

# INFO5992 Understanding IT Innovations

## Week 10: Structures Supporting Innovation

A/Prof Jinman Kim

Semester 1, 2017



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# UoS Outline

Week	Lecture Topics	Activity	Assessments
1. 31 Jul	UoS Introduction; Definition of Innovation; Innovation System; Innovation in Australia	Tute 1 – Welcome to your tutorial; Importance of innovation to a Country	
2. 7 Aug	Introduction to Technological / IT innovation; Examples of IT innovation in industry sectors; Type and Source of Innovation	Tute 2 – Massive Open Online Courses – Enabling technologies and Peer-review	
3. 14 Aug	Dynamics of Technological / IT Innovation; Adoption of Technology; Dominant Design	Tute 3 – Dominant design in the Smartphone market	Group Presentation Introduction (A1)
4. 21 Aug	Disruptive Innovation; Industry Value Chain; Value Network analysis; Guest Speaker on MS Technologies	Tute 4 – Cognitive IT services and its value chain	
5. 28 Aug	Distributed innovation I: Open / Closed innovation; Platform innovation; Web APIs; Crowd sourcing / funding; Open Data	Tute 5 – Web API considerations	Individual Report Introduction (A2)
6. 4 Sep	Distributed innovation II: Free and Open source software;	Tute 6 – Innovative Tech Practice – Open source Geolocation and Maps	Mid-semester Quiz (A3)
7. 11 Sep	Distributed innovation III: User innovation; Maker Movement; Platform ecosystem; Sharing Economy	Tute 7 – Sharing Economy	
8. 18 Sep	Innovation by Start-up companies and Opportunities; Guest speaker as a Case Study	Tute 8 – Group Presentation preparations and feedback	
<b>Semester Break</b>			
9. 2 Oct	Labour Day – No Lecturer		
10. 9 Oct	Organisational Culture; Structure supporting innovation	Group Presentation	Group Presentation submissions (A1)
11. 16 Oct	Innovation ecosystem; Sydney's innovation ecosystem (Bill Simpson)	Peer-Review Marking	
12. 23 Oct	Judging IT Innovations	Tute 9 – Business Model Canvas	
13. 30 Oct	UoS Review; UoS comments / questions	Tute 10 – Judging IT Innovations *	Report Submission (A2) - Monday Peer-review (A1) – Friday

## Agenda / Announcement

- Organisational Structure Supporting Innovation
- Presentation Session I
- Quiz Feedback
- Tutorial 9

# Creating an organisational **Culture** which supports invention and innovation

## Creating a culture for generation of new ideas

- Steven Johnson (popular science author)
- “Where good ideas come from” (TED Talk), 2010
- Liquid Networks
- Slow Hunch
- Connecting vs Protecting



[http://www.ted.com/talks/steven\\_johnson\\_where\\_good\\_ideas\\_come\\_from.html](http://www.ted.com/talks/steven_johnson_where_good_ideas_come_from.html) Starting from 7:00

Innovations: 1800 - now

Market (devised  
for fiscal gain)

Individual

Networked

Non-market (not  
devised for  
fiscal gain)

Steven Johnson, *Where good ideas  
come from: The natural history of  
innovation*. ePenguin, 2010.



## Innovations: 1800 - now

Market (devised  
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Steven Johnson, *Where good ideas  
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<p>Mason Jar Tesla Coil Gatling Gun Nylon Vulcanized Rubber Programmable Computer Revolver Dynamite AC Motor Air-Conditioning Transistor</p>	<p>Airplane Steel Induction Motor Contact Lenses Moving Assembly Line Locomotive Electric Motor Refrigerator Telegraph Sewing Machine Elevator Steel Typewriter Plastic Calculator Internal Combustion Engine Telephone</p> <p>Lightbulb Automobile Radio Welding Machine Motion Picture Camera Vacuum Cleaner Washing Machine Vacuum Tube Helicopter Television Photography Jet Engine Tape Recorder Laser VCR Personal Computer Bicycle</p>
Individual	Networked
MARKET/INDIVIDUAL	MARKET/NETWORKED
<p><b>NON-MARKET/INDIVIDUAL</b></p> <p>Spectroscope Bunsen Burner Rechargeable Battery Nitroglycerine Liquid Engine Rocket Uncertainty Principle Electrons in Chemical Bonds Absolute Zero Atomic Theory Stethoscope Uniformitarianism Cell Nucleus Benzene Structure Heredity Natural Selection X-Rays Blood Groups</p> <p>Hormones <math>E = mc^2</math> Special Relativity Earth's Core Radiometric Dating Cosmic Radiation General Relativity Universe Expanding Ecosystem Double Helix CT Scan Archaea World Wide Web Continental Drift Superconductors Neutron Early Life Simulated</p>	<p><b>NON-MARKET/NETWORKED</b></p> <p>Braille Periodic Table RNA Splicing Chloroform EKG Cosmic Microwave Background Radiation Aspirin Cell Division Global Warming MRI Enzymes Cell Differentiation DNA Forensics Stratosphere Radioactivity Plate Tectonics Cosmic Rays Electron Atomic Reactor Modern Computer Mitochondria Nuclear Forces Artificial Pacemaker Vitamins Oral Contraceptive Radiocarbon Dating Neurotransmitters Graphic Interface Genes on Chromosomes Endorphins Chemical Bonds Restriction Enzymes Infant Incubator Radiography Gamma-Ray Bursts Oncogenes Penicillin Universe Accelerating Atoms Form Molecules Quantum Mechanics Punch Cards (Jacquard Loom) Radar GPS Suspension Bridge Liquid-Fueled Rocket Second Law DNA (as Genetic Material) Internet Anesthesia Krebs Cycle RNA (as Genetic Material) Germ Theory Computer Asteroid K-T Extinction</p>



# Organisational culture: “Scientific Management” (Taylorism)



Frederick Winslow Taylor  
Mechanical engineer  
Efficiency expert  
Management consultant  
1856-1915

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

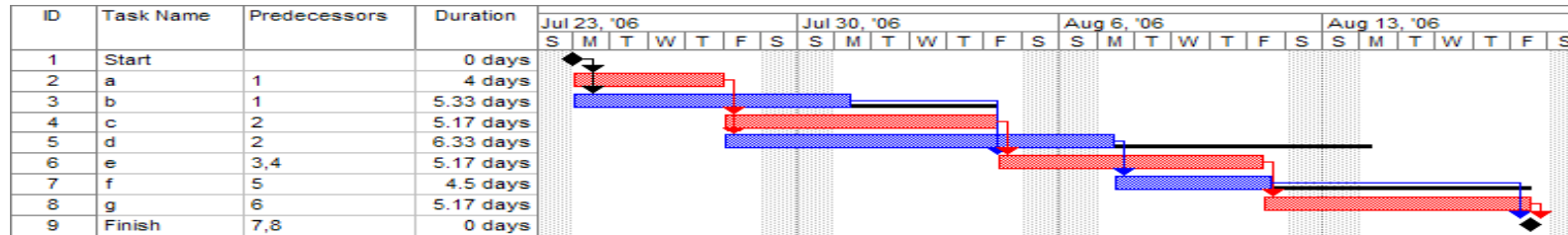
- Standardise work into separate tasks
- Scientifically study each task
- Continually measure performance of task
- Compensate workers based on performance

“In the past, the man was first.

In the future, the system will be first.” (1911)

# Influence of Taylorism in organisations

- Scientific management used not just in factories, but in most organisations
- Gantt charts (by Henry Gantt who worked with Taylor)



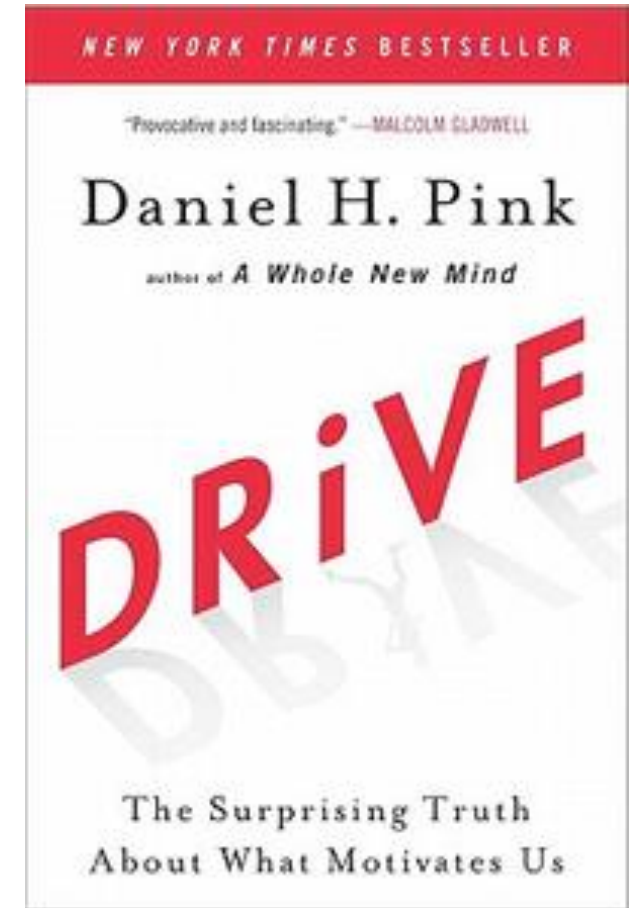
- Scientific management in education and government
- Industrial psychology
- Using budgets for accountability and performance measurement
- Key performance indicators

But designed for repetitive work with known function  
(e.g. production of known item in factory)

Not suitable for creative work with many unknowns  
(e.g. technological innovation)

# Organisational culture: Motivation

- According to Pink:
- True motivation does not come from traditional incentives (like reward and punishment)
- Motivation comes from:
  - Autonomy: Our desire to be self directed.
  - Mastery: Continually improving our skills toward a goal.
  - Purpose: Our desire to do something that has meaning and is important.

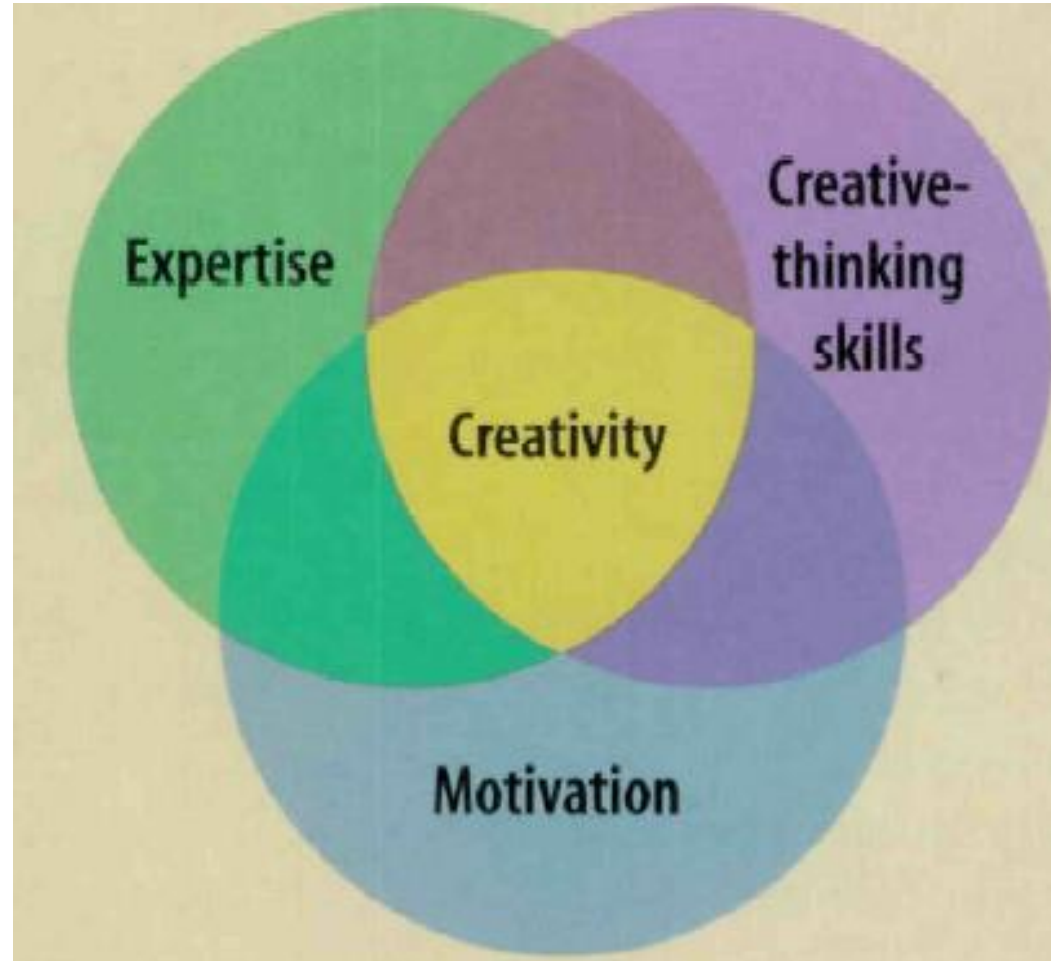


# Structure supporting Innovation

# Creating a culture for creativity – Fostering creativity in the workplace



Teresa Amabile,  
Harvard Business School



Source: Amabile, *How to Kill Creativity* (1998)



# Recap: Fostering creativity, productivity and innovation



Teresa Amabile,  
Harvard Business  
School

fostering creativity in  
the workplace

<https://youtu.be/K7tH07O4Fol?t=20>

- One of her studies:
  - Found the factor that most led to engagement of workers was:
    - “Making progress in meaningful work”
    - More important than bonuses, raises, etc
    - More likely to lead to ideas/breakthroughs

Amabile, T., & Kramer, S. (2011). The progress principle. *Harvard Business Review Press, Boston, MA.*

<http://www.nytimes.com/2011/09/04/opinion/sunday/do-happier-people-work-harder.html>

# The dynamics of “Inner Work Life”

- Emotions:
  - Sharply-defined reactions and more general feelings
  - Joy, disappointment, pride, etc
  - Vary by pleasantness and intensity
- Perceptions:
  - From immediate impressions to theories of what is happening
  - E.g. of causes of actions in the work environment
- Motivations:
  - Extrinsic motivations (external reward, e.g., bonus)
  - Intrinsic motivations (internal reward, e.g., naturally satisfying) more important than extrinsic for creativity)
  - Relationship or altruistic (selfless concern for the well-being of others) motivations

# Innovation openness

- The open innovation paradigm expects companies to engage in external relationships for innovation; however companies often neglect the actual internal openness of employees, which is an absolute must before partnering with external partners.
- 6 features to describing and measuring innovation culture and openness.

# Innovation openness

1. **Risk feature** – It's a commonly understood fact that innovation is inherently risky. Therefore, corporate openness needs to provide opportunities for employees to perform risky projects which aim at innovation.
2. **Belief feature** – Successful innovation projects require strong beliefs of the people involved in the project and recognition in the organization. Management needs to encourage individuals to find ways to solve non-standard problems.
3. **Exchange and share feature** – the exchange and sharing of knowledge between individuals, units and the outside world is essential for sustainable innovation performance.
4. **Governance feature** – Innovation strategies are often developed and approved by dedicated company innovation councils. Under the open innovation paradigm, these councils will involve third parties, such as external companies and expertise
5. **Partner feature** – Innovation activities are frequently carried out as part of multi-faceted cooperation with external partners.
6. **Training feature** – Openness is not limited to the actual innovation activities of companies but also includes professional development of human resources, i.e., further education in different forms and internal competitions for research and innovation excellence.

**How can a company have a **Structure** supporting invention and innovation?**

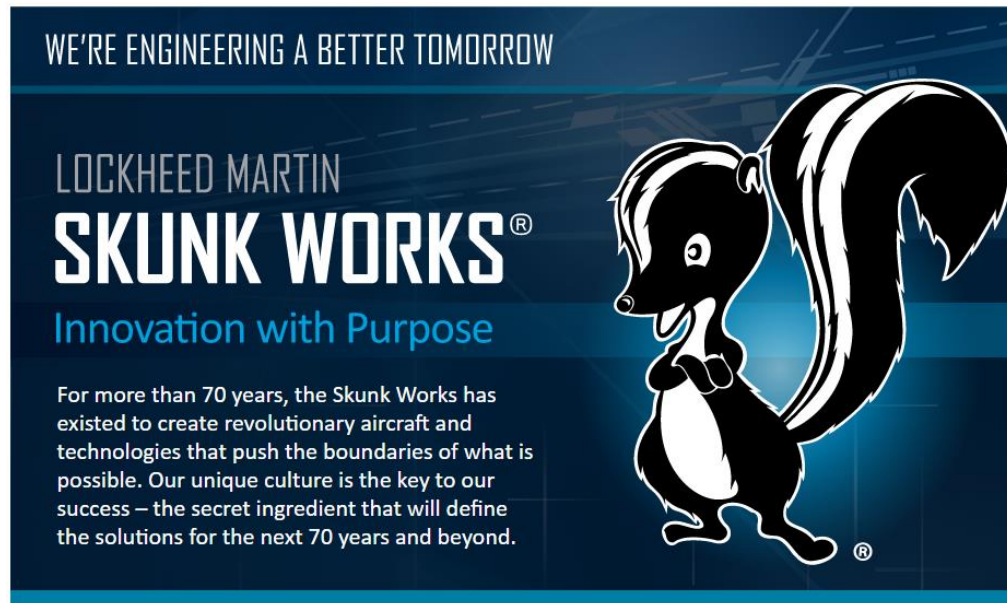
## Recap: Size and structural dimensions of companies

- Large companies might be disadvantaged for innovation because...
  - R&D efficiency may decrease due to loss of managerial control
  - Large companies can have more bureaucratic inertia
  - More commitments tie companies to current technologies e.g., Learning effects (see Week 3)
- Small firms are often more flexible and entrepreneurial
  - Can change direction quickly based on changing circumstances or new observations



# Size and structural dimensions of companies

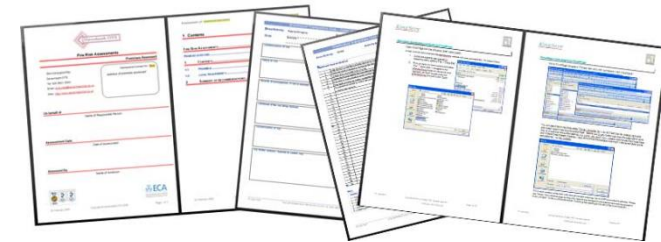
- Many big companies have found ways of “feeling small”
  - Break overall company into several subunits
  - Can utilize different culture and controls in different units
  - E.g. “skunk works” teams for doing new product development



<http://www.lockheedmartin.com.au/us/aeronautics/skunkworks.html>

# Structural dimensions which influence innovation

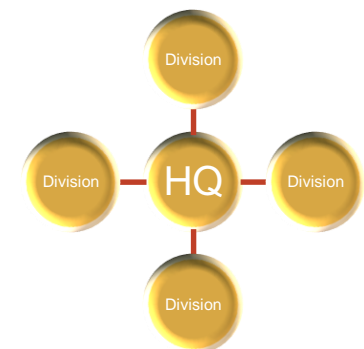
- 1) Formalisation: The degree to which the company uses rules and procedures to structure the behavior of employees.
- 2) Standardisation: The degree to which company activities are performed in a uniform manner.
- 3) Centralisation:
  - Centralised authority: The degree to which decision-making authority is kept at top levels of the company
  - Centralised activities: The degree to which activities are performed at a central location



[http://www.kingserv.org/design\\_examples.htm](http://www.kingserv.org/design_examples.htm)



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*Source: Schilling (2013)*

# Mechanistic vs Organic Structures

- **Mechanistic Structures** have high formalisation and standardisation.
  - Good for operational efficiency, reliability.
  - Minimizes variation → may stifle creativity
- **Organic structures** have low formalisation and standardisation; described as “free flowing”
  - May encourage creativity and experimentation
  - May yield low consistency and reliability.

# Combining the best of small and large companies

- Some divisions (e.g., R&D, new product lines) may be small and organic.
- Other divisions (e.g., manufacturing, mature product lines) may be larger and more mechanistic.
- Some organisations try to do both in different divisions:
  - Tushman and O'Reilly (1996) called this the “ambidextrous organisation”
- Can also alternate through different structures over time.
- Sometimes new product development can be quite independent of even the main R&D division (eg “skunk works”)

# Case Study – Apple - One organisation, different cultures

- 1980: Apple was producing the Apple II personal computer at reasonably high volumes for technical users
- Steve Jobs (CEO) wanted a new type of computer to be:
  - Very intuitive to use
  - Self-contained
  - Usable by everyone, not just technical people
- The corporate structure wasn't appropriate for the new product:
  - Apple's corporate environment had been structured for sound and efficient manufacturing
  - Wanted new group to have different culture and more flexibility
- Jobs started new product development group specifically to develop Macintosh with **renegade culture** (being consciously and intentionally different from the mainstream and its practices (and products, in this case))

<https://www.quora.com/Apple-co-founder-Steve-Wozniak-once-said-in-an-interview-that-Steve-jobs-was-exaggerated-in-the-movie-Jobs-What-did-Steve-Jobs-actually-mean-to-Apple-and-what-products-could-his-name-take-credit-for>

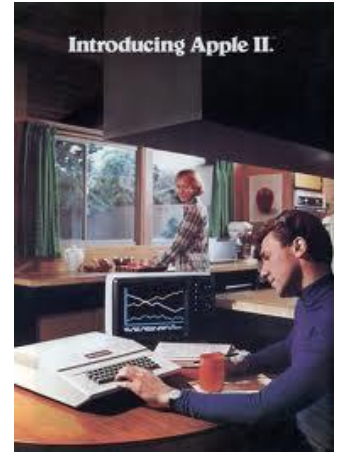


Photo: Apple



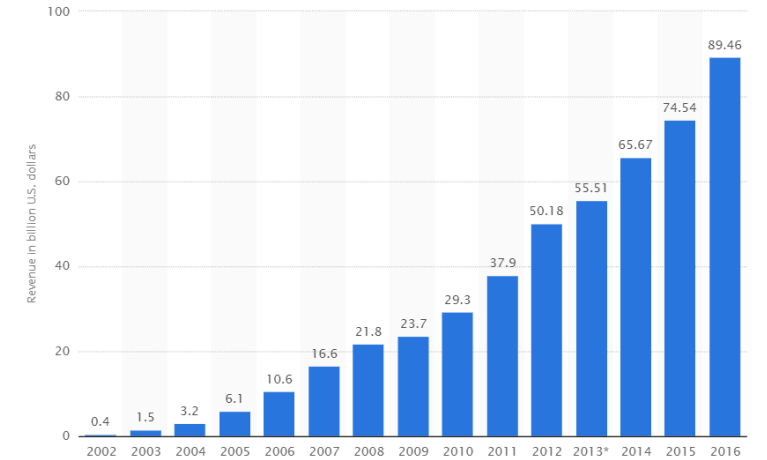
# Keeping benefits of a small company in a large company – Example: Google



Sergey Brin and Larry Page  
2 people



55,000 people (in Q1, 2015)  
US\$66b annual revenue (2014)



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# Keeping benefits of a small company in a large company – Example: Google



Eric Schmidt,  
Google CEO  
(until April  
2011)

- “One of the things that we've tried very hard to avoid at Google is the sort of divisional structure and the business unit structure that prevents collaboration across units. It's difficult. So, I understand why people want to build business units, and have their presidents.
- But by doing that you cut down the informal ties that, in an open culture, drive so much collaboration. If people in the organization understand the values of the company, they should be able to self organize to work on the most interesting problems.
- And if they haven't, or are not able to do that, you haven't talked to them about what's important. You haven't built a shared value culture.”

## “20% time”

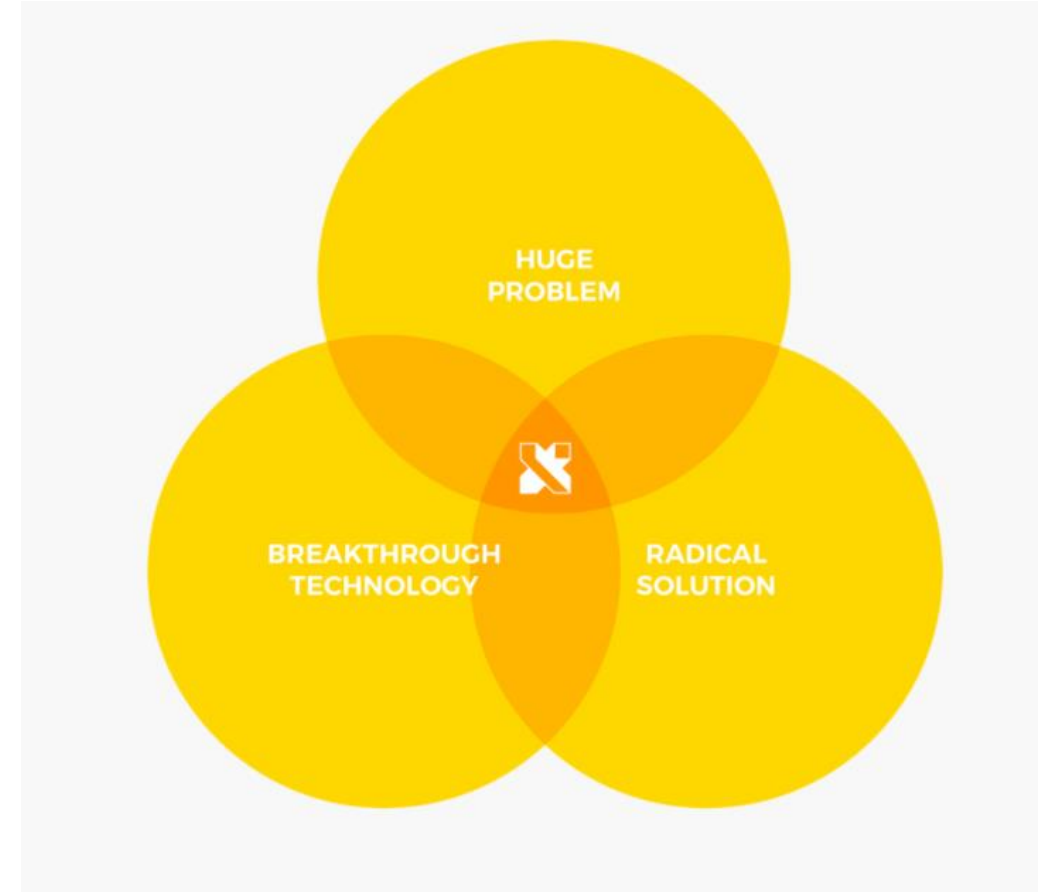
- “We encourage our employees, in addition to their regular projects, to spend 20% of their time working on what they think will most benefit Google. This empowers them to be more creative and innovative. Many of our significant advances have happened in this manner.”
- Huge 20% products include the development Google News, Gmail, and even AdSense.
- Only about 10% of Googlers are using it, last time the company checked, but it doesn't really matter, as long as *the idea* of it exists, according to Google HR boss Laszlo Bock in his new book, “Work Rules!”
- “In some ways, the idea of 20 per cent time is more important than the reality of it,” he writes. “It operates somewhat outside the lines of formal management oversight, and always will, because the most talented and creative people can't be forced to work.”

<http://www.businessinsider.com.au/google-20-percent-time-policy-2015-4?r=US&IR=T>

# Solve for X

- One of our most important principles is to run as fast as we can at all the hardest parts of a problem, and try to prove that something can't be done. We want to force ourselves to learn. We actively embrace failure: by making mistakes, we make progress. In this way, our ideas get stronger faster, or we discard them and move on to new ones.

<https://www.solveforx.com/about>



Astro Teller:

# The unexpected benefit of celebrating failure

TED2016 · 15:32 · Filmed Feb 2016

21 subtitle languages ?

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# Summary

- Culture for innovation
  - The importance of networked individuals for generating new ideas
  - The importance of “Making progress on meaningful work”
  - Effective management of people requires:
    - More focus on: stretch, self-discipline, support and trust
    - Less focus on: constraints, compliance, control and contract
- Structure for innovation
  - The structure of an organisation influences the ability to innovate
  - Some large companies find ways to have the advantages of small companies

# Presentation I



# Peer Marking

- You are to submit a report of the peer markings and submit it to Blackboard Peer Assessment by Week 13 (**6 pm 30<sup>th</sup> Oct**). Your group's peer review will be assessed based on the quality and fairness of your comments, in correspondence to your score.
- You must use a 5 Point Spread (Excellent, Good, Neutral, Not Clear, Poor) and for each scoring category, you must provide comments justifying your score.
- You must mark according to the following criteria:
  - 10% Clear description of the innovative technology
  - 10% Introduction to the selected Industry using the defined technology
  - 50% Effective application of innovation concepts (theories and frameworks)
    - Demonstration of critical analysis in the discussion of the case studies for the chosen industries;
    - Exercise of judgement about what is important and what is not
  - 20% Appropriate use of suitable high-quality and timely sources; use of media (e.g. images, diagrams, tables, etc.); referencing to the sources
  - 10% Demonstrate clarity in the presentation; timing; coherence of presentation (e.g., it doesn't look like different people did separate parts and then stuck them together)