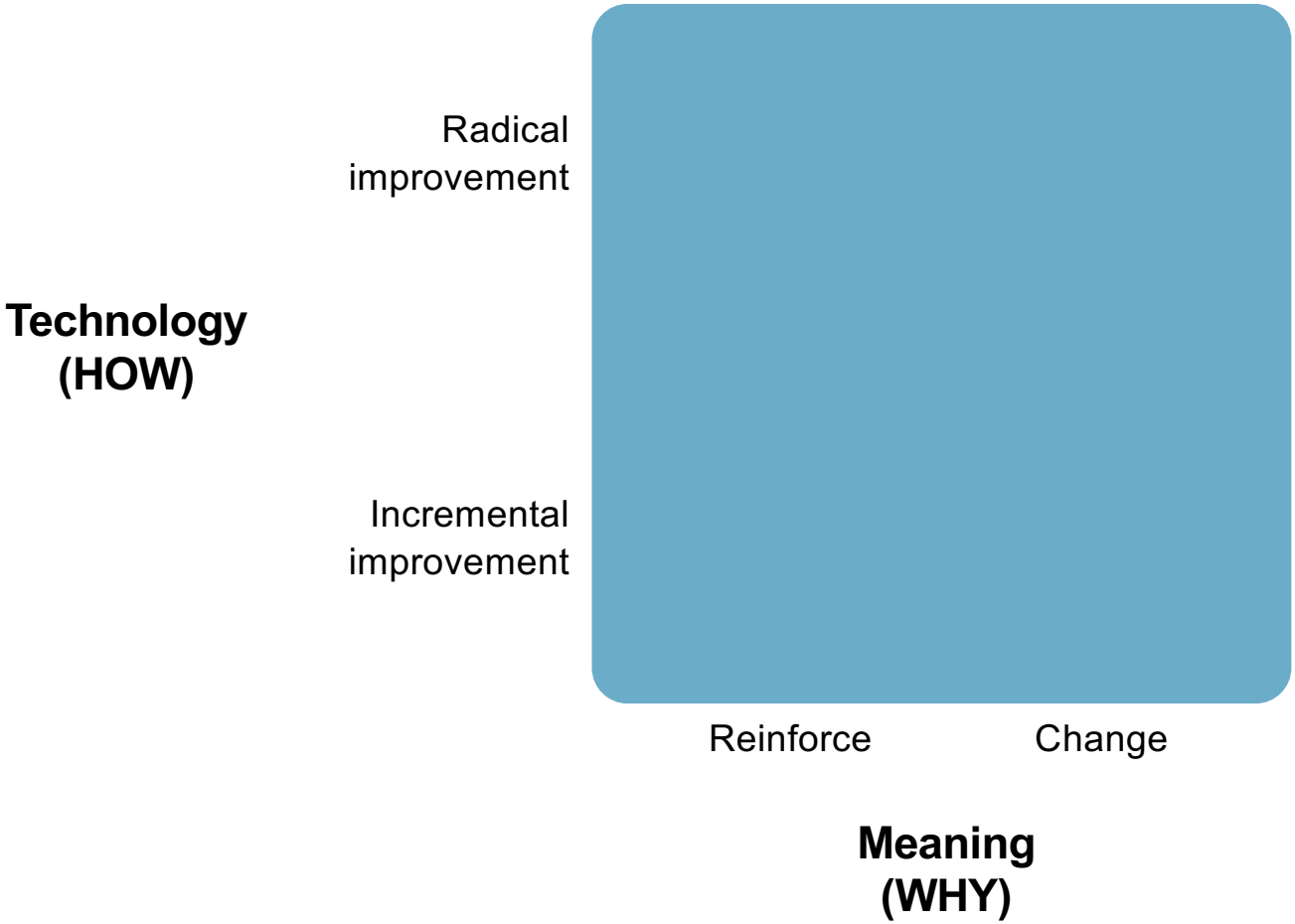
A Fine Line
Hartmut Esslinger
Companies that focus on producing creative, attractive goods are more likely to profit. Just look at Apple.

Design-Driven Innovation
Roberto Verganti
Smart executives align with "interpreters" of technology and culture—industrial designers—to help sell inventions.

The Design of Business
Roger Martin
Corporations can boost productivity by asking managers first to observe problems then imagine solutions.

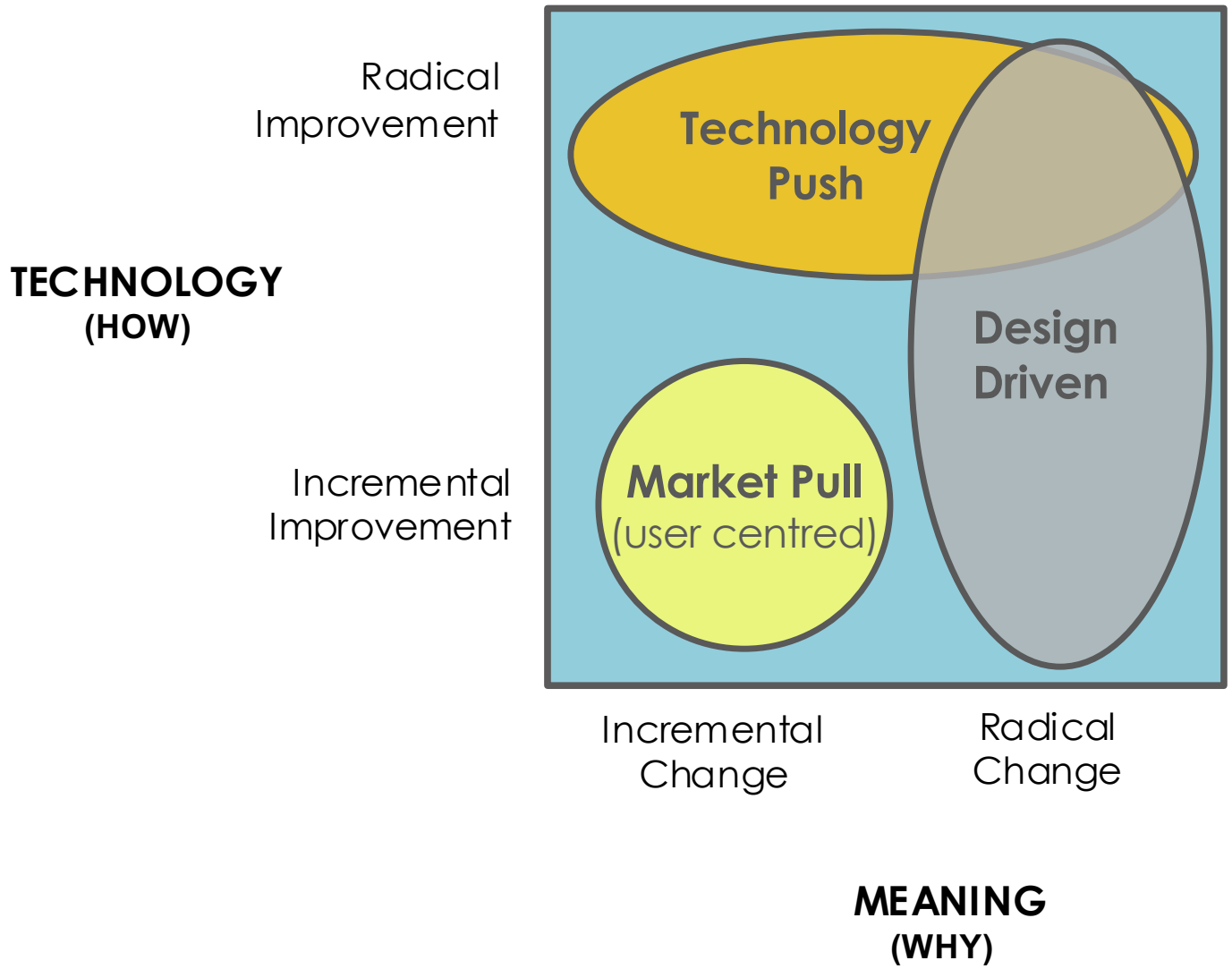


Two Dimension of Value Creation



Innovation Strategies

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



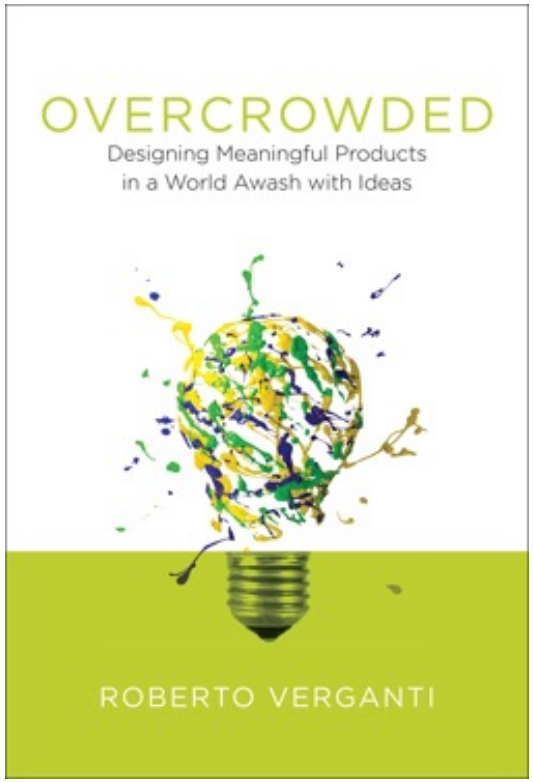
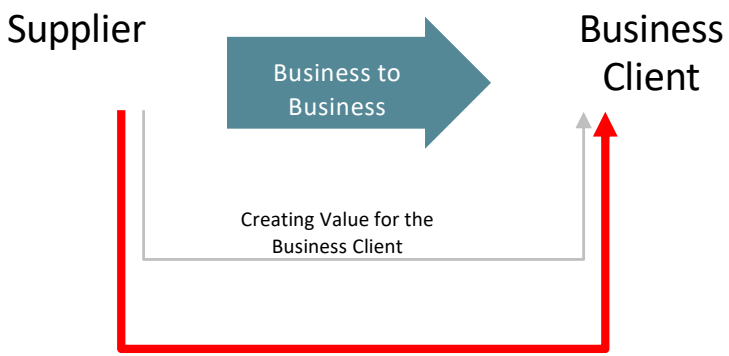
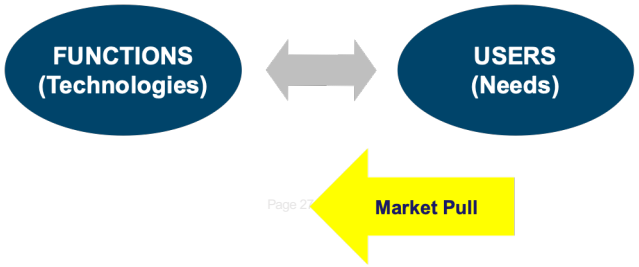


Table of Contents

Series page
Title page
Copyright page
Dedication
A Gift Note
1 Innovation of Meaning
Part I The Value
2 The Search for New Meaning
3 Competing through Meaning
Part II The Principles
4 Innovation from the Inside Out
5 The Art of Criticism
Part III The Process
6 Envisioning
7 The Meaning Factory
8 The Interpreter's Lab
Appendix: New Meanings Are Everywhere
Design Thinking, Design Theory: About the Series
Index





Steve Ballmer

Ballmer in 2014

Born	Steven Anthony Ballmer March 24, 1956 (age 63) Detroit, Michigan, U.S.
Nationality	American
Alma mater	Harvard University (AB) Stanford Graduate School of Business
Net worth	US$51.9 billion (October 2019)[1]
Spouse(s)	Connie Snyder (m. 1990)
Children	3
Awards	Legion of Honour[2]

7 best salesmen of technology industry globally

Steve Ballmer

Ballmer in 2014

Born	Steven Anthony Ballmer March 24, 1956 (age 63) Detroit, Michigan, U.S.
Nationality	American
Alma mater	Harvard University (AB) Stanford Graduate School of Business
Net worth	US$51.9 billion (October 2019)[1]
Spouse(s)	Connie Snyder (m. 1990)

Ballmer was Microsoft's very first salesman. His energy and explosive sales pitches played a big role in transforming Bill Gates' tiny startup into the largest software maker in the world.
When Ballmer took over the Microsoft CEO role from Gates in 2000, some people saw it as "the triumph of sales over technology and innovation."

Crazy and Passionate: What Microsoft Loses With Steve Ballmer

There will never be another Steve Ballmer.

Steve Ballmer

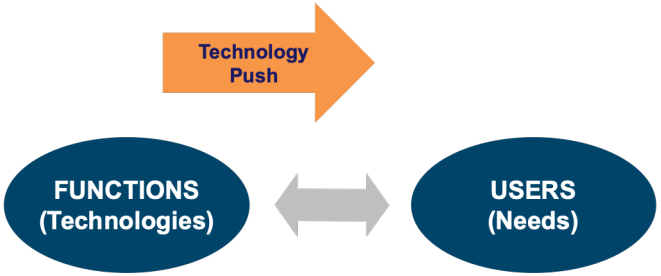
From Wikipedia, the free encyclopedia

Steven Anthony Ballmer (/ˈbɔlmər/; born March 24, 1956)[3] is an American businessman and investor who was the chief executive officer of Microsoft from January 13, 2000,[4][5] to February 4, 2014,[3] and is the current owner of the Los Angeles Clippers of the National Basketball Association (NBA). As of October 2019, his personal wealth is estimated at US $51.9 billion,[6] ranking him the 16th richest person in the world.[7]

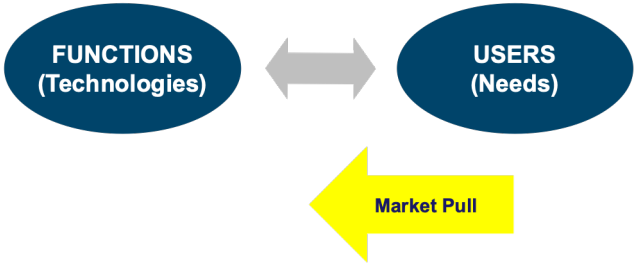
2007, iPhone competitors: Business Customers and Consumers

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

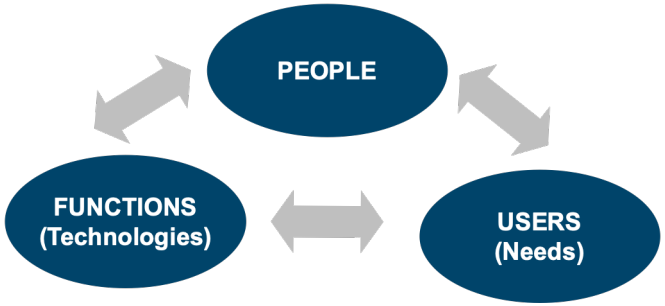
Technology Push



Market Pull



Design Driven



From Existing Value Drivers

To New Value Drivers

TECH • THE MOBILE EXECUTIVE

That Time Steve Ballmer Laughed at the iPhone

BY DON REISINGER
January 10, 2017 4:45 PM GMT+1

Data integration and analytics that promise the unreal – and delive
SEE HOW
LEAD WITH DATA Qlik

FORTUNE
THE MODERN BOA
Mastering the new rules of corporate leadership
Learn more

«… 500 dollars? Fully subsidized? With a plan? I said that is the most expensive phone in the world. **And it doesn't appeal to business customers because it doesn't have a keyboard. Which makes it not a very good email machine**…»

«…We have our strategy. We are very happy with Windows Phone devices in the market today… **Let's take phones first**. Right now, we're selling millions and millions and millions of phones a year. Apple is selling zero phones a year...»

Agenda

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

- Innovation of Meaning and Value Creation
- Technology Epiphanies
- Leadership and Innovation of Meaning: the Process
- Leadership and Innovation of Meaning: the Principles

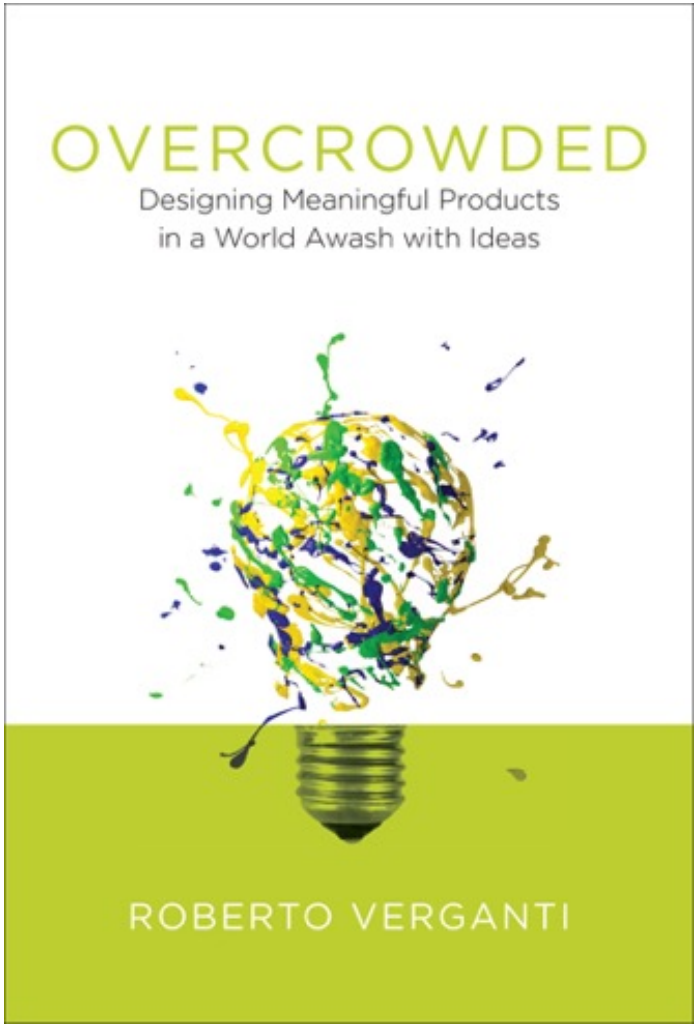


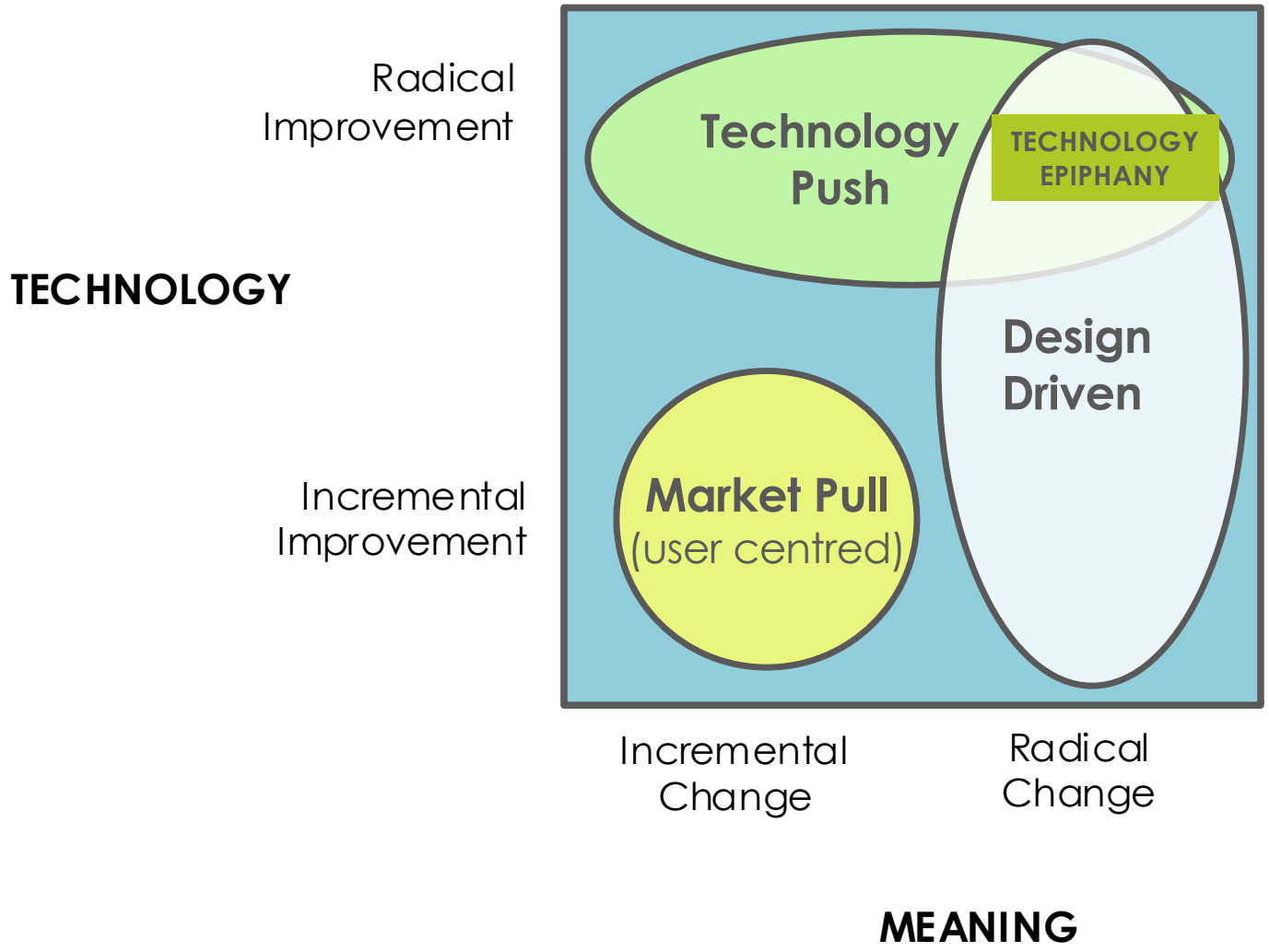
Table of Contents

Series page
Title page
Copyright page
Dedication
A Gift Note
1 Innovation of Meaning
Part I The Value
2 The Search for New Meaning
3 Competing through Meaning
Part II The Principles
4 Innovation from the Inside Out
5 The Art of Criticism
Part III The Process
6 Envisioning
7 The Meaning Factory
8 The Interpreter's Lab
Appendix: New Meanings Are Everywhere
Design Thinking, Design Theory: About the Series
Index

epiph · a · ny (ἐπιφάνεια)

a manifestation that stands in a superior position
a perception of the essential nature or meaning of something

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



Benedetto Vigna

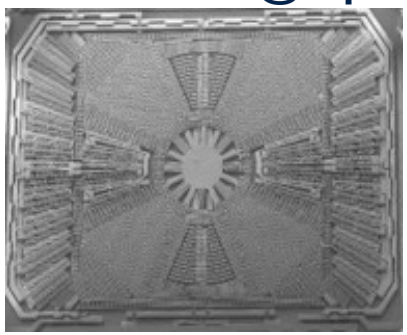
STMicroelectronics' President,
Analog, MEMS and Sensors
Group

Vigna joined ST in 1995 and launched the Company's efforts in MEMS. Under his guidance, ST's MEMS sensors established the Company's leadership with large OEMs in motion-activated user interfaces. Vigna has piloted ST's successful moves into microphones, e-compasses, and touch-screen controllers, as well as environmental sensors, micro-actuators, industrial and automotive sensors, and low-power radios for IoT. Vigna's mandate was further expanded with analog ICs and RF products (2011) and smart-power devices for OEMs and mass market (2016). ST's Imaging division moved under his management in late 2017.

MEMS as Extreme Analog Products

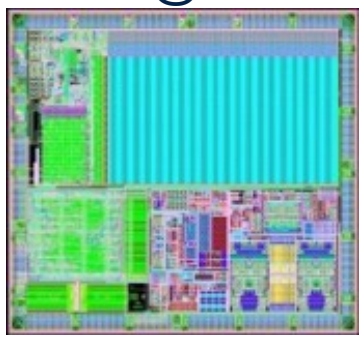
MEMS means **M**icro **E**lectro **M**echanical **S**ystems … taking advantage of the mechanical AND electrical properties of silicon

THELMA @ 1 µm



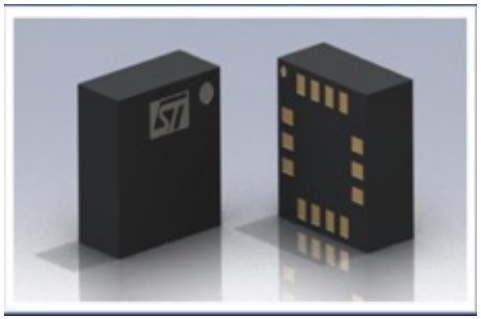
+

ASIC @ 130 nm



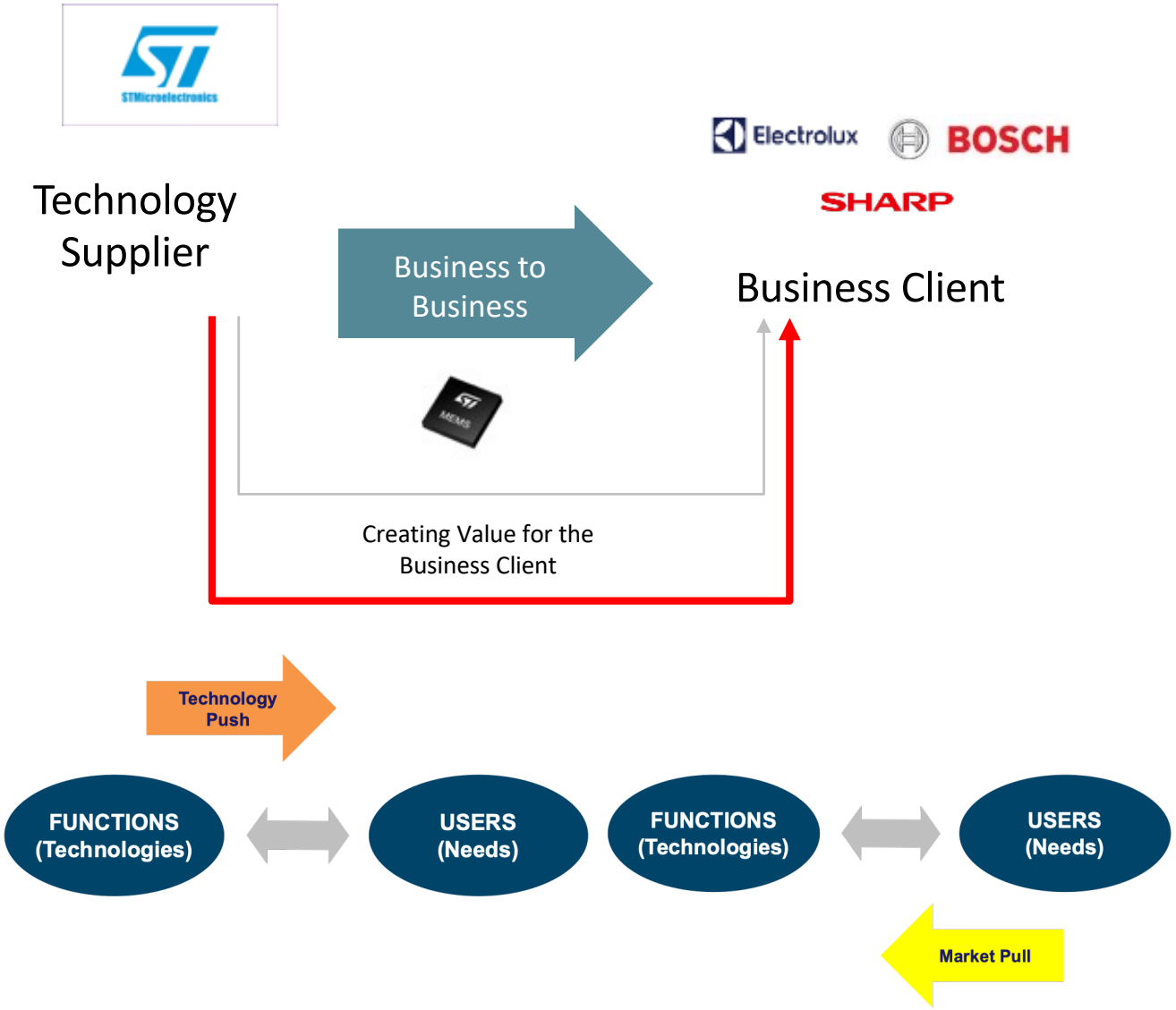
=

3 Axis Gyroscope



Creating Value in a B2B setting?

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



Technology Push and Demand Pull?

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

STMicroelectronics

Technology Supplier

Business to Business

Business Client

Business to Consumer

End Consumer

Helping Business Client to Create a New Value Driver for its Consumer

EXISTING NEEDS
- **Speed Gaming**
- **Quality of Images**

NEW TECHNOLOGY
- **High Speed (Processor)**
- **High Quality of Virtual Image**

Example of B2B2C Value Creation

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

STMicroelectronics

Technology Supplier

Business to Business

Nintendo®

Business Client

Business to Consumer

End Consumer

Helping Business Client to Create a New Meaning for its Consumer

FROM …
… Application of New Motion Sensors to Existing Business Requirements

TO …
… Evolution of New Motion Sensors toward New Human Interactions

FROM …
… Game Consoles as passive immersion in a virtual world for young adepts

TO …
… Game Consoles as active physical entertainment for everyone

Nintendo Wii 2006 changed the market rules: “Lower Speed”, “Lower Graphics”, “New Interactions”

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

- Sales volumes about sixth generation
  - PS2: 120 millions
  - Xbox: 24 millions
  - GameCube: 21.6 millions

- Sales volumes about seventh generation
  - PS3: 36 millions
  - Xbox 360: 40 millions
  - Wii: 71 millions

- Worldwide market dimension: around $30 billions

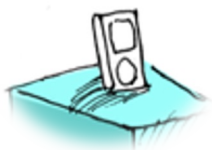
- Margin about consoles
  - PS3: $-250
  - Wii: $50

- Average cost necessary to develop a new game
  - PS3 and Xbox: $20 millions
  - Wii: $5 millions

People
(Context of Life)

Meaning
Utilitarian – Symbolic – Emotional

WHY?



Solution
Product – Service – Process

HOW?

The contribution provided by STMicroelectronics

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

If a client asks for a specific feature or component, it means that ***someone else has already created it***

Bruno Murari, scientific advisor for MEMS, STMicroelectronics

We started to envision possible applications in different fields. The basic idea was ***to think more abstractly of what MEMS could provide in final products****: information on movement and position. This can be used for automation, or, even more interestingly, for simplifying human interfaces. Then we proposed our envisioned applications directly to the most innovative engineers of potential clients in current or new markets*

Aldo Romano, CEO of STMicrolectronics Italy

Technology Leadership: Design and Innovation of Meaning

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

FINANCIAL TIMES

HOME WORLD US COMPANIES TECH MARKETS GRAPHICS OPINION WORK & CAREERS LIFE & ARTS HOW TO SPEND IT

Latest on Technology sector

Technology: Healthy.io marries machine learning and medicine

Tiger Global builds stake in TikTok-owner ByteDance

Quibi/Netflix: quarantine a

Premium

Opinion **Tech blog**

STMicro gives gamers new sense of direction

CHRIS NUTTALL + Add to myFT

STMicroelectronics: Intriguing Apple Supplier Play

Jul. 16, 2018 1:12 AM ET | About: STMicroelectronics N.V. (STM), Includes: AAPL

Un po' di Italia dentro iPhone X, STMicroelectronics vola in borsa grazie ad Apple

STMicroelectronics' Near Infrared Camera Sensor in the Apple iPhone X

The first NIR camera sensor with multiple innovations based on imager-silicon-on-insulator substrate from SOITEC, supplied and produced by STMicroelectronics for the Apple True Depth Module

Home / Investing / Technology

Apple iPhone 11 Pro Teardowns Look Encouraging for STMicro and Sony

STMicroelectronics and Sony each appear to be supplying four chips for Apple's latest flagship iPhones. Many other historical iPhone suppliers also make appearances in the latest teardowns.

By ERIC JHONSA + FOLLOW set 26, 2019 | 03:29 PM EDT

Stocks quotes in this article: STM, SNE, AAPL, AVGO, NXPI, SWKS, TXN, CRUS, INTC, QCOM

Bloomberg

Hyperdrive

Ferrari Hires Little-Known Tech Leader Vigna to Be New CEO

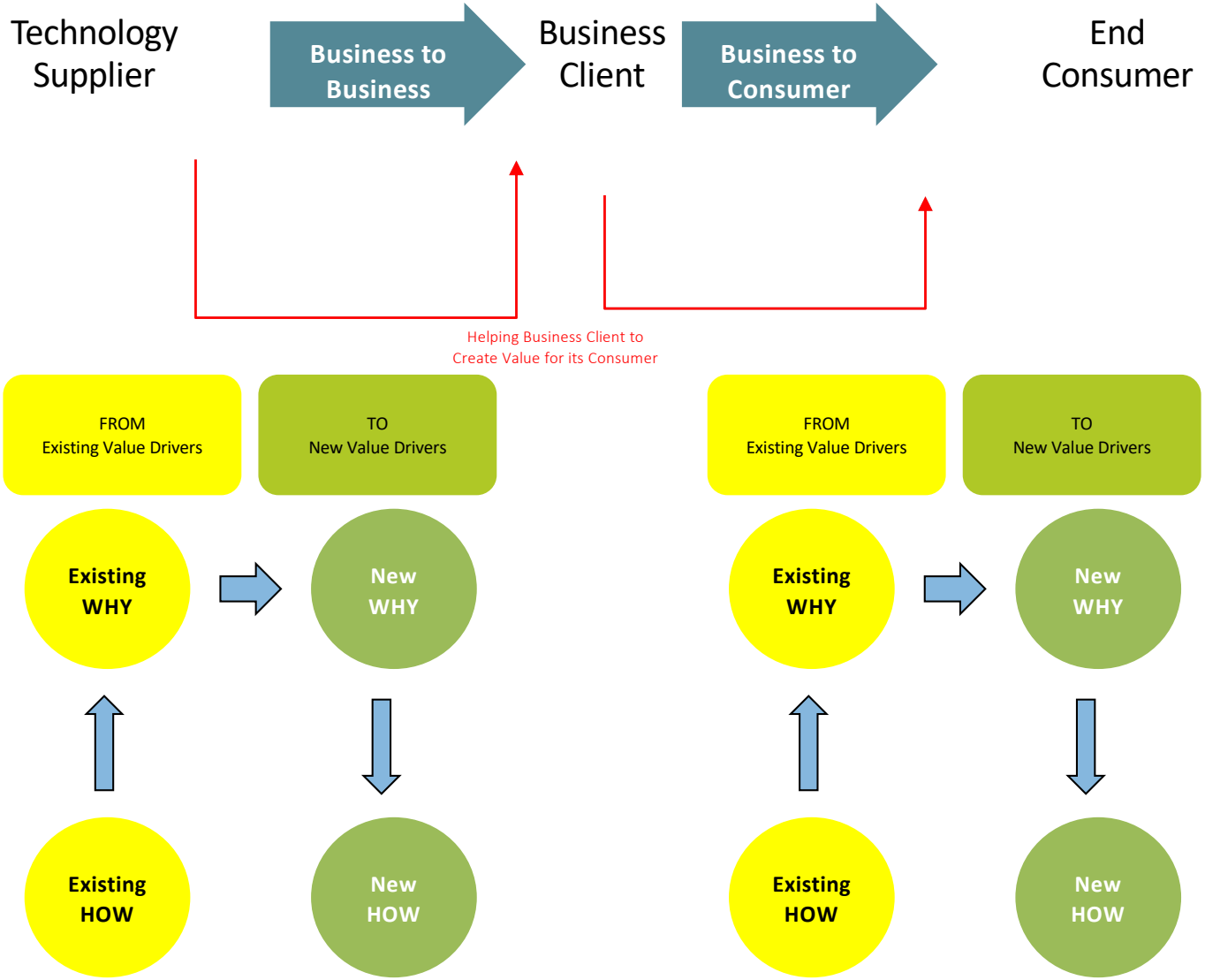
By Daniele Lepido
9 giugno 2021, 07:56 CEST *Updated on 9 giugno 2021, 10:27 CEST*

- Heads most profitable unit at chipmaker STMicroelectronics
- Surprise choice reflects pressure to reinvent Ferrari: analyst

Benedetto Vigna Source: *Ferrari NV*

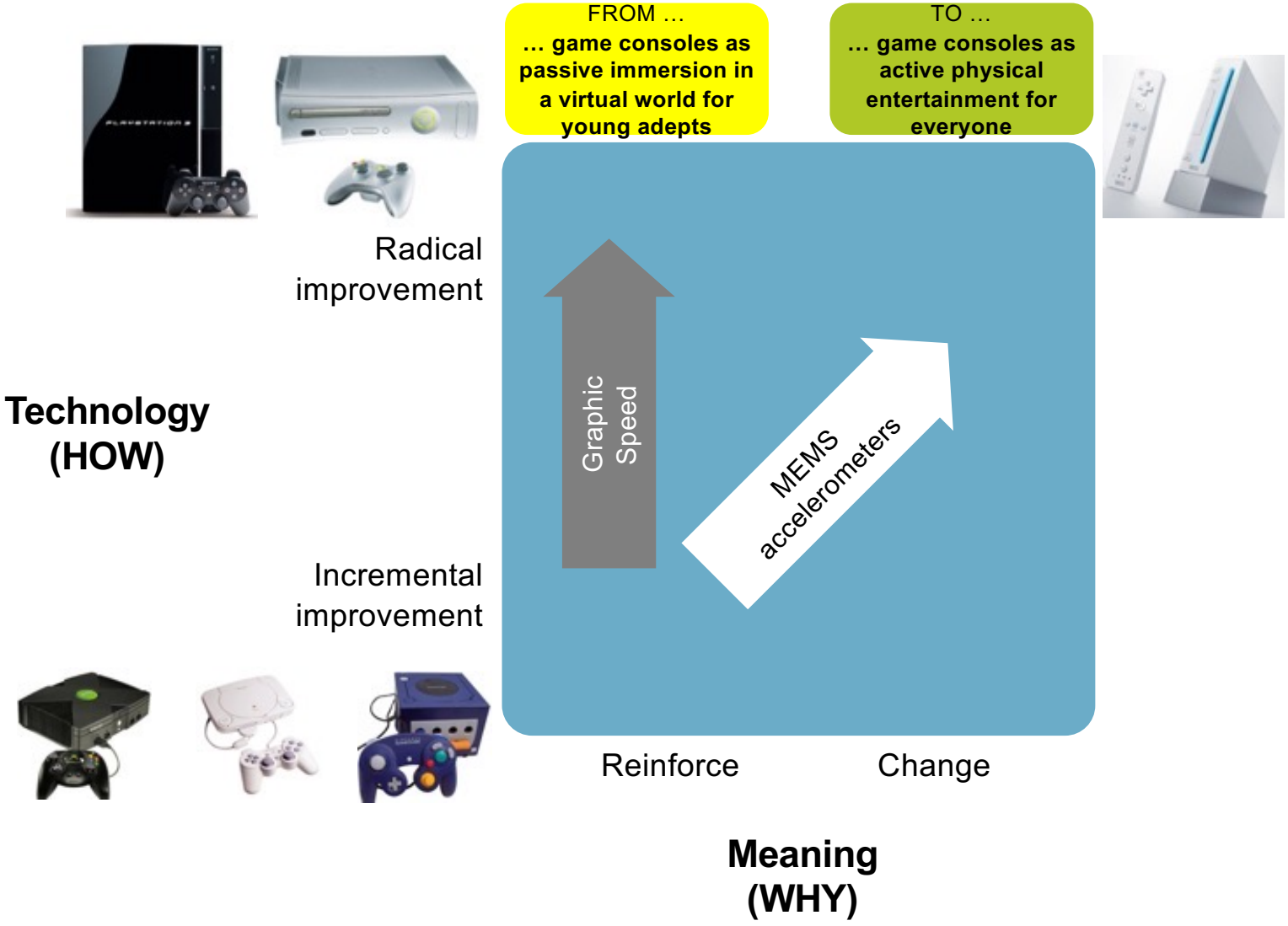
Creating Value in a B2B2C Perspective

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

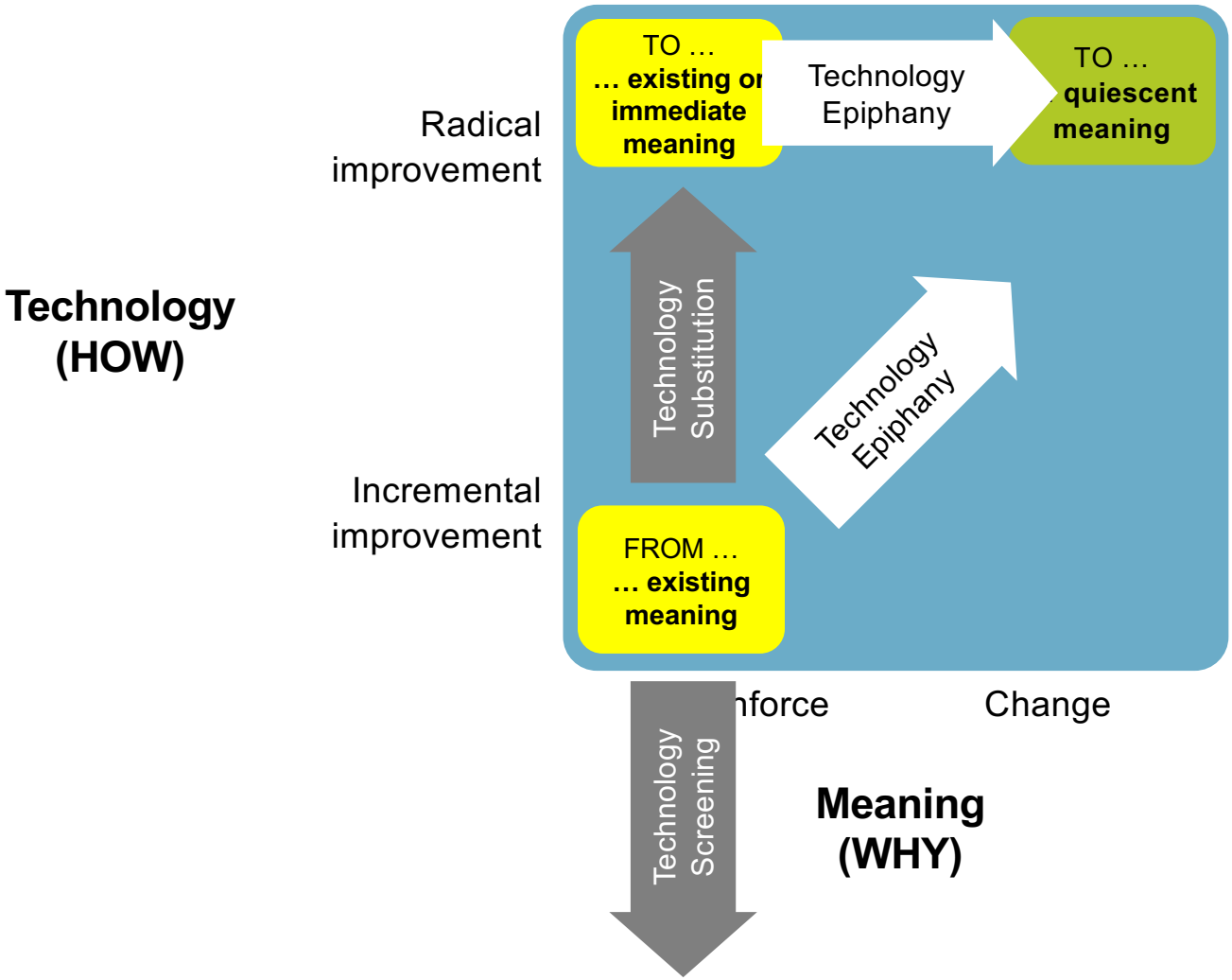


Technology Epiphany enabled by STMicrolectronics

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



Technology Epiphanies



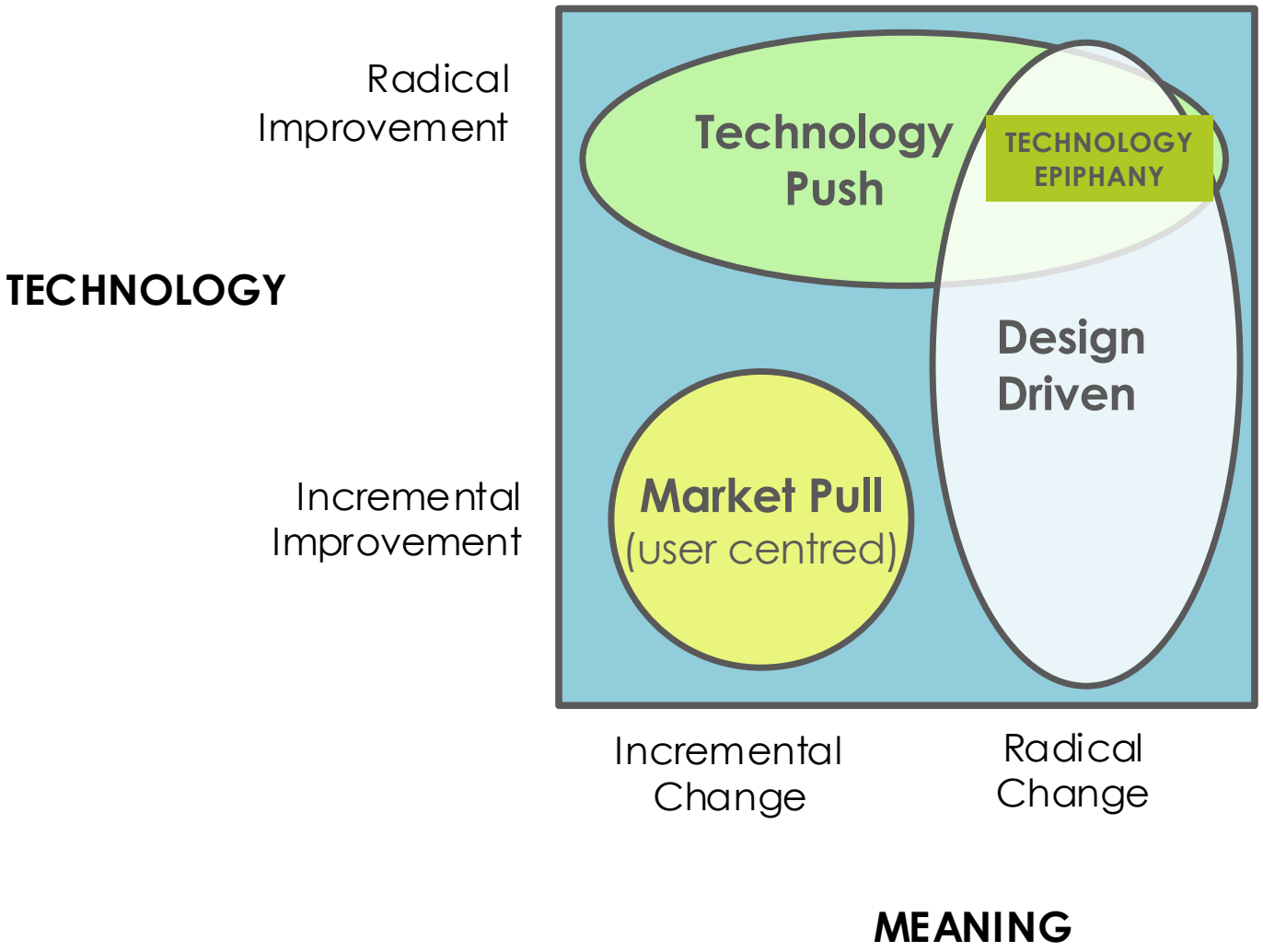
Individual Thinking
(Questions about My Strategy)

- Technology Substitution Strategy (Technology Push or Market Pull):
  - "…Can we substitute this for an old technology to better address customers' existing needs?"

- Technology Epiphany Strategy:
  - "… Will this new technology enable us to create products and services that people find more meaningful than current offerings? Will it transcend existing needs and give customers a completely new reason to buy a product?..."

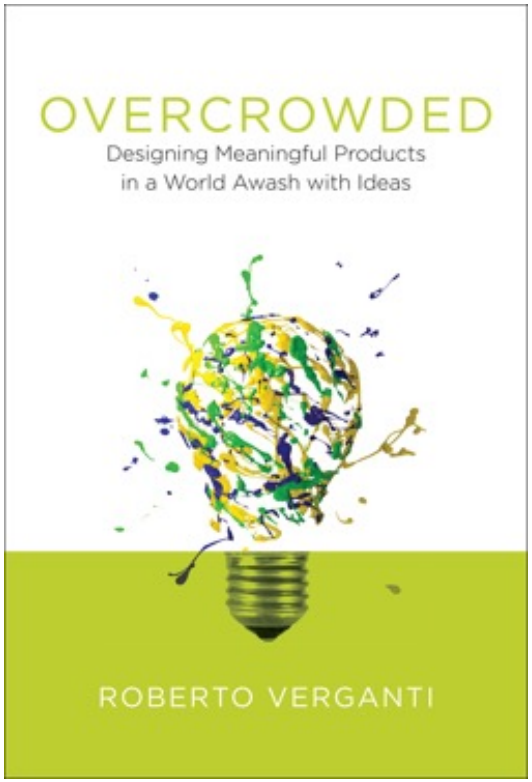
Four Innovation Strategies

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



B2B2C Radical Innovation is about Value Creation and Value Capture

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



- It's not a Creative Idea (about technology or marketing application)
- It's not an Invention
- It's not a Substitution/Better Performance

«we live in a world overcrowded… with Ideas, Inventions, Substitutions…»

Interpreting Drivers of Change in Technology: Technology Exaptation

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

MEMS means **M**icro **E**lectro **M**echanical **S**ystems … taking advantage of the mechanical AND electrical properties of silicon

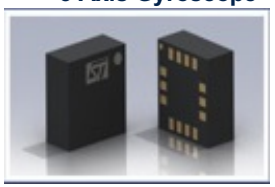
THELMA @ 1 µm

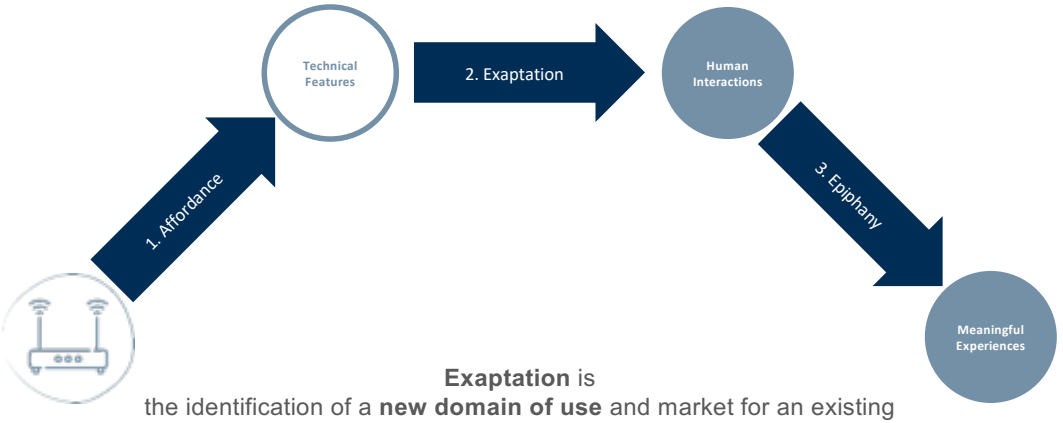
+

ASIC @ 130 nm

=

3 Axis Gyroscope

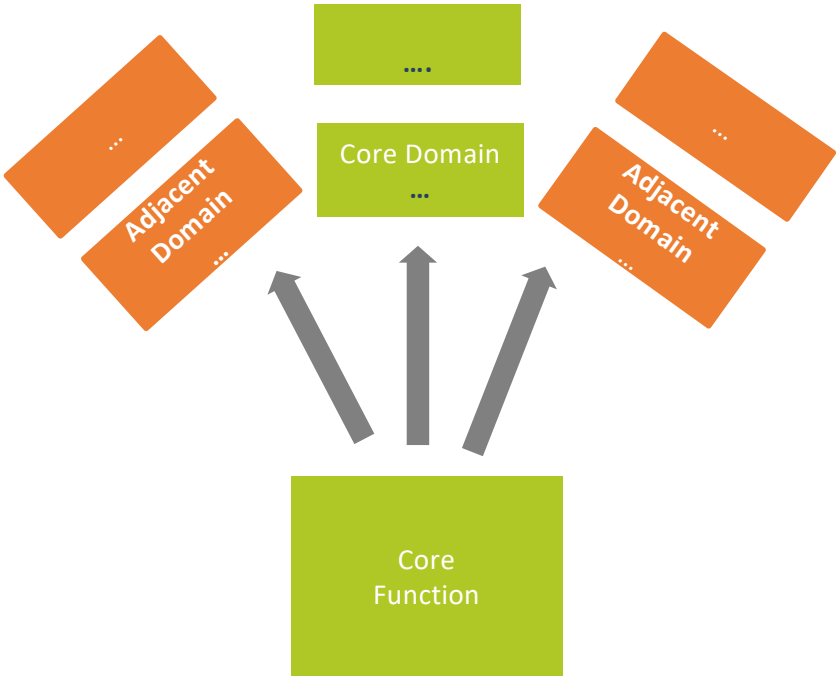




Exaptation is
the identification of a **new domain of use** and market for an existing technology (differently from adaptation)

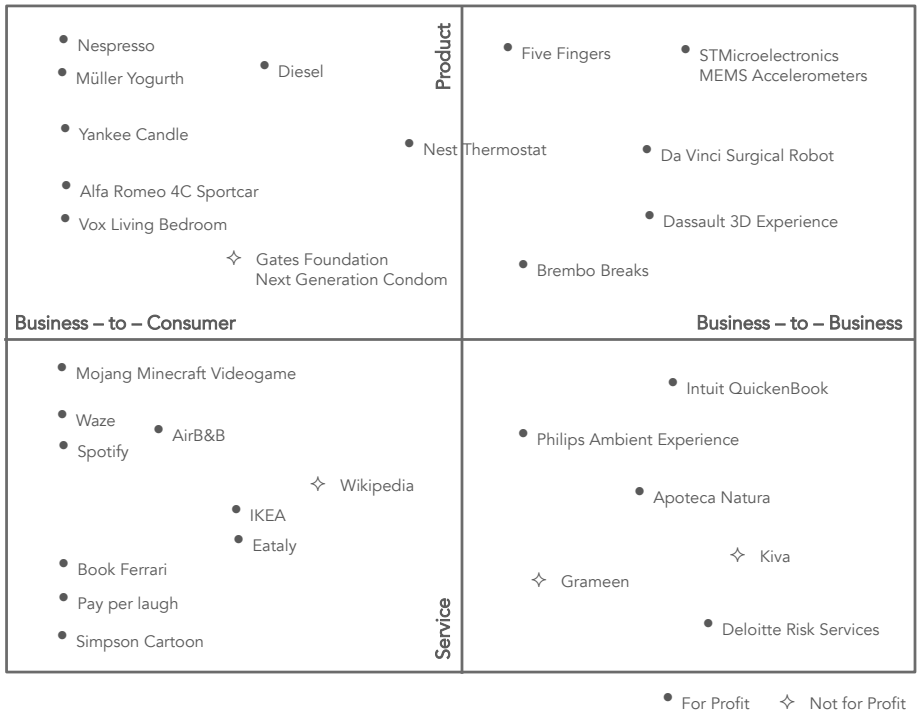
Objectives
Identifying new Contexts of Life, New Experiences of Life, New Human Interactions,
Enabled by the Technology

Adjacent Domains of Use/Human Interactions



Case Studies from Overcrowded

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE



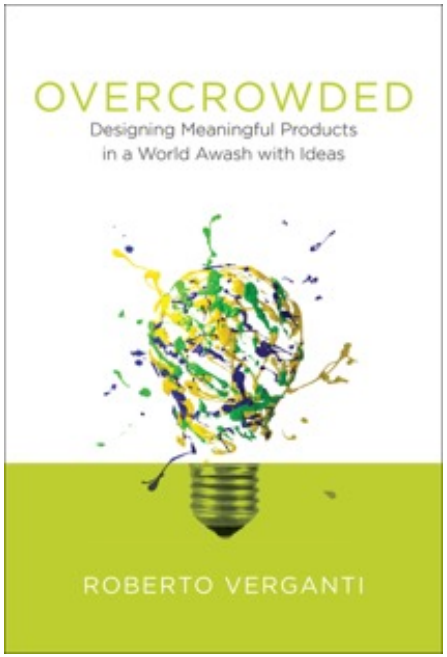


Table of Contents

Series page
Title page
Copyright page
Dedication
A Gift Note
1 Innovation of Meaning
Part I The Value
2 The Search for New Meaning
3 Competing through Meaning
Part II The Principles
4 Innovation from the Inside Out
5 The Art of Criticism
Part III The Process
6 Envisioning
7 The Meaning Factory
8 The Interpreter's Lab
Appendix: New Meanings Are Everywhere
Design Thinking, Design Theory: About the Series
Index

The Challenge for Business Innovators: Innovation and Value Creation

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

From Existing Meaning…

To New Meaning

Incumbent (Competition)

Innovator

Incumbent

Innovator

FROM
Existing Value Drivers:
…

TO
New Value Drivers
…

Innovator

FROM
Existing Value Drivers:
…

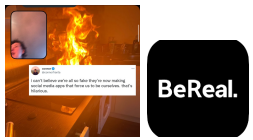
TO
New Value Drivers
…

Innovator

TO
New Value Drivers
…

Last Innovation of Meanings
'oduct-Service: …)

Innovator



Meaningful (Why) — **Innovation of Meaning**

Better (How) — **Innovation of Solution**

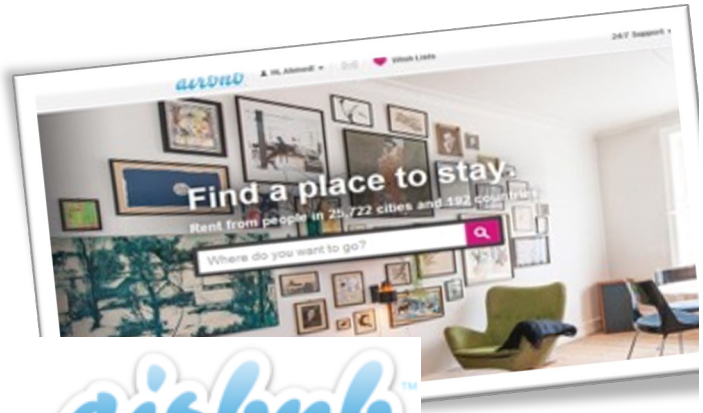
Understanding Last Innovation of Meanings (Category of Product-Service: …)

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

Incumbent

Booking.com

Innovator



airbnb

FROM (Existing Meaning)

TO (New Meaning)

Understanding Last Innovation of Meanings (Category of Product-Service: …)

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

Incumbent

Innovator

FROM (Existing Meaning)

TO (New Meaning)

Understanding Last Innovation of Meanings (Category of Product-Service: …)

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

Incumbent

Innovator

FROM (Existing Meaning)

TO (New Meaning)

Understanding Last Innovation of Meanings (Category of Product-Service: …)

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

Incumbent

Instagram

Innovator

BeReal.

FROM (Existing Meaning)

TO (New Meaning)

Tips: «I Need, I Love…»

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

Incumbent (Year): …….

Innovator:…. ….

Existing Meaning 2024

- Text and/or Image

New Meaning for the Future

- Text and/or Image

Existing Value Drivers:

I need a solution (How)…,
Because I Love (Why)….

New Value Drivers/ 2024 :

I need a solution (How)…,
Because I Love (Why)….

Existing Solution (How)
I need/like/want this features of the service:

- …
- ,
- …
- …

New Solution (How)
I need/like/want this features of the service:

- …
- ,
- …
- …

Understanding Last Innovation of Meanings (Category of Product-Service: …)

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

Incumbent

Innovator

instax
FUJIFILM

FROM (Existing Meaning)

TO (New Meaning)

Agenda

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

- Innovation of Meaning and Value Creation
- Technology Epiphanies
- Leadership and Innovation of Meaning: the Process
- Leadership and Innovation of Meaning: the Principles

Our Contribution: Radical Innovation of Services through the Process of Innovation of Meaning

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

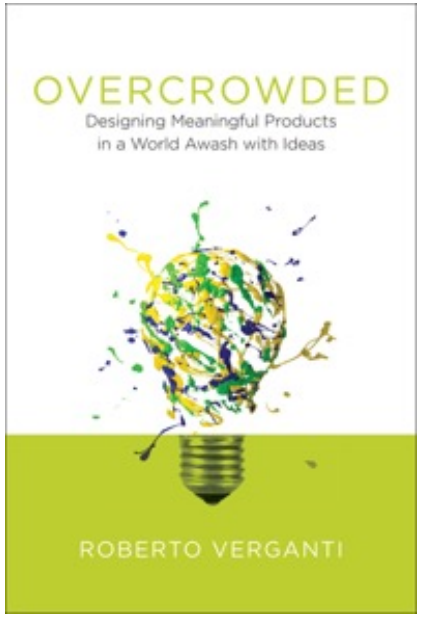


Table of Contents

Series page
Title page
Copyright page
Dedication
A Gift Note
1 Innovation of Meaning
Part I The Value
2 The Search for New Meaning
3 Competing through Meaning
Part II The Principles
4 Innovation from the Inside Out
5 The Art of Criticism
Part III The Process
6 Envisioning
7 The Meaning Factory
8 The Interpreter's Lab
Appendix: New Meanings Are Everywhere
Design Thinking, Design Theory: About the Series
Index

Design-Driven Innovation in Retailing: An Empirical Examination of New Services in Car Dealership

Emilio Bellini, Claudio Dell'Era, Federico Frattini and Roberto Verganti

Innovation strategies in retail services: solutions, experiences and meanings

Giuseppe Leonardo Pinto, Claudio Dell'Era, Roberto Verganti and Emilio Bellini
Department of Management, Economics and Industrial Engineering, Politecnico di Milano, Milan, Italy

Designing an Omni-Experience to Save Retailing

Lessons from an Italian Book Retailer*Retailers can achieve competitive advantage by creating an omni-experience, a novel customer experience innovation strategy.*

Federico Artusi, Emilio Bellini, Claudio Dell'Era & Roberto Verganti

ARTICLE

WILEY

Design and the customer experience: The challenge of embodying new meaning in a new service

Federico Artusi | Emilio Bellini

ARTICLE

Check for updates

From vision to innovation: new service development through front-line employee engagement

Federico Artusi and Emilio Bellini

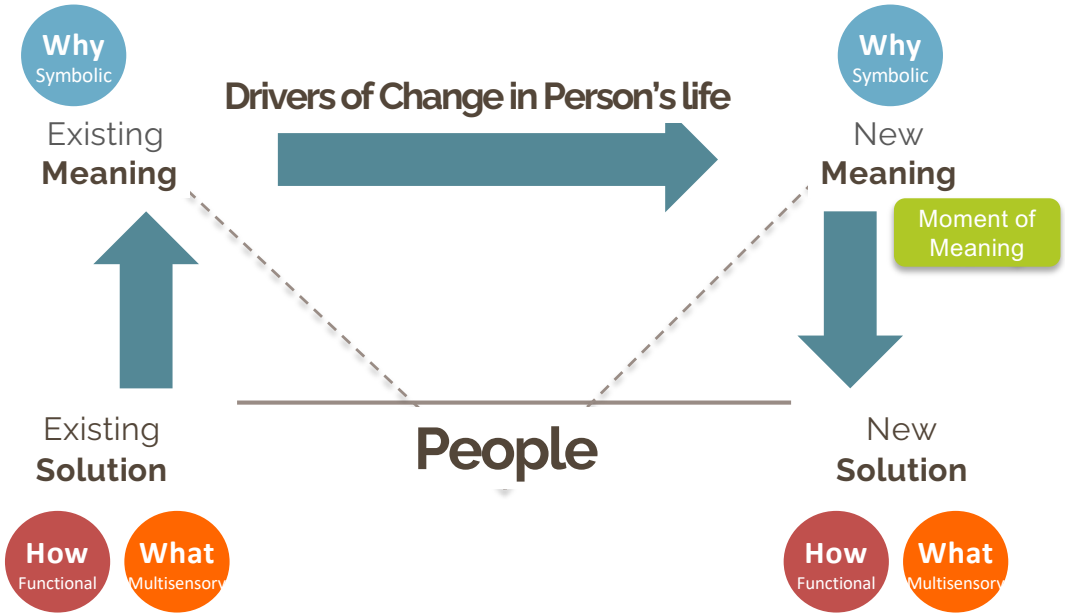
Department of Management, Economics and Industrial Engineering, Politecnico Di Milano, Milan, Italy

The Metacognition Underlying Radical Business Model Innovation: Four Case Studies of Individual Criticism

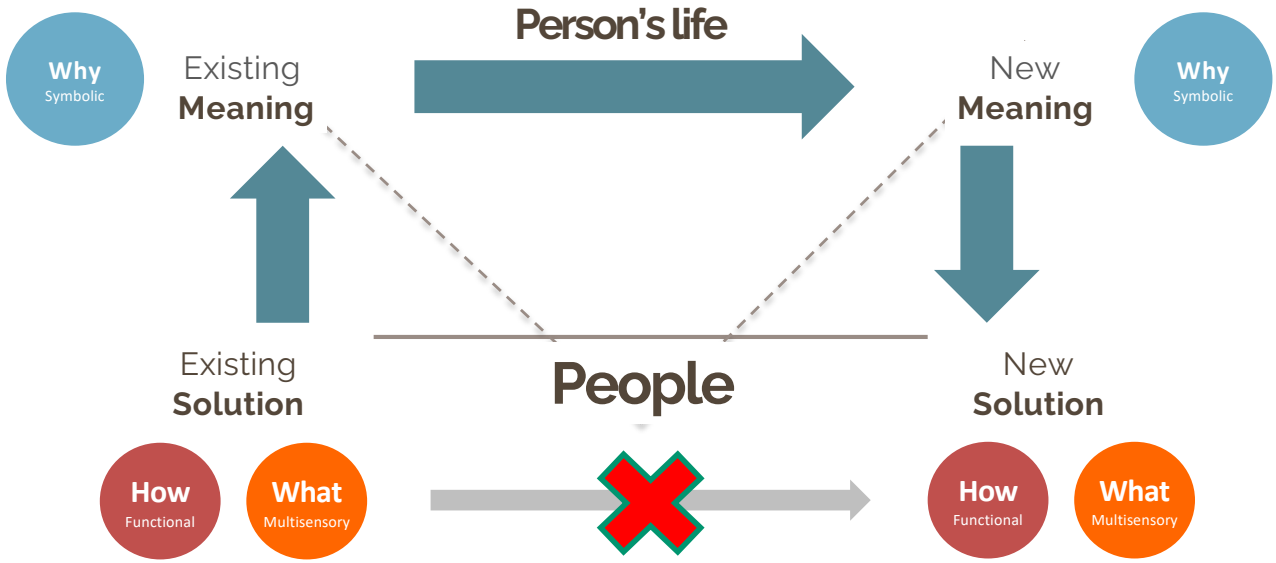
Emilio Bellini and Silvia Castellazzi

The Process of Innovation of Meaning in Services

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



A Counterintuitive Approach



Interpreting Drivers of Change in Soclety: Emerging Socio-Cultural Models and New Meaning of a Service

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

- **Total stores:** 32.660 (2020) across 80 markets
- **Revenue:** US$ 26.50 billion (2019)
- **Net Income**: US$ 4,08 billion (2019)
- **Number of employees:** 349.000 (2019)

Case Study: Starbucks Coffee
A New Meaningful Direction in US Coffee Retail

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

FROM EXISTING MEANING…

The Filling Station:
A Reliable Access to Coffe as Energy

1960/1990- Competition

TO NEW MEANING …

… The Italian Bar:
My Home Away from My Home

1987/2010- Starbucks

Example Starbucks, Coffee Retail in US 1984-2000

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

My Filling Station: Quick or Long

Person's life

- **US Knowledge Workers**
- **Premium Experience**
- **Italian Bar as Theatre**

My Home Away from My Home

Existing **Meaning**

New **Meaning**

Existing **Solution**

User

New **Solution**

Cleanness, safety, wide spaces, reliability

Cozy furnishings, Free Wi-Fi, orders/client name

A Journey into the Mind of Innovation Leader

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

Interpreting Society and Technology:
From Signals of Change in Person's Life to
<u>Imaginable Value Drivers</u> of
…

Existing Value Drivers:

I want a solution (How)…,
Because I Love (Why)….

Existing Solution (How)
I need/like this features of the service:

- …
- ,
- …
- …

New Value Drivers:

I want a solution (How)…,
Because I Love (Why)….

New Solution (How)
I need/like this features of the service:

- …
- ,
- …
- …

Agenda

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

- Innovation of Meaning and Value Creation
- Technology Epiphanies
- Leadership and Innovation of Meaning: the Process
- Leadership and Innovation of Meaning: the Principles

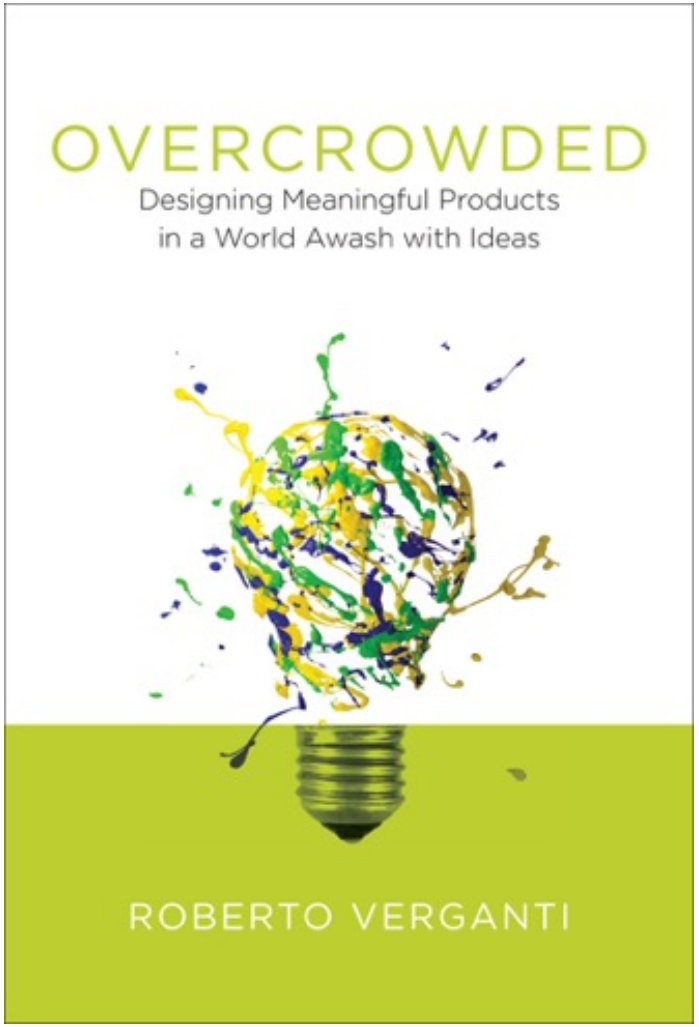


Table of Contents

Series page
Title page
Copyright page
Dedication
A Gift Note
1 Innovation of Meaning
Part I The Value
2 The Search for New Meaning
3 Competing through Meaning
Part II The Principles
4 Innovation from the Inside Out
5 The Art of Criticism
Part III The Process
6 Envisioning
7 The Meaning Factory
8 The Interpreter's Lab
Appendix: New Meanings Are Everywhere
Design Thinking, Design Theory: About the Series
Index

Two Principles of Innovation of Meaning

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE

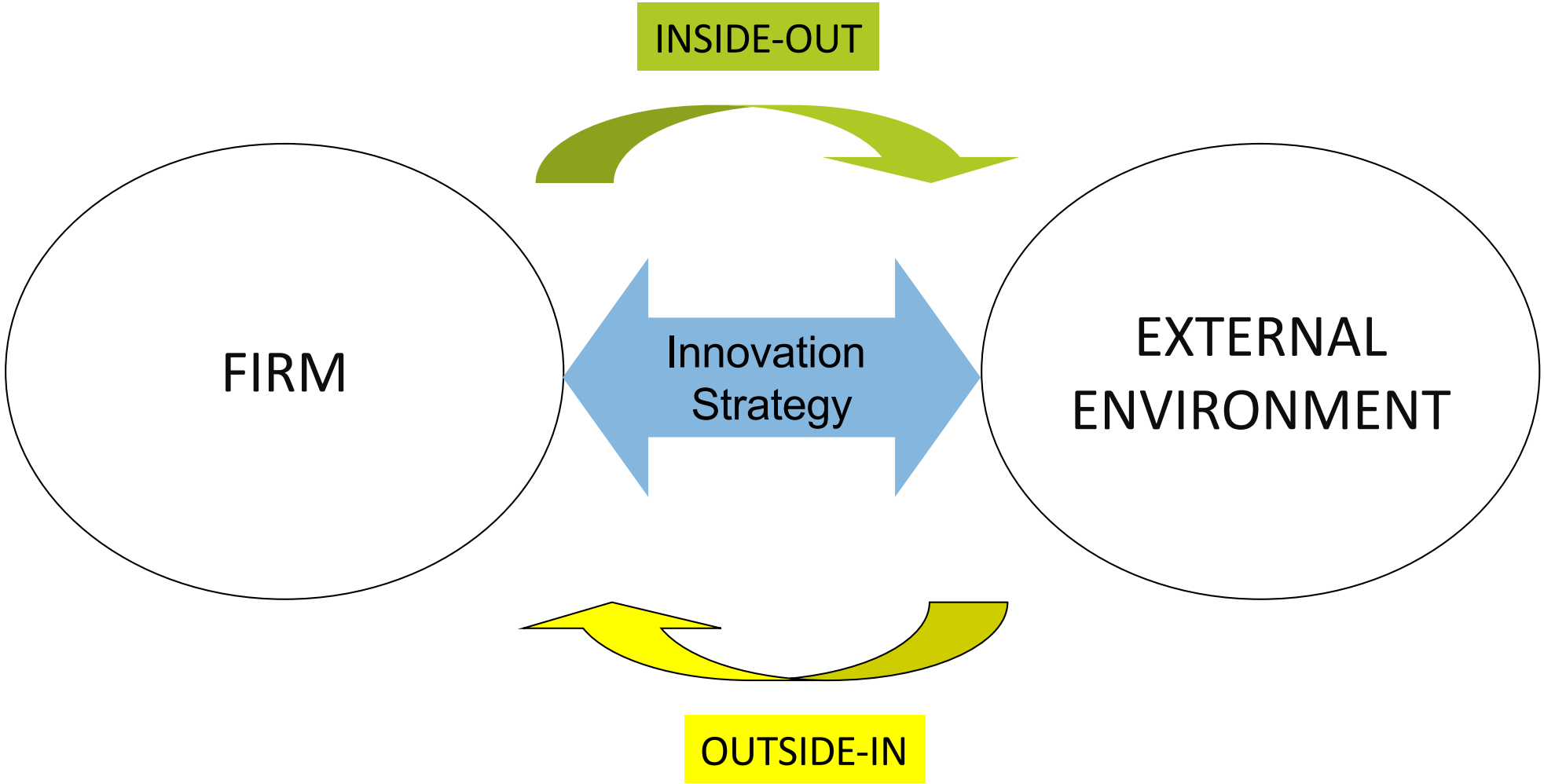
People

Inside → Out | **Meaning** | Criticism

Outside → in | **Solution** | Ideation

Inside-Out vs. Outside-In

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



Criticism

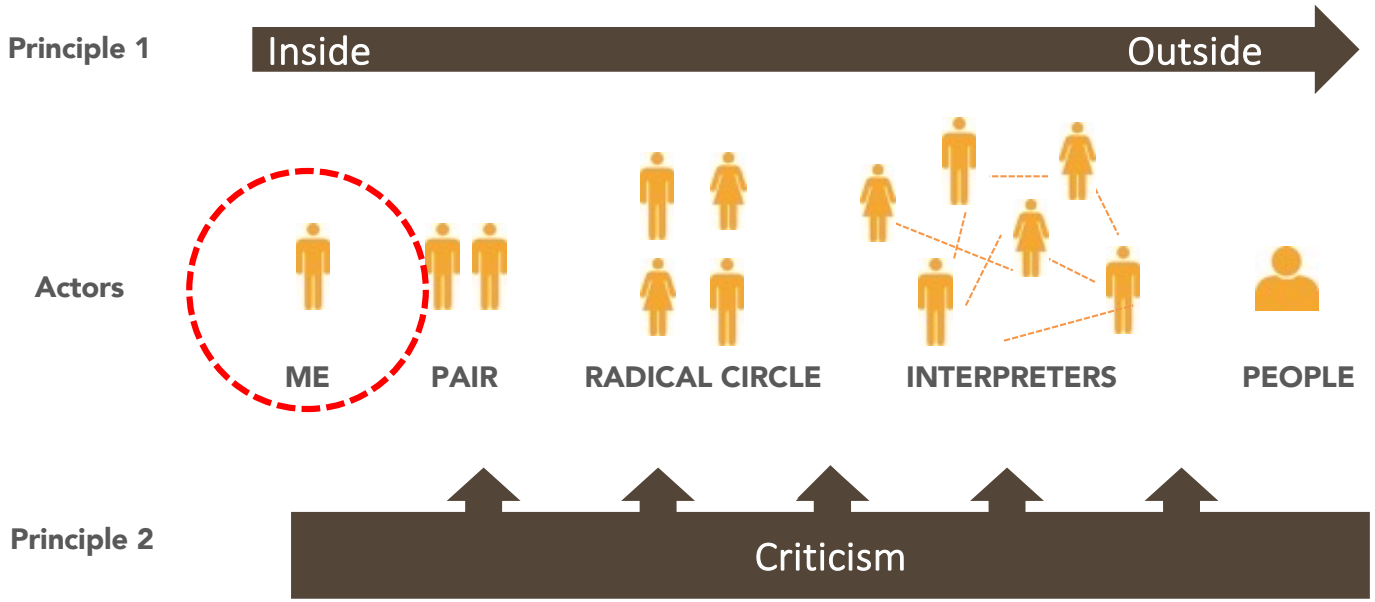
"To understand a world that changes we must revisit our **myths**, we must subject them to **criticism**, … to cure the ideas that we use to interpret life…".

Criticism is a word that refers to the Greek Krino, which means "I judge", "I value", "I interpret".

Umberto Galimberti
"The Myths of our Time"

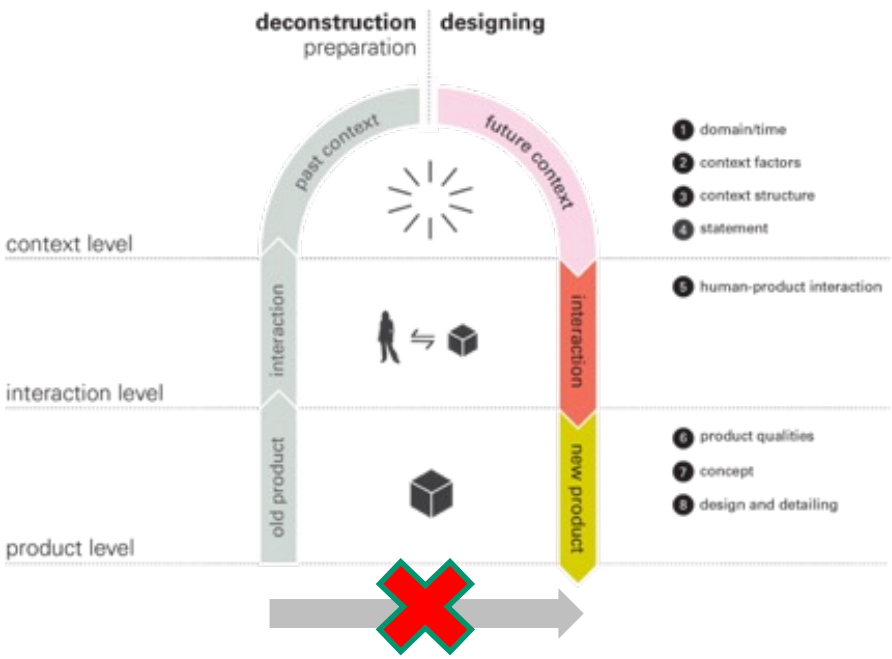
Individual Envisioning

POLITECNICO
MILANO 1863
DIPARTIMENTO DI
INGEGNERIA GESTIONALE



Adapted from Verganti R., Overcrowded- Designing Meaningful Products in a World Awash with Ideas, Cambridge MA, the MIT Press, 2016

Re-framing (https://www.reframingstudio.com/reframing-method)



Reframing (Meaning? Why?)

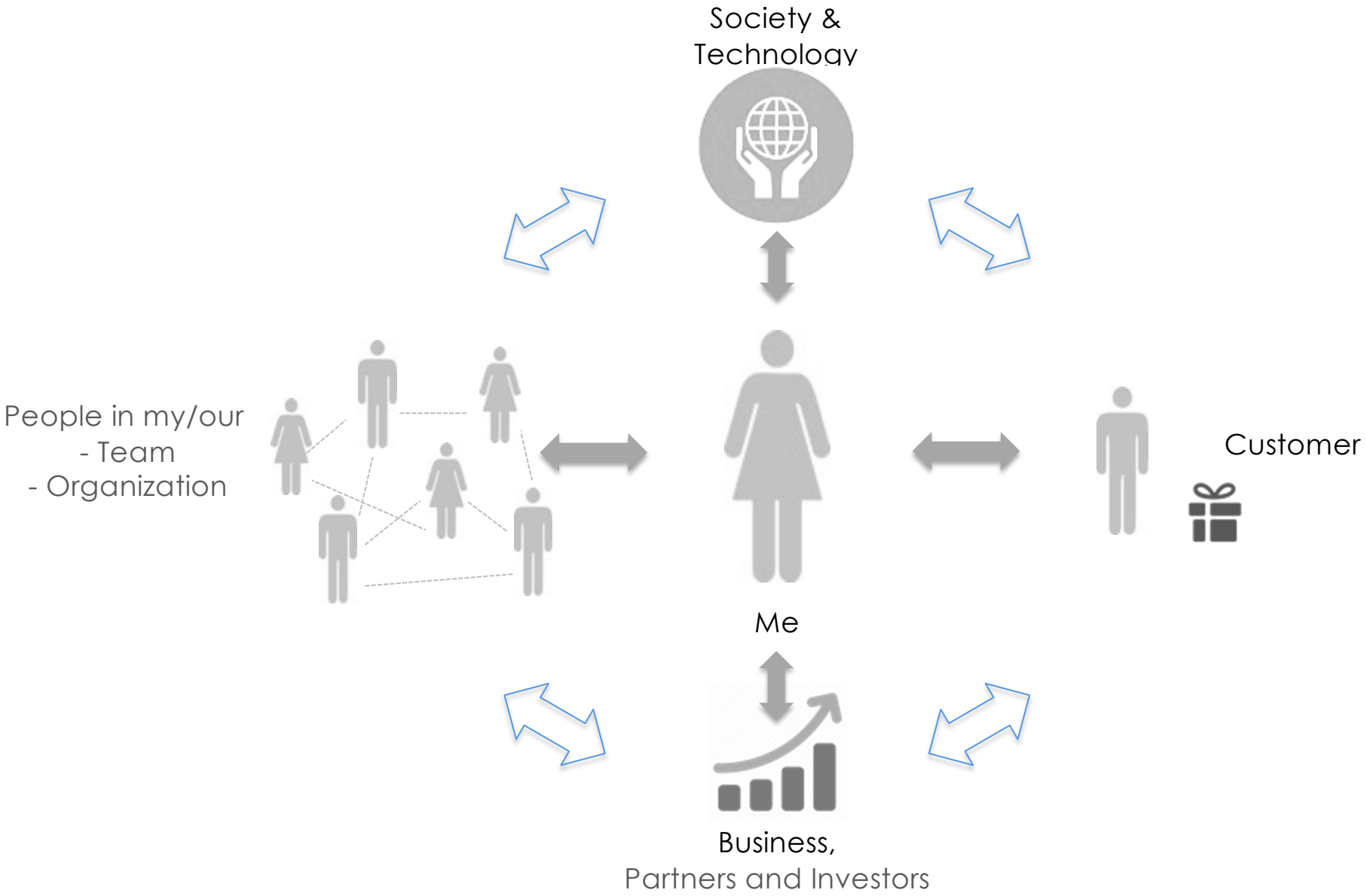
Reframing is seeing the current situation from a different perspective. Reframing can be tremendously helpful in problem solving, decision making and learning. With reframing, one shifts one's perspective to be more empowered to act effectively and impactfully. The goal of reframing is to expand your vision of a problem's context so that you can consider a wider range of interpretations of what's happened (the current state), or a wider range of potential future states (the desired outcomes), or a wider range of control mechanisms to transform the current state into the desired outcomes.

Framing (Solutions? How?)

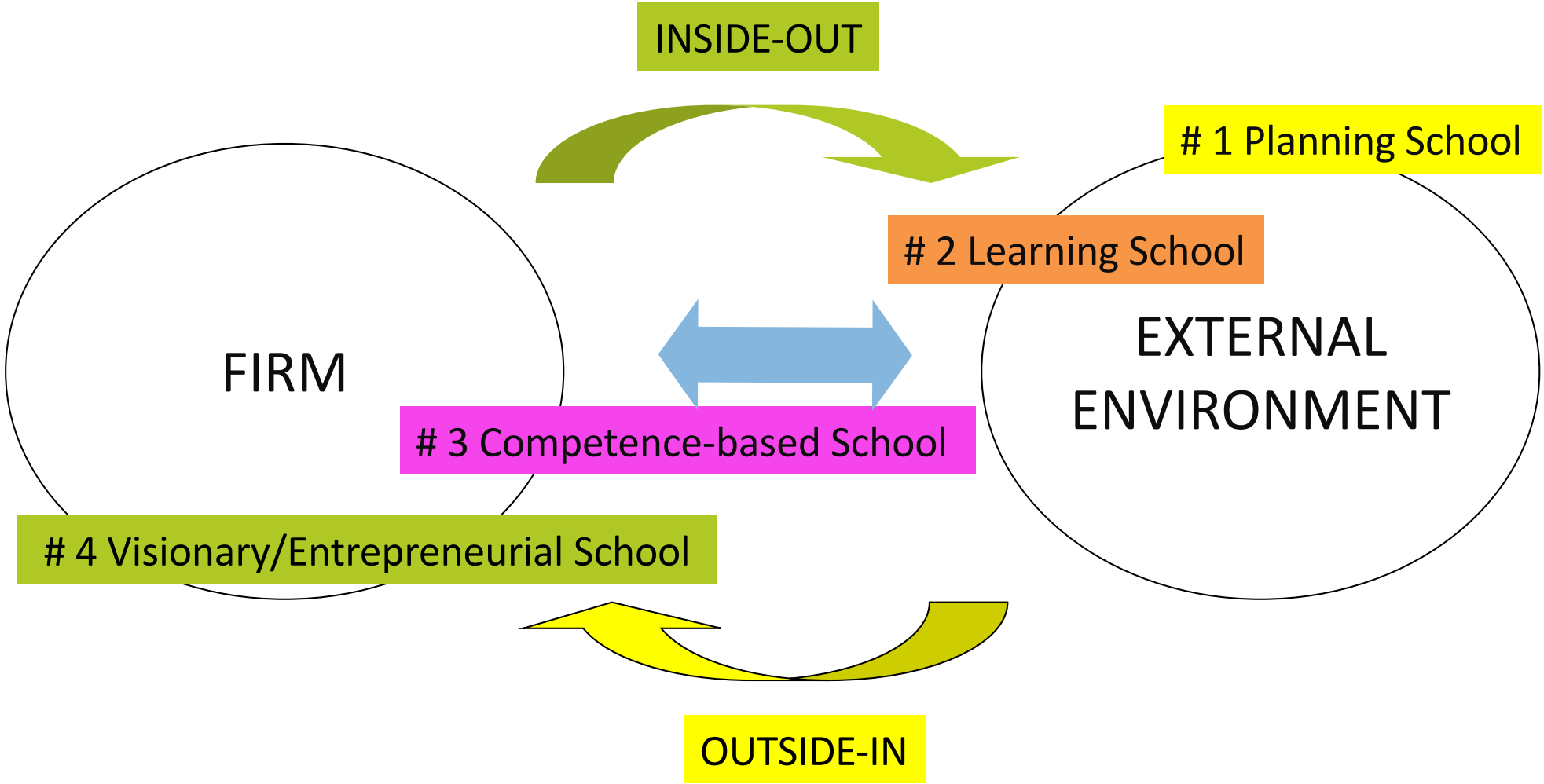
Framing is a mental structure that is built upon the beliefs you have about yourself, your roles, your resources, your circumstances, and about other people. It is a structure you use to ascribe meaning in what you observe of the world around you. In other words, the meaning you perceive from any event is dependent upon how you frame it in your mind. As such, your frames shape how you perceive the world, yourself, and others. Our human perceptual capacity is like a magnifying glass that we can move over text or images. We focus in on something and often lose awareness of what originally surrounded that magnified area.

Leadership and Innovation: LEADIN'LAB 5 Spheres *(Verganti et al., 2018)*

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE



4 Approaches to Innovation Strategy

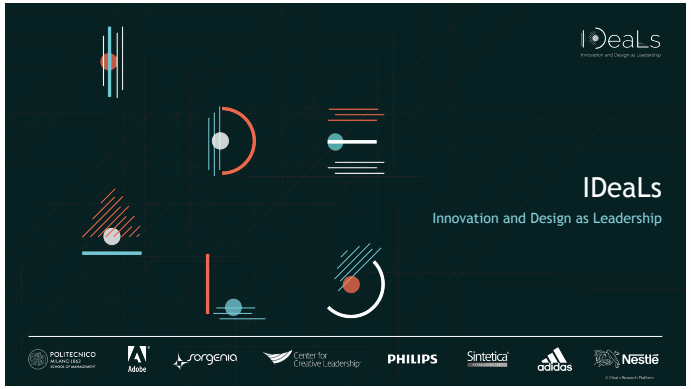


Thesis with Leadin'Lab

POLITECNICO MILANO 1863
DIPARTIMENTO DI INGEGNERIA GESTIONALE

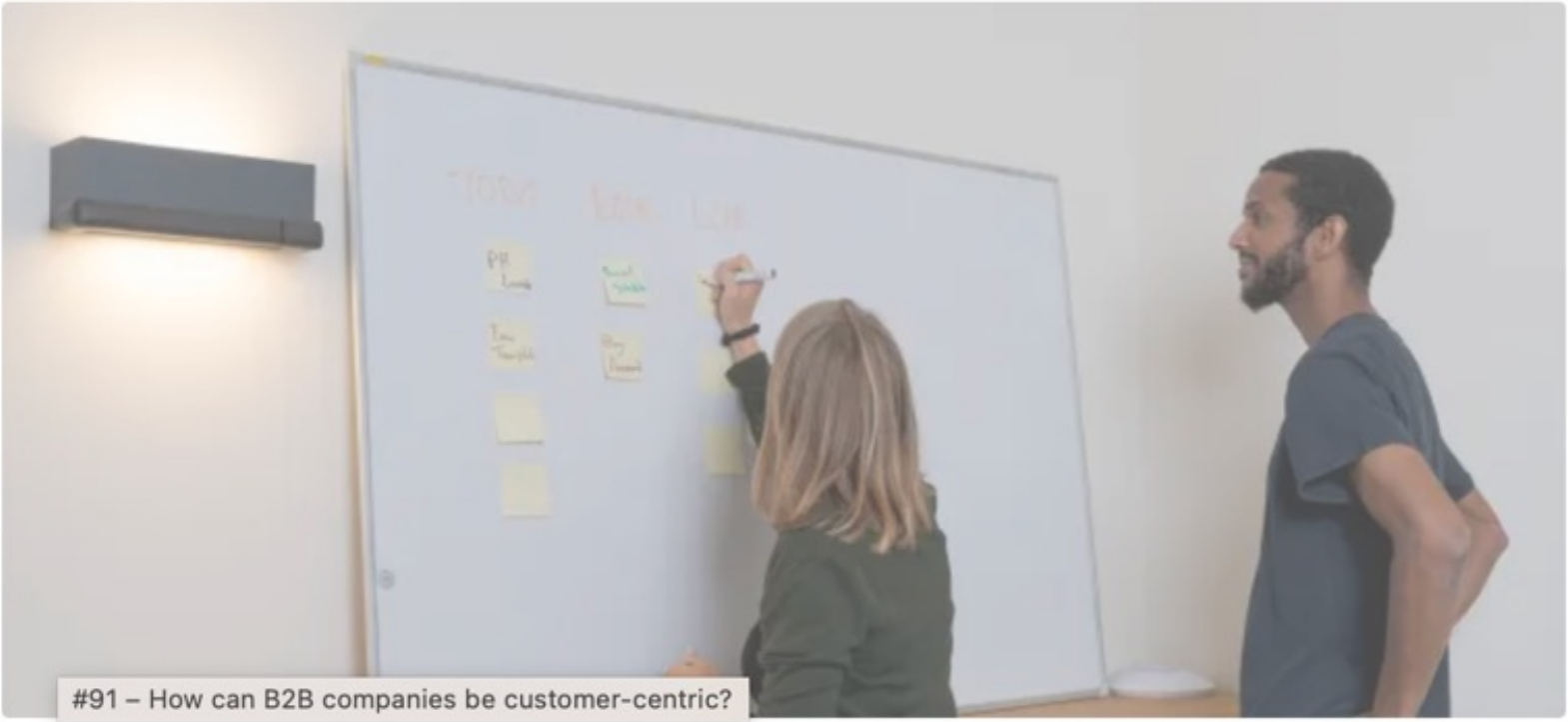
If you wish to continue exploring the topics of this course you can consider to take do your thesis within our research group:

https://leadinlabtheses.wordpress.com/



#90 – Reframing Myself: a cognitive approach to individual thinking about innovation of meaning

#91 – How can B2B companies be customer-centric?



#92 – Innovation and the phygital customer experience: what's for the front-line employees?

#93 – How to change the role of front-line employees?

MAY 18. 2023

Leadership & Innovation

2023/2024

Leadership and Innovation of Meaning

Emilio Bellini

LEADIN' LAB – Leadership Design and Innovation Laboratory

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

Leadership and Innovation

POLITECNICO DI MILANO

Module on Innovation

Organizing the Innovation process: from to traditional process to Open & Agile Innovation

Mariano Corso

Agenda

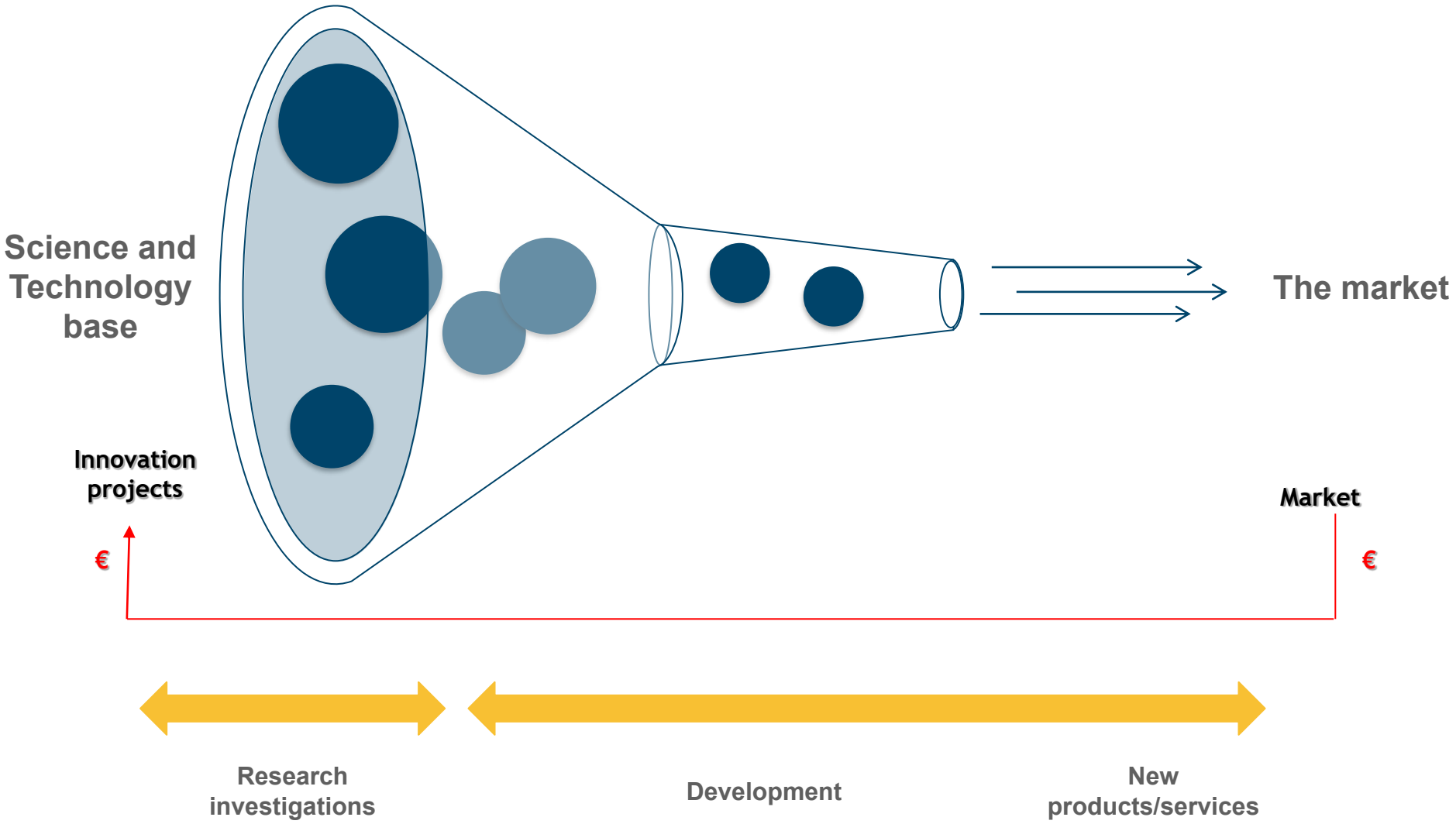
- The crisis of traditional innovation approaches and the rise of Open and Collaborative Innovation

- Open Innovation

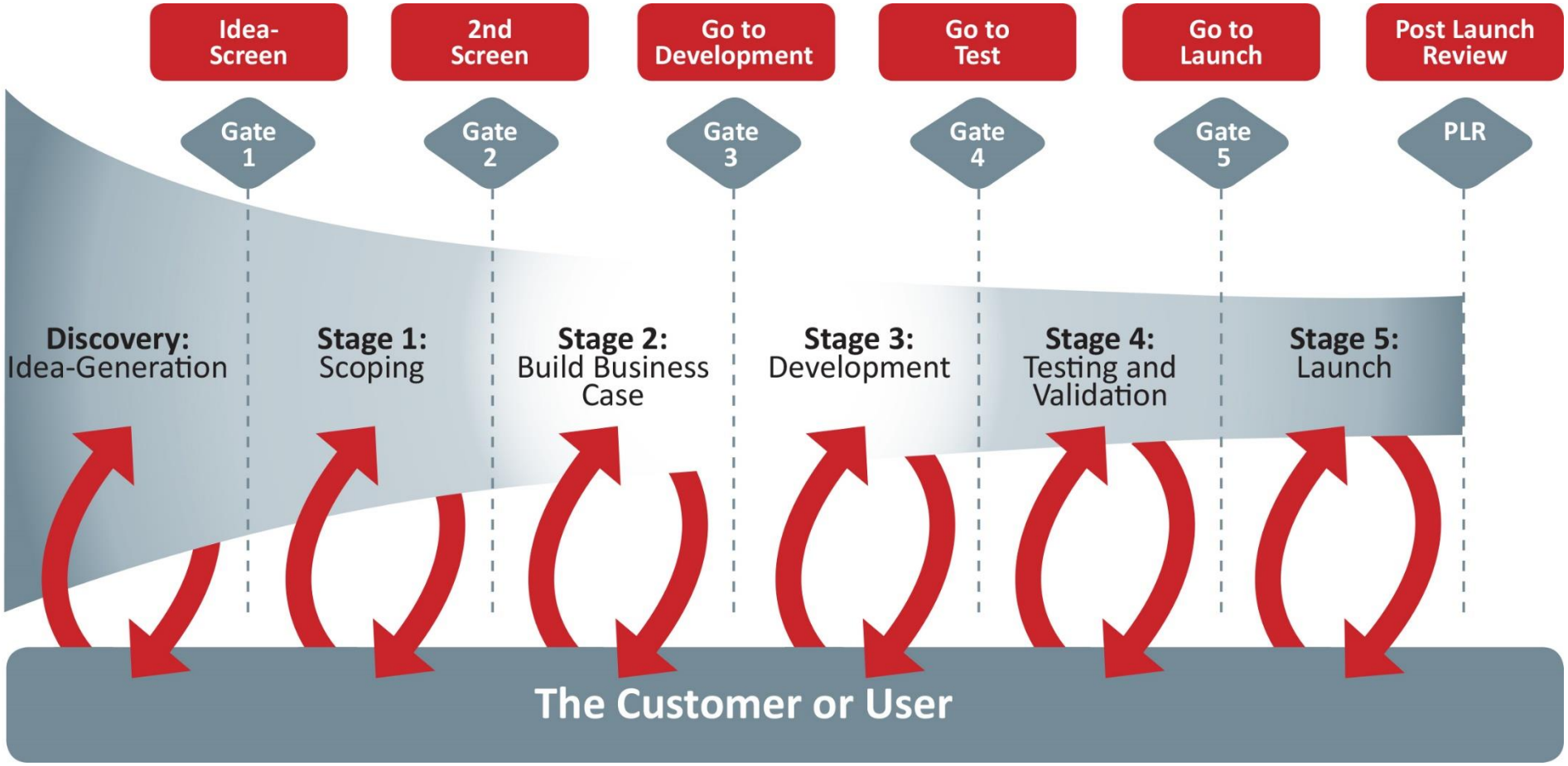
- Agile innovation and Agile organization

© POLITECNICO DI MILANO

The “traditional” innovation funnel



The Stage-Gate model (Cooper, 1986)



© POLITECNICO DI MILANO

Managing Innovation

Historically, efforts in innovation management focused on *internal organizational issues*

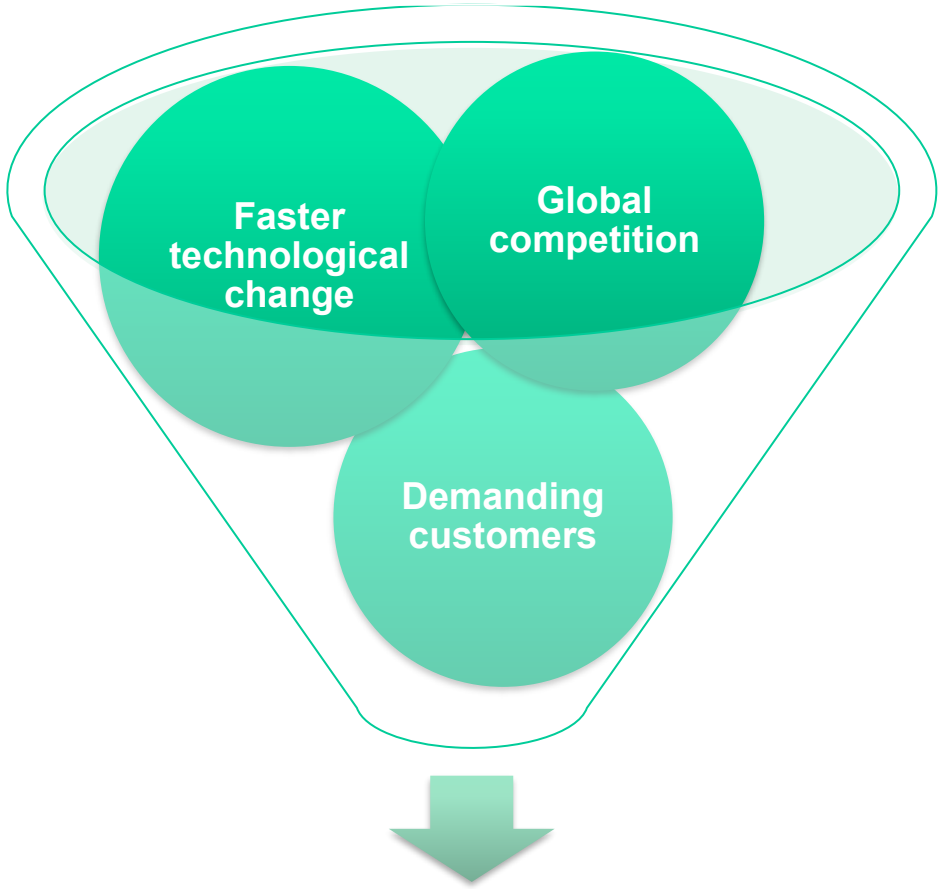
- Creating an innovative climate inside the company
- Select the right projects (and kill them when needed)
- Executing and monitoring projects

These issues are all still important …

BUT

© POLITECNICO DI MILANO

The crisis of traditional approaches to innovation



Intensifying competition

© POLITECNICO DI MILANO

The crisis of traditional approaches to innovation

- **Not always more R&D is better**: increased R&D expenditure without the corresponding **link to new products leads to serious questions from shareholders**

- The **ability to capture ideas from R&D** and convert these into products and services that **people want to buy** is more significant than idea-generation

- Investing in new Ideas for the existing businesses may not be enough: the European Industrial Management Association (EIRMA, 1985) recognised R&D as having three distinct areas, each requiring investment:
  i. R&D for existing businesses
  ii. R&D for new businesses
  iii. R&D for exploratory research

© POLITECNICO DI MILANO

The crisis of traditional approaches to innovation

Shortening life cycles of innovations

- In the early 1980s **hard disk drives** would typically ship for four to six years, by the end of 1990s the period was just six to nine months
- The time period between two competing **drugs** on the market is currently less than four months, up form 6 years in the late 1980s

Rising costs of innovation development

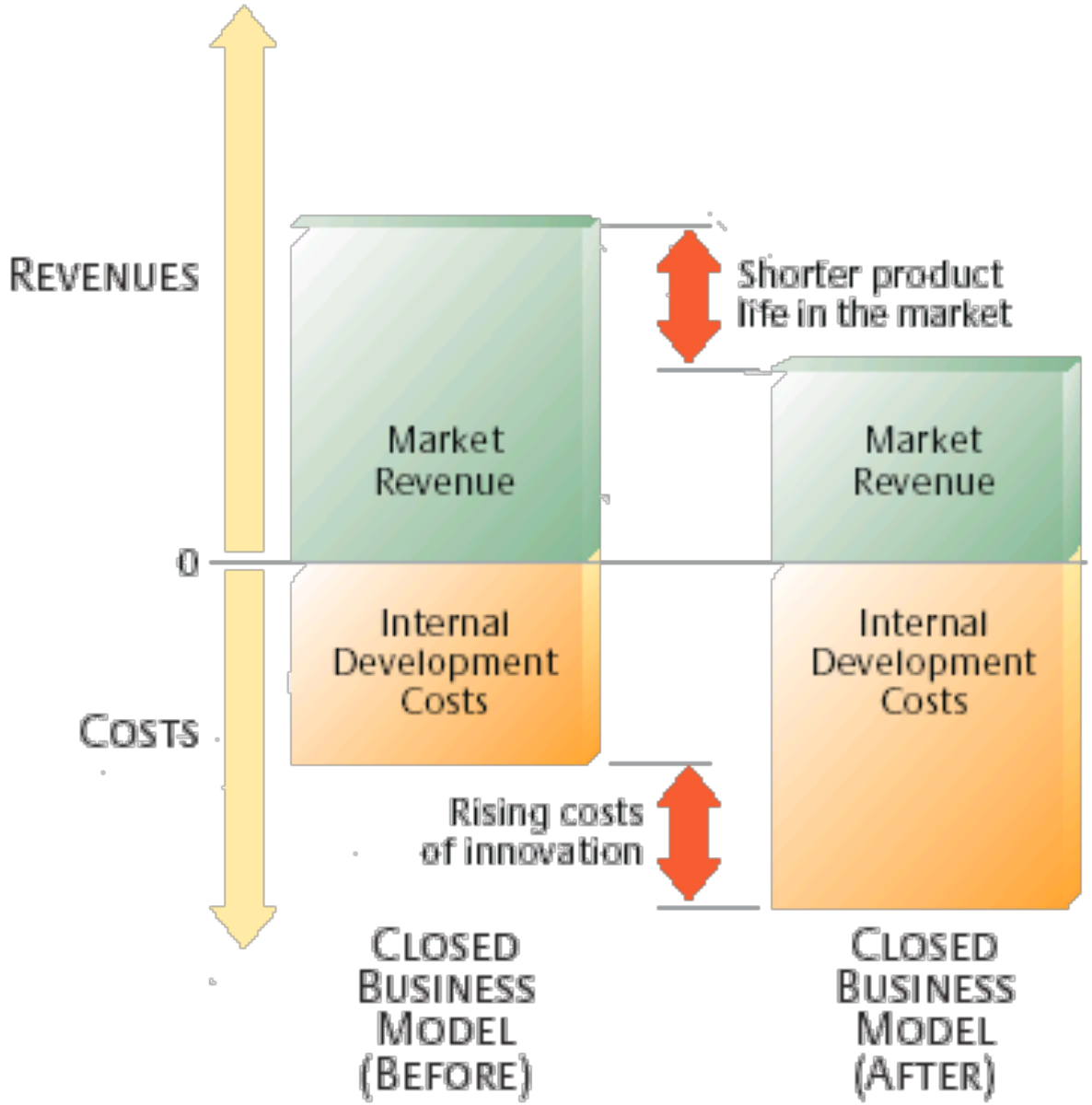
- The cost of building a semiconductor fabrication facility in 2006 is nearly 3 $ billion … it would have cost nearly 1% of that in 1986
- The cost of developing a new drug is currently well over 800 $ million, up more than ten-fold from the mid of 1990s

© POLITECNICO DI MILANO

The crisis of traditional approaches to innovation

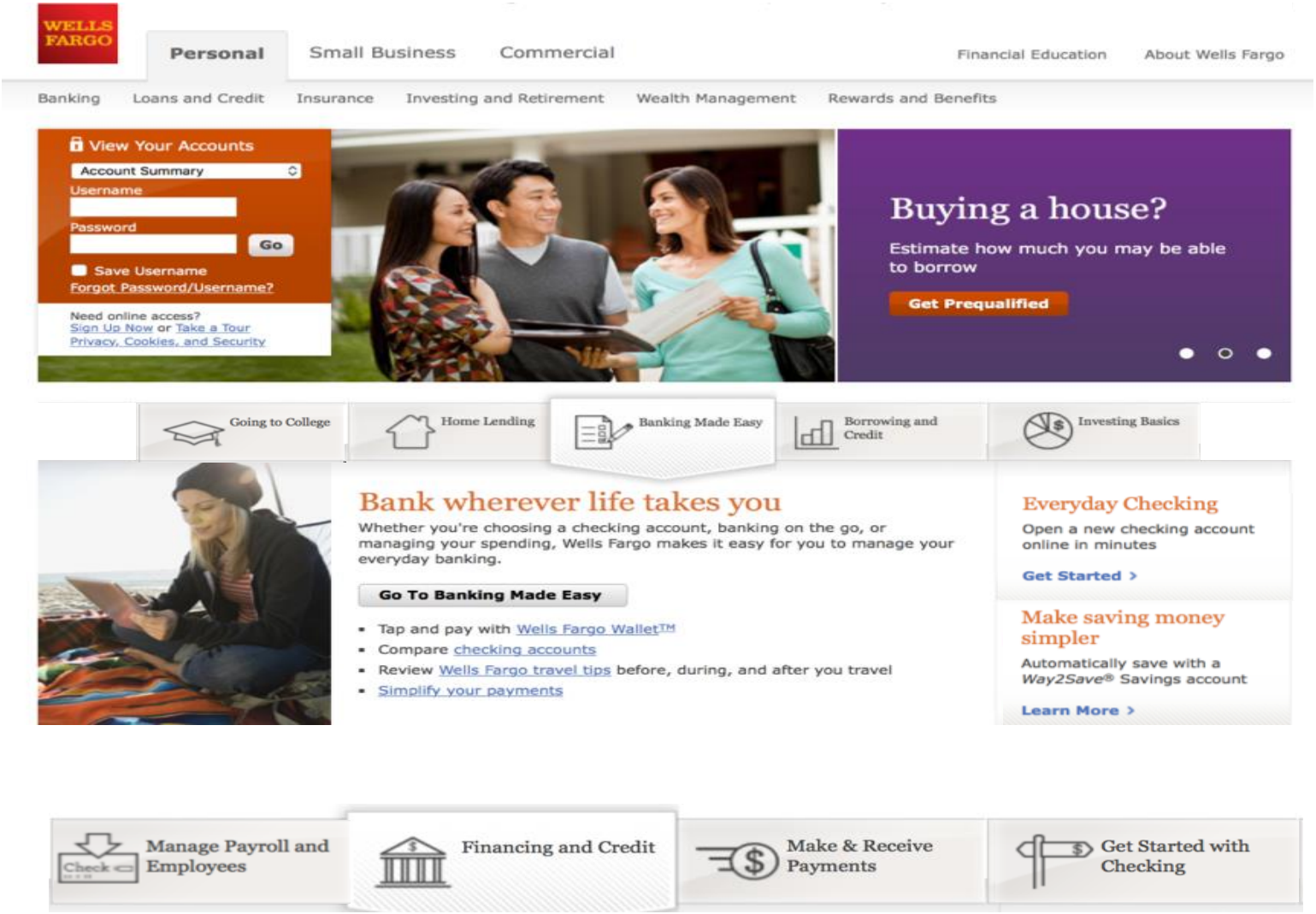
Shortening life cycles of innovations

Rising costs of innovation development



© POLITECNICO DI MILANO

A «larger» competition to face…

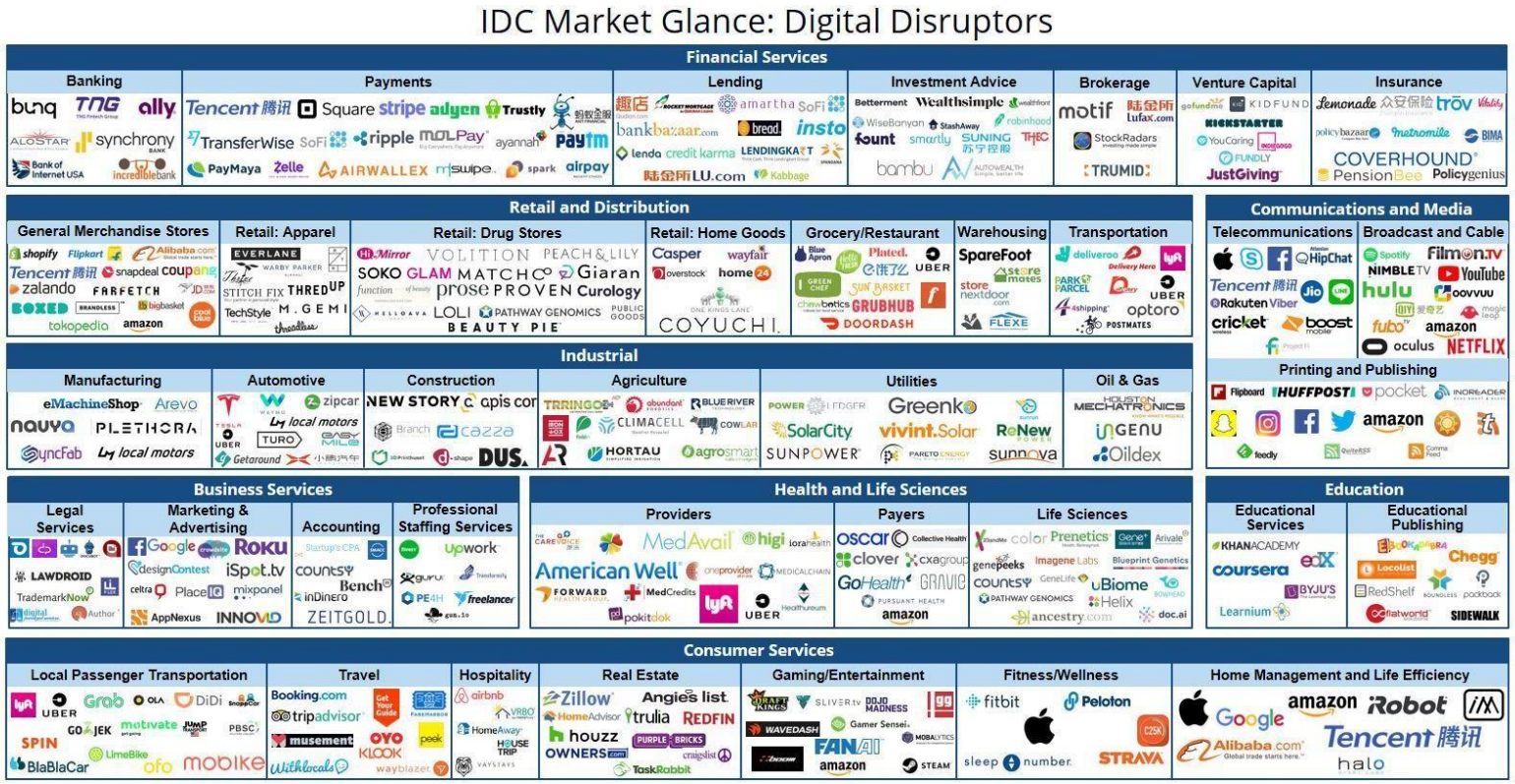


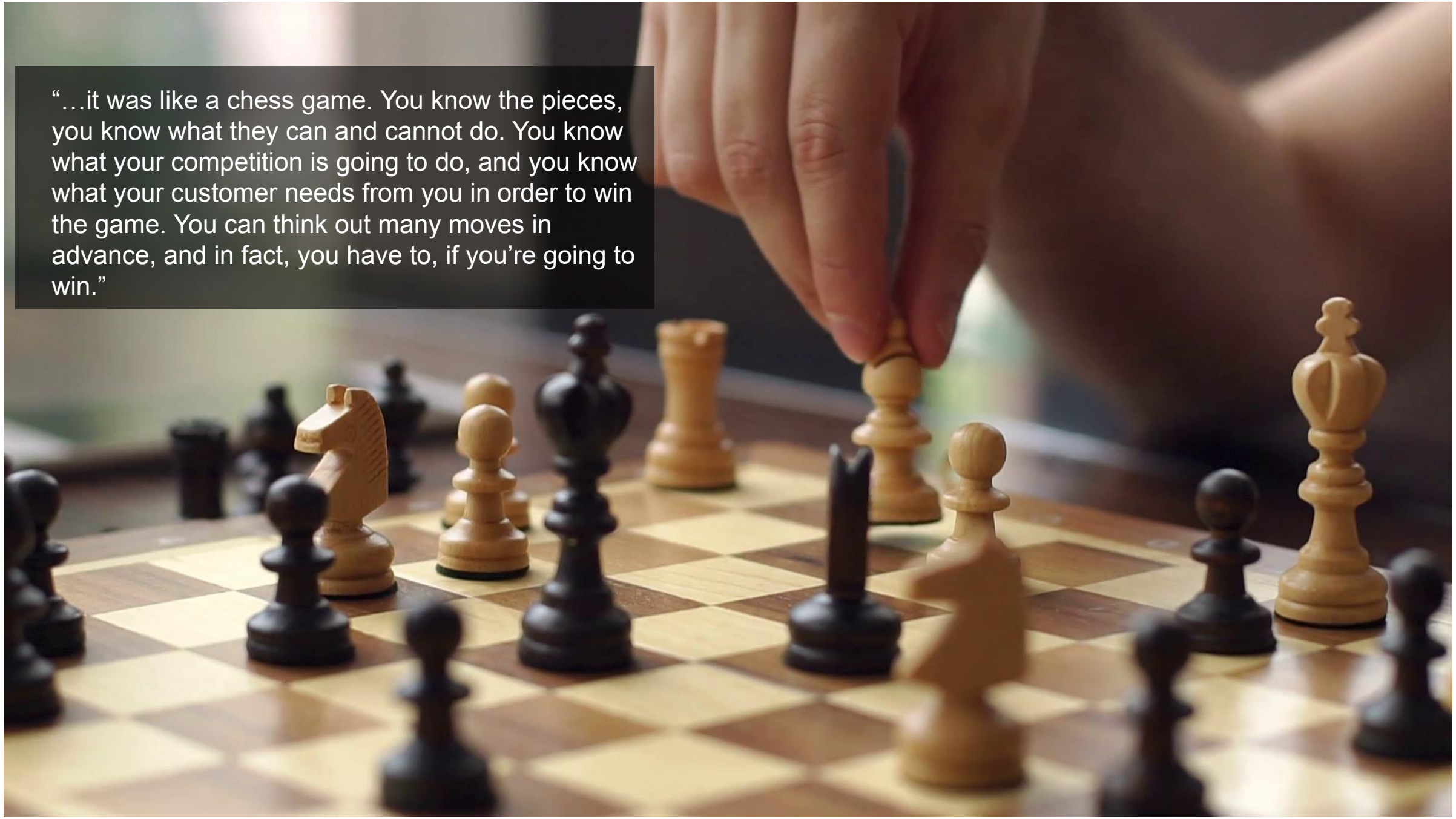
A «larger» competition to face…

Source: CBInsights

The crisis of traditional approaches to innovation

Beware of the «Not In My Industry» (NIMI) Syndrome: enlarged competition is become the rule everywhere!





"…it was like a chess game. You know the pieces, you know what they can and cannot do. You know what your competition is going to do, and you know what your customer needs from you in order to win the game. You can think out many moves in advance, and in fact, you have to, if you're going to win."

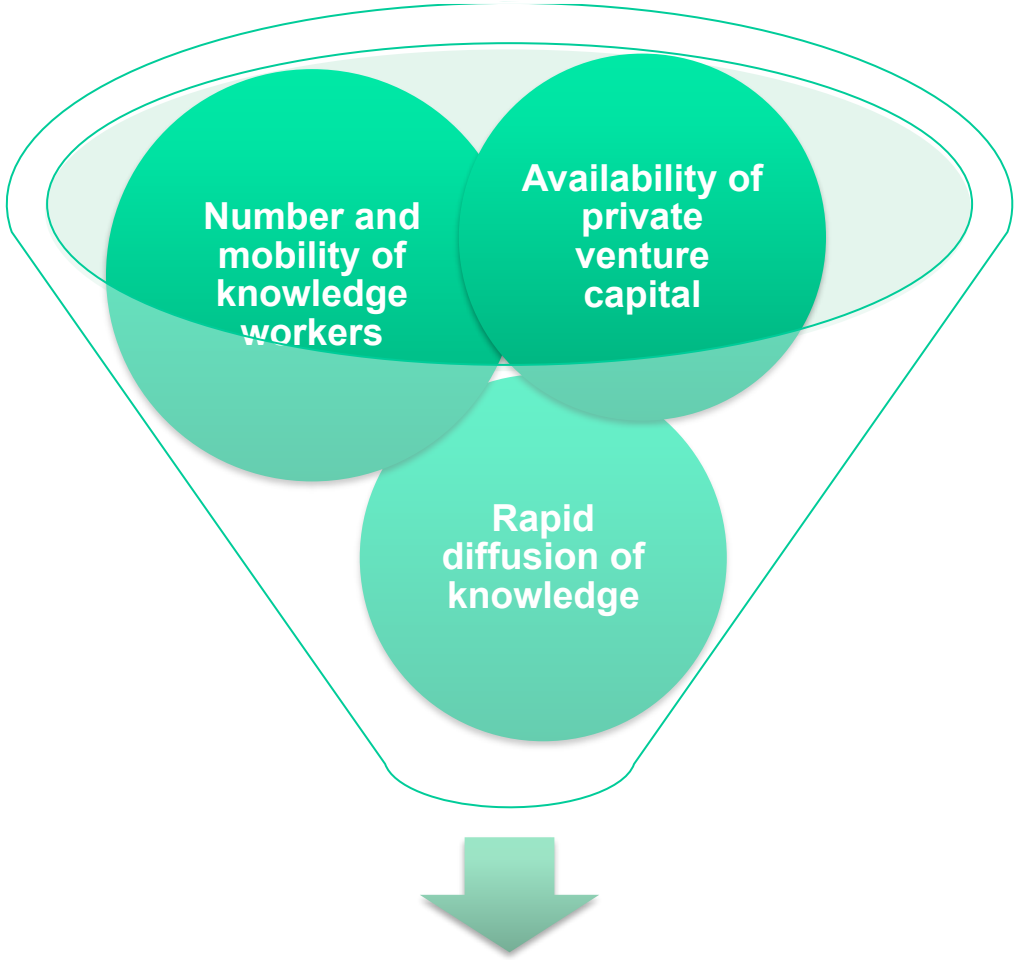
© POLITECNICO DI MILANO

"… Now you have to play poker. You don't have the information in advance. You can't really predict what will happen, but you still have to decide whether to continue investing to stay in the game and see the next cards …"

James McGroddy, ex IBM Research Director

© POLITECNICO DI MILANO

Opportunities for changes in the innovation landscape



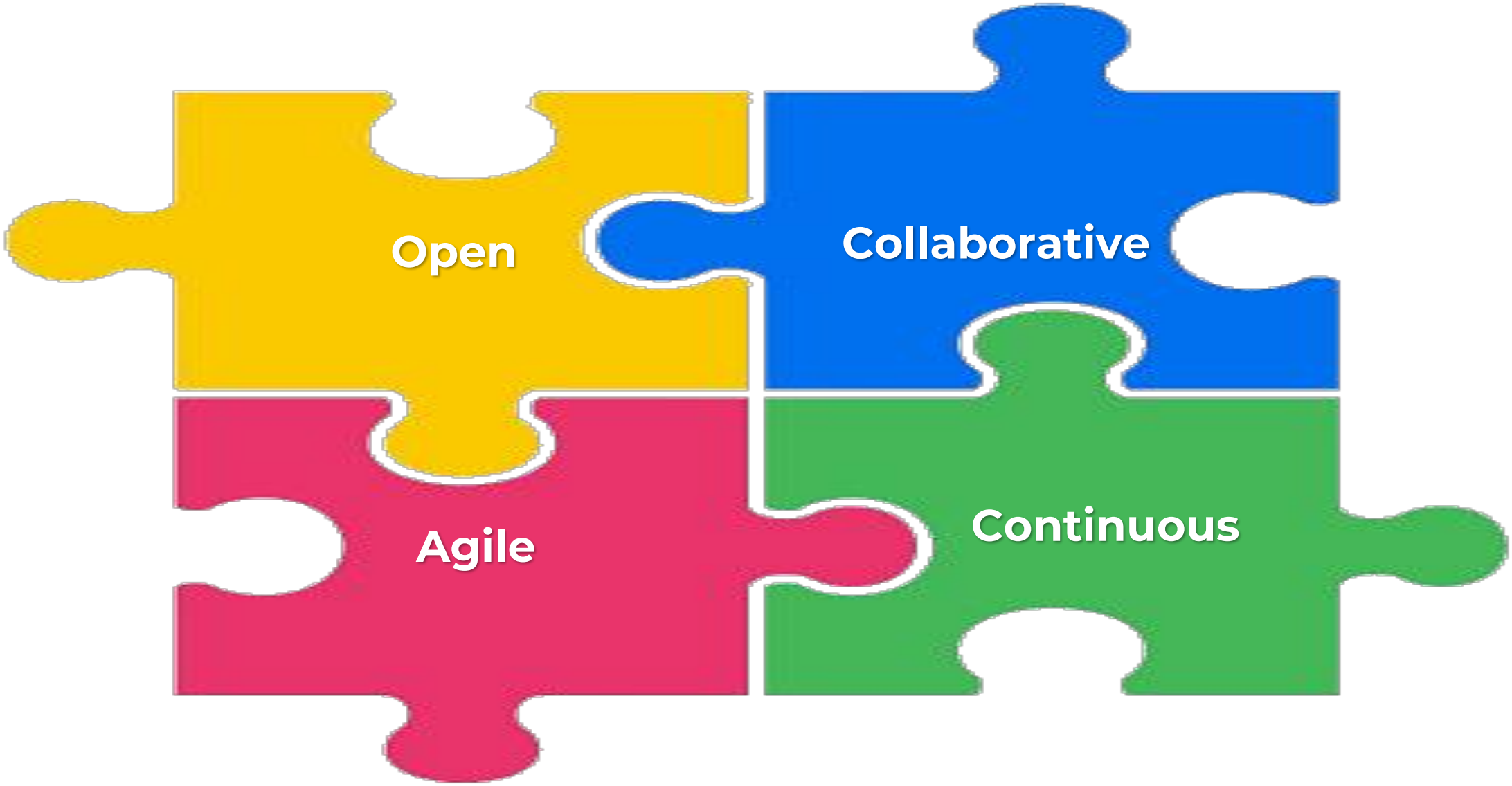
Technology and innovation competences are available on the market

© POLITECNICO DI MILANO

How to deal with this challenge?

© POLITECNICO DI MILANO

How should innovation be organised at the time of Digital Disruption?



© POLITECNICO DI MILANO

Collaborative Innovation

From this …

Innovation as specialization
Dedicated time and resources
Exogenous motivation

…to this

Innovation as a shared responsibility
Time and resources in competition
Endogenous motivation

© POLITECNICO DI MILANO

Continuous Innovation

Change is no longer a sporadic event, but a daily reality: organizations must know how to combine…

Capacity for innovation
The ability to develop new products and solutions, and develop the organization that will be able to prevent and meet the demands of tomorrow's customers

Operational Effectiveness
The ability to meet current market demands

© POLITECNICO DI MILANO

Agenda

- The crisis of traditional innovation approaches and the rise of Open and Collaborative Innovation
- Open Innovation
- Agile innovation and Agile organization

© POLITECNICO DI MILANO

Open Innovation in Theory: Henry Chesbrough

No one has a monopoly on knowledge the way that, say, IBM had in the 1960s in computing, or that Bell Labs had through the 1970s in communications. When useful knowledge exists in companies of all sizes and also in universities, non-profits and individual minds, it makes sense to orient your innovation efforts to accessing, building upon and integrating that external knowledge into useful products and services.

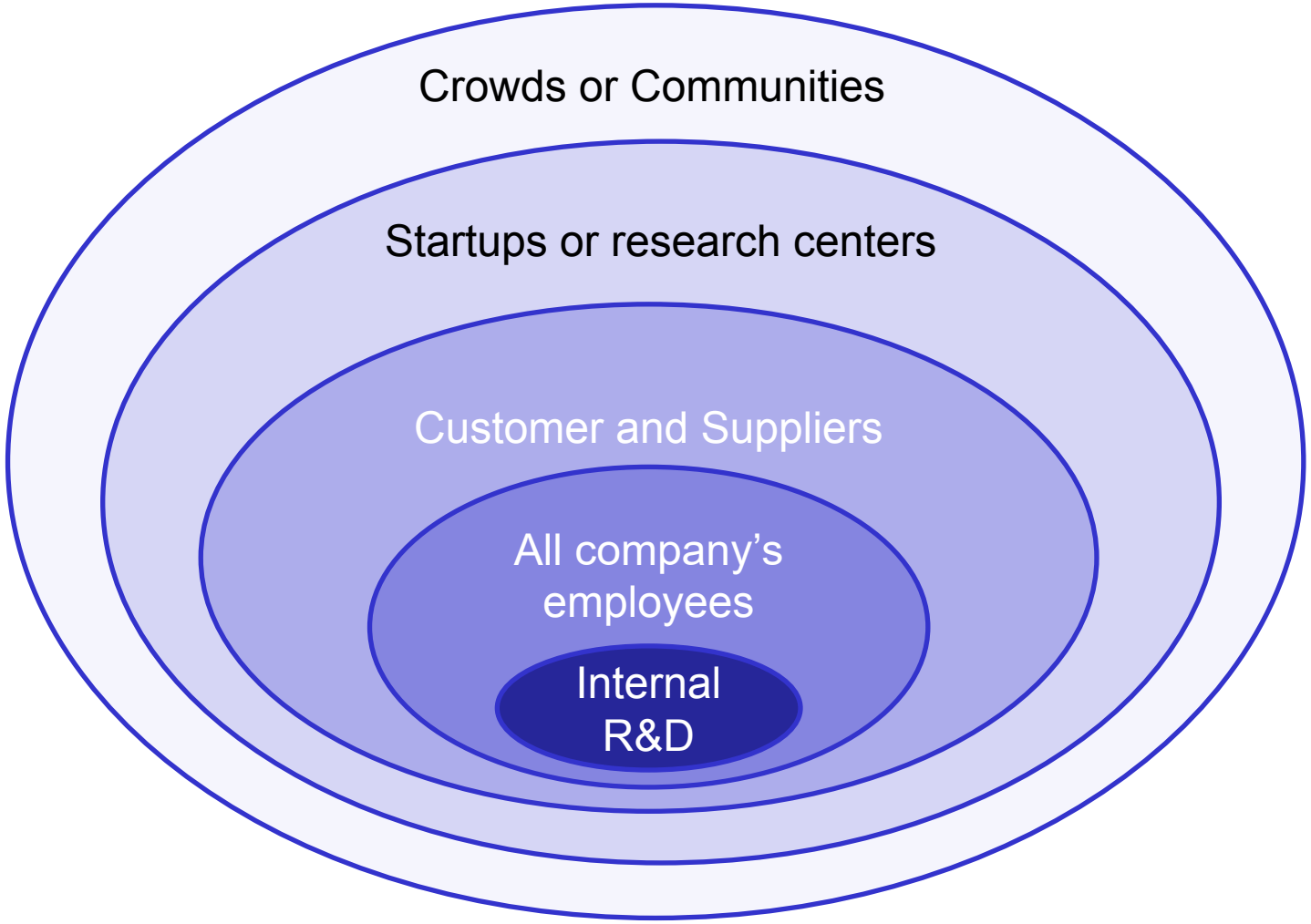
Henry Chesbrough

PICTUREQUOTES.com

PICTUREQUOTES

© POLITECNICO DI MILANO

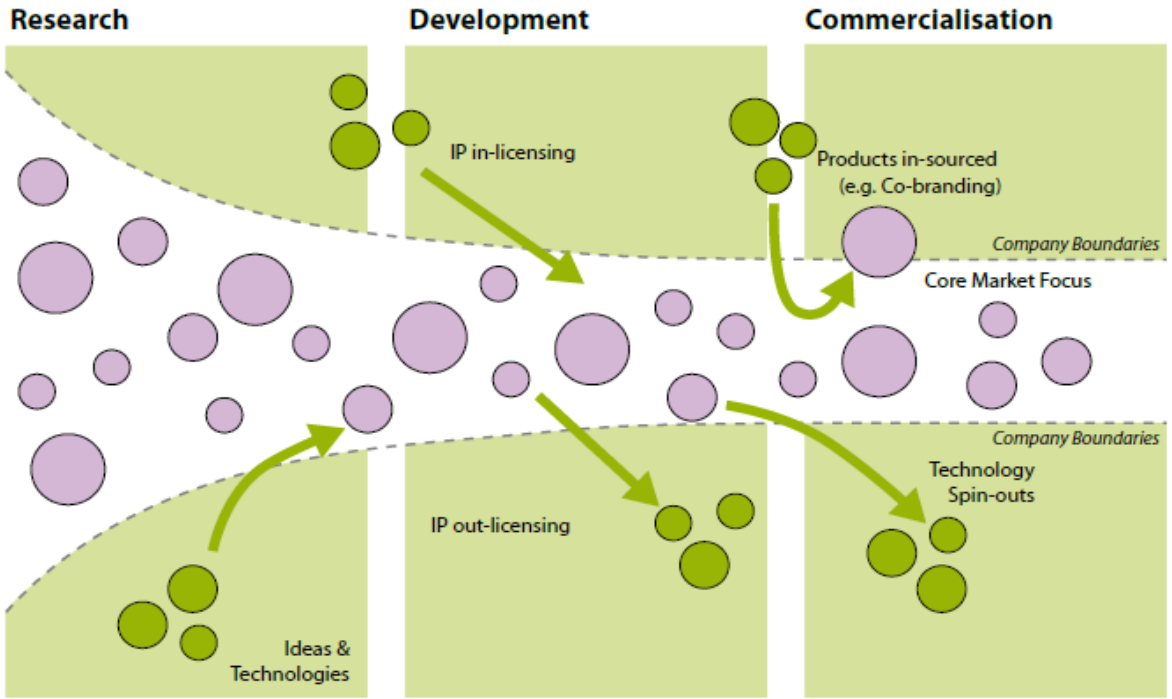
A simple and yet powerful idea: opening the boundaries of the innovation process



© POLITECNICO DI MILANO

Open Innovation: the definition

"Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets **for external use of innovation**, respectively."

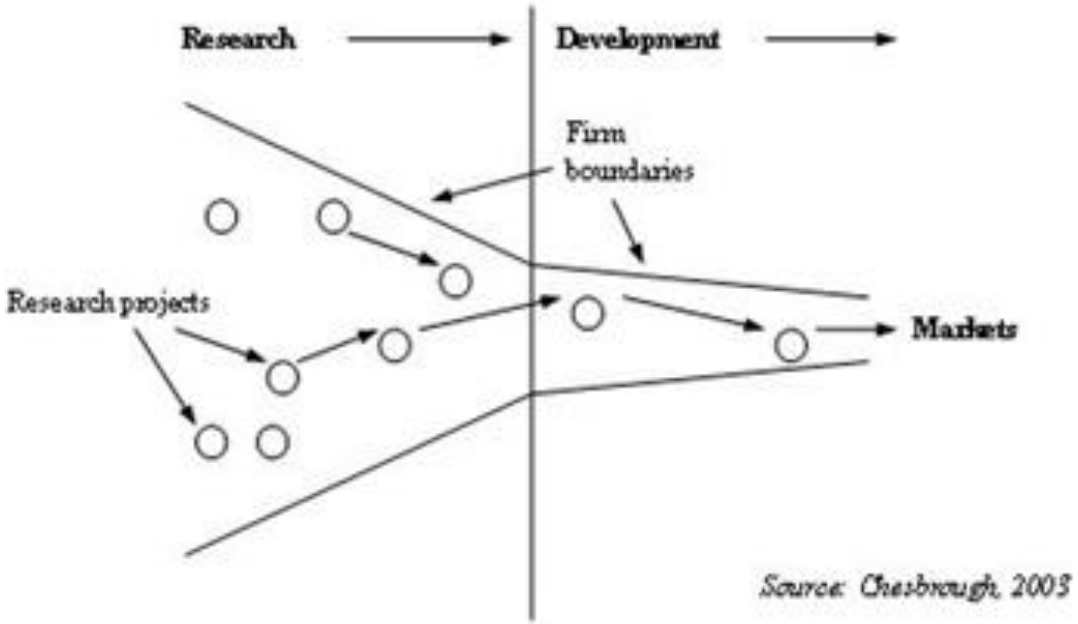


Henry Chesbrough (2006), Open Innovation: Researching a New Paradigm

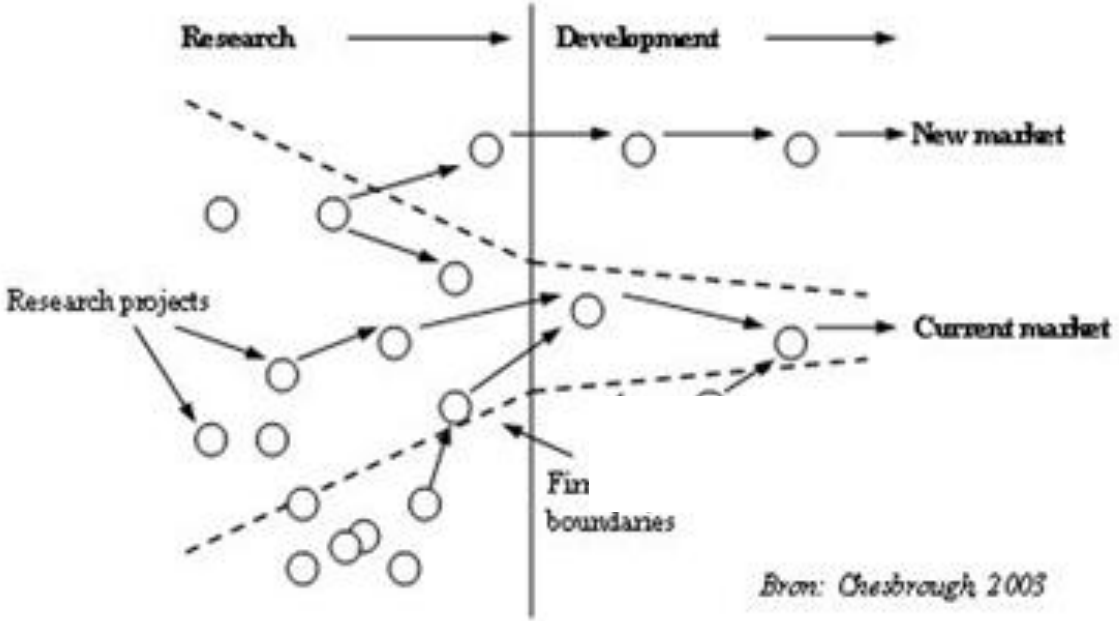
© POLITECNICO DI MILANO

Open Innovation vs Closed Innovation

Closed Innovation



Open Innovation



Chesbrough 2003, 2006

© POLITECNICO DI MILANO

Is this totally new?

© POLITECNICO DI MILANO

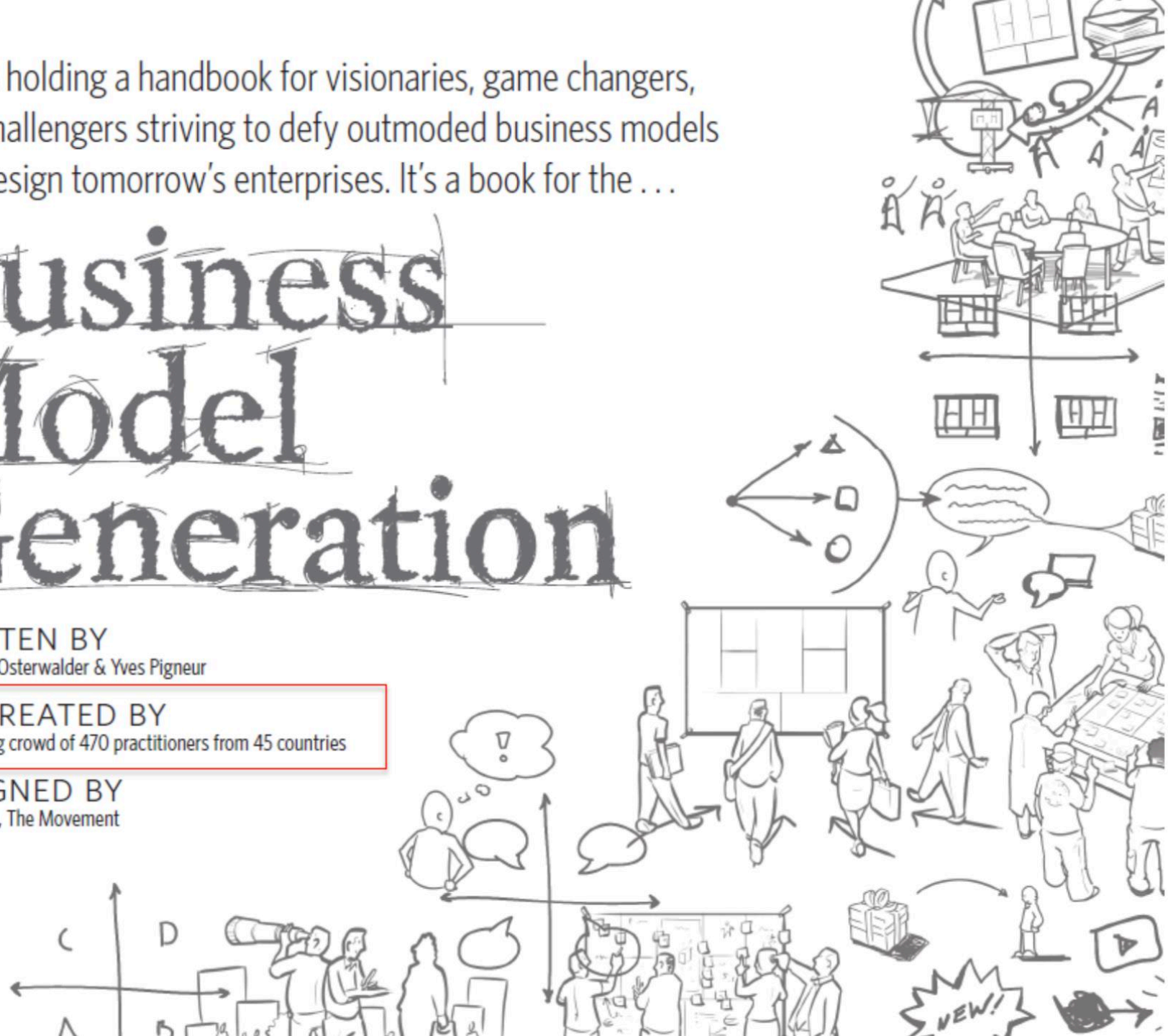
You're holding a handbook for visionaries, game changers, and challengers striving to defy outmoded business models and design tomorrow's enterprises. It's a book for the . . .

Business Model Generation

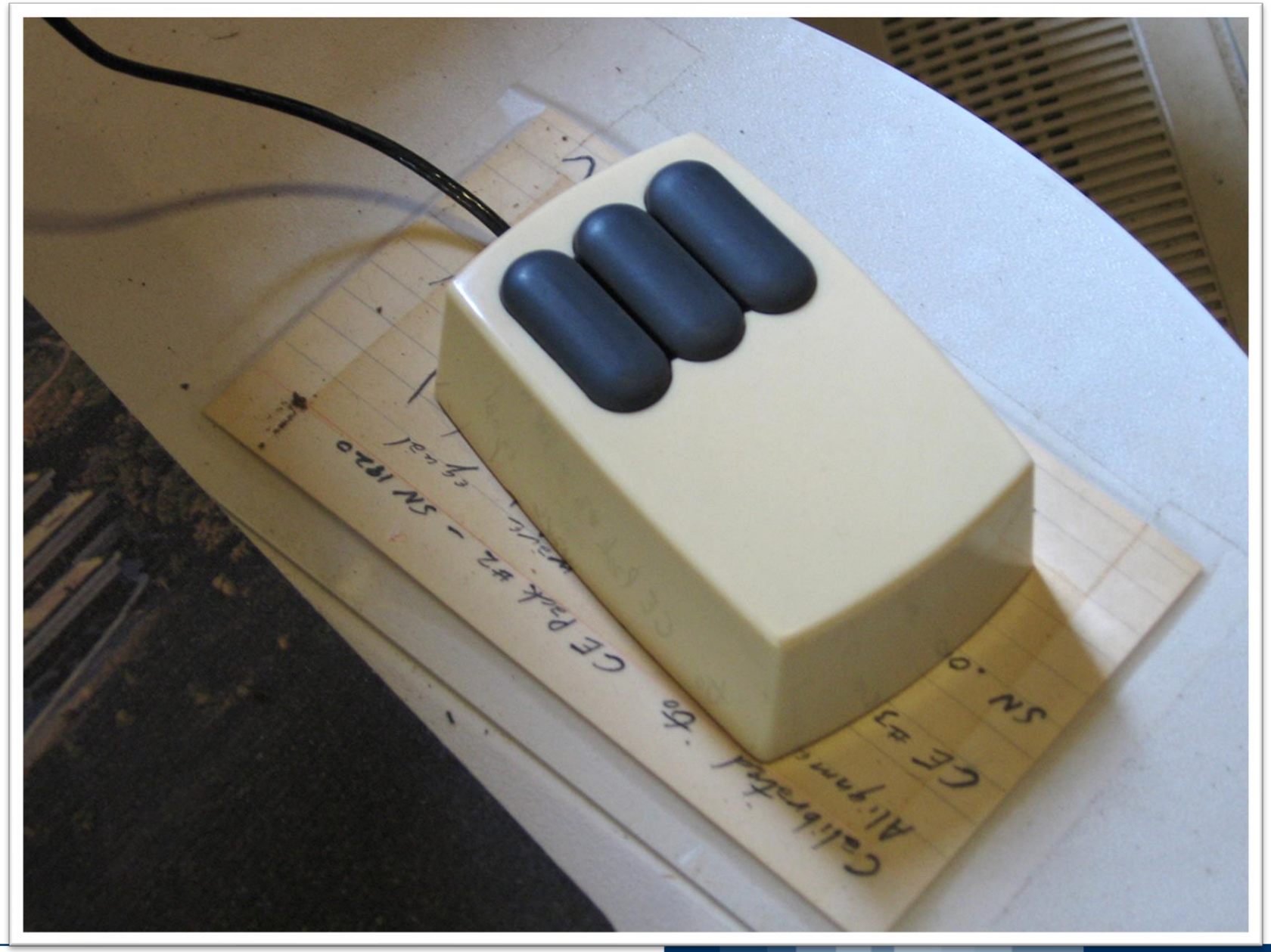
WRITTEN BY
Alexander Osterwalder & Yves Pigneur

CO-CREATED BY
An amazing crowd of 470 practitioners from 45 countries

DESIGNED BY
Alan Smith, The Movement



Who invented this?

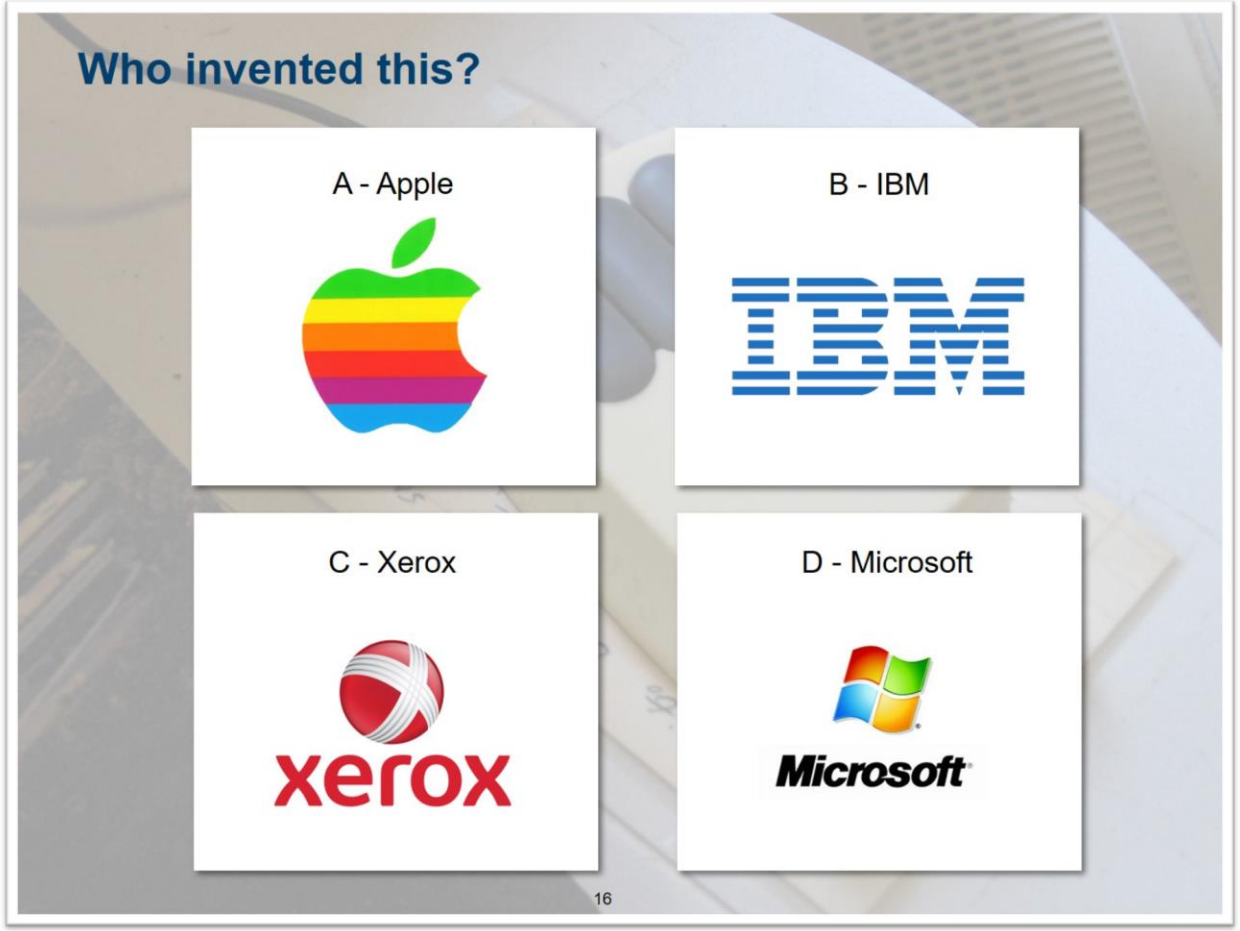


© POLITECNICO DI MILANO

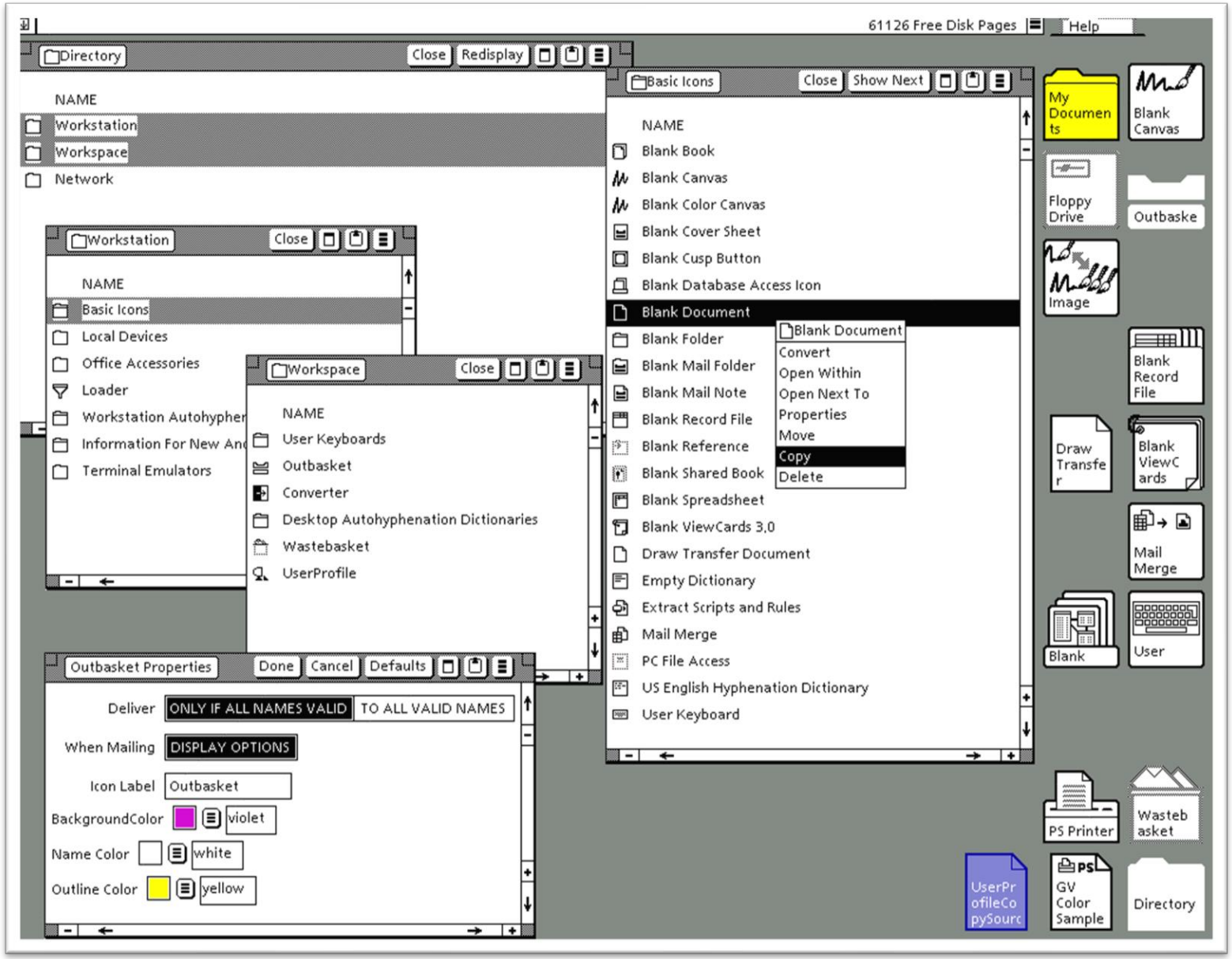
Join by Web **PollEv.com/mcorso**

Who invented this?

0



Who invented this?

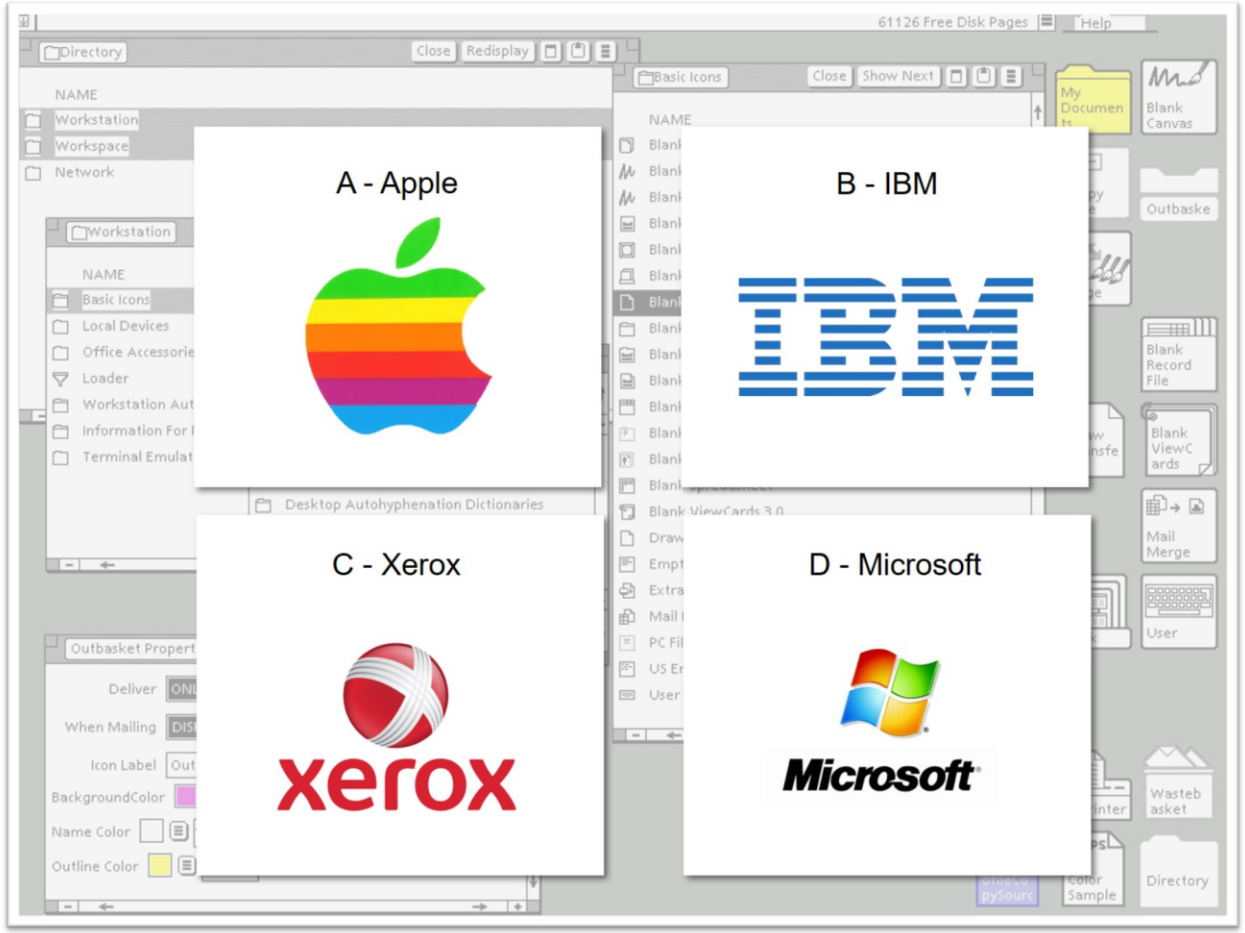


© POLITECNICO DI MILANO

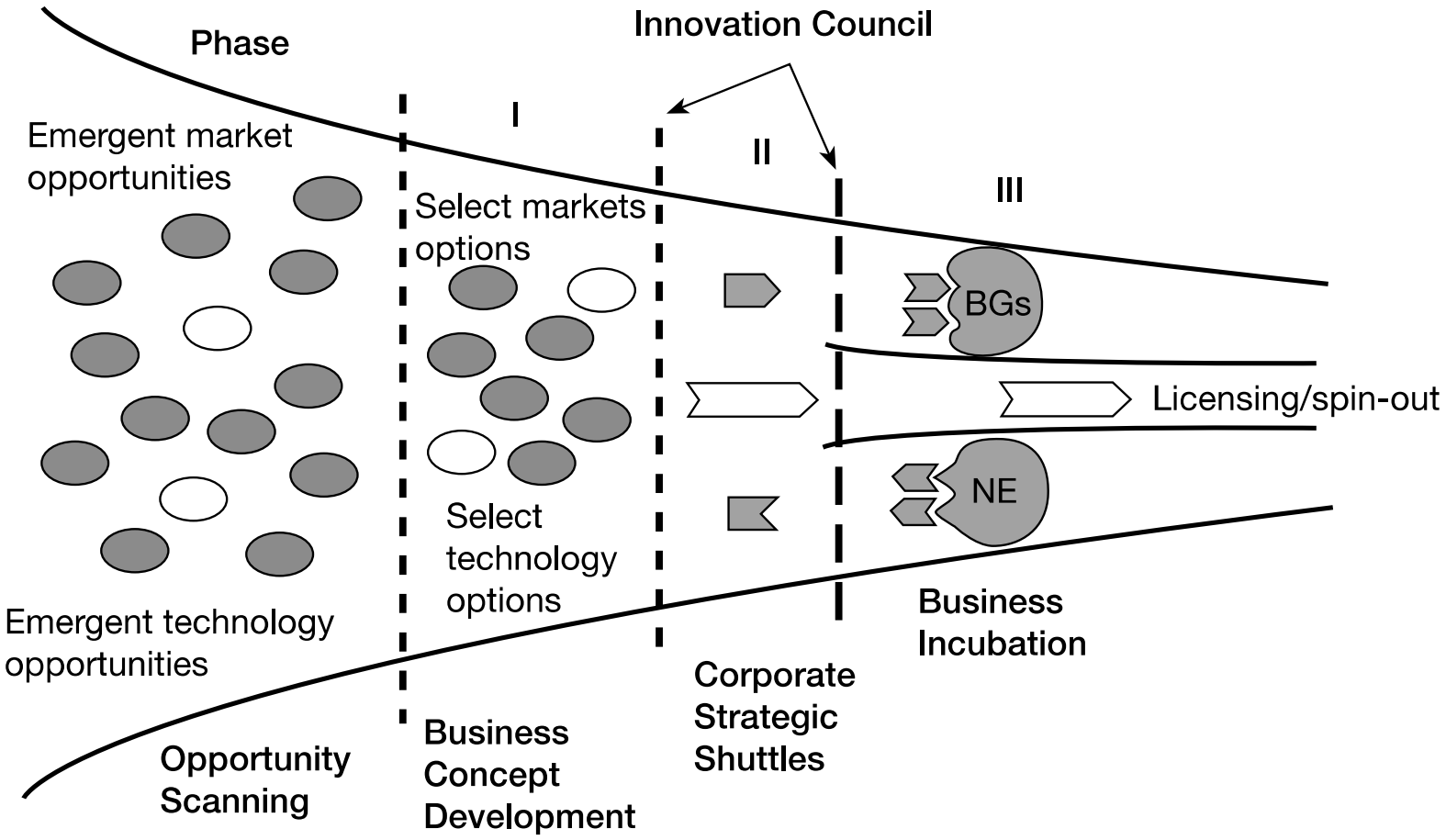
Join by Web **PollEv.com/mcorso**

Who invented this?

0



The innovation funnel at Xerox



Source: H. Chesbrough, "PlaceWare: Issues in Structuring a Xerox Technology Spinout," Case no 9-699-001.

© POLITECNICO DI MILANO

Licencing and spin-out

It is unlikely that the best (or even very good) ideas are all located in one organization and, even with an idea in hand, should one organization really manage all of the technical and markets risks associated with commercializing technologies?

Prof. Raul Chao, june 5th 2012 on Forbes

© POLITECNICO DI MILANO

Open Innovation Implications: a different concept of “core” knowledge

We live today in a network of knowledge where the distinctive capability in technological innovation shift

from **know-how** to **know-where**

Beside, you need to have an

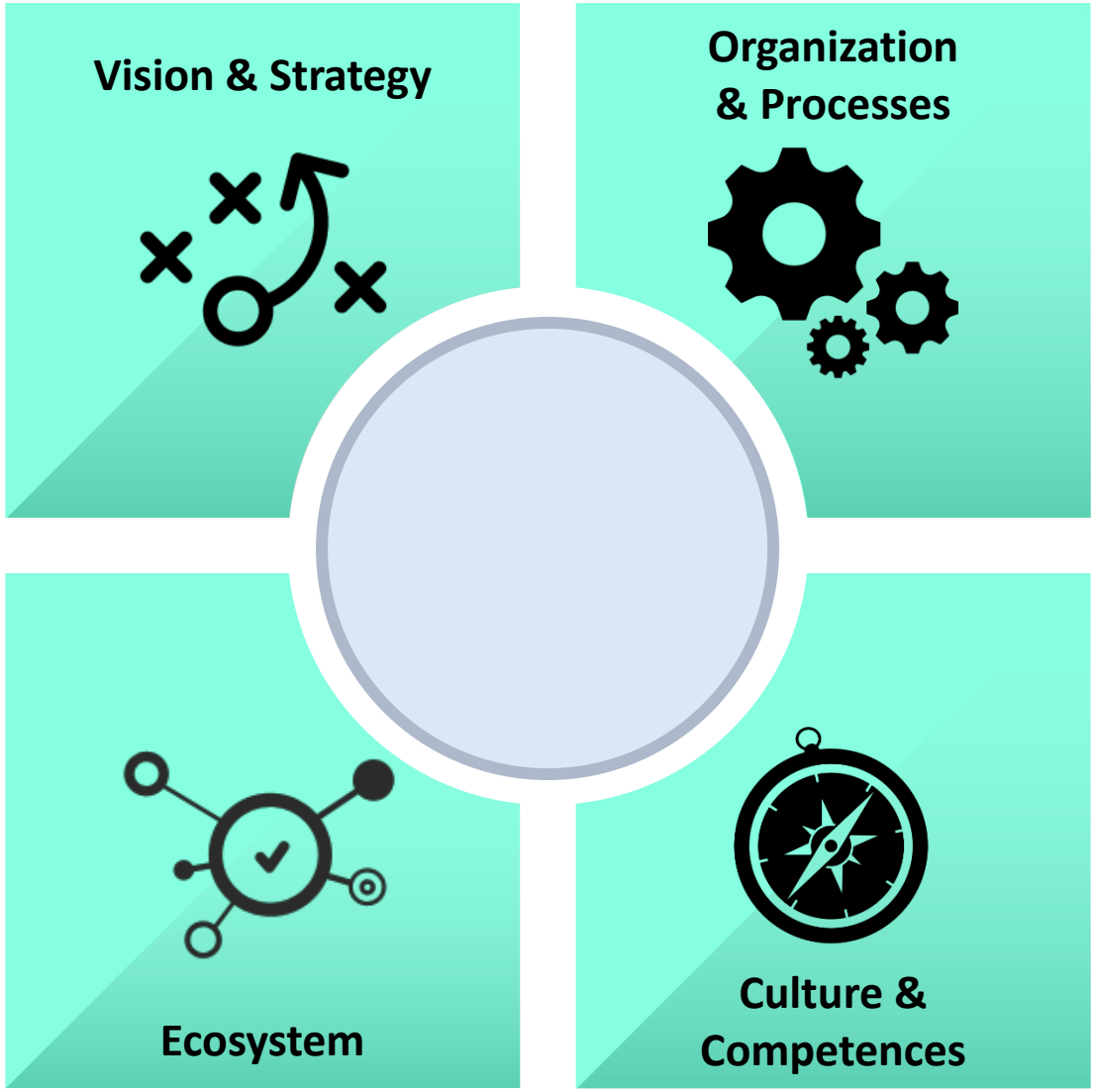
Open Culture

and a minimum ammount of critical knowledge in order to assure

Absorbitive capacity

© POLITECNICO DI MILANO

Open Innovation: enabling factors



© POLITECNICO DI MILANO

Open Innovation: enabling factors

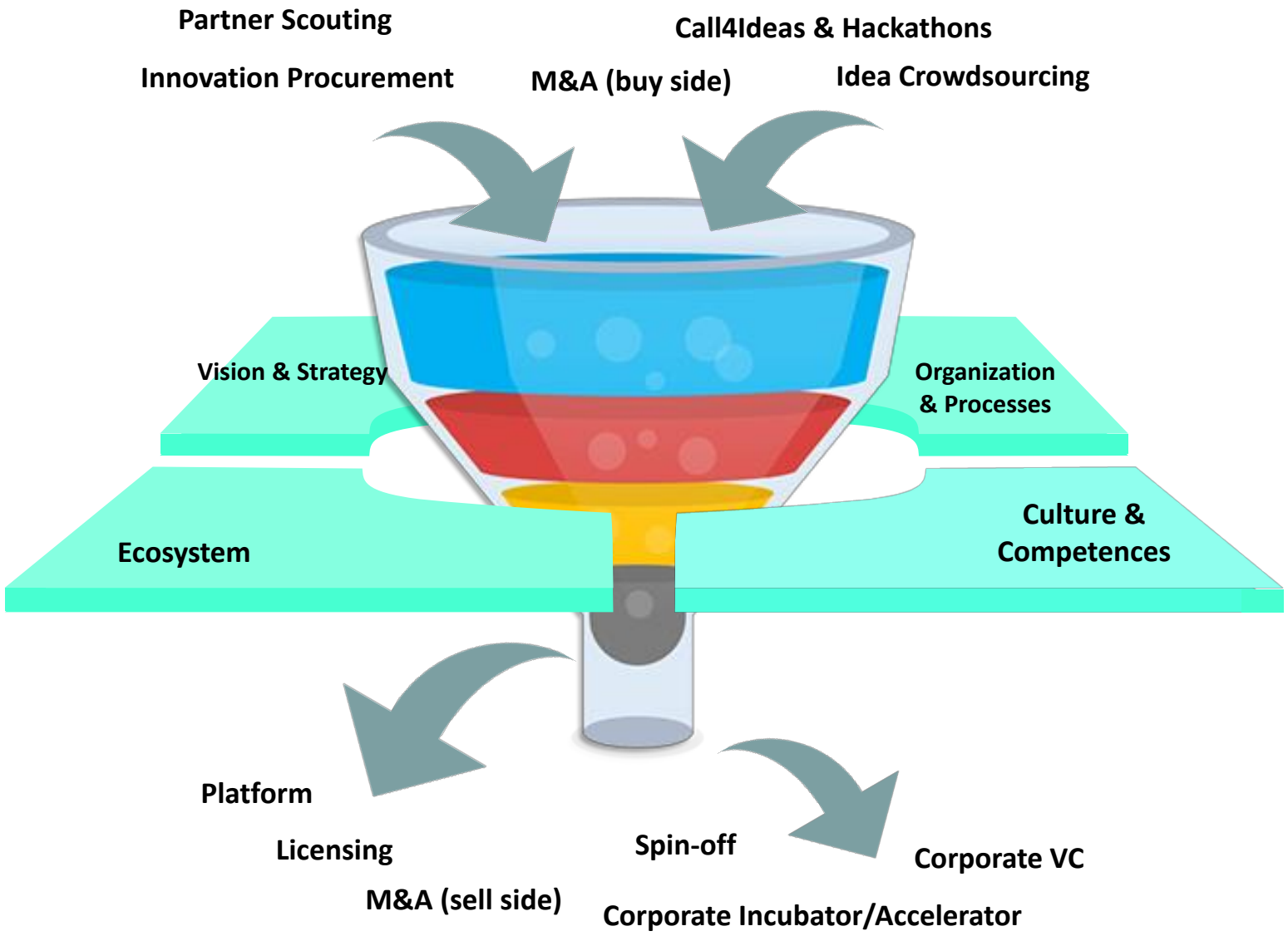
1. **Organizational culture** plays an important role in the willingness and ability of an organization to successfully profit from external sources of innovation

2. **Absorptive Capacity** by looking at the effect that internal R&D capabilities have upon the ability to utilize external knowledge

3. **Competencies:** externally sourcing innovations could change the R&D competencies of the firm, both directly and indirectly. On the one hand, resources allocated to sourcing innovations from external sources could directly reduce the resources made available for internal innovation. On the other hand, external sourcing can improve internal R&D capabilities

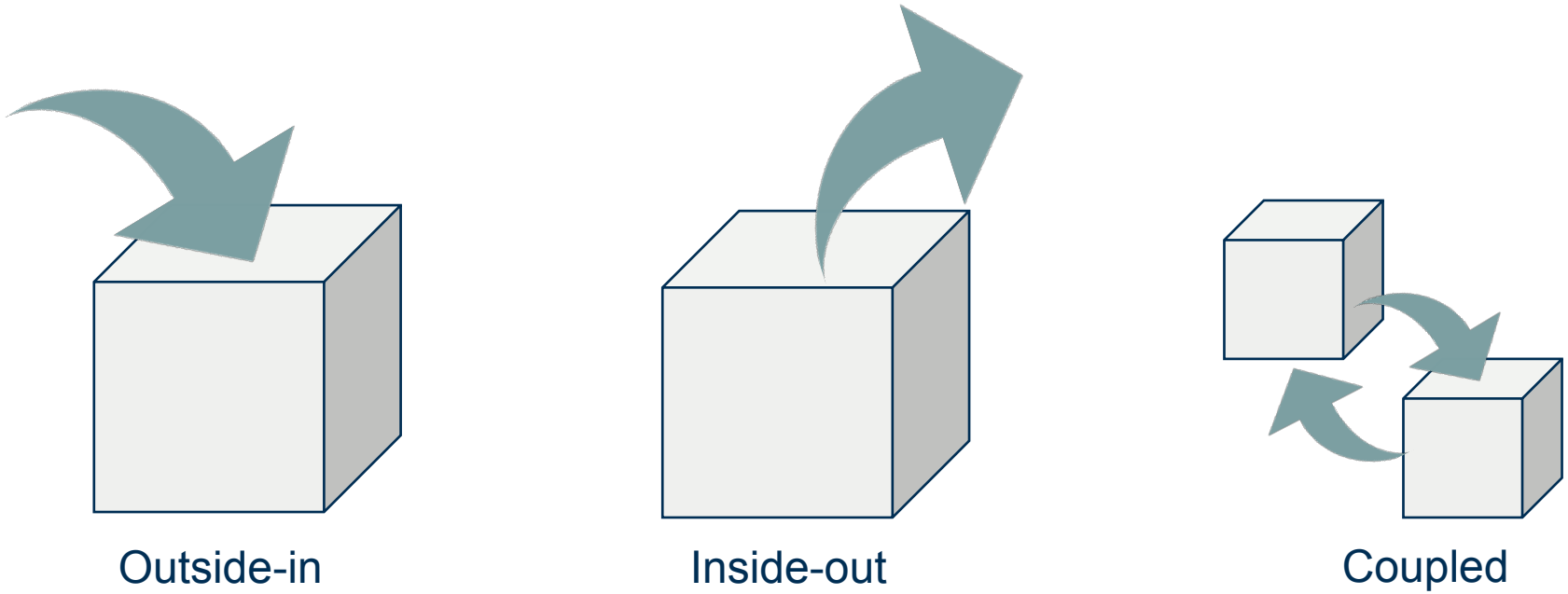
© POLITECNICO DI MILANO

Open Innovation: actions



© POLITECNICO DI MILANO

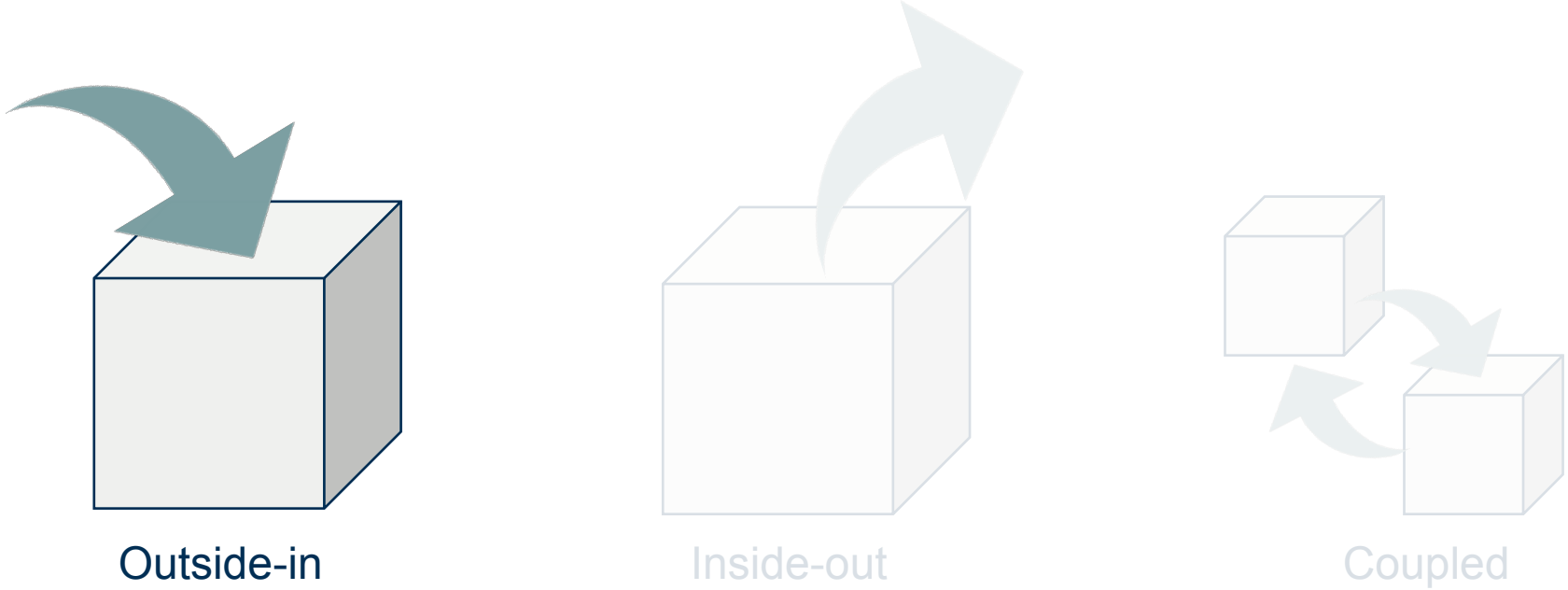
Three core processes in Open Innovation



(Enkel et al., 2009)

© POLITECNICO DI MILANO

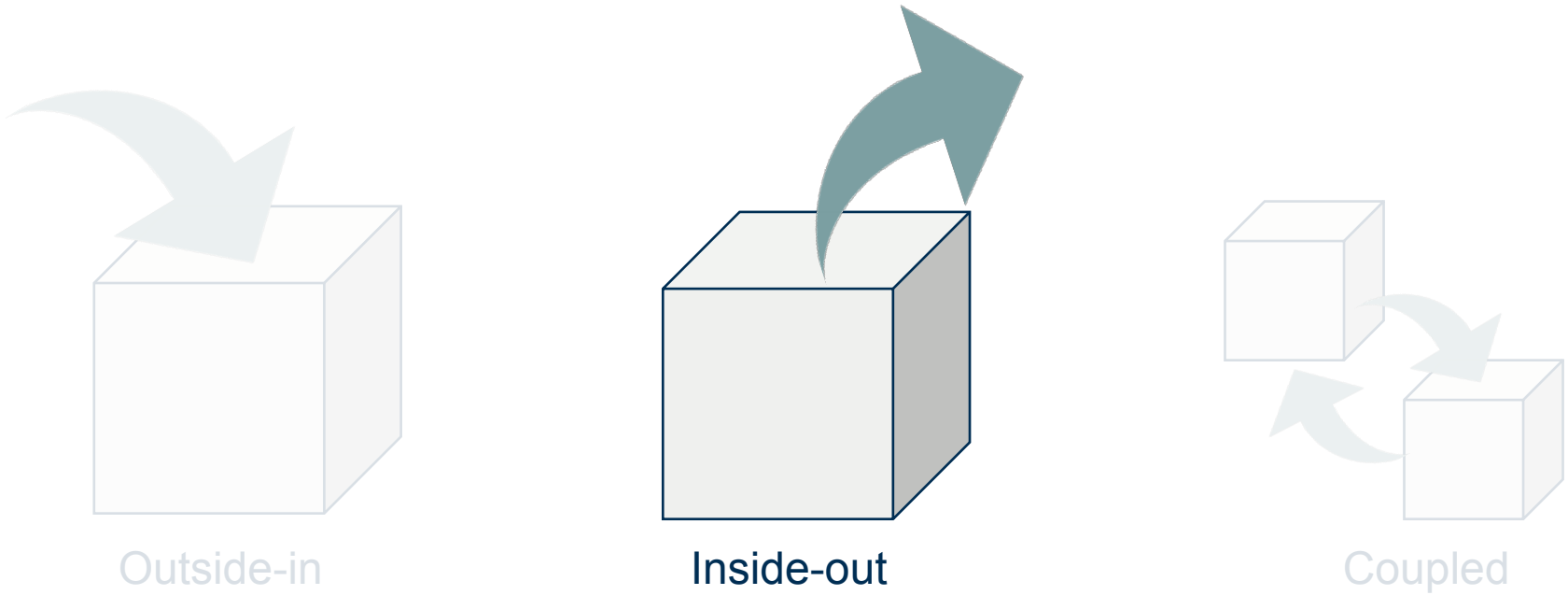
Three core processes in Open Innovation



- The **outside-in process (or inbound)**: enriching the company's own knowledge base through the integration of suppliers, customers, and external knowledge sourcing

(Enkel et al., 2009)

Three core processes in Open Innovation

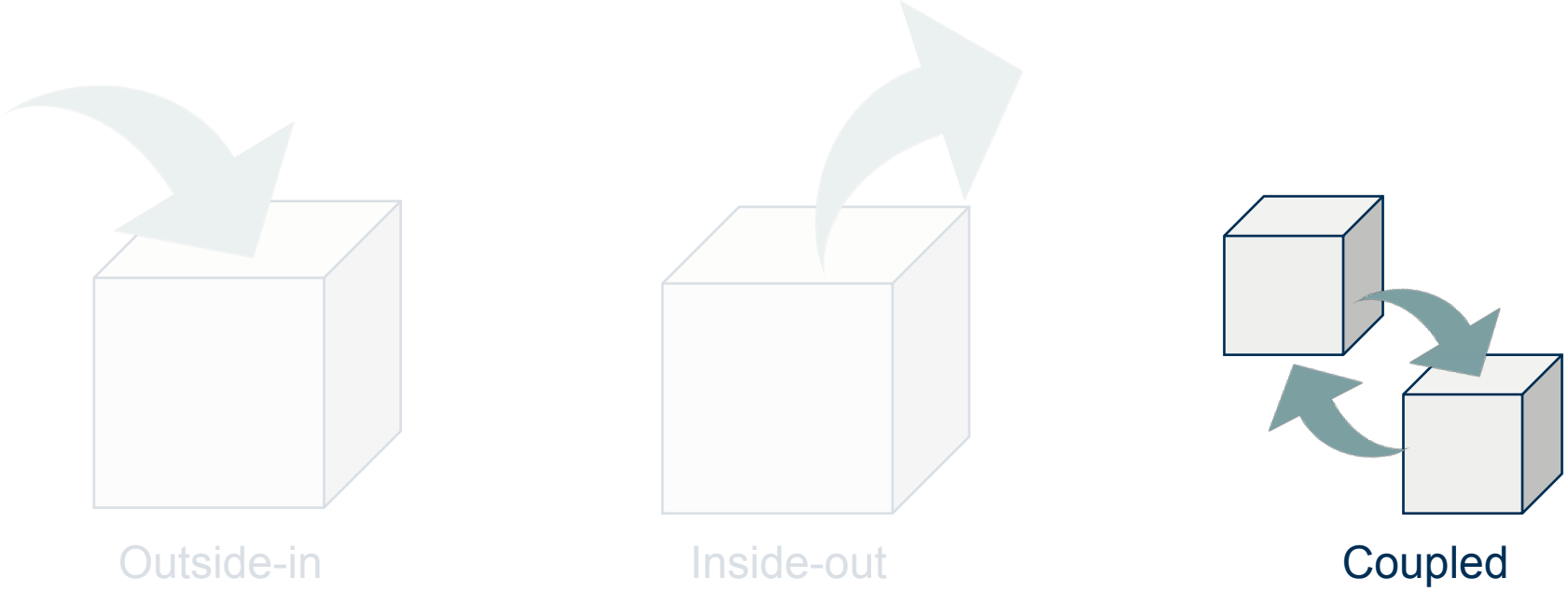


- The **inside-out process (or outbound)** refers to earning profits by bringing ideas to market, selling IP, and multiplying technology by transferring ideas to the outside environment. Companies that establish the inside-out process as key, focus on externalizing their knowledge and innovation in order to bring ideas to market faster than they could through internal development

(Enkel et al., 2009)

© POLITECNICO DI MILANO

Three core processes in Open Innovation

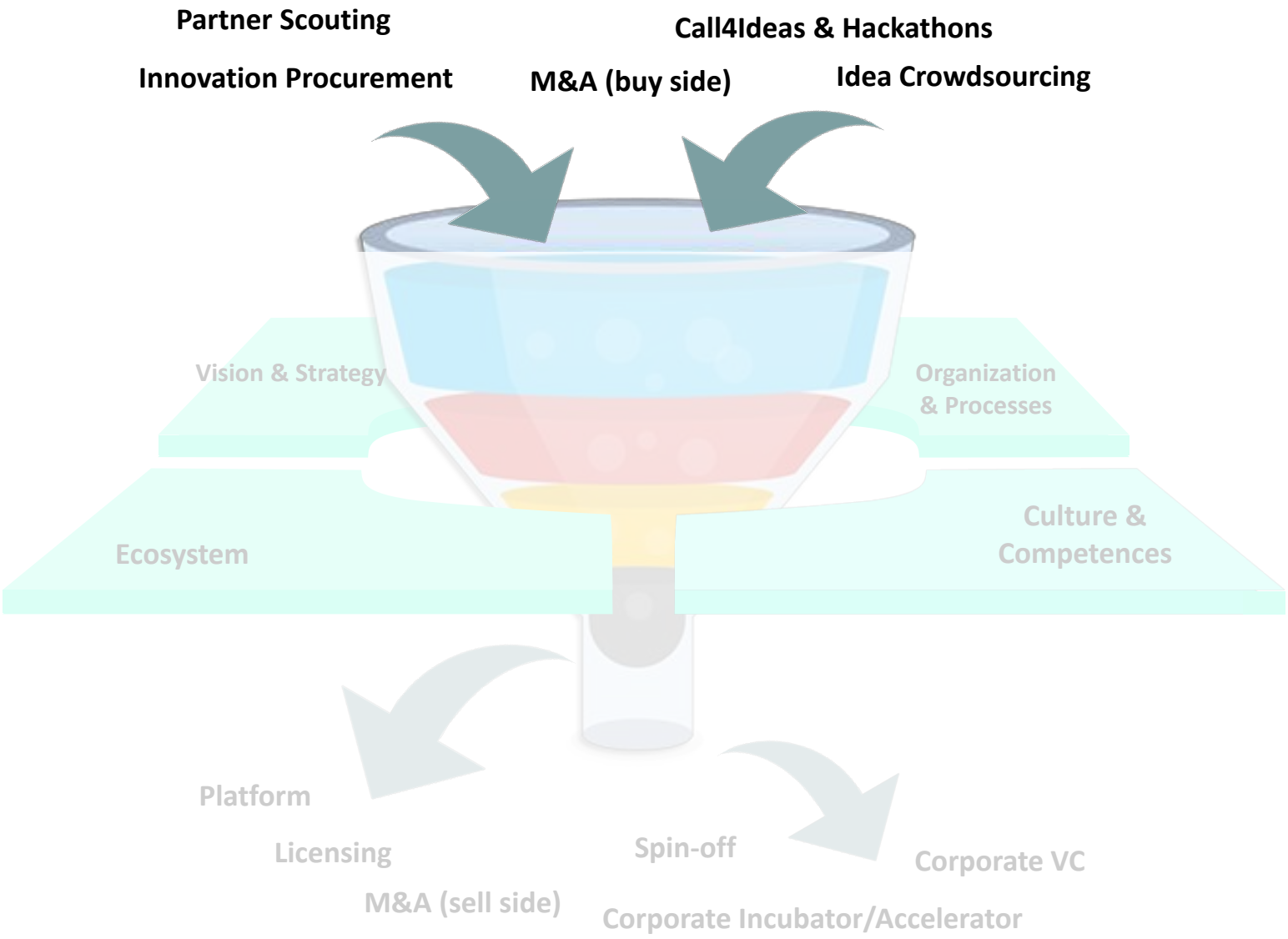


- The **coupled process** refers to co-creation with (mainly) complementary partners through alliances, cooperation, and joint ventures during which give and take are crucial for success. Companies that establish the coupled process as key combine the outside-in process (to gain external knowledge) with the inside-out process (to bring ideas to market) and, in doing so, jointly develop and commercialize innovation.

(Enkel et al., 2009)

© POLITECNICO DI MILANO

Outside-in Open Innovation

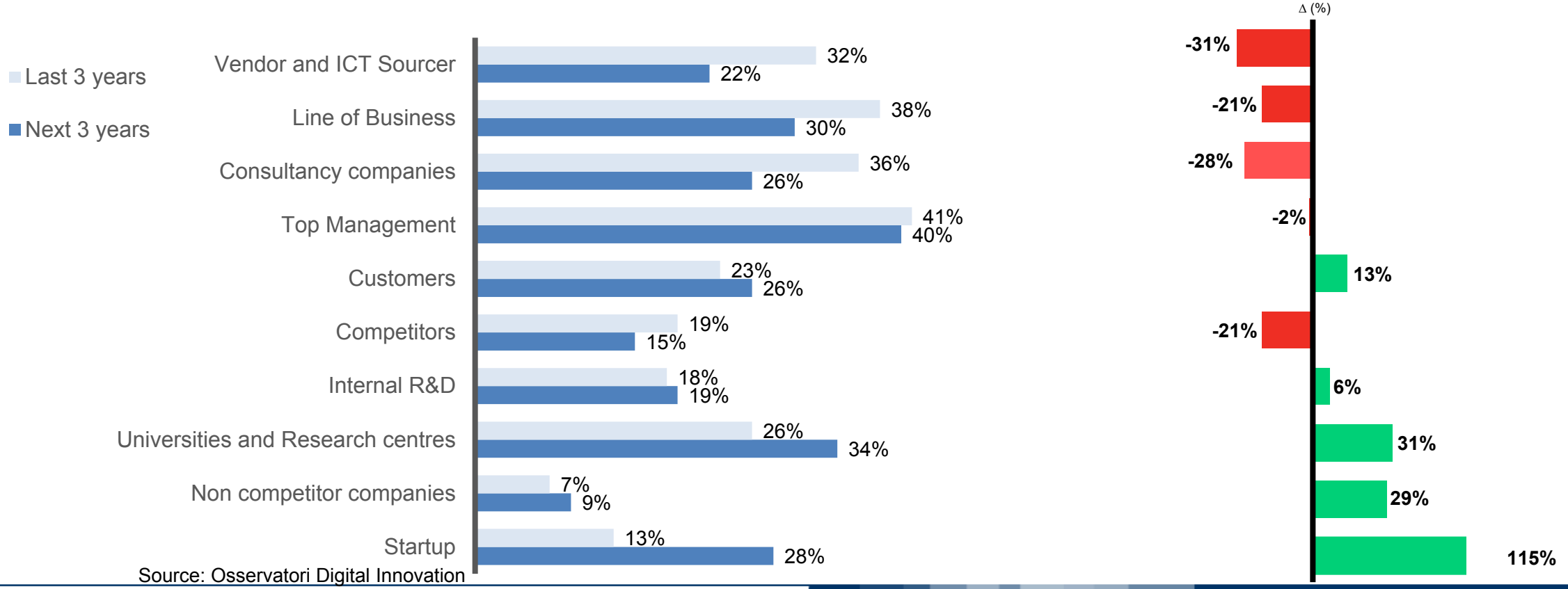


© POLITECNICO DI MILANO

Outside-in Open Innovation in Practice

Companies can leverage different and multiple sources for Digital Innovation:

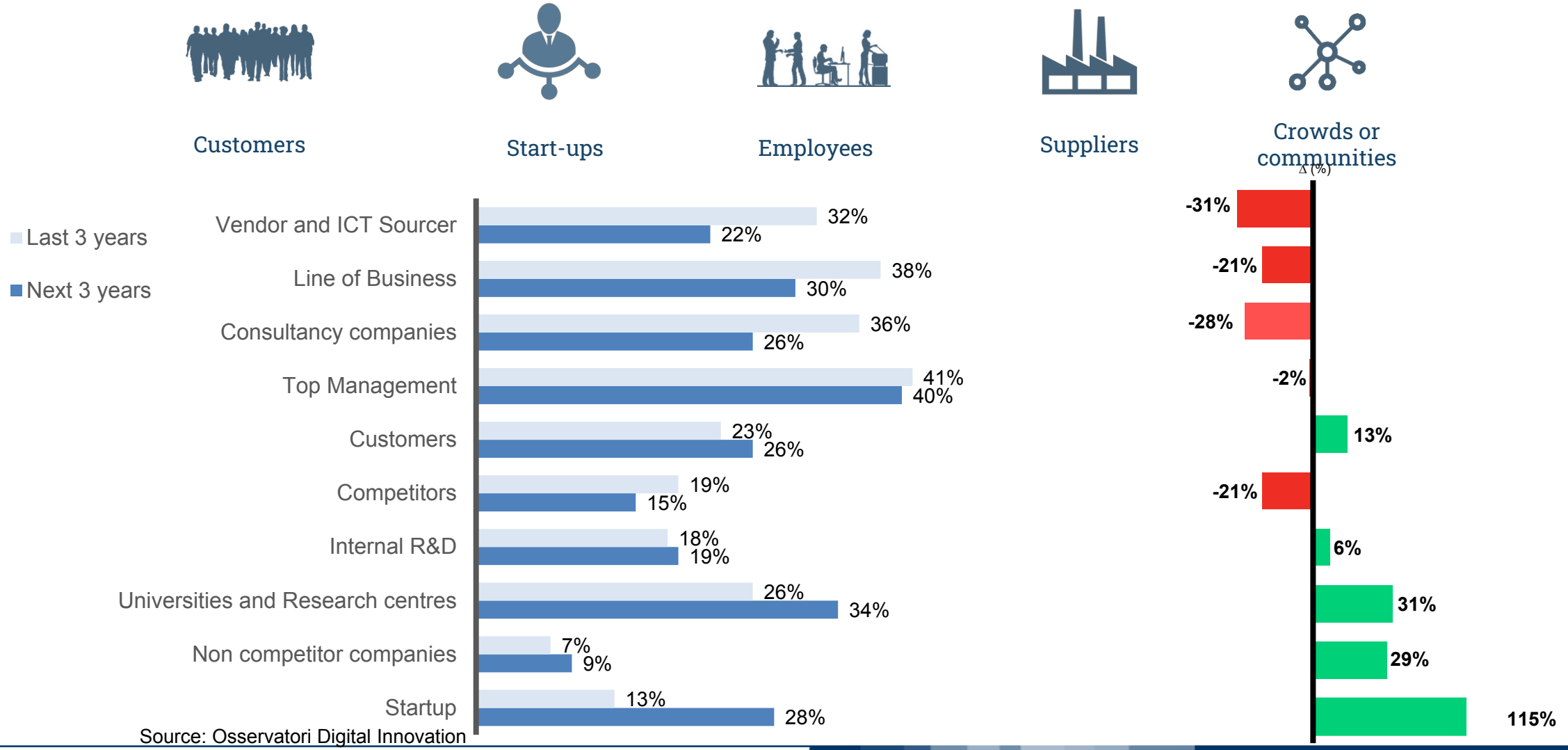
- **ICT Vendors**, one of the most important source in the last 3 years, are going to lose their leading role (-31%)
- **Startups** (+115%) will replace ICT Vendors, increasing the marginal role they played in the last 3 years
- **Universities** and **Top Management** will be the main sources for Digital Innovation with more than 30% of companies



Source: Osservatori Digital Innovation

Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation



Source: Osservatori Digital Innovation

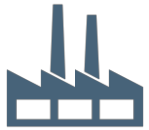
Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

Start-ups

Employees



Suppliers

Crowds or communities

And even others…

© POLITECNICO DI MILANO

Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

Start-ups

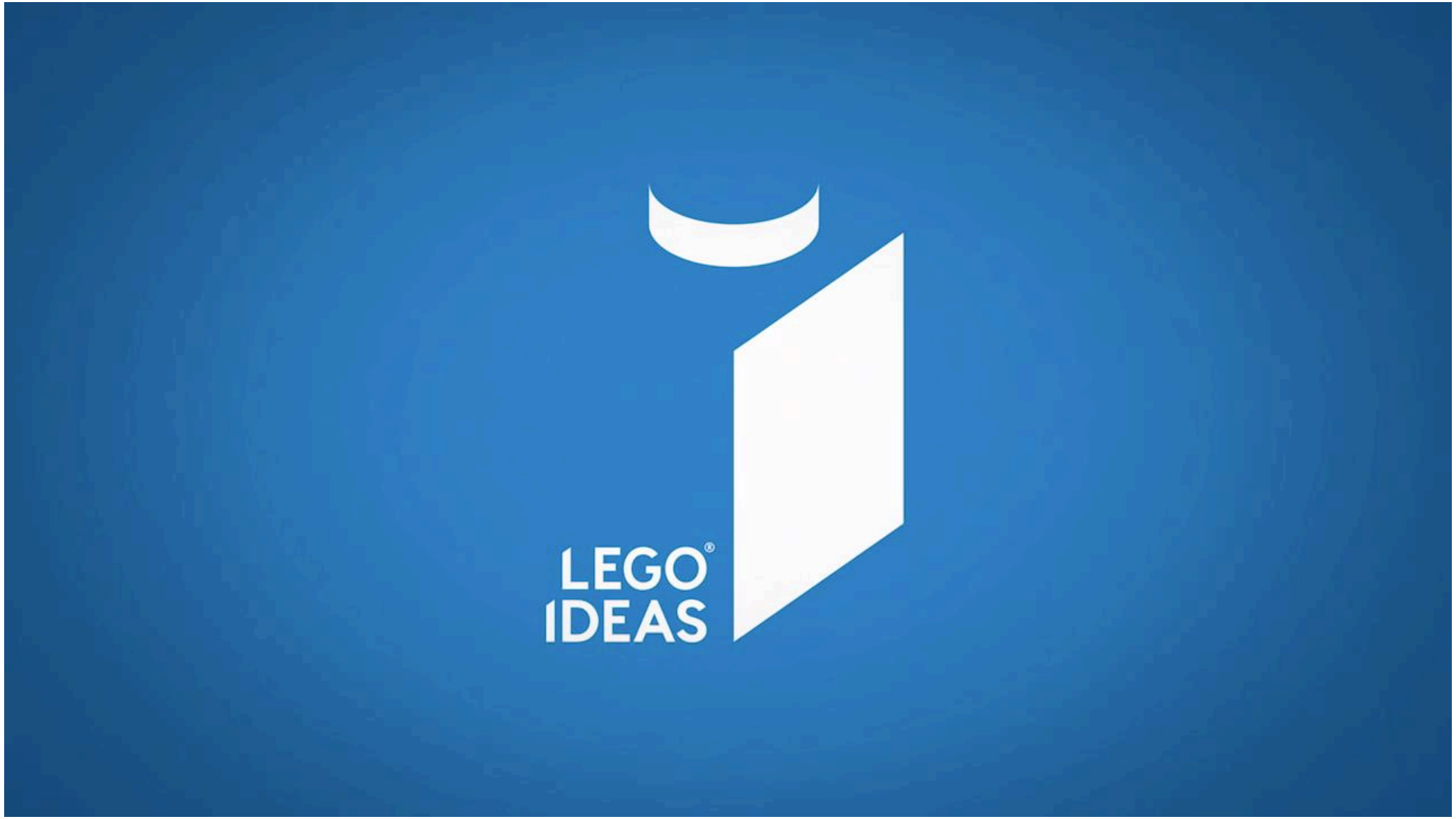
Employees

Suppliers

Crowds or communities

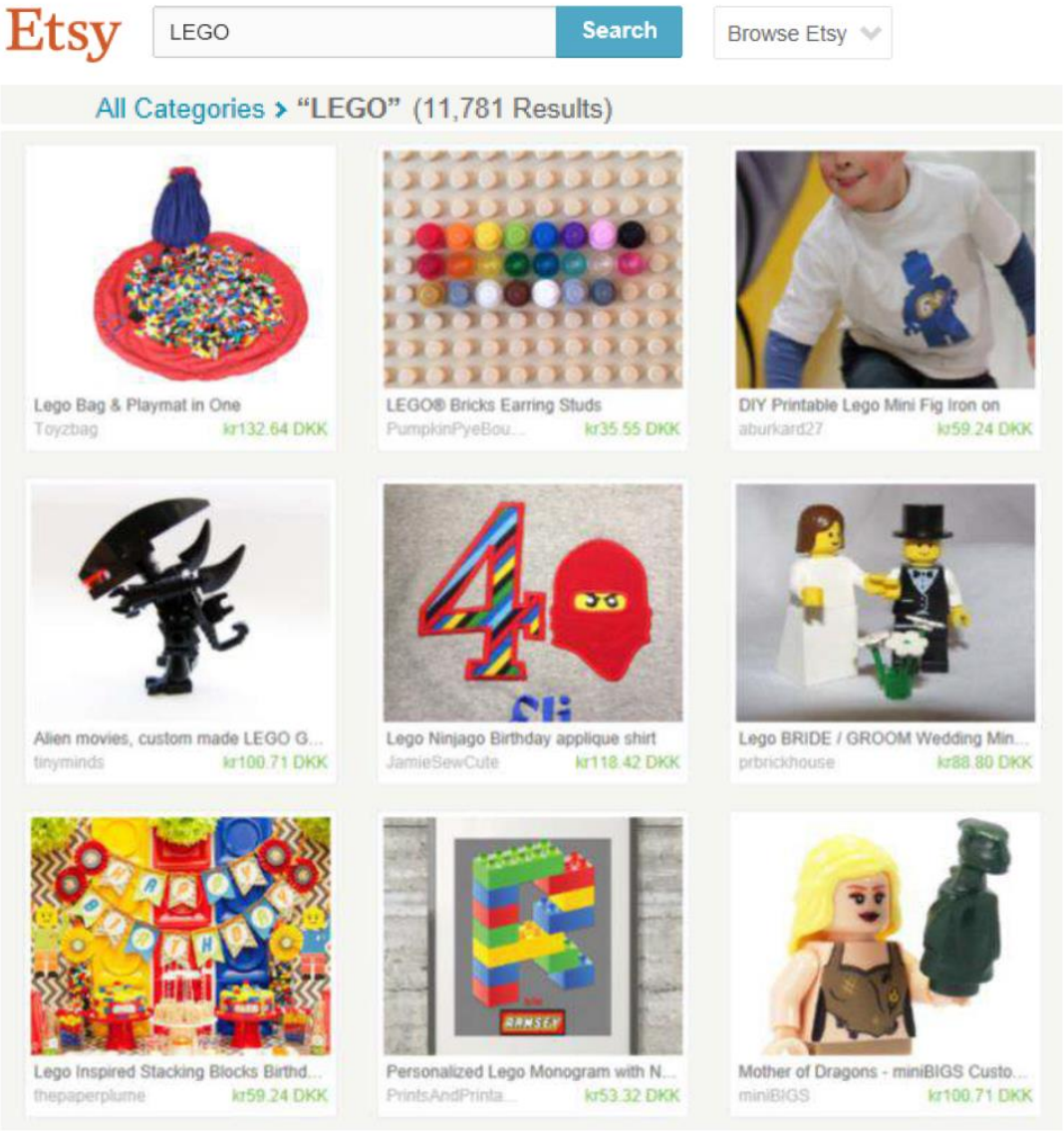
© POLITECNICO DI MILANO

Opening Innovation to customers: LEGO (https://youtu.be/j1L49BWDJb4)



© POLITECNICO DI MILANO

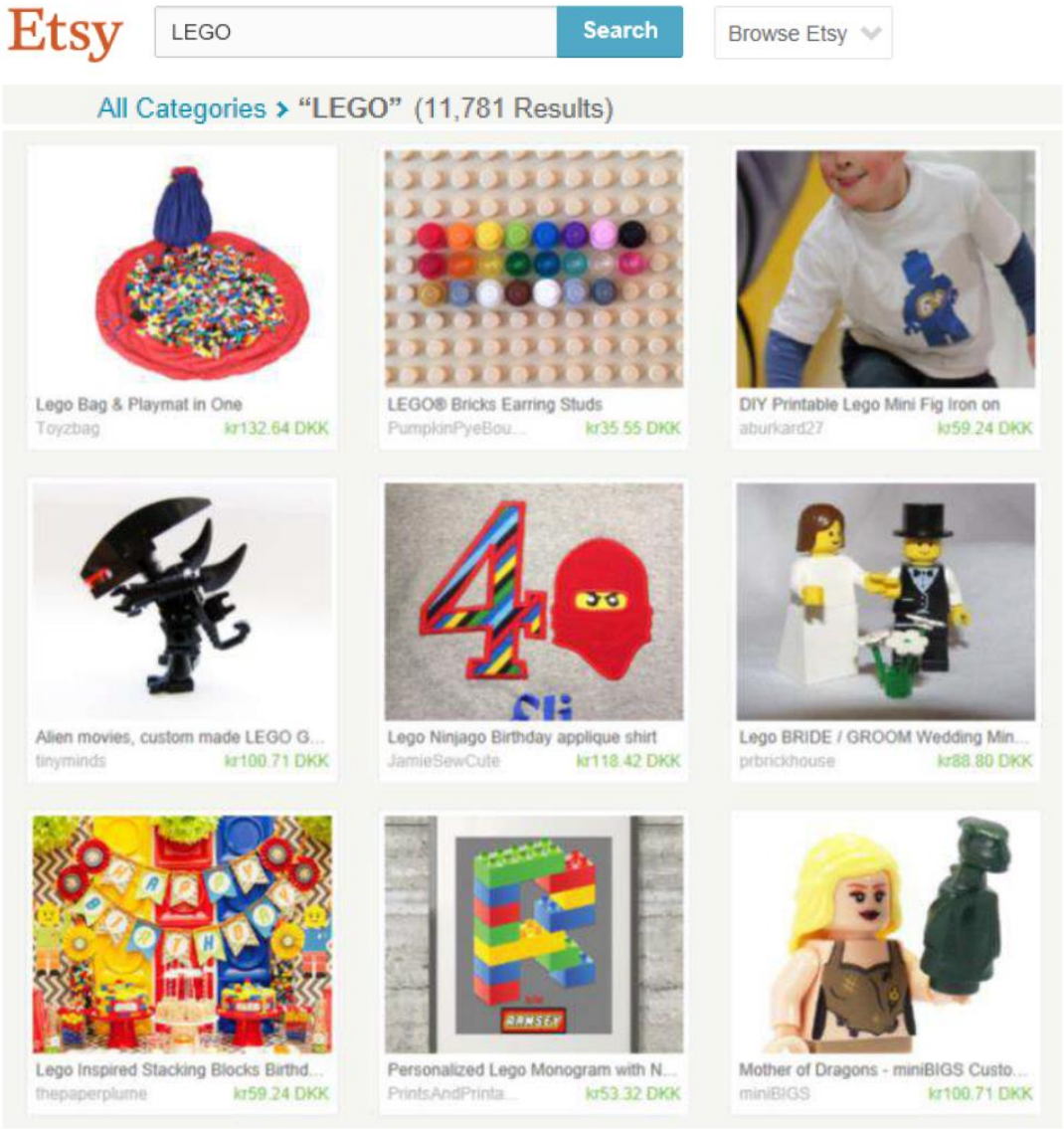
Opening Innovation to customers: LEGO



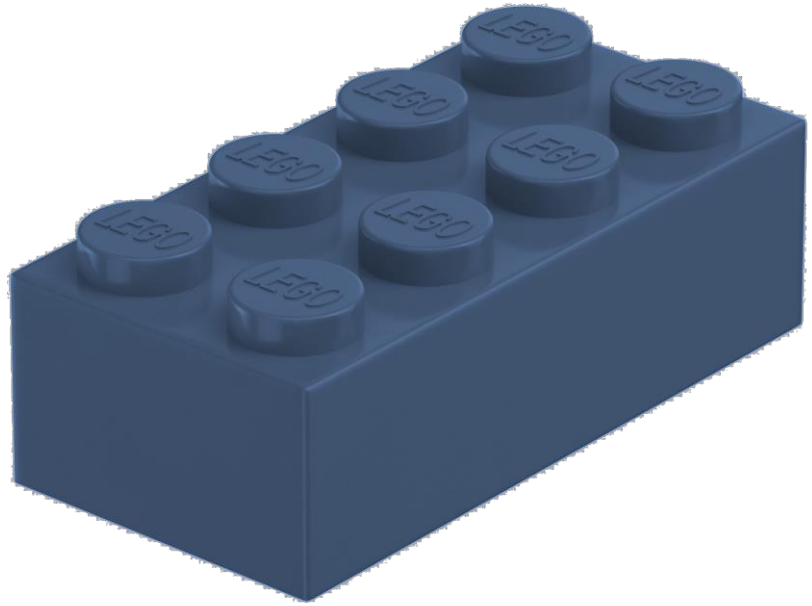
Development of LEGO products is being Democratized

© POLITECNICO DI MILANO

Opening Innovation to customers: LEGO



The Users become your Marketers



© POLITECNICO DI MILANO

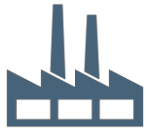
Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

Start-ups

Employees



Suppliers

Crowds or communities

52.4%

"Most companies are committed with startups: ***262 companies from the 500 largest listed companies*** *in the world work with startups in one way or another..."*

Source: #500 Corporations – 500 & INSEAD (2016)

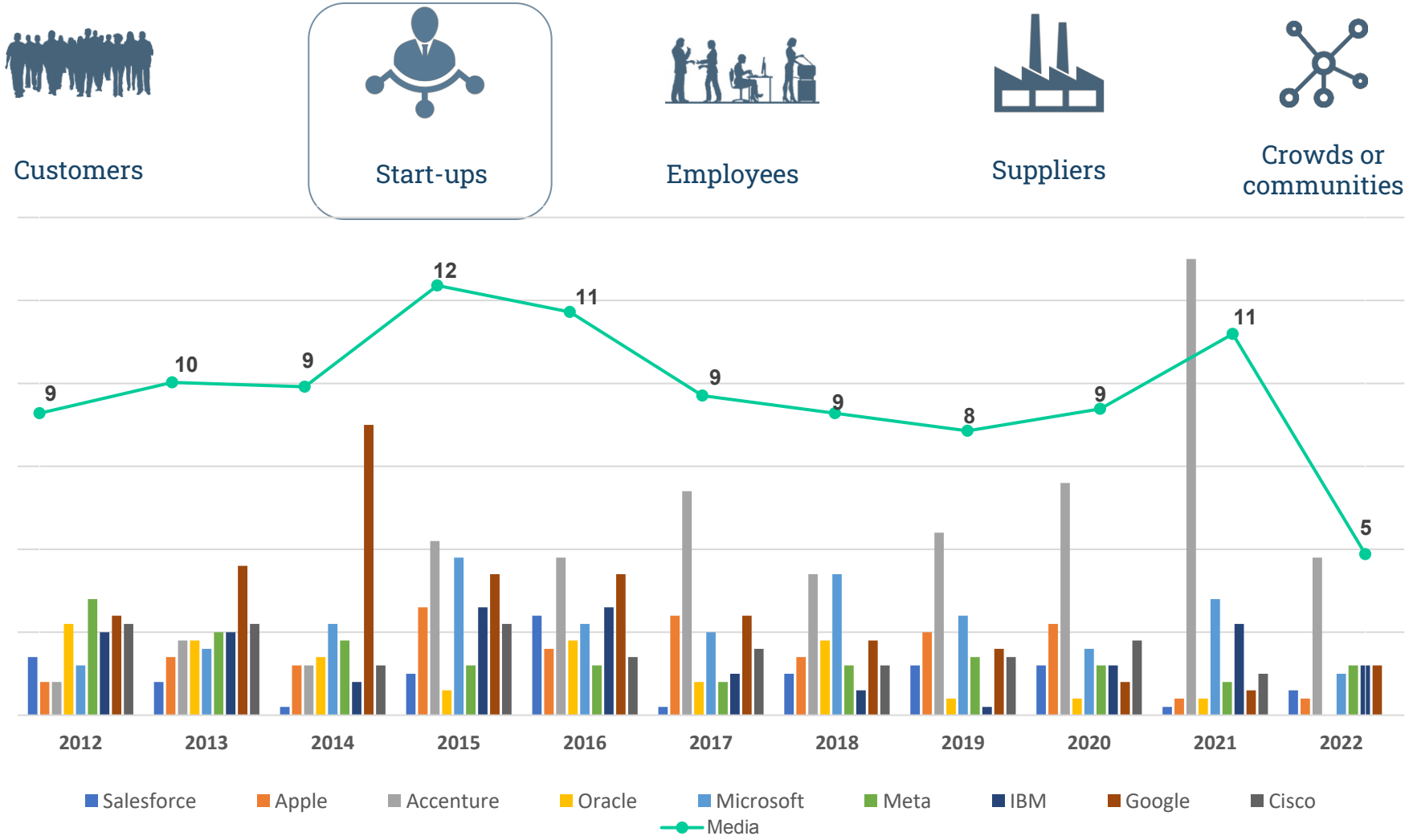
1791 corporate investments in startups worth about **$31.2 billions** in 2017

Source: CBInsights (2017)

© POLITECNICO DI MILANO

Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation



© POLITECNICO DI MILANO

Opening Innovation to Startups: Google Maps

In 2004 Google acquired Where 2 Technologies, an Australian startup founded by Jens and Lars Rasmussen that where unable to get funding from Sequoia Capital for their Maps application.

© POLITECNICO DI MILANO

Famous acquisitions: Google

Google acquired Youtube
for **$1.65 billion**

Google acquired Android in 2005 for
$50 million

© POLITECNICO DI MILANO

Famous acquisitions: Facebook

[Fast Fact: Facebook purchased Instagram for $1 billion on April 9, 2012.]

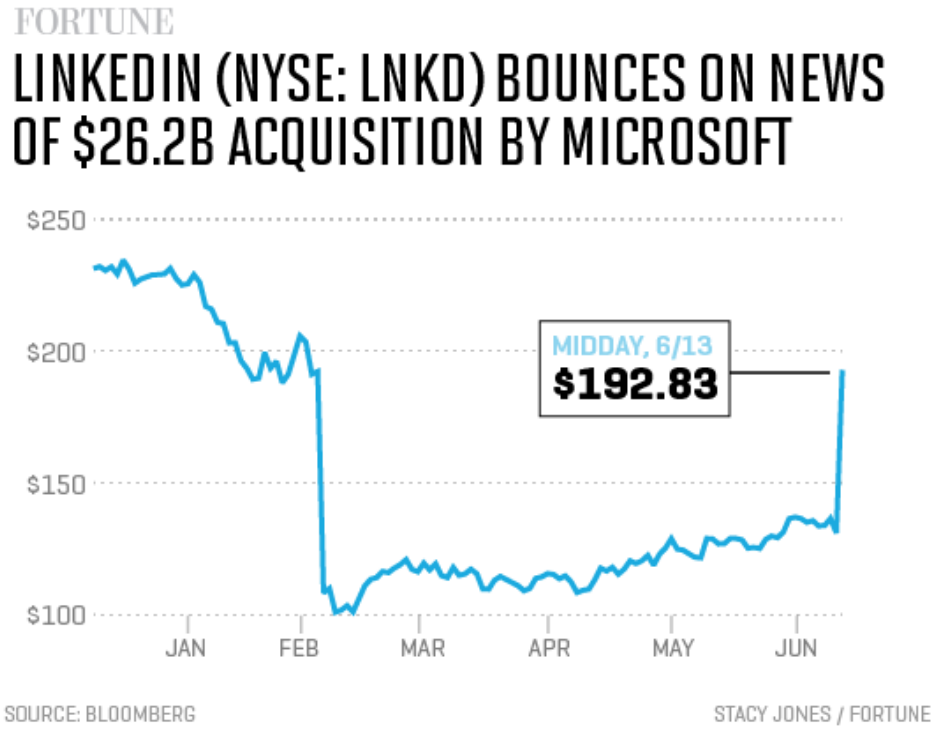
[Fast Fact: Facebook acquired WhatsApp for a reported $19 billion on February 19, 2014.]

© POLITECNICO DI MILANO

Famous acquisitions

1. Skype (2011): $8.5 billion

Microsoft acquired Skype for $8.5 billion in 2011, not an entirely unreasonable fee for a service that pretty much owned the consumer voice over internet protocol (VoIP) market.



Famous acquisitions: Apple

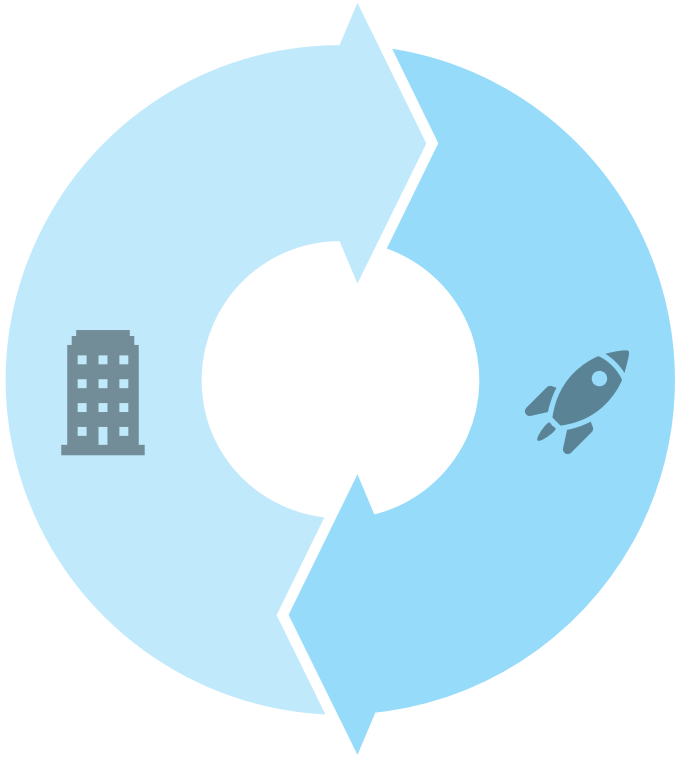
Silicon Valley Buzz: Apple Paid More Than $200 Million For Siri To Get Into Mobile Search

Apple closes its $400M Shazam acquisition and says the music recognition app will soon become ad free

Working with startups: a win-win approach

Enterprise

- Access to market
- Knowledge of the Business
- Capability to produce at scale
- References
- Shared commercial strategy



Startup

- Test
- Innovative skills
- Lean & fast approach
- Innovation culture
- Acceptance of failure

- Agile supply vs terms of contract
- Risk-adversion culture

© POLITECNICO DI MILANO

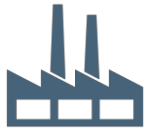
Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

Start-ups

Employees



Suppliers

Crowds or communities

Employ driven innovation

"It refers to the **generation** and **implementation** of significant new ideas, products, and processes originating from a single employee or the joint efforts of two or more employees who are not assigned to this task. […] Employees have **hidden abilities for innovation** and that this potential can be made visible, recognized, and exploited to the benefit of both the firm and its employees."

[Kesting & Ulhøi, 2010]

Involvement Drivers

- Events or systems structures
  - Innovation management platform and labs
  - Call for Idea, Competition and hack
- Process
  - Idea generation
  - Idea evaluation
  - Idea implementation
- Which employees
  - Team or individuals
  - Open or selected

Different objectives

- Innovation
- Motivation and engagement
- Talent development and competence enhancement
- Networking and marketing

© POLITECNICO DI MILANO

Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

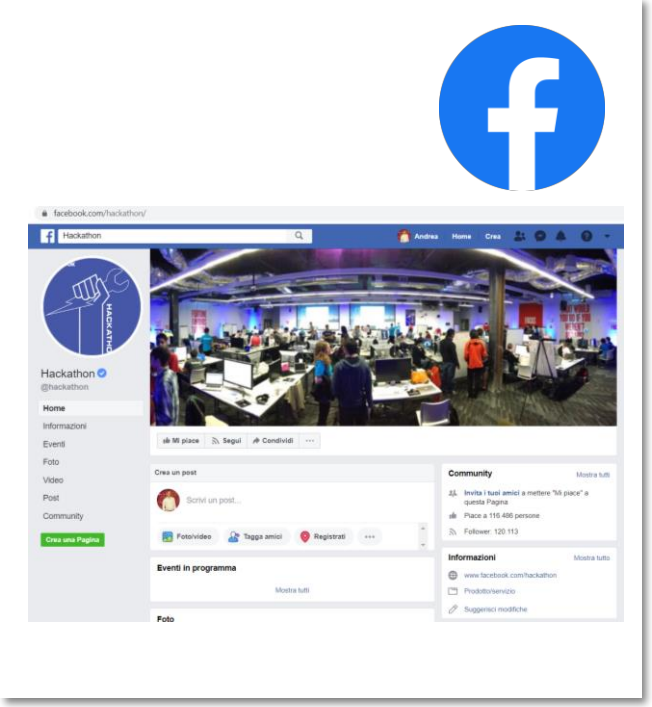
Customers

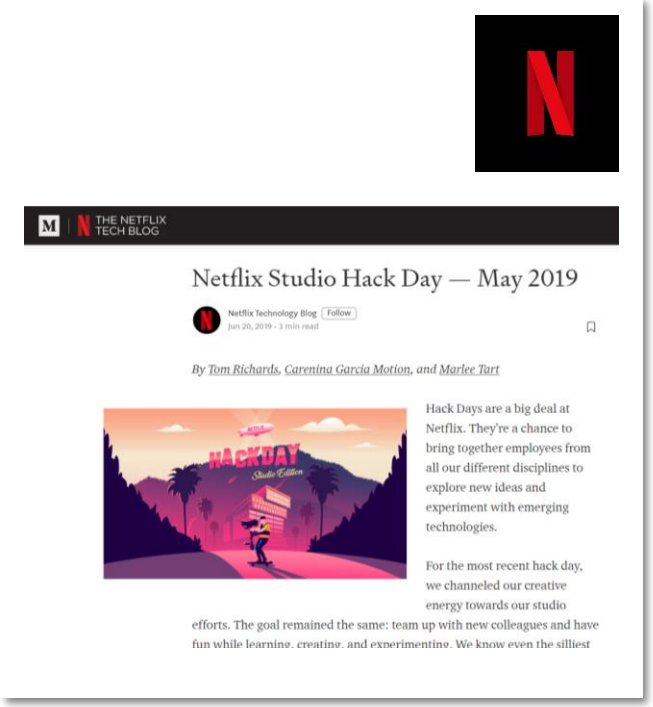
Start-ups

Employees

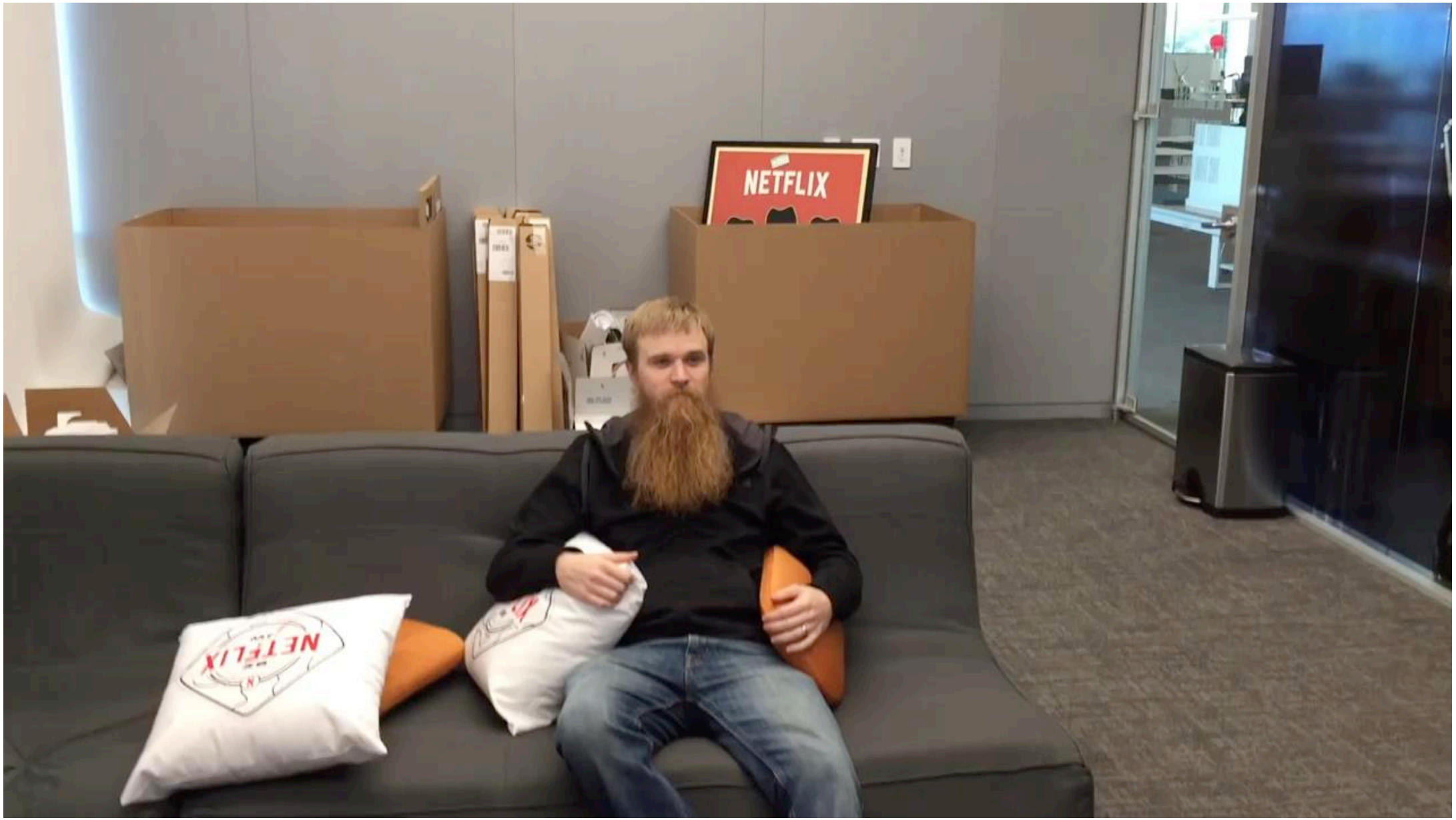
Suppliers

Crowds or communities





Opening innovation to all employees: Netflix (https://youtu.be/cyMqFEJSI_U)



© POLITECNICO DI MILANO

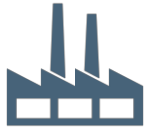
Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

Start-ups

Employees



Suppliers

Crowds or communities

Partner and Supplier Innovation

"Many organizations around the world today don't stand alone as independent entities. They work with and form alliances with suppliers and partners who they trust. Pretty much any organization you can think of today is somehow aligned with or supplied to another organization. Starbucks and Barnes & Noble , HP and Disney, Coca Cola and the World Wildlife Fund, IBM and Box, and the list goes on and on. The point is that in today's world companies realize that the chance of individual success is slim to none. Partners and suppliers are oftentimes the lifeblood of thriving organizations because they provide many of the parts, services, and referrals that allow these companies to flourish. Without these types of ecosystems these companies would not be where they are today and chances are, many of them wouldn't even be around anymore."

https://www.forbes.com/sites/jacobmorgan/2015/08/03/the-5-types-of-innovation-for-the-future-of-work-pt-3-partner-supplier-innovation/#6a4d7a511266

cherrypack

L'Oreal is another great example of a company that innovates with its suppliers in a hosted event called Cherry Pack. During this in person event suppliers meet with L'Oreal executives and managers to talk about everything from formulas being used in products to ideas around marketing and packaging. It's a candid conversation where attendees share insights around customer needs, challenges, and demands. This helps make sure that the L'Oreal suppliers can continuously create the best and most unique products for the company and that L'Oreal can also sell more of the products that the suppliers create. These suppliers also get strategic insight and direction straight from L'Oreal so that there are no surprises down the road. Not only that but the Cherry Pack dramatically helps improve efficiency while reducing waste of products, time, and resources. When L'Oreal first started doing this in 2010 the idea of bringing together a cosmetics company with its suppliers was pretty much unheard of. One of the several innovations that came as a result of this relationship was the self-loading pipette that is used in many of the Lancome products.

© POLITECNICO DI MILANO

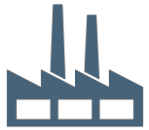
Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

Start-ups

Employees



Suppliers

Crowds or communities

- Wikipedia (2001) began as a complementary project for Nupedia (2000), a free online English-language encyclopedia project whose articles were written by experts and reviewed under a formal process.
- Wikipedia started as a "feeder" project for Nupedia (wiki project).

Development of knowledge assets or information resources from a distributed pool of contributors

WIKIPEDIA
The Free Encyclopedia

© POLITECNICO DI MILANO

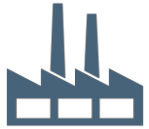
Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

Start-ups

Employees



Suppliers

Crowds or communities

Crowdsourcing is defined as the process of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, especially an online community, rather than from employees or suppliers.

(Wikipedia)

© POLITECNICO DI MILANO

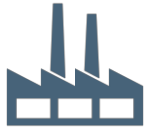
Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

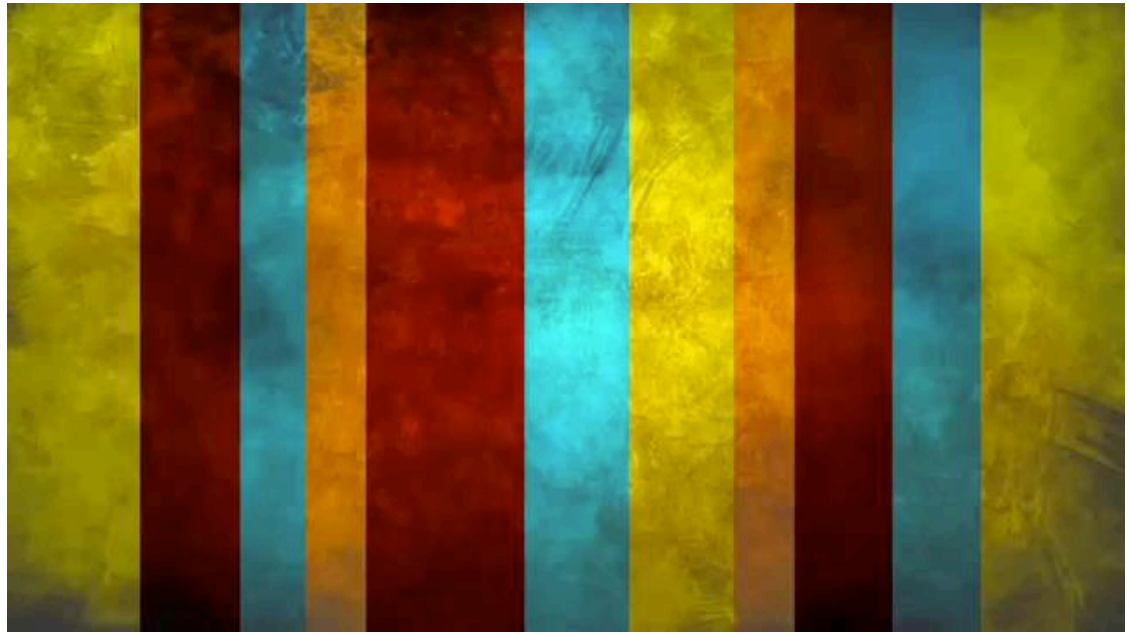
Start-ups

Employees



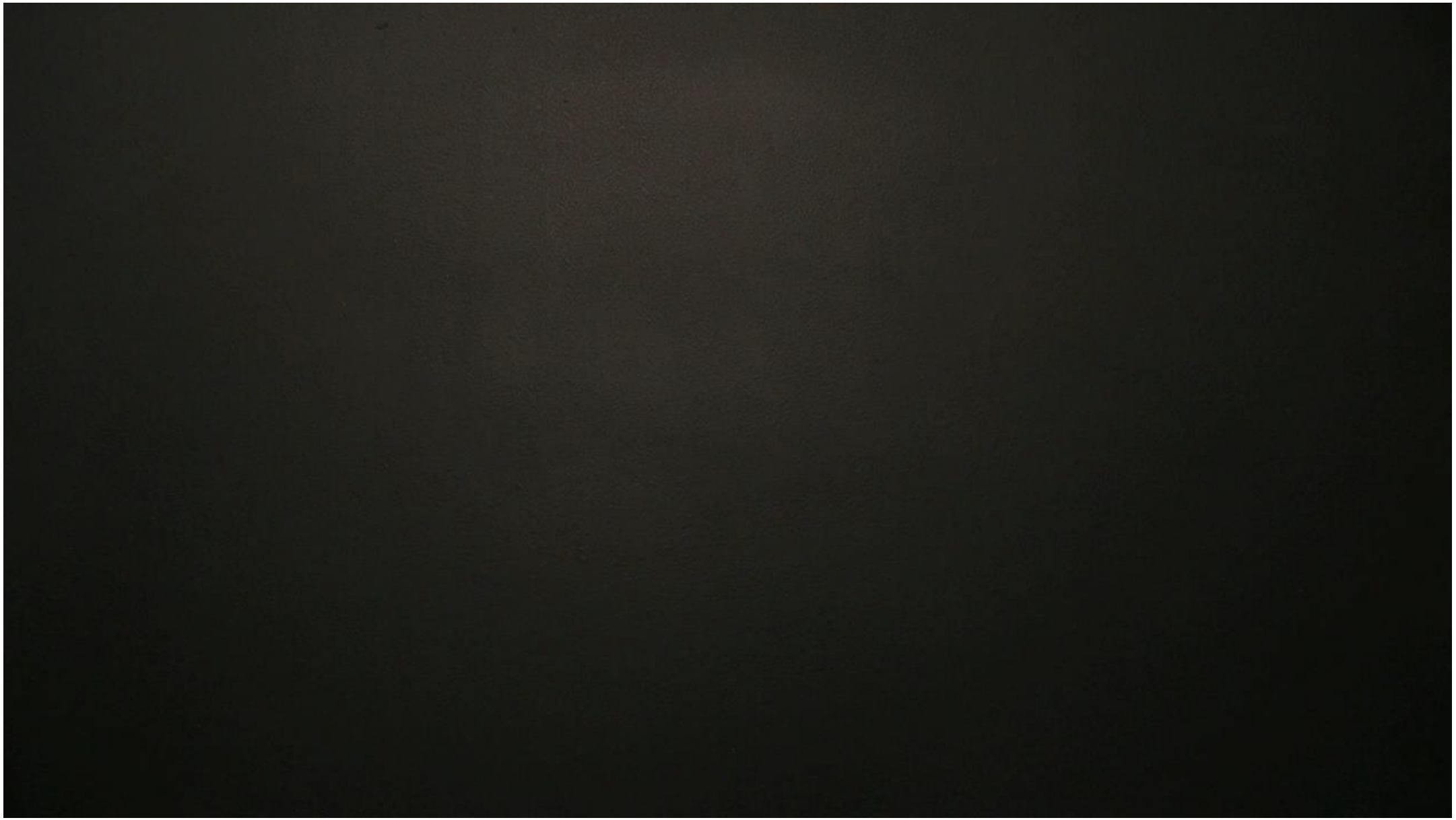
Suppliers

Crowds or communities



© POLITECNICO DI MILANO

Opening Innovation to communities: Threadless



© POLITECNICO DI MILANO

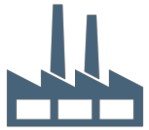
Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

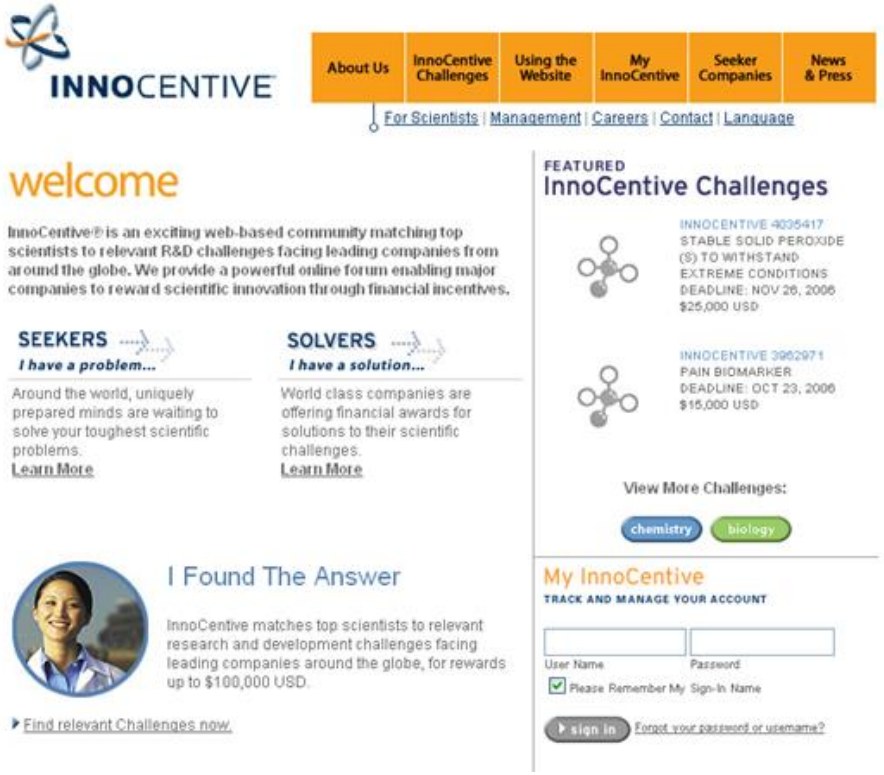
Start-ups

Employees



Suppliers

Crowds or communities



140’000 scientists

Each problem picked by 200 scientists

About 10 propose solutions

“Unknown quantity”

© POLITECNICO DI MILANO

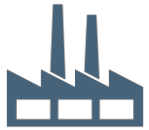
Outside-in Open Innovation in Practice

Possible sources of inbound Open Innovation

Customers

Start-ups

Employees



Suppliers

Crowds or communities

140’000 scientists

Each problem picked by 200 scientists

About 10 propose solutions

“Unknown quantity”

© POLITECNICO DI MILANO

Organisational forms for outside-in Open Innovation

ORGANISATIONAL MODE	DESCRIPTION
Acquisition	A company acquires another company in order to access a technology (or technological competence) of interest
Educational acquisition	A company recruits experts in a certain technological discipline or acquires a smaller company, in order to obtain people familiar with a certain technological or managerial competence
Merger	A company merges with another one that possesses a technology of interest, and a new company emerges from the two existing companies
Licensing	A company acquires a license for a specific technology
Minority equity	A company buys an equity in the source organisation in which a technology of interest is embedded, but does not have management control
Joint venture	A company establishes a formal joint venture with equity involvement and a third corporation is created, with a definite objective of technological innovation
Joint R&D	A company agrees with others to jointly carry out research and development on a definite technology, with no equity involvement
R&D contract	A company agrees to fund cost of R&D at a research institute or university or small innovative firm, for a definite technology
Research funding	A company funds exploratory research at a research institute or university or small innovative firm to pursue opportunities and idea for innovation
Alliance	A company shares technological resources with other companies in order to achieve a common objective of technological innovation (without equity involvement)
Networking	A company establishes a network of relationships, in order to keep the pace in a technological discipline and to capture technological opportunities and evolutionary trends
Outsourcing	A company externalises technological activities and, then, simply acquires the relative output

© POLITECNICO DI MILANO

Organisational forms for outside-in Open Innovation

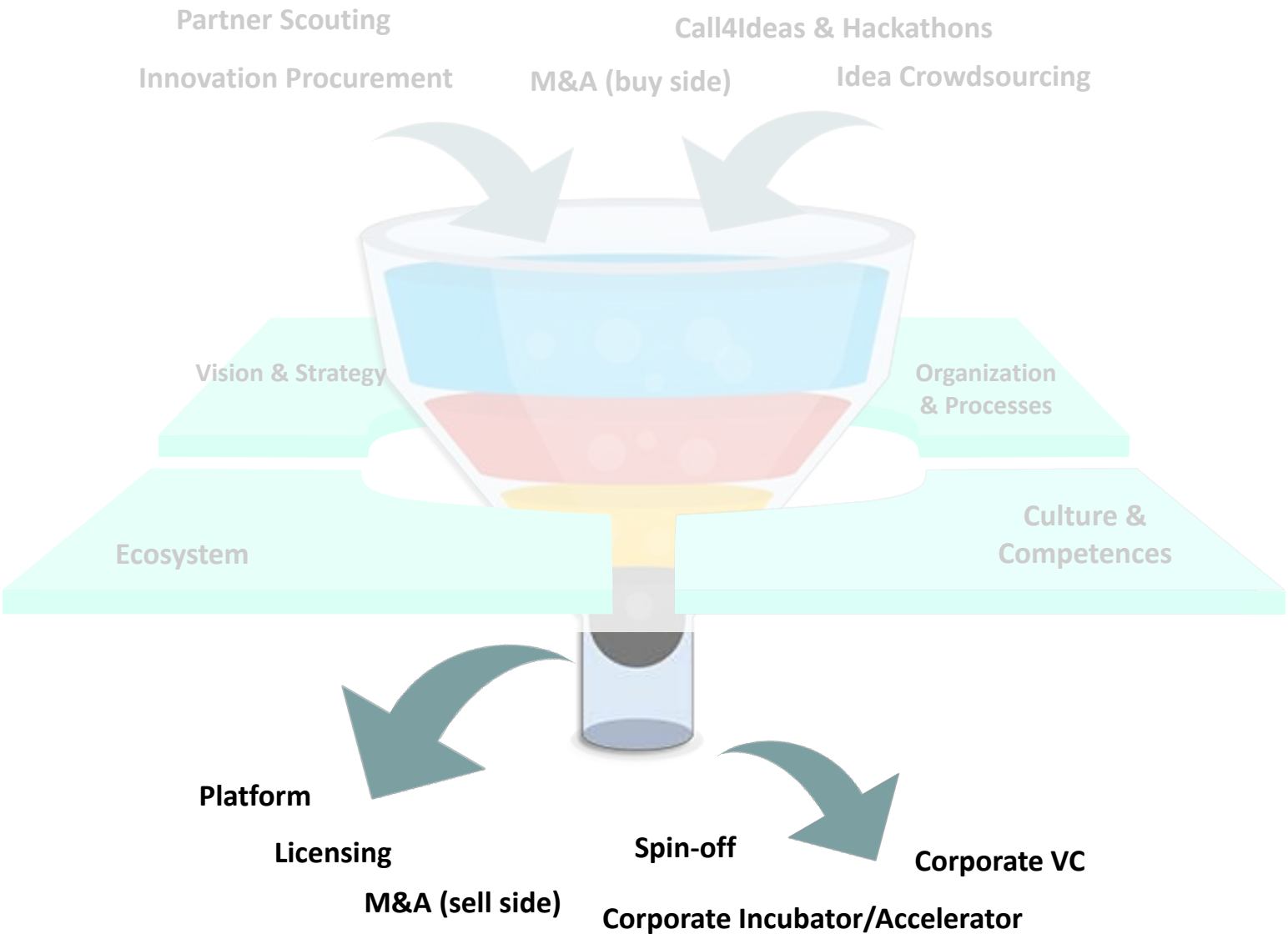
ORGANISATIONAL MODE	DESCRIPTION
Acquisition	A company acquires another company in order to access a technology (or technological competence) of interest
Educational acquisition	A company recruits experts in a certain technological discipline or acquires a smaller company, in order to obtain people familiar with a certain technological or managerial competence
Merge	nd a new
Licens	
Minorit	terest is
Joint v	l
Joint R	a definite
R&D c	nall
Resea	all
	innovative firm to pursue opportunities and idea for innovation
Alliance	A company shares technological resources with other companies in order to achieve a common objective of technological innovation (without equity involvement)
Networking	A company establishes a network of relationships, in order to keep the pace in a technological discipline and to capture technological opportunities and evolutionary trends
Outsourcing	A company externalises technological activities and, then, simply acquires the relative output

The different forms can be analysed looking at their key managerial and organisational characteristics:

- Level of integration
- Time horizon
- Risk
- Startup time and costs
- Reversibility
- Level of contractual formalisation

© POLITECNICO DI MILANO

Inside-out Open Innovation



© POLITECNICO DI MILANO

Inside-out Open Innovation

Many technologies are unused…

- According to a survey conducted in 1998 **only 67% of patents** held by the top patenting firms around the world **were utilized** in mainstream businesses
- **70%to 80%** of corporate technology assets typically **never get used** in core products or lines of business
- In 1999 **less than 10%** pf Procter&Gamble technologies **were being used** in products

© POLITECNICO DI MILANO

Inside-out Open Innovation

Many technologies are unused…

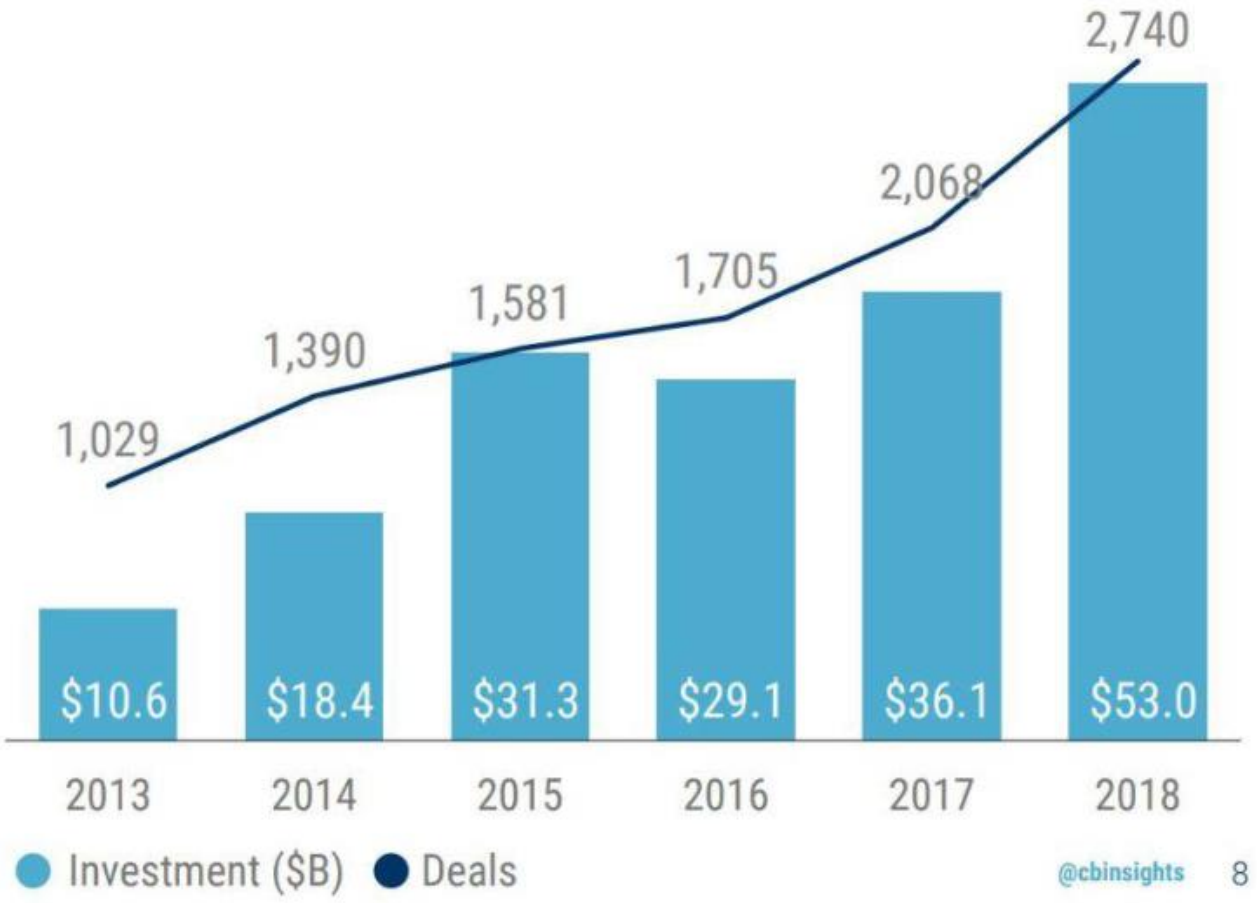
Why?

- Technologies are often **patented only to block competitors**
- R&D and innovation are serendipitous activities…they may produce technologies not useful today…
  - …but good technologies can be used in the future…

© POLITECNICO DI MILANO

Corporate Venture Capital

Corporates, including their **CVC** arms, are participating in **25% of deals** into all startups globally. Corporates participate in private markets with various aims in mind, from investing in products that are complementary to their core business, to outsourcing their R&D efforts, or investing simply for the returns



© POLITECNICO DI MILANO

Corporate Venture Capital

- Intel started an independent business unit named Intel Capital in 1991, acting as a venture capital company with more than 100 investment professionals around the world
- Over $ 12 billion have been invested into more than 1,500 companies in 57 countries. In that timeframe, 670 portfolio companies have gone public on various exchanges around the world or were acquired or participated in a merge

In 2018, $ 391 million have been invested in 89 investments

Intel Capital provide venture funds to three types of investments:

- Ecosystem development investment, companies building technologies related with core products of Intel
- Gap-filing investments, focused on technologies complementary to those of Intel and not sold directly
- «eyes and ears» investments (about 10% of the total invested), centered on monitoring opportunities looking extremely useful, promising and profitable but also very challenging and risky

© POLITECNICO DI MILANO

Platform

iPhone Developer Program

The fastest path from code to customer.

- 6 March 2008: Apple launches the iPhone Developer Program (enrollment $99) Free SDK and iPhone Simulator
- Nurturing the ecosystem: With VC firm KPCB it launches the 100 mln iFund
- Apple sells in App Store (keeps 30% if not free)
- In 4 days: 100’000 downloads, by June 2008: 250’000 SDK downloaded
- July 2008: App Store opens with 800 applications (200 free)
- First weekend: **10 million applications downloaded**

© POLITECNICO DI MILANO

Is «open» always the best option? Balancing the innovation project portfolio

Good reasons for «going open»

- The pace of change is so high that the technology will become rapidly obsolete
- Need to access complementary assets through contractual agreement
- The window of opportunity is narrow
- The firm is not familiar with the market (market risk)
- The technology is not proven yet (technical risk)

Good reasons for «keeping close»

- Speed to market is not critical
- Technology is proven and innovation is incremental
- Control over product quality is critical
- Ownership of complementary assets and world-class capabilities
- Need to protect knowledge assets

© POLITECNICO DI MILANO

Barriers to Open Innovation … and how to overcome them

- **Not-Invented-Here** (NIH) and **Not-Sold-Here** (NSH) syndromes
  - It should be removed by working on culture, rewarding and incentives
- Lack of **absorptive** and **desorptive capacity**
  - Open Innovation is not mere outsourcing
- **Loss of control** over core competencies
  - IP management and partner selection should be given high priority
- Managerial **complexity**
  - ICT knowledge management systems could be used to organize information

© POLITECNICO DI MILANO

Agenda

- The crisis of traditional innovation approaches and the rise of Open and Collaborative Innovation
- Open Innovation: Theory & Practice
- Organisational Agility
- Bibliography and further material

© POLITECNICO DI MILANO

The agile revolution

11-13 February 2001

The beginning of the Agile Revolution took place (about) 20 years ago with the creation of the "Agile Manifesto", where the conception and adoption of Agile practices exploded in an "unexpected" sector – software development– coining the term **Agile Software Development**.

© POLITECNICO DI MILANO

Manifesto for Agile Software Development

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

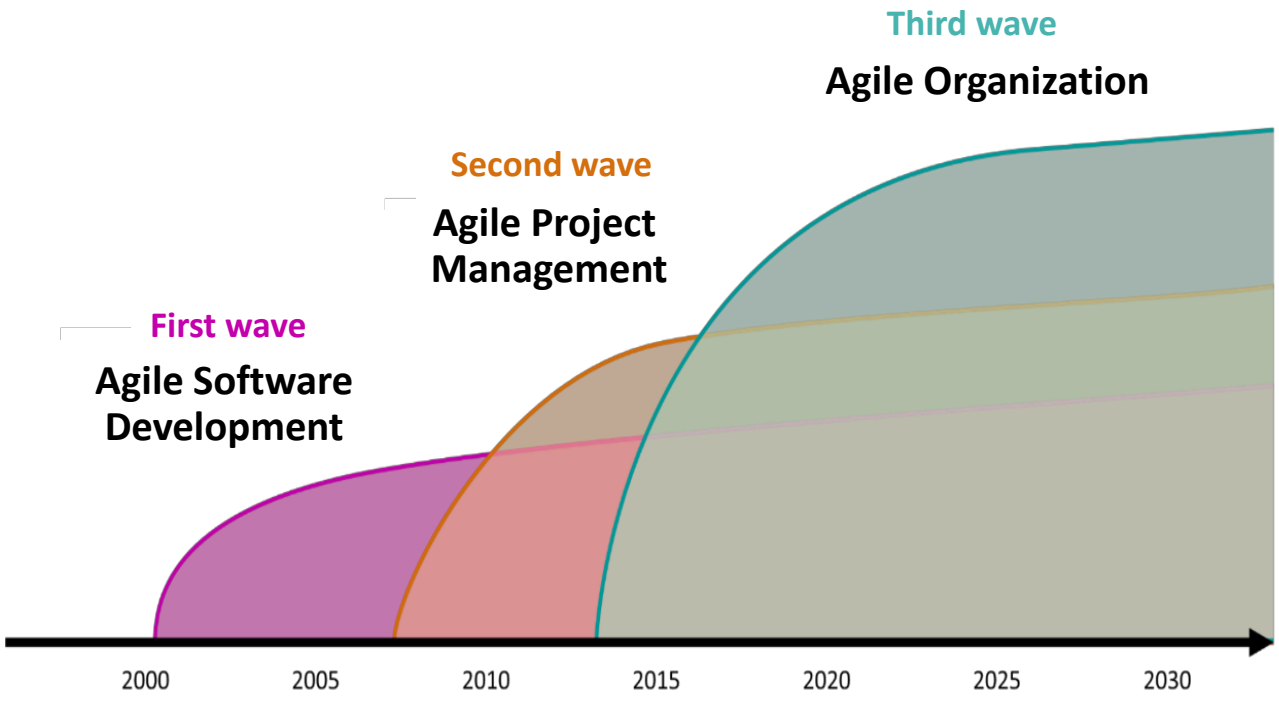
That is, while there is value in the items on
the right, we value the items on the left more.

Kent Beck
Mike Beedle
Arie van Bennekum
Alistair Cockburn
Ward Cunningham
Martin Fowler
James Grenning
Jim Highsmith
Andrew Hunt
Ron Jeffries
Jon Kern
Brian Marick
Robert C. Martin
Steve Mellor
Ken Schwaber
Jeff Sutherland
Dave Thomas

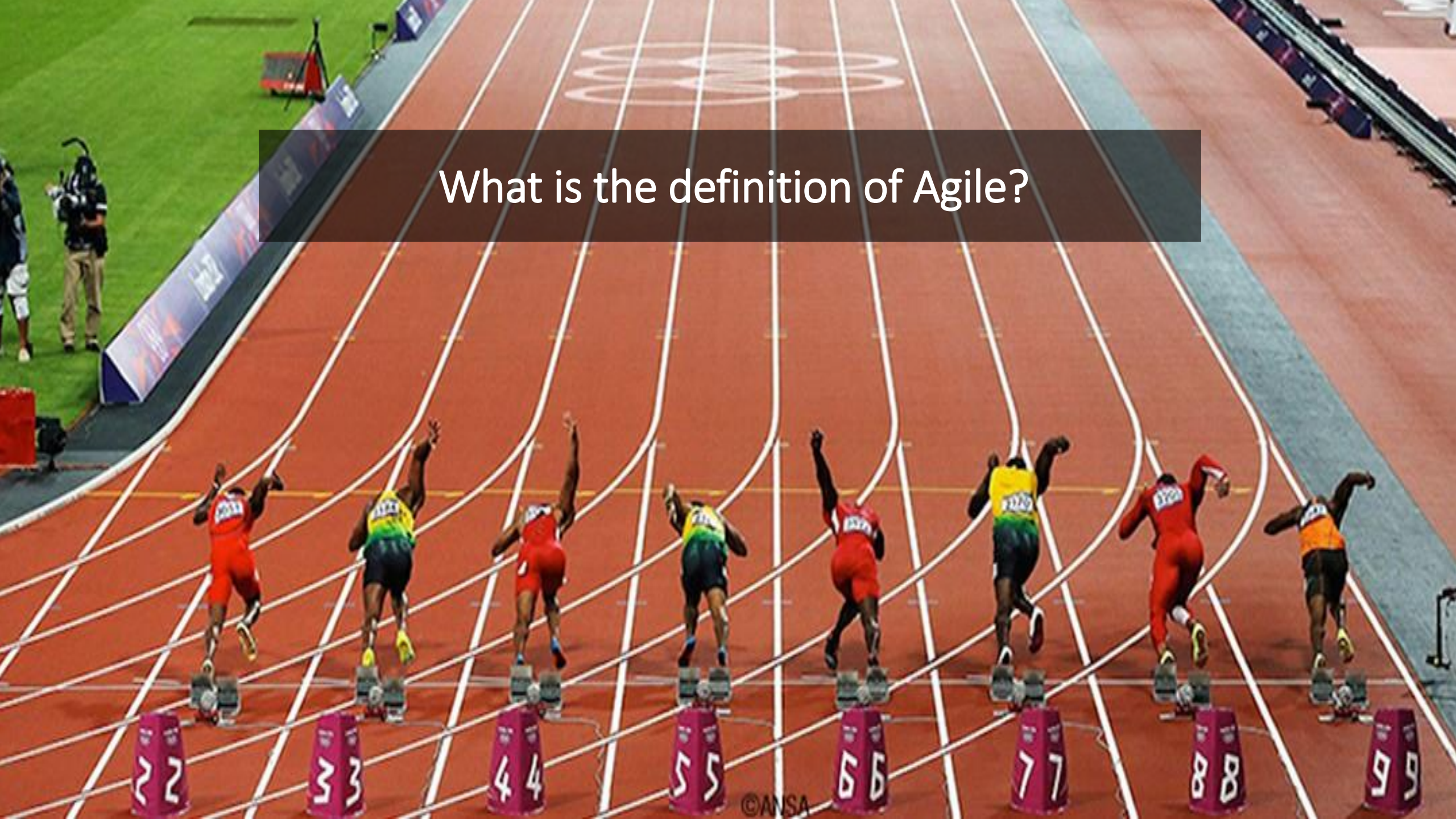
© POLITECNICO DI MILANO

The agile revolution

Once these methodologies reached a fair level of diffusion within the **Software industry**, Agile methodologies began to revolutionize the field of **Project Management**, continuing their diffusion until expanding the concept of Agility to the entire organization, then giving life to the concept of "**Agile Organization**"



© POLITECNICO DI MILANO



What is the definition of Agile?

The definitions in the literature

"Capability to respond to unfamiliar changes in the environment with high variety and speed of response manifested as discontinuing current strategies and creating new norms, values and actions."

(Volberda, 1996)

"Continual readiness of an organization to rapidly or inherently create change, proactively or reactively embrace change and learn from change while contributing to perceived customer value, through its collective components and relationships with its environment"

(Conboy, 2009)

"Ability to explore and exploit opportunities for innovation and competitive performance by sensing opportunities, deploying requisite assets and knowledge, and leveraging a network of relationships with speed and surprise."

(Sambamurthy, Bharadwaj & Grover, 2003)

"Ability to respond quickly to changing technological and market opportunities by offering:

1) *more new products*
2) *broader product lines*
3) *more rapid product upgrades"*

(Sanchez, 1995)

"The ability to quickly reconfigure internal structures and contractual obligations to meet market demands"

(Matusik&Hill, 1998)

© POLITECNICO DI MILANO

Agile is not just processes and tools

"***If you are thinking about Agile as a set of tools and processes, you're looking for the wrong thing***. *You can't go to the store and "buy" some Agile management*."

(Stephen Denning)

© POLITECNICO DI MILANO

Agile Principles

- Embrace change
- Iterativity
- Continuous improvement
- Simplicity
- Customer centricity
- Multidisciplinary
- Empowerment
- Measurement
- Extreme collaboration

© POLITECNICO DI MILANO

The Agile Organization

Organisation Agility

"Is the ability of a company to anticipate, understand and respond to market volatility in ways that create competitive advantage»

Agility = Willingness to adapt + Speed + Execution

Agile Organisation

A network-like organization with a people-centered culture, operating in a context of continuous learning and rapid decision-making cycles enabled by technology

© POLITECNICO DI MILANO

Agile Organization: principles, levers and results

Organizational Principles Traditional	New
Specialization	Transversality
Supervision	Orchestration
Linearity	Agility
Internal/external border stability	Liquidity and openness

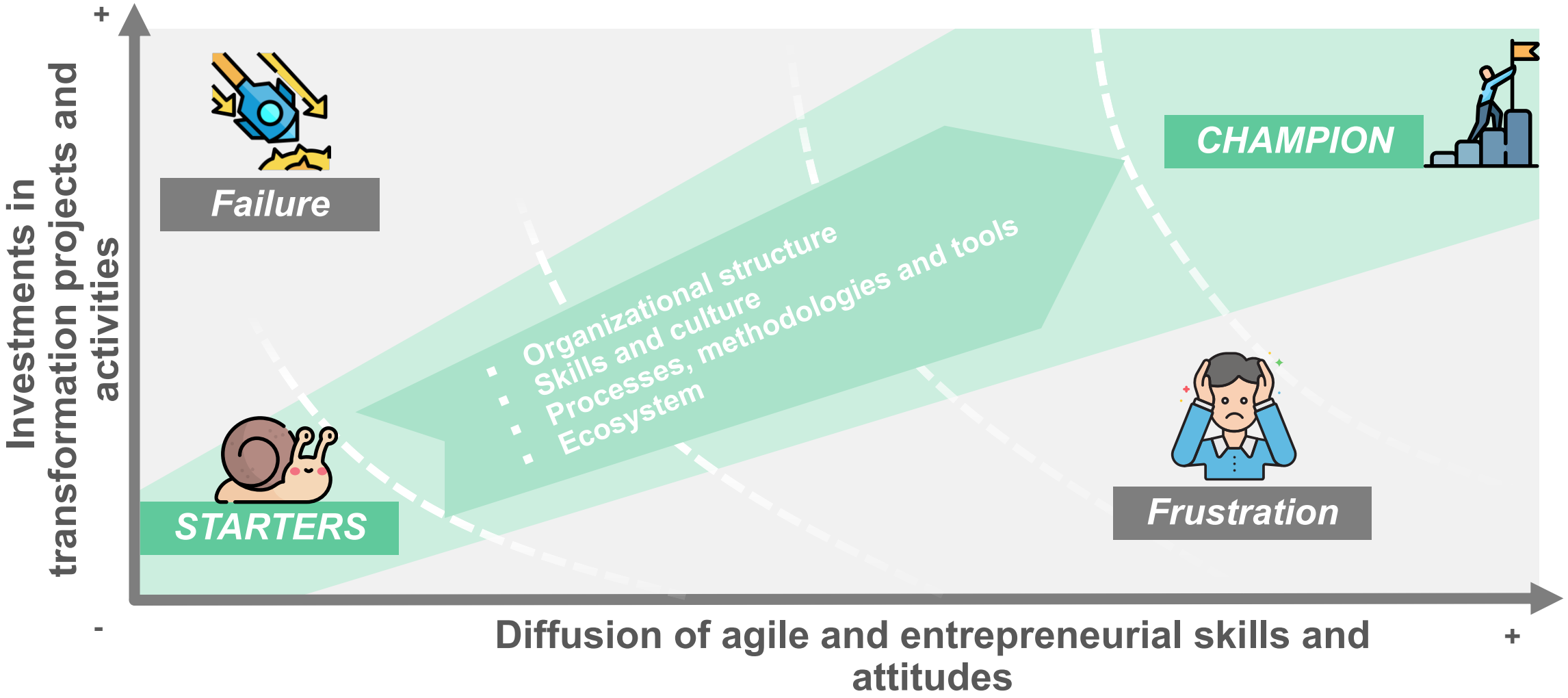
Results	
Innovation	Knowledge
Opening to change	Engagement and satisfaction

Enabling factors

- Organizational Structure
- Skills and Culture
- Processes, Methodologies and Tool
- Ecosystem

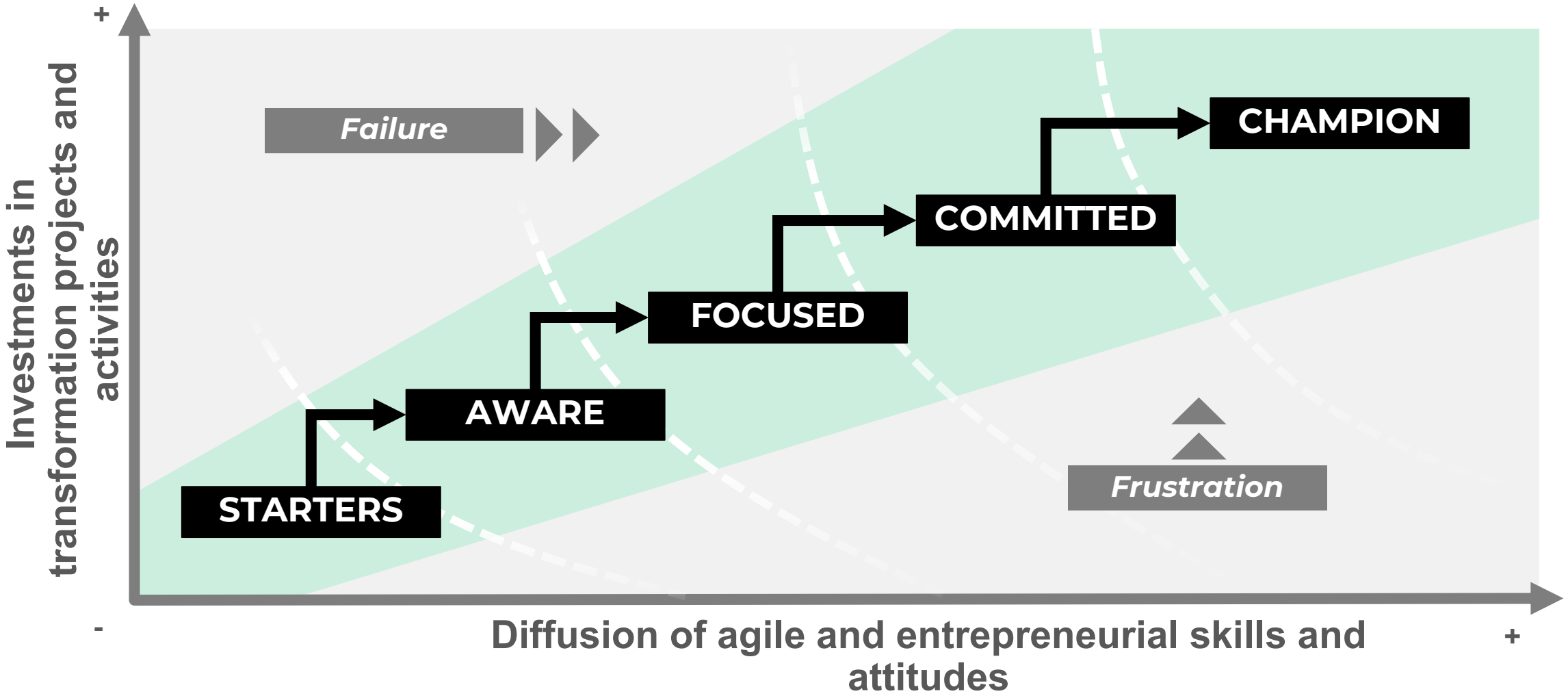
© POLITECNICO DI MILANO

A path that requires a delicate balance...



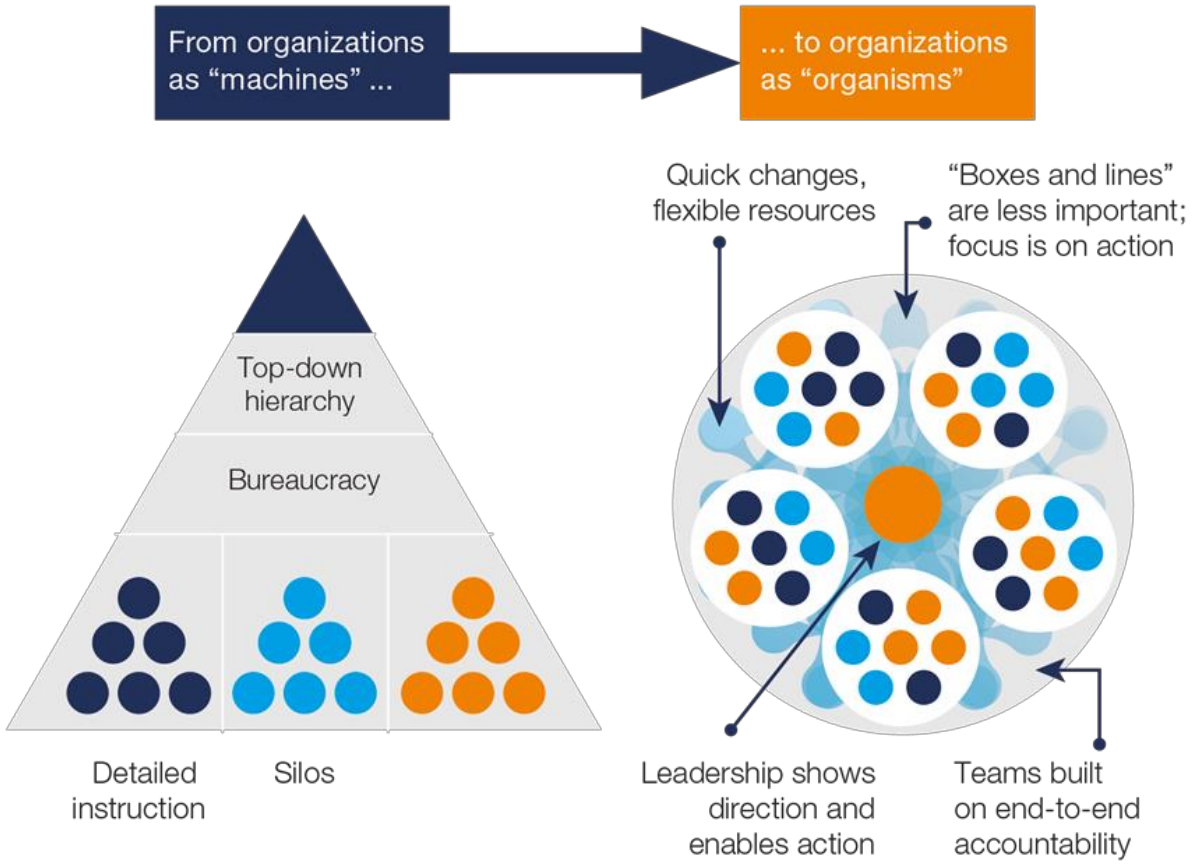
© POLITECNICO DI MILANO

A path that requires a delicate balance...



© POLITECNICO DI MILANO

Organizational Structure



Source: McKinsey & Company, The five trademarks of Agile organizations, 2018

STRUCTURE

FROM (TRADITIONAL):

- The organizational structure is **rigid** and **pyramidal**
- The main approach is **top-down hierarchy**
- **High level of Bureaucracy**
- Organizational Units **organized in silos**
- **Low autonomy** of people

Agile teams

Transversality of organizational units

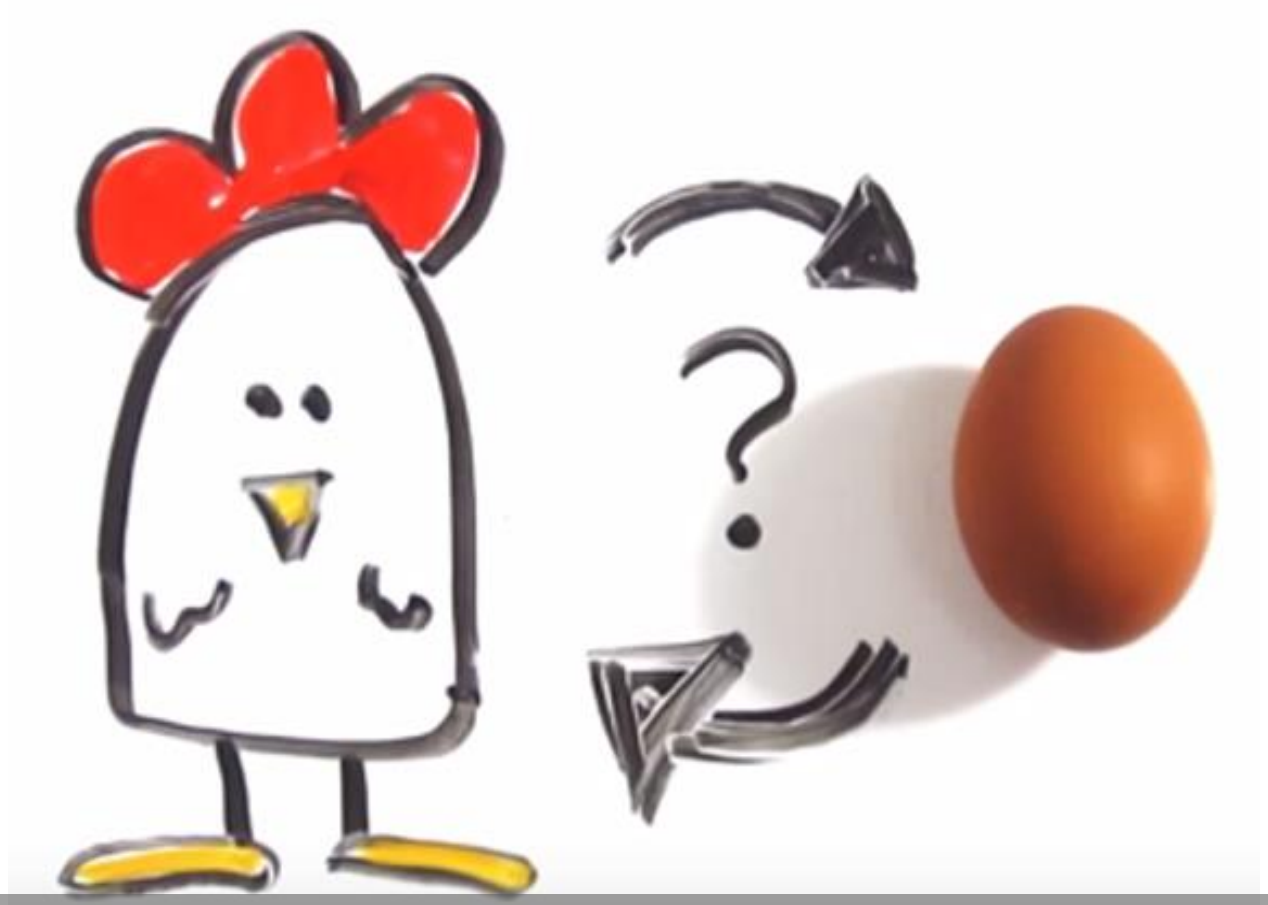
Mobility of role and responsibilities

TO (AGILE):

- The organizational structure is **flat** and it is organized in **teams with complete autonomy and responsibility** for achieving results
- **Flexible resources**
- **Fluidity in role and responsibilities**

© POLITECNICO DI MILANO

Skills & Aptitudes



Is it the organization that makes people “agile”? Or are the people who make the organization “agile”?

SKILLS & APTITUDES

FROM (TRADITIONAL):

- Agile and entrepreneurial skills are **neither widespread nor tracked**
- **Talents are hidden** and unrecognized
- **People don’t use their full potential at work**, **and this** affects their commitment and engagement

Mindset / aptitudes

Hard skills

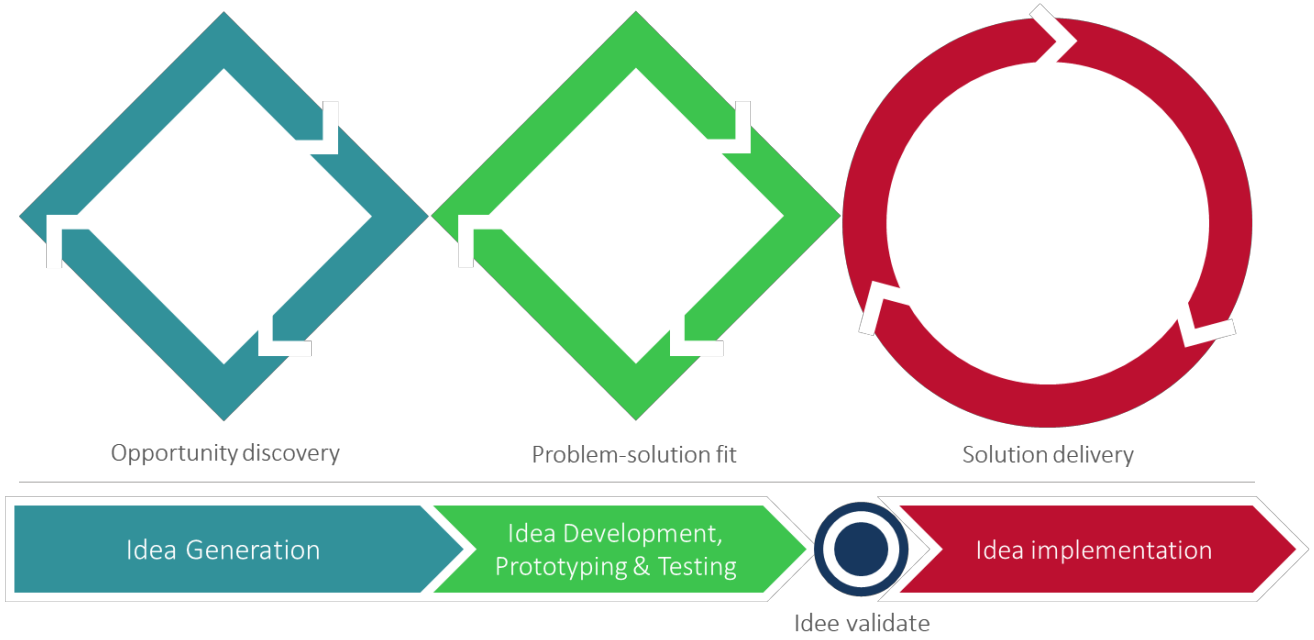
Soft skills

TO (AGILE):

- The **agile and entrepreneurial attitudes are widespread** in the entire company population
- **People apply these skills in their "everyday“**
- **There is a positive pressure to constant** develop and learn new skills
- **Contamination** is adopted: people are **constantly looking and sharing new stimuli to grow and learn**

© POLITECNICO DI MILANO

Processes, Methodologies and Tools



PROCESSES & PRACTICE

FROM (TRADITIONAL):

- The processes are **structured and rigid, defined top-down** and difficult to change
- The **practices are not shared** and there is low **information transparency**
- The **waterfall approach** is the main followed
- The processes are **built and focused only on products**

Processes characteristics

Approaches, methodologies and tools

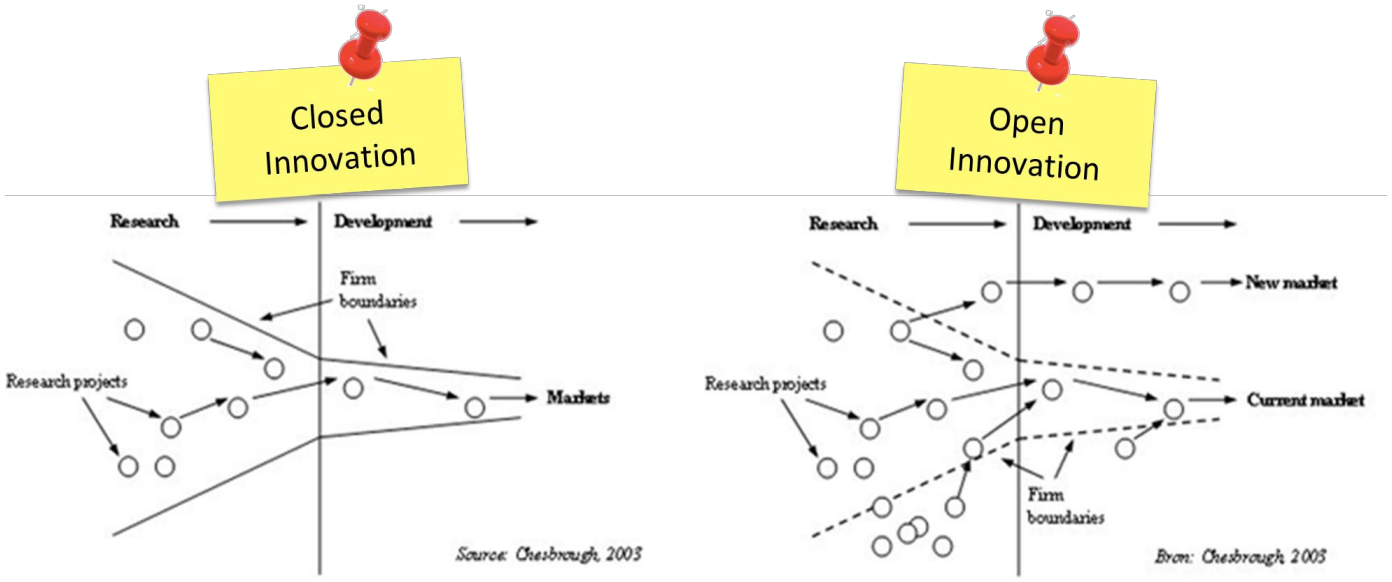
Supporting Processes

TO (AGILE):

- The processes are **flexible, iterative** and **continuously improved** (following the internal and external changes)
- The **organization promotes the use of methodologies** and **tools** aimed at **increasing the involvement of people** and **experimentation**, based on continuous improvement
- **People at the core**

© POLITECNICO DI MILANO

Ecosystem



Open Innovation

The use of purposive **inflows** and **outflows** of knowledge to **accelerate internal innovation**, and **expand the markets** for external use of innovation, respectively.

[Henry Chesbrough, Open Innovation: Researching a New Paradigm, 2006]

ECOSYSTEM

FROM (TRADITIONAL):

- The organization is **reluctant to collaborate with the outside world** and it does not promote or encourage it
- The organization **trust** and support **only the ideas developed within it.**

Collaboration strategy

External network

Innovation methods

TO (AGILE):

- The organization **collaborates with a wide and varied network of partners** (startups, trade associations, universities, innovative suppliers, customers, etc.) to facilitate the birth and development of innovative ideas.
- The organization **takes advantage of** inputs that come from outside, leveraging both on **external skills and opportunities.**

© POLITECNICO DI MILANO

How to facilitate the shift toward Agility

- Focus on (Agile) **teams**
- (Safe) spaces to develop personal passions and **test entrepreneurial attitudes**
- **Leadership** based on trust, delegation and autonomy
- **Inclusive** culture and **collaborative approach**
- **Open and transparent** communication
- Environment based on **continuous learning** and **skills training**
- Collaboration with **external ecosystem** and **open innovation**
- **Flexible processes** in order to constantly **adapt to change**

© POLITECNICO DI MILANO

Bibliography

- AA. VV., Manifesto for Agile Software Development, 2001, http://agilemanifesto.org
- Chesbrough, H. (2006). Open innovation: a new paradigm for understanding industrial innovation. *Open innovation: Researching a new paradigm*, 1-12.
- Chesbrough, H. W. (2006). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press
- Corso M., Cavallaro A. e Gaschi A., 2020, "Agile Organization: che cos'è e come aiuta l'innovazione in azienda", EconomyUp, 15 gennaio 2020 Link
- Dobbs R., Koller T., Ramaswamy S. (2015) The Future and How to Survive It, *Harvard Business Review*
- Enkel E., Gassmann O. and Chesbrough H. (2009), Open R&D and open innovation: exploring the phenomenon, R&D Management 39, 4.
- Osterwalder A, Pigneur Y (2010). Business Model Generation – A Handbook for Visionaries, Game Changers and Challengers. John Wiley and Sons, Inc., Hoboken, New Jersey.
- Rigby D.K., Sutherland J., Noble A., (2018), Agile at Scale: How to Create a Truly Flexible Organization, Harvard Business Review, May–June.
- Trott P., Hartmann D. (2009) WHY 'OPEN INNOVATION' IS OLD WINE INNEW BOTTLES, *International Journal of Innovation Management*
- West, J., & Bogers, M. *(2014).* Leveraging external sources of innovation: a review of research on open innovation. *Journal of Product Innovation Management,* 31(4), 814-831.
- Williams J. (2015) Disruptive Innovation in Mature Industries, *INSEAD Knowledge, freely available at http://knowledge.insead.edu/strategy/disruptive-innovation-in-mature-industries-4367*

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

SCHOOL OF MANAGEMENT

DIPARTIMENTO DI ELETTRONICA,
INFORMAZIONE E BIOINGEGNERIA

osservatori.net
digital innovation

Artificial Intelligence: an overview

Camilla Sorrentino

Researcher at Artificial Intelligence Observatory
camilla.sorrentino@polimi.it

19.03.24

Agenda

osservatori.net digital innovation

- History and definition
- Application Areas
- Deep dive: Generative AI

Artificial Intelligence

osservatori.net digital innovation

Seymour Papert

Grey Walter

Jerry Kaplan

Claude Shannon

Johns Hopkins

Judea Pearl

Allen Newell

*«The study of the computational that makes it possible to **perceive, reason and act»***

Michael Jordan

John McCarthy

Nathaniel Rochester

John Koza

*«The art of creating machines that perform functions that require **intelligence when performed by people»***

Steve Muggleton

Alan Turing

Herbert Simon

Hod Lipson

Ross Quinlan

*«A field of study that seeks to explain and **emaulate intelligent behavior** in terms of computational processes»*

Douglas Hofstadter

Geoff Hinton

*«The **automation of** activities that we associate with **human thinking»***

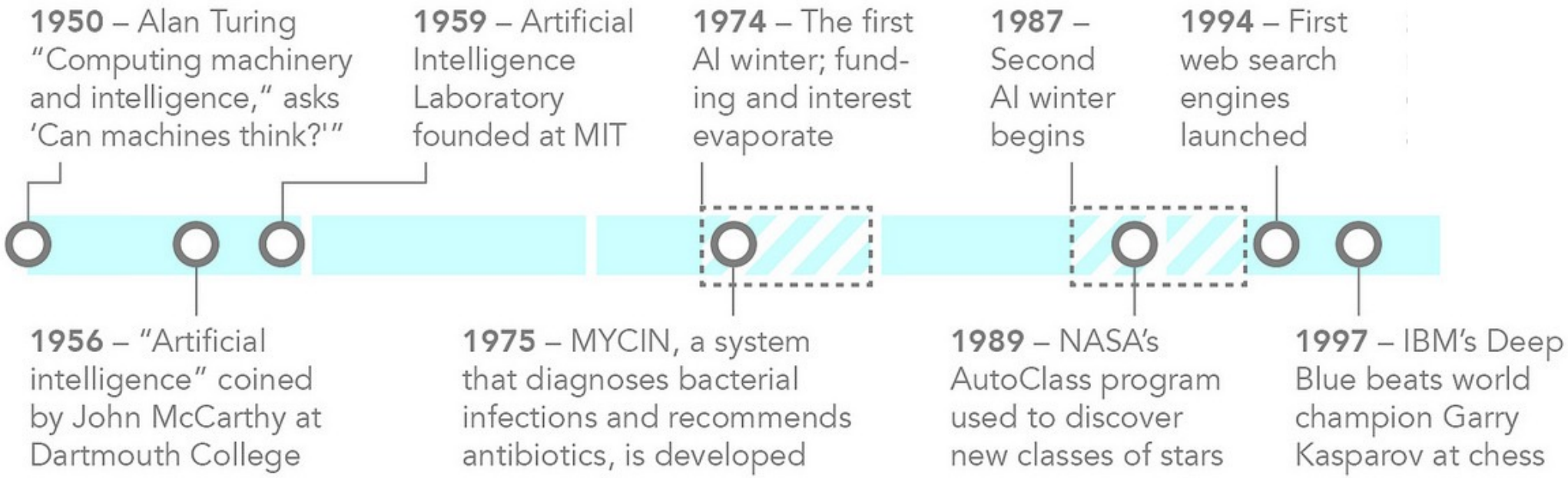
Richard Bellman

Marvin Minsky

Peter Hart

Yoshua Bengio

History of AI



AI Achievements (so far)

osservatori.net digital innovation

- 2005 – First success at the DARPA Grand Challenge
- 2011 – IBM Watson's wins Jeopardy
- 2015 – A machine achieves super-human ability in image recognition
- 2016 – AlphaGo goes where no machine has gone before

Definition

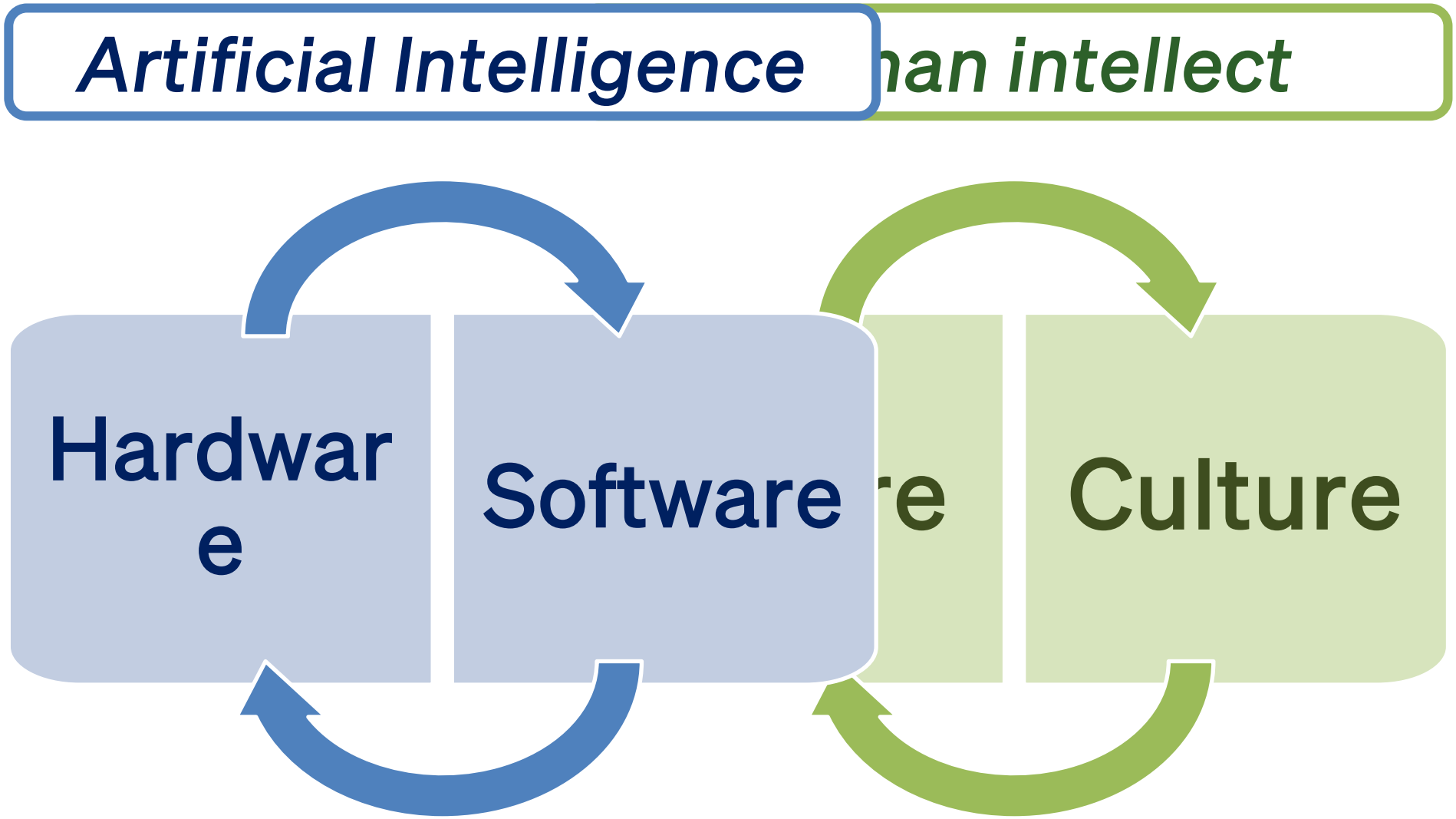
osservatori.net digital innovation

"Artificial Intelligence deals with the development of **hardware-and-software systems** endowed with **human-like capabilities,** able to **autonomously pursue** a given goal and **making decisions** that, **until that moment**, were usually assigned to humans"

By Osservatorio Artificial Intelligence

…hardware-and-software systems…

osservatori.net digital innovation



…human-like capabilities…

osservatori.net digital innovation

INPUT

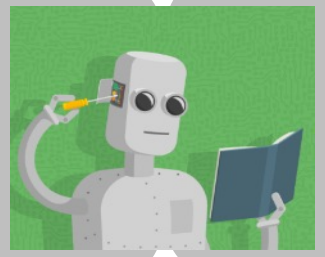
PROCESSING

OUTPUT

Natural Language Processing

Image Processing

Learning



Reasoning and Planning

Interacting Physically

Interacting Socially

… autonomously pursue a given goal…

osservatori.net digital innovation

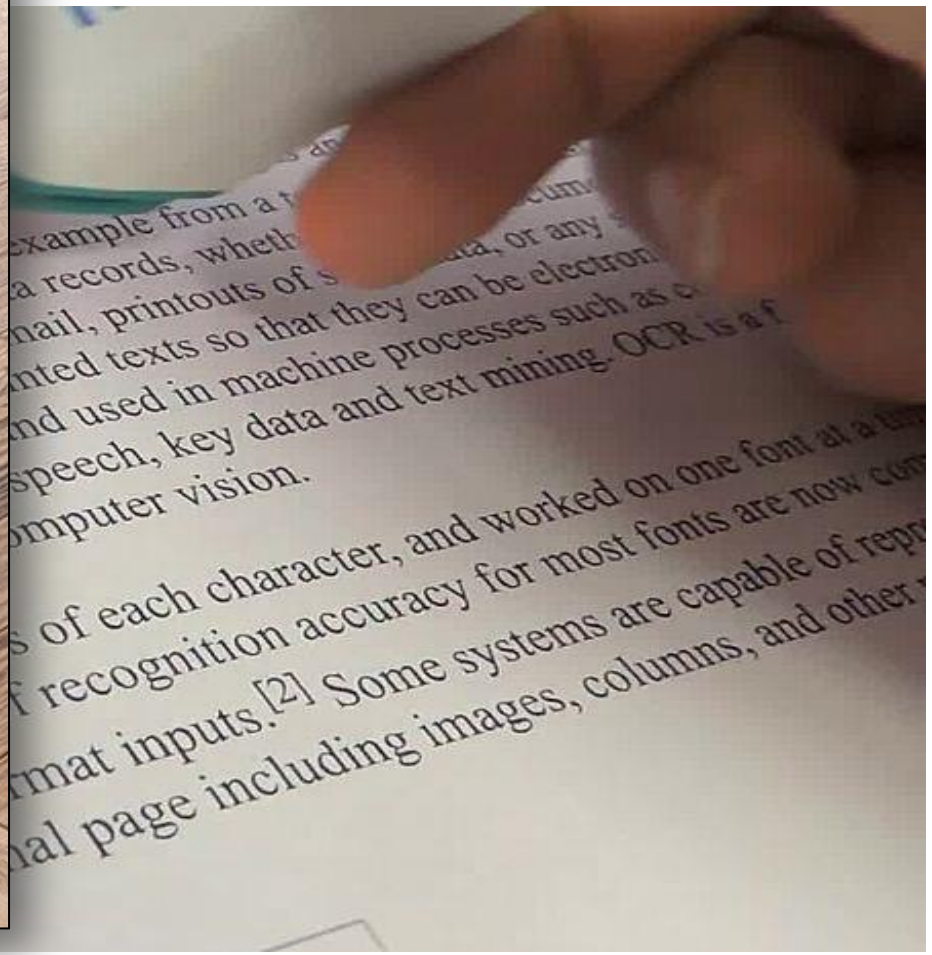
Machine as a decision support tool… NO

VS.

Machine as autonomous decision maker… YES

…until that moment…

osservatori.net
digital innovation



…human-like capabilities…

osservatori.net digital innovation

INPUT

PROCESSING

OUTPUT

Natural Language Processing

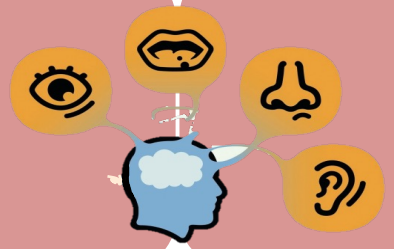
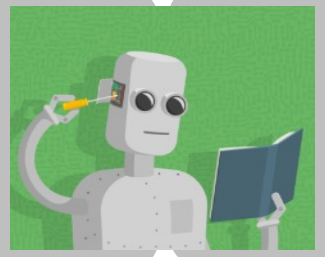


Image Processing

Learning



Reasoning and Planning

Interacting Physically

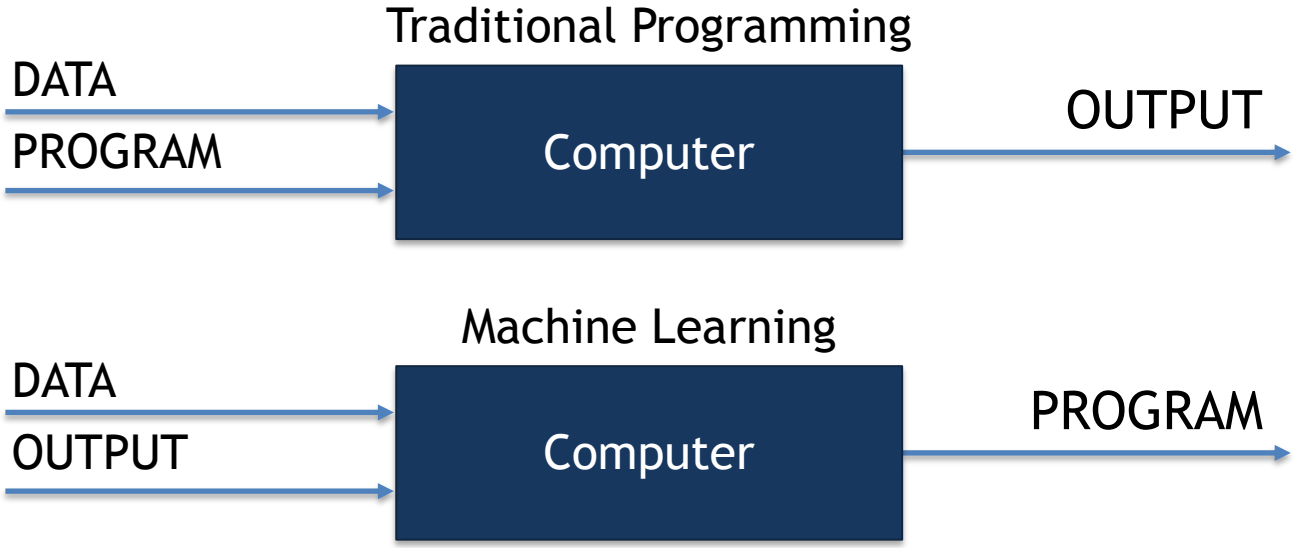
Interacting Socially

What is Machine Learning?

osservatori.net digital innovation

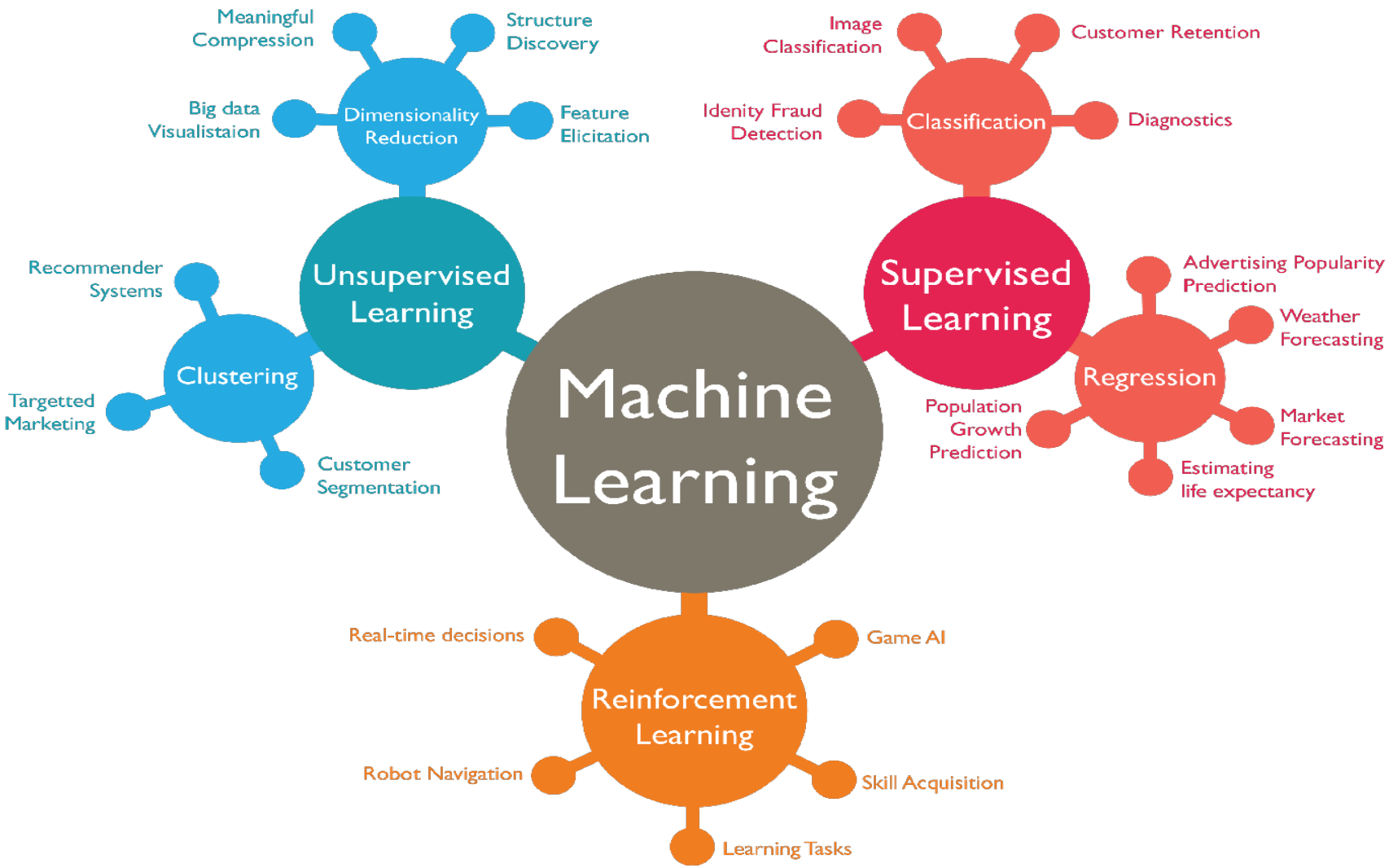
«The field of study that gives computers the ability to learn without being explicitly programmed»

Arthur Samuel (1959)



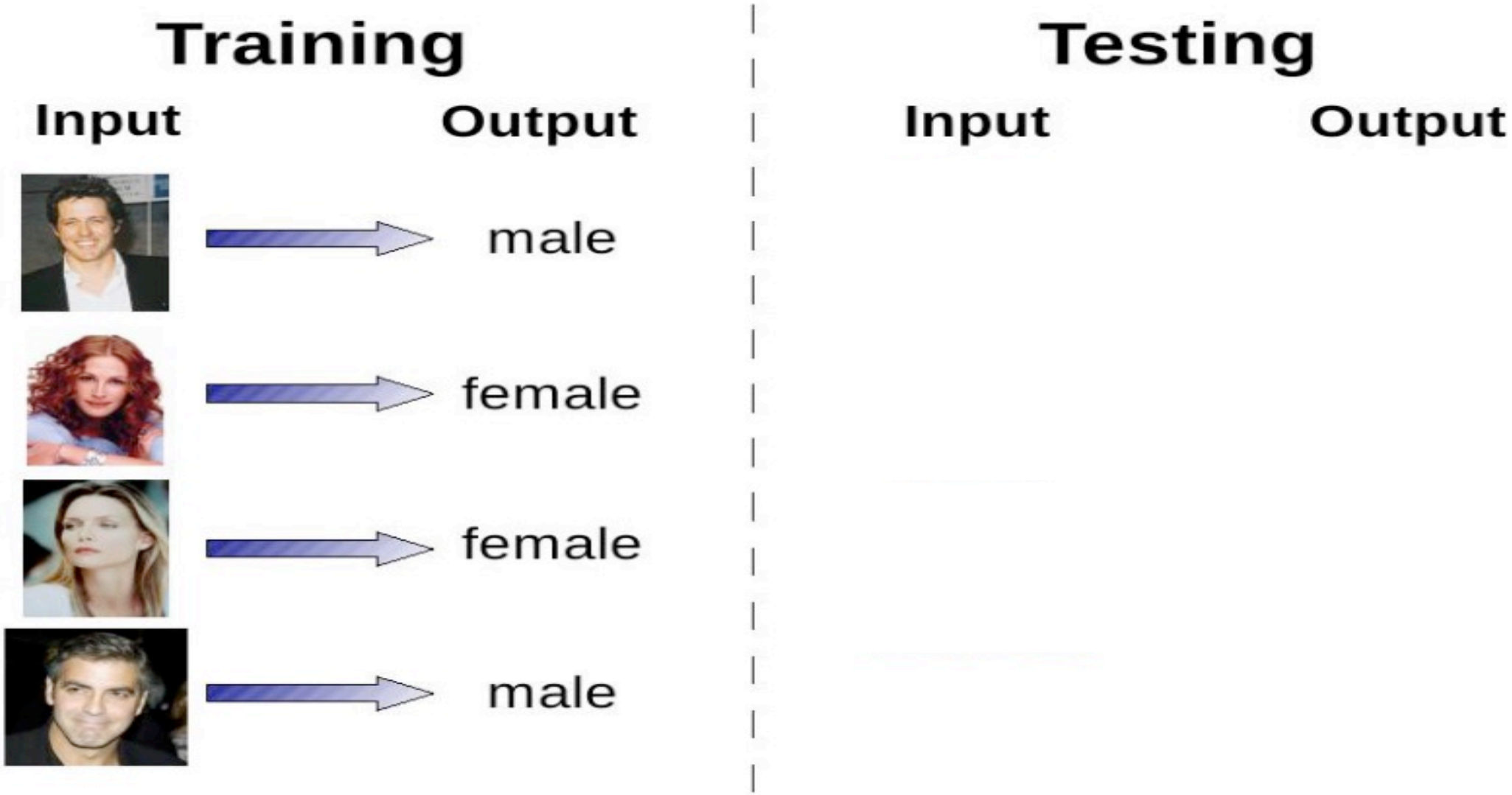
Machine Learning

osservatori.net digital innovation



Supervised Learning

osservatori.net digital innovation



Agenda

osservatori.net digital innovation

- History and definition
- Application Areas
- Deep dive: Generative AI

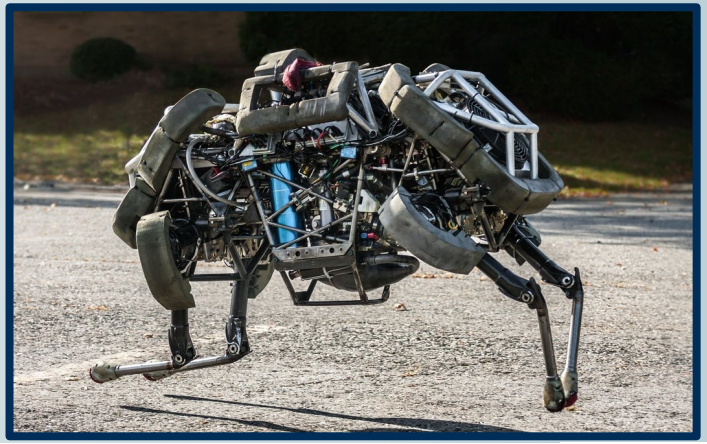
The 8 classes of solutions

osservatori.net digital innovation

- Autonomous Robot
- Autonomous Vehicle
- Intelligent Object
- Virtual Assistant / Chatbot
- Recommendation
- Image Processing
- Language Processing
- Intelligent Data Processing

Autonomous Robot

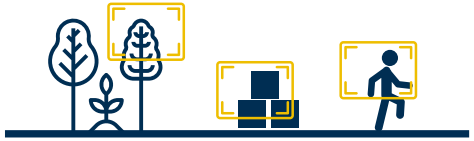
Robots that can move themselves, or some parts (e.g. arms), manipulate objects and execute actions of various types, without human intervention, taking information from their surroundings and adapting themselves to events that were not foreseen or programmed.



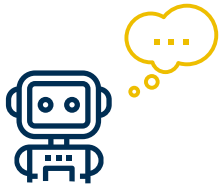
Autonomous Robot

osservatori.net digital innovation

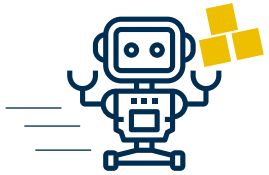
Environmental perception
Vocal/Textual data
Structured data



Habits learning
Identification and
Interpretation



Driving action/reaction
Manipulation
Answer



For example

- Collaborative Robot
- Humanoid Robot
- In-store assistant
- …

Autonomous Vehicle

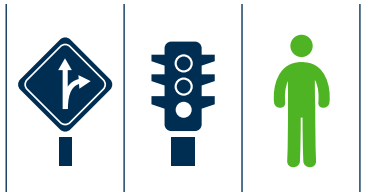
Autonomous means of transport used to transport people, animals or things, either driving on the roads (vehicle) or navigating in the sea, lakes or rivers (vessel), or even flying in our atmosphere or in space (aircraft), able to perceive the external environment and identify the correct manoeuvres required to adapt to that environment.

Autonomous Vehicle

osservatori.net digital innovation

Environmental perception

Identification and interpretation



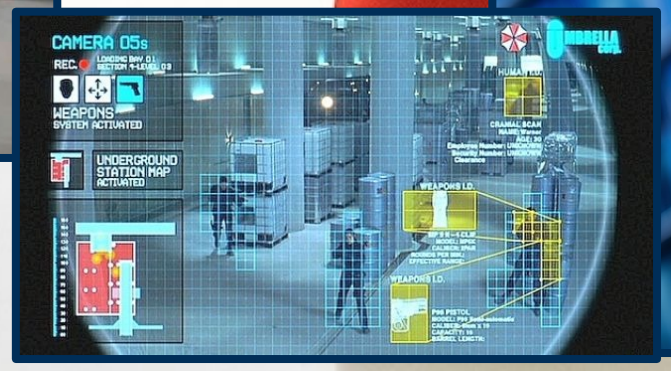
Driving action/reaction

For example

- Self-driving car
- Self-driving boat
- Delivery Drone
- …

Intelligent Object

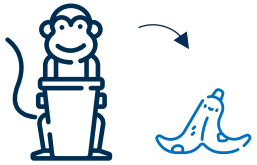
Objects that are able to perform actions and make decisions without requesting human intervention, interacting with the surrounding environment using sensors (e.g. thermometers, cameras, microphones, etc.) and actuators (e.g. open/close door/window, switching on of domestic appliances or installations, etc.), learning from the habits and actions of the people that interact with them.



Intelligent Object

osservatori.net
digital innovation

Environmental perception
Vocal/Textual data
Structured data



Habits learning
Identification and
Interpretation

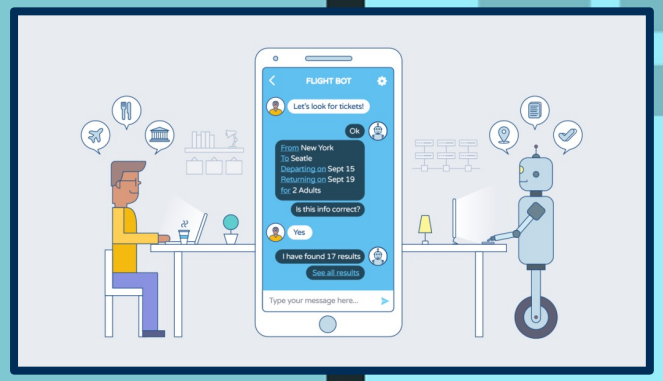
Action

For example

- Smart glasses
- Smart thermostat
- Intelligent cameras
- …

Virtual Assistant/Chatbot

Software agents able to perform actions or provide services to a human interlocutor, based on commands or requests received via natural language interaction (written or spoken).



Virtual Assistant / Chatbot

osservatori.net
digital innovation

Voice/text request

Comprehension
Learning

Answer

For example

- Customer Service
- Recruiting
- Help-desk
- ...

Recommendation

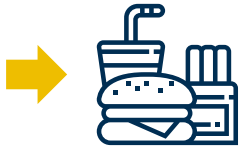
Solutions aimed at showing the preferences, interests or general decisions taken by the user, based on information provided by the user, directly or indirectly. The output consists of personalised recommendations, that can appear at different stages of the customer journey, or more generally, of the decision-making process.

Recommendation

Behavioural data

Habits/preferences learning

Recommendation



For example

- Customized Promotions
- Cross Selling
- Content Recommendation
- …

Language Processing

Language processing solutions for various purposes from content comprehension, to translation, to producing text autonomously based on data and documents supplied as input.

Language Processing

osservatori.net digital innovation

Vocal/textual data

Comprehension

Information/action

For example

- Translation
- Document search engine
- Contract review
- …

Computer Vision

Solution for analysing images, individual or in sequence (video), for recognising people, animals and objects in the image, biometric recognition (e.g. face, irises) and to generally extract information from the image.

Computer Vision

osservatori.net digital innovation

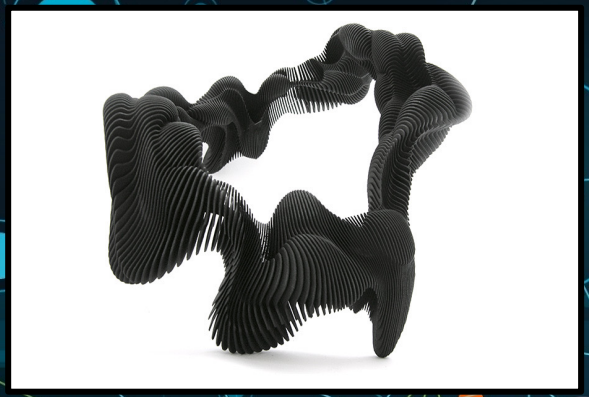
Video / Image

Identification and interpretation

Information/action

For example

- Face Recognition
- Surveillance
- Object Detection
- …



Intelligent data processing

Solutions that use artificial intelligence algorithms on structured and non-structured data, for purposes related to extracting information from the data and to trigger consequent actions.

- Predictive Analysis
- Fraud / Anomaly Detection
- Pattern Recognition

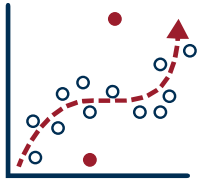
Intelligent Data Processing

osservatori.net digital innovation

Structured and unstructured data

Elaboration Learning

Information Action



For example

- Predictive Analysis
- Anomaly Detection
- Pattern Discovery
- …

The collection of internation business cases

osservatori.net digital innovation

Sample:
- 979 Companies
- 618 International Cases (503 Companies)

	Support Activities						Primary Activities				Product	Frequency
	Asset Mgmt	Finance & Compliance	HR	Procurement	R&D/Design	IT	Logistics	Operations	Marketing & Sales	Services	Product	
Intelligent Data Processing	30	30	4	1	26	17	5	51	23	20	2	34%
Virtual Assistant/Chatbot	1		4					2	21	96	12	22%
Computer Vision	3	1			3	1	1	17	13	19	14	11%
Recommendation	2	1			2			2	21	28	1	9%
Language Processing	2	8	4	1	2	5		3	8	16		8%
Autonomous Vehicle					1		3	6			33	7%
Autonomous Robot		1					6	10			18	6%
Intelligent Object	1							3			13	3%

The collection of intern ss cases

Sample:
- 979 Companies
- 618 International Cases (503 Companies)

Autonomous Product Dev.

NISSAN — AI system able to design a car autonomously

Virtual Customer Care

Aetna — Members receive the same responsive service that they receive when calling customer service, but without leaving the website

Advanced Customer Analytics

Walmart — Use of AI methods to transform raw data from 3.000 stores into useful information

Virtual Personal Shopper

FCA — Simulates a human conversation to provide customers product informations and advices

Computational Advertising

alibris — Analysis of 11 Mln books and 45 Mln purchase-transactions to provide recommendations

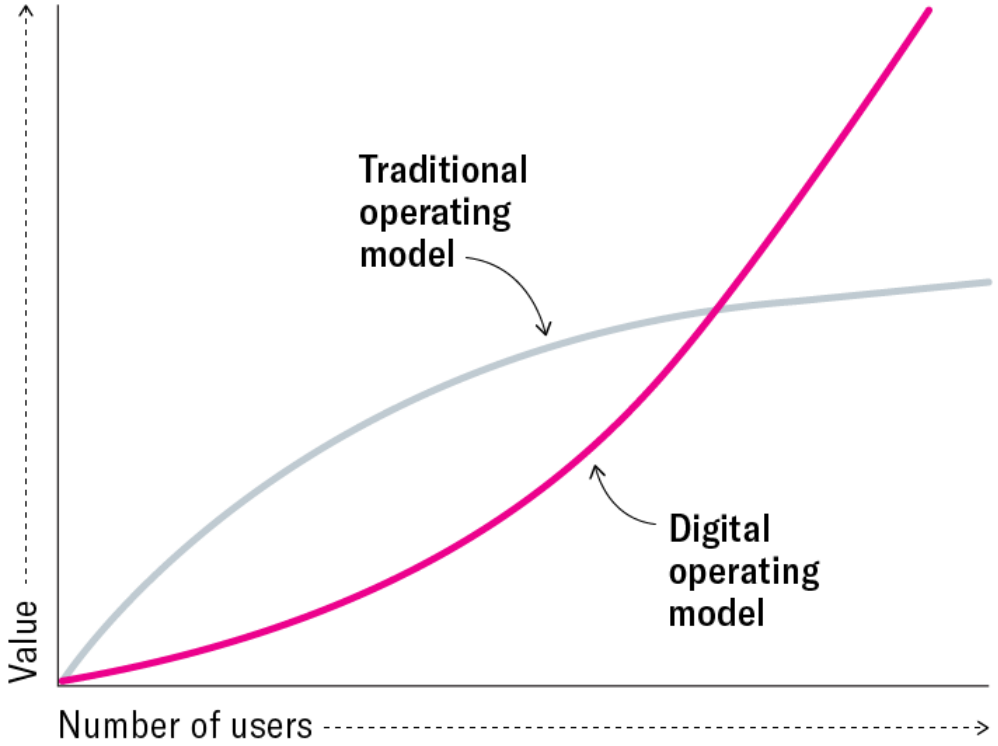
	Asset Mgmt	Finance & Compliance	HR	Pr	R&	IT	Logistics	Operations	Marketing & Sales		Product	Frequency
	Support Activities						Primary Activities					
Intelligent Data Processing	30	30	4	1	26	17	5	51	23	20	2	34%
Virtual Assistant/Chatbot	1		4					2	21	96	12	22%
Computer Vision	3	1						17	13	19		
Recommendation	2	1						2	21	28		
Language Processing	2	8	4	1	2					16		
Autonomous Vehicle					1						33	7%
Autonomous Robot		1					6	10			18	6%
Intelligent Object	1							3			13	3%

Competing in the age of AI

osservatori.net digital innovation

After hundreds of years of incremental improvements to the industrial model, the **digital firm is now radically changing** the scale, the scope and the learning paradigm.

AI-driven processes can be **scaled up** much more rapidly than traditional processes can, allow for **much greater scope** because they can easily be **connected with other digitized businesses**, and create incredibly powerful **opportunities for learning and improvement**—like the ability to produce ever more accurate and sophisticated customer-behavior models and then tailor services accordingly.



From: "Competing in the Age of AI," by Marco Iansiti and Karim R. Lakhani, January–February 2020

HBR

Competing in the age of AI: the AI factory

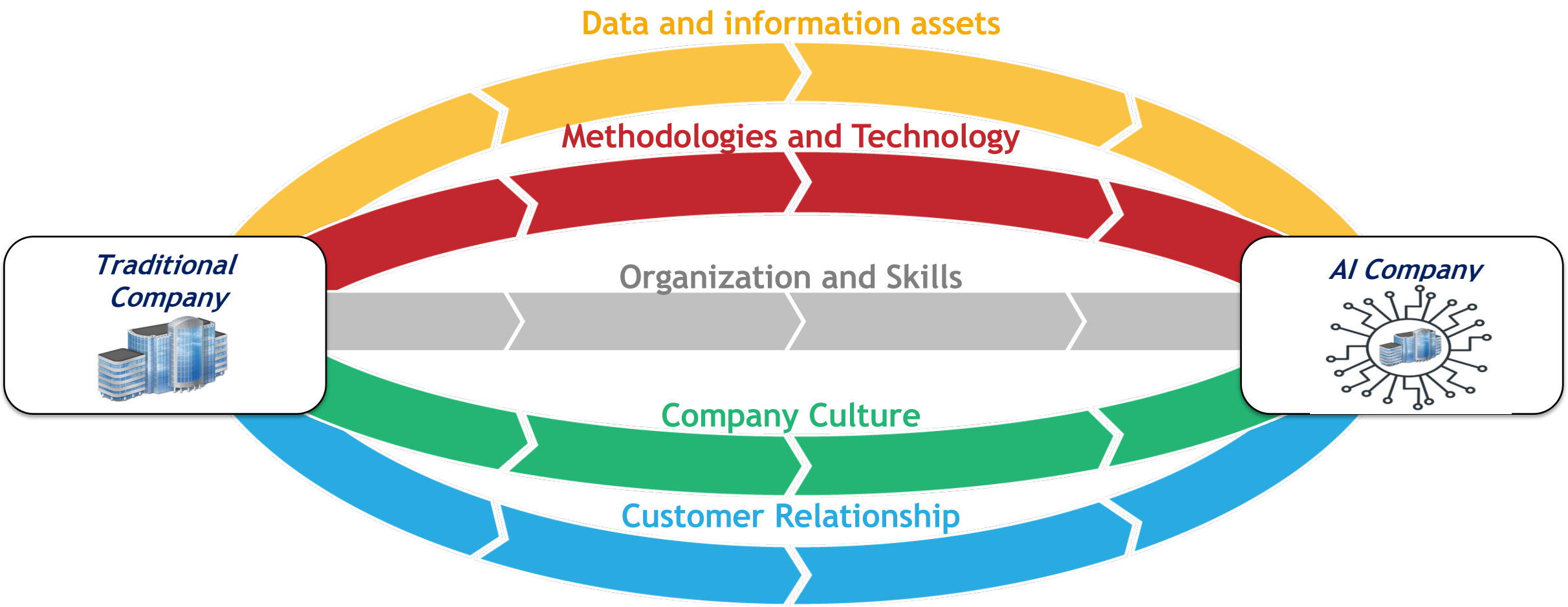
osservatori.net digital innovation

Four components are essential:

- The first is the **data pipeline**, the semiautomated process that gathers, cleans, integrates, and safeguards data in a systematic, sustainable, and scalable way;
- The second is **algorithms**, which generate predictions about future states or generate actions of the business.
- The third is an **experimentation platform**, on which hypotheses regarding new algorithms are tested to ensure that their suggestions are having the intended effect.
- The fourth is **infrastructure**, the systems that embed this process in software and connect it to internal and external users.

Marco Iansiti, Karim R. Lakhani, **Competing in the Age of AI,** *HBR, Jan-Feb 2020*

AI Journey – A balanced perspective



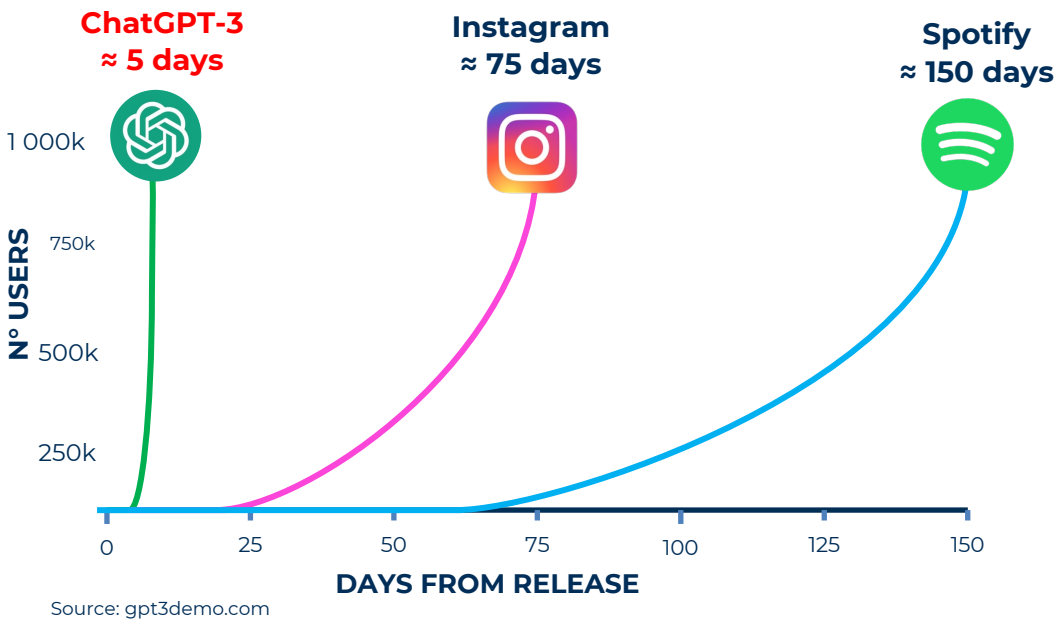
Agenda

osservatori.net digital innovation

- History and definition
- Application Areas
- Deep dive: Generative AI

ChatGPT: hype and fears

osservatori.net digital innovation



Source: gpt3demo.com

THE WALL STREET JOURNAL.

ChatGPT Banned in New York City Public Schools

Fonte: 6 gennaio'23, WSJ

Elon Musk
@elonmusk

In risposta a @sama

ChatGPT is scary good. We are not far from dangerously strong AI.

Traduci il Tweet

8:48 PM · 3 dic 2022

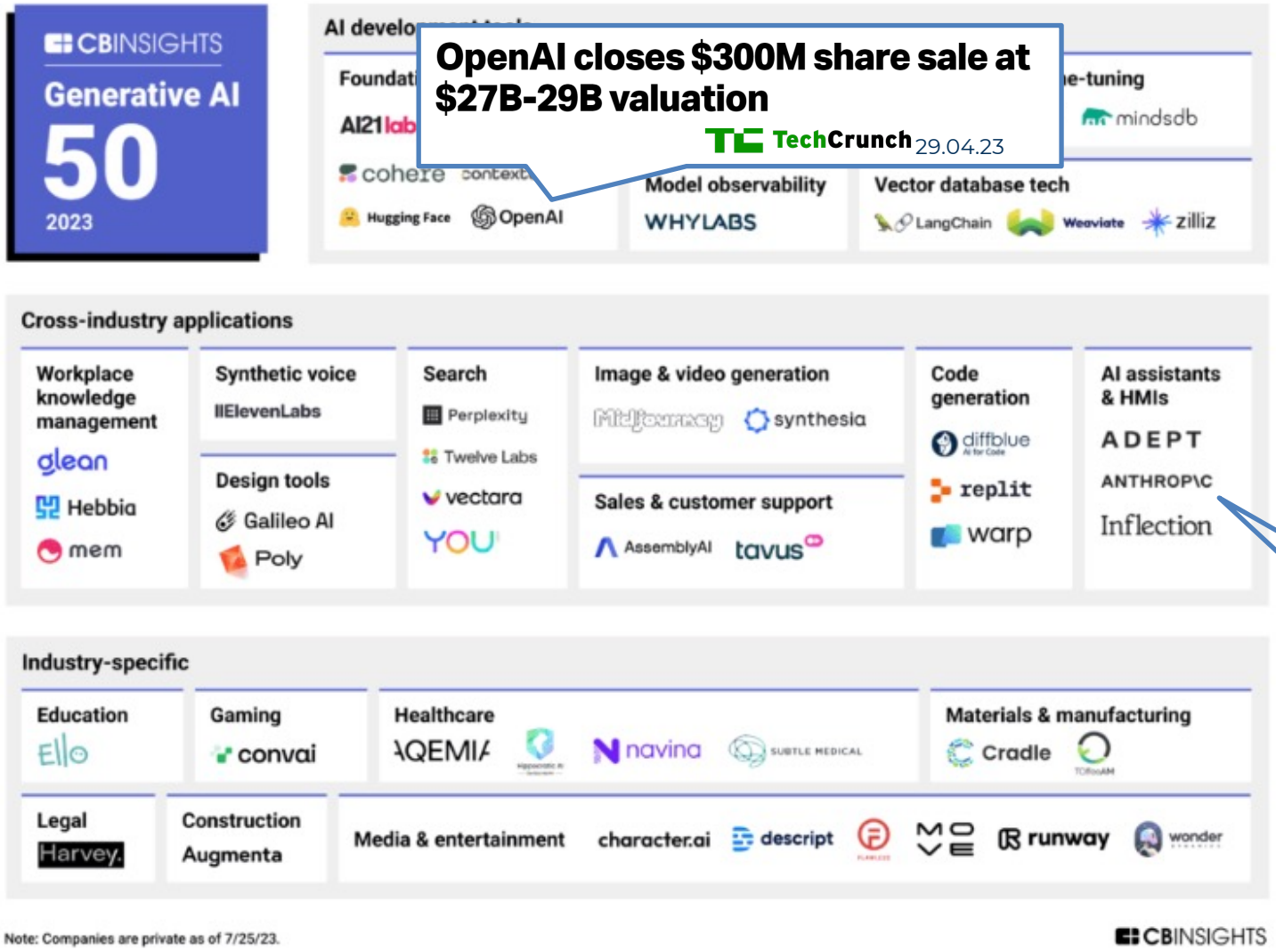
Bloomberg

Microsoft Invests $10 Billion in ChatGPT Maker OpenAI

Source:: 23 gennaio'23, Bloomberg

GENERATIVE AI: A NEW MARKET & NEW UNICORNS

osservatori.net digital innovation



OpenAI closes $300M share sale at $27B-29B valuation

TechCrunch 29.04.23

In Generative AI,
15 companies have
reached the unicorn status

3.6 years - average time to reach 1B$
(on average a company takes 7 years)

AI Startup Anthropic Raising Another $300M At $4.1B Valuation — Report

Chris Metinko March 8, 2023

Source: CBInsight, July 2023

*Unicorn: companies that have achieved a market valuation of over a billion dollars.
(A. Lee, founder of Cowboy Venture Venture Capital (1968 -2013)

Generative AI: Definition

osservatori.net digital innovation

"Generative AI, also known as generative artificial intelligence, refers to a branch of artificial intelligence (AI) that focuses on creating or generating new content, such as images, text, music, or even entire virtual environments. Unlike other forms of AI that primarily involve pattern recognition and data analysis, generative AI aims to produce original and creative outputs that **resemble human-generated content**.

At the core of generative AI is the use of generative models, typically based on **neural networks**, which are trained on **large datasets** to learn the underlying patterns and structures of the data. These models can then generate new content by sampling from the learned **distributions**, combining existing elements, or even creating entirely novel elements."

ChatGPT

What is Generative AI?

osservatori.net digital innovation

What is Generative AI?

Generative Artificial Intelligence is **a type of artificial intelligence that uses machine learning algorithms to generate new content**. This content can be for example text, audio, images, video and computer code

What is it based on?

Generative Artificial Intelligence is typically based on **foundation models, AI models trained on huge amounts of data.** These models can learn the probability distribution underlying the training data and use that distribution to generate new content that is similar in style and structure to the training data.

The timeline of Generative AI

MAIN EVENTS

osservatori.net digital innovation

Foundation of Open AI — **2015**

2017: *«Attention is all you need»**

Generative Pre-trained Transformer

2018-2019: GPT 1; GPT 2

2020: GPT 3

The Guardian — **The 1st article written by GPT-3** — **2020**

2021: DALL E — **2022: DALL E 2**

Text to image generator

ChatGPT — **30.11.2022**

ChatGPT Plus — **01.02.2023**

March/April 2023

ChatGPT blocking in Italy

GPT – 4, multimodal — **14.03.2023**

ChatGPT Plugins — **March 2023**

Bing GPT-4 open to all — **04.05.2023**

ChatGPT for enterprises! — **28.08.2023**

But there's so much more!

* *Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A., Kaiser, L., Polosukhin, I. 2017. "Attention is all you need", Advances in Neural Information Processing Systems 30, NIPS Conference.*

The 4 areas of Generative AI

osservatori.net digital innovation

Conversational AI	**Chatbots specialized in conversation with human user**, similar to ChatGPT. The conversation can involve both natural language and computer code
Content creation	Creation of **creative content** such as creation of text, 2D and 3D images, videos, music and podcasts
Productivity	Tools to increase productivity, such as **content summary, insight extraction, slide creation, post writing, personal assistant, coding assistant**
Data & model creation	Creating **new structured data or models**, such as for the development and training of ML systems or simulations; Creating privacy-compliant, fair and unbiased datasets

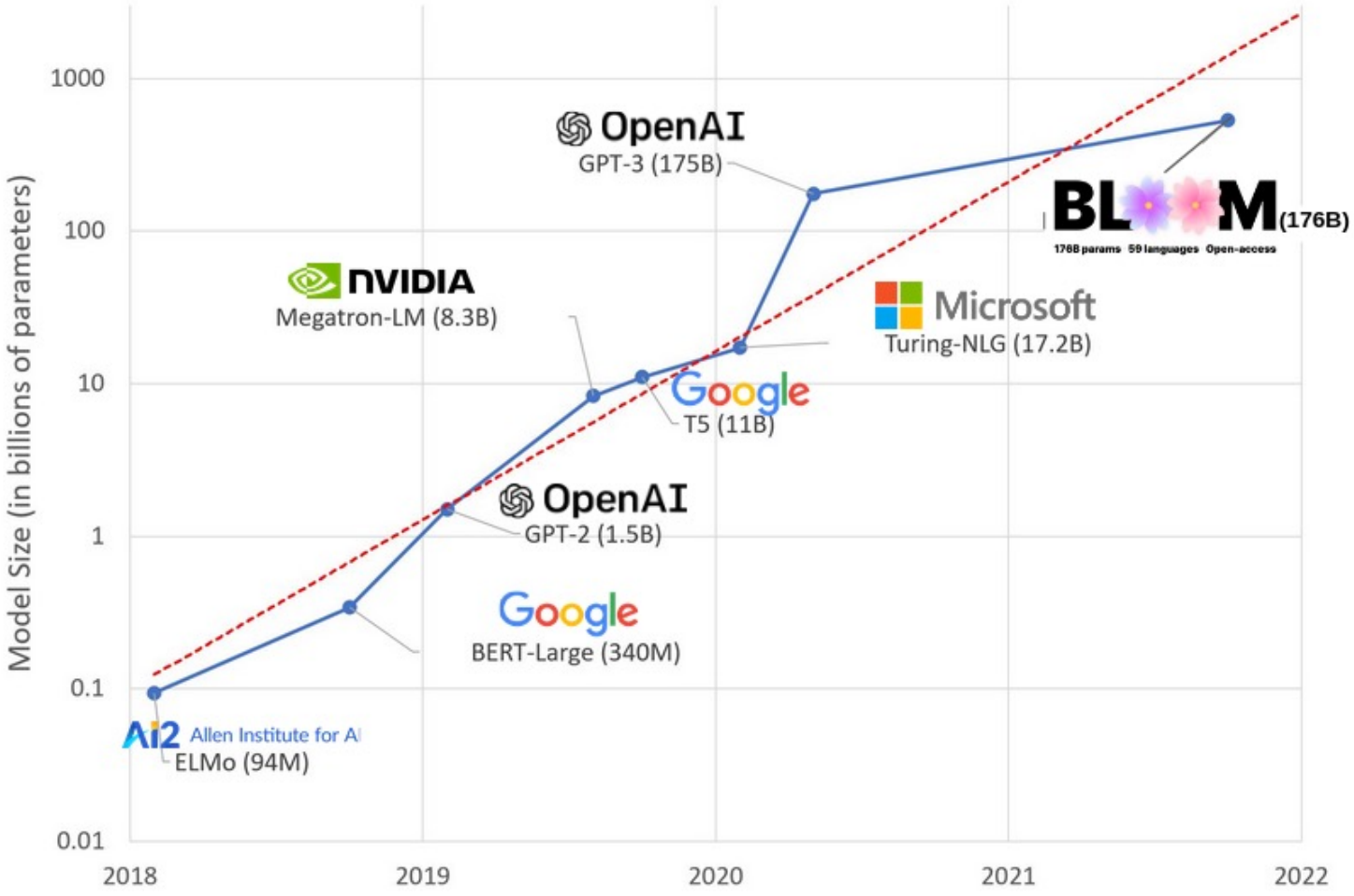
Generative AI impacts every industry

osservatori.net digital innovation

Automotive	*Designing cars, creating synthetic data for self-driving car training...*
Banking	*Generate scenarios for market risk models, generate privacy-compliant datasets...*
Design/Architecture	*Generation of interior/exterior design...*
Education	*Creating a personalized learning plan, learning languages with conversational artificial intelligence...*
E-commerce	*Product design, avatar generation and chatbots to improve customer interaction...*
Entertainment	*Music generation, podcasts, games...*
Fashion	*Creative Design, 3D rendering...*
Pharma/Healthcare	*Improve the patient care process, accelerate drug discovery, generate privacy-compliant datasets...*
Manufacturing	*Process design, design and development of products...*

Generative AI tools can often be applied across different industries, without a specific sectoral orientation.

Models are growing in size!



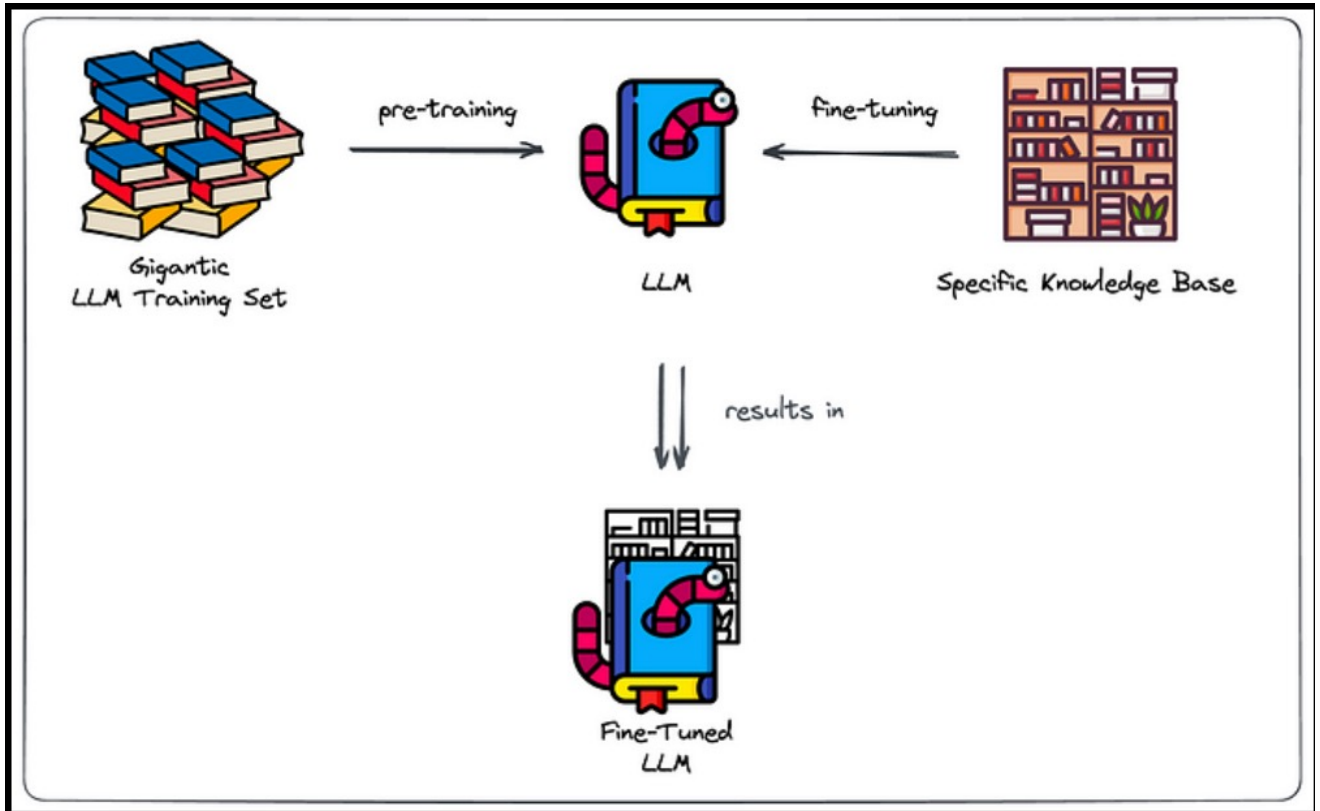
Marcello Restelli - Artificial Intelligence Observatory

The value will be in fine-tuning?

osservatori.net digital innovation

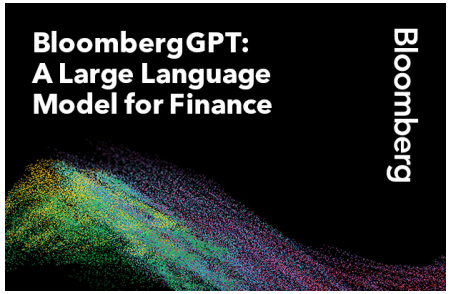
OBIETTIVI

- Making **processes** more **efficient** by accessing company's **knowledge base**
- Create **new services** for clients based on a **specific set of data**

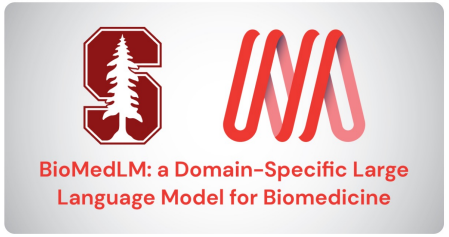


Classical approach of fine-tuning on domain specific data (all icons from flaticon)

EXAMPLES



The first LLM specific for Finance



BioMedLM trained on PubMed Abstracts

(Stanford Center for Research on Foundation Models (CRFM) , MosaicML)

Fini – «ChatGPT» for customer support

Fine tuning on a specific knowledge base

Generative AI: problems yet?

osservatori.net
digital innovation

Marcello Restelli - Artificial Intelligence Observatory

Generative AI: Pros and Cons

osservatori.net digital innovation

Hello Chat, can you generate a short bio of Giovanni Miragliotta, who is professor at Politecnico di Milano, starting from data which are available online?

Giovanni Miragliotta is a professor at the Politecnico di Milano.

He has extensive experience in the field of civil engineering and engineering management, as well as teaching and research activities. His areas of expertise include structural analysis, seismic design, construction safety and risk assessment. Professor Miragliotta holds several patents related to seismic protection devices for buildings. He is also an active member of various professional organizations such as the Italian Association for Earthquake Engineering (AIE) and the European Seismic Experts Group (ESEG).
Additionally, he regularly publishes his work in international journals and conferences around the world.

Generative AI: Pros and Cons

osservatori.net digital innovation

Hello Chat, could you tell me what the environmental impact of AI generated language models is and provide scientific references in the text and links to the sources mentioned?

Certainly! The environmental impact of AI-generated language models like myself can be significant, as training and running these models requires large amounts of computational power, which in turn requires significant amounts of energy. The energy consumption of AI models is estimated to be growing rapidly, and some studies have suggested that it could account for a significant portion of global energy consumption in the coming years.

In particular, the training of large AI models such as GPT-3, the model on which I am based, is estimated to require hundreds of thousands of dollars in electricity costs and generate large amounts of carbon emissions. However, there are ongoing efforts to develop more energy-efficient and sustainable AI models, and researchers are exploring various techniques such as model compression and distillation, which aim to reduce the energy consumption and carbon footprint of AI models.

Here are some scientific references and links to sources that provide more information on this topic:

"Emerging energy use of artificial intelligence," by Eric Masanet et al., published in Nature on July 15, 2020: https://www.nature.com/articles/s41560-020-0679-9

"The carbon footprint of large-scale language models," by Emma Strubell et al., published in the Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing (EMNLP) on November 17, 2020: https://www.aclweb.org/anthology/2020.emnlp-main.740.pdf

"Towards Environmentally Sustainable Natural Language Processing," by Jianguo Zhang et al., published in the Proceedings of the 2021 Conference of the North American Chapter of the Association for Computational Linguistics (NAACL) on June 10, 2021: https://www.aclweb.org/anthology/2021.naacl-industry.13.pdf

«(Un)Useful» dialogue with chatgpt about climate change

osservatori.net digital innovation

Here are some scientific references and links to sources that provide more information on this topic:

- "Emerging energy use of artificial intelligence," by Eric Masanet et al., published in Nature on July 15, 2020: https://www.nature.com/articles/s41560-020-0679-9
- "The carbon footprint of large-scale language models," by Emma Strubell et al., published in the Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing (EMNLP) on November 17, 2020: https://www.aclweb.org/anthology/2020.emnlp-main.740.pdf
- "Towards Environmentally Sustainable Natural Language Processing," by Jianguo Zhang et al., published in the Proceedings of the 2021 Conference of the North American Chapter of the Association for Computational Linguistics (NAACL) on June 10, 2021: https://www.aclweb.org/anthology/2021.naacl-industry.13.pdf

Page not found

Sorry, the page you requested is unavailable. The link you requested might be broken, or no longer exist.

A Probabilistic End-To-End Task-Oriented Dialog Model with Latent Belief States towards Semi-Supervised Learning

Yichi Zhang[1], Zhijian Ou[1*], Min Hu[2], Junlan Feng[2]
[1] Speech Processing and Machine Intelligence Lab, Tsinghua University, Beijing, China
[2] China Mobile Research Institute, Beijing, China
zhangyic17@tsinghua.org.cn, ozj@tsinghua.edu.cn

Should we find another model?: Improving Neural Machine Translation Performance with ONE-Piece Tokenization Method without Model Modification

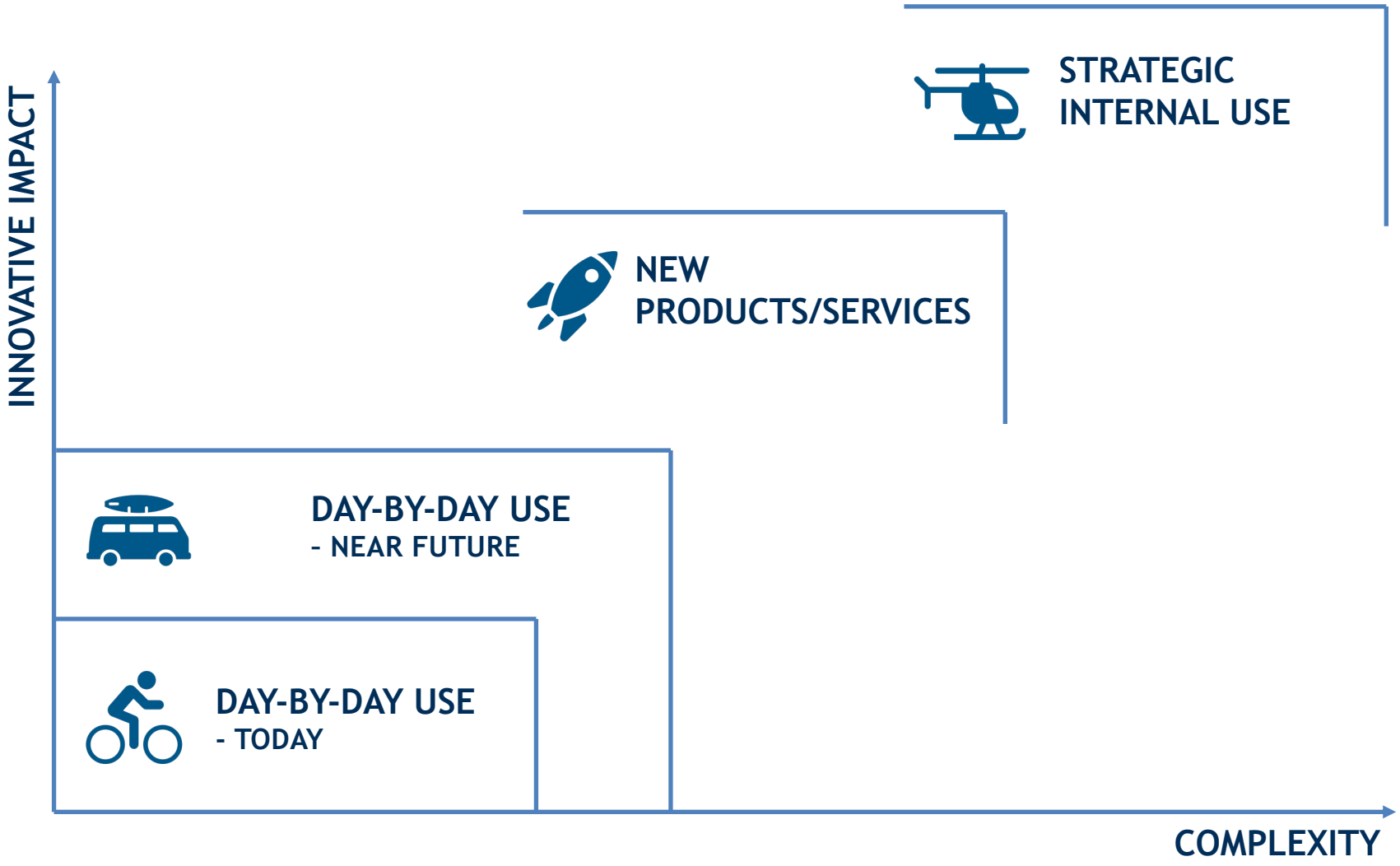
Chanjun Park[1†], Sugyeong Eo[1†], Hyeonseok Moon[1‡], Heuiseok Lim[1*]
[1]Korea University, South Korea
{bcj1210, djtnrud, glee889, limhseok}@korea.ac.kr

Hallucinations - The model can confidently state things/facts that are actually totally invented

Source: [ChatGPT: climate knowledge - and misinformation - at your fingertips - Foresight (climateforesight.eu)]

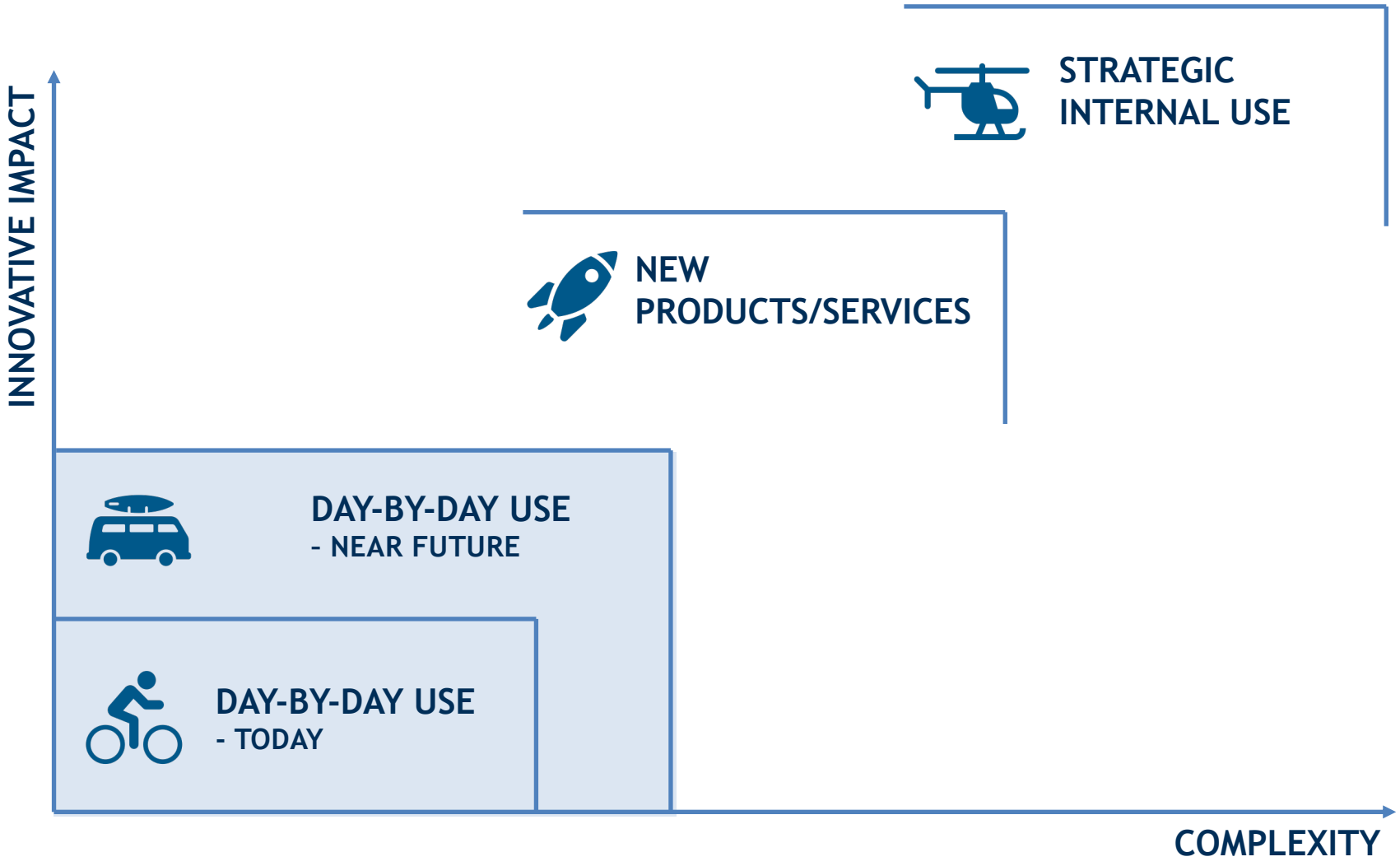
Generative AI INTO PRACTICE

osservatori.net
digital innovation



Generative AI INTO PRACTICE

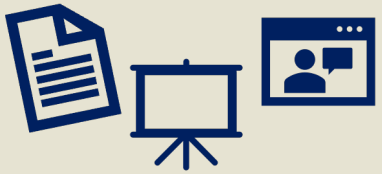
osservatori.net
digital innovation



DAY-BY-DAY USE

osservatori.net digital innovation

PERSONALIZED ASSISTANCE AND TIME MANAGEMENT



CONTENT CREATION AND CURATION

DATA ANALYSIS AND INSIGHTS

… and more

PERSONALIZED ASSISTANCE AND TIME MANAGEMENT

osservatori.net digital innovation

EXAMPLES

DAY-BY-DAY USE
- TODAY

- **Writing routine emails or generating emails using a set of information**
- **Summarization/text re-phrasing**
- **Define power point presentation**
- **Translation**
- **Answer general questions** (watch out for hallucinations!)
- **Video summarization**
- **Extract main information** from a document
- **Code generation**

……

DAY-BY-DAY USE
- NEAR FUTURE

- **Daily to-do list** that takes into account a person's schedule, priorities, and goals
- **Personalized task recommendations** that would help a person develop a new skill
- **Task prioritization** based on a variety of factors, such as deadlines, importance, and dependencies
- **Project planning**

….

CONTENT CREATION AND CURATION

osservatori.net digital innovation

SOME SPECIFIC EXAMPLES

MARKETING & ADVERTISING

- Keyword extraction
- Content ideation
- Writing drafts
- Edit and proofread drafts
- Converting long-form content into social media posts
- Production of photos and videos

….

LEGAL

- Contract analysis and negotiation
- Document drafting and review
- Compliance and regulatory monitoring
- Due diligence document summarization
- Intellectual property management
- Legal research

….

HUMAN RESOURCES

- Create content for job descriptions and job adverts
- Optimize training path: ex. employees of a manufacturing company can ask a generative AI–based “virtual expert” technical questions about operating procedures
- Summarize exit interview feedback
- Summarize legal documents
- Edit and enhance internal communications
- Edit and refine policy and procedure documents

…..

DATA ANALYSIS AND INSIGHTS

osservatori.net digital innovation

EXAMPLES

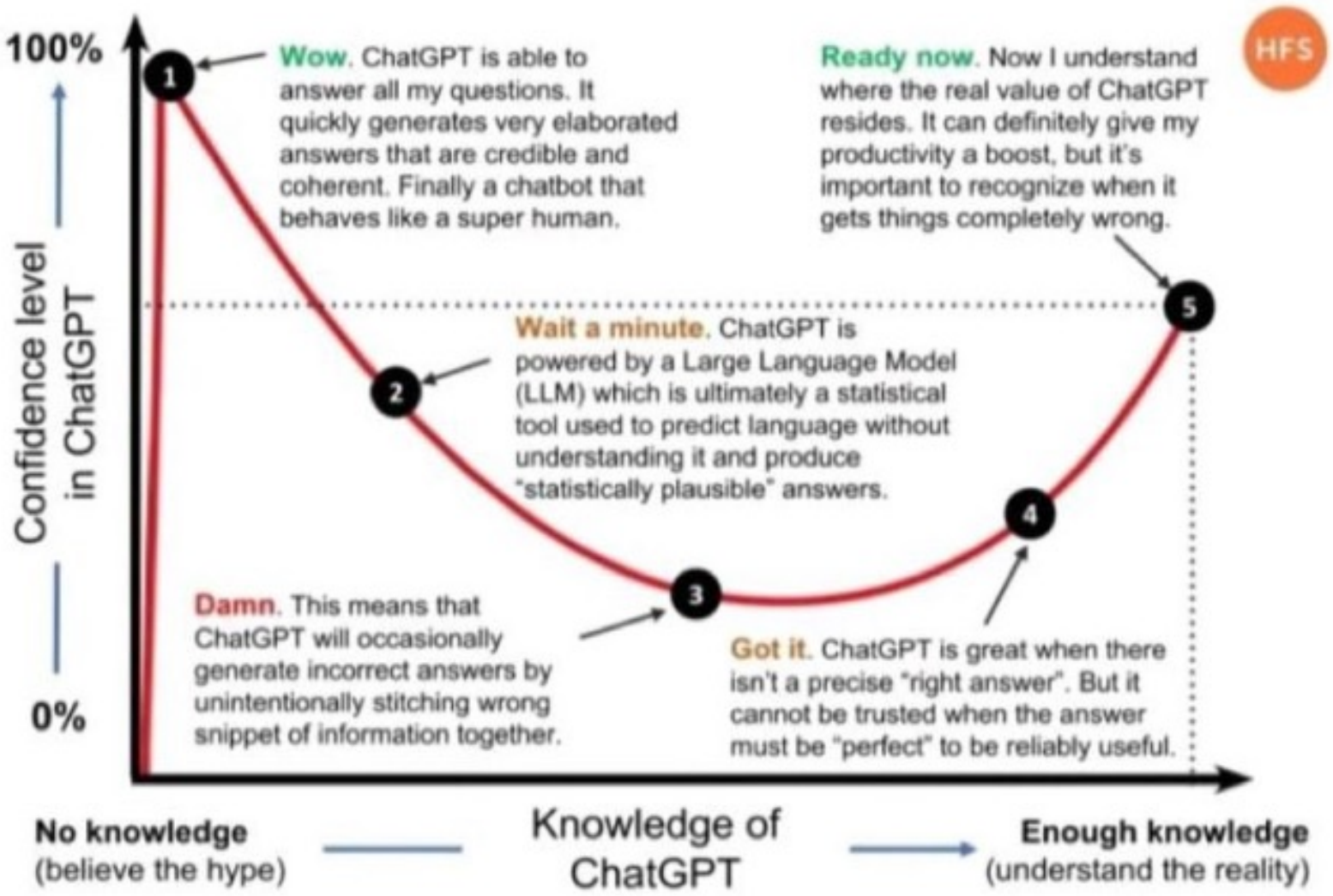
Code Interpreter Beta

Create a map with World Heritage Sites Map

Create a chart instead of a map

It decided to do a bar chart on the number of World Heritage Sites per country, and gave me a handy PNG I could download.

HAVE YOU BEEN A VICTIM OF DUNNING-KRUGER EFFECT?

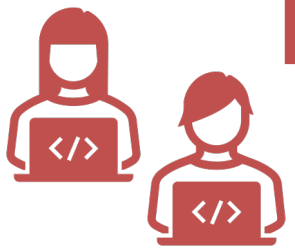


Source: Maurizio Bisogni

How to use Generative AI well? Prompt design!

osservatori.net digital innovation

It is crucial to know how to interact with generative AI tools and be able to **guide them to the desired output**



Prompt design

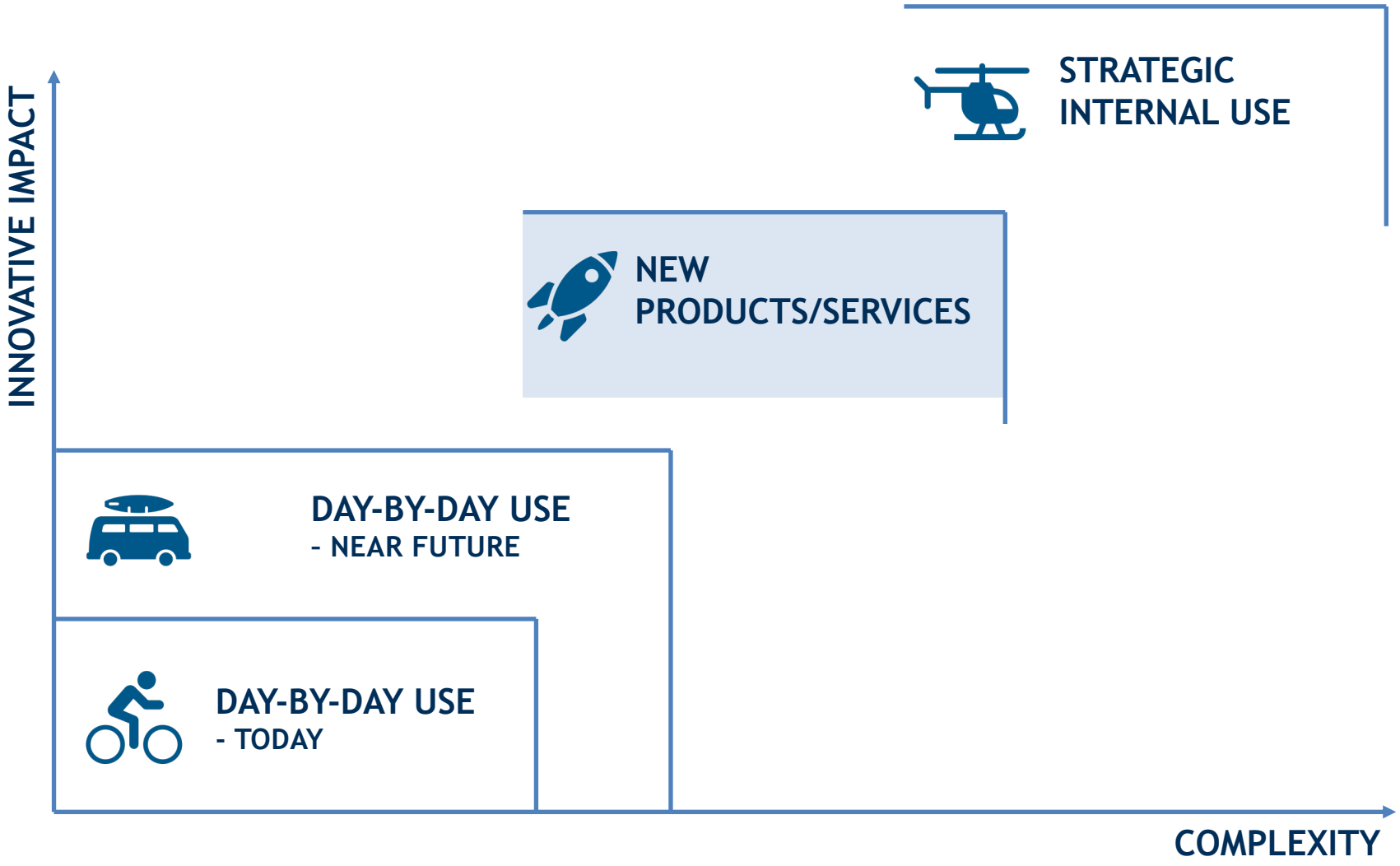
Prompt design is aimed at **designing, refining and optimizing the input requests of a Generative Artificial Intelligence tool** with the aim of guiding it towards the realization of the desired output

Guides and tips are born to interact with Generative AI!

- Specify the desired tone (formal, casual...) and role (Act as..)
- Define the target and context
- Procure useful details, also through examples and keywords to be included
- Specify the format (e.g. bullet point, essay) and any other constraints (e.g. number of words)
- Try to break down complex requests into intermediate steps: "chained prompting"

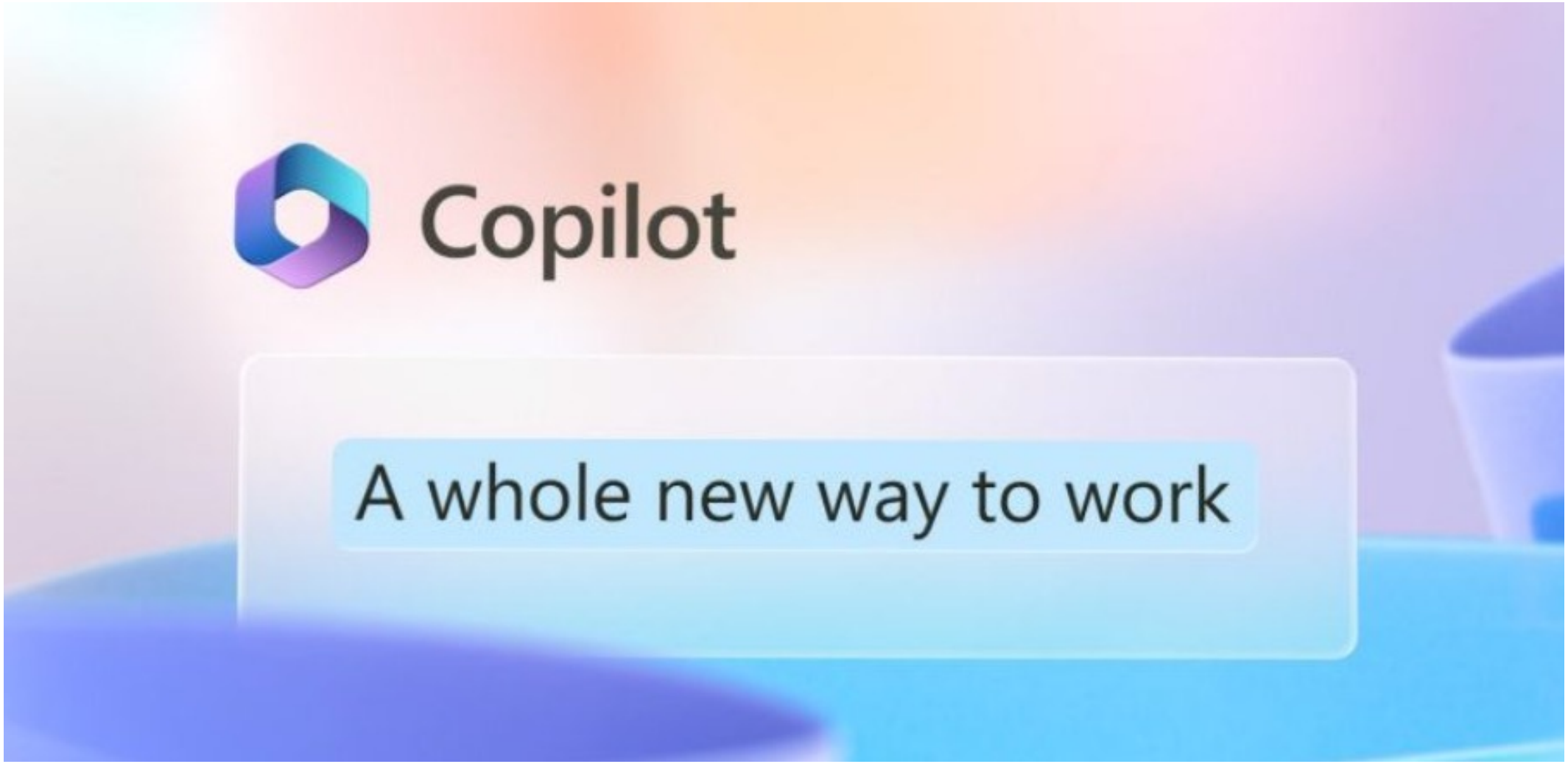
Generative AI INTO PRACTICE

osservatori.net
digital innovation



NEW PRODUCTS AND SERVICES – big techs run

osservatori.net digital innovation



NEW PRODUCTS AND SERVICES

osservatori.net digital innovation

In addition to big tech and software companies, where we can already find several cases of Gen.AI integration, there are also the **first examples of end-user companies**

Carrefour

L'assistant intelligent

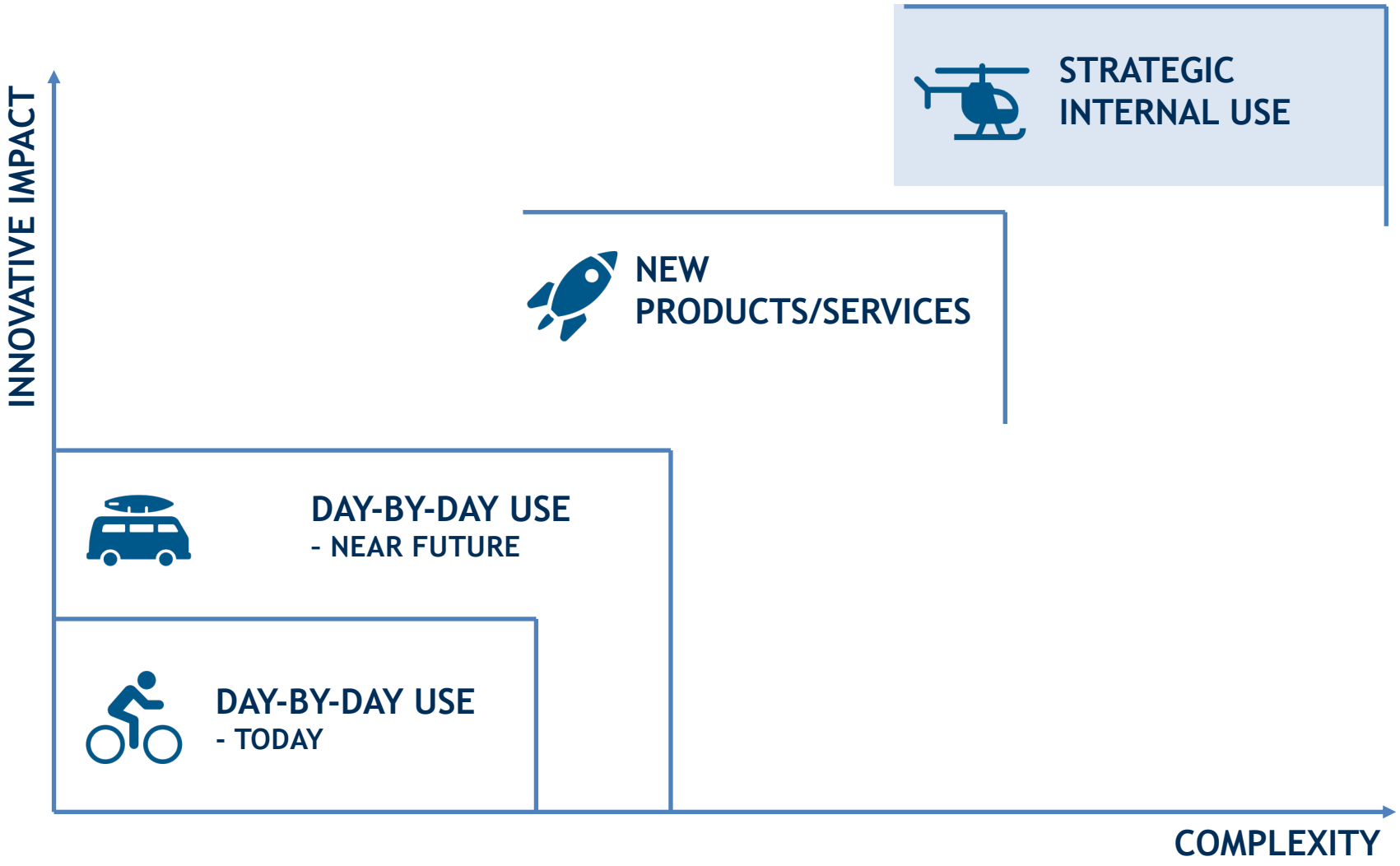
Hopla, a chatbot integrated into the Carrefour.fr website, offers a natural language AI interface to assist customers with their daily shopping. The bot suggests products based on the customer's budget, food constraints, or menu ideas. It also offers anti-waste solutions and suggests associated recipes and baskets.

Expedia

Expedia has announced a **new way to use the artificial intelligence of OpenAI.** The beta version of the iOS app allows you to take advantage of ChatGPT to organize a trip.

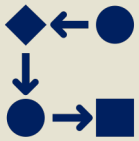
Generative AI INTO PRACTICE

osservatori.net
digital innovation



STRATEGIC INTERNAL USE

osservatori.net digital innovation



PROCESS STREAMLINE AND AUTOMATION

KNOWLEDGE DISCOVERY AND MANAGEMENT

IDEA GENERATION AND VALIDATION

… and other areas could be identified

PROCESS STREAMLINE

osservatori.net digital innovation

*A SPECIFIC EXAMPLE: **SALES WORKFLOW***

Research the client	Use Gen.AI to research competitors and market trends
Meet the prospect	Use Gen.AI to generate and summarize meeting notes
Draft a proposal	Use Gen.AI to create a first draft of the proposal
Review and edit the proposal based on client feedback	Prompt Gen.AI with the proposal and client feedback to generate reviews
Sign the contract	Use Gen.AI to customize available contracts' templates and accelerate the deal

Process automation

osservatori.net digital innovation

A SPECIFIC EXAMPLE: OPERATIONS AUTOMATION USING AI

Imagine being a company active in business furniture…

Utilize a **Generative AI model to generate potential designs and layouts for the products**. For example, Generative AI could generate various design variants for customized furniture that meet customer specifications.

Use an **optimization model** to determine the optimal quantity of raw materials to purchase, the best timing to do so, and the quantities of products to manufacture based on projected demand and production capabilities.

Integration: Outcomes of the optimization model can guide decisions regarding production quantities and timing, while the designs generated by the GAN can be tailored to production specifics based on existing capabilities.

Robots and automated machinery can be programmed to create products according to the specifications provided by the AI models.

Generative AI can also be used in conjunction with "traditional AI"
The latter is the most suitable, for example, for solving optimization problems

KNOWLEDGE DISCOVERY AND MANAGEMENT

osservatori.net digital innovation

- Content generation
- Interactive training session
- Personalized learning path
- Adaptive learning
- Automatic documentation
- Feedback and assessment

IDEA GENERATION AND VALIDATION: COCA-COLA REAL MAGIC CONTEST

osservatori.net digital innovation

Digital creatives around the world can use **a first-of-its-kind AI platform to generate original artwork** with iconic creative assets from the Coca-Cola archives.

"Create Real Magic" is the first platform of its kind to combine the capabilities of GPT-4, which produces human-like text from search engine queries, and DALL-E, which produces images based on text.
(March 2023)

Promotional Video: Create Real Magic Contest

Make vs. Buy

osservatori.net digital innovation

Competitive advantage / business innovation

Cost (CAPEX, OPEX)

Access to data

Skills Availability

Organizational change management

Time to implement

Access to assets

Lock-in risks

Direction

MAKE

Direction

BUY

Open questions on Generative AI

osservatori.net digital innovation

Output accuracy

The response of the generative process is not always accurate, sometimes the answers seem plausible but are in fact incorrect or not related to the given input ("Fluent but not factual"). This phenomenon is often referred to as **the hallucination of generative AI.**

Cost and method of use

The cost for training generative AI models is very high and
It consumes a large amount of energy; **it is possible that only the largest and most resourceful companies will be able to develop such models**. Other companies could use out-of-the-box models or refine existing ones to perform specific tasks (fine tuning)

Ethical and bias issues

The use of generative AI has raised several ethical questions. Some outputs of the generative process, for example, may contain **discrimination/bias or bias** if the dataset on which the model has trained is not large or representative enough..

Legal issues

There are several legal issues related to generative AI,
For example, **data used for training**, **copyright on the produced output**, **liability in case of errors** or malicious use, ...

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

SCHOOL OF MANAGEMENT

DIPARTIMENTO DI ELETTRONICA,
INFORMAZIONE E BIOINGEGNERIA

osservatori.net
digital innovation

Artificial Intelligence: an overview

Camilla Sorrentino

Junior Researcher at Artificial Intelligence Observatory
camilla.sorrentino@polimi.it

19.03.24

POLITECNICO
MILANO 1863

SCHOOL OF MANAGEMENT
DIPARTIMENTO DI ELETTRONICA,
INFORMAZIONE E BIOINGEGNERIA

osservatori.net
digital innovation

19.03.24

Blockchain & Web3 Observatory

Introduction to Blockchain and Web3

Giacomo.vella@polimi.it

Agenda

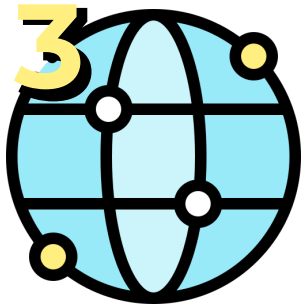
- **Web3 and Blockchain**
- Blockchain platforms
- Blockchain applications

Why does web3 matter, and what problems does it solve?

Big tech shift toward centralization	Web2 platforms have democratized access to some web services, but **infrastructure** and content distribution often **remain centralized.**
Privacy concerns	Web2 platforms often **collect and sell user data to advertisers**, for profiling users' interests and behaviors.
Lack of transparency	**Web2 platforms can be opaque**, leaving users uncertain about their operations, data usage, and responsibility for privacy and security protection.
Vendor lock-in	Web2 platforms can make it **difficult for users** to move their data or **switch to other platforms**, creating a form of vendor lock-in.
Lack of users' control	Web2 platforms may be structured to **restrict users' control** over their data and online experiences.

Image: www.wsj.com – Congress must halt big techs power grab

Web3: introduction and definition



Web3 ***is*** *a* ***new version of the web*** *grounded on key principles such as* ***decentralization***, ***composability*** *of applications, service* ***accessibility***, *data* ***privacy***, *and the* ***ability for users to own*** *and exchange digital assets while managing their online identities* ***without intermediaries***.

Web3: introduction and definition

Web1

Web2

- In **web1** most users could only access information. **Web2** has enabled anyone to **create content** online.
- The term **web2** (or web 2.0) refers to the set of services offered by a **small and defined set of platforms**.
- These **centralised platforms** introduced **major innovations**, such as **social and content aggregation**.

Web3: introduction and definition

Web2

- The **content we create** in the web2 paradigm **does not really belong to us**.
- The user who uses a 'proper' **username on X** may not necessarily also use it on **Facebook** or **YouTube**.
- **X** may **revoke control** of the **name**
- The same thing happens with **identity attributes**.

Web3: introduction and definition

Web3 enables a seamless user experience across different services, due to the possibility of **certifying digital identity** and easily **proving the ownership** of digital assets and attributes

Web1

Read

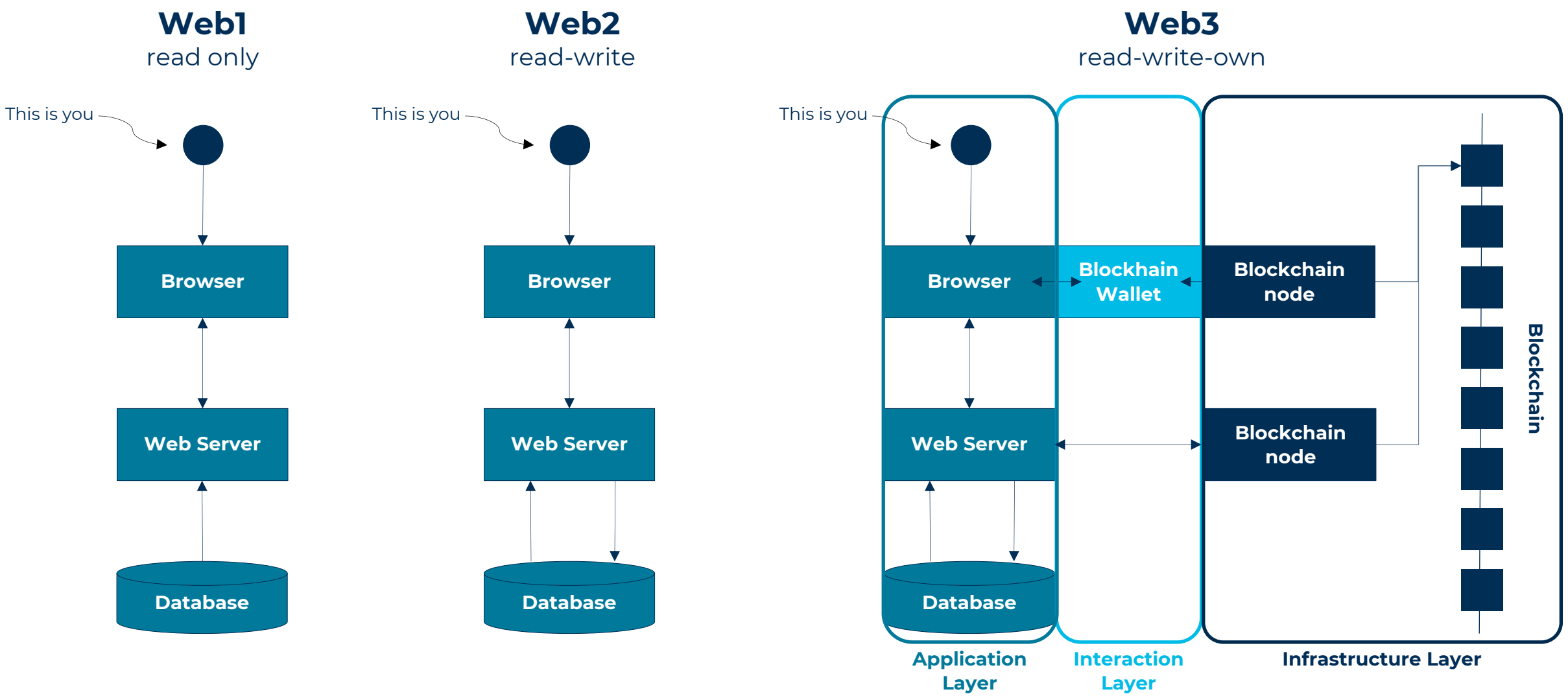
Web2

Read
Write

Web3

Read
Write
Own

The web3 stack: infrastructure



History of Blockchain

2008

Bitcoin dawning
The white paper by Satoshi Nakamoto is published, introducing the innovative idea of a virtual, decentralized, p2p currency.

2012

The relation with the legislators
Legislators develop a conflicting approach towards the cryptocurrencies. In some cases Bitcoin is considered a currency, while in others it is prohibited or not recommended.

2014

Not only Bitcoin
Other platforms are born, based on the very same founding principles of Bitcoin. E.g. Ethereum, Corda, Hyperledger.

2016

The Hype
Blockchain is all over the media as one of the potentially disrupting and revolutionary technology of the future. It is the time of testing and PoC.

2018

The growth of cryptocurrencies and ICOs
Strong growth phase of the cryptocurrency market. ICOs are in the spotlight and raise $ bn.

2019

Cryptowinter
Collapse of the cryptocurrency market. Many projects fail and ICOs face numerous regulatory hurdles and project development challenges.

Rationalization and disillusionment
Cryptocurrencies mature slowly and work to solve performance problems. Facebook launches Libra and the European Commission invests in EBSI.

2020

CBDC and crypto assets
Numerous central banks accelerate trials to issue CBDCs. The EU commission works in the Digital Finance Package on a regulation of crypto assets.

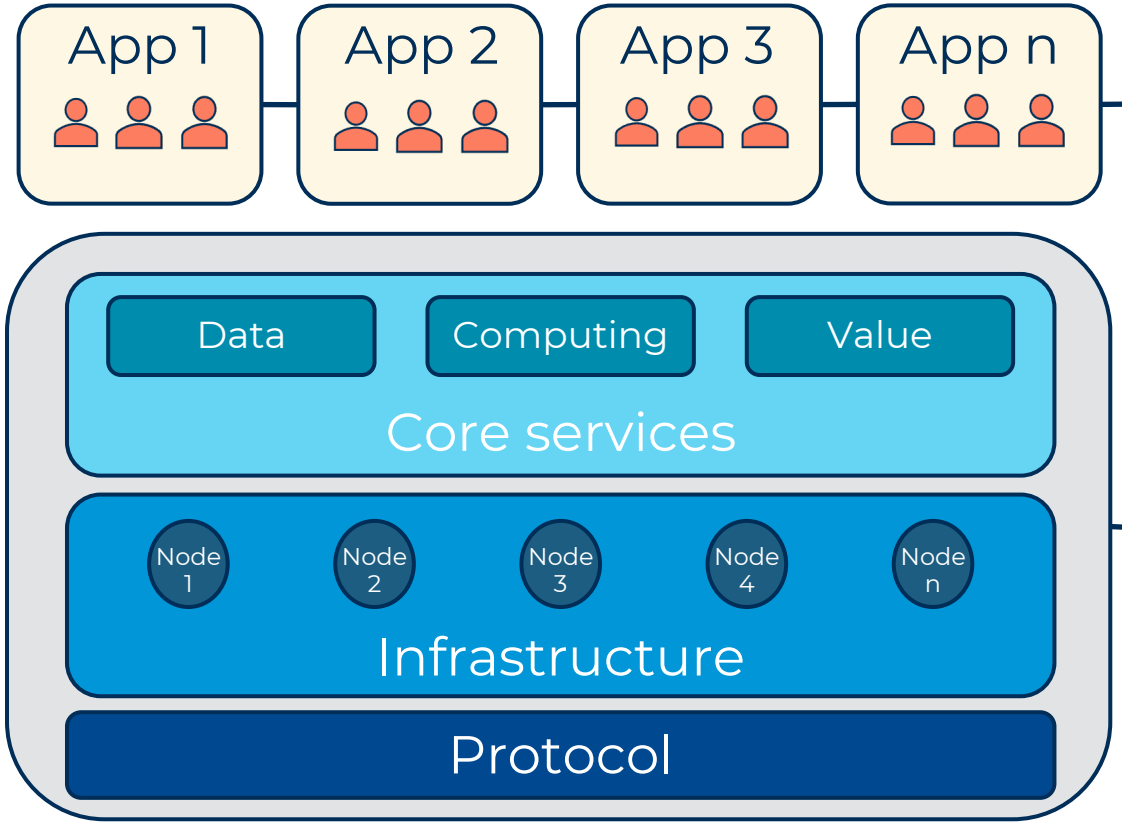
2021

DeFi and NFT
The DeFi market continues to grow. Crypto-assets are gaining relevance thanks to the adoption of some financial institutions and the rediscovery of the NFT phenomenon.

2022-23

Web3 and Metaverse
Applications built on public platforms are growing, and Web3 is becoming an increasingly popular term. The Metaverse is beginning to be a topic increasingly associated with the Blockchain and NFT world.

What is Blockchain?



Application layer

as projects built on top of an existing blockchain to serve end-users with specific needs; at the application layer, a project often focuses on creating business logics and user interfaces that can serve end-users.

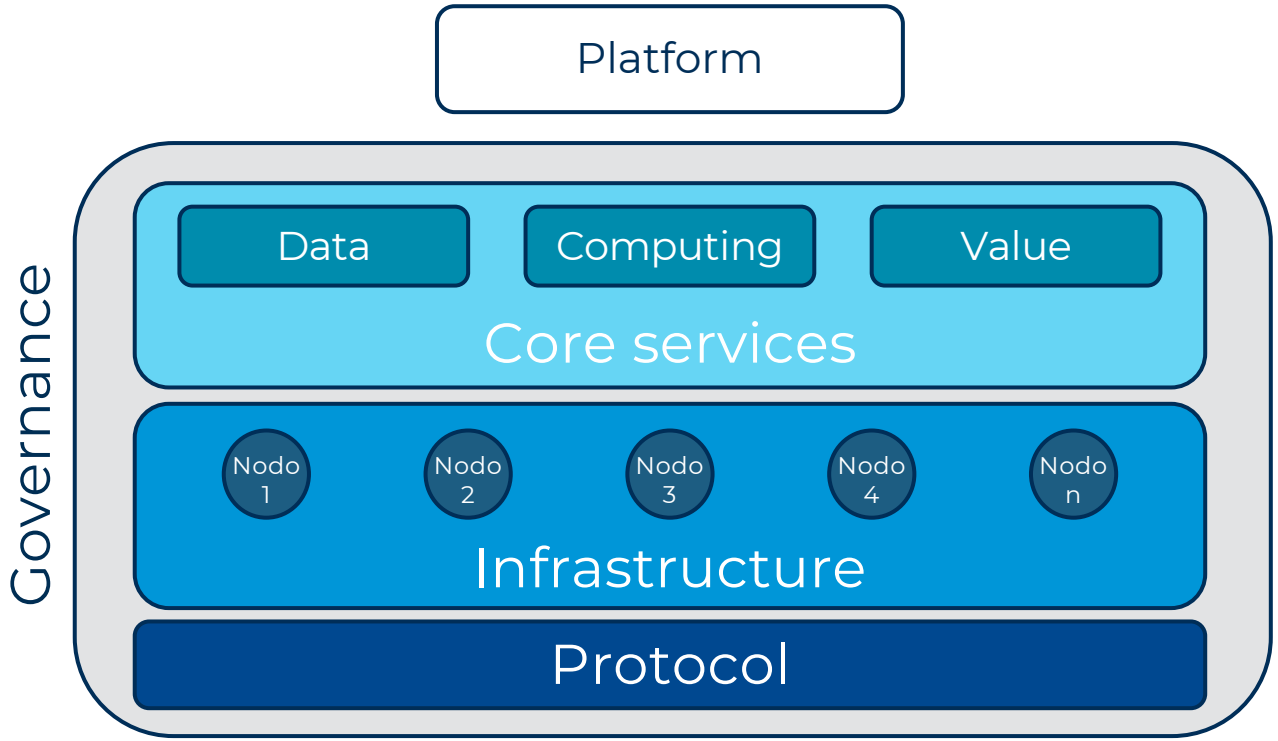
Platform layer

as the blockchain itself; at the platform or infrastructure layer, a project needs to secure its distributed ledger, establish distributed consensus, and offer tools to developers.

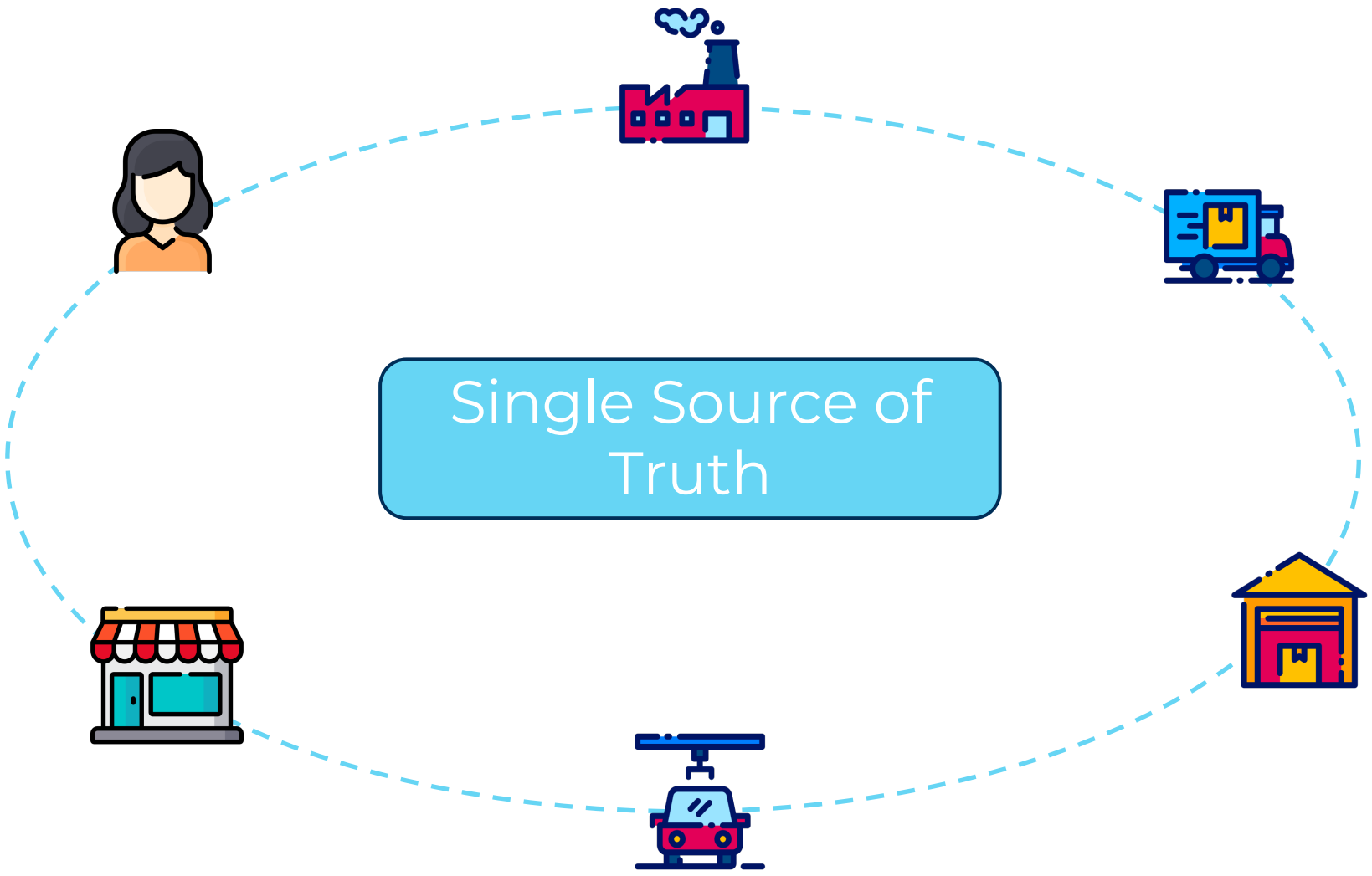
Agenda

- Web3 and Blockchain
- **Blockchain platforms**
- Blockchain applications

Platforms

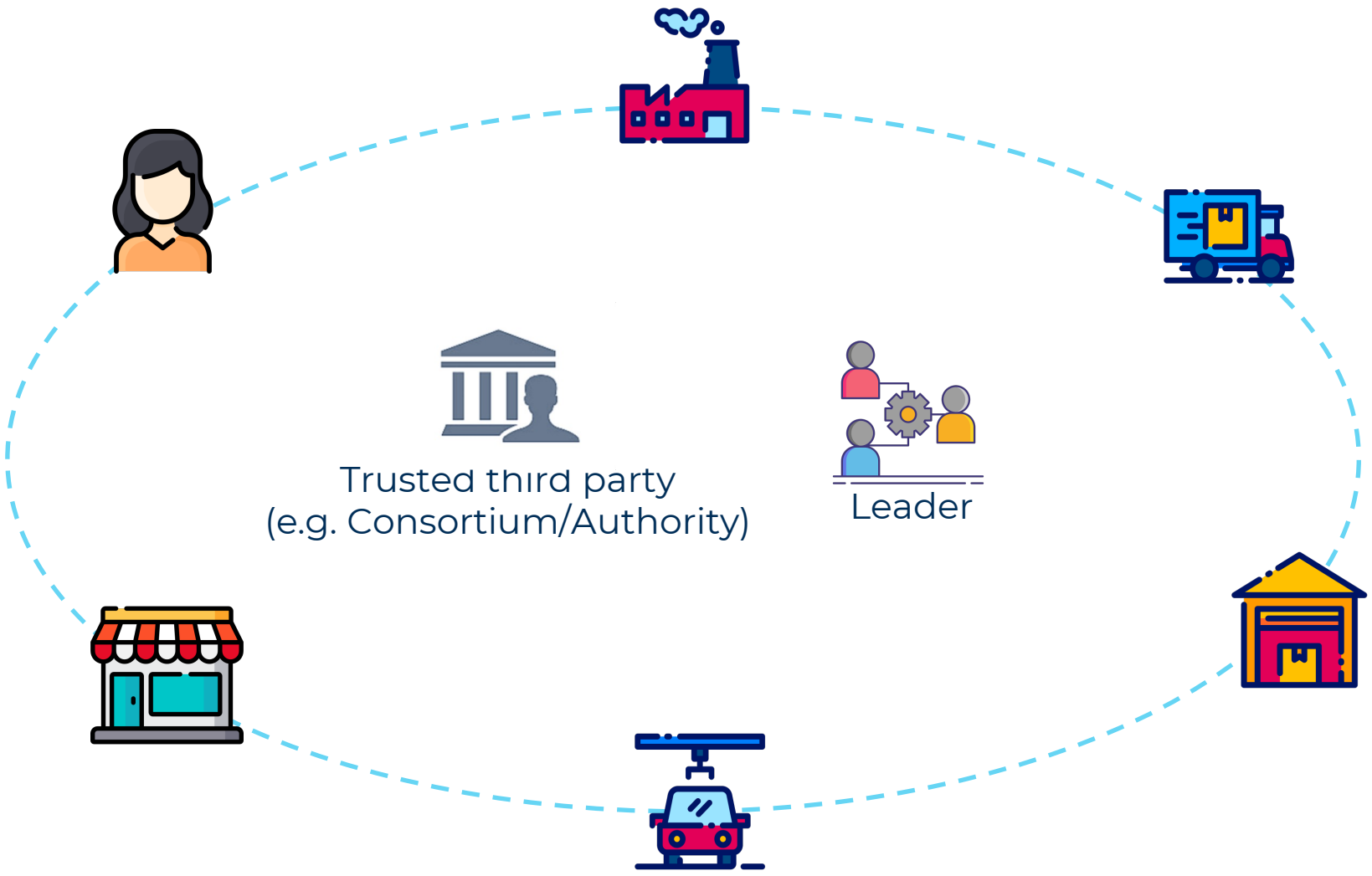

Platform
Governance
Data
Computing
Value
Core services
Nodo 1
Nodo 2
Nodo 3
Nodo 4
Nodo n
Infrastructure
Protocol

Single source of truth



From an ecosystem in which each actor has its own version of the truth to one in which everyone shares a **single source of truth**

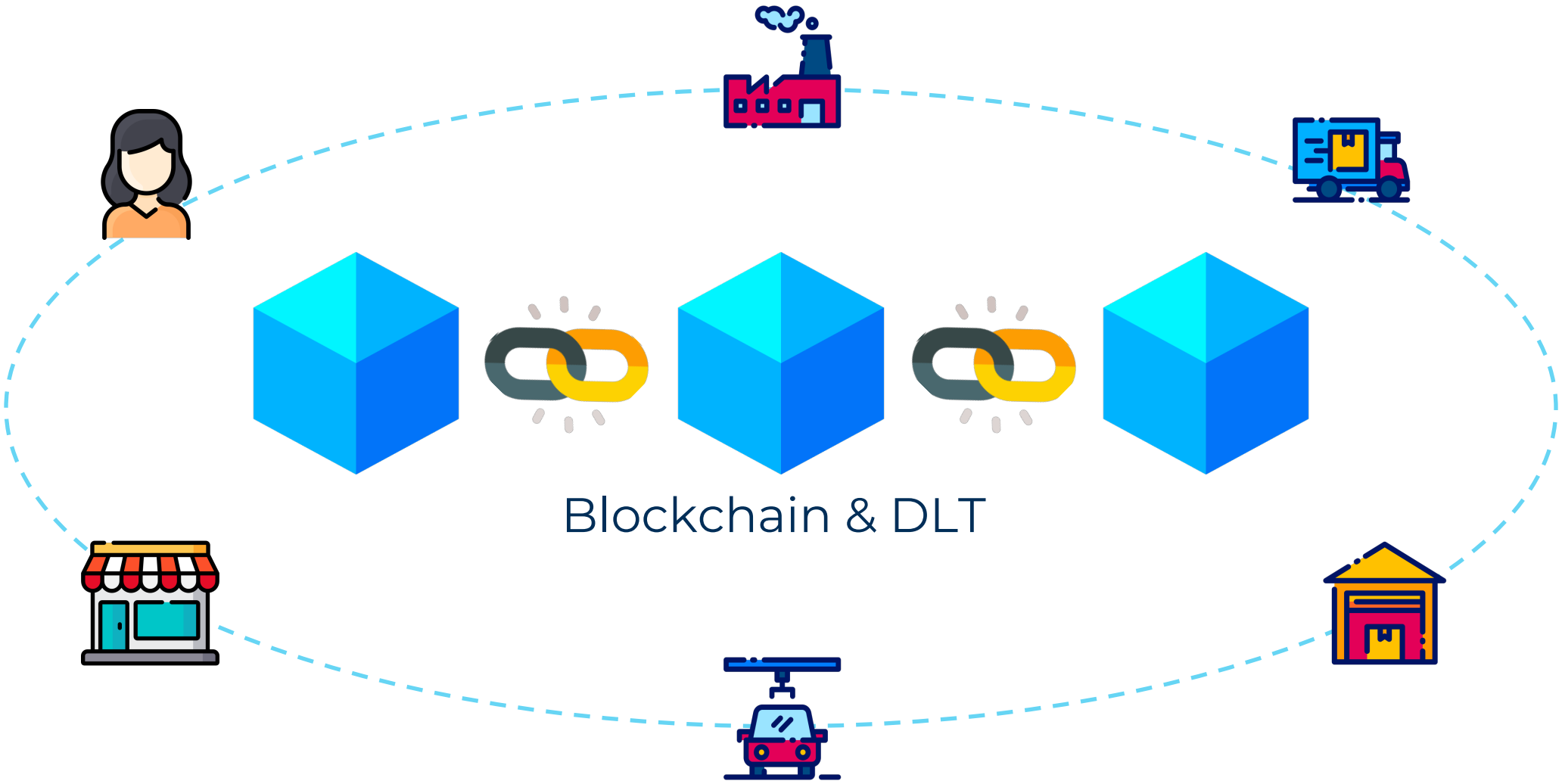
Single source of truth



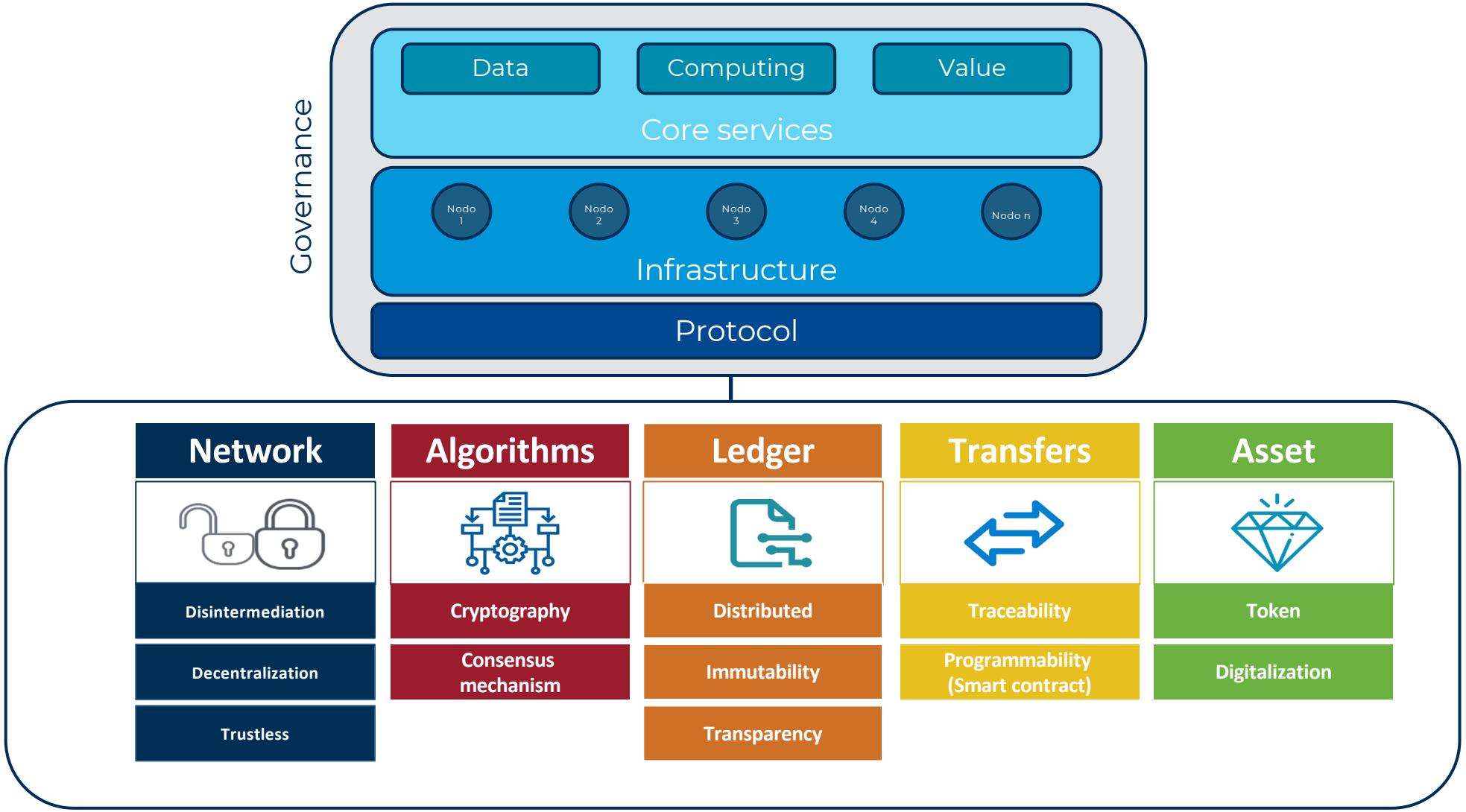
There are different methods to obtain a a **single source of truth**.

1. TTP
2. Leader

Blockchain and DLT for a single source of truth



The pillars of platforms

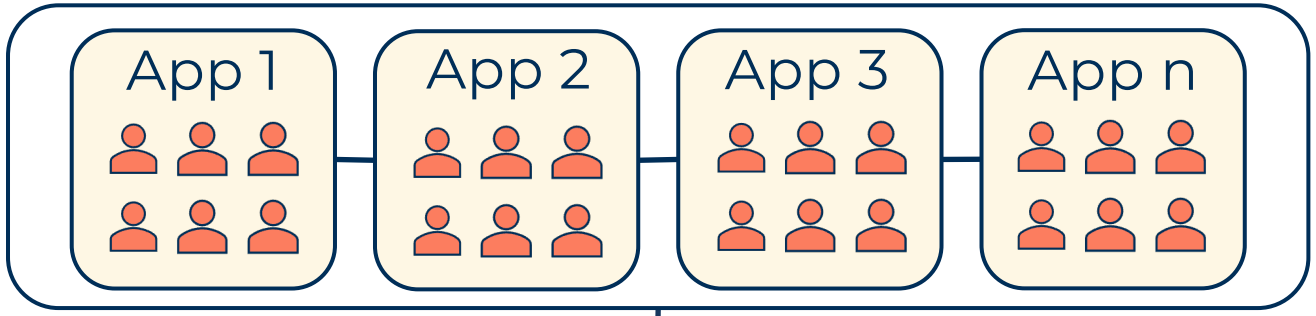


Permissioned or Permissionless?

Access to data	Validation process: Predefined user	Validation process: Every user
Predefined user	Permissioned Private Platforms	Permissionless Private Platforms
Every user	Permissioned Public Platforms	Permissionless Public Platforms

- Web3 and Blockchain
- Blockchain platforms
- **Blockchain applications**

Different types of applications



Timestamp

Projects that use the distributed register of an existing Blockchain to certify the date of a document and the fact that it has not been modified over time.

Smart contract

Projects that exploit the programmability characteristic to digitize single parts of bigger processes.

DApp

Projects that exploit the programmability characteristic to digitize entire processes and create decentralized application.

Token

Digital assets that can be exchanged on a Blockchain. They can be used as representations of other digital or physical goods or even a right, such as asset ownership or access to a service.

Cryptocurrency

Projects that exploit the already existing cryptocurrencies to allow the exchange of value between actors who do not know each other and do not trust each other.

Projects that use the distributed ledger of an existing Blockchain to certify the date of a document and the fact that it has not been modified over time.

Timestamping process

1. User submits a file to a timestamping service
2. A hash of the file is created
3. The timestamping service submit the hash created in a Bitcoin transaction that include a timestamp
4. The hash is now embedded in Bitcoin register of transaction (Blockchain)
5. Anyone can verify the existence and the timestamp of the registered hash and consequently that of the related file

Have you ever used a vending machine?

Would you buy a smartphone from this vending machine?

What if you could see how it works on the inside?

Smart contract

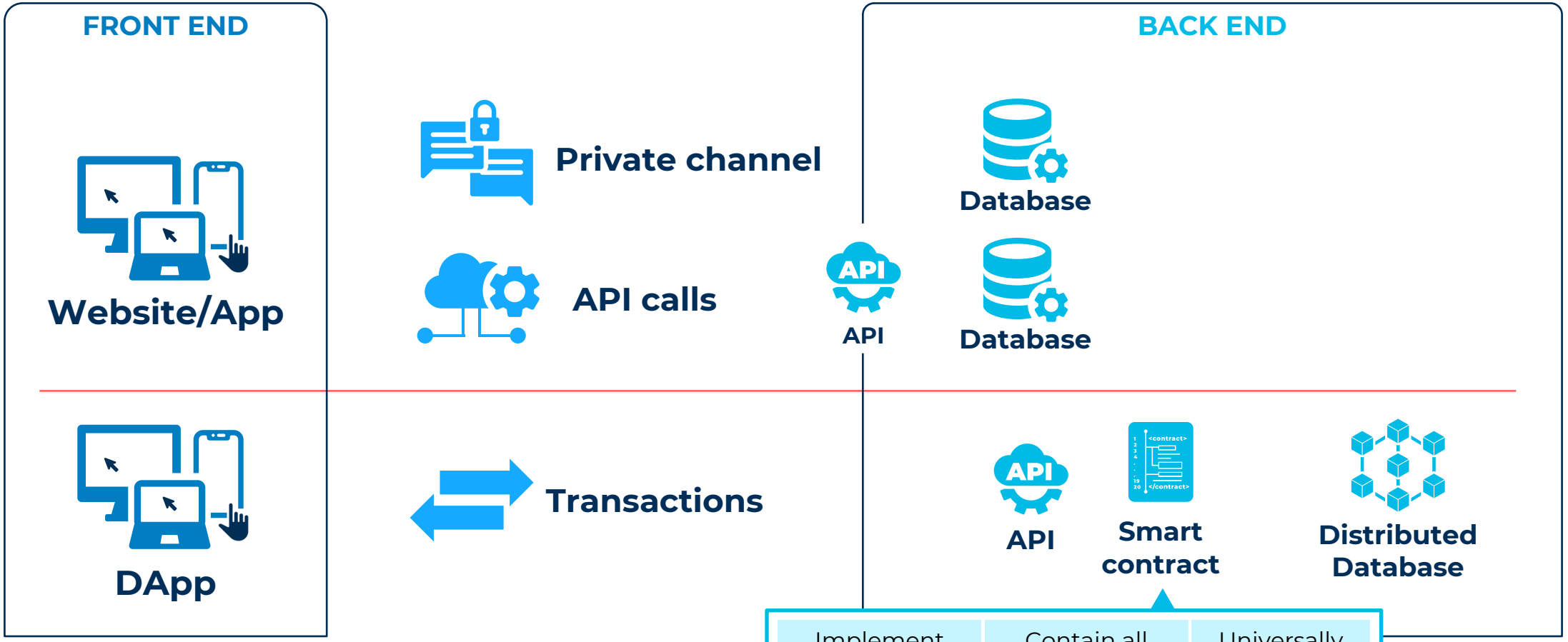
Projects that exploit the programmability characteristic to digitize single parts of bigger processes.

Set of instructions expressed in computer language and **visible to all**, which are **automatically executed** by a Blockchain network upon the occurrence of predetermined events.

Once the smart contract is activated, **its execution is guaranteed and not stoppable**

Smart contract and DApps

Decentralized applications, similar to traditional apps, that rely on Blockchain platforms and their distributed network to achieve guarantees of non-censorability



Decentralized Applications (DApps)

DApps are a **fast-growing phenomenon** that is beginning to show interesting potential that has not yet been fully explored. The use and development of these tools **could bring companies closer to the web3.**

DApp

- They are **incensurable**
- The code is inherently **open source**
- They are **globally accessible**
- They are **permissionless**, anyone can create them and use them
- They are **interoperable** and **composable**, they can be combined to create other DApps
- **Trust shifts** from the developer to the code

What is tokenization

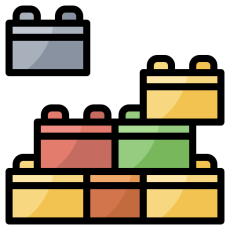
In Web3, the decentralised web, the emerging narrative is that tokens are the **new digital primitive** that will serve as the **key building blocks** for many of the future products, services and innovations that will impact our society

Web2

Websites

Web3

Tokens



Tokens as a **new digital primitive** in **web3**

What is tokenization

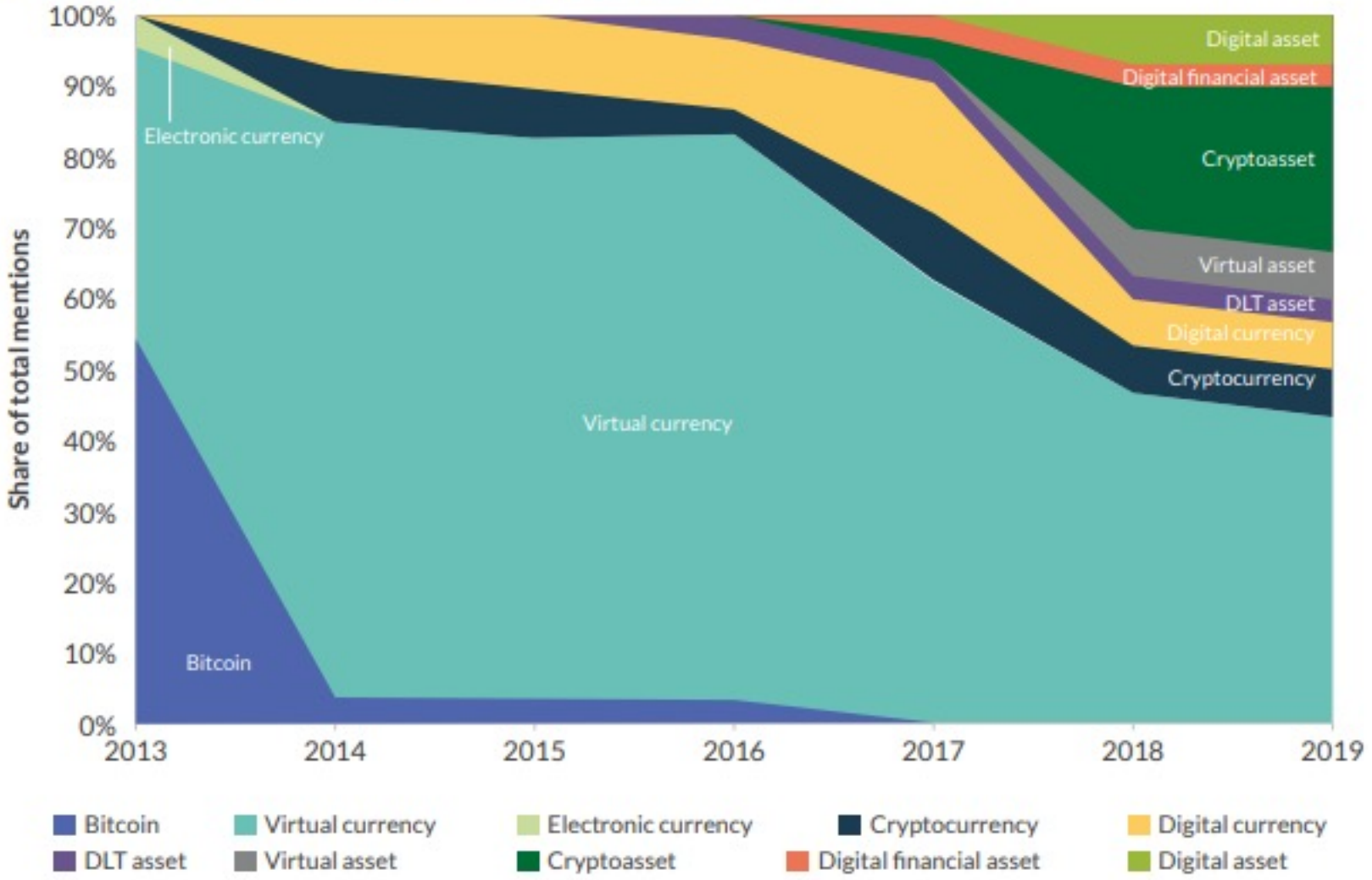
A token can **represent almost any asset** (digital or in real world).
Token creation itself has incredibly **low barriers**

Tokens can take many forms, and **can be programmed** with unique characteristics that **expand their use cases**

Tokenization can be described as the **process of representing a particular asset**, utility or right **into a digital token** that can be traded on the **blockchain**

An evolving terminolgy

Figure 5: Evolution of the terminology used by regulators (2013-2019)



Global Cryptoasset Regulatory Landscape Study, University of Cambridge, 2019

Crypto-asset categories

Crypto-asset: digital asset stored and managed using Blockchain e Distributed Ledger technology

Money	Value	Utility	Ownership	Asset
They perform some functions generally associated with **money**	They represent the **value of an asset**, without implying its ownership	They provide the ability to **access** a service or the right to take an **action**	They represent the **ownership** of an asset	They represent some **characteristics** of an asset

Native and non-native crypto-asset

Crypto-asset can be divided in **two classes**:

Native

They are usually referred to as
Cryptocurrencies

They provide the financial incentives needed to drive a blockchain platform.

They could also have a role in the services offered by the blockchain platform.

Money | Utility

Non-native

They are usually referred to as
Tokens

They are built on top of a pre-existing blockchain platform.

They could represent all four the categories of crypto-assets.

Money | Utility | Ownership | Value | Asset

Crypto-asset categories

Crypto-asset: digital asset stored and managed using Blockchain e Distributed Ledger technology

Money	Utility	Ownership	Value	Asset
They perform some functions generally associated with **money**	They provide the ability to **access** a service or the right to take an **action**	They represent the **ownership** of an asset	They represent the **value of an asset**, without implying its ownership	They represent some **characteristics** of an asset

Money: they perform some functions generally associated with money

Payment

Tokens created to facilitate the **exchange of value**.

Many **native crypto-assets** were created primarily as a mean to exchange value. Although some of them have other uses.

Stablecoin

Digital assets whose **value** is **pegged** to a reference asset.

Therefore their **price is stable.**

MAKER

Maker generates tokens (DAI), whose value is kept stabilized at one dollar through a monetary policy defined by smart contracts

CBDC on Blockchain

A CBDC is **issued and managed** by a sovereign institution such as the **Central Bank**.

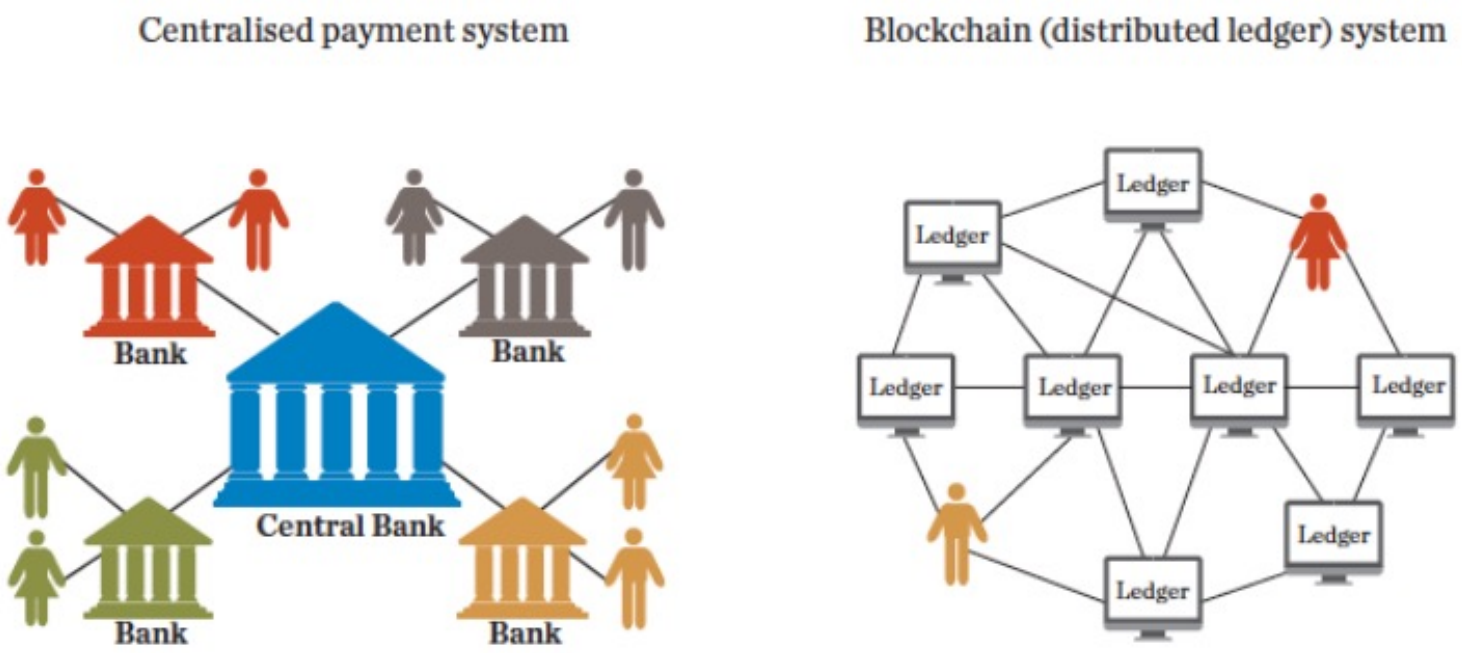
It is "*a central bank liability, denominated in an existing unit of account, which serves both as a medium of exchange and a store of value*"

80% of Central Banks are conducting research on CBDCs

(Survey BIS – 66 respondents)

94% of the projects are considering DLT

The main goal is to create a decentralized mean to exchange value, eliminating banks and other intermediaries.



In traditional banking, the central bank tracks payments between clients; in blockchain banking, transactions are recorded on multiple network computers and settled by many individuals.

Source: International Monetary Fund, Finance & Development, June 2016

Payment tokens: strengths and weaknesses

Depending on their use they can have different strengths and weaknesses

- Decentralization
- Security
- Immutability
- Traceability and transparency
- Programmability 010001

- High volatility
- Difficult custody
- Fragmented regulation
- Limited monetary policy
- Low performances

Created to minimize the problems related to the volatility of cryptocurrencies and to make payments more efficient.

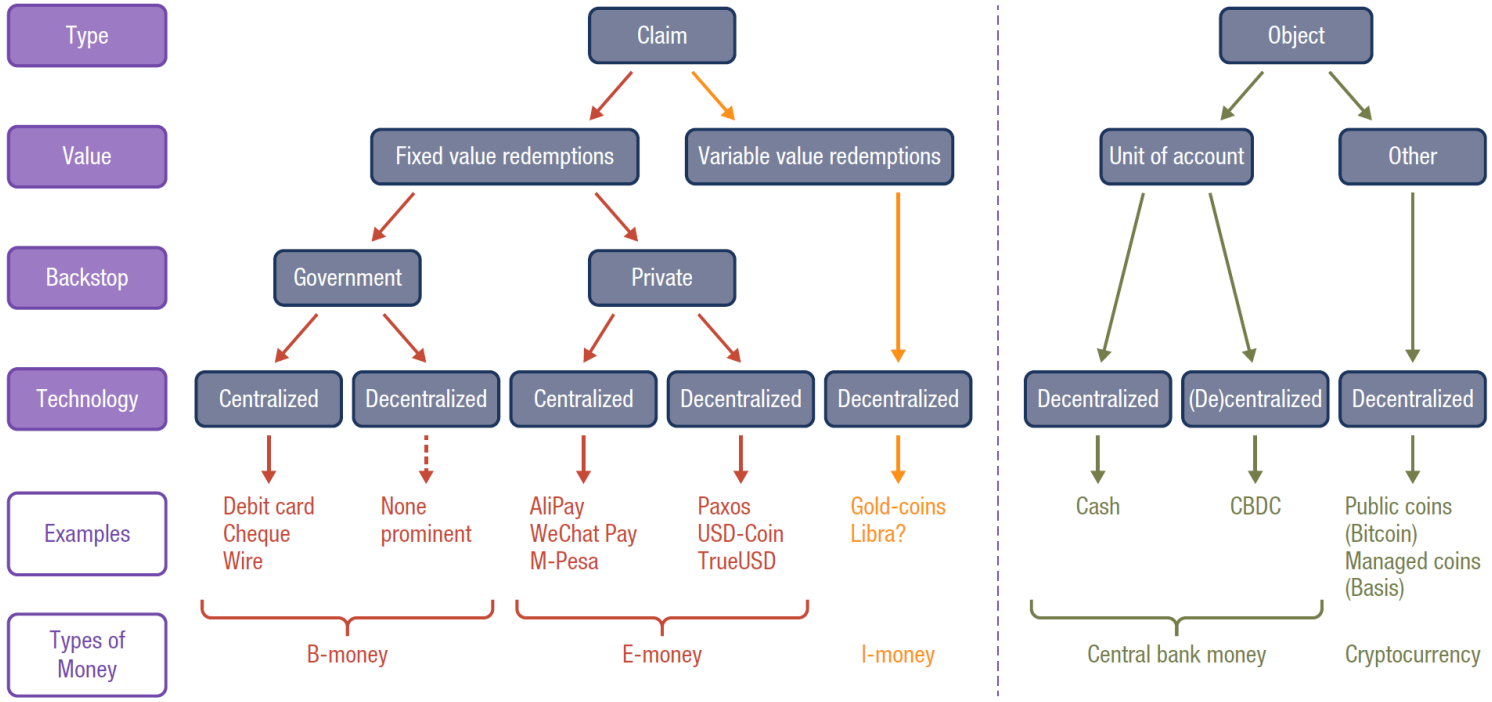
Collateralization	Technology	Issuer
• Fiat-backed • Crypto-backed • Commodity-backed • Non-collateralized	• Own Blockchain • Permissionless Blockchain • Other	• Unregulated entity • Regulated entity

A CBDC is a digital form of existing fiat money issued and managed by a sovereign institution such as the Central Bank. That is a central bank liability, denominated in an existing unit of account, which serves both as a medium of exchange and a store of value.

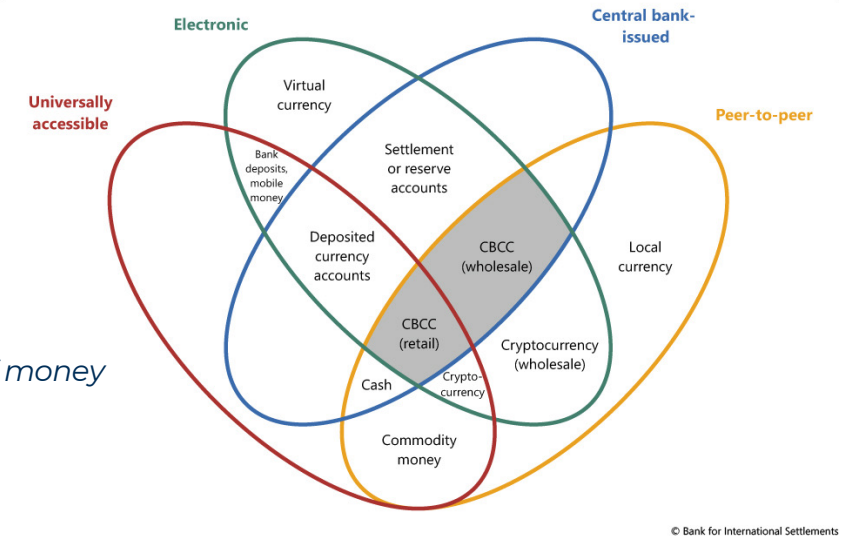
- Decentralization
- Security
- Immutability
- Traceability and transparency
- Programmability

- High volatility
- Difficult custody
- Fragmented regulation
- Limited monetary policy
- Low performances

Taxonomy of payment methods – the "Money tree"



Source: IMF Staff.
Note: CBDC = central bank digital currency.



Picture 1: The money flower: a taxonomy of money

A CBDC can be used in two different types of scenarios:

1. **Retail:** digital extension of cash, which citizens and companies can use in their daily transactions
2. **Wholesale:** intended to be used only by authorized institutions. It is utilized as an asset for settlement in the interbank market.

Crypto-asset categories

Crypto-asset: digital asset stored and managed using Blockchain e Distributed Ledger technology

Money	Utility	Ownership	Value	Asset
They perform some functions generally associated with **money**	They provide the ability to **access** a service or the right to take an **action**	They represent the **ownership** of an asset	They represent the **value of an asset**, without implying its ownership	They represent some **characteristics** of an asset

Utility: they provide the ability to **access** a service or the right to take an **action**

Services

Utility tokens can **represent** the **right to use a service**.

Filecoin is a decentralized storage network that allows users to sell and buy unused capacity space.

Users who have purchased the digital asset can use it to access the service

Vote

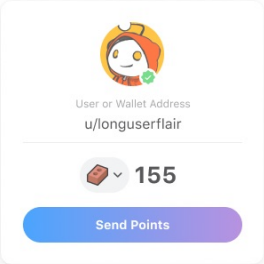
Utility tokens may **represent** the **voting right** on several decisions

Governance Tokens are often used in the management of decentralized projects and **give owners decision power** regarding the main protocol, the roadmap of product or functionalities, people and changes to governance parameters

Community

Utility tokens can be used to **remunerate** and **incentivise** the activities of **participants** in a community

MOON are **tokens** created by Reddit **to reward user** posts and comments within the forums. The tokens can also be used to give "tips" to other users who post content



Crypto-asset categories

Crypto-asset: digital asset stored and managed using Blockchain e Distributed Ledger technology

Money	Utility	Ownership	Value	Asset
They perform some functions generally associated with **money**	They provide the ability to **access** a service or the right to take an **action**	They represent the **ownership** of an asset	They represent the **value of an asset**, without implying its ownership	They represent some **characteristics** of an asset

Ownership: they represent the **ownership** of an asset

Securities

Token for financial securities represent the **ownership** on a **financial asset**

The **SIX Swiss Exchange** together with **SDX** is creating a **regulated secondary market** for the issuance and management **of tokenized financial assets**.

Physical assets

Tokens for physical assets represent the **property** of a **physical good**

RealT is an American startup that sells **fractional property rights** of real estate. The tokens represent the ownership share of the property and can also be exchanged on secondary market through Uniswap (decentralized exchange on Blockchain).

Digital assets

Tokens for digital assets represent the **property** of a **digital good**

SuperRare is a social network for artists and collectionists where **digital artworks** can be **exchanged through tokens**. Every time an artwork is sold, its creator automatically receives a share of the sale price.

From collectibles to art

Non Fungible Tokens (**NFTs**) are a particular type of crypto-assets present on various Blockchain platforms. NFTs are characterized by the presence of **unique identification codes** and **metadata** that make them different from each other.

Blockchain technology ensures that each NFT is truly **unique** and **non-replicable**.

Why are NFTs cool?

NFTs have some peculiar proprieties:

- Digital scarcity
- Uniqueness
- Market ready
- Provable ownership
- Royalties
- Communities
- Copyrights

Why are NFTs cool?

Digital scarcity

Uniqueness

Market ready

Beeple sold a digital art piece represented by an NFT for 69.3 million $.

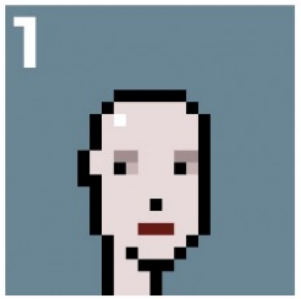
The auction through which it was sold was curated by a traditional art player, **Christie's**

Why are NFTs cool?

Digital scarcity

Uniqueness

Market ready

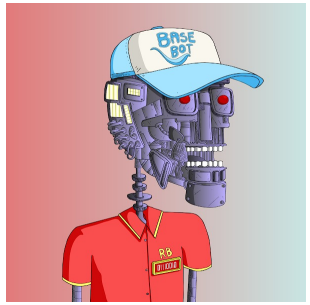


#6487

#8348

#2386

#4513



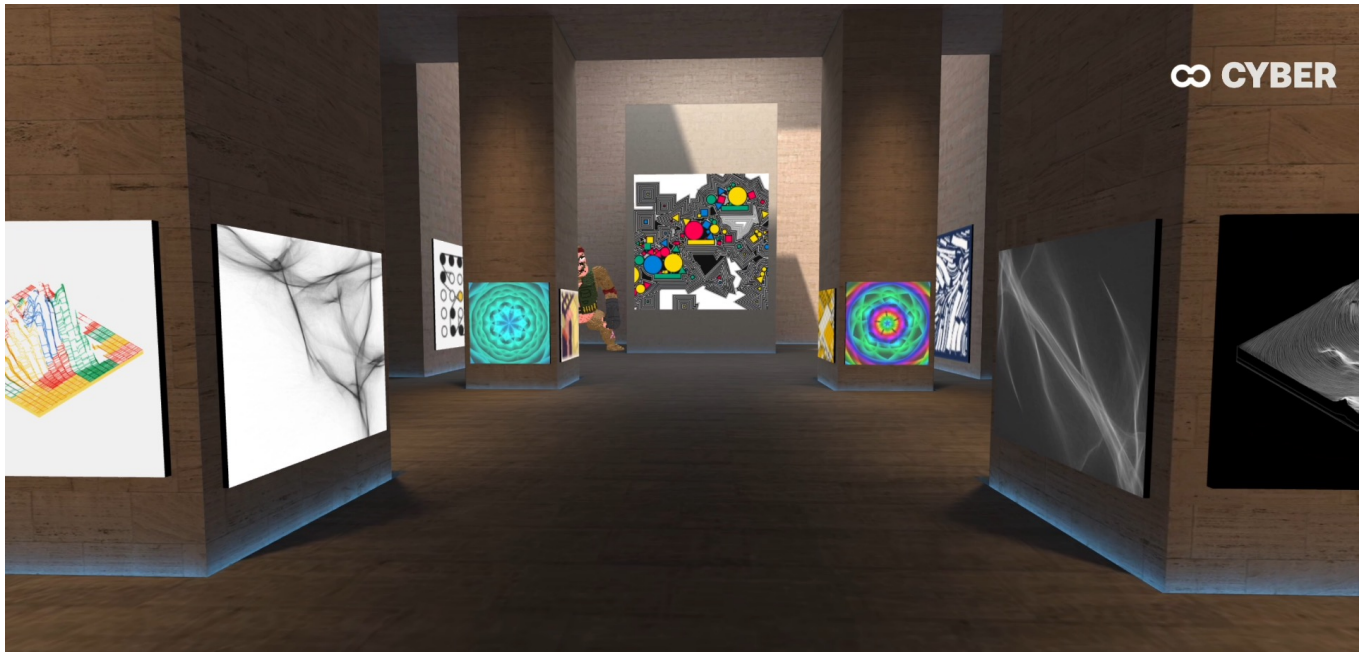
Digital scarcity

Uniqueness

Market ready

Provable ownership

Is it already possible to create metaverse galleries where you can show your collection



https://oncyber.io/6529ab

Digital scarcity

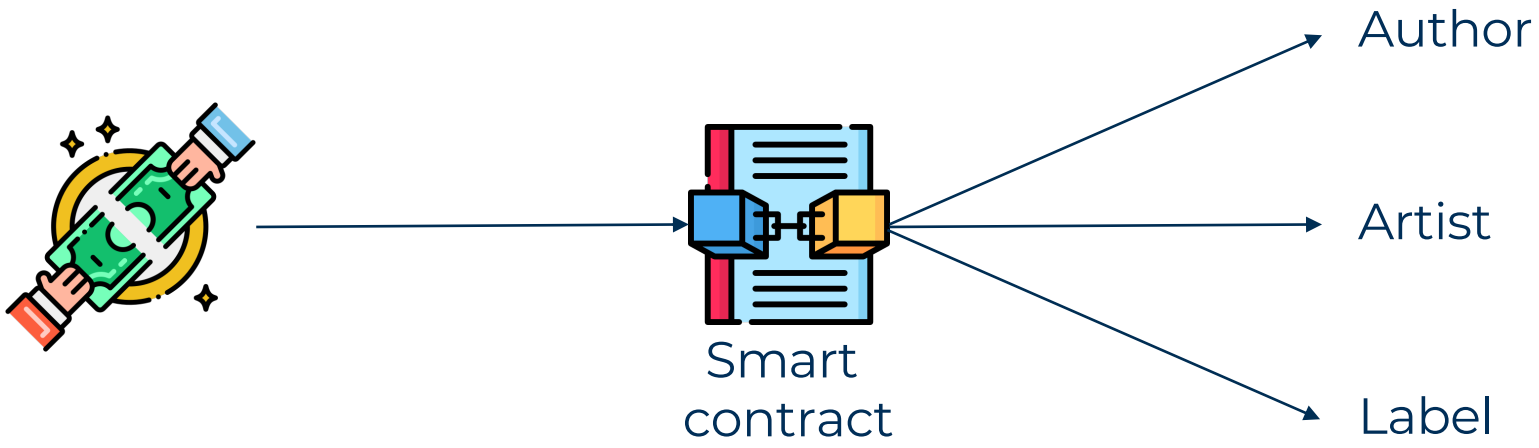
Uniqueness

Market ready

Provable ownership

Royalties

Blockchain's **immutability** and **transparency** features allow it to offer greater **payment transparency** for all stakeholders. Through the use of NFTs and smart contracts anyone could verify in real time the **correct** and **transparent distribution** of revenues.



Digital scarcity

Uniqueness

Market ready

Provable ownership

Royalties

Communities

Copyrights

BAYC

NFTs are used by decentralized organizations to organize their communities.

Unlike customer databases, they are **public**, they are **composable**, they are **uncensorable**.

Crypto-asset categories

Crypto-asset: digital asset stored and managed using Blockchain e Distributed Ledger technology

Money	Utility	Ownership	Value	Asset
They perform some functions generally associated with **money**	They provide the ability to **access** a service or the right to take an **action**	They represent the **ownership** of an asset	They represent the **value of an asset**, without implying its ownership	They represent some **characteristics** of an asset

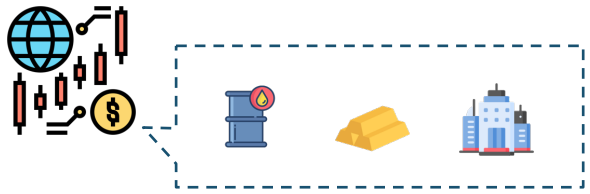
Value: they represent the **value of an asset**, without implying its ownership

Derivatives

Derivatives tokens **derive their value** from an **existing asset**, which can be physical or digital.

SYNTHETIX

Synthetix is a protocol that allows you to create "synthetic assets" on Ethereum. These assets are **tokens** that **replicate the value** of other **real-world assets**.



Crypto-asset categories

Crypto-asset: digital asset stored and managed using Blockchain e Distributed Ledger technology

Money	Utility	Ownership	Value	Asset
They perform some functions generally associated with **money**	They provide the ability to **access** a service or the right to take an **action**	They represent the **ownership** of an asset	They represent the **value of an asset**, without implying its ownership	They represent some **characteristics** of an asset

Asset: they represent some **characteristics** of an asset

Traceability

Traceability tokens allow to **track** the **history** and **authenticity of goods** throughout the entire supply chain.

AURA

AURA is a blockchain network that enable consumers to track the authenticity and history of luxury goods developed in partnership between LVMH, Consensys and Microsoft.

Crypto-asset lifecycle: phases

1. Creation

Crypto-assets can be created **using standard smart contracts** on existing platforms (e.g. ERC20 on Ethereum) **or** as native tokens **on a new platform**.

Stakeholders involved: Token issuer

2. Distribution

Distribution on the market **can take place in several ways**. Examples are:

- ICOs/STOs
- Airdrops
- Rewards for actions.

Stakeholders involved: Token issuer, users, exchange platforms, custodians

3. Custody

Custody refers to who holds the **private key** linked to the address on which the asset is "stored". The custodian can be the user itself or a third party.

Stakeholders involved: Users, custodians

4. Use

Crypto-assets can be **used actively** to perform the functions associated with them**.**

Stakeholders involved: Users, custodians

5. Exchange

Crypto-assets can be **listed and traded** on the secondary market through **exchange platforms**.

Stakeholders involved: Exchange/trading platforms, custodians, users

6. Burning

Tokens distributed cannot be revoked, but the issuer can **buy them back** with other tokens and **burn** them. Rules for the **blacklisting** of users or for the **destruction** of tokens can be inserted within the issuing smart contract.

Stakeholders involved: Token issuer, users, exchange platforms, custodians

POLITECNICO
MILANO 1863

SCHOOL OF MANAGEMENT
DIPARTIMENTO DI ELETTRONICA,
INFORMAZIONE E BIOINGEGNERIA

osservatori.net
digital innovation

19.03.24

Blockchain & Web3 Observatory

Introduction to Blockchain and Web3

Giacomo.vella@polimi.it

Blockchain & Web3: blockchain protocols as innovation platforms in web3

Category: thesis **with discussant** (2 available positions)

Description: blockchain holds considerable opportunities for platform businesses, in terms of potential implications on existing business models, operations, governance and stakeholder roles. Notably, blockchain-based, two-sided platforms can offer promising solutions to common issues faced by such businesses. The analysis will compare the role of blockchain protocols as key infrastructure for industry innovation and will offer insights into patterns and trends on how blockchain protocols are driving innovation in digital platform models.

Methodology: multiple case study

How to apply: Interested students are required to submit by e-mail their CV, a list of completed courses with grades received, and a brief description outlining why they are interested in the topic.

Contacts: Davide Ghezzi, davide.ghezzi@polimi.it – Giacomo Vella, giacomo.vella@polimi.it – Valeria Portale, valeria.portale@polimi.it

Blockchain & Web3: blockchain technology in digital platform business governance structures

Category: thesis **with discussant** (2 available positions)

Description: the advent of blockchain technology has sparked the emergence of an increasing array of decentralized platforms, where governance is less dictated by platform owners and more driven by community participation. This rise of blockchain platforms also presents a distinct chance to explore alternative models of platform governance and to formulate a theory regarding the tradeoffs of centralized, semi-decentralized, and decentralized governance structures. The research aims to develop a framework for assessing how blockchain technology can address common challenges encountered in digital platforms governance.

Methodology: multiple case study

How to apply: Interested students are required to submit by e-mail their CV, a list of completed courses with grades received, and a brief description outlining why they are interested in the topic.

Contacts: Davide Ghezzi, davide.ghezzi@polimi.it – Giacomo Vella, giacomo.vella@polimi.it – Valeria Portale, valeria.portale@polimi.it

Blockchain & Web3: payment programmability and business processes

Category: thesis **without discussant** (1 available position)

Description: programmable payments open revolutionary scenarios for the management of financial transactions, offering exciting opportunities. The research will focus on understanding the potential advantages of payment programmability within business processes by performing a single (multiple) case study analysis of an international project which successfully tested (or implemented) programmable payments based on a DLT infrastructure.

Methodology: single/multiple case study

How to apply: Interested students are required to submit by e-mail their CV, a list of completed courses with grades received, and a brief description outlining why they are interested in the topic.

Contacts: Ettore Zauli, ettore.zauli@polimi.it – Giacomo Vella, giacomo.vella@polimi.it – Valeria Portale, valeria.portale@polimi.it

Analysis of DApps and DAOs ecosystem in the context of Blockchain and web3 industry

Category: thesis **without discussant** (1 available position)

Description: this thesis proposal focuses on the study and analysis of Decentralized Applications (DApps) and Decentralized Autonomous Organizations (DAOs) within the realm of Blockchain and web3 industry. The main objective is to understand the development directions of these technologies and the business implications by examining the most interesting projects on the market. This research will investigate aspects like the adopted business models, the governance structure, funding information, and the types of services offered and functionalities.

Methodology: census

How to apply: Interested students are required to submit by e-mail their CV, a list of completed courses with grades received, and a brief description outlining why they are interested in the topic.

Contacts: Davide Ghezzi, davide.ghezzi@polimi.it – Giacomo Vella, giacomo.vella@polimi.it – Valeria Portale, valeria.portale@polimi.it

Blockchain & Web3: thesis

MORE ON THE THESIS BOARD!

Thesis with discussant

- *Tokens' impact on business models*
- *Blockchain protocols as innovation platforms in web3*
- *The role of blockchain technology in digital platform business governance structures*

Thesis without discussant

- *Token adoption by companies and institutions*
- *Payment programmability and business processes*
- *Value chain for digital assets*
- *Effectiveness of web3 marketing tactics*
- *Systematic literature review on web3*
- *Analysis of DApps and DAOs ecosystems*
- *The impact of web3 on traditional business mo*
- *Blockchain & sustainability*
- …

Leadership & Innovation

Platform Thinking

POLITECNICO
MILANO 1863

DIPARTIMENTO DI
INGEGNERIA GESTIONALE

We are living the

PLATFORM ECONOMY

What is a platform?

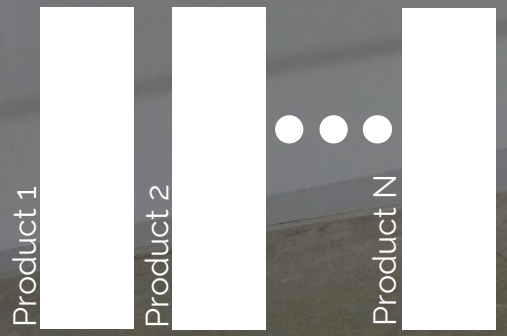
THE PLATFORM GAME

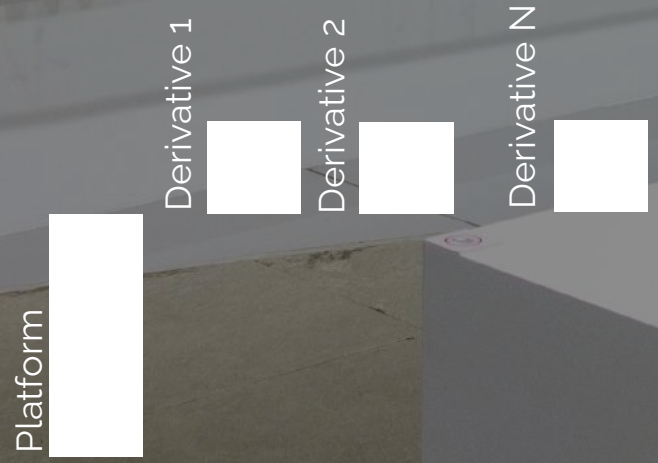
LET'S GET READY
KEEP CLEAR

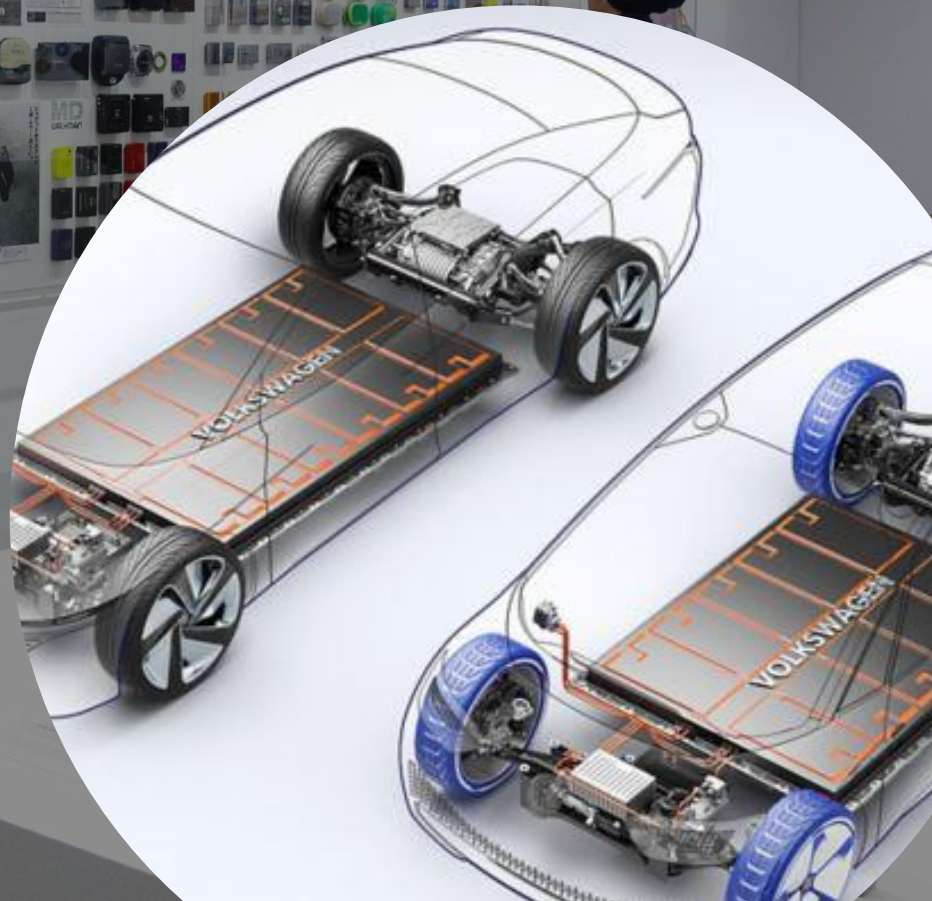
Icebreaker

Is WALKMAN a PLATFORM?

PRODUCT PLATFORM



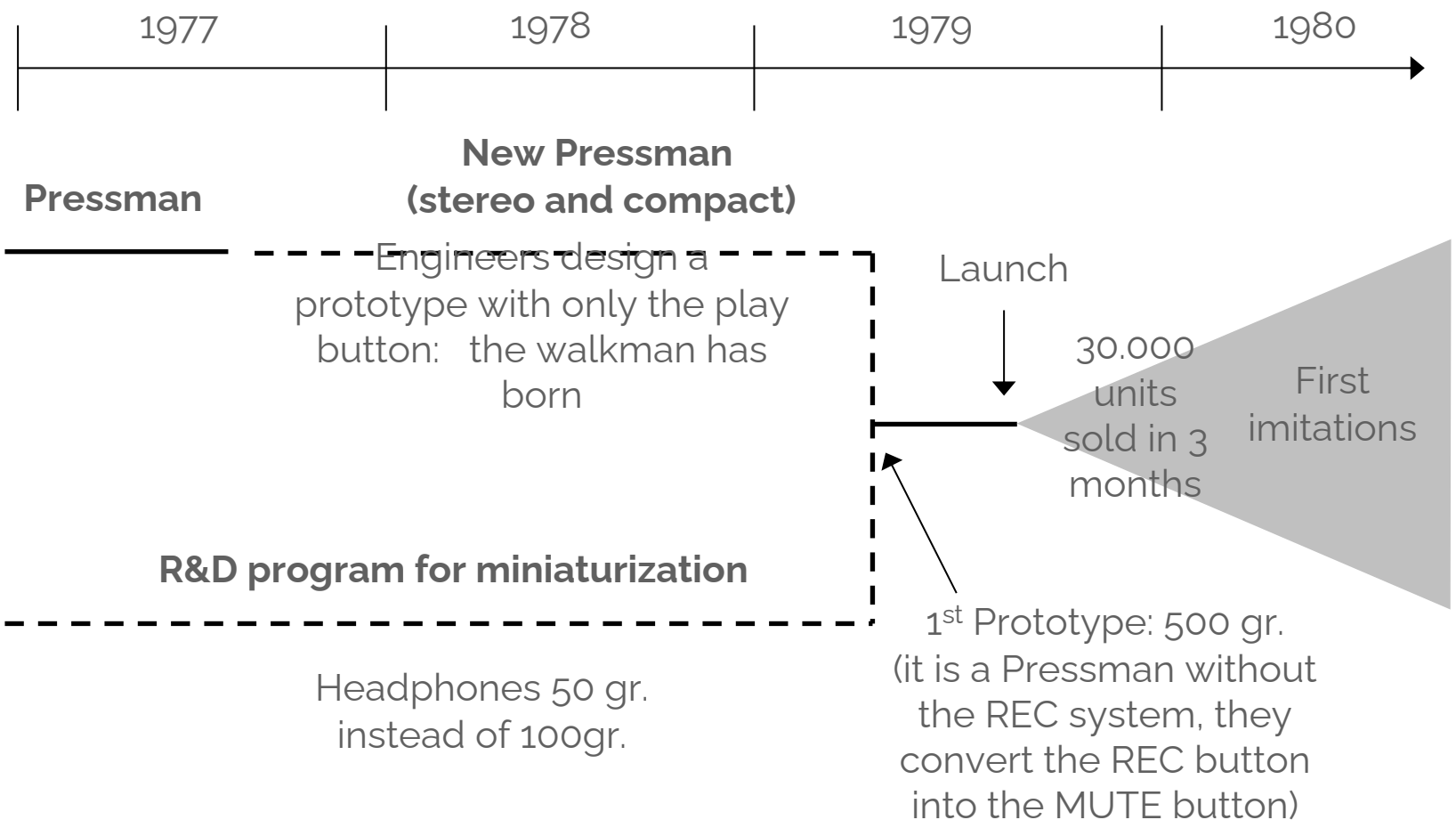




Product Platform strategy

- In the ‘80s 40% market share in volume and 50% in $
- 20$ Premium Price

Their innovation process



©Daniel Trabucchi

Product Platform strategy

- Average obsolescence time

  (from launch time to the 50%-off time):

  - Sony: 2 years
  - Competitors: 1,2 years

- Longevity due to market strategy: niches (sport, Kids, Hi-Fi addicted…)

- Competitors cannot get into the niches already filled by Sony and are forced to stay on the mass market competing through higher innovation frequency

Aggregate Project Plan

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

- Generational Projects (5 in ten years)

- Derivative Projects (250 in ten years)
  - Incremental innovations (20-30): functional or miniaturization innovations (e.g. autoreverse, graphic equalizer, chromo tape readers Dolby Stereo™)
  - Topological (220-230): changes in the look and feel

- Constant miniaturization project

©Daniel Trabucchi

Generational Projects

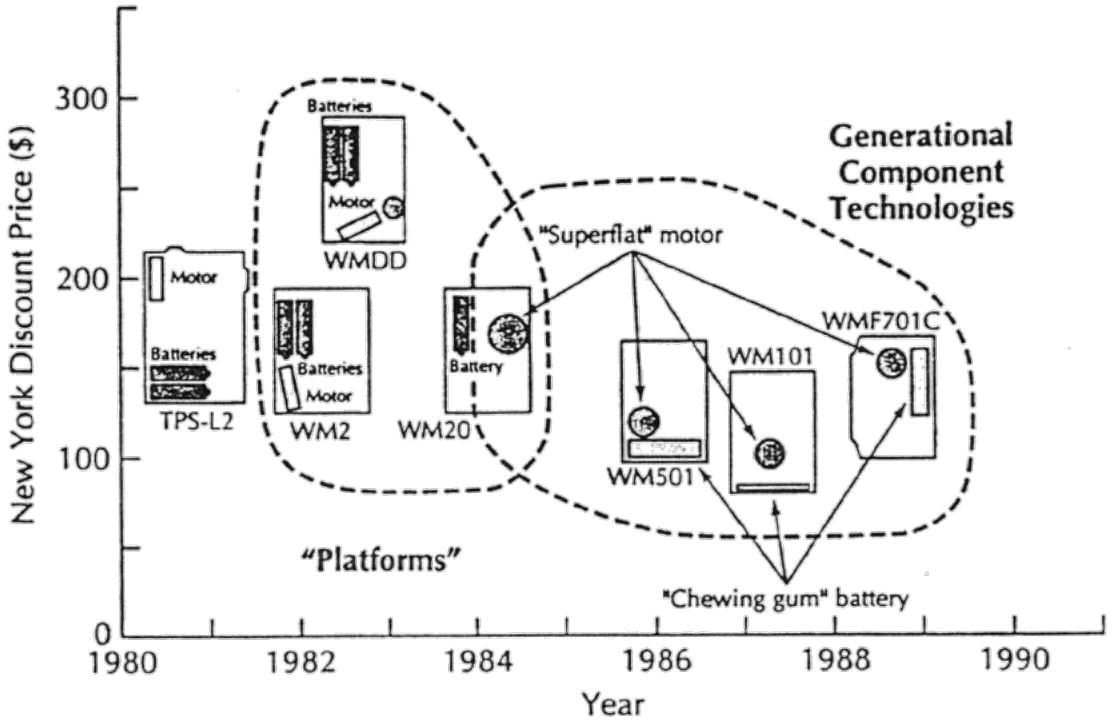
POLITECNICO MILANO 1863 SCHOOL OF MANAGEMENT

3 PLATFORMS:

- WM 2 (1981): compact and lightweight (300 gr. + 30 gr. headphone). Renewed only in 1990 (cost reduction)
- WM20 (1983): 50% thinner
- WMDD (1982): hi-fi platform (direct transmission and tape speed control)

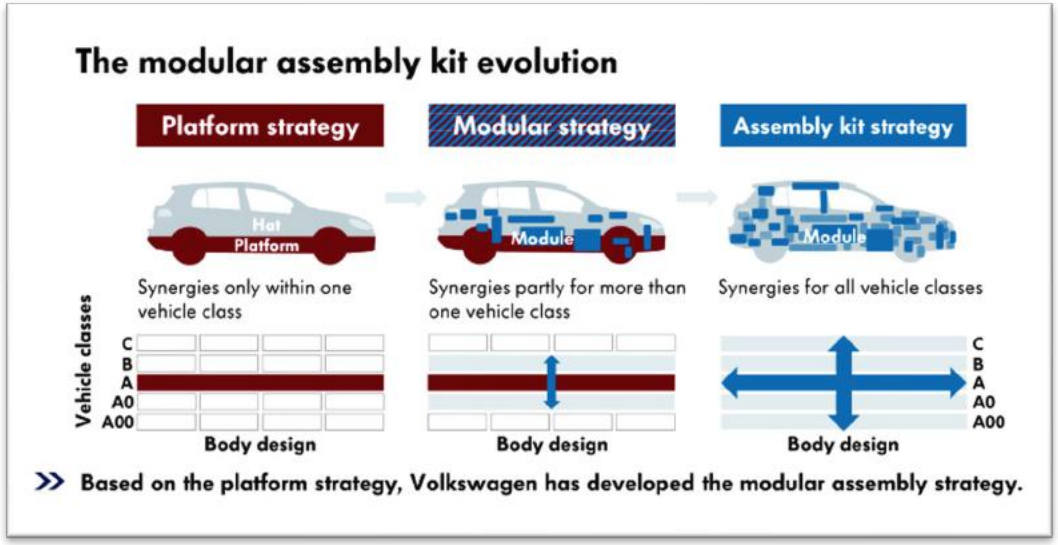
2 SHELF INNOVATION:

- Superflat Motor (1983): thin and low consuption
- NiCd Battery "Chewing Gum" (1986)



©Daniel Trabucchi

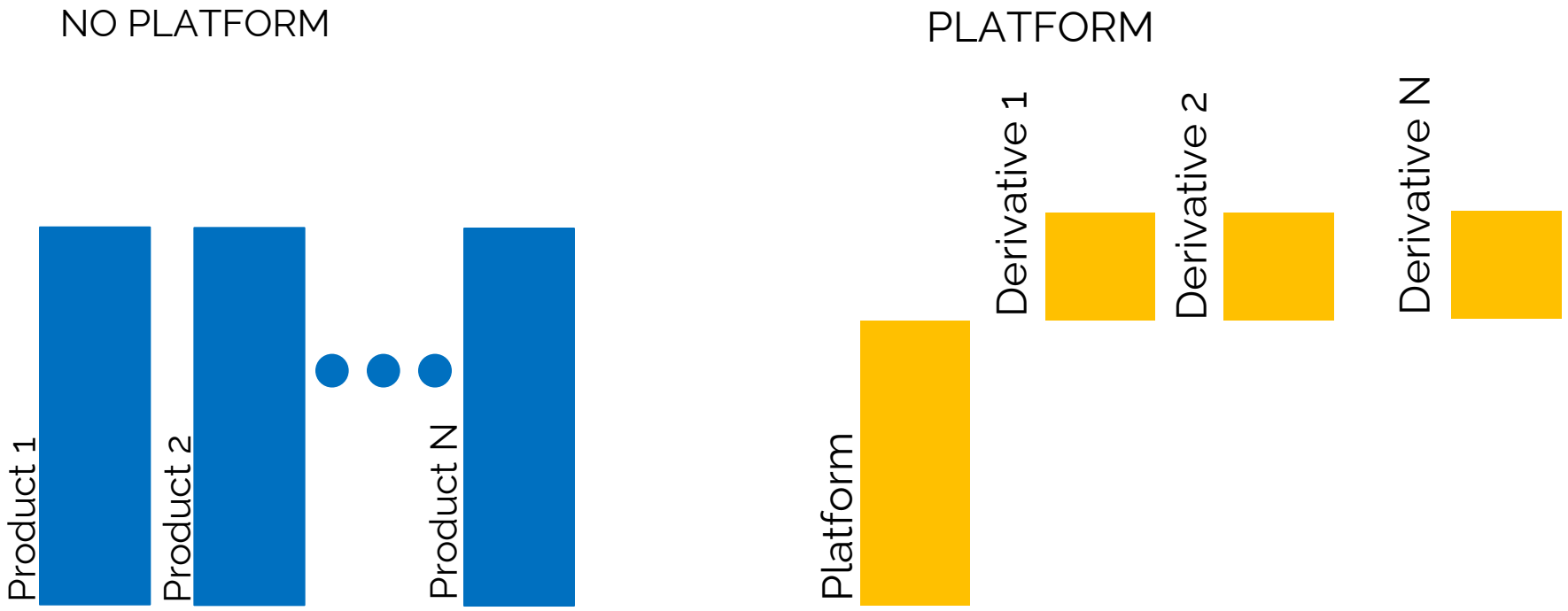
Volkswagen: MQB platform



The Volkswagen Group MQB platform is the company's strategy for shared modular construction of its transverse, front-engine, front-wheel-drive layout. Volkswagen spent roughly $60bn developing this new platform and the cars employing it. The platform underpins a wide range of cars from the supermini class to the full size SUV class. MQB allows Volkswagen to assemble any of its cars based on this platform across all of its MQB ready factories. This allows the Volkswagen group flexibility to shift production as needed between its different factories.

©Daniel Trabucchi

Product Platform



- Platform: a set of components, along with and the linkages among them, common to different products.
- Note: a platform is NOT a product itself

©Daniel Trabucchi

Internal or Product Platforms

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

«A firm, either working by itself or with suppliers, can build a family of related products or sets of new features by deploying these components»

(Gawer and Cusuamno, 2014)

©Daniel Trabucchi

One term, different meanings

- **Internal platforms**: a set of assets organized in a common structure from which a company can efficiently develop and produce a stream of derivative products.
  - Examples: Sony Walkman

INNOVATION PLATFORM

Industry wide platforms

POLITECNICO MILANO 1863 SCHOOL OF MANAGEMENT

- External or industry platforms [are] products, services, or technologies developed by one or more firms, and which serve as foundations upon which a larger number of firms can build further complementary innovations and potentially generate network effects.
- There is a similarity to internal platforms in that industry platforms provide a foundation of reusable common components or technologies, but they differ in that this foundation is "open" to outside firms.
- The degree of openness can also vary on a number of dimensions—such as level of access to information on interfaces to link to the platform or utilize its capabilities, the type of rules governing use of the platform, or cost of access

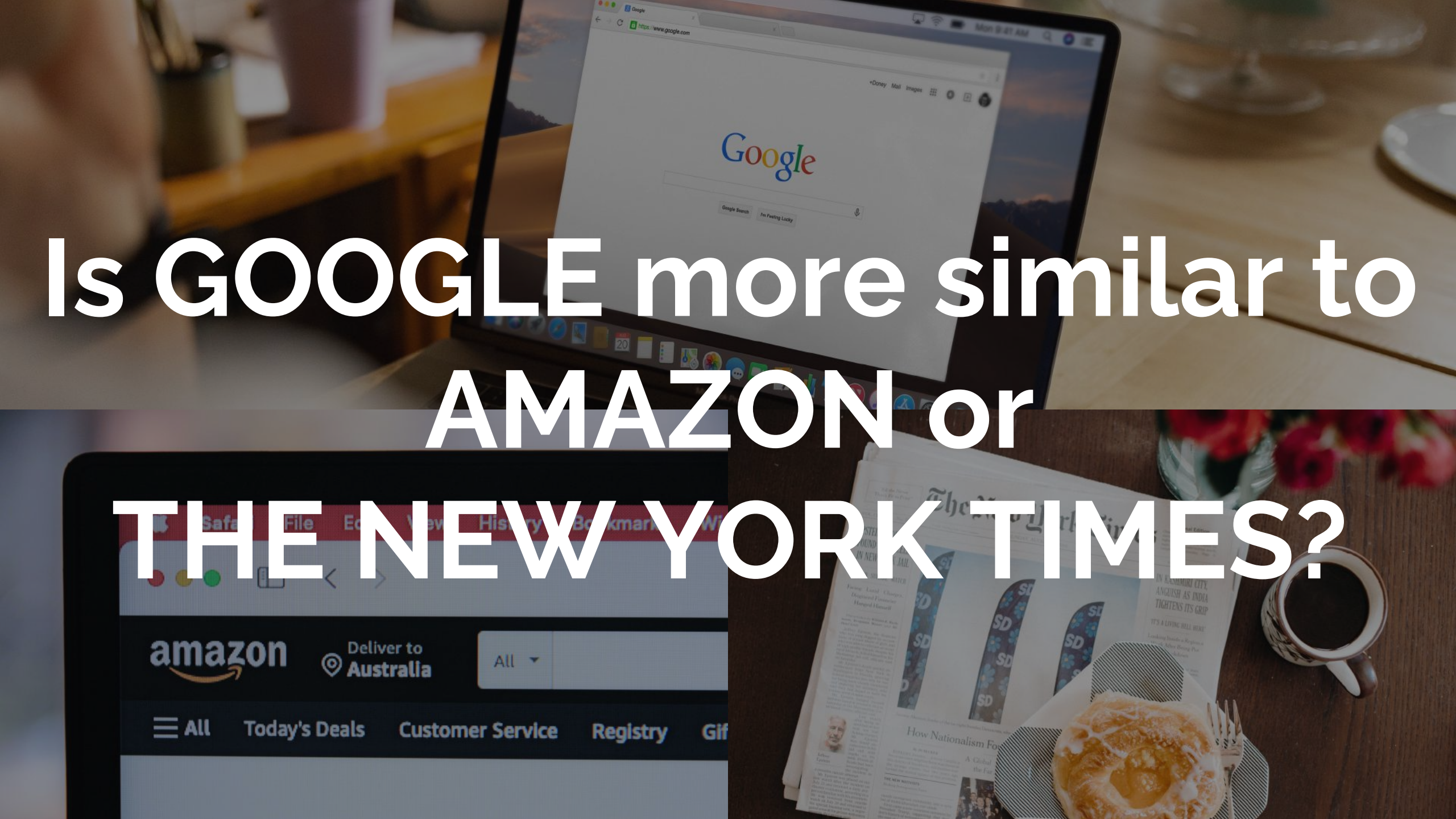
(Gawer and Cusumano, 2014)

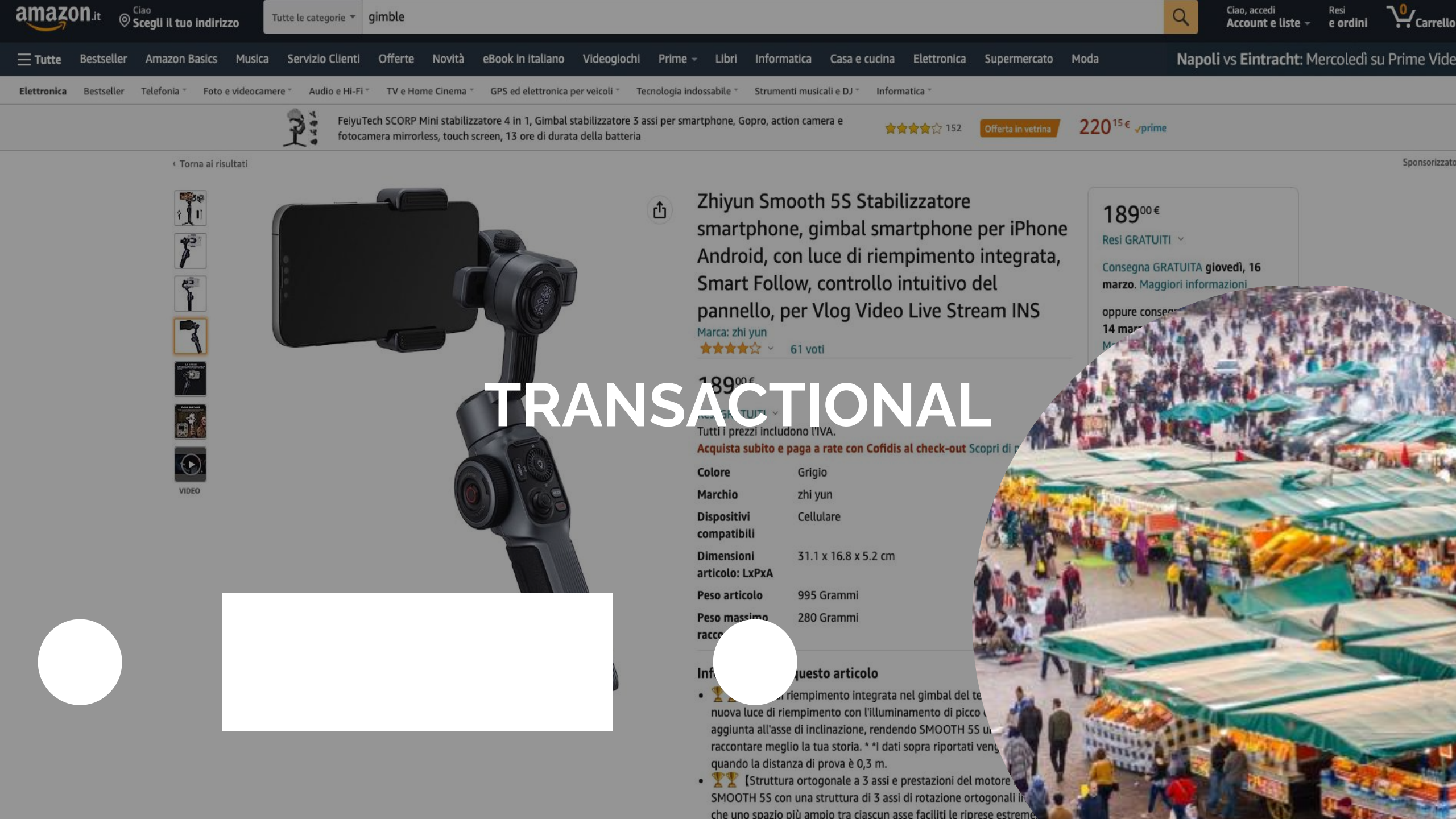
©Daniel Trabucchi

One term, different meanings

- **Industrywide platforms**: products, services, or technologies that act as a foundation upon which external innovators, organized as an innovative business ecosystem, can develop their own complementary products, technologies, or services.
  - Examples: Intel/Microsoft/IBM, iOS

Is GOOGLE more similar to AMAZON or THE NEW YORK TIMES?





TRANSACTIONAL

OpenTable

“It’s Saturday morning in the summer of 1998. Julie Templeton’s mom and dad are coming into town the next weekend. She and her husband, Chuck, want to treat them to a gala restaurant weekend in San Francisco, with dinners out Friday, Saturday, and Sunday nights.

Julie starts dialing for reservations. No answer. She leaves a message. She keeps calling, restaurant after restaurant. Some don’t have anything on the evenings she wants. One she wants to go to on Sunday isn’t open. Almost four hours later, after a lot of calling and juggling, she’s got the weekend planned.

Back then, making dinner reservations was hard. Taking them was, also. Most restaurants still took reservations over the phone. Someone wrote them down with a pencil, on paper, in a notebook. Often, tables went empty if the phone didn’t ring enough. Restaurants had no way to let people know when they had tables available.

Julie Templeton’s persistence paid off. Most people, though, just aren’t willing to work that hard to get a restaurant reservation. As a result, in 1998, on a typical Saturday night in San Francisco, there were unhappy couples sitting at home, perhaps having takeout pizza, who had given up trying to get a table for their date night, and unhappy restaurant owners with tables sitting empty, not making ends meet in a tough business. The market for matching up diners with tables at restaurants wasn’t working very well. Restaurants and diners spent a lot of resources—time and effort—getting together, and even so tables went empty and diners stayed home. That’s the sort of problem that an important, but until recently overlooked, type of business sets out to solve by helping parties who have something valuable to exchange find each other, get together, and do a deal”

From: David S. Evans. “Matchmakers: The New Economics of Multisided Platforms”.

...based on an old model...

Transactional Two-Sided Platform

(Rochet and Tirole, 2003; Parker et al., 2016)

Network externalities: direct or indirect?

POLITECNICO MILANO 1863 SCHOOL OF MANAGEMENT

- **Direct network effects**: An increase in usage leads to a direct increase in value for other users.
  - For example, telephone systems, fax machines, and social networks all imply direct contact among users.

A direct network effect is called a **same-side** network effect.

- **Indirect network effects**: Increases in usage of one product or network spawn increases in the value of a complementary product or network, which can in turn increase the value of the original.
  - Examples of complementary goods include operating systems and game consoled.

This is why Windows and Linux might compete not just for users, but (also) for software developers. This is also called a **cross-side** network effect. It is typical of two-sided markets.

©Daniel Trabucchi

Three necessary conditions to be a 2SM

POLITECNICO MILANO 1863 SCHOOL OF MANAGEMENT

1. **Two** or **more** distinct groups of customers are required.
2. **Cross-side (or indirect) network effects** associated with two or more group of customers must exist.
   - In some cases the indirect effects have got a reciprocal impact (then there are two indirect network effects), but one suffices.
3. An **intermediary**, that can internalize the externalities, must exist.

(Evans, 2003)

©Daniel Trabucchi

The case of Uber

“Aswath Damodaran - Professor at NYU – launched a debate when he published an article estimating the value of Uber, the platform company whose smartphone app connects riders with drivers. Earlier that month, investors had ponied up $1.2 billion in financial capital for Uber, receiving in return a share of the company that suggested the overall value of the business was around **$17 billion**.

Damodaran called this “a mind-boggling sum for a young company with only a few hundred million in revenue.”

Damodaran’s judgment was based on the classic tools of finance. He estimated the size of the global taxi market, Uber’s prospective market share, and the revenues this was likely to yield. Then he used risk-adjusted cash flows to come up with a company valuation of $5.9 billion. With admirable forthrightness, he even posted his spreadsheet online so others could examine and test his assumptions.

Bill Gurley, a partner at Benchmark Capital and one of Uber’s Silicon Valley investors, took up the challenge. Gurley argued that the $17 billion valuation was likely an ***underestimate***, and that Damodaran’s figure could be short by a factor of **25**.Gurley questioned Damodaran’s assumptions about both the total market size and Uber’s potential market share, basing his calculations on economist W. Brian Arthur’s analysis of network effects.”

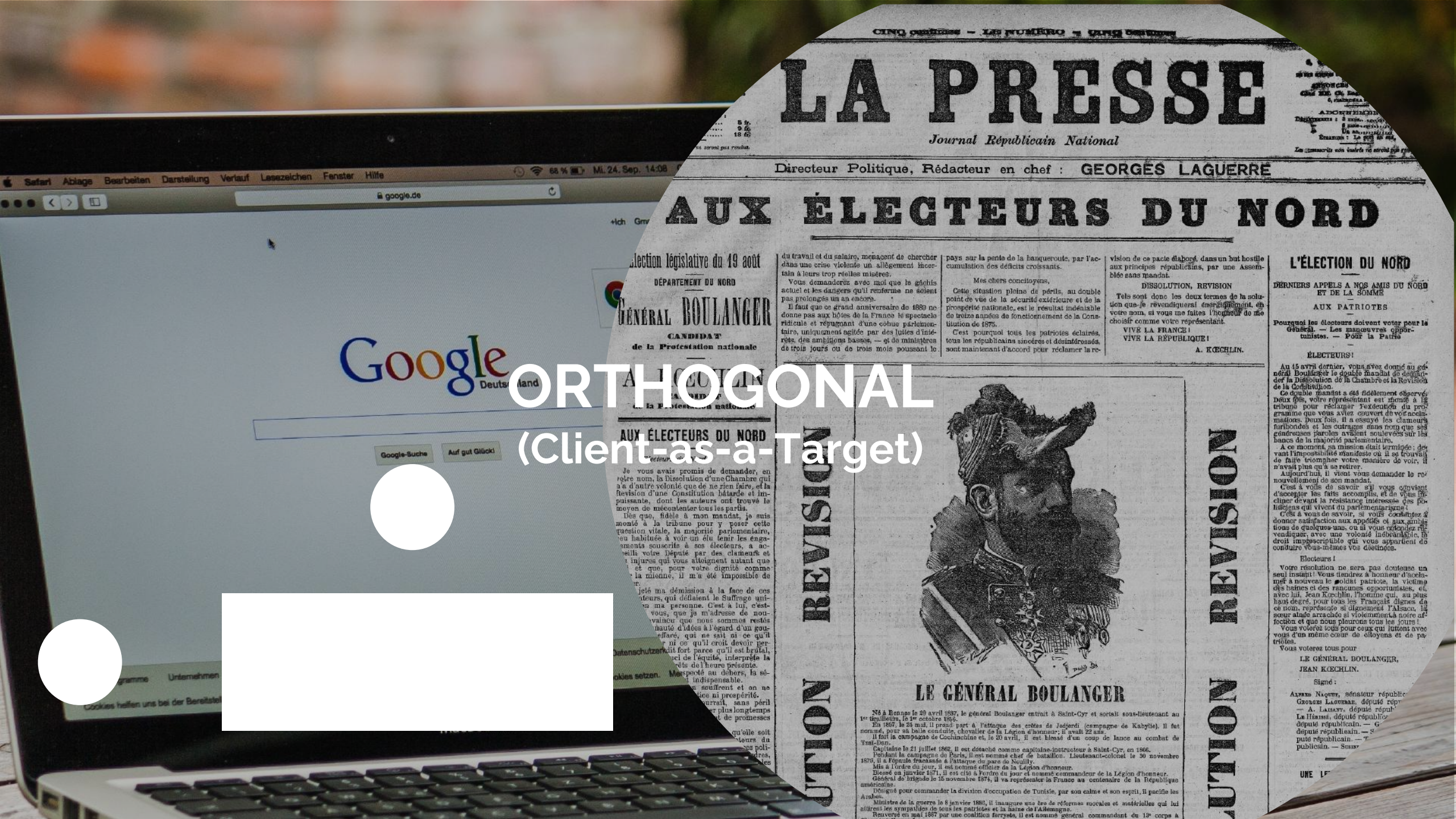
(Parker, Van Alstyne and Choudary, *Platform Revolution*, 2016)

One term, different meanings

- **Two (or multi) Sided Platforms**: products or services where two or multiple groups of customers are get together through a platform that internalize indirect network externalities
  - Examples: Airbnb, Uber

ORTHOGONAL

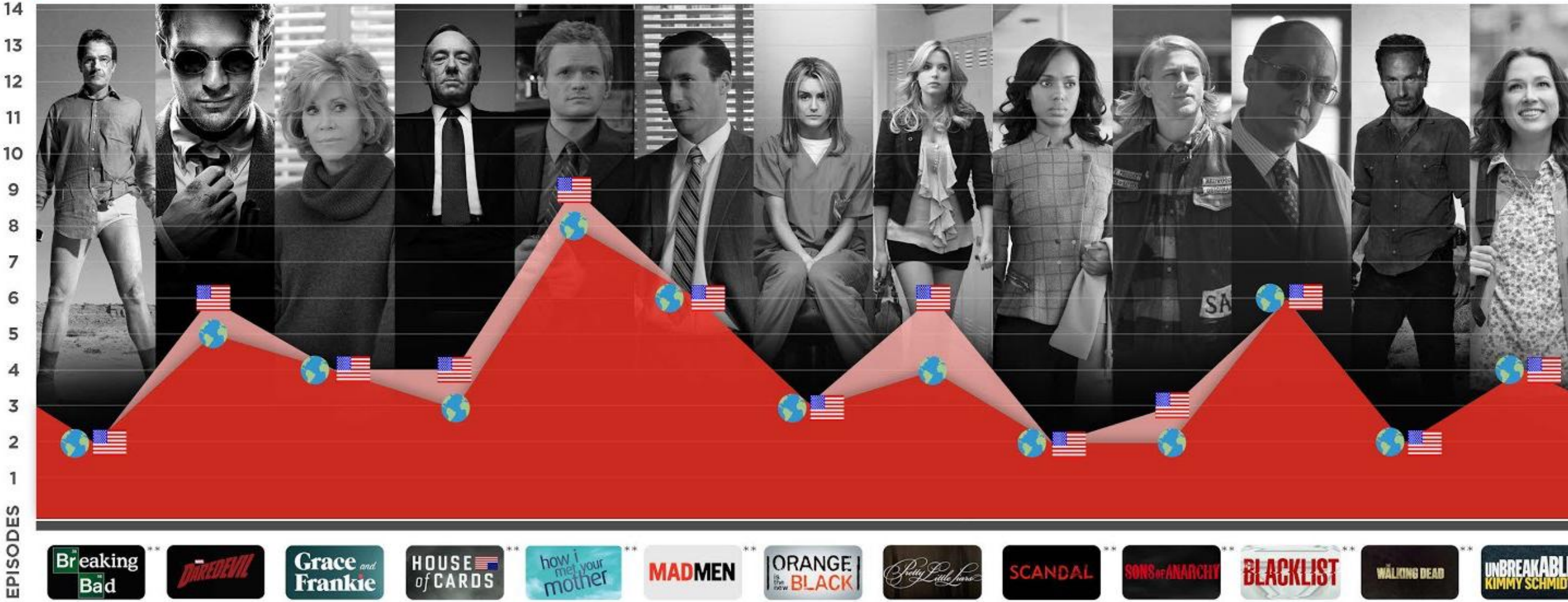
(Client-as-a-Target)



Is NETFLIX a PLATFORM?

DO YOU KNOW WHEN YOU WERE HOOKED*? NETFLIX DOES

NETFLIX UNVEILS THE MOMENT FANDOM BEGINS FOR SOME OF TODAY'S MOST POPULAR SERIES



= GLOBAL Average Hooked Episode

= COUNTRY Hooked Episode

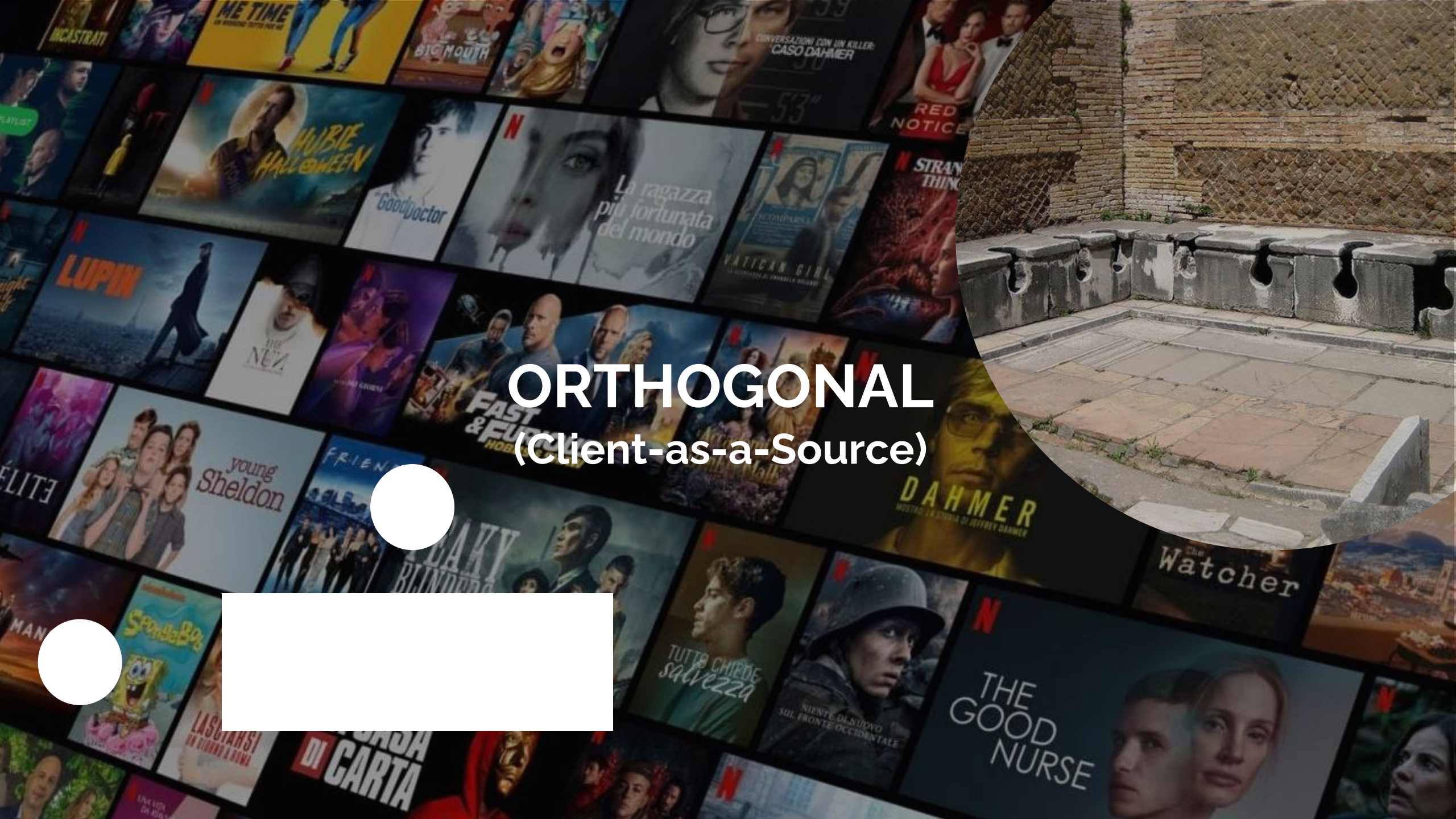
*The hooked episode was denoted as the episode that, when viewed, resulted in a 70% or higher member completion rate of the first season of each s
Hooked episodes had no relation to viewership num

**Denotes shows where for one or more countries, the show was unavailable to watch on Netflix and therefore the average is comprised of data from less than 16 cou

Note: Shows are listed in alphabetical

ORTHOGONAL

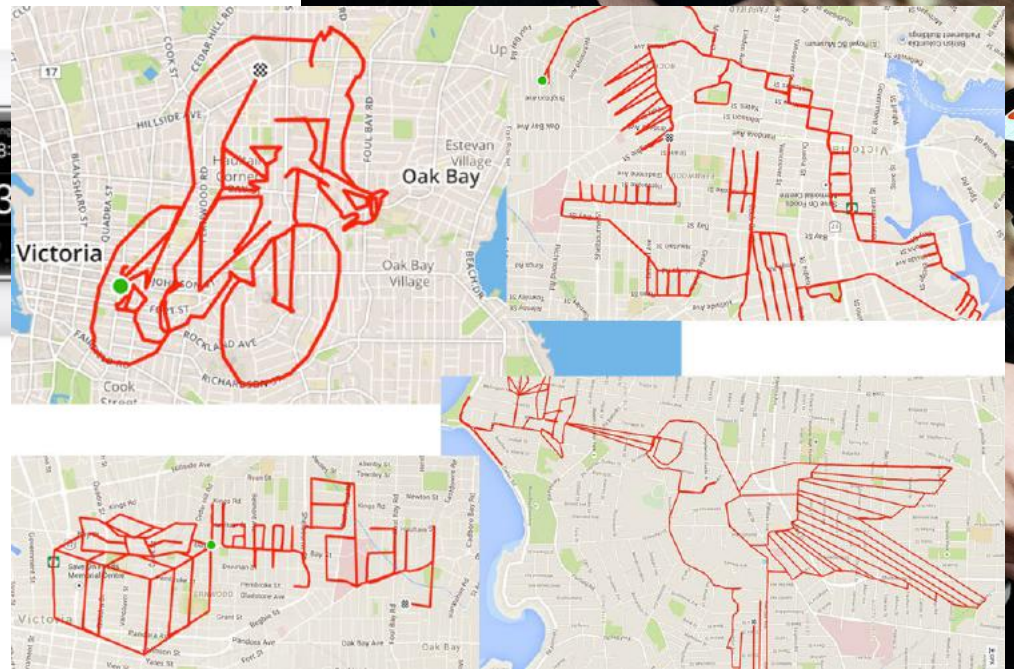
(Client-as-a-Source)



The case of Strava

©Daniel Trabucchi

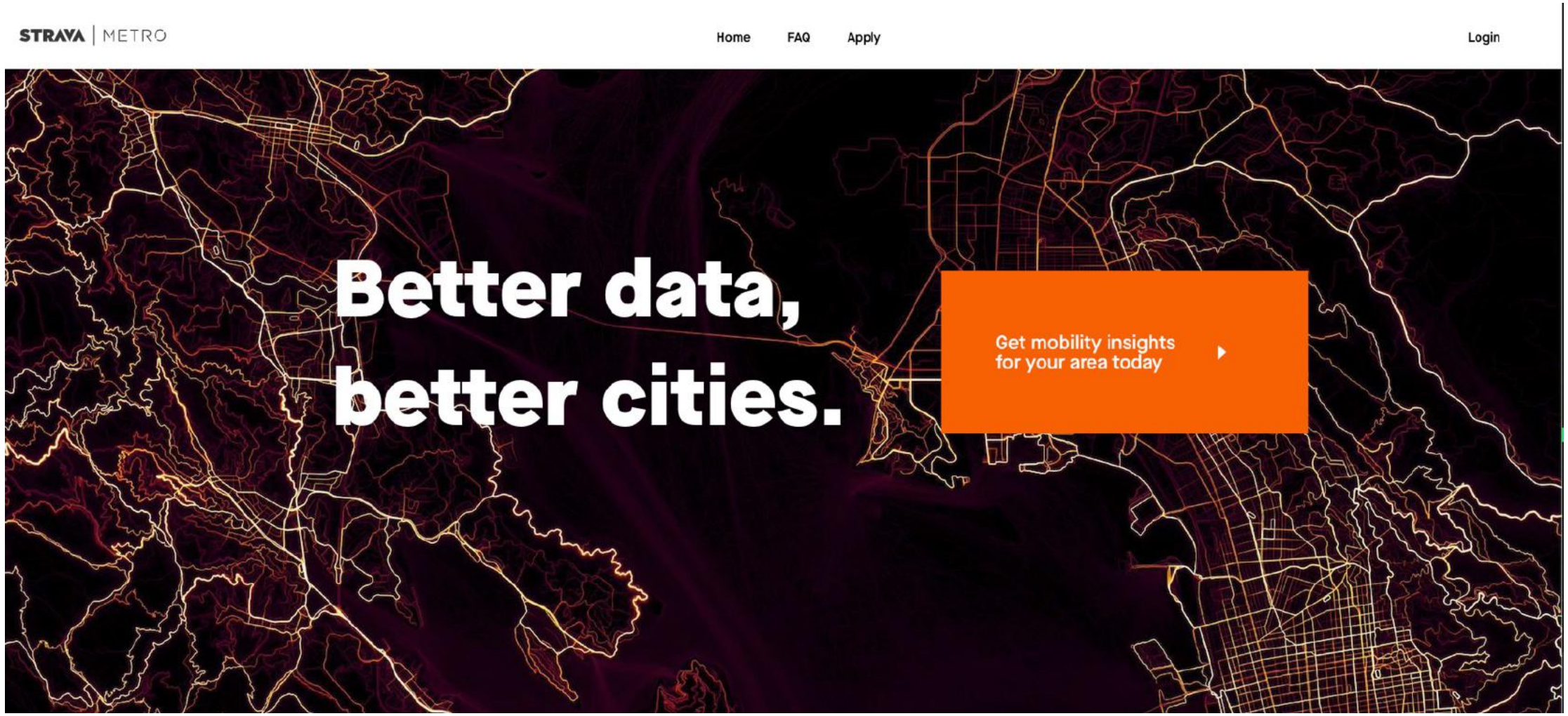
The case of Strava



©Daniel Trabucchi

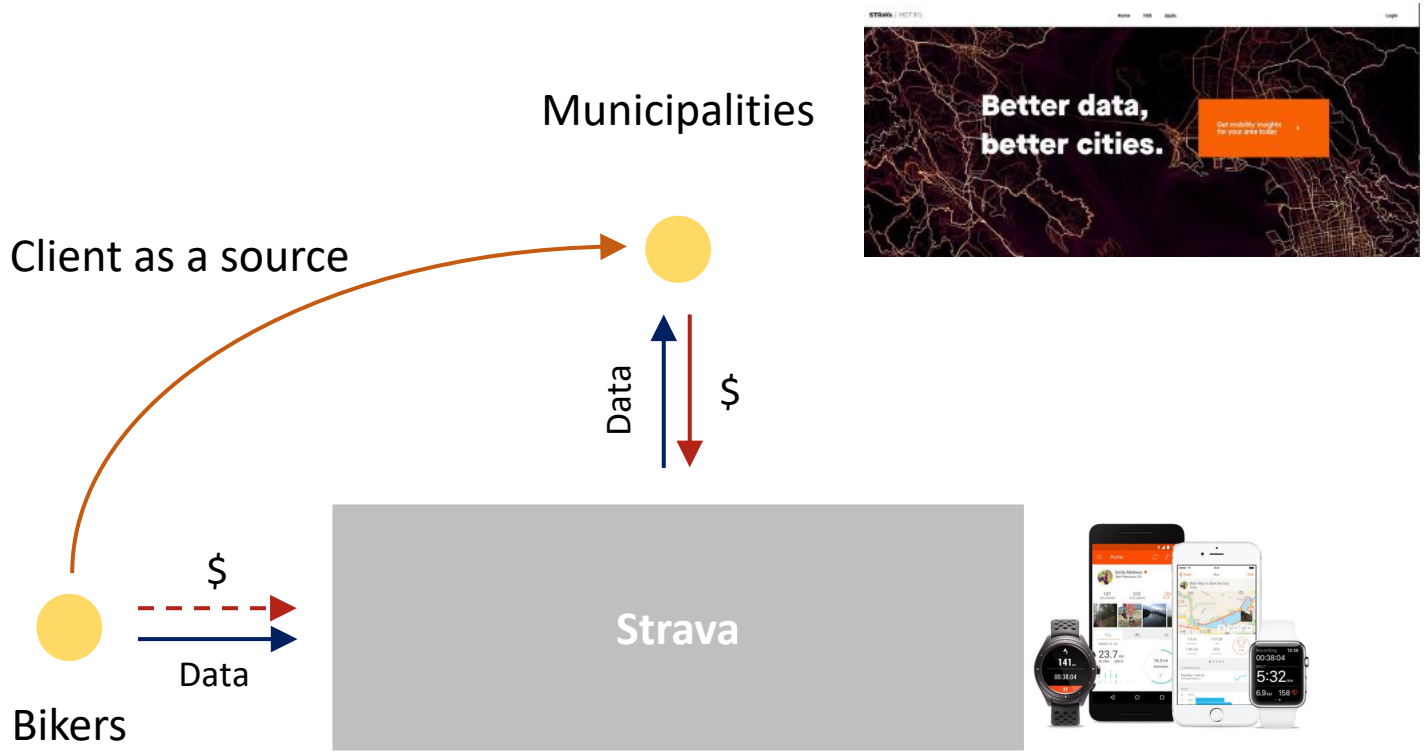
The case of Strava…and Strava Metro

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT



©Daniel Trabucchi

Strava as an Orthogonal Two-Sided Platform

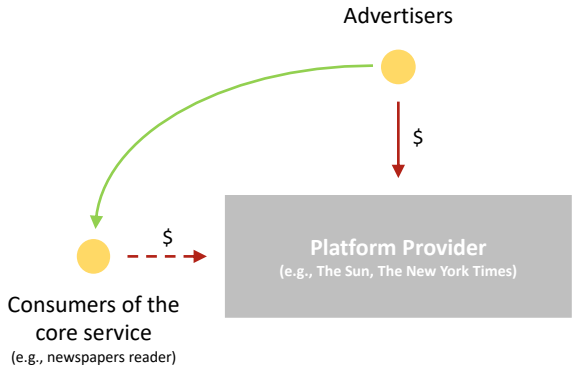


©Daniel Trabucchi

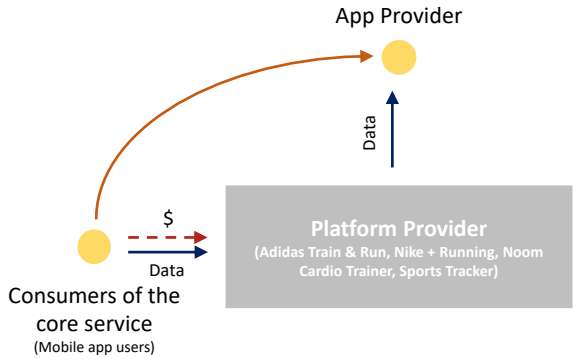
…that generate Orthogonal Two-Sided Platforms

POLITECNICO MILANO 1863
SCHOOL OF MANAGEMENT

Traditional Orthogonal Model



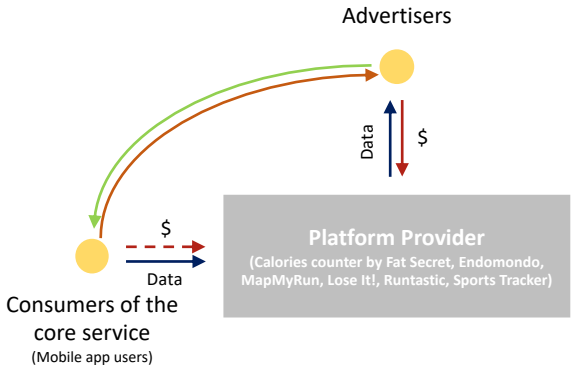
E-Ethnography Model



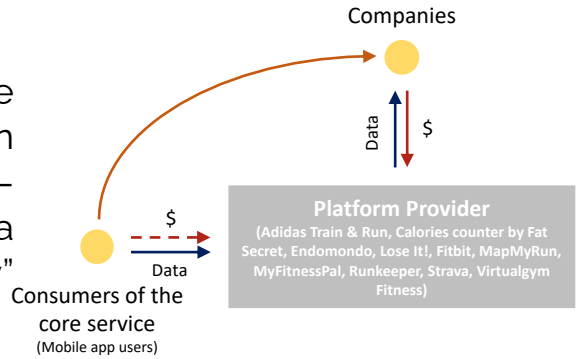
"Companies employ user data to improve their core products or services and to develop their relationship with their customers"

"Enhanced advertising improves on the traditional advertising-based mechanism by using customer data to help advertisers target their messages."

Enhanced Advertising Model



Data Trading Model



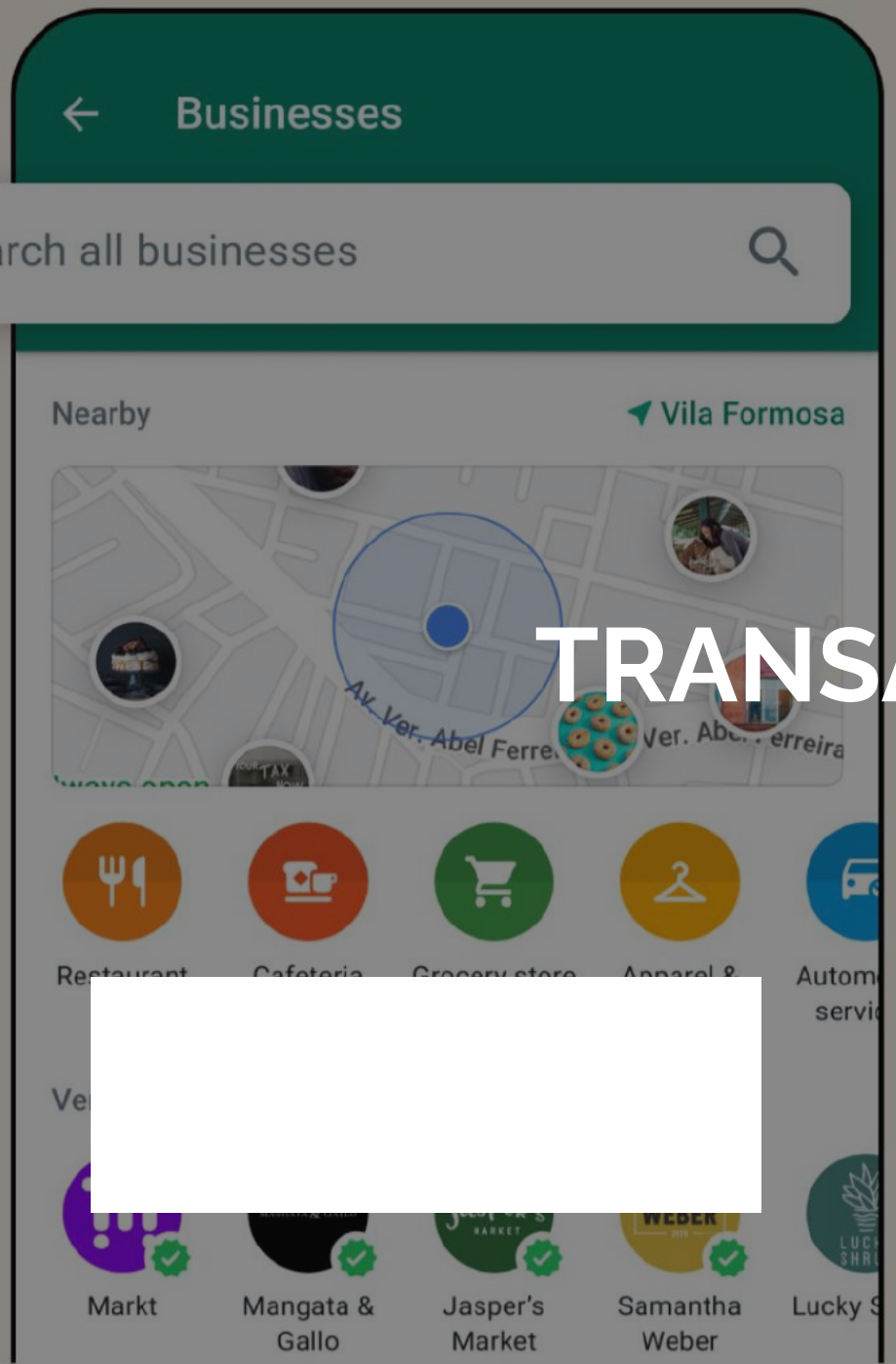
"Companies can generate revenue from user data in a much more direct way—by selling user data to a third party"

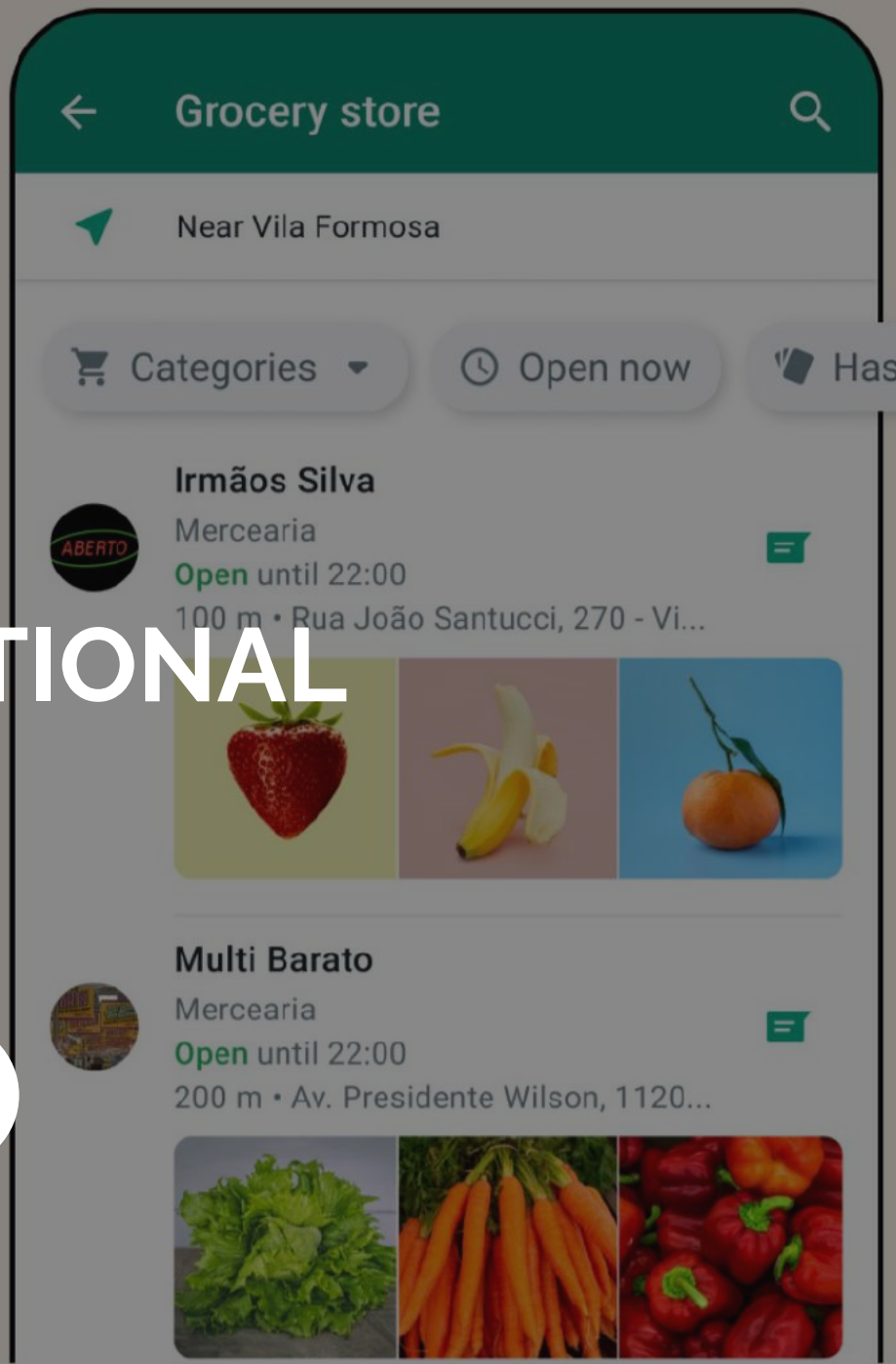
©Daniel Trabucchi

Is WHATSAPP a PLATFORM?

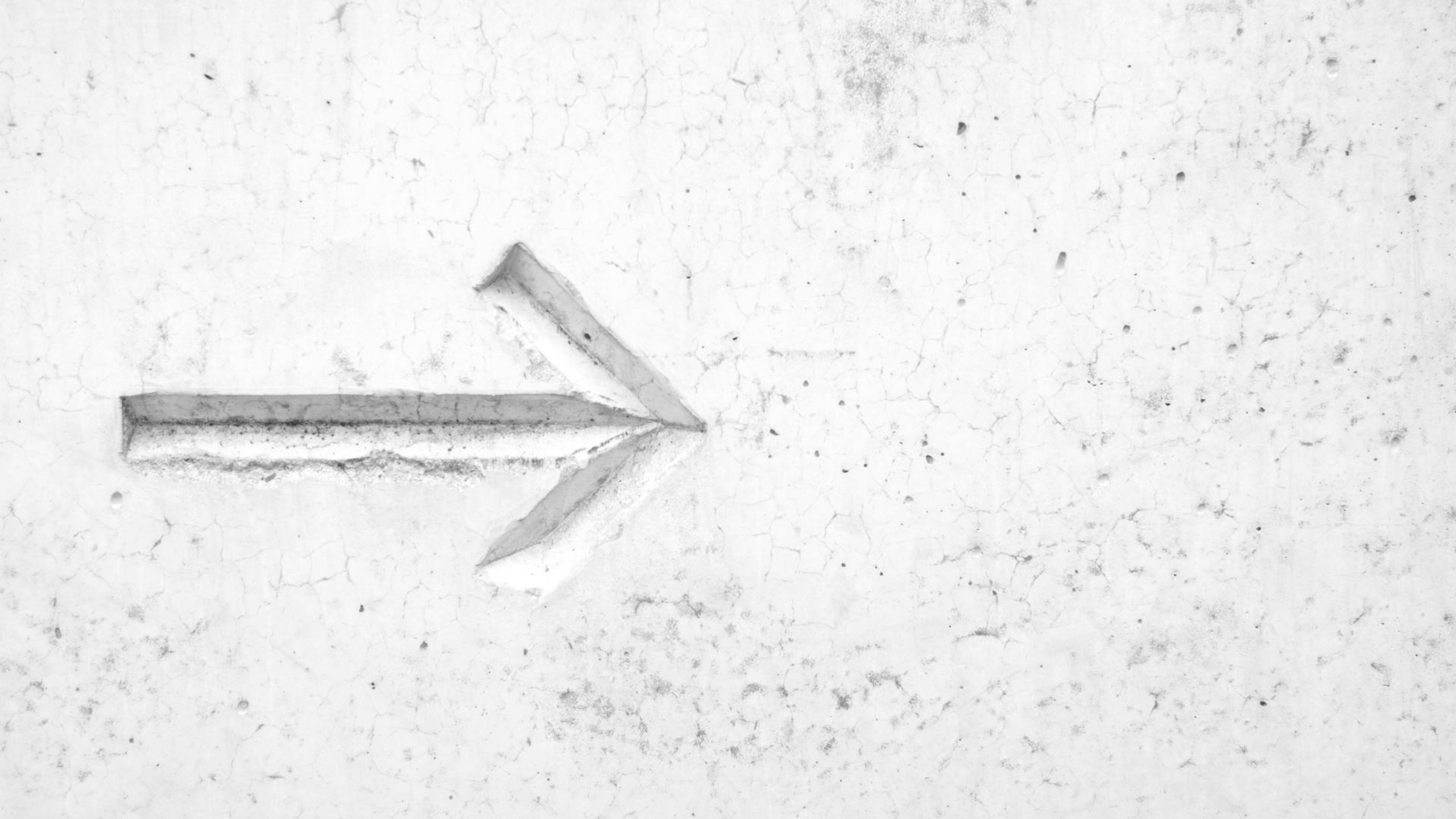
NETWORK GOODS

TRANSACTIONAL





What is NOT a platform?



Linear Value Chain

Suppliers FIRM Customers

Platforms are not all the same

TRANSACTIONAL

Transactional Platforms have

At least

sides

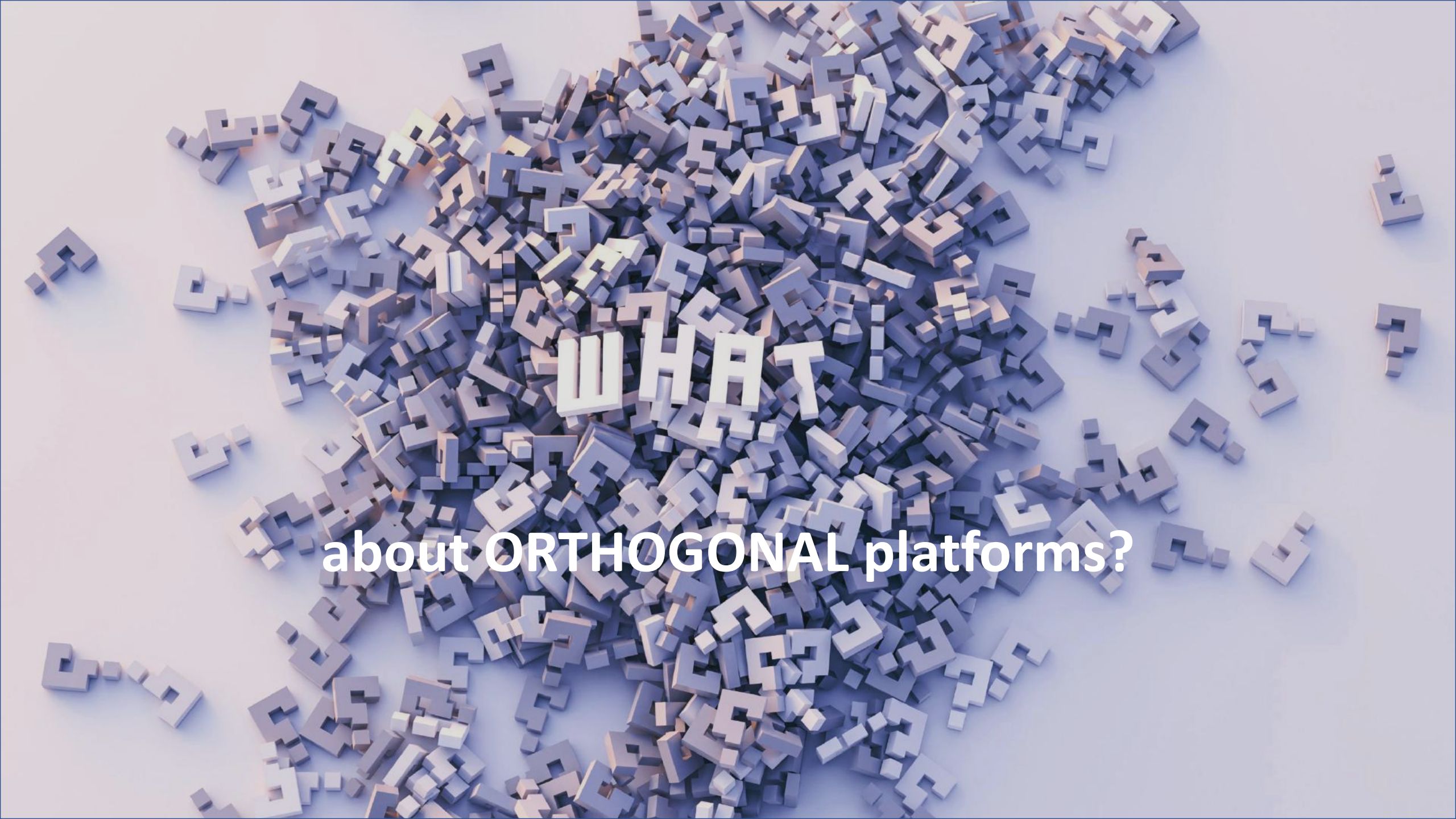
(generating the chicken & egg paradox)

&

Bidirectional

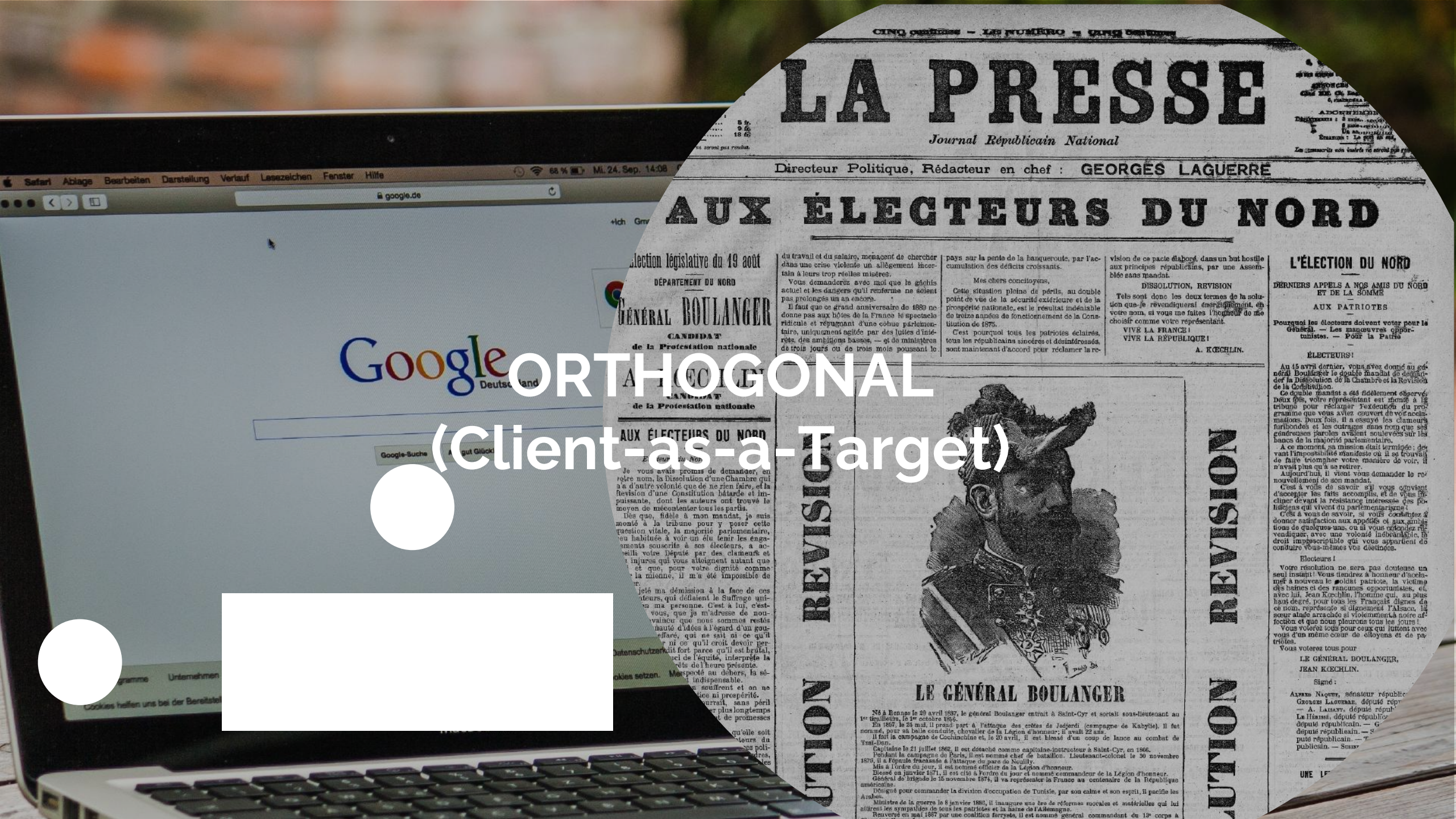
Cross-side

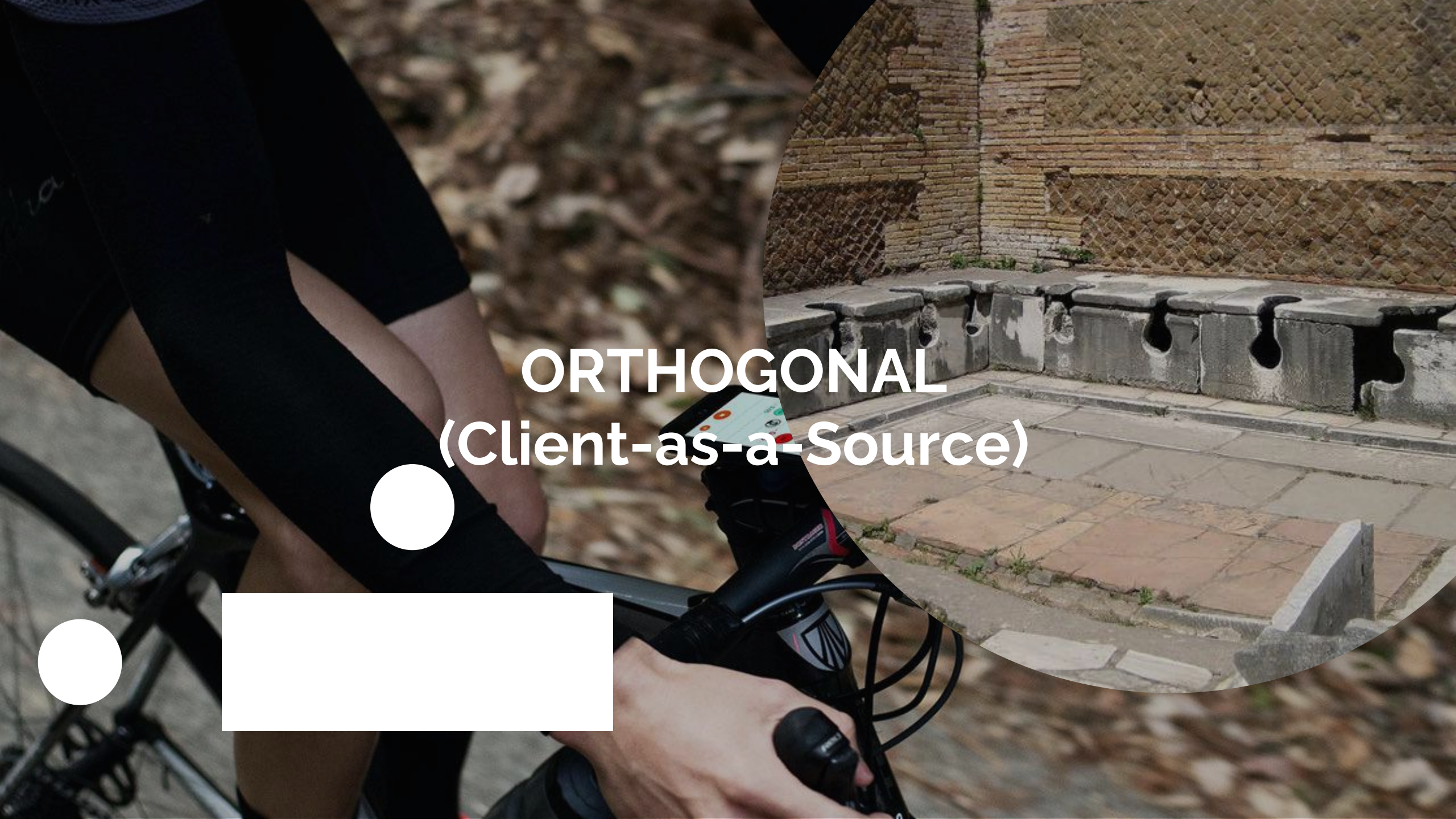
Network Externalities



about ORTHOGONAL platforms?

ORTHOGONAL
(Client-as-a-Target)





ORTHOGONAL
(Client-as-a-Source)

Orthogonal Platforms have

At least

sides

(that can even join in different moments

, which means no paradox)

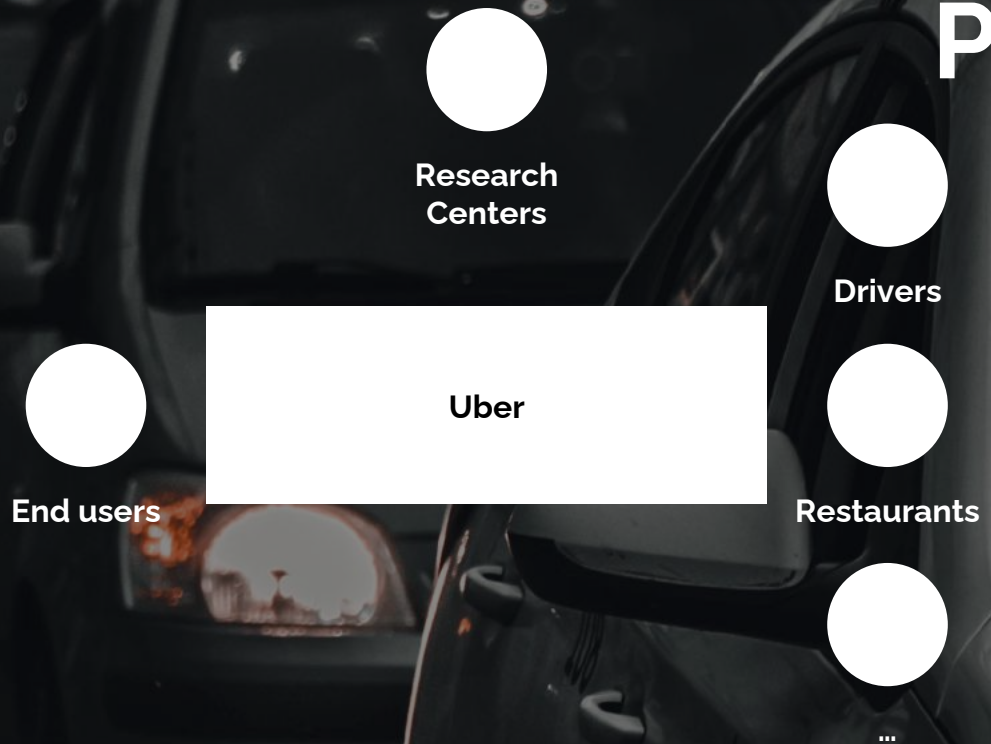
&

Unidirectional

Cross-side

Network Externalities

MULTI-SIDED PLATFORM



Platform thinking is the ability to use **platform-based mechanisms** to unlock **digital business transformations**

Takeaways:

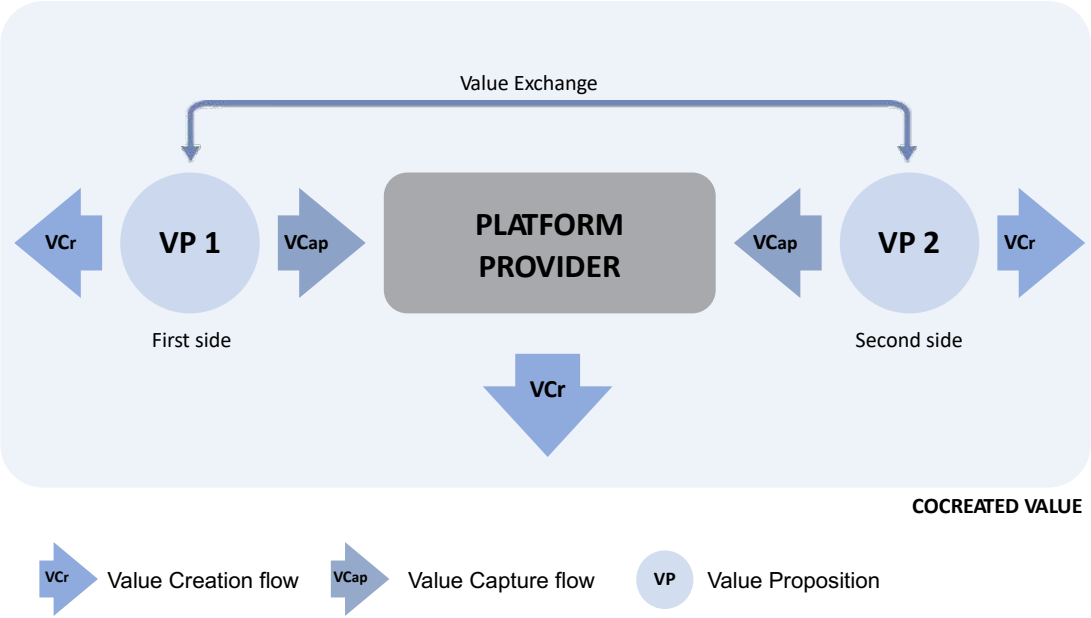
1)" Platform" became a **buzzword**, in the **innovation** field it has **different meanings** that range from internal or product platforms to transactional two-sided platforms

Uber

airbnb

How do (**successful**) transactional two-sided platforms **create**, **deliver**, and **capture value**?

1) Solving the market frictions



POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

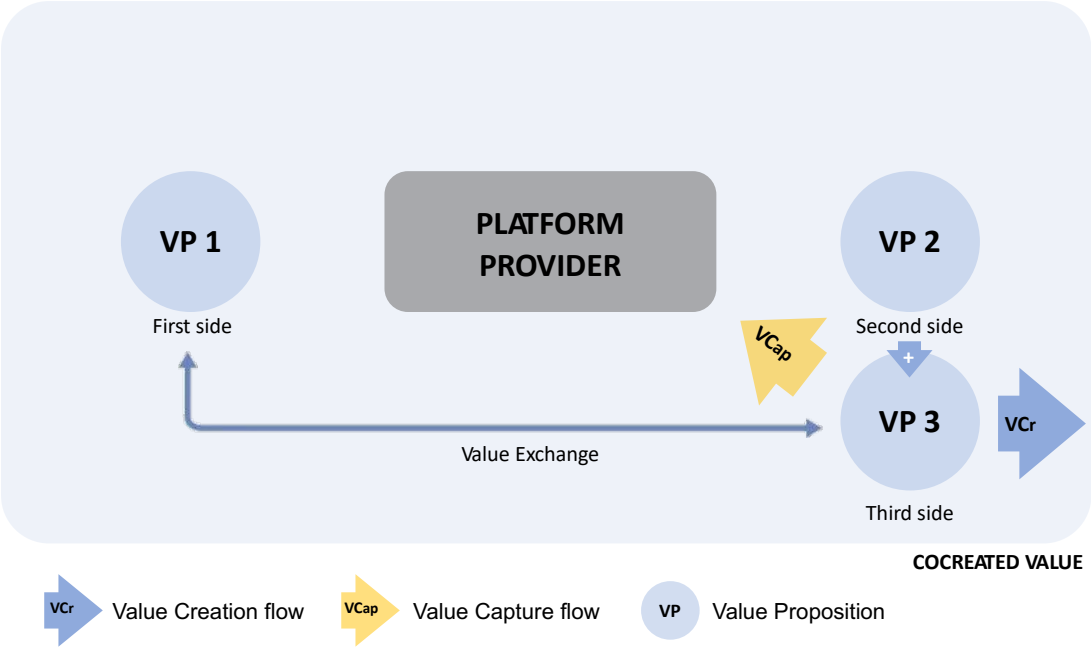
Opportunities

- **Scalability**: they are (often based on a zero-marginal cost structures)
  - E.g.: Spotify VS Airbnb
- **Potential for disruption**: fast diffusion in multiple markets
  - E.g.: AirBnb, Uber

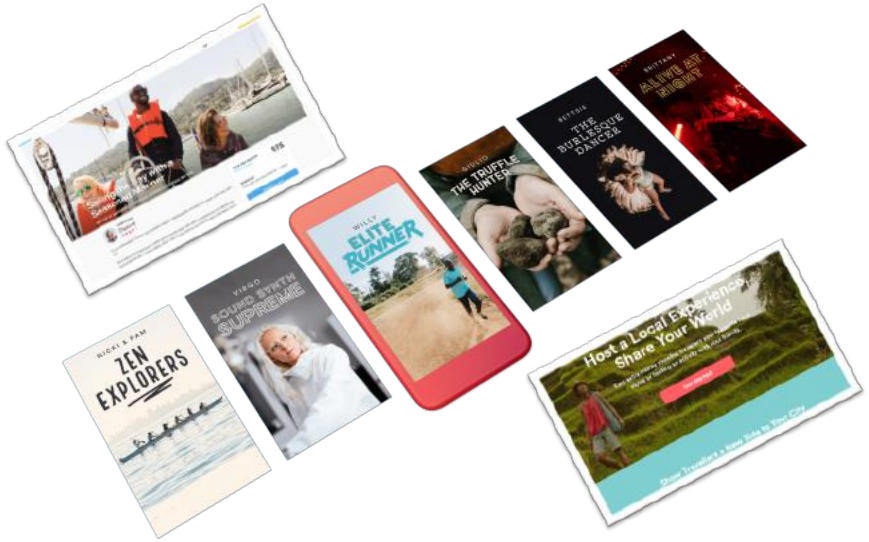
Challenges

- **Chicken and Egg Paradox**: to get on board the two sides, without having the other, is difficult…since the platforms is worthless
- **Double (or multi) sided value proposition**: it needs to be designed…leveraging the right ingredients

2) Exploiting the critical mass

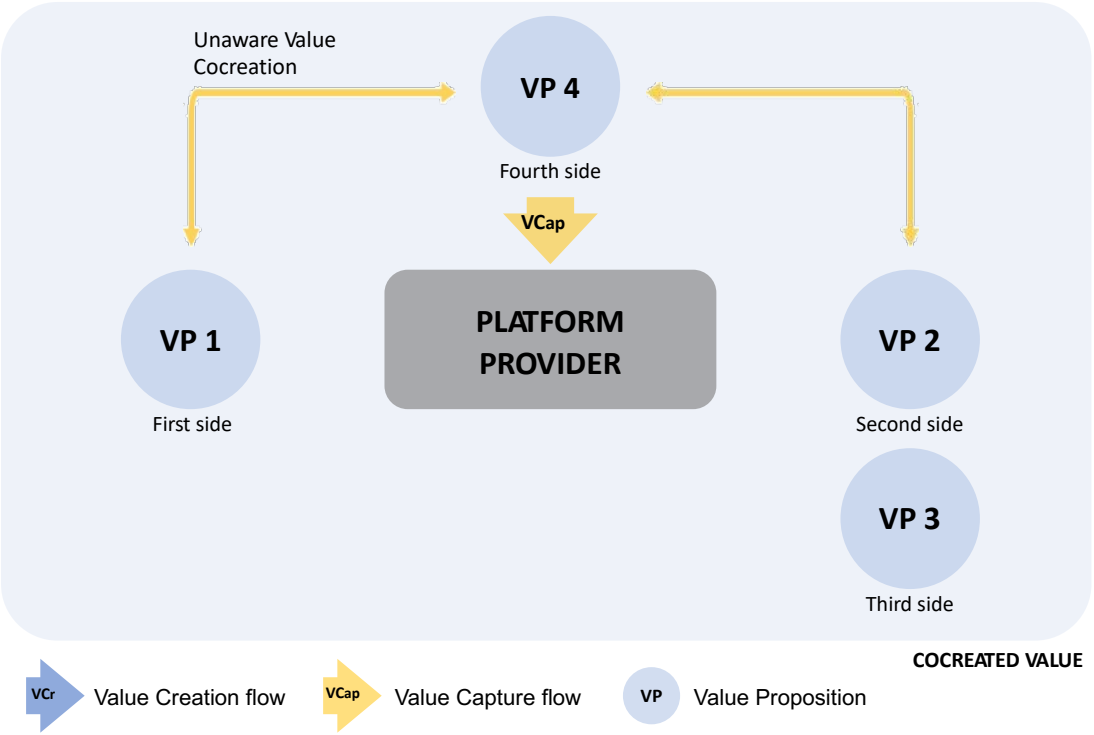


AirBnb - Experiences

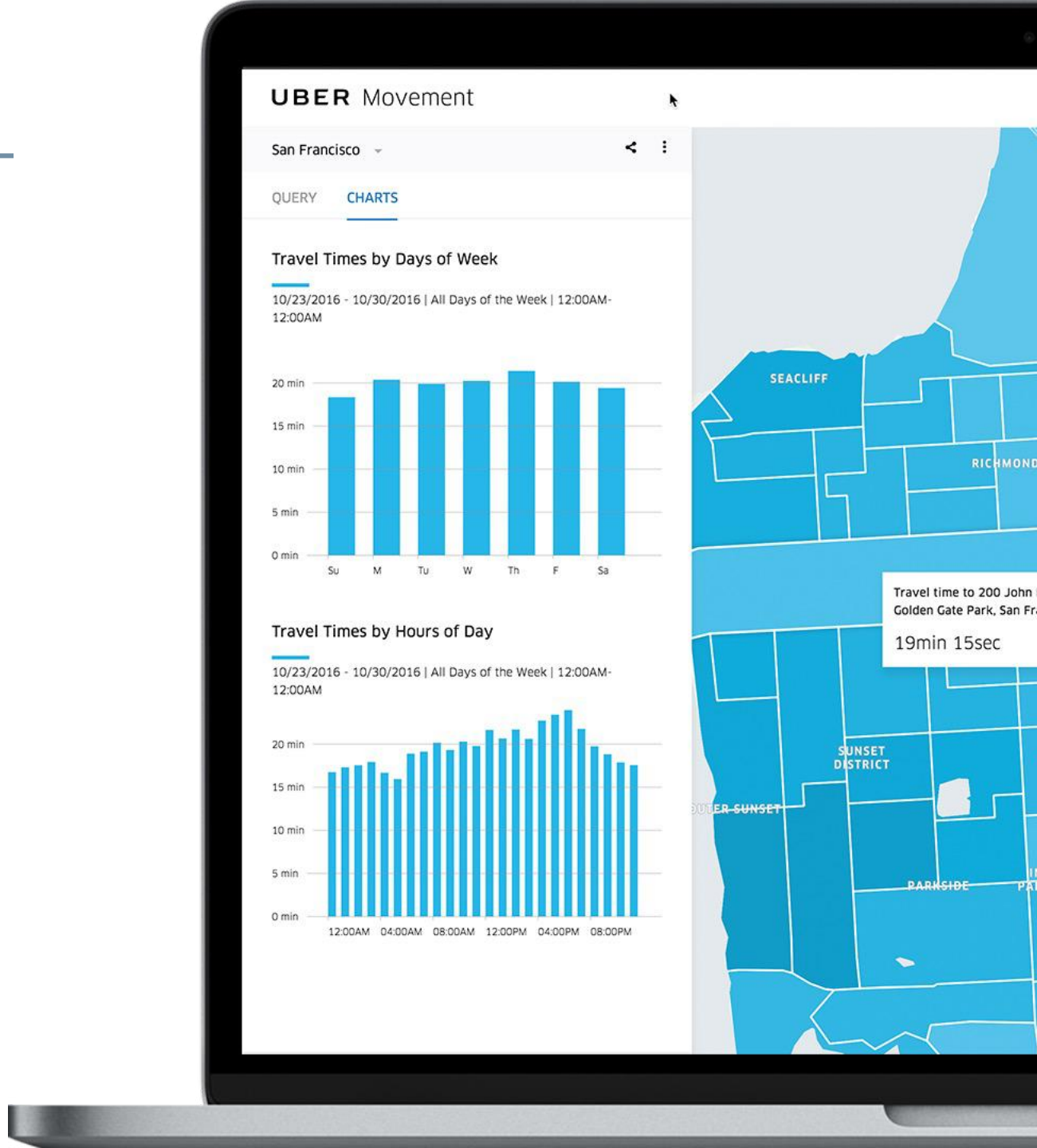


©Daniel Trabucchi

3) Capturing unaware co-created value



Hybrid multi sided platform



POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

(Successful) Platforms are Idle-Asset Hunters

1) Identify

Idle Assets

2) Design **Value**

Propositions

3) Get Players

on Board

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

Takeaways

1. **Frictions** on the market are the **starting** point, not the final

2. **Value** need to be **designed** and clear for all the sides involved

3. **Users** need to **join** on all the sides…generating **new idle assets**

Repeat and grow

Platform's journeys are not **straightforward**

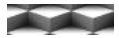
Still, if they are **able** to find **idle assets**, they can act as **magnifiers**.

Takeaways:

1)" Platform" became a **buzzword**, in the **innovation** field it has **different meanings** that range from internal or product platforms to transactional two-sided platforms

2) Successful (multi-sided) platforms are **Idle Asset Hunters**, reaching the success with a transactional two-sided platform is (often) just the beginning of a **long innovation journey**

Want to know more?



FEATURE ARTICLE

Idle Asset Hunters—The Secret of Multi-sided Platforms

Companies can use a three-step framework to shift from a two-sided to a multi-sided platform and find and exploit untapped assets.

Daniel Trabucchi, Silvia Sanasi, Antonio Ghezzi, and Tommaso Buganza

OVERVIEW: Since the dot-com revolution in the early 2000s, traditional, vertically integrated firms have attempted to innovate using multi-sided digital platforms, matching customer and supplier groups to resolve the needs of both. These firms' underlying logic has disrupted traditional business models, enabling them to introduce new and counterintuitive value creation, delivery, and capture configurations. Using Uber and Airbnb, two prominent cases of multi-sided platforms, we present an overview of the dynamics governing value mechanisms within a platform through the theoretical lens of the business model. Multi-sided business models undergo three evolutionary phases: they solve the market friction; they exploit the critical mass they develop; and they unveil and capture new value derived from cocreation based on data. Our study reveals how successful platform providers act as *idle asset hunters* that can identify and leverage untapped assets. We propose a framework that helps companies move from a two-sided to a multi-sided platform.

KEYWORDS: Two-sided platforms, Multi-sided platforms, Business model, Digital platforms, Network externalities

Dozens of digital platforms surround our daily lives. We move with Uber, gather information through Google, share our everyday lives on Instagram, Facebook, and Snapchat, make travel arrangements using Booking.com and Skyscanner, and order food through Deliveroo or UberEats, all while enjoying a new song on Spotify. All these companies share a common key characteristic: they are based on two-sided or multi-sided platforms.

The concept of two-sided platforms, later expanded in the more comprehensive "multi-sided platforms" label (Hagiu and Wright 2015), has its roots in the economic literature (Rochet and Tirole 2003) and refers to businesses characterized by having two or more groups of customers, linked through cross-side network externalities, which means that the value for one set of customers depends on the number of customers on the other side (Katz and Shapiro 1985) and

Daniel Trabucchi is an assistant professor at Politecnico di Milano's School of Management, where he serves as a researcher of LEADIN'Lab, the Laboratory for Leadership, Design and Innovation. He researches innovation management with particular focus on how digital two-sided platforms can create and capture value and their related data-driven business models. He has published his research in peer-reviewed journals such as *Technological Forecasting and Social Change*, *Internet Research*, *Research-Technology Management*, *Creativity and Innovation Management*, *Technology Analysis and Strategic Management*, and *European Journal of Innovation Management*. He has a PhD in management engineering. daniel.trabucchi@polimi.it

Silvia Sanasi is a PhD candidate in strategic management, innovation, and entrepreneurship at Politecnico di Milano's School of Management, where she also collaborates as a researcher in the Hi-Tech Startups and Startup Intelligence Observatories. Her main research interest lies in the use of experimentation for business model design, innovation, validation, and scaling in both startups and established companies. She also researches the strategic management and business models of digital startups, with particular focus on multi-sided platforms. She has published articles in peer-reviewed journals such as *Technology Analysis and Strategic Management* and *Competitiveness Review*, as well as in conference proceedings. silvia.sanasi@polimi.it

DOI: 10.1080/08956308.2021.1842677
Copyright © 2020, Innovation Research Interchange.
Published by Taylor & Francis. All rights reserved.

Antonio Ghezzi is an associate professor of strategy and entrepreneurship in Politecnico di Milano's Department of Management, Economics, and Industrial Engineering. His main research field is strategy, entrepreneurship, and digital transformation, with a focus on startups' business model design, innovation, and validation. He has published more than 100 articles in journals such as *International Journal of Management Reviews*, *Technological Forecasting and Social Change*, *Journal of Business Research*, and *R&D Management*. He has also written books, book chapters, and conference proceedings. He has a PhD in management engineering. antonio1.ghezzi@polimi.it

Tommaso Buganza is an associate professor of leadership and innovation at Politecnico di Milano's School of Management, where he also is cofounder of LEADIN'Lab. He is a member of the scientific committee of the International Product Development Management Conference EIASM-IPDMC. His research focuses on the intersection between technological innovation and leadership. He has published articles in *Journal of Product Innovation Management*, *International Journal of Innovation Management*, *European Journal of Innovation Management*, and *Creativity and Innovation Management*. He is also a reviewer for many of these journals. He has a PhD in management engineering. tommaso.buganza@polimi.it

Or click here

The Platform Room episode:

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

Overview Since the dot-com revolution in the early 2000s, traditional, vertically integrated firms have attempted to innovate using multi-sided digital platforms, matching customer and supplier groups to resolve the needs of both. These firms' underlying logic has disrupted traditional business models, enabling them to introduce new and counterintuitive value creation, delivery, and capture configurations. Using Uber and Airbnb, two prominent cases of multi-sided platforms, we present an overview of the dynamics governing value mechanisms within a platform through the theoretical lens of the business model. Multi-sided business models undergo three evolutionary phases: they solve the market friction; they exploit the critical mass they develop; and they unveil and capture new value derived from cocreation based on data. Our study reveals how successful platform providers act as idle asset hunters that can identify and leverage untapped assets. We propose a framework that helps companies move from a two-sided to a multi-sided platform.

Idle Asset Hunters—The Secret of Multi-sided Platforms

Is Amazon a Platform? If yes, how?

Welcome to Amazon.com Books! Earth's Biggest ... - Microsoft Internet Explorer

File Edit View Go Favorites Help

Back Forward Stop Refresh Home Search Favorites Print Font Mail Edit

Address http://www.amazon.com/exec/obidos/subst/index2.html/5032-8514921-293460

Links

2.5 Million Titles

Text Only

SEARCH BY

Author, Title, Subject
Keyword
ISBN
Advanced Query

BUY BOOKS

Shopping Cart

WELCOME TO EARTH'S BIGGEST BOOKSTORE

Amazon.com

1.5 Million Books in Print & 1 Million Out-of-Print Books

40% off the Amazon.com 500! ~ Browse our Miles of Aisles
Win $1,000 of books ~ Earn Money: Sell books from your Web site!

First-Time Visitors Please Click Here

May 25th--New on Our Shelves

Dog's Best

Book of the Day

Platform Thinking: starting from Established Linear Value Chain

From Linear Value Chain Organizations

To Hybrid Multi-Sided Platforms

Established businesses based on a linear value chain can exploit their assets, resources and relationships by evolving towards Hybrid Multi-Sided Platforms.

Teamwork

Let’s apply Platform Thinking

- I’ll open random breakout rooms,
- You’ll have 15 minutes to pick (at least) one example of “Platform Thinking”
- You all share your work through a PollEv, ’ll pick some random groups to share the results

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

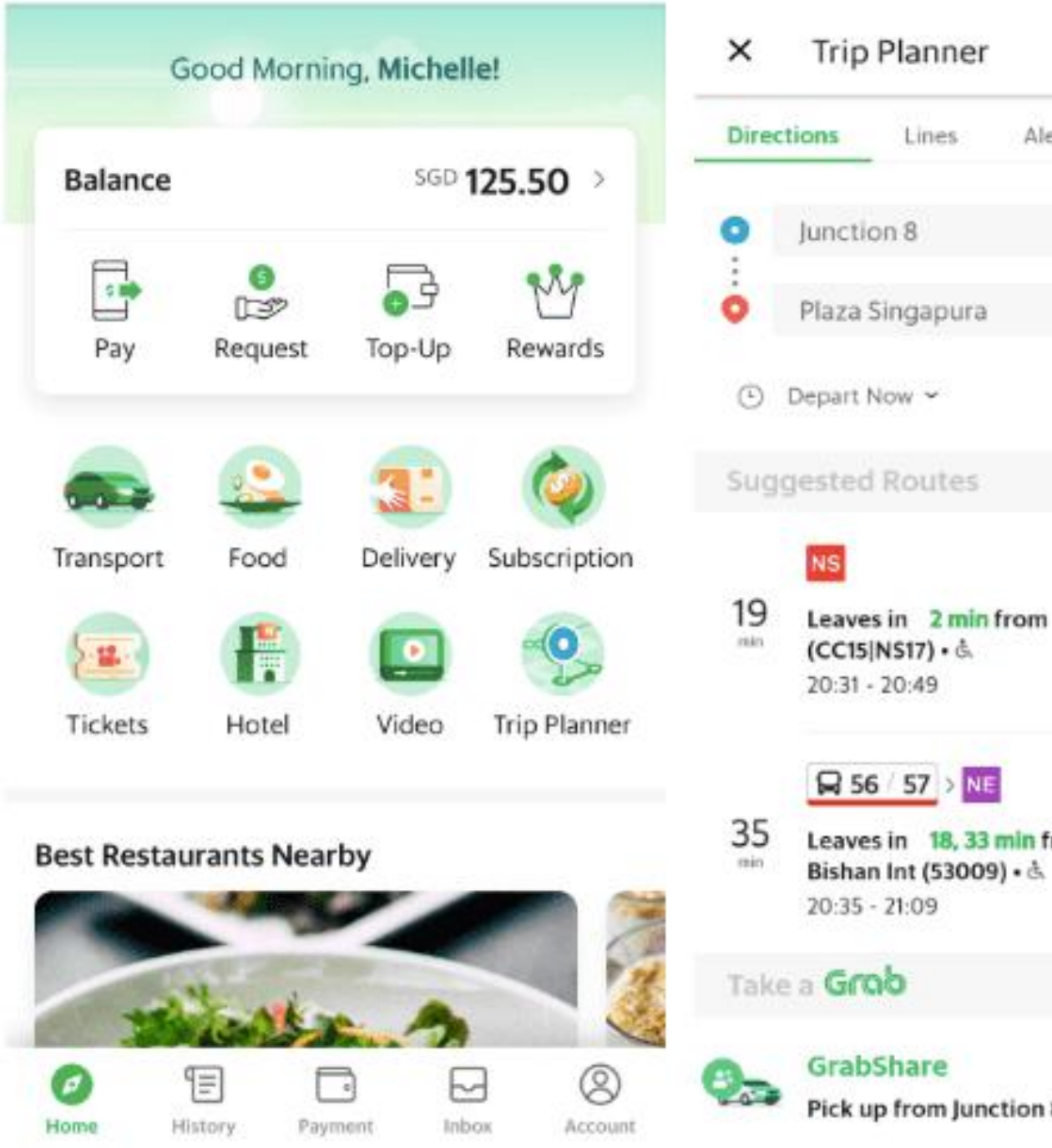
Platform thinking is the ability to use **platform-based mechanisms** to unlock **digital business transformations**

Platform Thinking: starting from Transactional Platforms

From Transactional Two-Sided Platforms

To Hybrid Multi-Sided Platforms

Transactional Two-Sided Platforms can further exploit their untapped value by evolving towards Hybrid Multi-Sided Platforms.



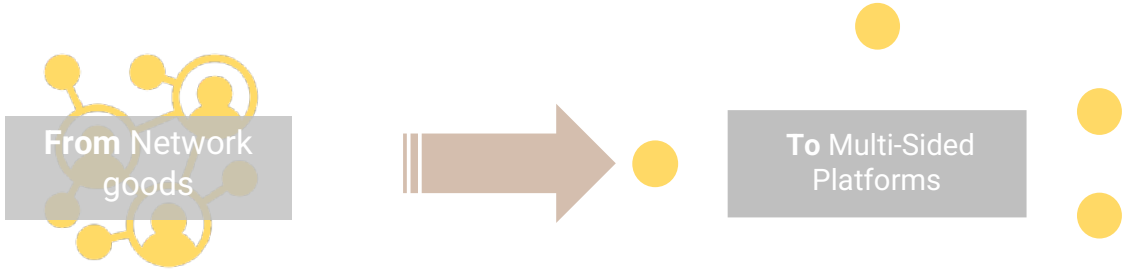
Platform Thinking: starting from Orthogonal Platforms

From Orthogonal Two-Sided Platforms

To Hybrid Multi-Sided Platforms

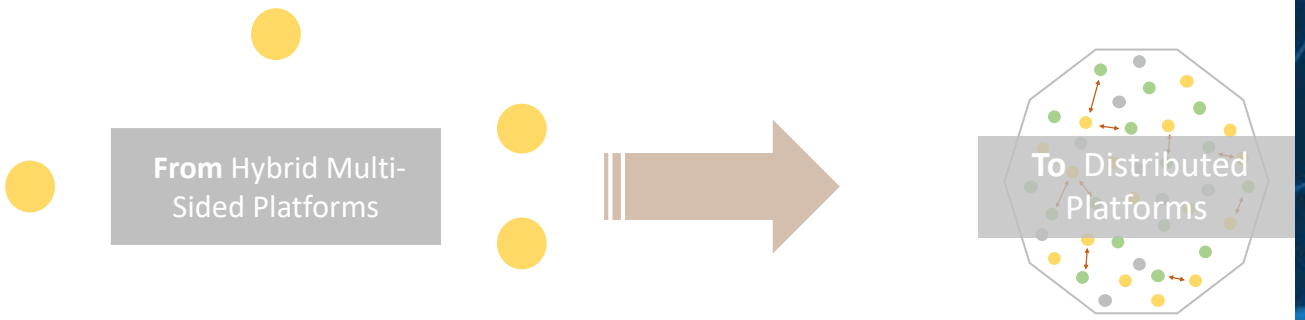
Orthogonal Two-Sided Platforms can exploit their ability to manage different sides by externalizing part of the value creation process and evolving towards Hybrid Multi-Sided Platforms.

Platform Thinking: starting from network business



Network goods (or services) can exploit their ability to gather end users by involving other customers and evolving towards Hybrid Multi-Sided Platforms.

Future Evolutions



Hybrid multi-sided platforms can exploit some of their basic underlying mechanisms by relying on the opportunities that emerging technologies may provide, by exploring a new level of business model innovation becoming Distributed Platforms.

Takeaways:

1)" Platform" became a **buzzword**, in the **innovation** field it has **different meanings** that range from internal or product platforms to transactional two-sided platforms

2) Successful (multi-sided) platforms are **Idle Asset Hunters**, reaching the success with a transactional two-sided platform is (often) just the beginning of a **long innovation journey**

3) Platform thinking is the ability to use platform-based mechanisms to unlock digital business transformations

Want to know more?

The current issue and full text archive of this journal is available on Emerald Insight at:
https://www.emerald.com/insight/1460-1060.htm

Landlords with no lands

Landlords with no lands: a systematic literature review on hybrid multi-sided platforms and platform thinking

Daniel Trabucchi and Tommaso Buganza
School of Management, Politecnico di Milano, Milan, Italy

Received 23 November 2020
Revised 11 February 2021
Accepted 19 February 2021

Abstract

Purpose – This article is based on a systematic and comprehensive review of the literature on two-sided platforms, the business structure based on the concept of matchmaking groups of customers (e.g. Uber or Airbnb). The research aims to identify gaps in the existing literature while providing a structured summary of the existing knowledge in the field. Finally, we propose a conceptual framework enabling platform thinking, the ability to see hybrid multi-sided platforms as a useful resource-orchestration structure to unveil innovation opportunities.

Design/methodology/approach – This study adopts a bibliometric approach, combing co-citation and text mining analyses of 196 papers, also implementing a longitudinal analysis that highlights the evolution of the field since its inception till today.

Findings – The novel aspect of the paper consists in taking a purely managerial stance of a very peculiar kind of platform, merging existing knowledge in comprehensive frameworks while providing potential avenues for research.

Research limitations/implications – From an academic perspective, this research highlights the double nature of two-sided platforms: as an operational choice or as a way to exploit (digital) assets and reach the economic sustainability. A research agenda is proposed, based on three pillars: a side-based standpoint, a business model perspective and an evolutionary stance to see how these businesses may evolve.

Practical implications – The research identifies different literature streams that may help practitioners in identifying how two-sided platforms may help them in fostering innovation.

Originality/value – The identification of two-sided platforms as a different way to create value (transaction platforms) or to capture value (non-transaction platform), enhancing the debate on this innovative business model. A research agenda to bring the field forward is proposed.

Keywords Systematic literature review, Business model innovation, Multi-sided platforms, Digital platforms, Two-sided platforms

Paper type Literature review

Introduction

The relative weight of platform-based businesses is growing continuously and becoming more and more relevant (e.g. Choudary *et al.*, 2016; Cusumano *et al.*, 2019). Unicorns like Uber and Airbnb, along with their multi-billion valuation, are often used as key examples for this paradigm (e.g. Guo *et al.*, 2020).

These companies aim to link two different groups of customers, which may be hosts and guests, drivers and passengers or readers and advertisers. In the literature, this kind of businesses has been defined as two-sided platforms, relying on the original concept of two-sided markets (e.g. Rochet and Tirole, 2003). Two-sided platforms are characterized by three

© Daniel Trabucchi and Tommaso Buganza. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at http://creativecommons.org/licences/by/4.0/legalcode

European Journal of Innovation Management
Emerald Publishing Limited
1460-1060
DOI 10.1108/EJIM-11-2020-0487

Or click here

POLITECNICO
MILANO 1863
SCHOOL OF MANAGEMENT

The Platform Room episode:

Purpose: This article is based on a systematic and comprehensive review of the literature on Two-Sided Platforms, the business structure based on the concept of matchmaking groups of customers (e.g., Uber or Airbnb). The research aims to identify gaps in the existing literature while providing a structured summary of the existing knowledge in the field. Finally, we propose a conceptual framework enabling Platform Thinking, the ability to see Hybrid Multi-Sided Platforms as a useful resource-orchestration structure to unveil innovation opportunities.

Design/Methodology/approach: This study adopts a bibliometric approach, combing co-citation and text mining analyses of 196 papers, also implementing a longitudinal analysis that highlights the evolution of the field since its inception till today.

Findings: The novel aspect of the paper consists in taking a purely managerial stance of a very peculiar kind of platform, merging existing knowledge in comprehensive frameworks while providing potential avenues for research.

Research implications: From an academic perspective, this research highlights the double nature of Two-Sided Platforms: as an operational choice or as a way to exploit (digital) assets and reach the economic sustainability. A research agenda is proposed, based on three pillars: a side-based standpoint, a business model perspective and an evolutionary stance to see how these businesses may evolve.

Practical implications: The research identifies different literature streams that may help practitioners in identifying how Two-Sided Platforms may help them in fostering innovation.

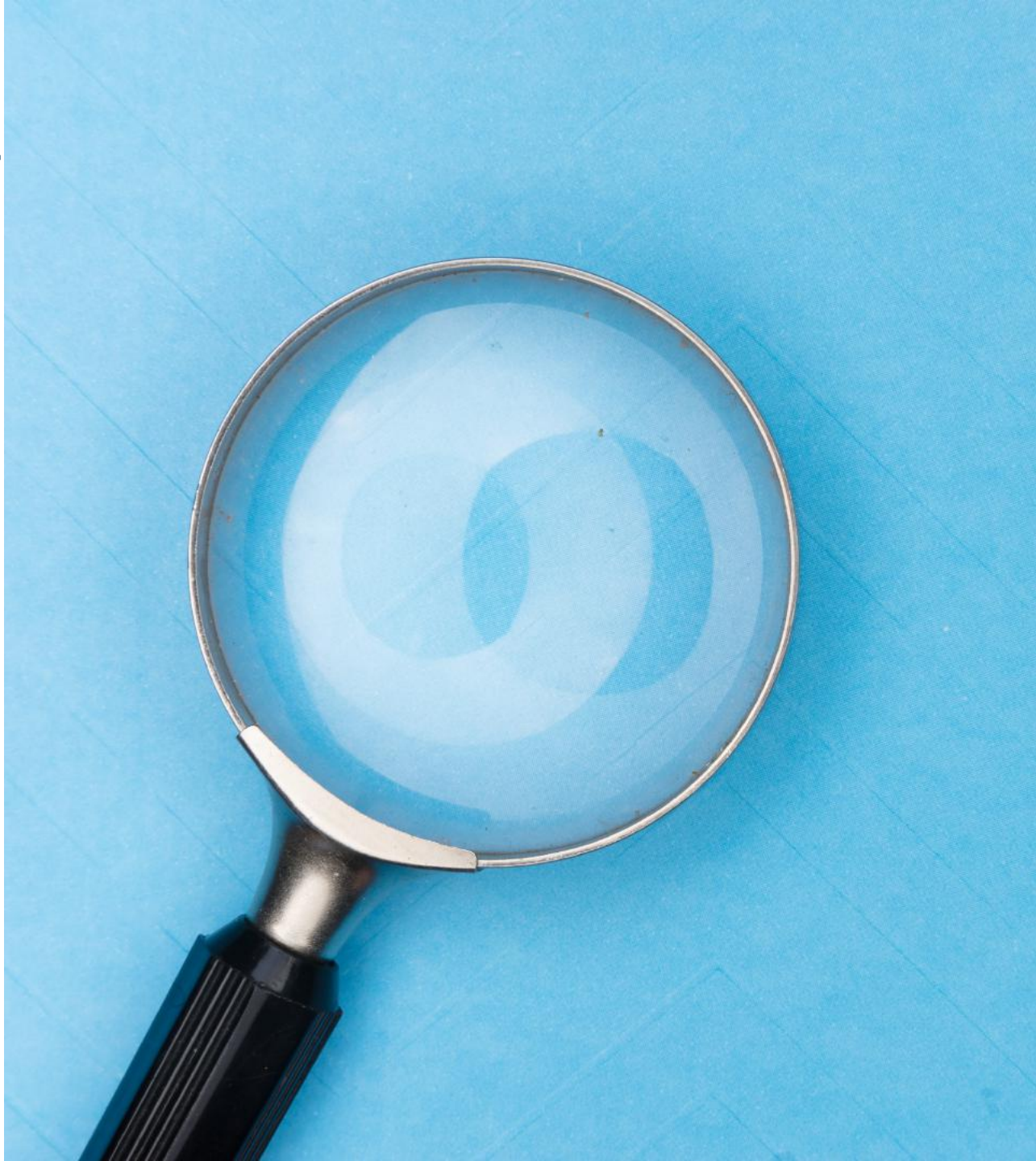
Originality/value: The identification of Two-Sided Platforms as a different way to create value (transaction platforms) or to capture value (non-transaction platform), enhancing the debate on this innovative business model. A research agenda to bring the field forward is proposed.

Landlords with no Lands: a Systematic Literature Review on Hybrid Multi-Sided Platforms and Platform Thinking

Want to know more?

Read more about:

- Platforms as Idle Asset Hunters here
- The strategies to capture value through data with orthogonal two-sided platforms here
- The origins of Platform Thinking here
- Strategies to let evolve two-sided platforms evolve in multi-sided platforms here
- The definitions of product or internal platform and industry wide platforms here



Manifesto
- Struttura Corso di Studi
- Cerca/Visualizza Manifesto
- Dati Insegnamento
- Scarica il Manifesto

Regolamento didattico
- Consulta il Regolamento
- Indicatori corsi di studio
- Elenco docenti
- Strutture didattiche
- Internazionalizzazione

Orario Personalizzato
- Il tuo orario personalizzato è disabilitato
- Abilita

Ricerche
- Cerca Docenti
- Cerca Insegnamenti
- Cerca insegnamenti degli Ordinamenti precedenti al D.M.509
- Erogati in lingua Inglese

Legenda

Semestre (Sem)	
1	Primo Semestre
2	Secondo Semestre
A	Insegnamento Annuale
Attività formative	
C	Affini o integrative
B	Caratterizzanti
Lingua d'erogazione	
	Insegnamento completamente offerto in lingua italiana
	Insegnamento completamente offerto in lingua inglese
--	Non definita

Dati Insegnamento

Contesto

Anno Accademico	2022/2023
Scuola	Scuola di Ingegneria Industriale e dell'Informazione
Corso di Studi	(Mag.)(ord. 270) - BV (479) Management Engineering - Ingegneria Gestionale
Piano di Studio preventivamente approvato	BST - BUSINESS STRATEGY AND TRANSFORMATION
Anno di Corso	2

Scheda Insegnamento

Codice Identificativo	058359
Denominazione Insegnamento	PLATFORM THINKING
Tipo Insegnamento	Monodisciplinare
Crediti Formativi Universitari (CFU)	5.0
Semestre	Secondo Semestre
Programma sintetico	The disruptive power of digital technologies is day after day clearer and stronger. Entire industries have been challenged by new companies that approached the market leveraging unconventional strategies, without traditional assets and often without a clear regulation frame. Examples like the taxi industry, the hotels and the media are just the beginning. Uber approached the market without owning any taxi, AirBnb offers accommodations all over the world - in big and small cities - without owning any room or apartment and finally, social medias offer any kind of content leveraging crowd generated contents, and these are just the most famous examples. Behind all these innovations there is a common trait: the enabling role of digital technologies. The chance to have a continuous and obliquus access to the internet and the incredible computational power of smartphones are the two basic characteristics that allows these new born companies to leverage the opportunities of non-owned assets to develop their own business model. The course is a unique journey in the strategy and innovation landscape, aiming to develop capabilities and skills to handle the challenges and opportunities of the digital technology in its disruption process.

Settori Scientifico Disciplinari (SSD)

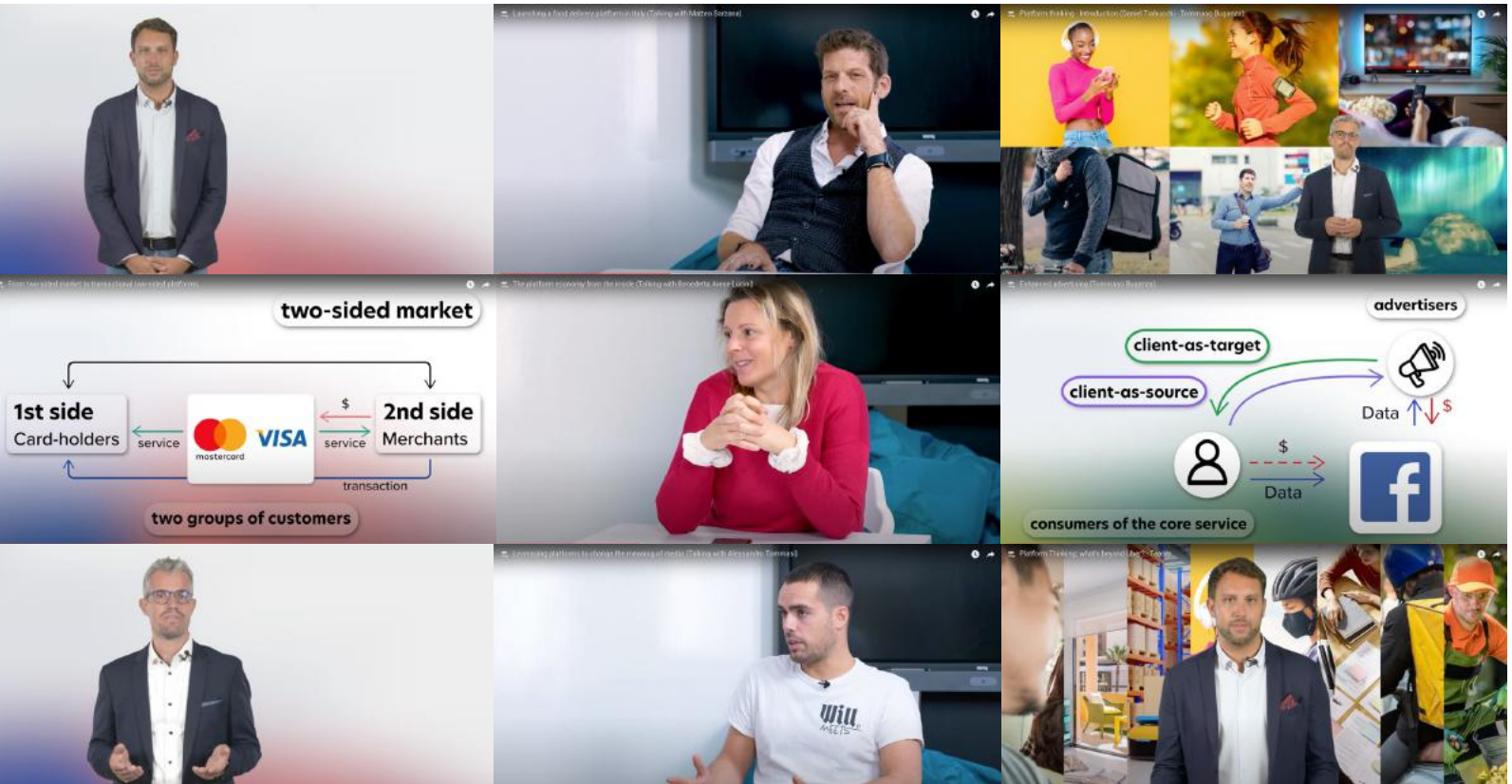
Attività formative	Codice SSD	Descrizione SSD	CFU
B,C	ING-IND/35	INGEGNERIA ECONOMICO-GESTIONALE	5.0

Dettaglio | **Orario didattico**

Scaglione		Docente	Lingua offerta	Programma dettagliato
Da (compreso)	A (escluso)			
A	ZZZZ	Trabucchi Daniel		

coursera

#PlatformThinking



What's beyond Uber?

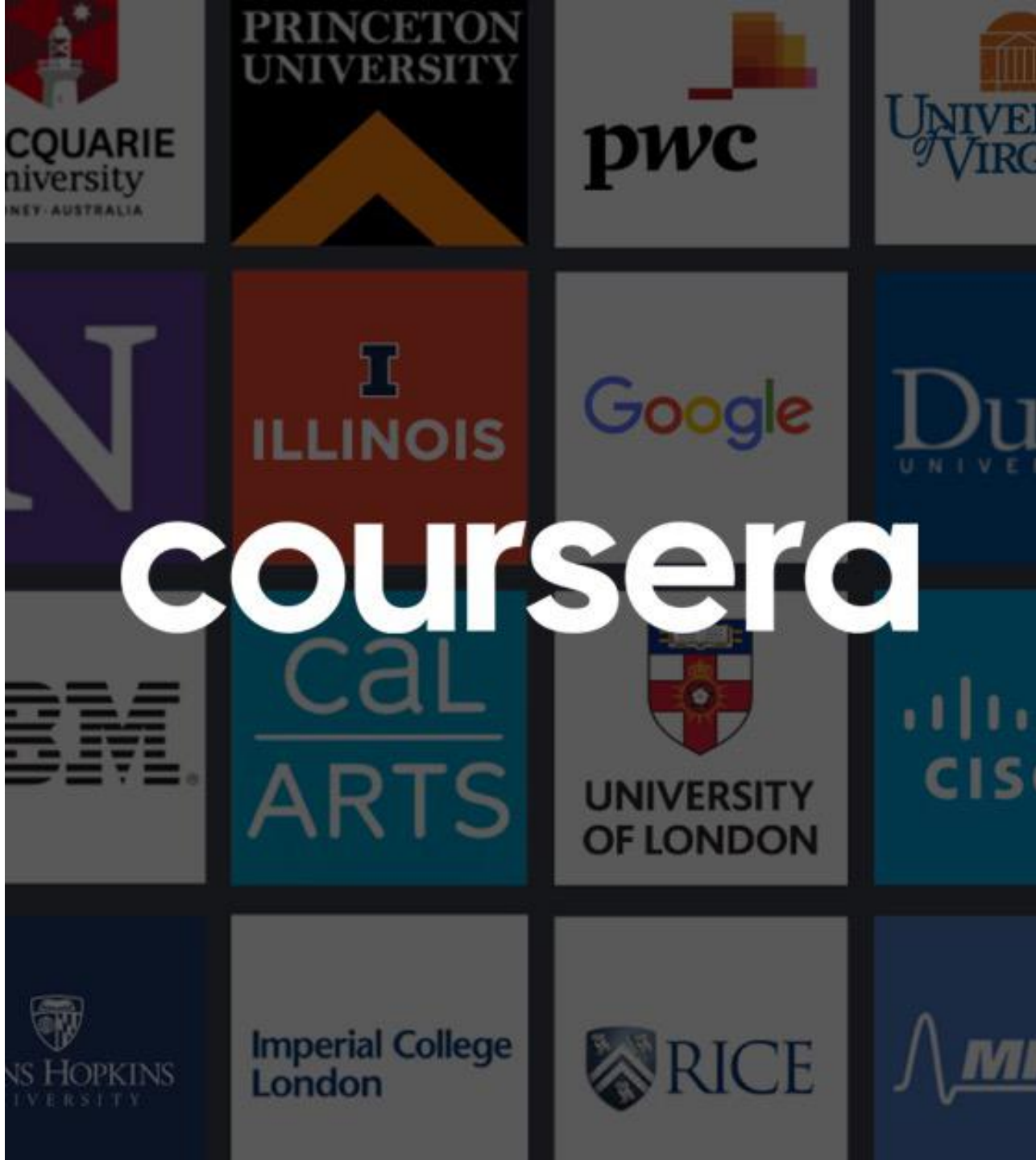
Designining a platform

Exploiting data through platforms

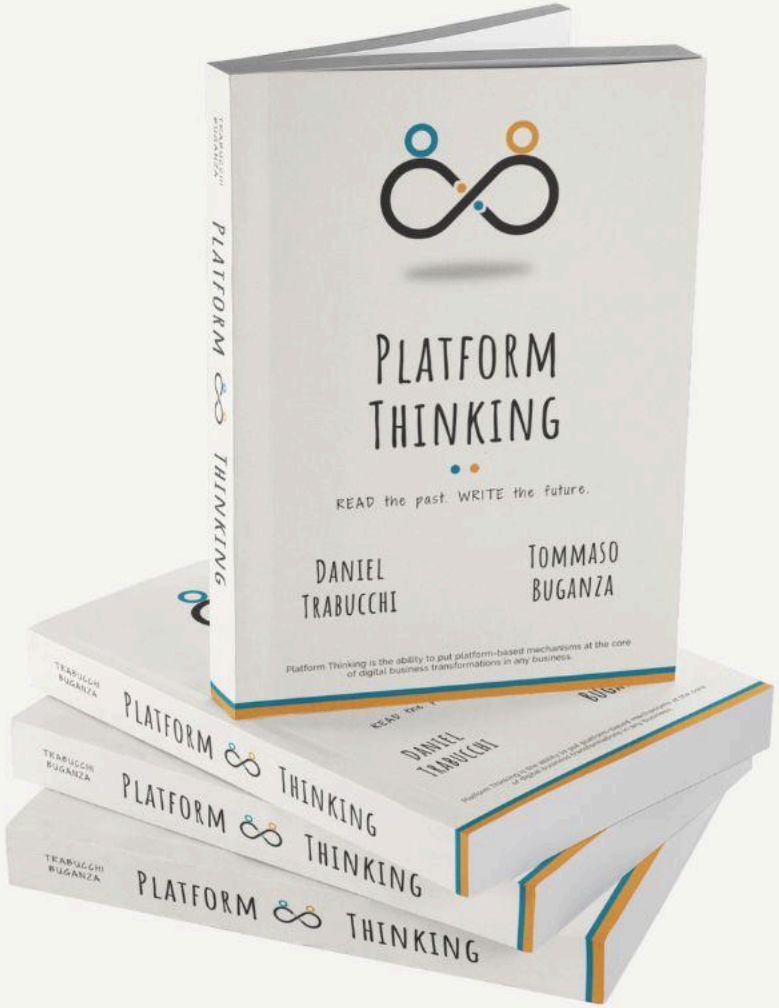
©Daniel Trabucc

The MOOCs

- Platform Thinking: what's beyond Uber?: https://www.coursera.org/learn/platform-thinking-whats-beyond-uber
- Platform Thinking: designing a Platform: https://www.coursera.org/learn/platform-thinking-designing-a-platform
- Platform Thinking: exploiting data through platforms: https://www.coursera.org/learn/platform-thinking-exploiting-data-through-platforms



READ THE PAST. WRITE THE FUTURE.



Platforms are all around you. Are you ready to start seeing them?

Release date May 10th, 2023

BEP BUSINESS EXPERT PRESS