



Technology and Innovation Management

[Prof. Dr.] Stefano Brusoni

www.timgroup.ethz.ch



Introduction to TIM

Outline



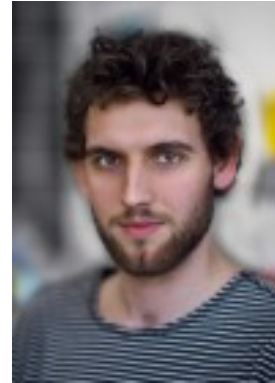
TIM group at MTEC April 2018



The team



Daniella



Axel



Stefano



Alan
(Founder, Blockchain
Business Lab @ ETHZ)



Technology and Innovation Management

Content of this Course

- Understand how stability and change interact within organizations
- Learn how firms manage the shift from phases of stability to phases of change
- Discuss and make sense of the interplay between technological and organizational change



Sources of pictures: google images

Stability and change in the 3D printing industry



Learning objectives

Concepts

- Acquire the basic jargon necessary to discuss, in a precise and concise manner, innovation processes and their outcomes

Methods

- How to study and assess the relationship between cognitive and organizational processes and their innovative outcomes

Abilities

- Analyse the appropriateness different organizational settings and behaviors in terms of their likely innovative and strategic outcomes

Teaching Modes

Lectures

- In-class theoretical inputs and guest lecture
- *E.g. Examples and anecdotes, such the Wright brothers*

Case Study/ Simulations

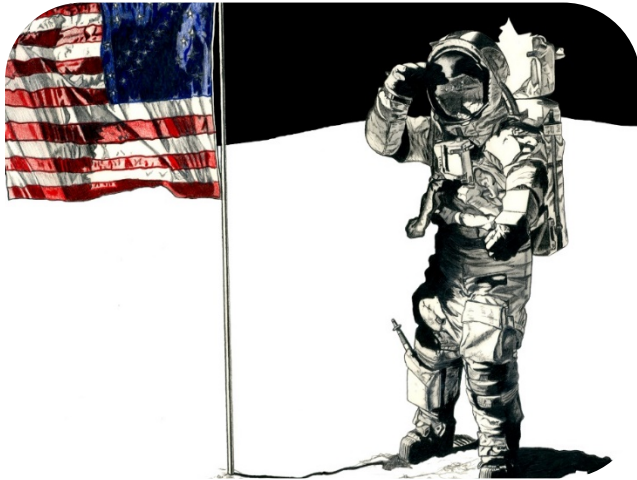
- Take-home exercises to apply the acquired knowledge and learned concepts to concrete (real/fictional) cases
- *E.g.: 3D printing, outbound open innovation*

Research Methods

- Preliminary explanation of most used research methodologies for data collection and analysis
- *E.g.: research findings and related papers*

To answer what kind of questions?

Changing industrial leadership [?]



A combination of factors related to:

- Development of managerial and organizational capabilities
- Role of anti-trust legislation
- IPRs protection and enforcement
- Size of demand (both public and private)

New ways of organizing for production and Innovation



The role of scientific and technological knowledge in fostering growth and industrial applications

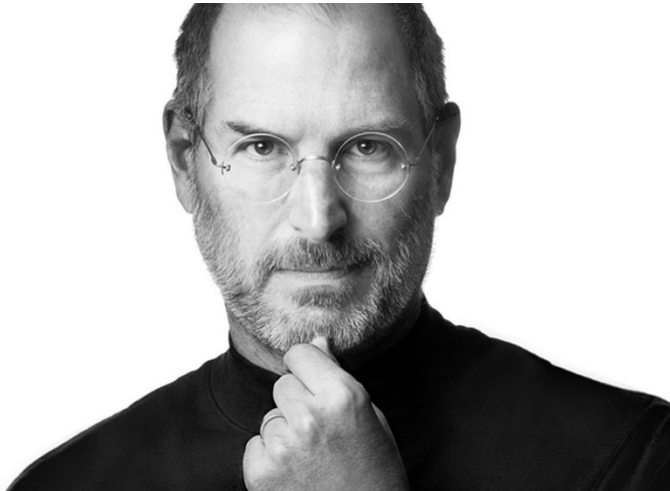


The (persistent) role of individuals in initiating change processes



The (pervasive) importance of 'context' to explain success

What are we going to talk about?



VS.

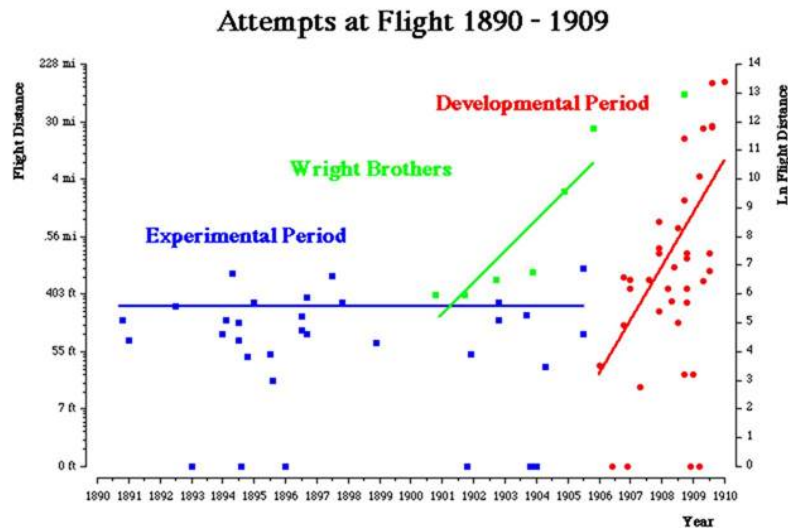


The Woz: Steve Jobs' lack of technical skills drove Apple's success

Steve Wozniak in 2016
(<https://www.cio.com.au/article/598173/woz-steve-jobs-lack-technical-skills-drove-apple-success/>)

**Innovation is a process that builds upon
technical inventions
(it builds on it, yes, but there is more to it)**

What are we going to talk about?



VS.



GE Catalyst

“A total of 855 conventionally manufactured parts has been reduced to 12 additive parts.”

Source: http://invention.psychology.msstate.edu/tale/Tale_of_Airplane/ (Sept 7 2016)

Source: <https://www.genewsroom.com/press-releases/ge-announces-name-its-advanced-turboprop-ge-catalyst%E2%84%A2-engine-284272> (Aug 2 2018)

Specialization and ‘simplification’ of work are essential features of the process of innovation

The End of All Corporate Business Models (Medium, 2017)

The End of Managers. Long Live Management. (in Blockchain Revolution, 2016)

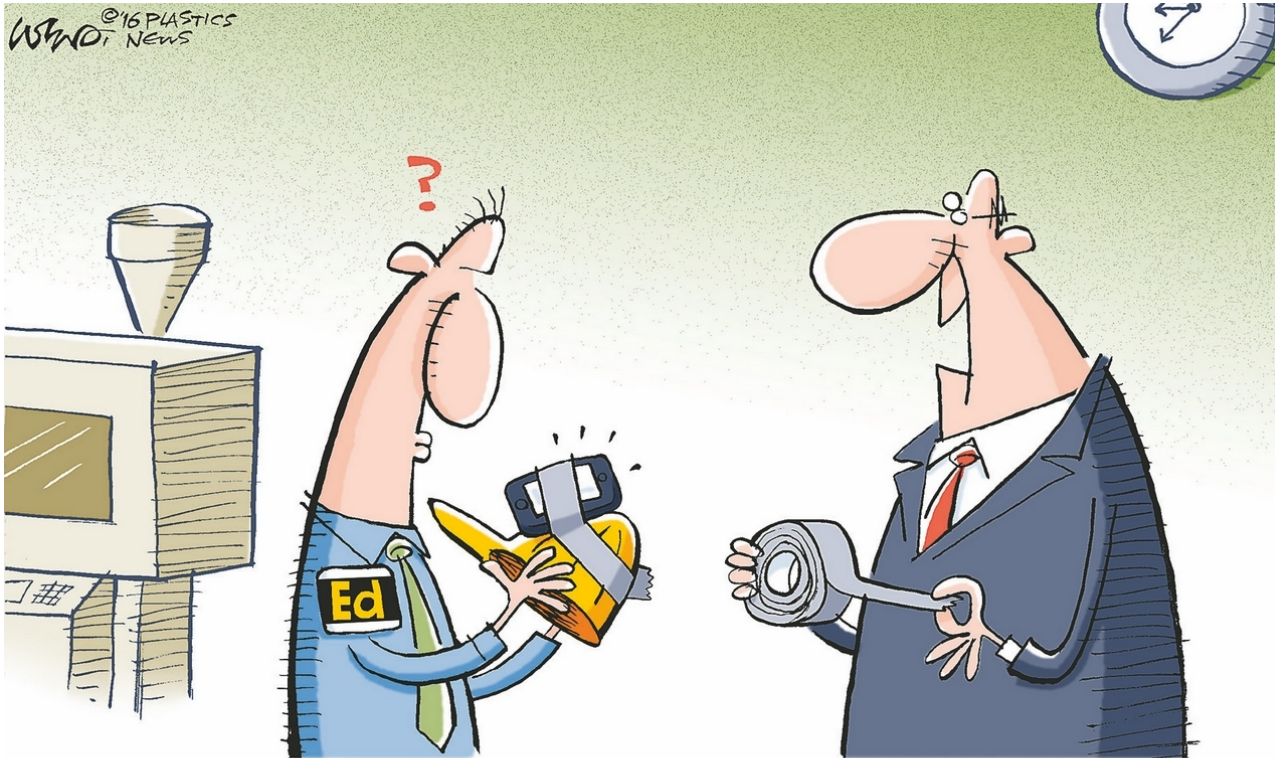


Blockchain Is Going To Destroy Your Industry And Take You With It (Innovation Enterprise Channels, 2016)

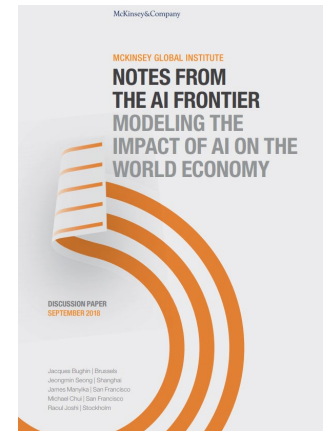
Tapscott, D., & Tapscott, A. (2016). *Blockchain revolution: how the technology behind bitcoin is changing money, business, and the world*. Penguin.

Technical and organizational change
interact, sometimes **reinforcing** and
sometimes **hindering** each other
(they follow different ‘laws’)

What are we going to talk about?



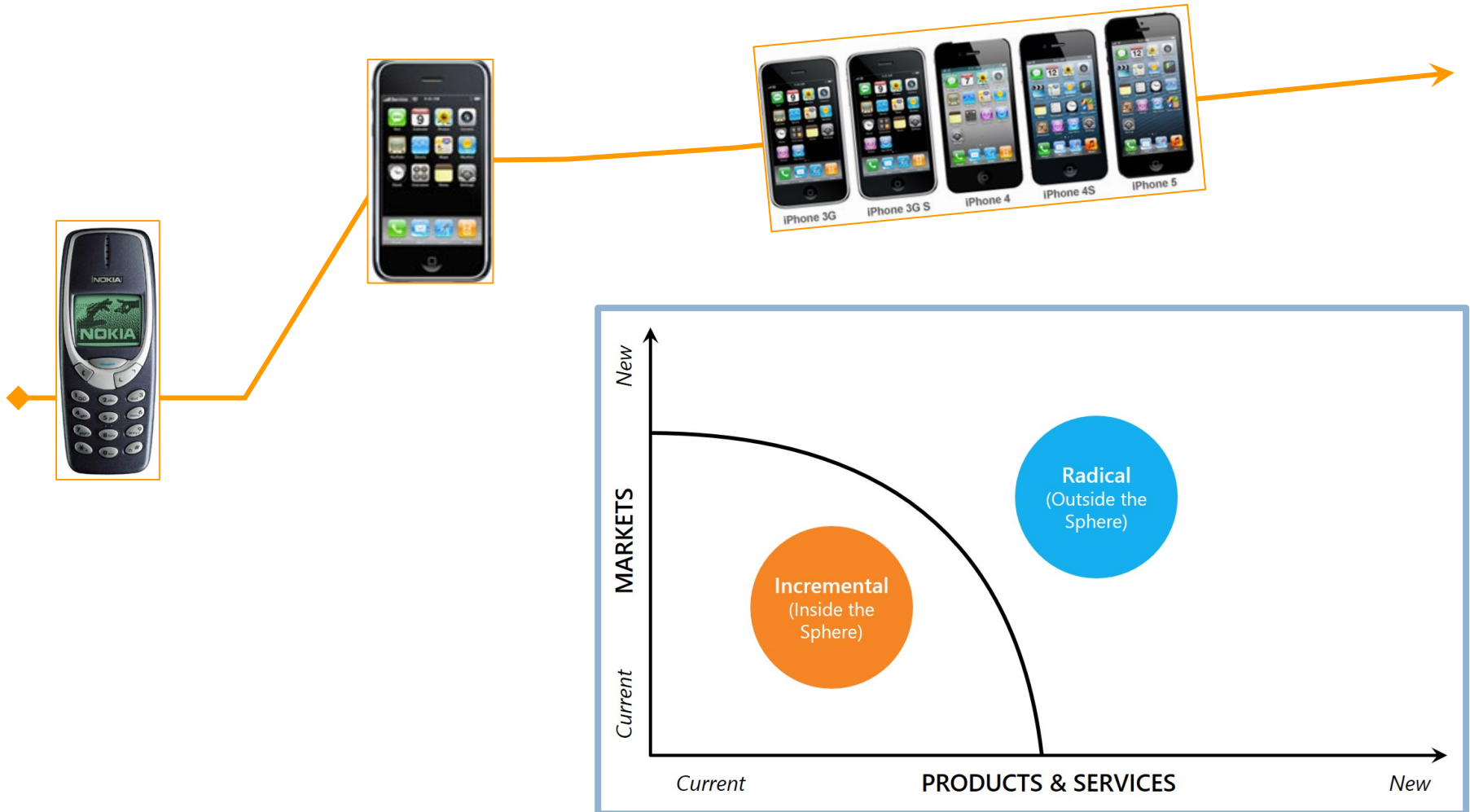
"I CALL IT 'HOW MANY HOURS ED WORKS 4.0'..."



Source: Plastics News

Organizational change may be (i.e. usually is) **slower** than **technical** change

What are we going to talk about?



Innovating organizations do not exist in vacuum,
but are embedded in complex social patterns.

Overview of the course

Innovation Studies – the ‘big’ picture (session 1-3)

- The historical role of science, technology and innovation
- Stability and change in how new technologies are integrated in existing structures
 - And how to measure it

Decision-making and discovery (session 4-7)

- Switching between exploration and exploitation
- How to organize for discovering new opportunities
 - including guest lecture

The changing structure of technology (session 8-12)

- What is ‘new’ about new technologies?
- The emergence of new industrial structures and business models
 - With teaching cases

- From micro- to macro-level explanations
- From switching (micro) to scope decisions (macro)

Overview of main topics

Innovation studies – the ‘big’ picture

- **Innovation, Science and Technology**
 - What does innovation consist of, and whose role is it?
- **Measuring Innovation and performance**
 - Can we draw a link between innovation and performance?



Decision-making and discovery

- **Exploration and Exploitation**
 - Why organizations struggle to be good at both
- **Exploration and Exploitation in individuals**
 - Tracing decision-making back to individual traits
- **Socialization and Spinouts**
 - Solving the exploration-exploitation dilemma
- **Guest Lecture: TIM in practice**
 - Dr. Alan Cabello (Founder of Blockchain Business Lab)

Overview of main topics

The changing structure of technology

- **Modularity and Integrality**
 - The importance and implications of the structure of technology
- **Platforms**
 - Where they come from, and how to manage them
- **Ecosystems**
 - Matching innovation strategies to ecosystems
- **Business models**
 - The business environment reacting to new technologies
- **New technologies and patterns**
 - What's next?



How is it organized?

Session:		Lecturer:	Content:
1	23.09.2019	Prof. Brusoni	Introduction to TIM
2	30.09.2019	Prof. Brusoni	Innovation, Science and Technology
3	07.10.2019	Prof. Brusoni	Measuring Innovation and Performance
4	14.10.2019	Prof. Brusoni	Exploration and Exploitation
5	21.10.2019	Dr. Laureiro-Martinez	Exploration and Exploitation in Individuals
6	28.10.2019	Prof. Brusoni	Socialization and Spinouts
7	04.11.2019	Dr. Alan Cabello, Founder Blockchain Business Lab @ETHZ	Guest Lecture: TIM in practice: implementing new technologies in old organizations
8	11.11.2019	Prof. Brusoni	Modularity & Integrality
9	18.11.2019	Mr. Zeijen, Prof. Brusoni	Platforms
10	25.11.2019	Mr. Zeijen, Prof. Brusoni	Ecosystems
11	02.12.2019	Mr. Zeijen, Prof. Brusoni	Business Models
12	09.12.2019	Mr. Zeijen, Prof. Brusoni	New Technologies and Patterns
13	16.12.2019	Prof. Brusoni	Summary & Mock Exam

How

- The course begins on September 23th and continues for 13 sessions
- All sessions will be held on Mondays 1.15 pm to 3.00pm
- Venue: HG D1.2

TIM: Additional cases (363-0389-02L)

- Only BSc students of MAVT (that also take the main course)
- One ECTS credit: 30 hours
- Ungraded semester performance

- Group project: ***Wisdom of the crowds***
- Deadline to hand in report: 09.12.2018
- Contact person is **Sebastian Niederberger**
(sniederberger@ethz.ch)
- Sebastian is available after class for questions and details
- All other information is sent by email

You got to do what you got to do...

Session preparation:

- Readings
- Interactive case discussions:
 - September 30th (session 2)
 - October 28th (Session 6)
 - November 25th (Session 10)
 - December 9th (Session 12)
- Slides

Please note that all communication during the semester will be carried out through official **ETHZ e-mail accounts**.

Exam and evaluation

- Date: Tuesday, **January 14th**, 2019
- Time: 09.00 – 10.30am / 90 minutes
- Location: to be announced
- Type: multiple choice + case + concept questions
- Repetition exam **February 17th**, 2019
 - The usual ETH rules for eligibility apply
- Details:
 - **Online exam**
 - **Closed book examination: no written or printed material!**
 - English questions and answers (multiple choice and short open questions)
 - No dictionaries and electronic devices allowed (cellphones, calculators etc.)

Exam from abroad: yes, it is possible for exchange students (incoming and outgoing)

- **Who should I contact?**
 - The request has to be submitted through MyStudies
 - Responsible exam office at the host university/institution
- **How do I register?**
 - Register to MyStudies (from mid-November)
 - Fill in the form you will receive automatically (make sure you have all the information regarding your host institution)
 - Once registered, the exam will be sent to the responsible supervisor at the host institution
- **Be aware of time difference and check deadlines in advance!**

Materials

All readings and slides are made available on the website.

<https://moodle-app2.let.ethz.ch/course/view.php?id=11022>

For any queries please contact Mr. Axel Zeijen (**azeijen@ethz.ch**)



Questions?

Technology and Innovation Management, I

Technology and innovation management is the field of scientific enquiry focused on the analysis of how a socio-technical system of interconnected elements changes over time, whether by emergence or through design, and how such changes can be leveraged to generate value in a sustainable way.

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