

Insights into the Innovation Process

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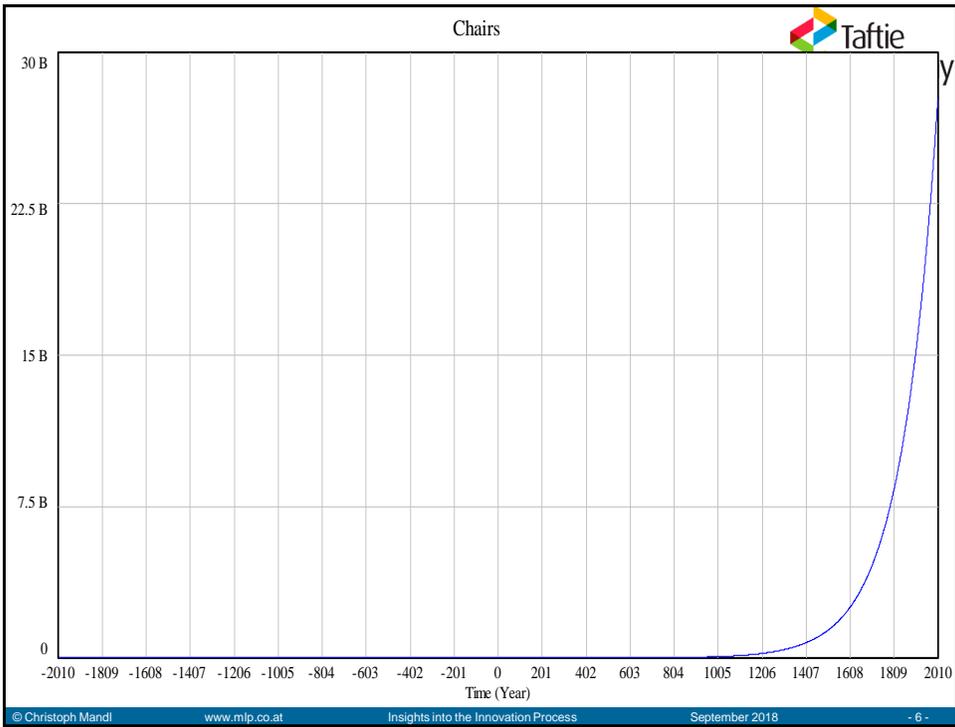
- **Your name?**
- **Your task in your innovation agency?**
- **What made you decide to attend?**

Today

- 09:00 The innovation process in theory**
- 10:30 Coffee break**
- 10:45 The innovation process in practice**
- 12:15 Lunch break**
- 13:15 The innovation process in practice**
- 15:00 Coffee break**
- 15:15 Implications for Innovation Agencies**
- 17:00 End day 1**

Tomorrow

- 09:00 Implications for Innovation Agencies**
- 10:30 Coffee break**
- 10:45 Implications for Innovation Agencies**
- 12:30 End**



Frascati Manual: Proposed standard practice for surveys on research and experimental development. OECD 1963

Basic Research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.

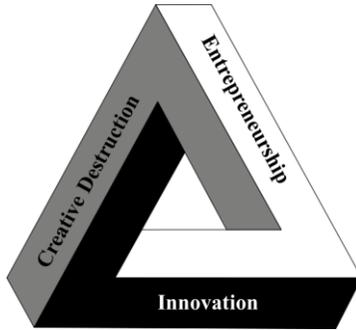
Applied Research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.

Experimental development is systematic work, drawing on knowledge gained from research and practical experience, that is directed to producing new materials, products and devices; to installing new processes, systems and services; or to improving substantially those already produced or installed.

Oslo Manual: Guidelines for collecting and interpreting technological innovation data. OECD 1992

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.

Images of Innovation



Situations emerge in the process of creative destruction in which many firms may have to perish.

Joseph Schumpeter

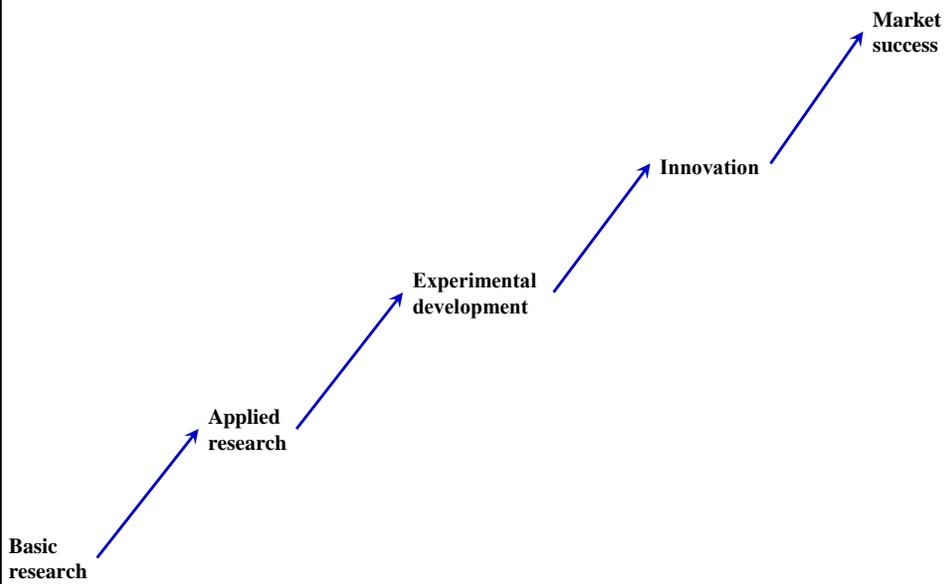
Anyone who says failure is not an option has also ruled out innovation.

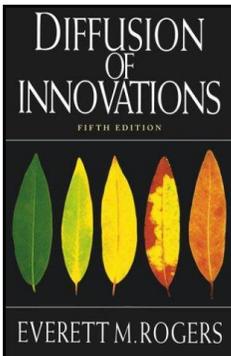
Seth Godin

Wonder what your customer really wants? Ask. Don't tell.

Lisa Stone

Linear Model of Innovation – Technology Push



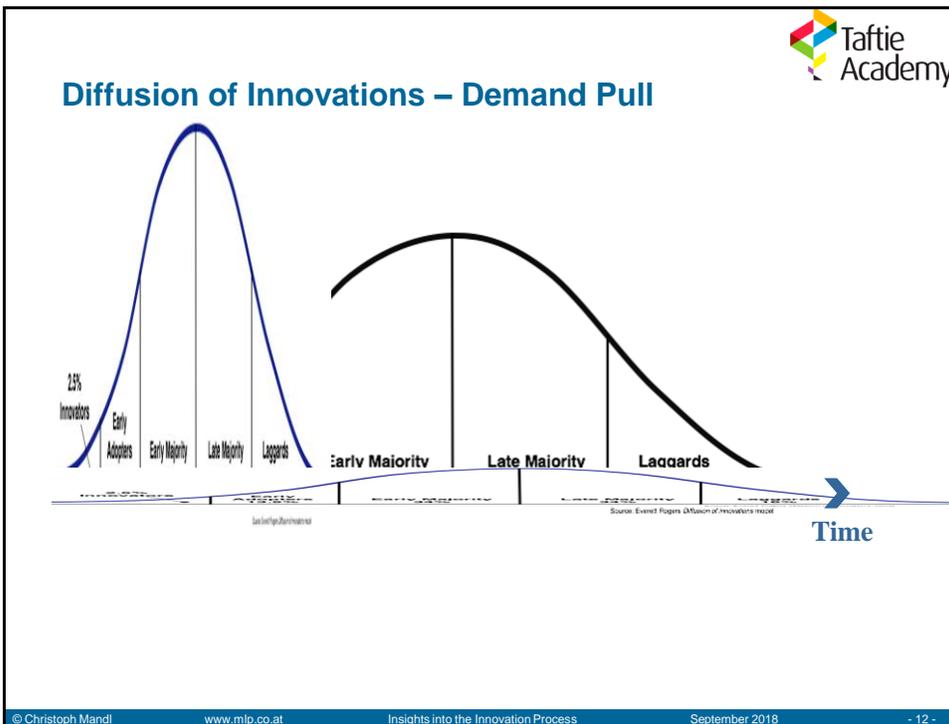
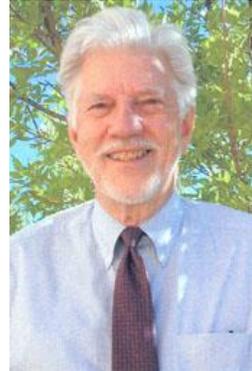


In 1962 Everett Rogers, a professor of rural sociology, published his seminal work:



Diffusion of innovations is the spread of innovations,

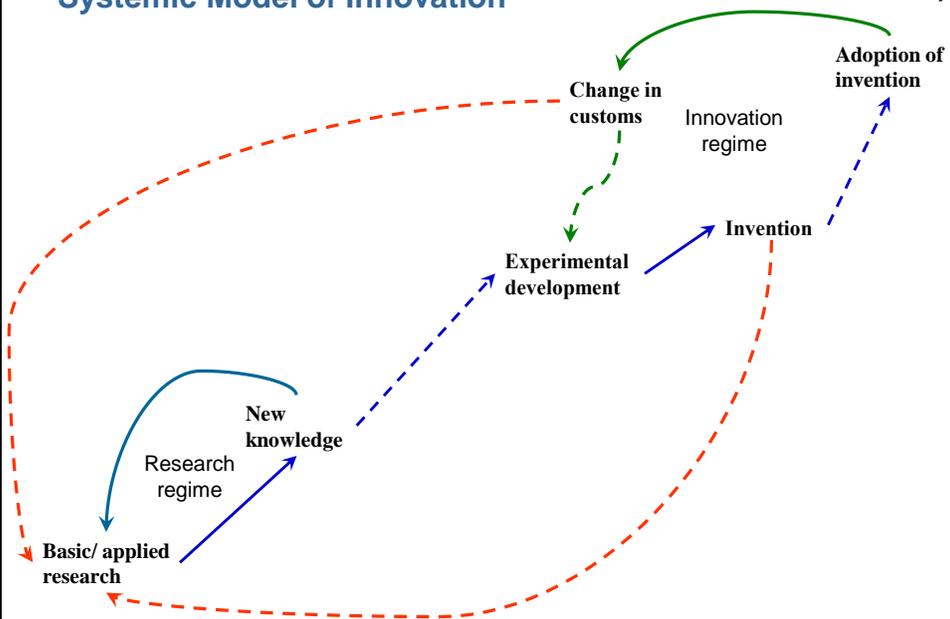
- through market or non-market channels,
- from first implementation anywhere in the world
- to other countries and regions, and
- to other markets and firms.

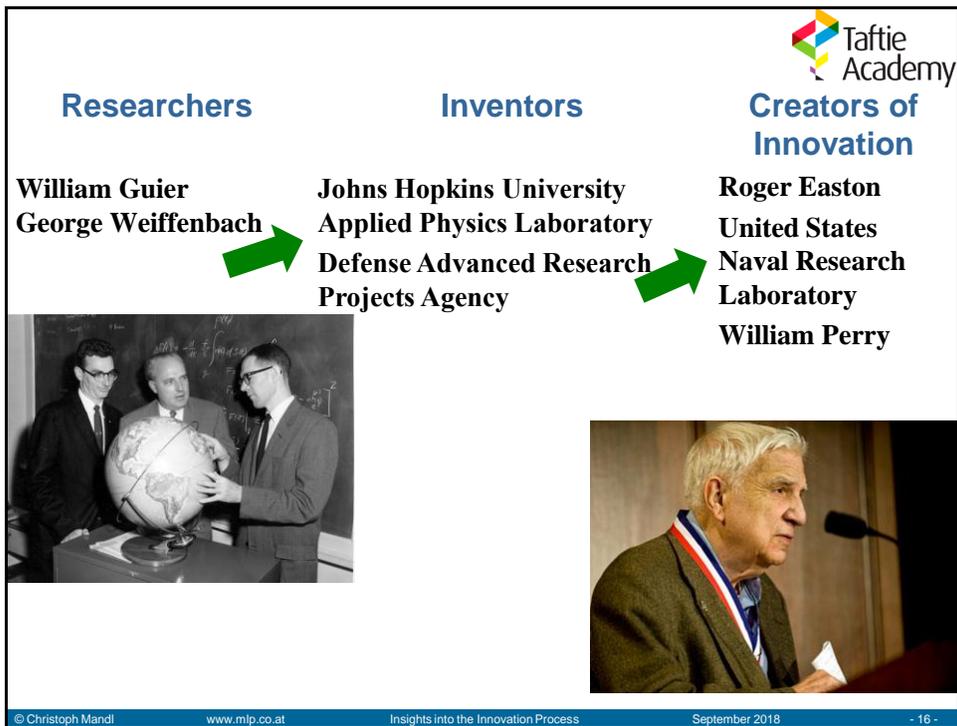
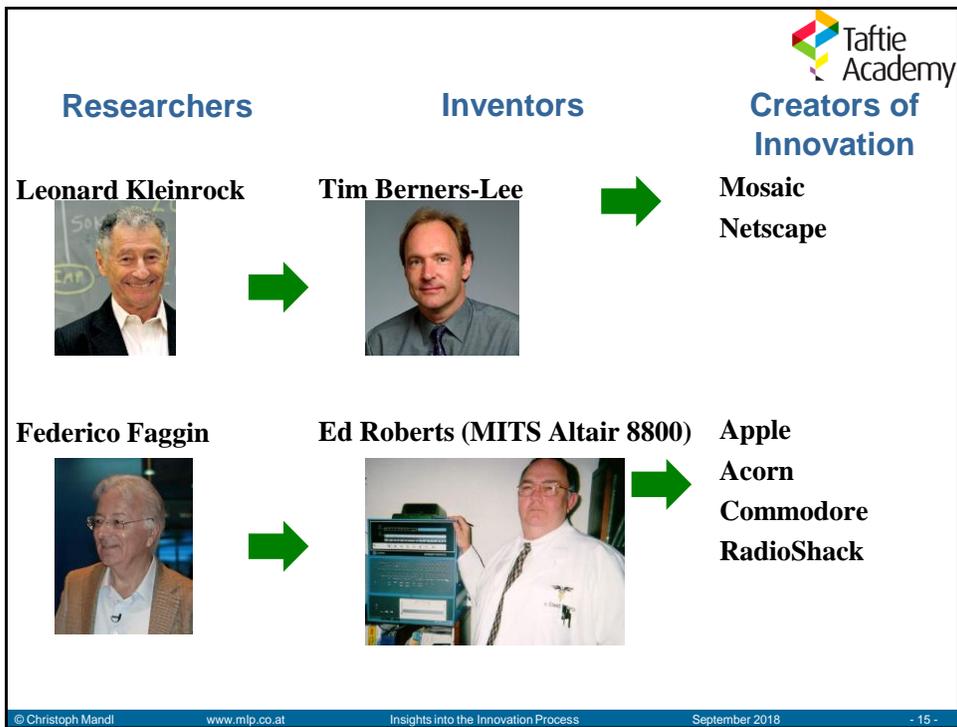


Douglas Erwin, David Krakauer
Insights into Innovation, Science Vol 304, 2004

- **Invention** is the creation and establishment of something new.
- **Innovation** is an **invention** that becomes economically successful.

Systemic Model of Innovation



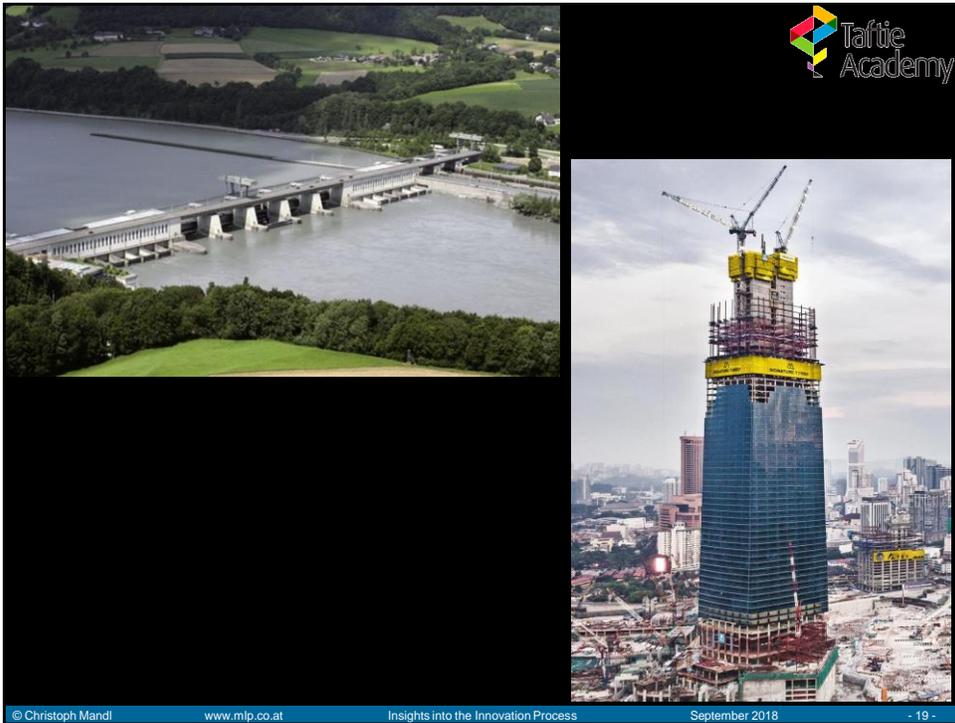


Fibre-Glass Technology



Fischer Advanced Composite Components





The image shows the cover of the book 'INNOVATION: THE MISSING DIMENSION' by Richard Lester and Michael Piore. The cover features a glowing crystal ball held by two hands, with the title 'INNOVATION' in large white letters and 'THE MISSING DIMENSION' in smaller white letters inside the crystal ball. The authors' names are listed at the top.

- **The capacity to integrate across organizational, intellectual, and cultural boundaries,**
 - **the capacity to experiment,**
 - **and the habits of thought that allow us to make sense of radically ambiguous situations and move forward in the face of uncertainty**
- are the real wellsprings of innovation.**

Innovation as defined by Horizon 2020

**Innovation is the process, including its outcome,
by which new ideas**

- **respond to societal or economic needs and demand and**
- **generate new products, services or business and organisational models**

**that are successfully introduced into an existing market or
that are able to create new markets and**

that **CONTRIBUTE VALUE to society.**

- **What does this entail for you as innovation agent?**
- **What questions come up?**

The Innovation Process in Practice

European Commission – Innovation Union

**We need to do much better at
turning our research into
new and better services and products if
we are to remain competitive in the global marketplace and
improve the quality of life in Europe.**

Companies with Greatest Market Capitalization

Third Quarter 2006

Exxon Mobil, US
General Electric, US
Microsoft, US
Gazprom, Russia
Citigroup, US
Bank of America, US
Royal Dutch Shell, EU
BP, EU
HSBC, EU
Pfizer, US

Second Quarter 2018

Apple, US
Amazon, US
Alphabet, US
Microsoft, US
Facebook, US
Tencent, China
Alibaba Group, China
Berkshire Hathaway, US
JPMorgan Chase, US
ExxonMobil, US

Francisco Varela, 2000

- **The know-what is only used to get started, but it is the know-how that counts and that is going to be transformative.**
- **For organization and learning, that, to me, seems crucial.**

Innovation Process: How

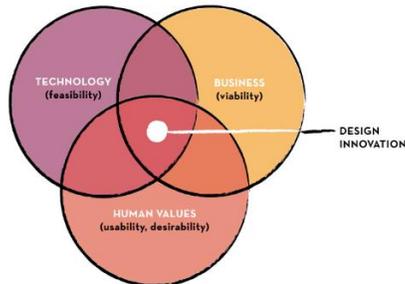
- **Project Management**
Henry Gantt, ca. 1910

Innovation Process: How to Contribute Value

• ~~Project Management~~
~~Henry Gantt, ca. 1910~~ => inadequate for value-contributing

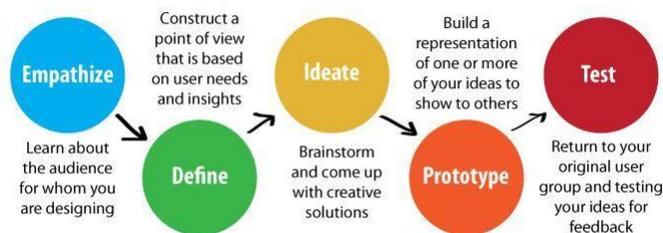
- **U Process**
MIT, ca. 2000
- **Design Thinking**
IDEO, ca. 2001
- **Effectuation**
University of Virginia, ca. 2001
- **Open Innovation**
UC Berkeley, ca. 2003
- **Lean Startup**
Stanford University, ca. 2004
- **User Innovation**
MIT, ca. 2005

Design Thinking – Stanford University Institute of Design



- **Students start in the field, where they develop empathy for people they design for, uncovering real human needs they want to address.**
- **They then iterate to develop an unexpected range of possible solutions, and create rough prototypes to take back out into the field and test with real people.**
- **Our bias is toward action, followed by reflection on personal discoveries about process.**
- **Experience is measured by iteration: students run through as many cycles as they possibly can on any project.**

Design Thinking: 5 Steps



The Deep Dive with IDEO – ABC Nightline

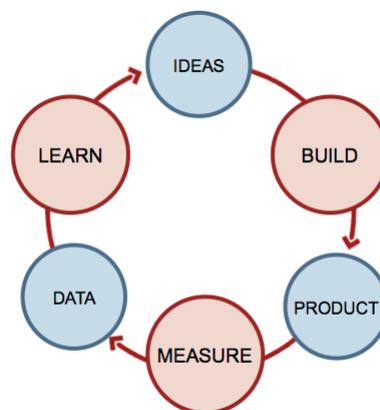
<https://www.youtube.com/watch?v=2Dtrkrz0yoU>

The Deep Dive: Quotes

- **The trick is to find these real experts. The people who are really getting the info are out in the field meeting with people.**
- **You have to have some wild ideas and then you build on those wild ideas.**
- **It is not organized, it is focused chaos.**
- **Enlightened trial and error succeeds over the planning of the lone genius.**
- **If you don't work under time constraints you could never get anything done.**
- **Being playful is of huge importance for being innovative.**
- **Try new stuff and ask forgiveness instead of asking permission. It is the way people come up with new ideas.**
- **Fail often in order to succeed sooner.**

- In what ways can you make use of this process?
- What questions come up?

Lean Startup



Minimum Viable Product – MVP

Don't build a product like this. You only discover if you have succeeded at the end.



Instead start with something basic and gather feedback as you get more complex.



Lean

Traditional

Lean	Traditional
Strategy Business Model Hypothesis-driven	Business Plan Implementation-driven
New-Product Process Customer Development Get out of the office and test hypotheses	Product Management Prepare offering for market following a linear, step-by-step plan
Engineering Agile Development Build the product iteratively and incrementally	Agile or Waterfall Development Build the product iteratively, or fully specify the product before building it
Organization Customer and Agile Development Teams Hire for learning, nimbleness, and speed	Departments by Function Hire for experience and ability to execute
Financial Reporting Metrics That Matter Customer acquisition cost, lifetime customer value, churn, viralness	Accounting Income statement, balance sheet, cash flow statement
Failure Expected Fix by iterating on ideas and pivoting away from ones that don't work	Exception Fix by firing executives
Speed Rapid Operates on good-enough data	Measured Operates on complete data

Customer Development



Business Model Canvas: Testing Hypotheses

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITIONS	CUSTOMER RELATIONSHIPS	CUSTOMER SEGMENTS
<p>Who are our key partners?</p> <p>Who are our key suppliers?</p> <p>Which key resources are we acquiring from our partners?</p> <p>Which key activities do partners perform?</p>	<p>What key activities do our value propositions require?</p> <p>Our distribution channels?</p> <p>Customer relationships?</p> <p>Revenue streams?</p>	<p>What value do we deliver to the customer?</p> <p>Which one of our customers' problems are we helping to solve?</p> <p>What bundles of products and services are we offering to each segment?</p> <p>Which customer needs are we satisfying?</p> <p>What is the minimum viable product?</p>	<p>How do we get, keep, and grow customers?</p> <p>Which customer relationships have we established?</p> <p>How are they integrated with the rest of our business model?</p> <p>How costly are they?</p>	<p>For whom are we creating value?</p> <p>Who are our most important customers?</p> <p>What are the customer archetypes?</p>
	KEY RESOURCES		CHANNELS	
	<p>What key resources do our value propositions require?</p> <p>Our distribution channels?</p> <p>Customer relationships?</p> <p>Revenue streams?</p>		<p>Through which channels do our customer segments want to be reached?</p> <p>How do other companies reach them now?</p> <p>Which ones work best?</p> <p>Which ones are most cost-efficient?</p> <p>How are we integrating them with customer routines?</p>	
COST STRUCTURE		REVENUE STREAMS		
<p>What are the most important costs inherent to our business model?</p> <p>Which key resources are most expensive?</p> <p>Which key activities are most expensive?</p>		<p>For what value are our customers really willing to pay?</p> <p>For what do they currently pay?</p> <p>What is the revenue model?</p> <p>What are the pricing tactics?</p>		

Joe Gebbia, Co-Founder and CPO of Airbnb

<https://www.youtube.com/watch?v=e6Xt0RvTR6A>

NSF I-Corps



This is a groundbreaking grant program by the national Science Foundation to support commercialization of technologies developed as a result of NSF sponsored research.



There will be twenty-five awards in Q4-2011, one-hundred awards in 2012 and one-hundred awards in 2013. An I-Corps team must be in place when submitting an application. An I-Corps team consists of:

- **Entrepreneurial Lead** (usually a post-doc or grad student)
- **Principal Investigator**
- **Mentor** (domain expert volunteer)

<https://www.youtube.com/watch?v=b5v43xfIqO0>

<https://www.launchpadcentral.com/>

- **In what ways can you make use of this process?**
- **What questions come up?**

Implications for Innovation Agencies

- **The majority of European countries are striving in the direction of developing a more systemic innovation policy.**
- **However, it is concluded that the innovation policies in European countries are still dominantly linear despite the fact that systemic policy seems to be the driving vision.**



Resolution on EU research and innovative funding, European Parliament, 2011

- **Takes the view that not all innovation is research-based and that not all research has innovation as its goal.**
- **Believes in consequence that the proposed reorganisation should cover the full spectrum of activities related to innovation, from concept to market, including non-technological, eco- and social innovation.**
- **Believes that this should include the promotion of innovative practices (such as **innovative and pre-commercial public procurement**, inducement prizes, IPR policies and lead market initiatives) and the facilitation of their widespread dissemination.**

Regulation establishing Horizon 2020, European Union, 2013

- **Horizon 2020 should support all stages in the research and innovation chain, including non-technological and social innovation and activities that are closer to the market, with innovation and research actions having a different funding rate based on the principle that the closer to the market the supported activity is, the larger the additional funding from other sources should be.**
- **Activities closer to the market include innovative financial instruments.**
- **The management of European research funding should be more trust-based and risk-tolerant towards participants.**

More emphasis on innovation*


 new

- **Substantial support to activities** such as prototyping and testing, demonstrating and piloting, first market replication - establishing technical and economic viability in (near) operational environments
- **Significant support to demand side approaches** innovation procurement (pre-commercial procurement and public procurement of innovative solutions), standard-setting, inducement prices...
- **Piloting new forms and sources of innovation** extending beyond technological and research-based innovation
- **Leveraging and boosting engagement of industry** Public Private Partnerships, SME measures, Debt and Equity Instruments...
- **When you evaluate a proposal, you need to take into account innovation activities in the targeted innovation actions as well as in research and innovation actions**

* The definitions of the terms used are available in the [Horizon 2020 Glossary](#) on the Participant Portal
HORIZON 2020

Award criteria

Research and Innovation/Innovation

Excellence

Clarity and pertinence of the objectives

Soundness of the concept, including trans-disciplinary considerations, where relevant

Extent that proposed work is ambitious, has innovation potential, and is beyond the state of the art (e.g. ground-breaking objectives, novel concepts and approaches)

Credibility of the proposed approach

Impact

The expected impacts listed in the work programme under the relevant topic

Enhancing innovation capacity and integration of new knowledge

Strengthening the competitiveness and growth of companies by developing innovations meeting the needs of European and global markets; and, where relevant, by delivering such innovations to the markets

Any other environmental and socially important impacts

Effectiveness of the proposed measures to exploit and disseminate the project results (including management of IPR), to communicate the project, and to manage research data where relevant

Implementation

Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources

Complementarity of the participants within the consortium

Appropriateness of the management structures and procedures, including risk and innovation management

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Takes Application Form Questions

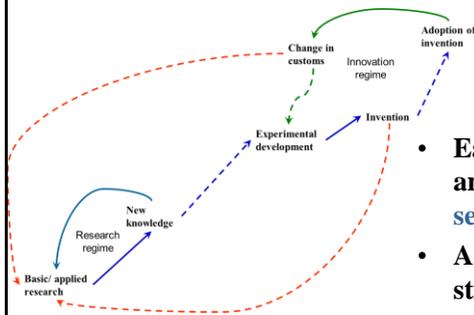
- What customer need does the company's product/service fulfill and who are its end users and paying customers?
- What concrete benefits will the company's product/service generate for customers and end users?
- Why should customers pay for the solution (e.g. money/time savings, aesthetic/ecological values, status)?
- What kind of competitive advantage does the solution give your company from the customer's perspective?

- **What ideas / concepts are useful and in what ways?**
- **What questions come up?**

Strategic questions for innovation project evaluations

- **To what extent is the Business Model Canvas incorporated into the proposal form and why?**
 - **How should this be changed?**
- **In what ways are proposals for innovation projects selected and why?**
 - **How should this be changed?**
- **What expertise have the persons who select proposals for innovation projects and why?**
 - **How should this be changed?**
- **Based on what indicators are funded projects monitored and why?**
 - **How should this be changed?**

General Implications from Complexity Science



- Each output is simultaneously an input and thus cause and effect cannot be separated.
- A response once observed for a given stimulus may not be the same for the same stimulus given later.

Principles of Self-Organization
Heinz von Foerster 1984

- A complex system not only depends on its past but accurate longer range forecasts are impossible.

Deterministic Nonperiodic Flow
Edward Lorenz 1963

Strategic questions for innovation programme assessments

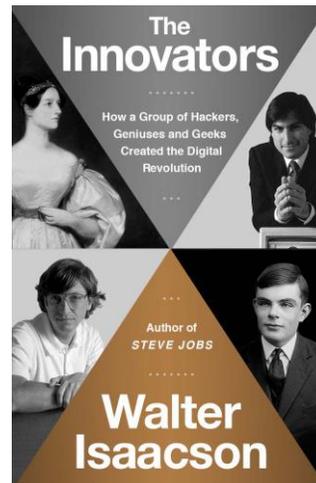
- Against what indicators are innovation programmes assessed and why?
– How should this be changed?
- In what ways foster programmes knowledge transfer from research organizations to innovation seeking organizations and why?
– How should this be changed?
- In what ways is pivoting and split testing encouraged?
– How should this be changed?
- To what extent are innovators and early adopters of inventions funded and why?
– How should this be changed?

Innovation is usually a group effort, involving collaboration between visionaries and engineers, and creativity comes from drawing on many sources.

A great team is pairing visionaries, who can generate ideas, with operating managers, who can execute them. Visions without execution are hallucinations.

Authority should be questioned, hierarchies should be circumvented, nonconformity should be admired, and creativity should be nurtured.

A lesson of digital-age innovation is that, now as in the past, physical proximity is beneficial. There is something special about meetings in the flesh.



Strategic questions for designing innovation programmes

- **In what ways should a proposal's innovation process be regulated and why?**
- **In what ways should a proposal's demand pull be a requirement and why?**
- **What type of enterprises should be eligible for receiving funding for innovation projects and why?**
- **How should the amount of funding of a proposal be linked with the proposal's probable contribution to the programme's intended impact and why?**

Typical for an innovative culture

- See what needs to be done and do it
- He/she who proposes does
- Don't wait to be told what to do
- Make it happen
- Push back if you think the “wrong” thing is happening
- Invest in and build trusting relationships
- Truth will be discovered through conflict and debate
- Keep on your commitments
- Get buy-in before moving forward

