Managing & Communicating Knowledge in Three States

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New Knowledge exists in 3 States

- **Scientific Research methodology** ► *Conceptual Discovery*

- **Engineering Development methodology** ► *Prototype Invention*

- **Industrial Production Methodology** ► *Market Innovation*
Discovery State of Knowledge

**Purpose:** Scientific Research methods create new to the world knowledge.

**Process:** Empirical analysis reveals novel insights regarding key variables, precipitated by push of curiosity or pull of gap in field.

**Output:** Conceptual Discovery expressed as manuscript or presentation – the ‘know what.’

**Legal IP Status:** Copyright protection only.

**Value:** Novelty as first articulation of a new relationship/effect contributed to knowledge base.
Invention State of Knowledge

Purpose: Engineering Development methods combine/apply knowledge as functional artifacts.

Process: Trial and error experimentation/testing demonstrates proof-of-concept, initiated through opportunity supply or operational demand forces.

Output: Prototype Invention claimed and embodied as functional prototype - the ‘know how.’

Legal IP Status: Patent protection.

Value: Feasibility of tangible invention as a demonstration of the Novelty of concept.
Innovation State of Knowledge

Purpose: Industrial Production methods codify knowledge in products/components positioned as new/improved products/services in the marketplace.

Process: Systematic specification of components and attributes yields final form.

Output: Market Innovation embodied as viable device/service in a defined context, initiated through a commercial market opportunity – ‘know why.’

Legal IP Status: Trademark protection.

Value: Utility defined as revenue to company and function to customers + Novelty + Feasibility
Knowledge Communication – 3 Strategies for 3 States

Science and Innovation Policy for the generation of technology-based devices and services

RESEARCH ACTIVITY GENERATING DISCOVERY OUTPUTS

Knowledge Translation

DEVELOPMENT ACTIVITY GENERATING INVENTION OUTPUTS

Technology Transfer

PRODUCTION ACTIVITY GENERATING INNOVATION OUTPUTS

Commercial Transaction

MARKETPLACE OUTCOMES AND IMPACTS
Why are these distinctions important?

- National policies and programs are increasingly focused on generating socio-economic benefits.
- These benefits are seen as chiefly arising from technological innovations.
- Dominant theories and practices are seriously flawed in most nations – *China’s 2050 Plan is getting it right.*
Public Support for Knowledge Creation

• **Grant-based Scientific Research Programs** – Exploration to discover new knowledge about physical world (science/medicine).
  
  *Grant-based Scholarship → Peer System → Publish for Tenure.*

• **Contract R&D for Production Programs** – Application of S&E to deliver specified products with national value (defense/energy):
  
  *Contract Production → Performance Specs → Sell for Profit.*

  - These two Programs each work well because their respective systems and incentives are closely and properly aligned.

• **Sponsored “R&D” for “S&T” Innovation** – Generate S&E outputs for commercial exploitation to generate beneficial socio-economic impacts.
  
  *Scholarly outputs for tenure ≠ Corporate requirements for profit*

  - Hybrid Programs have many problems because their systems and incentives are misaligned and incongruent!
Implications for Managing Knowledge & Communicating Information:

- **Awareness of knowledge state:** Method of origin and attributes of output state dictate opportunity and constraints for knowledge application.

- **Avoid confusing jargon and metrics:** Academic ‘impact factor’ bears no relation to societal impact, nor can national innovation be measured as \(((R + D) / GDP)\).

- **Apply proper strategies to transitions between Knowledge States:** Ensure that models, methods and metrics underlying Knowledge Management systems are congruent and designed to communicate information based on rigor and relevance, *not on rhetoric*.
Related Publications


- **Stone, V. & Lane J (2012).** “Modeling the Technology Innovation Process: How the implementation of science, engineering and industry methods combine to generate beneficial socio-economic impacts.” *Implementation Science*, 7, 1, 44. [http://www.implementationscience.com/content/7/1/44](http://www.implementationscience.com/content/7/1/44).


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