Culture and Innovation for Engineering Students:

The PIPE©™ Model at City University of Hong Kong

3333創造創新創業課©™

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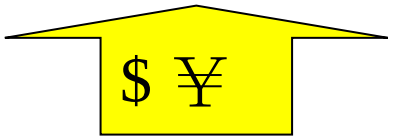
Economic growth
經濟增長



Innovation
創新

Schumpeter's theory on economic growth（熊彼德的經濟增長理論）

- Schumpeterian **innovations** are the result of 'entrepreneurial behavior'— exploit some latent demand or to attack existing firms with radically **new** product or process.
- Which is the ***engine*** that drives economic growth
- 1995：400 entrepreneurship programs
  - (business/management schools)

Education in **Engineering Entrepreneurship:**

Journal of Engineering Education, Jan 2002, p.33-39

Introducing Engineering & Science students to Entrepreneurship: Models and influential factors at Six American Universities

1. Carnegie Mellon University: The Donald H. Jones Center for **Entrepreneurship**
2. Stanford University: Stanford Technology Ventures Program (STVP)
3. University of Colorado at Boulder: The Center for **Entrepreneurship**
4. Rensselaer Polytechnic Institute: The Center for Technological **Entrepreneurship**,
5. University of California, LA, The Harold Price Center for Entrepreneurial Studies
6. University of Iowa, The John Pappajohn Entrepreneurial Center (JPEC)

2003 : Three international conferences

1. Three international conferences /colloquium American Society for Engineering Education (ASEE, www.asee.org)（美國工程教育學會）
2. European Society for Engineering Education (SEFI, www.ntb.ch/SEFI)歐洲工程教育學會
3. REE: Roundtable Meeting for Entrepreneurship Education for Eng'g & Sci. students in Asia

Especially Creativity, Innovation and

The Engineer of 2020

US National Academy of Engineering (2004)

Strong analytical skills	較強的分析能力
Practical ingenuity	實用的獨創性
Creativity	創造能力
High ethical standards and a strong sense of professionalism	較高的道德水準和專業態度
Dynamic/agile/resilient/flexible	活力，靈活，
Good communication skills	溝通能力
Business+management skills	管理能力
Leadership capabilities	領導能力
Lifelong learner	終生學習

中国工程院

CHINESE
Academy of Engineering

The training of innovative ng'g & tech talents

关于中国创新型工程科技人才培养的研究

课题负责人：中国工程院常务副院长 **潘云鹤**

课题负责人：中國教育部部長**周济**

June 2006 Shenzhen

中华人民共和国教育部

Ministry of Education of the People's Republic of China

CAE visits CityU (19 July 2007)

IEEE ENGINEERING MANAGEMENT REVIEW

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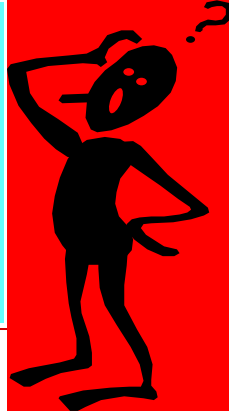
Awards

- 香港城市大学，全校通识课程，2012年度 杰出教学奖。
- 2010年高教学会，创新创业分会，年度征文论文一等奖， 题目： 创新创业教育的四个基本问题。(2011年二等奖）
- 中国创造学会，二等奖，2010年。
- 国际Emerald 创业教育国际会议，最佳实践\政策论文奖 （The Best Practical/Policy paper, International Conference on Entrepreneurship Education by Emerald Publisher, Li Ka-Shing Education Foundation and Shantou University, September 2010, Shantou, China.）
- Journal of Chinese Entrepreneurship，UK）《中国创业期刊》（2012年度高度赞许奖，（The Highly Commended Award at the Literati Network Awards for Excellence, Sun, H. (2011) "The 3-3-3 Framework and 7P Model for Teaching Creativity, Innovation and Entrepreneurship" *Journal of Chinese Entrepreneurship, Vol. 3, No. 2, pp. 159 – 166.*

- 被收录到：**IEEE** 《工程管理评论》之**"创新创业和工程管理教学国际视野特刊"**，IEEE Engineering Management Review, Vol.40, No.2, pp.157-163.

创新，创造，创意，创业，创见，创富，创伤，
发明，发现，发展，发疯，发财，研究，开发，
科学，技术，科技，专利，商标，版权，侵权。



Innovation

Invention

Ideas

Creativity

R&D

Process

New Product Development

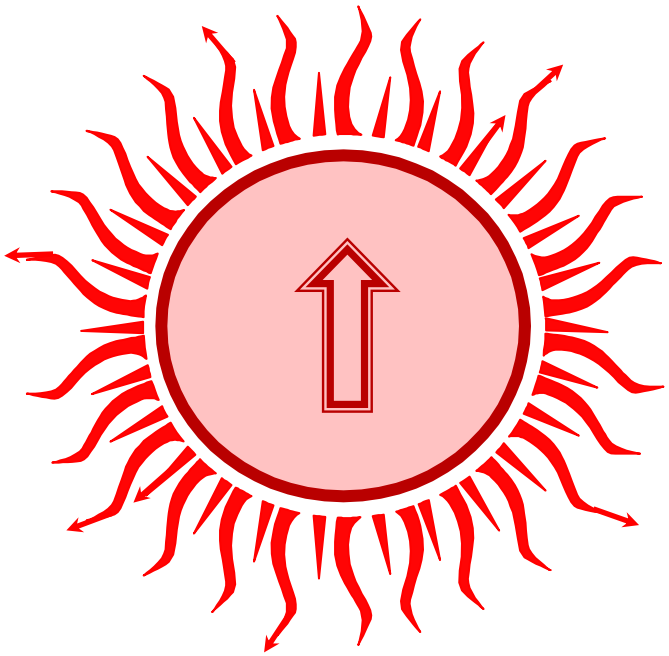
S&T

Technopreneurship

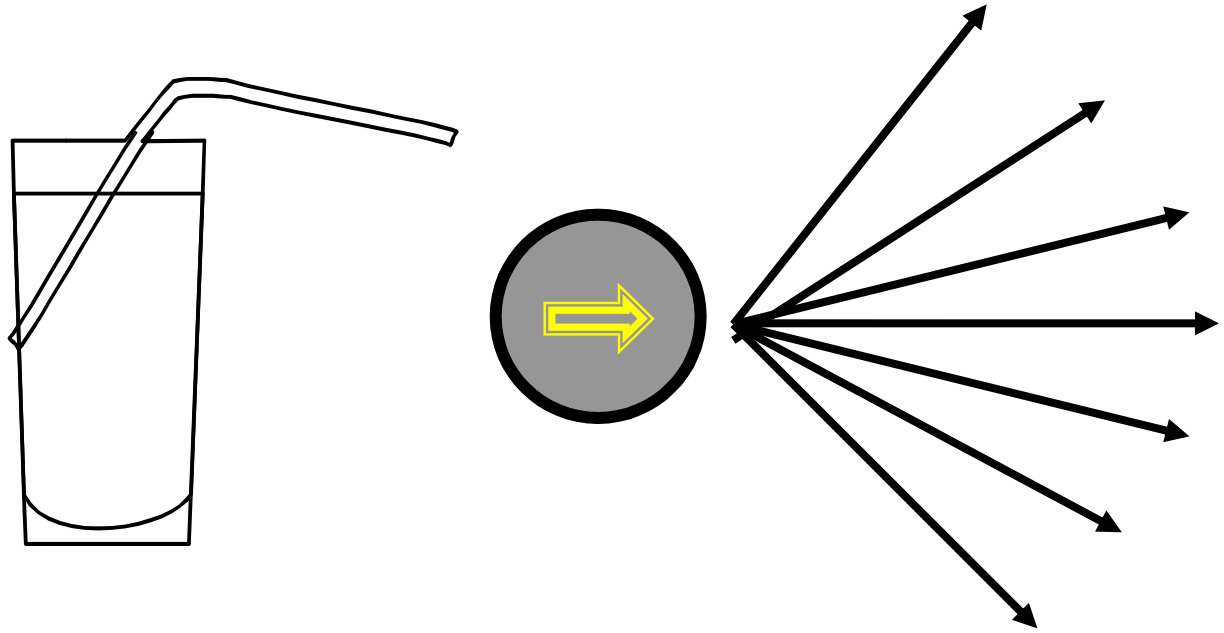
The Sun model of creative thinking:

- Ordinary thinking **(常规思维)**
- **(Different)**
- Creative thinking: (创新思维)
- think out ideas that other people normally do not think of.
  - Breakthrough the conventional frame of reference or pattern
  - 超越常规思维的束缚

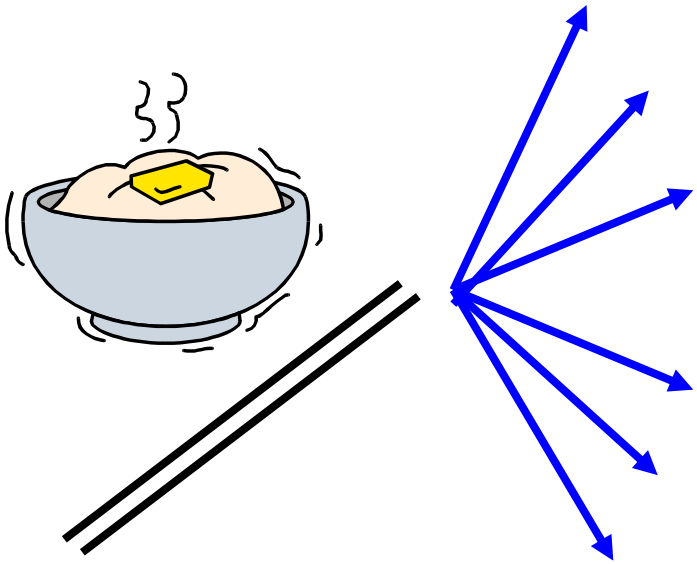
Lateral thinking:
横向思维
Divergent thinking
发散思维



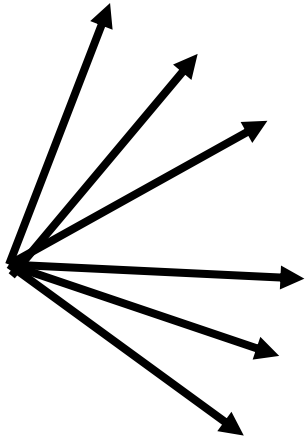
The function of a glass ?

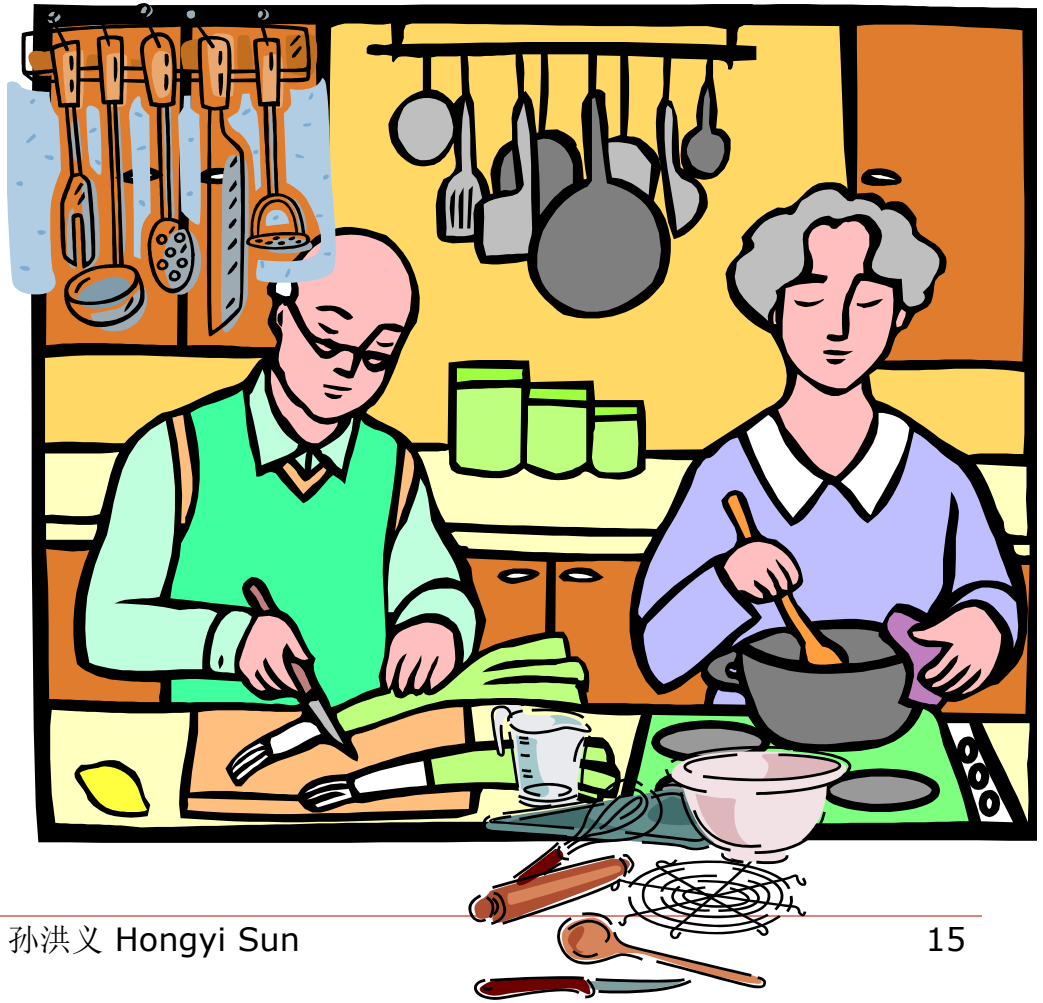


Flexibility while eating



Flexibility in cooking



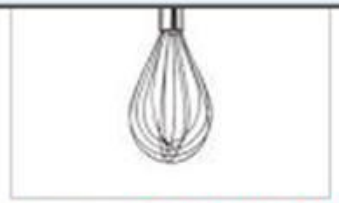


Kitchen knife, cleaver


1-800-731-6031
Only 3
Credit Card
Payments Of
$13.33
Each
Stainless SIX STAR
CUTLERY

Balloon Whisk
800 × 739 - 67k - jpg
jamie-olivers-kitchen-...

Double Balloon Whisk (11-in.
495 × 371 - 17k - jpg
cooking.com



Cuisipro Balloon Whisk
400 × 400 - 38k - jpg
bluecashewkitchen.com

IKEA 365+ HJÄLTE Ballo
whisk
500 × 500 - 13k - jpg
ikea.com

Balloon Whisk 25.0cm
500 × 500 - 30k - jpg
allianceonline.co.uk

Grips Nylon Balloon Whisk
300 × 300 - 11k - jpg
amazon.com

FAVORIT Balloon whisk
500 × 500 - 13k - jpg
ikea.com

Stainless Steel Balloon W
300 × 300 - 41k - jpg
foodiekitchen.com

Balloon Whisk

Jamie Oliver Balloon Whisk

What culinary used in a Chinese Kitchen for preparing and serving meals

Chinese thinking style:

- 中國人： 灵活的， 发散的，
- Flexible, divergent
- Chinese thinking = creative thinking?

Which contains more innovation?

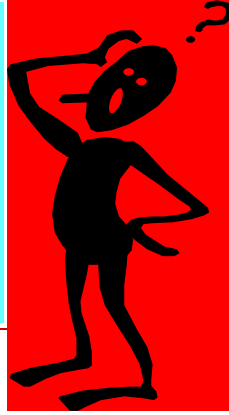
The Needham Question:

- why China had been overtaken by the West in science and technology, despite its earlier successes?
- 钱学森之问

Dr Sun's Question

- **Why did not Chinese invent many new tools in their kitchens,** despite their flexible thinking?

创新，创造，创意，创业，创见，创富，创伤，
发明，发现，发展，发疯，发财，研究，开发，
科学，技术，科技，专利，商标，版权，侵权。



Innovation

Invention

Ideas

Creativity

R&D

Process

New Product Development

S&T

Technopreneurship

Creativity or innovation?

- 创新：应用到商业环境里的创造力和想象力：

- 2006: "Creativity and imagination applied in a business context is innovation." (Business Week: 100 top innovative companies)

Schumpeter's theory on economic growth （熊彼德的經濟增長理論）

- Schumpeterian innovations are the result of 'entrepreneurial behavior' — exploit some latent demand or to attack existing firms with radically new product or process. （以创新为基础的创业）
- Which is the ***engine*** that drives economic growth
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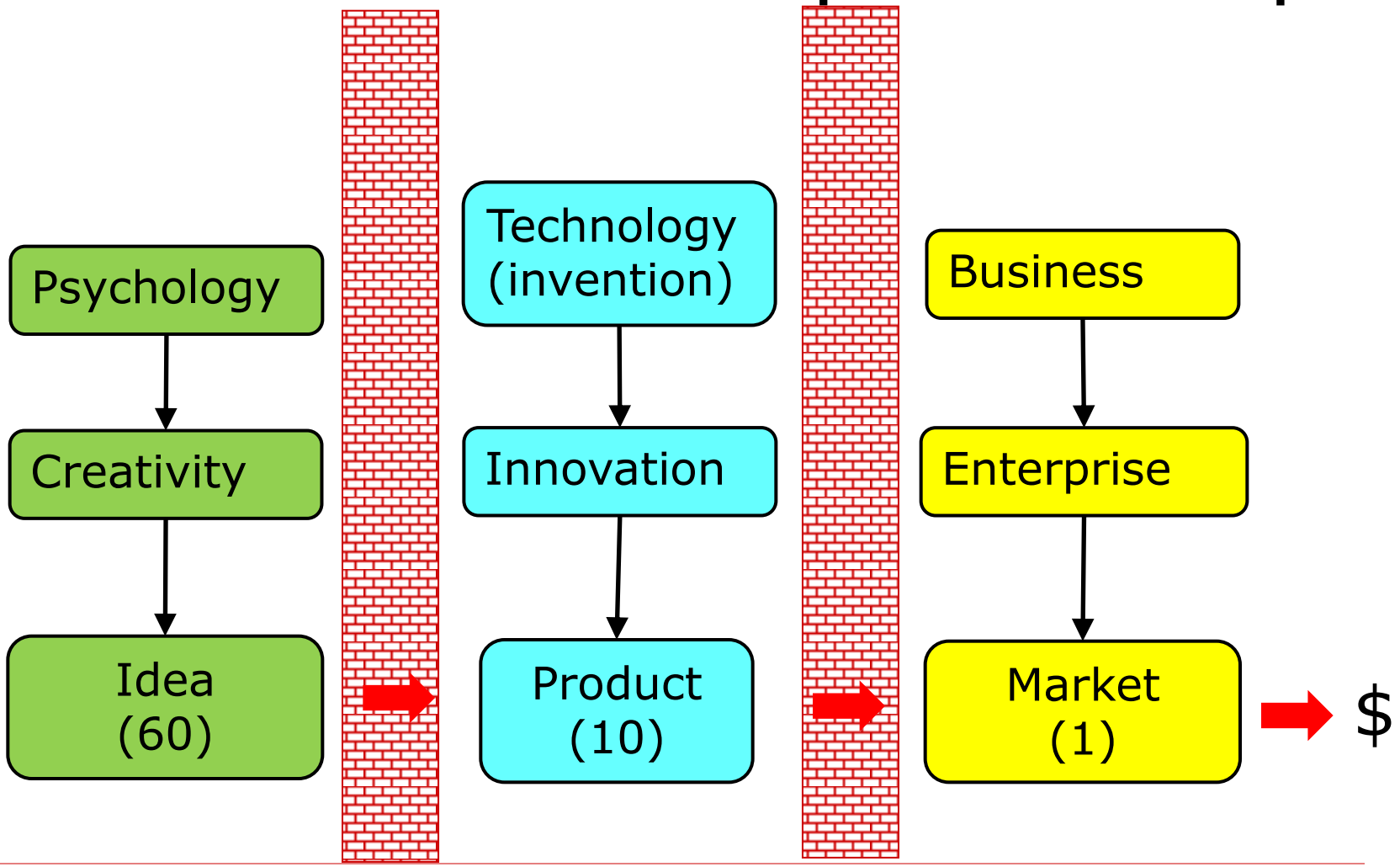
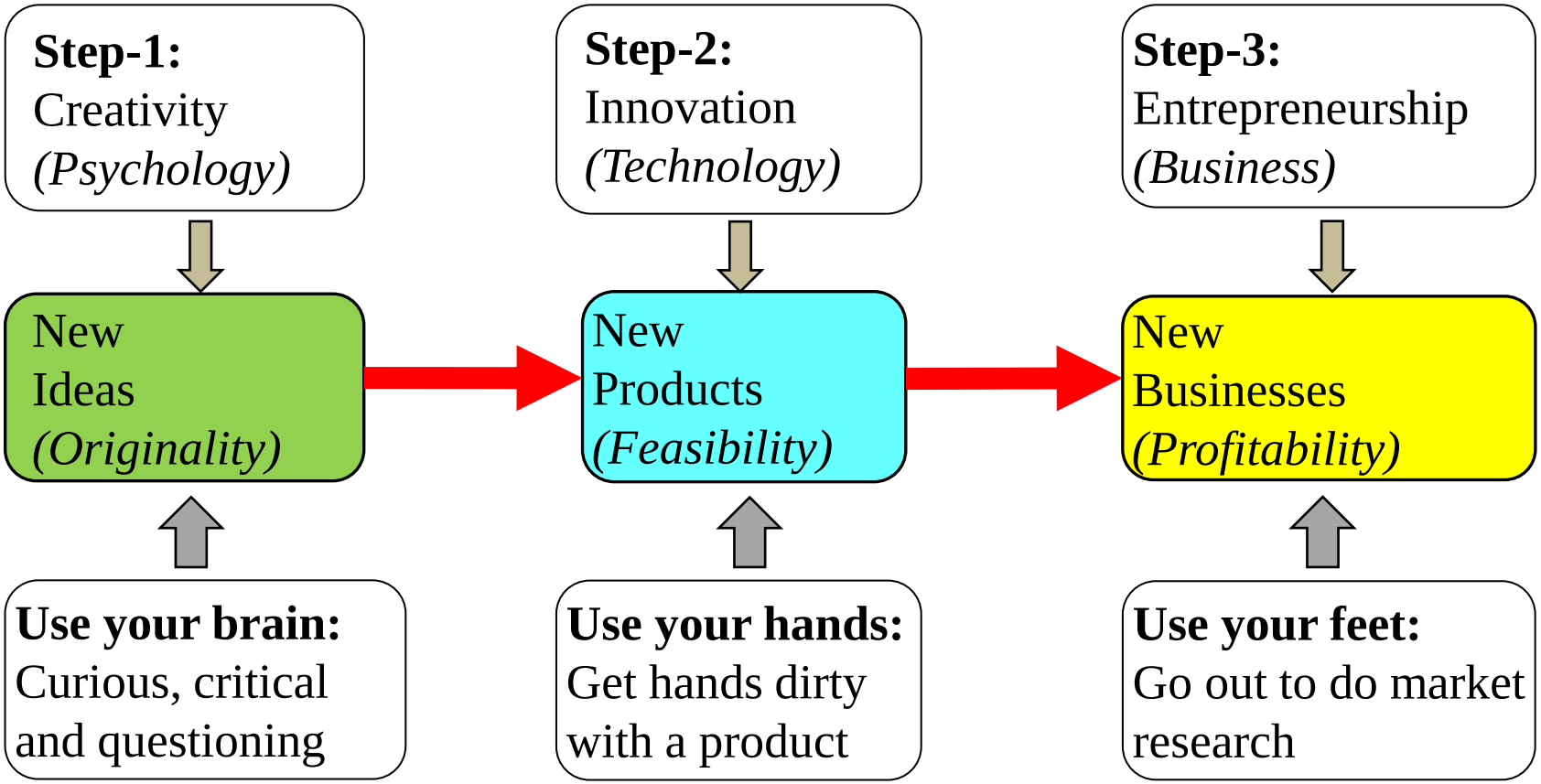
  - (business/management schools)

The Process from Creativity, Innovation to Entrepreneurship



The Cross-disciplinary Syllabus (3-3-3 syllabus*)



*Sun, Hongyi (2011) "The 3-3-3 Framework and 7P Model for Teaching Creativity, Innovation and Entrepreneurship" *Journal of Chinese Entrepreneurship, Vol. 3, No. 2, pp.159 – 166. (Re-printed in a special issue on global perspective on teaching innovation, entrepreneurship & EM, IEEE EM Review)*

Process 过程

If you can not describe what you are doing as a process, you do not know what you are doing.

如果你不能用一个过程来描述你做的事情，你就不知道你在做什么

Dr W. Edwards Deming 1900-1993,

American CI management guru

Chinese Proverb/Confucius:

-Tell me and I will forget
-Show me and I will remember
-**Involve me** and I will understand
-Step back and I will act

- "不闻不若闻之，闻之不若见之；见之不若知之，知之不若行之；学至于行而止矣。" ---荀子《儒效篇》
- "夫耳闻之，不如目见之；目见之，不如足践之。"----汉·刘向《说苑·政理》
- "学而时习之，不亦说乎"----孔子 《论语》
- 千学不如一看，千看不如一练。百闻不如一见，百见不如一干。

The PIPE model for motivating student-centered learning*

Project 项目	Team-based project (Mock company, role play, teamwork, communication)			**Performance** 成绩
Process 过程	Creativity 创造	Innovation 创新	Entrepreneurship 创业	3-steps
	Ideas 新想法 →	**P**roduct 新产品 →	**E**nterprise 新企业 →	(PIPE)
实例/实践 **Practice**	Use brain 动脑	Hands-on 动手	Move Feet 动脚	(Head to Feet)
报告 **Presentation**	报告 1 Report 1	报告 2 Report 2	报告 3 Report 3	Final report

*Sun, H. Y. (2012) The PIPE model for teaching CIE, IEEE TALE Conference, 20-23 Aug. HK

2012/40: 100 problems → 20 ideas →6 new products

3333创造创新创业课©™

3333/PIPE framework

3 Steps	Creativity	Innovation	Entrepreneurship
3 New Problem	New Idea	New Product	New Enterprise
3 Trainings	Brain 動腦	Hand-on 動手	Go to market 動腳
3 sets of capabilities	Questioning Discovery	Handson Active learning	Leadership Risk taking

City University of Hong Kong

SEEM Home

AAA

2013 香港城市大学"创新创业教育"研讨会暨师资培训班

时间： 2013年12月1-6 日, **地点：** 香港城市大学

研讨会日程 讲演专家 培训大纲和日程 培训教师 下载报名表 下载会议邀请 组织委员会 顾问委员会

2013回顾和将来'创新创业教育3-3-3示范课暨师资培训研讨会'的筹划和邀请

"2013年香港城市大学创新创业教育研讨会暨师资培训班"于2013年12月6日圆满完成。按报名顺序，来自华侨大学，河海大学，南京审计学院，华南理工大学，北京大学，湖北经济学院，清华大学，厦门理工学院，中山大学，湖北第二师范学院，大连理工大学，新华都商学院，汕头大学，长庚大学，国立台北大学，和中国科学技术大学的31老师参加了为期一周的研讨会和培训班。在此衷心感谢他们的支持。根据反馈，大部分老师都认为参加这次培训班收获良多，对将来开设创新创业课程会有很大帮助，尤其是提纲挈领的'三创'理念和内容详实的创新创业教育3-3-3课程大纲，第一次把多年来反复议论的、看似既有区别但又有联系的、零零散散的内容系统地整合起来，而7P模式提供了

The PIPE ™© model for Teaching Creativity Innovation and Entrepreneurship

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