第六届亚洲工学院院长峰会（AEDS 2016)
2016 Asian Engineering Deans' Summit

Session 2: Cultivation of Practical Ability of Innovation and Entrepreneurship in Engineering Education

Making Faculty and Students Resourceful

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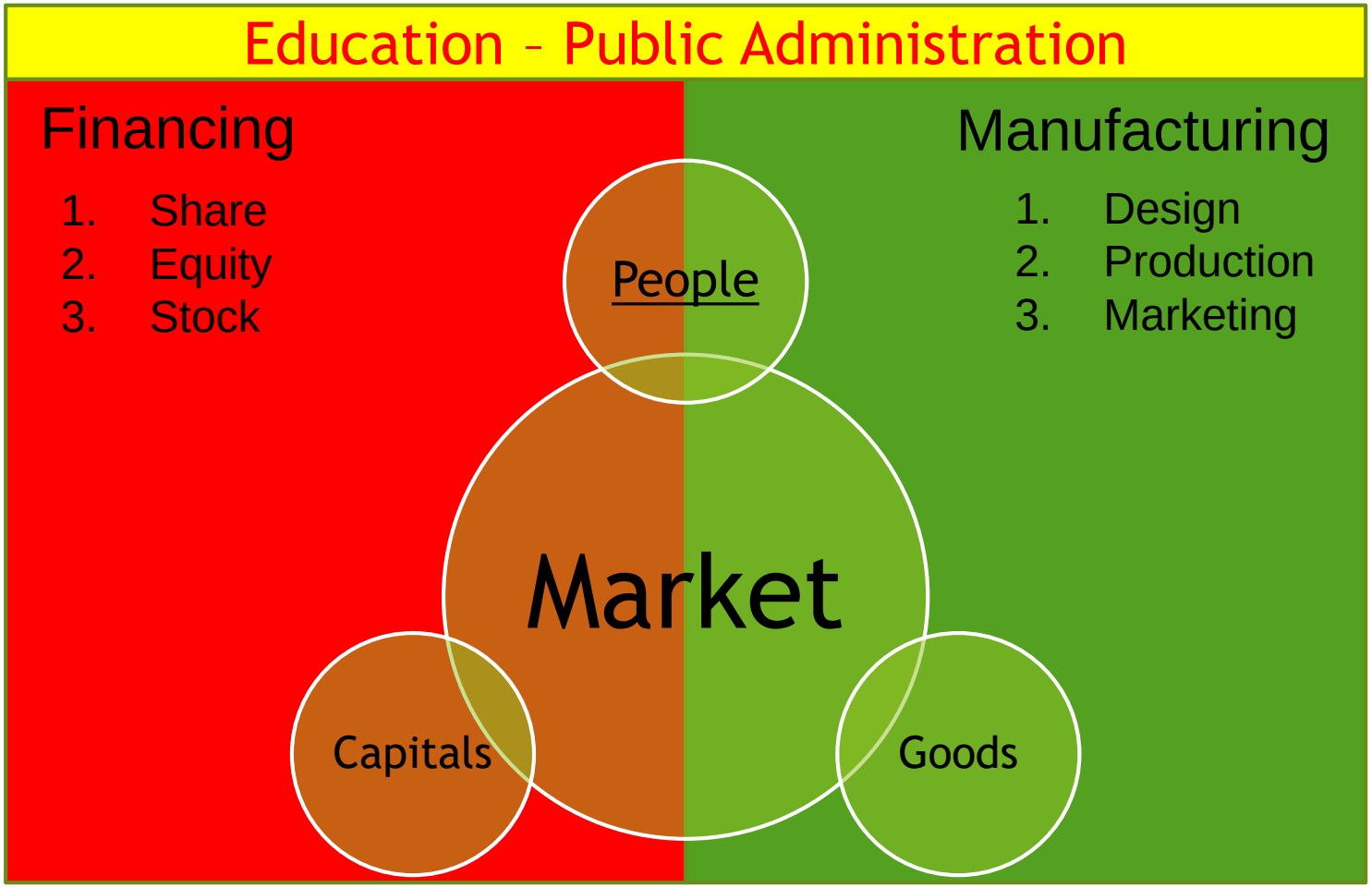
Ecosystem of Innovation and Entrepreneurship



Outline

- Challenges of Making People Resourceful in Asia
- Standard and Practice in Cultivating Students
- Standard and Practice in Cultivating Faculty
- Concluding Remarks

Challenges of Making People Resourceful in Asia

2013-2017年教育部高等学校自动化类专业教学指导委员会-第四次主任工作扩大会议纪要(2016年1月10日)

- 与会教授高度重视工业4.0、互联网+、中国制造2025等国内外发展战略，共同认识到其对我国自动化专业高等教育的巨大挑战和机遇。
- 结合各自通过实地考察、评估评审等多种方式对自动化专业的发展现状的了解，大家提出，国内多数自动化专业存在特色不鲜明、人才培养目标趋同、知识体系和课程体系陈旧、教育教学实践与工业发展脱节、教师队伍缺乏工程经验、教材急需更新等问题。

Extracts from Minutes of One Teaching Advisory Committee Chinese Ministry of Education

柴天佑院士谈到自动化专业存在三方面问题：

- 第一，我们这个专业**没有一个明确的抓手**。
- 第二个问题是，我们现在的教学内容，而且不光是我们的教学内容，**远远落后于需求、远远落后于信息技术的发展**。
- 第三个问题，我们这个专业离不开领域知识。
- 东北大学主导的研究生培养改革：在课程方面，新整合了《控制系统设计》《工业过程优化软件》《数据驱动的智能建模》和《工业过程计算机控制系统设计》四门课程，所有硕士生都要必修；在实践环节方面，关键抓教师，提出晋升“副教授的条件是三个，第一个学术条件，第二个条件是必须有开课能力，第三个条件是必须能设计一个实验，而且能用在教学中”；
- 在培养目标方面，他谈到“**今天我们缺一种人，缺一种什么人呢？系统工程师。美国的系统工程师都是尖子**，中国人在系统工程师的非常少，大部分都是软件开发、硬件开发。”作为特邀专家，他建议教指委“核心问题应该组织讨论会，探讨到底我们这个专业课程内容、课程教材怎么建设？”他认为，“**如果我们的专业要继续存在，教材要重新建设**。”

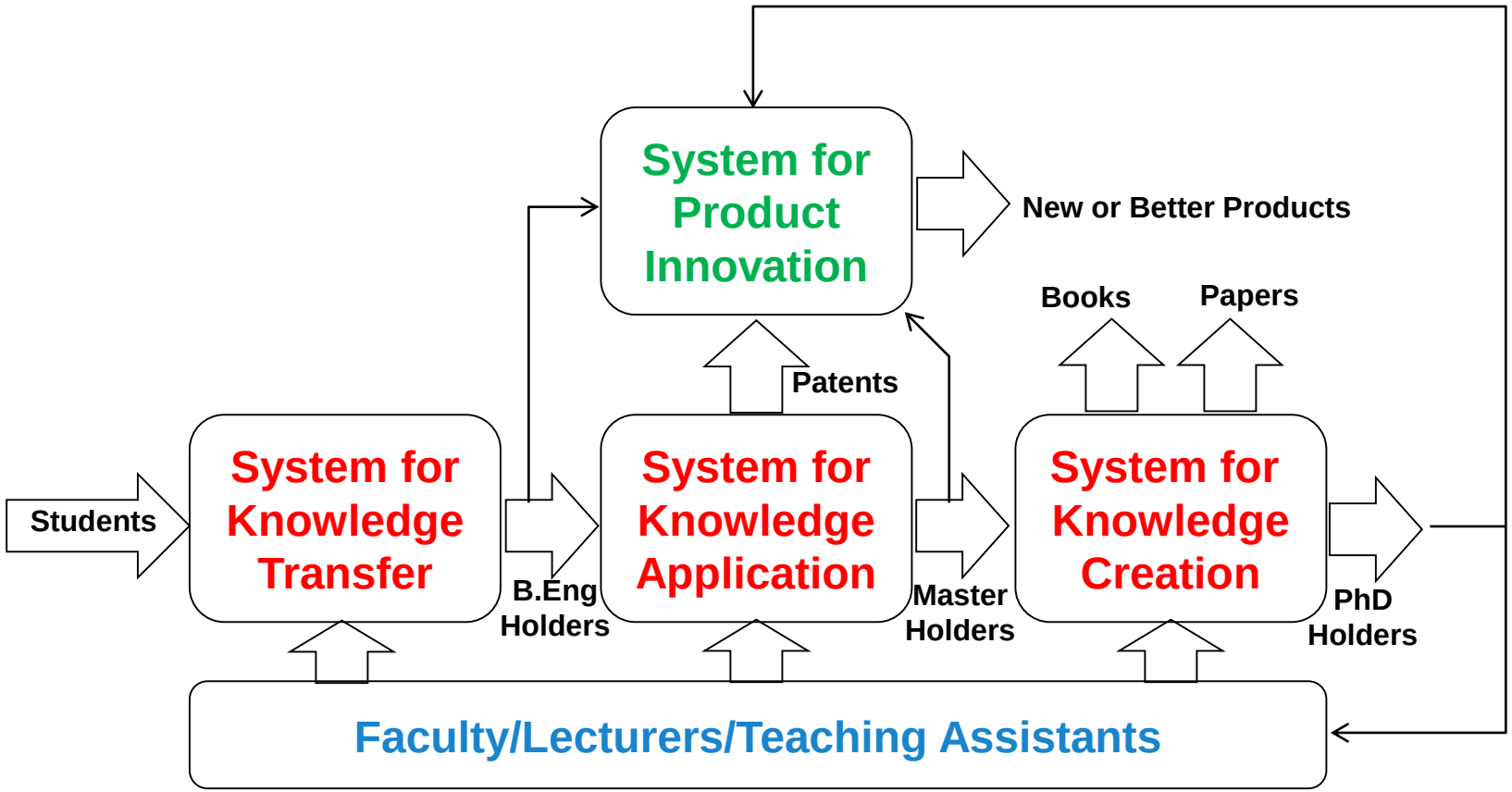
Extracts from Minutes of One Teaching Advisory Committee Chinese Ministry of Education

Cultural Challenges

- Processes versus Outcomes (重果轻因)
- Principles versus Shortcuts (重术轻道)
- Standards versus Labels (重标签轻标准)

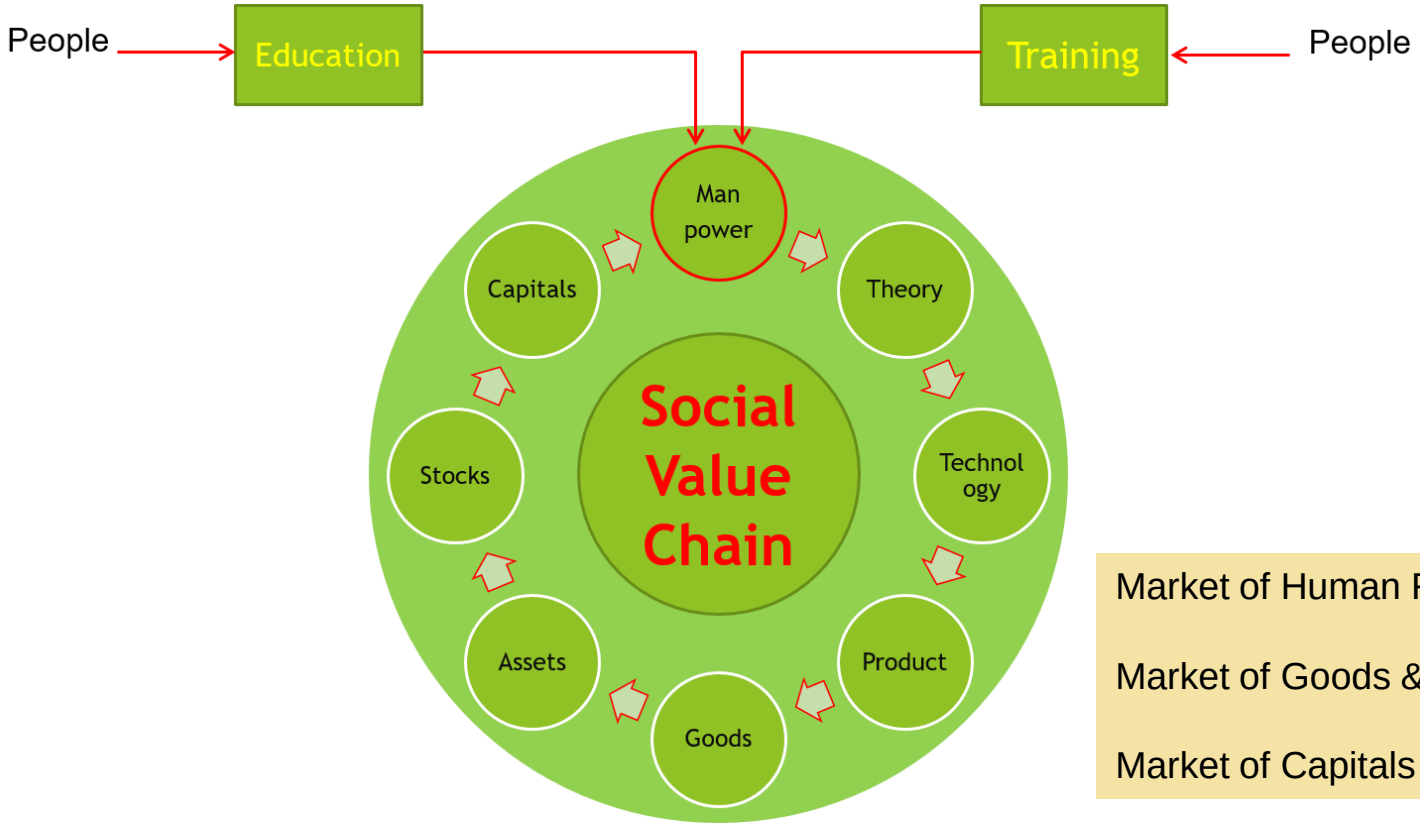
Scientific Challenges

- Lack of Viewpoint of Education as a Big System



Social Challenges

- Out of Balance Between Value Creation and Value Distribution



Market of Human Resources

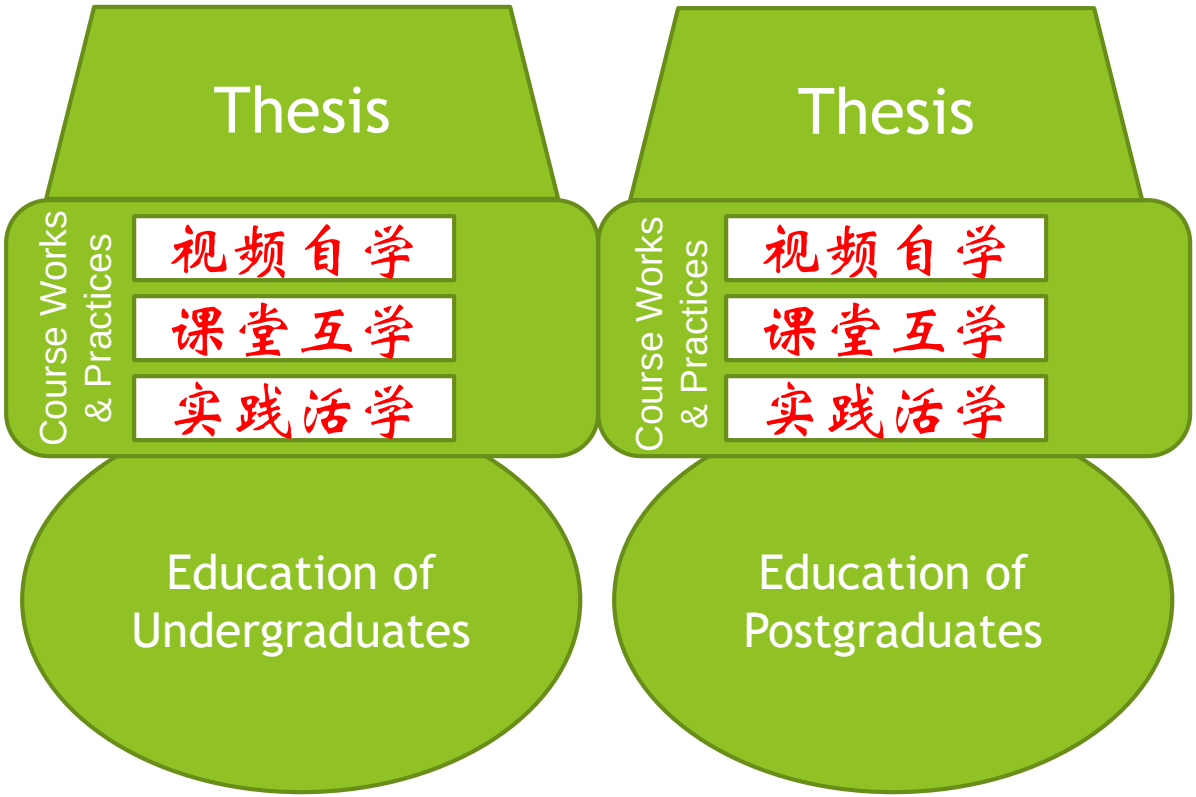
Market of Goods & Products

Market of Capitals

Standard and Practice in Cultivating Students

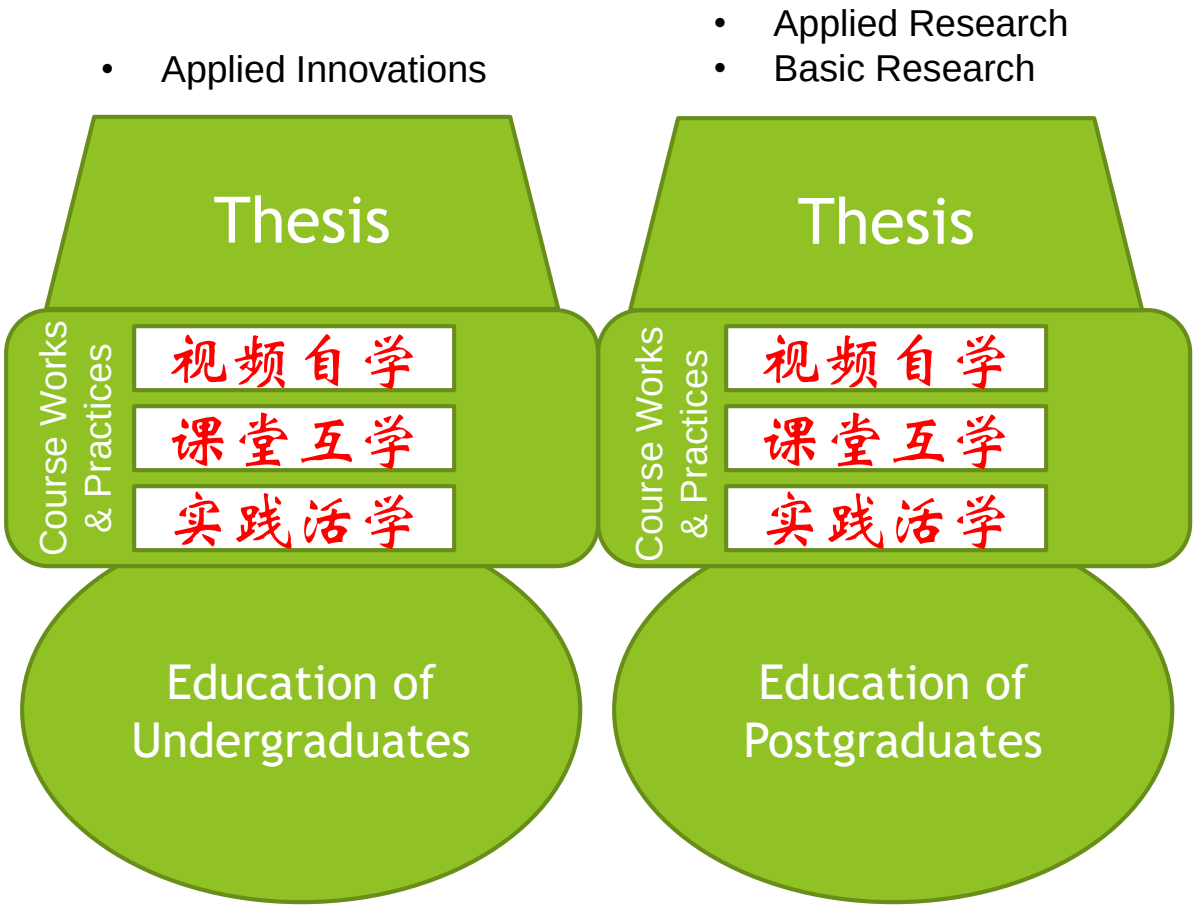
Two Fundamental Questions for Undergraduate Education

- What to learn instead of what to teach?
- How to learn instead of how to teach?



Two Fundamental Questions for Postgraduate Education

- Who is going to do applied research?
- Who is going to do basic research?



What to learn?

1. Theoretical Knowledge
2. Practical Knowledge
3. Information ≠ Knowledge

- 政治课
- 体育课
- 美育课
- 德育课

- 高等数学
- 高等物理
- 计算机原理
- 计算机语言
- 工程数学

- 计算机辅助办公
- 计算机辅助运算
- 计算机辅助仿真
- 计算机辅助设计
- 自然语言 （中文/英语）

Standard of Being Engineers

- 机械系统
- 建筑系统
- 过程系统
- 电路系统
- 电力系统

- 自动控制理论
- 传感器原理
- 执行器原理
- 控制器原理
- 网络及通讯原理

Standard of Being System Engineers

- 过程控制，智能控制，系统工程，现代物流，过程仪器仪表，过程控制工程设计，计算机控制系统，智慧工厂，专业英语，毕业创新作品设计
- 机器人视觉，机器人听觉，人工智能，运动控制原理，遥操作原理，机器人系统设计，智能机器人，智能仪器及装备，专业英语，毕业创新作品设计
- 电力系统分析，电力系统保护与自动装置，发电厂电气技术，新能源技术，高电压技术，电力系统设计与仿真，电力系统自动化，智能电网，专业英语，毕业创新作品设计
- 建筑电气控制，建筑供配电，建筑仪器仪表，建筑信息技术，建筑智能环境，建筑电气系统设计，建筑照明，智慧城市与楼宇，专业英语，毕业创新作品设计

Standard of Being Automation Engineers

What to learn?

1. Theoretical Knowledge
2. Practical Knowledge
3. Information ≠ Knowledge

- 智能电网
- 智能制造
- 智能机器
- 智能建筑

- 高级自控理论
- 高级人工智能

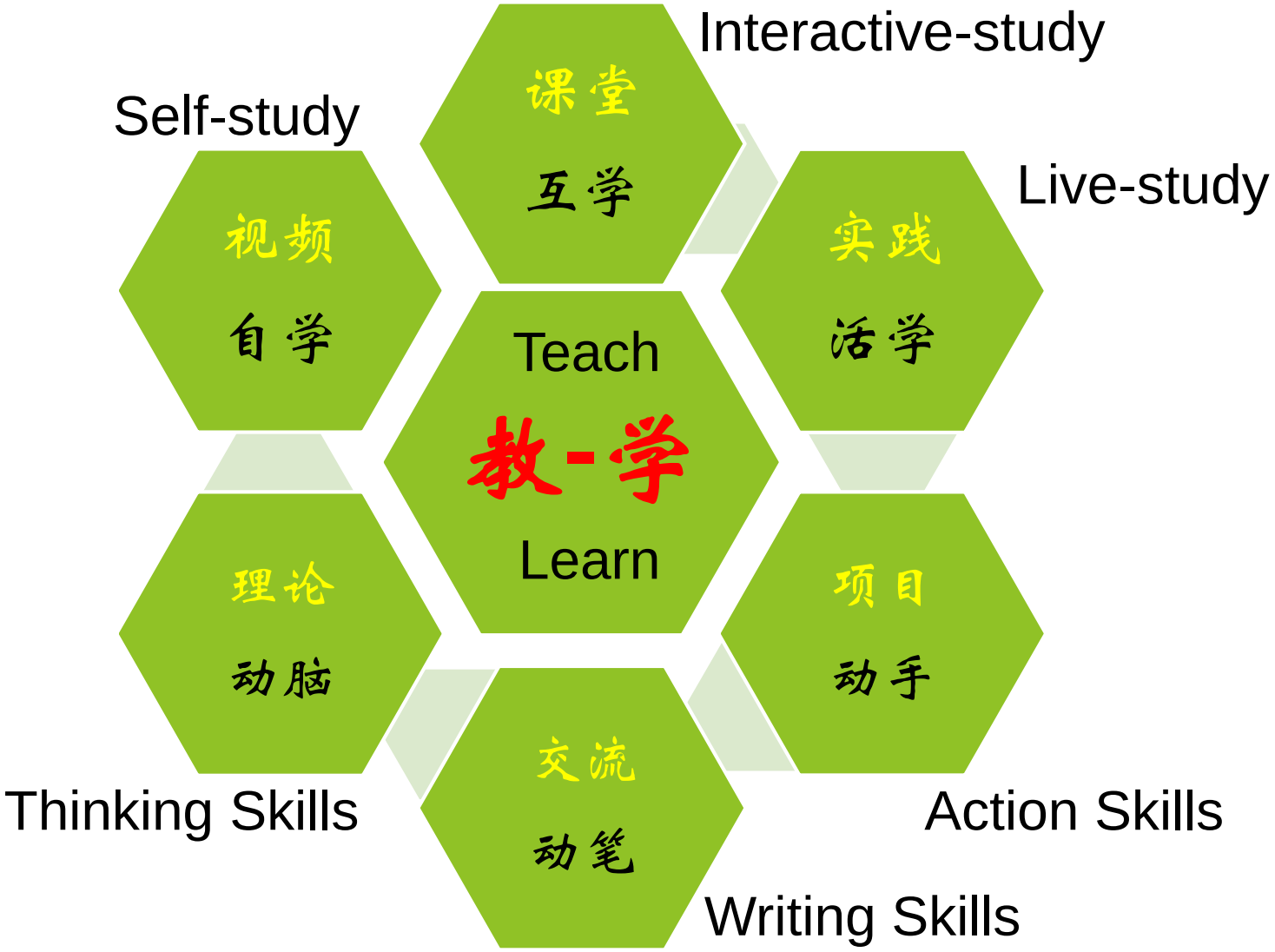
- 中文写作
- 英文写作
- 软件工程

Being Knowledge Communicators

Being Experts of Domain Knowledge

Being Experts of Advanced Domain Technologies

How to learn?


Interactive-study
Self-study
Live-study
课堂
互学
视频
自学
实践
活学
Teach
教-学
Learn
理论
动脑
项目
动手
交流
动笔
Thinking Skills
Action Skills
Writing Skills

Standard and Practice in Cultivating Faculty

Three Fundamental Questions for Cultivating Faculty?

- Who are we?

1. Educators
2. Scientists

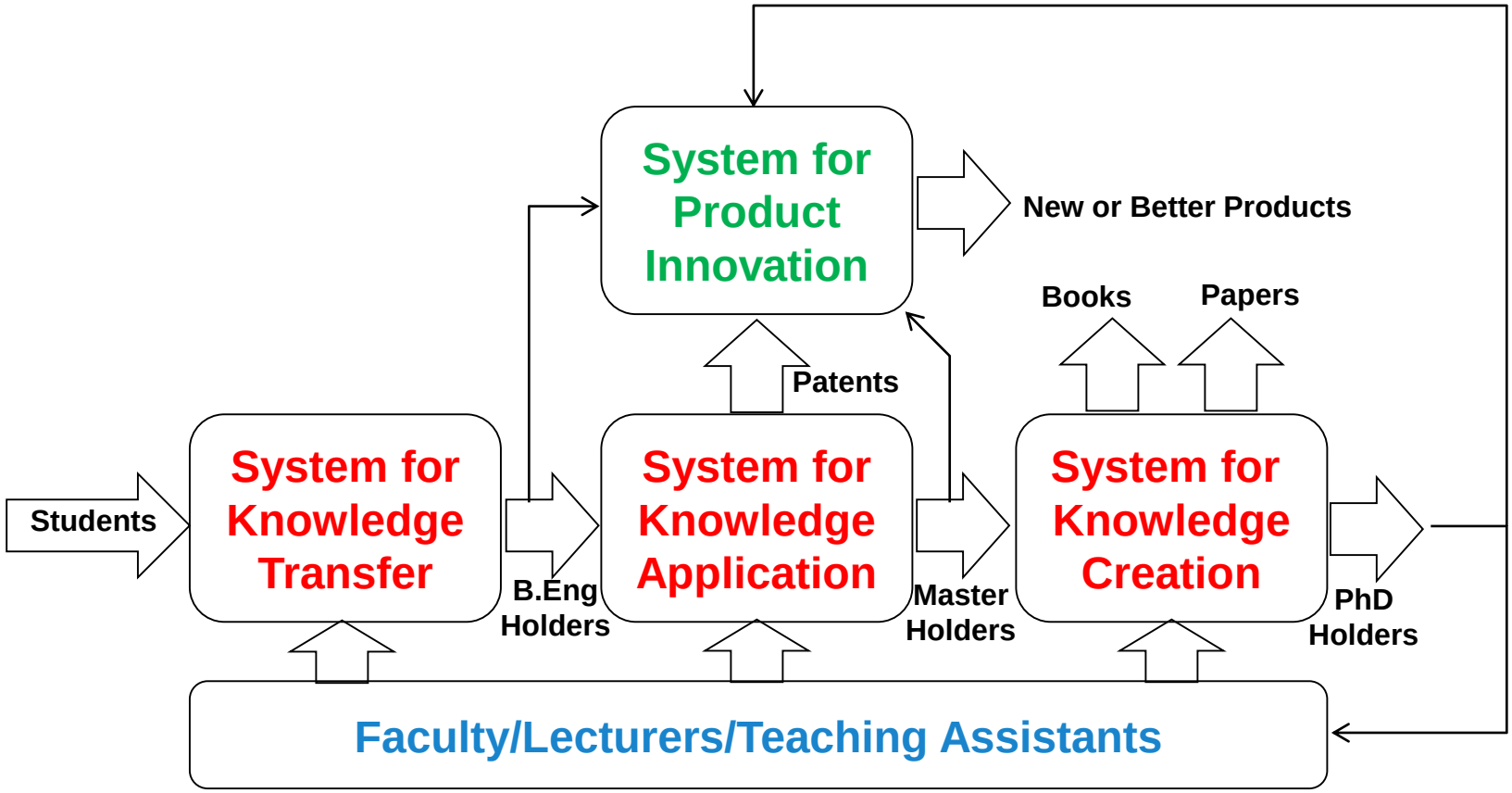
- What should we do?

1. Transfer Knowledge
2. Create Knowledge

- How should we do? (world-wide problem)

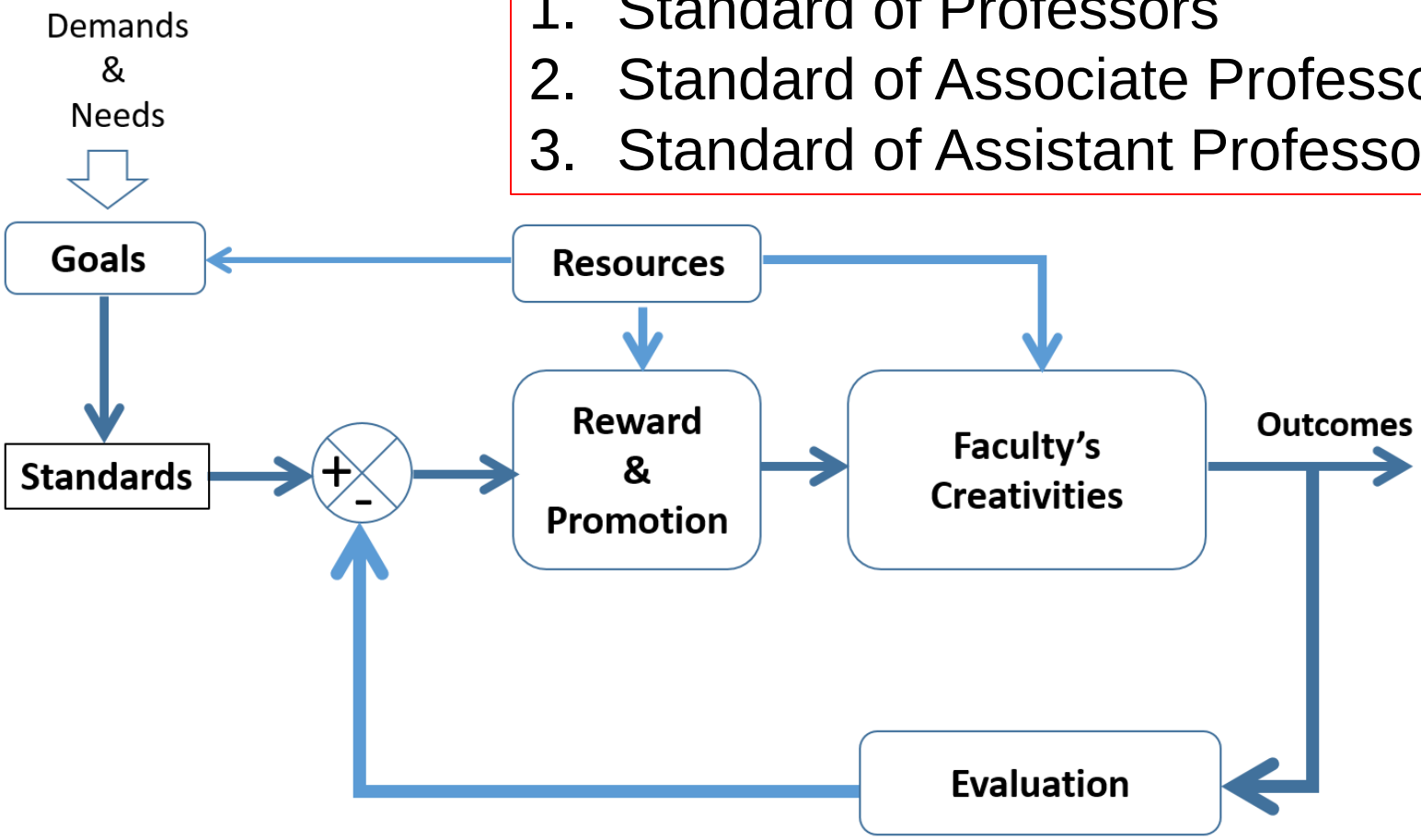
How should we be motivated to do what we should do?

First to Adopt Viewpoint of Systems



Second to Adopt Standard- and Outcome-based Appraisals

1. Standard of Professors
2. Standard of Associate Professors
3. Standard of Assistant Professors

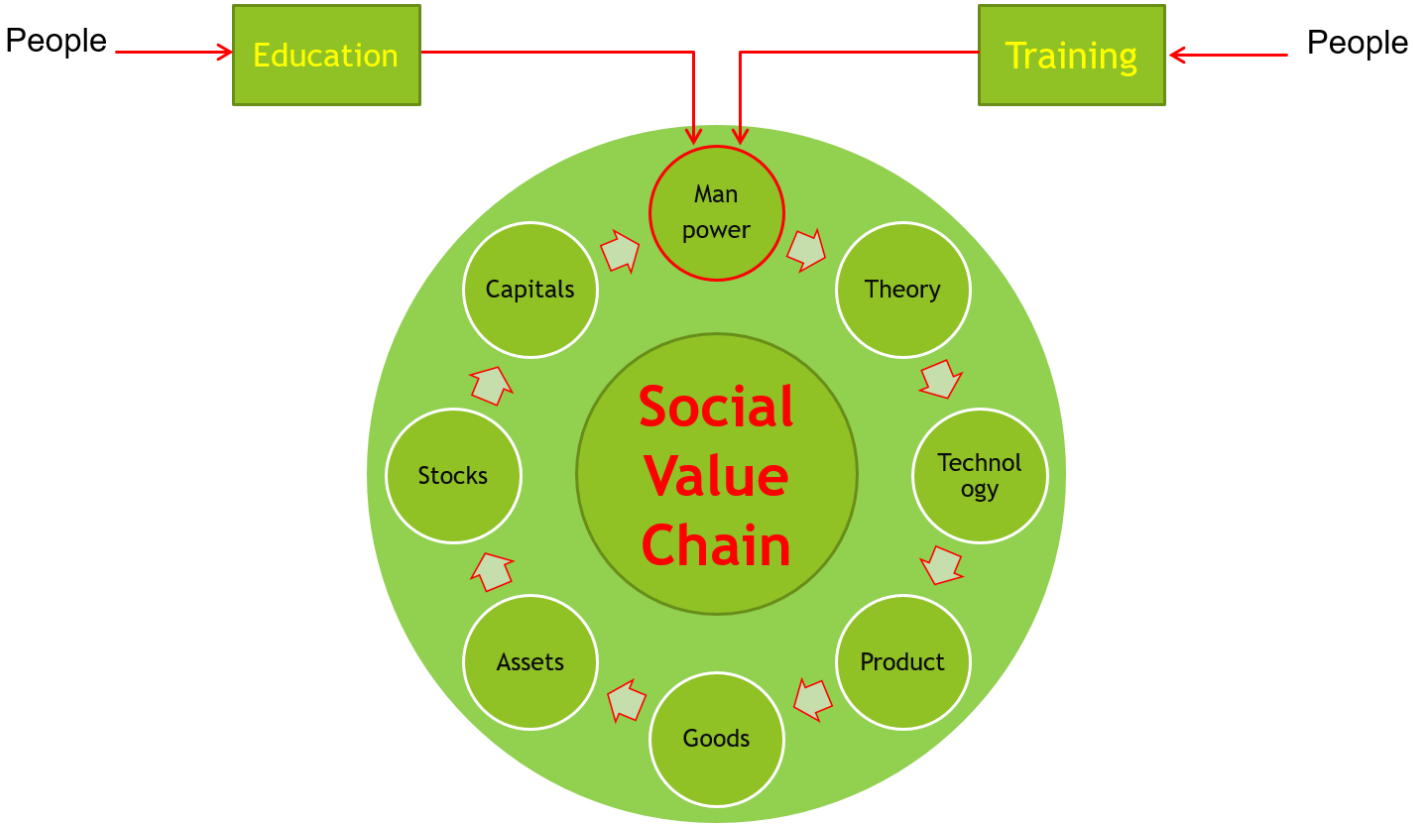


Concluding Remarks

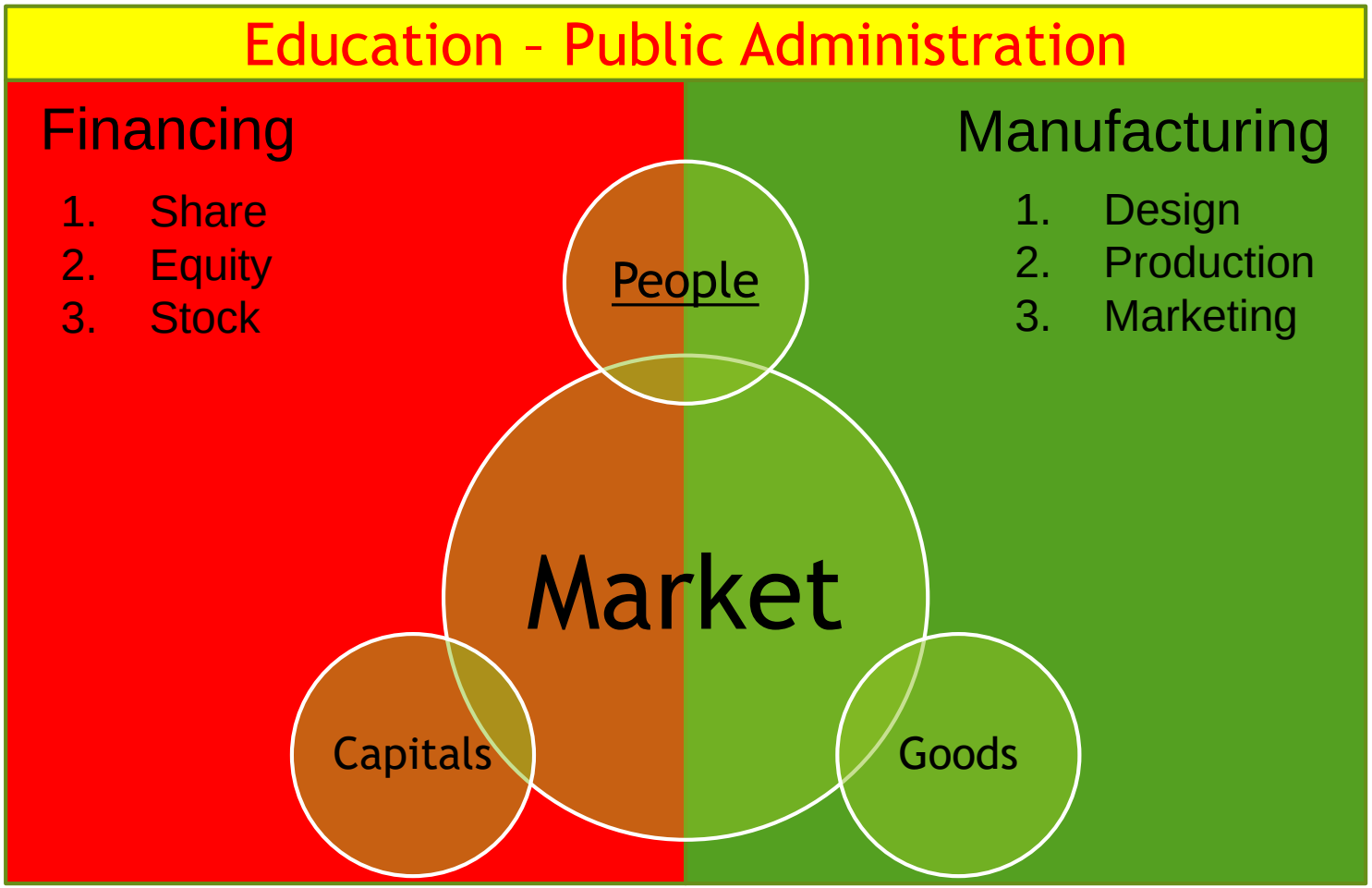
Summary

- We must recognize the challenges faced by making people resourceful in Asia
- We must embrace good standard and practice in order to cultivate our students to be resourceful
- We must embrace good standard and practice in order to cultivate faculty to be resourceful

Secondly, We Must Establish Good Balance Between Value Creation and Value Distribution



Finally, We Must Build a Good Ecosystem of Innovation and Entrepreneurship



Thank You!

Standing on the Shoulder of Giant