School of Business
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Core Concepts of Creativity and Innovation

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What we will do today...

- Get to know each other!

- Discuss why creativity and innovation matter

- Discuss why it is so difficult to innovate

- Understand what are the different perspectives necessary to understand the phenomenon of product/service innovation

Class Wiki

- Extra material related to the class + team wikis for team projects

  http://sjbae.pbworks.com/teaching/

Professional Standards

- Attendance
- Being on time
- Being prepared to discuss the case
- Teamwork
- Respect for the instructor and fellow students
- No Laptop Policy

Questions to get to know you

Do you have any experience of ...

- coming up with a breakthrough product or a new category-defining service?

- coming up with new products or services?

- modifying the features of the existing products or services?

- changing the existing way of doing things in your company?

- creating SOMETHING NEW in your life?

- Any fun in doing it?

- Any frustration in doing it?

My past 10 years...

10 years later
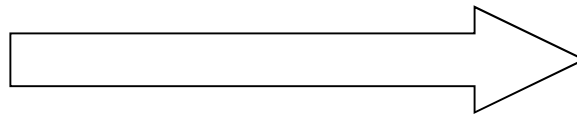
Definition?

- *Creativity*

- *Invention*

- *Innovation*

Definition?

- *Creativity* is the ability to produce novel and useful ideas in any domain

- *Invention* is the creation of useful goods (or ideas)

- *Innovation* is the successful <u>implementation</u> (product, service, process, structure…) of creative ideas within an organization

- **Diffusion** of innovation

(Source: Amabile, 1996)

Same Perspective…

"Innovation has been essential to our prosperity in the past, and it will be essential to our prosperity in the future"
- President Obama, 2009

"Innovation is the core of our national development strategy and a crucial link in enhancing the overall national strength"
- President Hu Jintao, 2007

Recession & Innovation

- First thing that companies do during recession – Slash R&D budget!!!

- In fact, recession provides many new opportunities
  - Relatively low operating cost
  - Available talent
  - Less competition
  - Challenges often yields a more efficient way of solving the existing problems

- Many successful companies were born during the recession
  - GE, Disney, MSFT, Genentech, HP

Source: Special Report on Innovation in a Recession in BW (July, 2009)

Today's Economy in General

- Rapid technological progress everywhere
- Ever-increasing performance of the products – any exception?
- Many industries in a state of saturation
- But many industries still emerging
- Information technology brings the cost of communication down
- Widely available low-cost production (outsourcing) puts more emphasis on innovative design
- Pressing issues: climate, hunger, natural resources, etc.

What is the role of creativity and innovation?

- What does technology solve? What does it not solve?
  - Ian Pearson
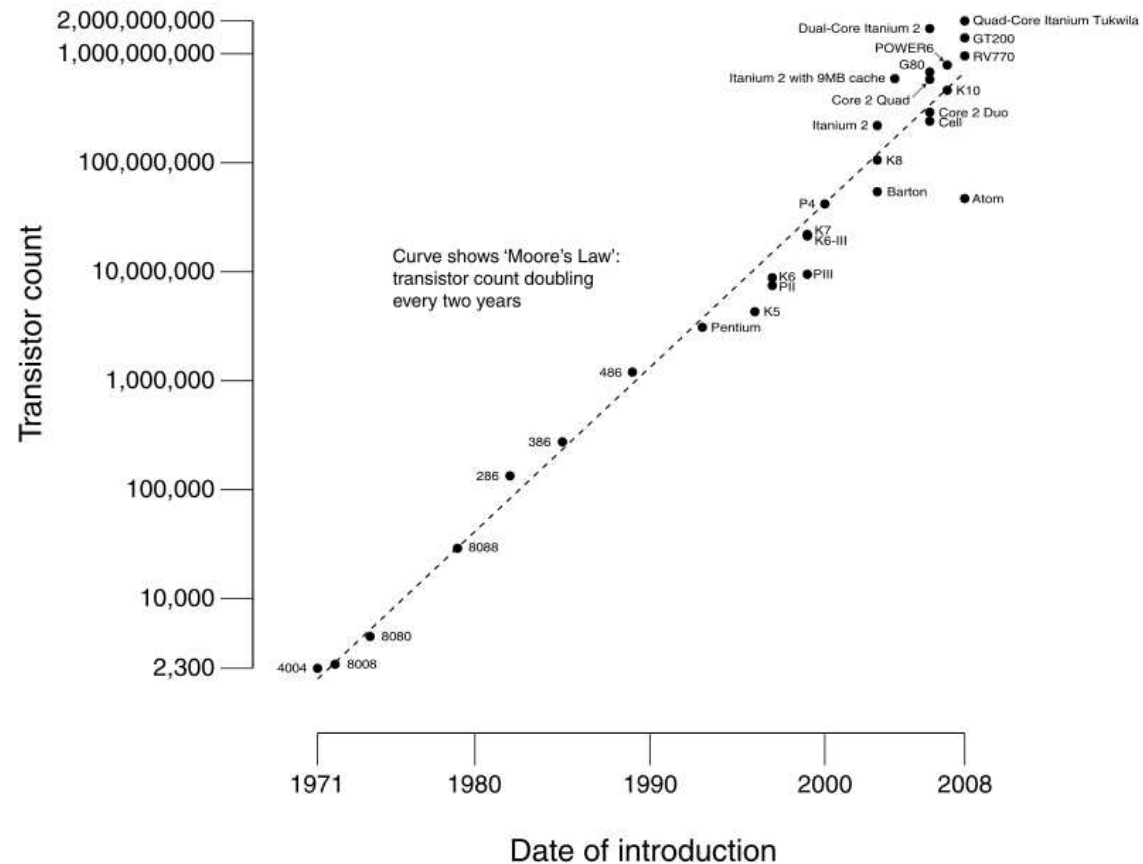- New generation's role in it
  - Don Tapscott

Moore's Law

CPU Transistor Counts 1971-2008 & Moore's Law
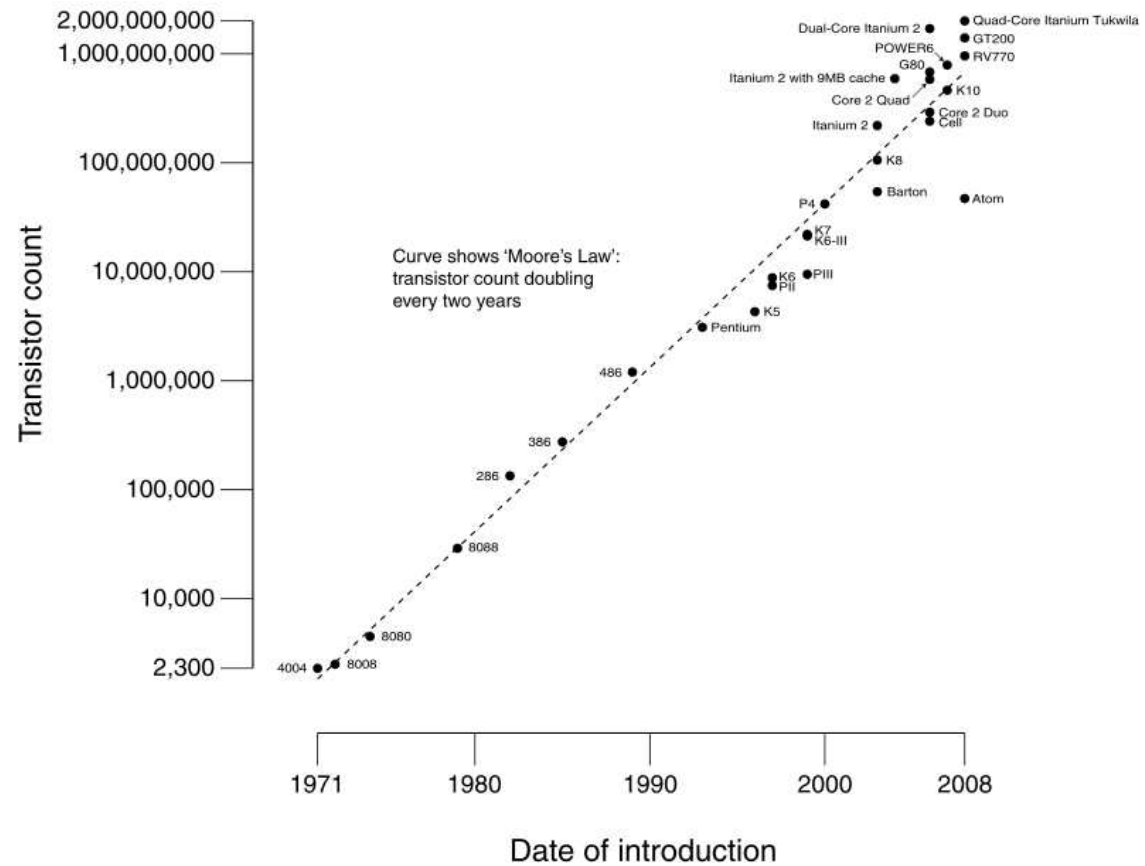
Moore's Law

CPU Transistor Counts 1971-2008 & Moore's Law

- The number of transistors on a chip will double about every two years
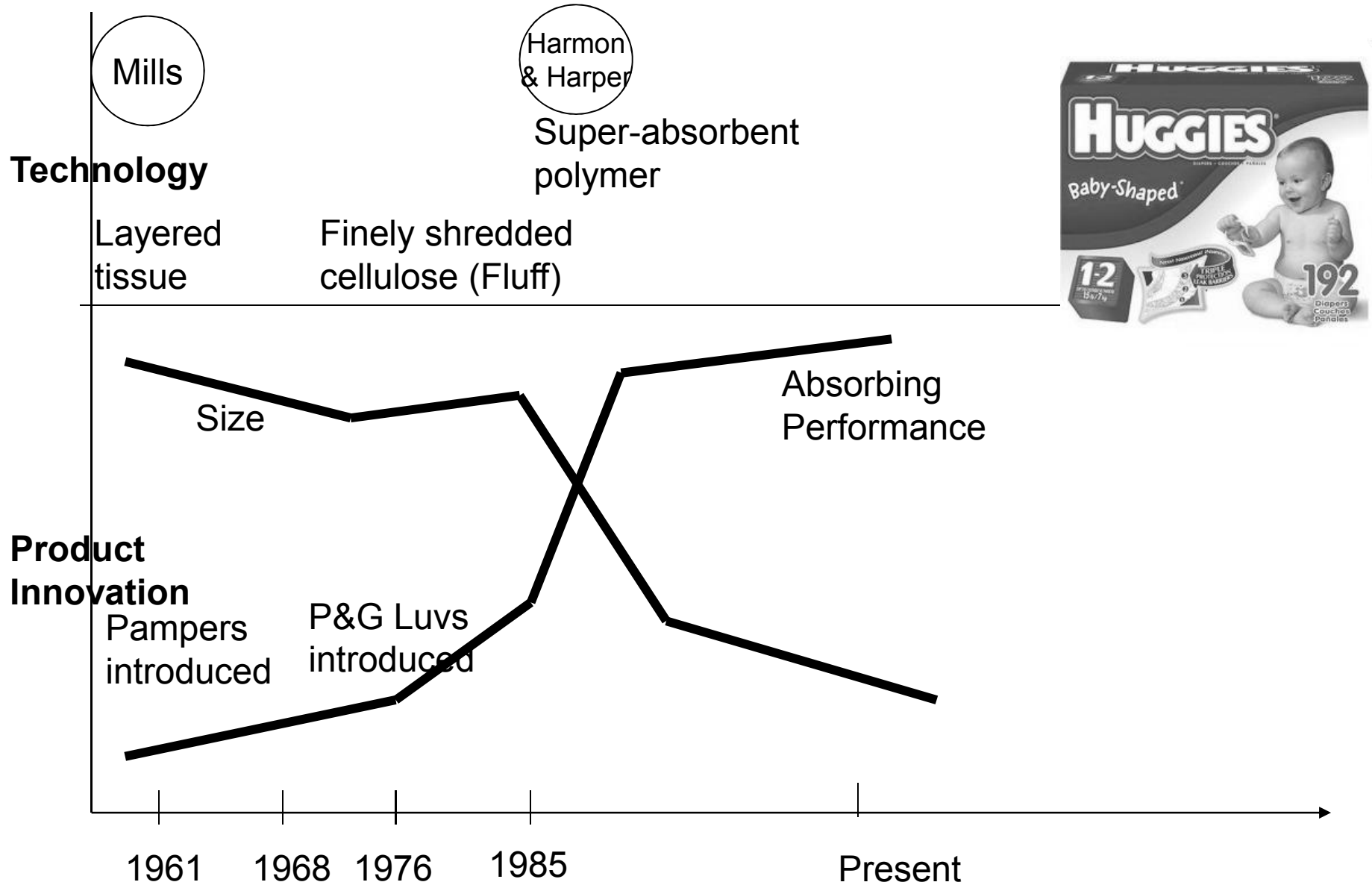
Moore's Law

- Is there a limit to this law?

http://video.intel.com/?fr_story=c11efd497dce83c4ca94278fb30c7dfeb01aef16&rf=bm

What's the main point of the disposable diaper story?

The History of Disposable Diaper

Technology

Mills

Harmon & Harper

Super-absorbent polymer

Layered tissue

Finely shredded cellulose (Fluff)

Size

Absorbing Performance

Product Innovation

Pampers introduced

P&G Luvs introduced

1961   1968 1976   1985   Present

Technical Progress and Its Nature

- A series of problem-solving

- Performance-enhancing

- Smallness matters – not only for the convenience, but also for the ripple effect on distribution & inventory

- With the distribution costs down, the number of necessary factories went down

- Corporate restructuring

- Price went down

Paper Airplane Competition

Paper Airplane Competition

- Objective: Make a paper airplane that can stay in the air as long as possible.

- Come up with the PA concept – 5~7 minutes

- Use all you know about the aerodynamics,

- Be CREATIVE!

- Use whatever is available around you to communicate – e.g. drawing

- Presentation of the concept to the class – 2 minutes

- Flying contest

- Evaluation: Creative design + Performance

Discussion

- How was the process in general?

- Was there any novel idea generated?

- Was it easy to reach the conclusion?

- How much did the previous experience of making PA affect the process?

- What could have been different if you had more than one piece of paper?

- What are the challenges in creative process?

- Was it fun?

- Was it frustrating?

Technical Problem-solving
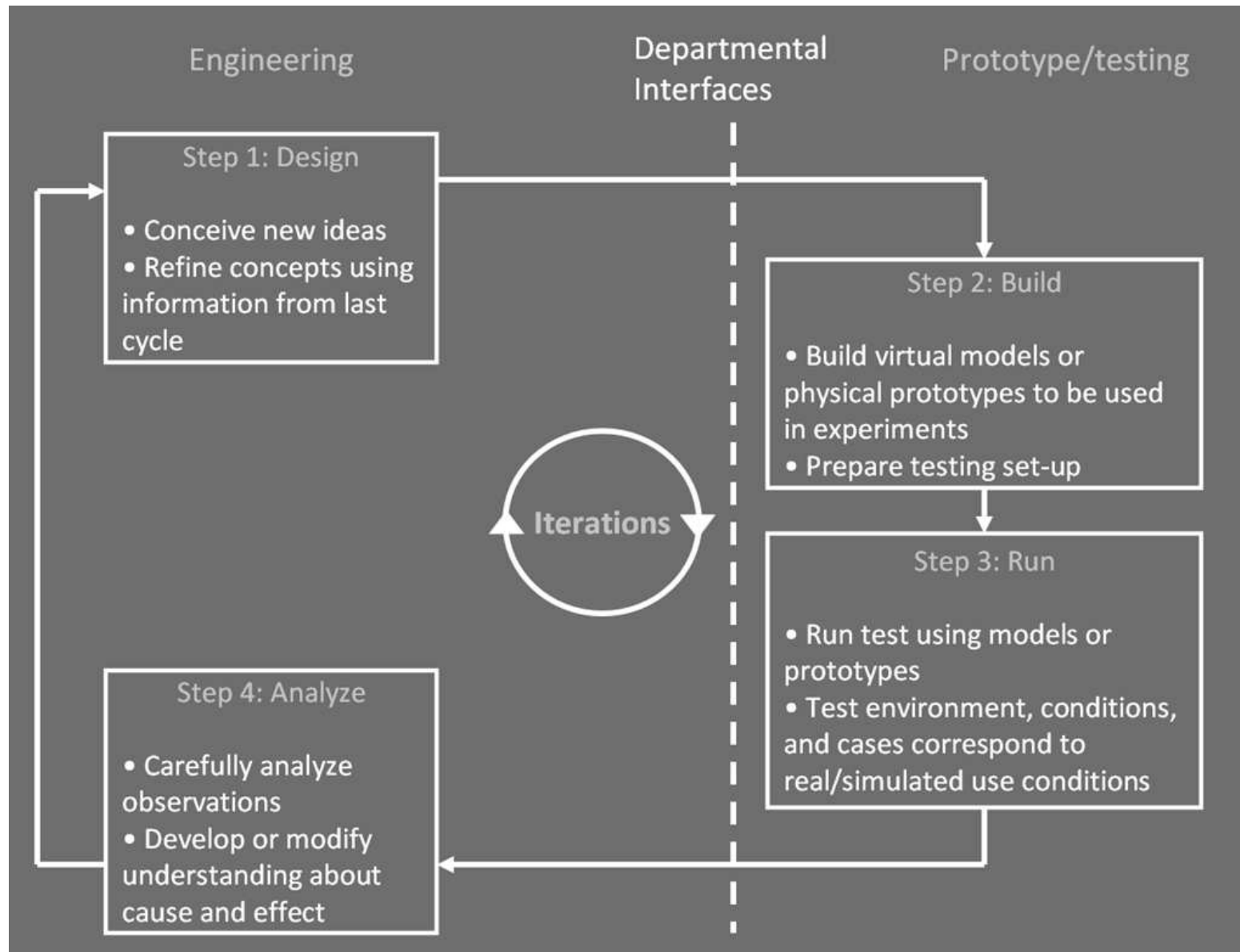
(Adapted from Thomke, 2003)

Factors that affect technical problem-solving

Factor	Definition
Fidelity of experiments	The degree to which a model and its testing conditions represent a final product under actual use conditions
Cost of experiments	The total cost of designing, building, running, and analyzing an experiment (e.g. cost for prototypes, labs)
Iteration time	The time from conceiving an experiment and to when the results are available
Capacity	The number of same fidelity experiments that can be carried out per unit time
Sequence	The extent to which experiments are run in parallel or series
Signal-to-noise ratio	The extent to which the variable of interest is obscured by experimental noise
Type of experiment	The degree of variable manipulation (incremental vs. radical)

(Adapted from Thomke, 2003)

Most Innovative Companies in 2010

2010 Rank ▲	2009 Rank	Company	HQ Country	HQ Continent	Stock Returns 2006-09 * (in %)	Revenue Growth 2006-09 ** (in %)	Margin Growth 2006-09 *** (in %)
1	1	Apple	U.S.	North America	35	30	29
2	2	Google	U.S.	North America	10	31	2
3	4	Microsoft	U.S.	North America	3	10	-4
4	6	IBM	U.S.	North America	12	2	11
5	3	Toyota Motor	Japan	Asia	-20	-11	NA
6	11	Amazon.com	U.S.	North America	51	29	6
7	27	LG Electronics	South Korea	Asia	31	16	707
8	NR	BYD	China	Asia	99	42	-1
9	17	General Electric	U.S.	North America	-22	-1	-25
10	14	Sony	Japan	Asia	-19	-5	NA
11	16	Samsung Electronics	South Korea	Asia	10	17	-9
12	33	Intel	U.S.	North America	3	0	12
13	31	Ford Motor	U.S.	North America	10	-12	NA
14	8	Research In Motion	Canada	North America	17	75	-6
15	18	Volkswagen	Germany	Europe	8	0	14
16	7	Hewlett-Packard	U.S.	North America	9	8	9
17	13	Tata Group	India	Asia	Private	Private	Private
18	20	BMW	Germany	Europe	-8	0	NA
19	24	Coca-Cola	U.S.	North America	9	9	1
20	5	Nintendo	Japan	Asia	-8	22	3
21	10	Wal-Mart Stores	U.S.	North America	7	6	-1
22	NR	Hyundai Motor	South Korea	Asia	23	12	17
23	9	Nokia	Finland	Europe	-14	0	-37
24	34	Virgin Group	Britain	Europe	Private	Private	Private
25	12	Procter & Gamble	U.S.	North America	1	5	2
26	22	Honda Motor	Japan	Asia	-11	-9	NA
27	NR	Fast Retailing	Japan	Asia	17	15	0
28	NR	Haier Electronics	China	Asia	28	22	-15

Source: BW-BCG Innovation Survey 2010

Creativity
– Solving the Most Basic Problems

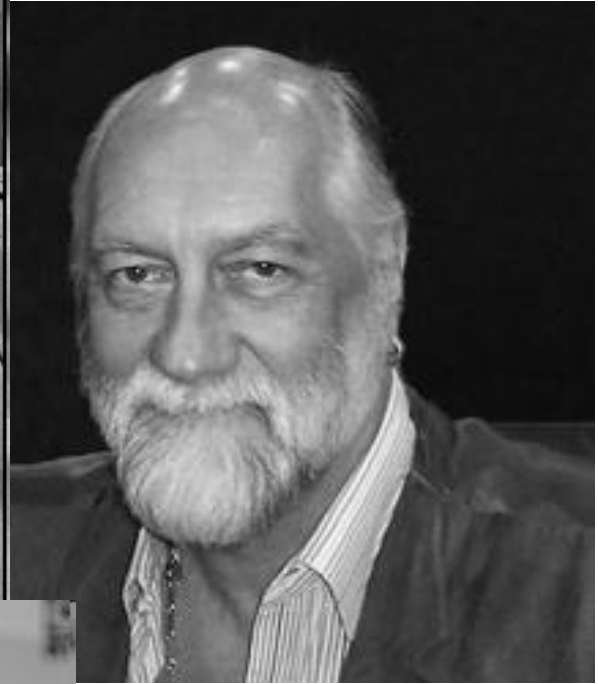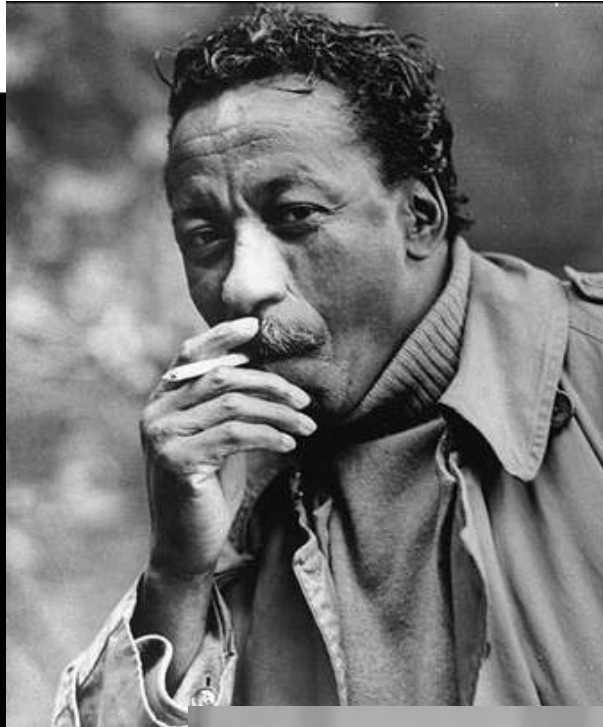**Thomas Edison's first commercially viable
light bulb model**
Public demonstration at Menlo Park, December 1879

Creativity
– Solving Today's Problems

UK Folding Plug
Gold Award,
International Design Excellence Award (IDEA 2009)
Design: Min-Kyu Choi, Royal College of Art (U.K.)

How intelligent are you?

|———————————————————————————|

1 2 3 4 5 6 7 8 9 10

Problems of Current Education System

- Preoccupation with certain sorts of academic capability

- Hierarchy of subjects

- Reliance on particular types of assessment

- Conformity-driven

- Perspectives on the range of our capacities, the holistic nature of the capacities, and the potential for growth

- Origin – Logic/Critical Reasoning, Importance of observable evidence

Element

- The place where the things you love to do and the things that you are good at come together

- Necessary condition?

  – Passion, talent, adequate education, holistic thinking, and what else?

- Results

  – Happiness, self-identity, purpose, $$$, and what else?

Important Factors of the "Element"

- I get it (Aptitude)
- → I love it (Passion)
- → I want it (Attitude)
- → Where is it? (Opportunity)

Challenge what we take for granted about human intelligence

- 5 hard senses & 1 spooky one

- Other senses: sense of balance, temperature, pain, acceleration, and the location of our body parts

- Human intelligence is complex and interrelated

- Multiple intelligences: linguistic, mathematical, spatial, kinesthetic, inter-personal, intra-personal, creative, practical

- How about sense of dealing with customers, selling, humor, details, strategy, design, engineering, making complex matters simple, etc?

Human Intelligence is...

- Diverse – many different kinds of "intelligence"

- Dynamic – finding new connections between things

- Distinctive – just as fingerprints

Again, how intelligent are you?

1 2 3 4 5 6 7 8 9 10
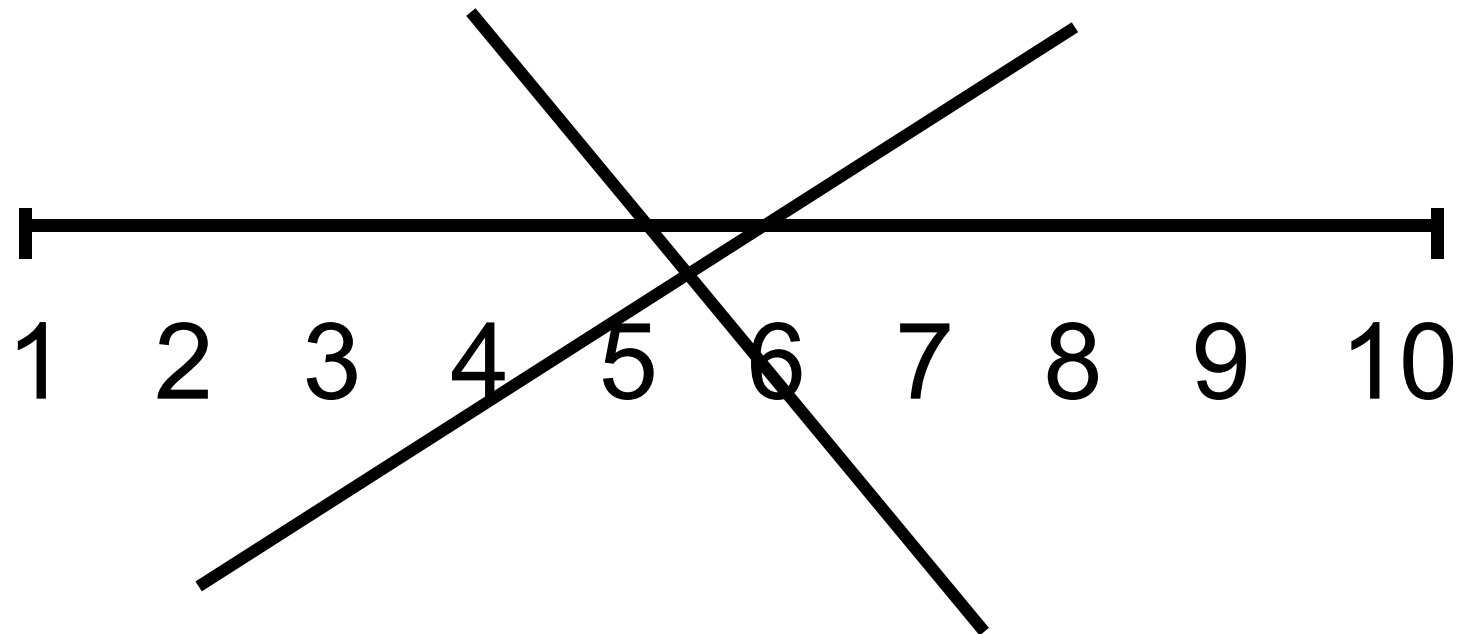
Creativity of individuals & Creativity in groups

Ethnography

- **_Ethnography_** is a branch of anthropology. It is a methodological strategy used to provide descriptions of human societies. Direct observation is the most common method of data collection.

- **_Empathic Design_** is a way to elicit latent user needs by observing them in the actual use context.

    - Unarticulated needs, Use environment, User customization, Intangible attributes of products

    (Source: Leonard & Rayport)

Ethnography

1. Plan the study

   - When, where, who, how long, how (covert or overt)

2. Identify participants

3. Observe participants

   - Why? Original use? What expectations? Any emotion? Any confusion or misuse?

   - Things to record: date, time, place of observation, facts and details, sensory impressions, personal responses, specific words or phrases, questions for future investigation

4. Interview participants – with open-ended questions
5. Collect artifacts – pictures or videos, process map
6. Analyze data
7. Verify hypothesis – interviews, focus groups, survey
8. Document findings

(Source: Silverstein et al.)

Observing a Creative Movie Production Process

- Objective: Observe the creative movie-making scene and find important factors that lead to a novel creation

- Method:

  – Please observe the video. Imagine you are in the actual movie set.

  – After watching the video, please discuss with your project team members on what aspects are important in a <u>creative process</u>.

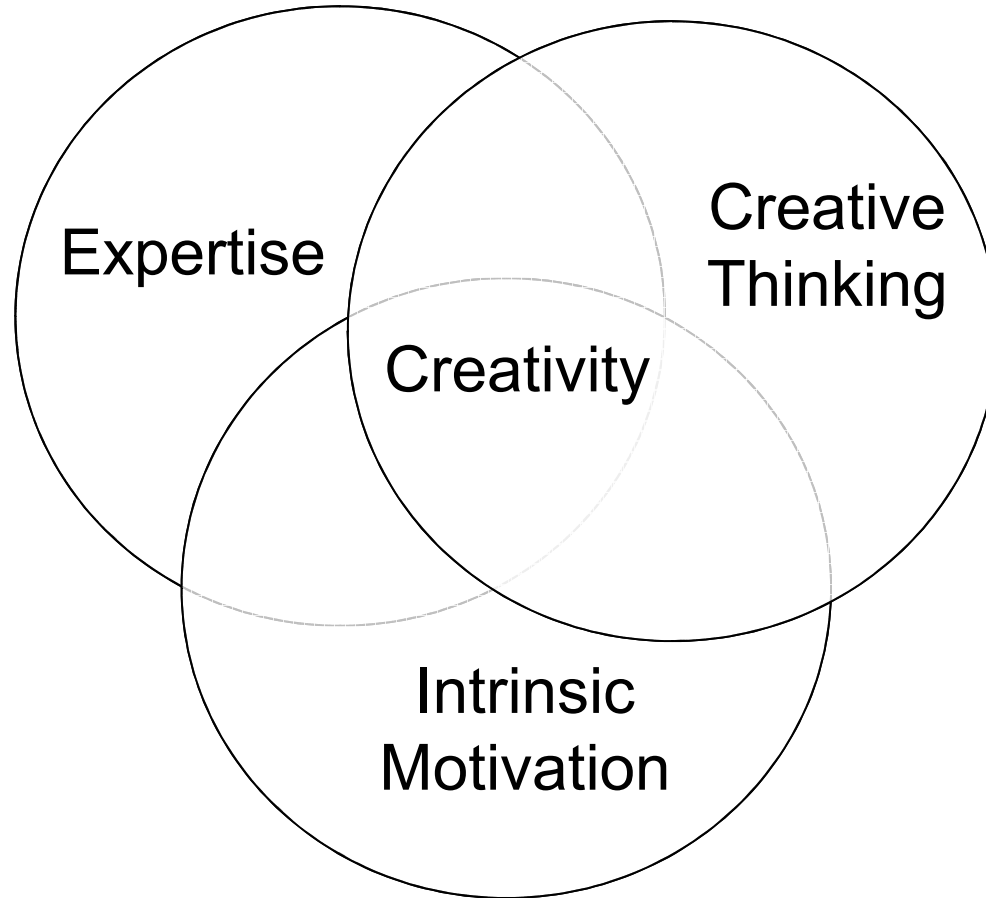 – Please write down the key ideas and present it to the class.

VIDEO – Making the Matrix

Individual Creativity - 3 component Model

Creativity

Individual Creativity - 3 component Model

Expertise

Creative Thinking

Creativity

Intrinsic Motivation
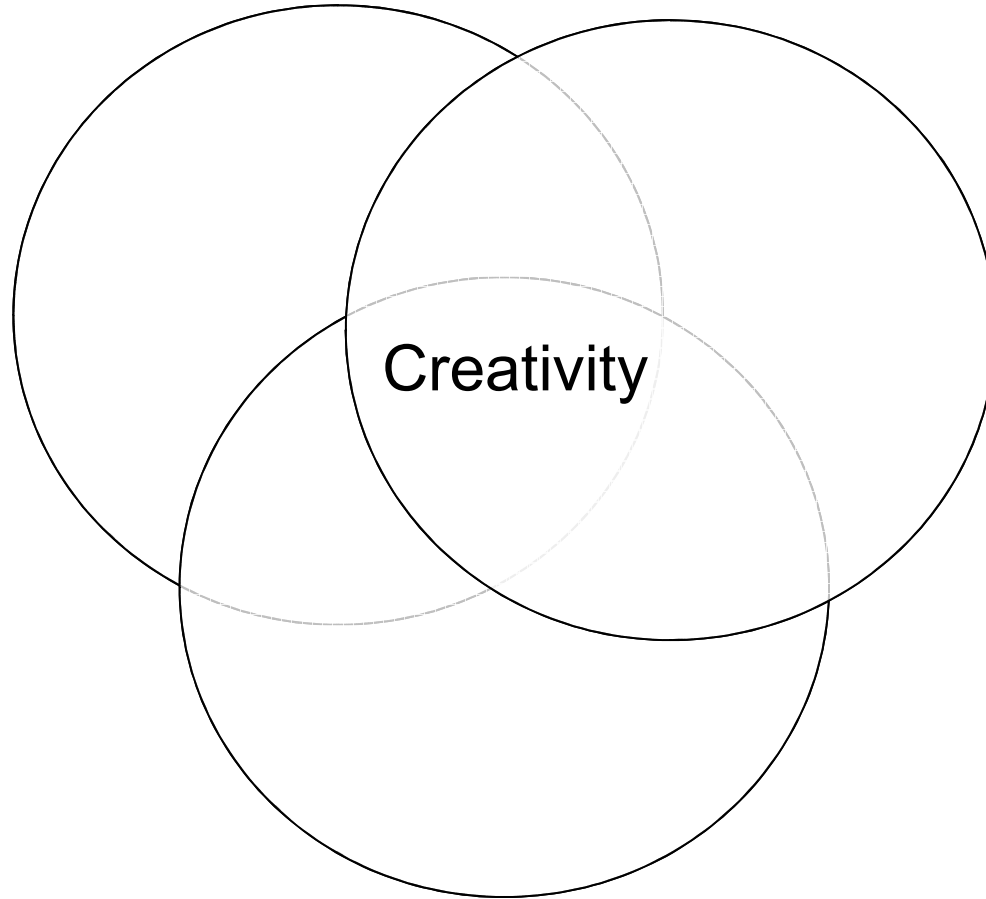
(Source: Adapted from Amabile 1996)

Individual Creativity - 3 component Model

• A set of cognitive pathways for solving a given problem
• Factual knowledge
• Technical proficiency
• Special talents in the target work domain (computer simulation, gene splicing, etc.)
• Familiarity with the past work and current developments
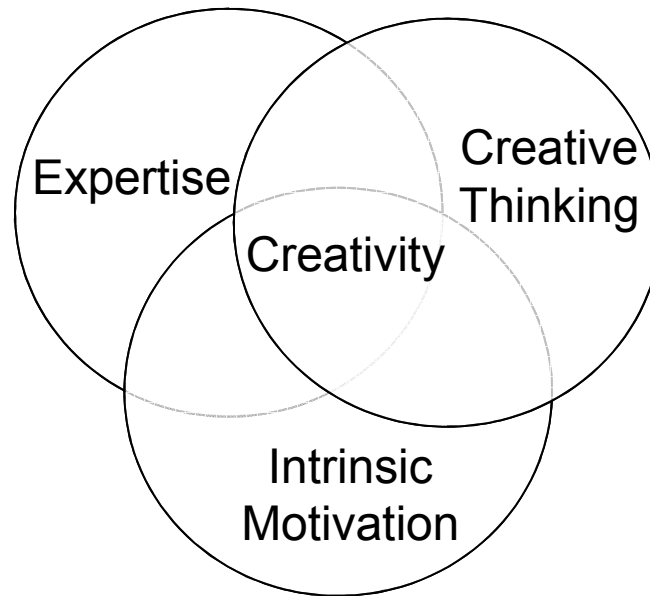
• Independent thinking
• Self-discipline
• Risk-taking
• Tolerance for ambiguity
• Perseverance in the face of frustration
• Less concern for social approval
• Break out of a pre-conceived perception
      -functional fixedness, given process or algorithms
• Suspension of judgment considering different approaches
• Search for validation

Expertise

Creative Thinking

Creativity

Intrinsic Motivation

• Deep interests and involvement in work
• Curiosity
• Enjoyment
• Personal sense of challenge
*** Extrinsic motivation's synergy with intrinsic motivation
(reward and recognition for creative ideas, clearly defined project goal, frequent constructive feedback)

(Source: Adapted from Amabile 1996)

Environmental stimulants for creativity

- Organizational Encouragement
  - ✓ Fair, constructive judgment of ideas
  - ✓ Reward and recognition of creative work
  - ✓ Active flow of ideas
  - ✓ Shared vision for what the organization tries to achieve

(Source: Amabile, 1996)

Environmental stimulants for creativity

- Supervisory Encouragement:
  - ✓ A good work model
  - ✓ Appropriate goal setting
  - ✓ Work group support
  - ✓ Values individual contributions
  - ✓ Shows confidence

(Source: Amabile, 1996)

Environmental stimulants for creativity

- Work Group Support:

  - ✓ Diverse set of skills

  - ✓ Good communication

  - ✓ Open to new ideas

  - ✓ Trust and help each other

  - ✓ Feel committed to their work

(Source: Amabile, 1996)

Environmental stimulants for creativity

- Freedom:

    ✓ Decision of what to do and how to do

    ✓ A sense of control over one's work

(Source: Amabile, 1996)

Environmental stimulants for creativity

- Sufficient Resources:

  ✓ Access to appropriate resources (funds, material, facilities, and information)

- Challenging Work:

  ✓ Appropriate level of challenging tasks

(Source: Amabile, 1996)

Environmental obstacles for creativity

- ✓ Internal political problems

- ✓ Harsh criticism of new ideas (Why?)

- ✓ Destructive internal competition

- ✓ Avoidance of risks

- ✓ Overemphasis on the status quo

- ✓ Extreme time pressure

- ✓ Unrealistic expectations for productivity

- ✓ Distractions from creative work

(Source: Amabile, 1996)

Key messages:

Think about the world in a wide variety of ways

Creativity and Innovation is all about solving difficult problems