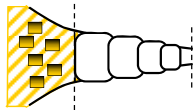


Top Quartile Practices in the Front End



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Research Objective

To determine the key Front End of Innovation (FEI) skills and activities that a company needs to be proficient in order to achieve **robust growth and sustained profitability** through an **evidence based approach**

2

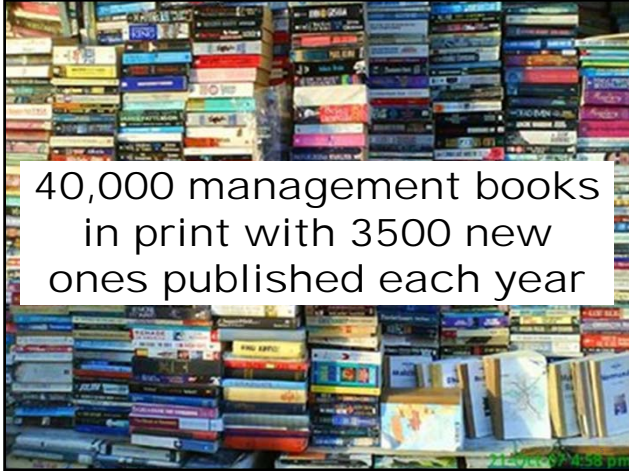
The Paradox

3

US Companies spend over \$60 billion in training and another \$45 billion on consultants



4



Plethora of Innovation Tools

Google innovation tools

378,000,000 hits

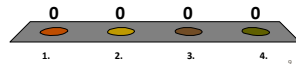
BUT all of these efforts fail to produce ANY real improvements in performance

Pfeffer and Sutton, Hard Facts, Dangerous Half Truths And Total Nonsense: Profiting From Evidence-Based Management, Harvard Business School, 2006.

Why??

Why do large companies, despite all of the books and consultants, fail to produce real innovation growth ?

1. Not innovative
2. Only good at sustaining
3. Practice management principles based on gut rather than evidence
4. To early in the morning to answer a serious question



} **Innovation management decisions in our companies are based on:**

- | What others seem to be doing
- | What senior leaders have done and believe has worked in the past
- | Closely held ideologies
- | Learning practices from ONLY high performing companies

Pfeffer and Sutton, Hard Facts, Dangerous Half Truths And Total Nonsense: Profiting From Evidence-Based Management, Harvard Business School, 2006.

10



...we base our innovation management decisions on a lot of things - **BUT NOT** facts!

12

The Paradox

Do you remember

- } Published in 1982
- } Studied practices in excellent companies

- | Avon
- | Boeing
- | DuPont
- | HP
- | IBM
- | Johnson & Johnson
- | Levi Strauss
- | Maytag
- | 3M
- | Revlon
- | Texas Instruments
- | Wang Industries



Comparison of Peters and Water's companies financial performance in 1985 vs. Fortune 1000 found NO significant performance differences!

Hitt, Michael and Duane Ireland, Peters and Waterman Revisited: The Unending Quest for Excellence, Academy of Management Executive, 1987, 1 pg. 91 - 98. 13

The Paradox

Medicine in the mid 1990's has begun to embrace Evidence Based Management



14

Evidence Based

Is this our innovation management practices today?



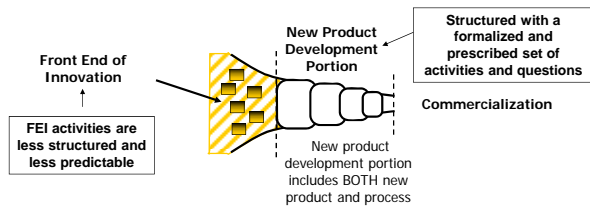
Agenda

- } **Definitions**
 - | What is the Front End
 - | NCD Model
 - | Terminology
- } **Latest Practices, Tools and Techniques**
 - | Survey
 - | Engine (Leadership, resources and climate)
 - | Engine (Knowledge sharing and teams)
 - | Incremental projects
 - | Breakthrough projects
- } **Conclusions**

15

What is the "Front End of Innovation?"

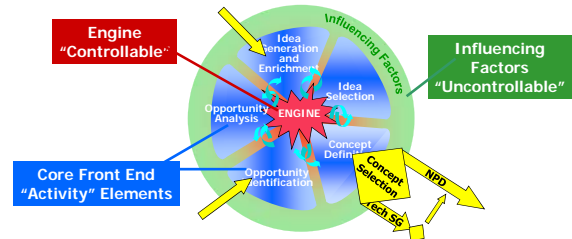
- } **"Front End of Innovation" is defined by:**
 - | Activities that come before the "formal and well structured" New Product Development (NPD) Portion



17

New Concept Development Model (NCD)

Provides a common language and terminology necessary to understand the "Front End of Innovation"



Koehn, et al., "Providing Clarity and a Common Language to the 'Fuzzy Front End,'" *Research Technology Management*, (March-April 2001), pp 46-55.
 Koehn, et al., "Fuzzy Front End: Effective Methods, Tools and Techniques," in P. Belliveau, A. Griffin and S. Sorenmeier, eds. *PDMA Handbook for New Product Development*. New York: John Wiley and Sons, 2-35, 2002.
 Koehn, P.A., "The Fuzzy Front End for Incremental, Platform and Breakthrough Products," in K. Kahn, G. Castellon and, A. Griffin, eds. *PDMA Handbook of New Product Development*. New York: John Wiley and Sons, 81-91, 2004.

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Terminology

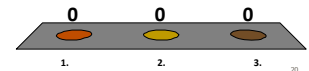
- } **Opportunity**
 - | Food company identifies the need to develop low fat due to rising consumer interest in low fat
 - | Company performs detail analysis on trends
- } **Idea**
 - | Several methods are identified for delivering nonfat potato chips.
 - | Candidate molecules are envisioned which provide the same flavor, but would not be absorbed by the body.
- } **Concept**
 - | Scientific program started and funded to develop specific types of nonfat molecules
- } **Product**
 - | Olestra – a non fat substitute



19

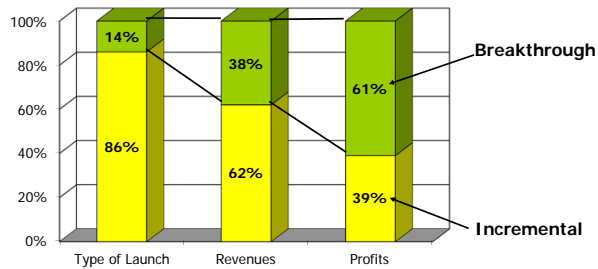
Which is the most important to a VC?

1. Opportunity
2. Idea
3. Concept



20

Incremental vs. Breakthrough



Disproportionate wealth creation from breakthrough opportunities

Based on a study of 150 companies in 30 different industries. (Kim and Mauborgne, "Blue Ocean Strategy," HBR, October 2004.)

21

Agenda

7 Definitions

- 7 What is the Front End
- 7 NCD Model
- 7 Terminology

} Latest Practices, Tools and Techniques

- | Survey
- | Engine (Leadership, resources and climate)
- | Engine (Knowledge sharing and teams)
- | Incremental projects
- | Breakthrough projects

} Conclusions

22

Survey

- } Surveyed 350 business units from 141 companies including GE, P&G and Intel
- } Developed by world-class academic and industry team consisting of 17 companies and institutions
- } Funded by National Science Foundation, Consortium for Corporate Entrepreneurship at Stevens Institute of Technology and supported by the Industrial Research Institute

An evidenced based management approach to understanding best practices in the front end.

23

Major Conclusions

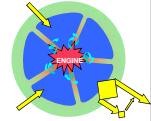
- } Senior Management commitment (vision, strategy, resources and culture) to the front end is the single most important variable
- } Effective networked teams and their leaders are more important than any tools and techniques
- } Incremental and breakthrough projects require fundamentally different innovation management practices

24

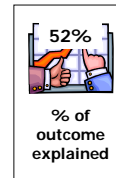
Agenda

- 7 Definitions
 - 7 What is the Front End
 - 7 NCD Model
 - 7 Terminology
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 - 7 Survey
 - | Engine (Leadership, resources and climate)
 - | Engine (Knowledge sharing and teams)
 - | Incremental projects
 - | Breakthrough projects
- } Conclusions

Engine



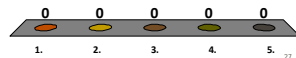
- } Consists of:
 - | Management Involvement
 - | Vision
 - | Strategy
 - | Resources
 - | Culture



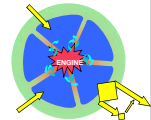
Which is the most important?

For this question you have two votes

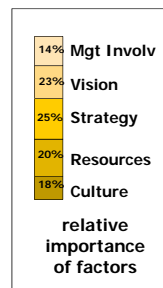
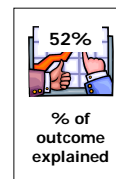
1. Management Involvement
2. Vision
3. Strategy
4. Resources
5. Culture

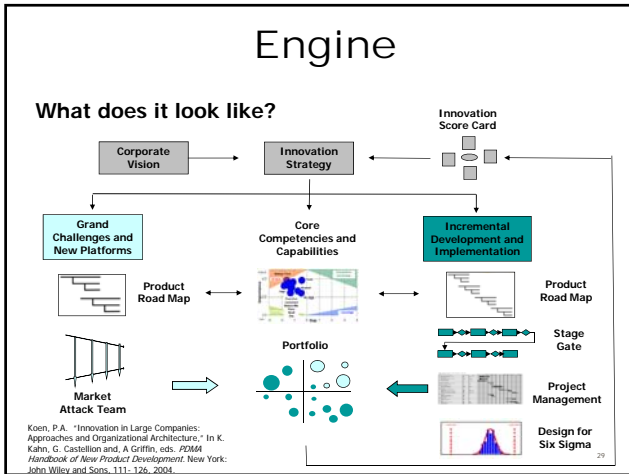


Engine



- } Consists of:
 - | Management Involvement
 - | Vision
 - | Strategy
 - | Resources
 - | Culture





Portfolio

Best Practices

- Best in class companies consider portfolio management to be critical

Financial

Year	2008	2009	2010	2011	2012	2013
Revenue	100	100	100	100	100	100
Profit	10	10	10	10	10	10

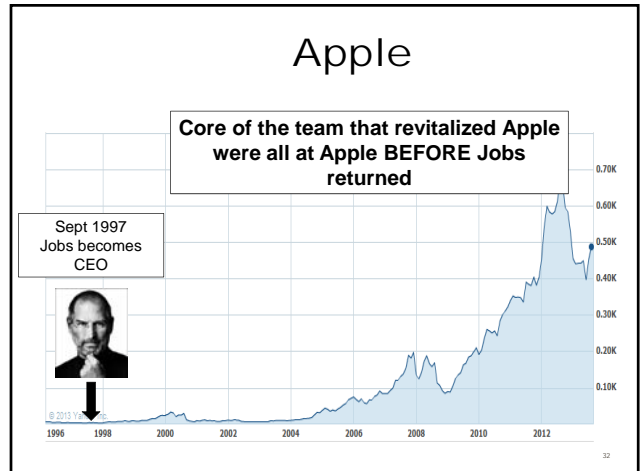
Strategic

Business	Market	Value	Strategic	Strategic	Strategic
Segment 1	High	High	High	High	High
Segment 2	High	High	High	High	High
Segment 3	High	High	High	High	High
Segment 4	High	High	High	High	High
Segment 5	High	High	High	High	High
Segment 6	High	High	High	High	High
Segment 7	High	High	High	High	High
Segment 8	High	High	High	High	High
Segment 9	High	High	High	High	High
Segment 10	High	High	High	High	High

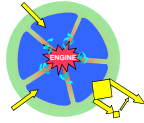
Scoring

Category	Score
Dead	1
Capital	2
High Growth	3
Strategic	4
Core	5
Star	6

Bubble

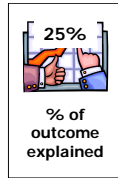


Engine



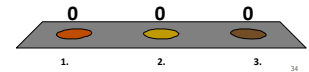
} Consists of:

- | Effective Teams
- | Team Leadership
- | Communities of Practice

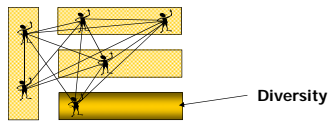


Which is the most important?

1. Effective Teams
2. Team Leadership
3. Communities of Practice



Communities of Practice



- } Creates new knowledge within the community
- } Connects, acquires, exchanges and builds new knowledge
- } New science occurs through the process of building upon internal and external knowledge communities

Breakthrough Knowledge Usually Occurs at the "Boundaries of the Old" McDermott, 1999

Communities of practice

Communities of Practice

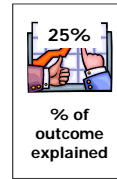


Best Practices:

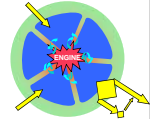
- | Focus of on the core competencies of the corporation
- | **Leader should be well respected member of the community and be able to commit at least 25% time**
 - { Experts need not apply
- | Initially the thought leaders need to be part of the community
- | Community of Practice should NOT become another project
- | Create passion and real dialogue since the COP is voluntary
- | Make connections between community members seamless

McDermott, R., "Knowing in Community: Ten Critical Factors for Community Success," *IHRIM Journal*, March, 2000.

Engine

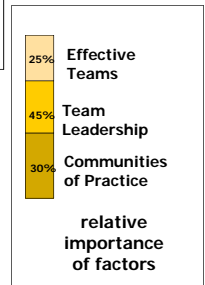


% of outcome explained



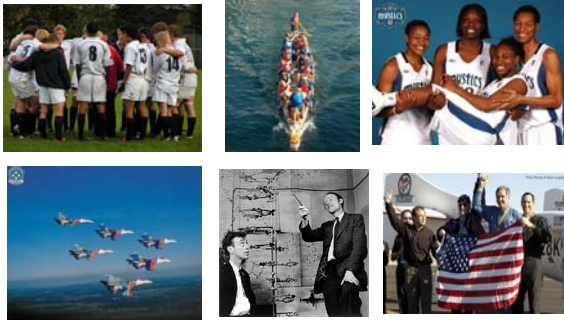
Consists of:

- | Effective Teams
- | Team Leadership
- | Communities of Practice



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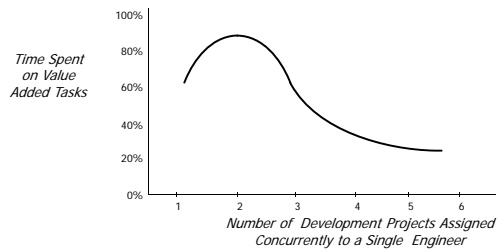
Teams



39

Teams

Overload

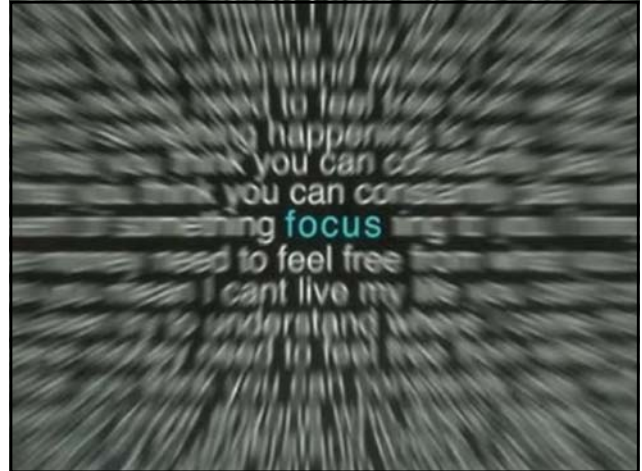
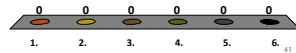


Wheelwright, S.C. and Clark, S.C., "Revolutionizing Product Development," Free Press, Macmillan Press, (1992), pg. 90-91.

40

Typical loading on major projects?

1. 1 project/person
2. 2 projects/person
3. 3 projects/person
4. 4 projects/person
5. 5 projects/person
6. > 5



Creativity Under Time Pressure



- } **Individual creativity occurs when:**
 - | People are on a mission
 - | Can FOCUS on one activity for a significant part of their day
 - | Are challenged and involved in their work
- } **Individual creativity does NOT occur when:**
 - | People feel they are on a treadmill
 - | Experience a highly fragmented day
 - | Have more group discussions rather than individual meetings
 - | Have lots of last minute changes in their plans and schedules
 - | After effects continue onto the 2nd and 3rd day

Cognitive Neuroscience



Creativity Experiment

Professional Jazz Musicians

Non-Musicians

Improvise



Hypothesis: Professional musicians would have more activation in the core generative network

Berkowitz, A. and D. Ansari, 2010, Expertise-related deactivation of the right temporoparietal junction during musical improvisation *Neuroimage*, 49, pp. 712 -719

Jazz in an fMRI scanner?

Limb and Braun, Neural Substrates of Spontaneous Musical Performance: A Study of Jazz Improvisation. *PLOS One* 2008.

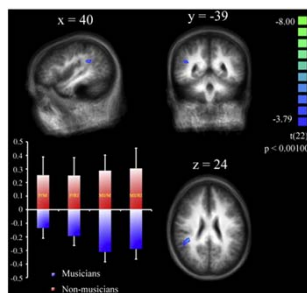
Creativity Experiment

} Hypothesis: **WRONG**

| Activity in the core network was identical between professional musicians and non-musicians

One single difference:

Deactivation in goal driven behavior or "top down" attention in professional musicians



Berkowitz, A. and D. Ansari, 2010, Expertise-related deactivation of the right temporoparietal junction during musical improvisation *Neuroimage*, 49, pp. 712 -719

Savants



Stephen Wiltshire

49



CHANNEL NEWS ASIA

Creativity Experiment: Implication

- } Creativity requires filtering out of task-irrelevant stimuli
- } Expertise in creativity requires training, the ability to modulate goal-directed attention and FOCUS

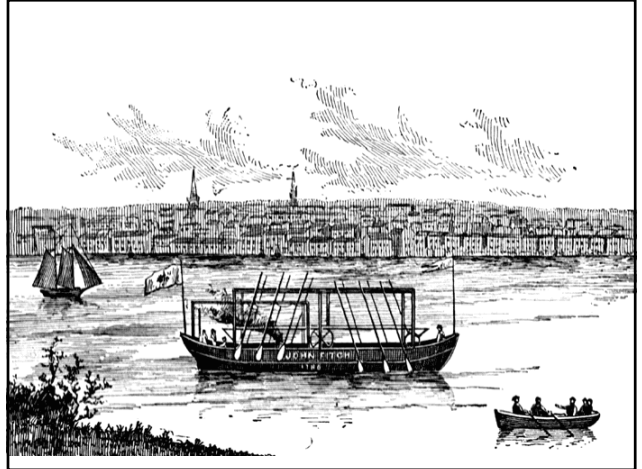
Berkowitz, A. and D. Ansari, 2010, Expertise-related deactivation of the right temporoparietal junction during musical improvisation Neuroimage, 49, pp. 712 -719

Collaboration

52

Linear Thinking: Trapped by our
embedded schemas

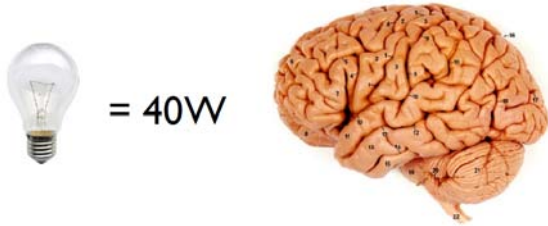




The brain: **neural darwinianism**



The brain: neural darwinianism



the brain evolved thru resource competition and adaption to process information at the lowest possible energy state Gerald Edelman

Laptop computer: power consumption



<http://www.upenn.edu/computing/provider/docs/hardware/powerusage.html>

Apple Mac 24 inch: power consumption



<http://www.upenn.edu/computing/provider/docs/hardware/powerusage.html>

IBM Watson





90 IBM 750 servers x 1950 watts/server
= 1462 Kilowatts



"You don't see what you are **looking at**,
you see what you are **looking for**."



consciousness = 300 milliseconds



Schemas

Count the x's

q	r	x	t	b	f	x	m	g	n	x	z
c	f	l	q	x	b	m	s	y	z	u	v
h	x	g	p	s	t	b	h	x	f	t	l
m	r	b	x	p	s	l	m	r	f	x	b
q	p	l	f	z	x	p	t	o	l	f	s
l	x	r	x	f	s	l	z	x	m	r	p

12

Count these: r, x, v, s, w

q	r	x	t	b	f	x	m	g	n	x	z
c	f	l	q	x	b	m	s	y	z	u	v
h	x	g	p	s	t	b	h	x	f	t	l
m	r	b	x	p	s	l	m	r	f	x	b
q	p	l	f	z	x	p	t	o	l	f	s
l	x	r	x	f	s	l	z	x	m	r	p

22

Count these: a, e, i, o, u

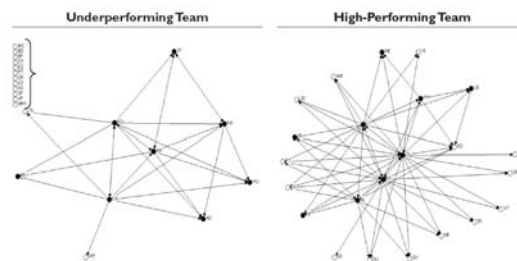
q	r	x	t	b	f	x	m	g	n	x	z
c	f	l	q	x	b	m	s	y	z	u	v
h	x	g	p	s	t	b	h	x	f	t	l
m	r	b	x	p	s	l	m	r	f	x	b
q	p	l	f	z	x	p	t	o	l	f	s
l	x	r	x	f	s	l	z	x	m	r	p

2

Schemas are an inevitable consequence of evolution

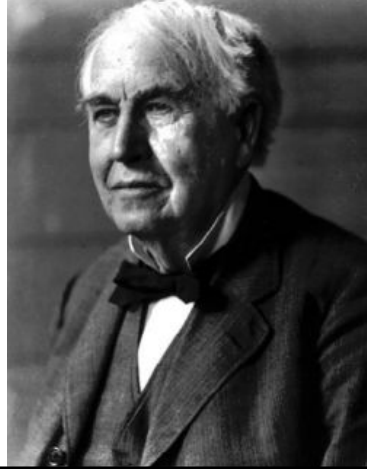
Breaking out of schemas:
How to?

The best solutions come from better networked teams



Cross, R., Ehrlich, K., Dawson, R. and Heflerich, J. "Managing Collaboration: Improving Team Effectiveness Through a Network Perspective," California Management Review 50(4), Summer 2008, pg. 74 - 98.

Teams produce bigger
wins than individuals



78



79



The 21st century leader manages their people's network



Juan Enriquez



Managing director Excel Venture Management (life sciences VC) Founder Biotechnology LLC. Founded several successful start ups. Bestselling researcher, author, and teacher on the economic and political impacts of life sciences as well as the rise and fall of countries. Was founding director of the Harvard Business School Life Sciences Project. Ran Mexico City's Urban Development Corporation. Member of Sarcoter II Expedition, a global circumnavigation, with Craig Venter, which doubled known genes from all species. Wrote "As the Future Catches You" and "The United States of America." Co-author, with Steve Gullans, "H. evoluts: Please Meet the Next Human Species." Published various academic articles and case studies including "Transforming Life Transforming Business the Life Science Revolution," (co-authored with Ray Goldberg), "Global Life Science Data Flows and the IT industry", "SARS, Smallpox, and Business Unusual," and "Technology, Gene Research and National Competitiveness." Co-author of the first map of global nucleotide data flow (Selected by Riem Koolhaas and Wired as one of the iconic examples of 21st century design). Has been on various boards including Cabot Corp., Cabot Micro, Synthetic Genomics, Activate Networks, Harvard Medical School Genetics Advisory Council, Americas Society, Harvard's David Rockefeller Center, Harvard's PAPSAC, WGBH, Tufts Institute for Global Leadership, Center for Excellence in Education, and the Boston Science Museum.



Diversity

People prefer working with people like themselves



Diverse Groups are More Creative

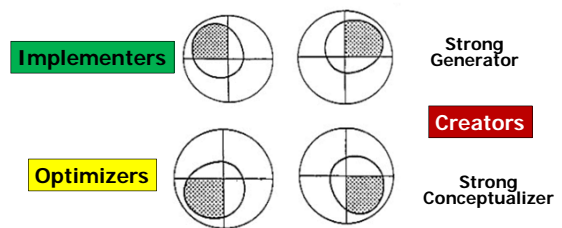


Team Performance

- } **Heterogeneous teams produce better results**
 - | All stages are focused on by heterogeneous teams
 - | Homogeneous teams neglect stages that are not their most comfortable stage
- } **Homogeneous teams are more satisfied with their teammates and their teamwork**
 - | "We like people who think like us"
 - | Heterogeneous team members often feel they have to 'fight' for time in their respective process stages

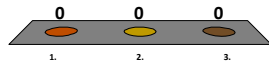
Basadur, M., & Head, M. 2001. Team performance and satisfaction: A link to cognitive style within a process framework. Journal of Creative Behavior, 35: 227-248.

Creative Problem Solving Profile Stages

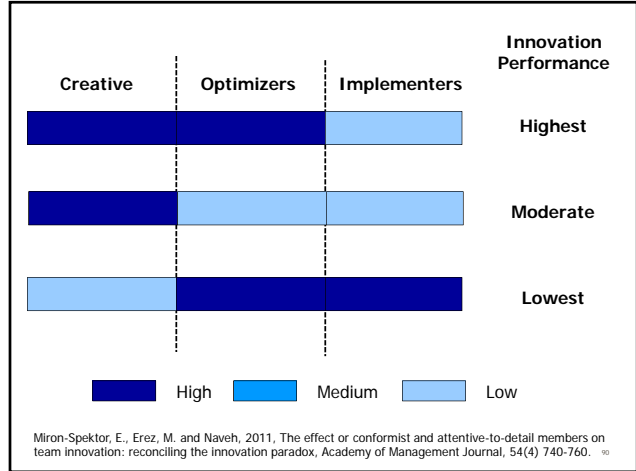


Which 2 personality styles will have the highest innovation performance?
(vote two times)

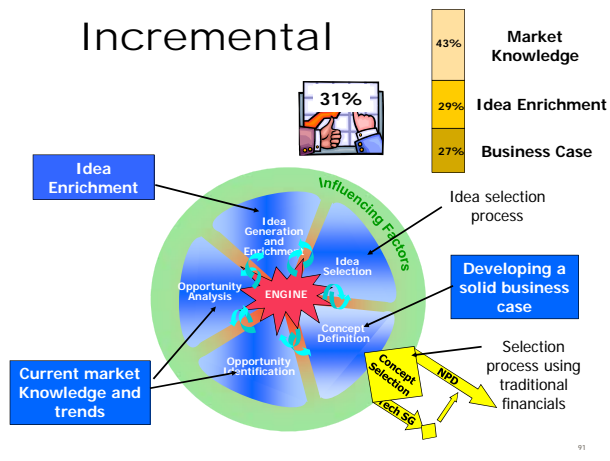
1. Creators
2. Optimizers
3. Implementers



Miron-Spektor, E., Erez, M. and Naveh, 2011, The effect of conformist and attentive-to-detail members on team innovation: reconciling the innovation paradox, Academy of Management Journal, 54(4) 740-760.

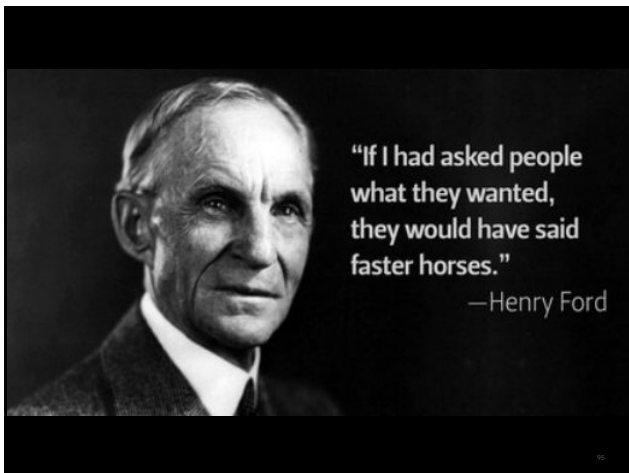


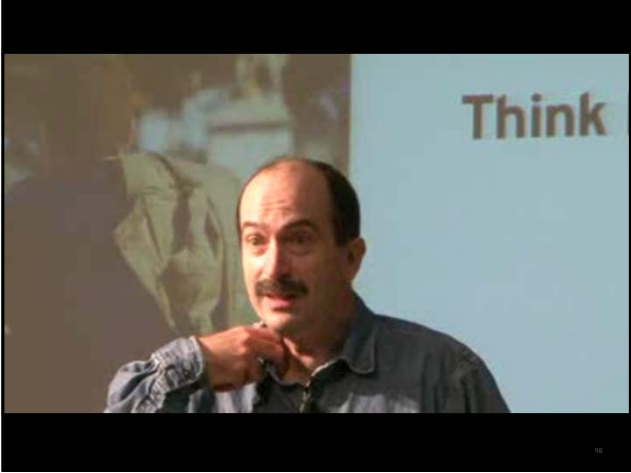
Incremental



Do you understand your unmet customer?

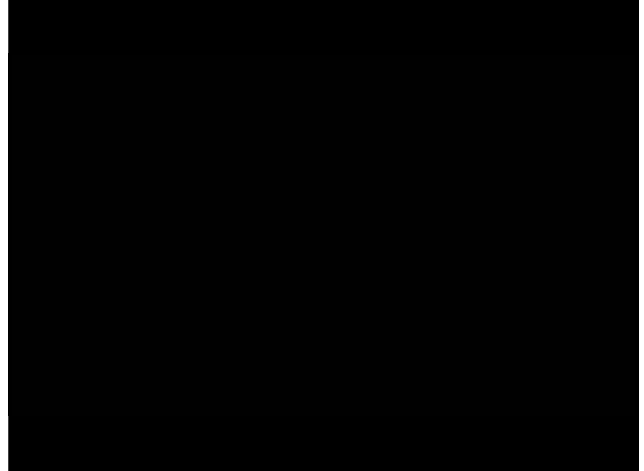
**Asking your customer
does NOT work**





**Asking your customer
does NOT work**

Not that easy



Look for "compensatory"
actions





Tide Pods

- } **Biggest innovation in Tide in 3 decades**
- } **Current sales: \$0.5 Billion**