National Defense Industrial Association

Reinventing Defense Innovation Ecosystem: S&T Programs to Innovation Programs

15th Annual Systems Engineering Conference

Presented by:

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I N F O L O G I C
The logical approach to harness innovation

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Department of Defense (DoD) Innovation Gap !

What DoD **NEED ?**
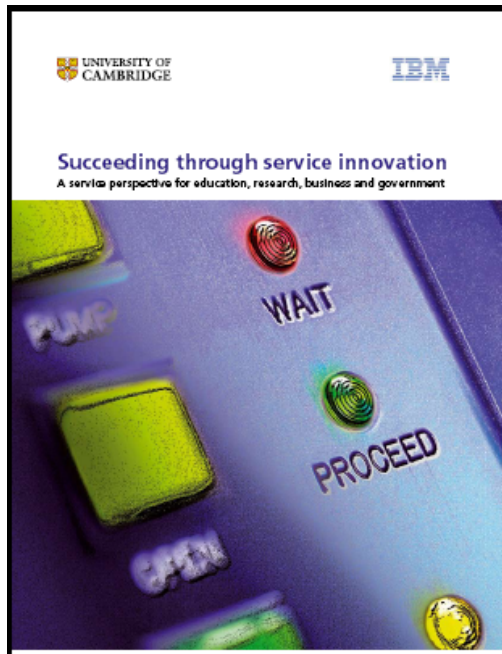
What DoD **INNOVATE !**

Innovation Gap !

1. Mismatch between DoD RDT&E spending and DoD Consumption

2. Notion of Innovation is much broader than Product R&D

3. DoD S&T Challenges: Globally shifting talent, technology and pace of Innovation

Fact Check: Service Science

- *"Service systems are dynamic configurations of people, technologies, organizations and shared information that create and deliver value to customers, providers and other stakeholders".*

- *"The importance of service has not led to increased investment in service research and development…. This mismatch hinders the progress we could make to address many challenges."*

- *"Innovation, a term applied almost exclusively to technologies in the past, is increasingly used in relation to service systems".*

Fact Check: DoD Service –v- Product Contracts ($Billion)
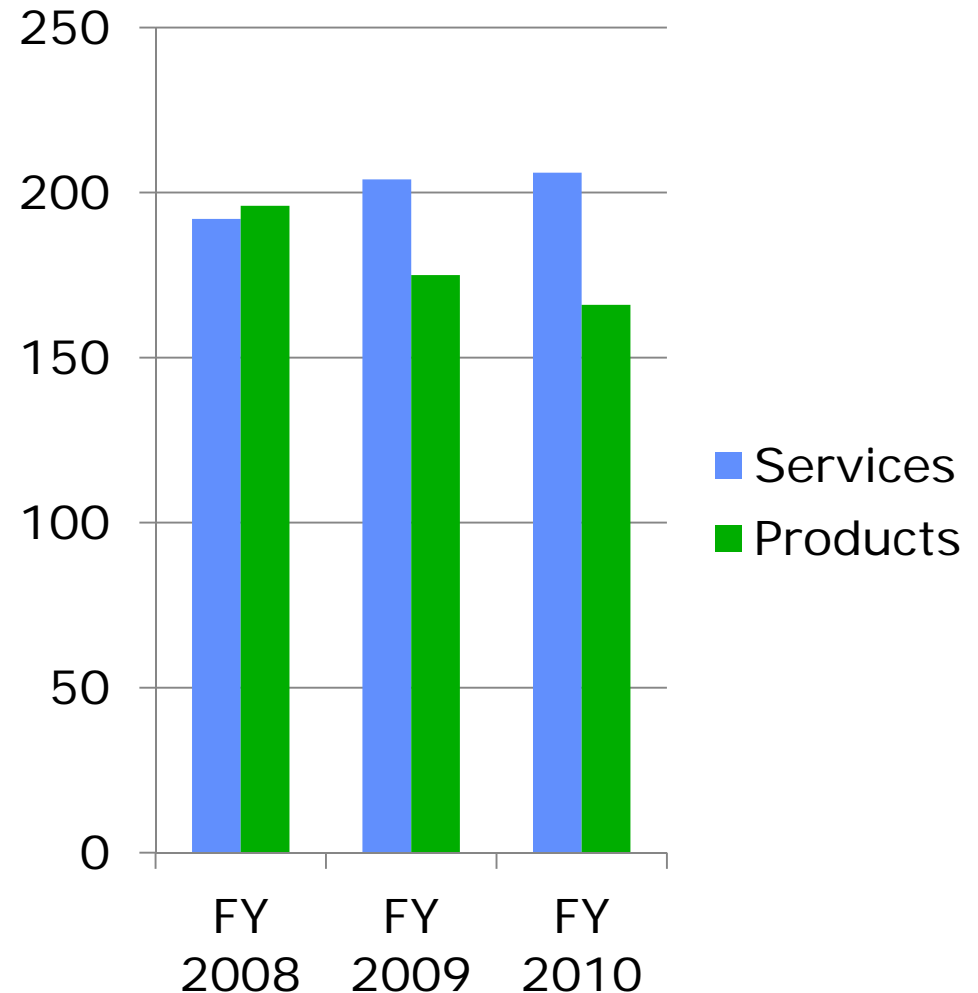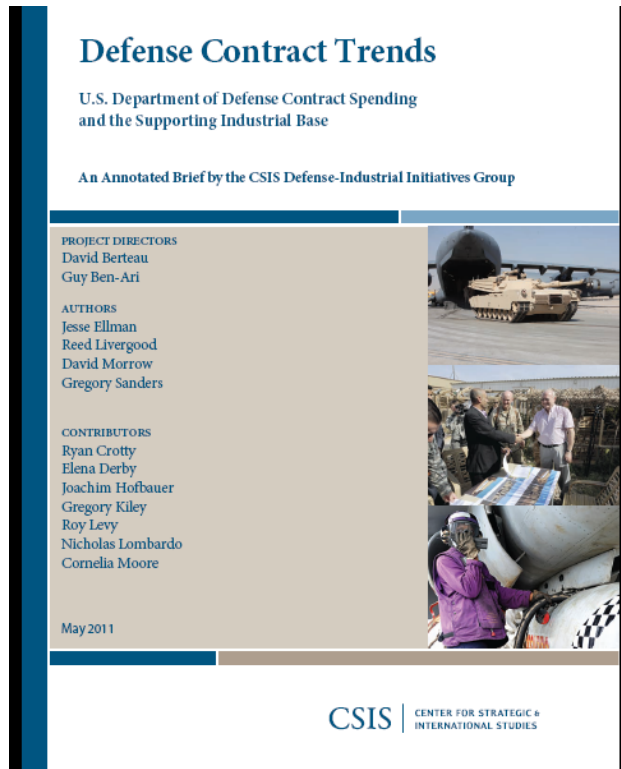
The America Competes Act (S.761)

Section 1106: Study on Service Science.

" ….. would also express a sense of Congress that the federal government should better understand and respond strategically to the emerging management and learning discipline known as "service science."
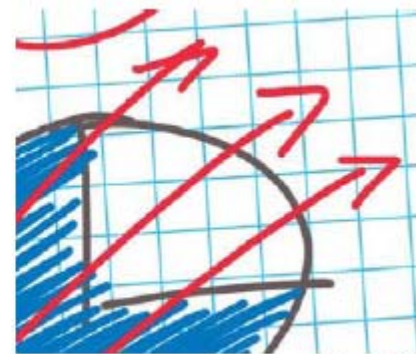
Fact Check: OECD Innovation Strategy

Ministerial report on the
OECD Innovation Strategy

*Innovation to strengthen growth and
address global and social challenges*

Key Findings

May 2010

" ....There is growing recognition that innovation encompasses a wide range of activities in addition to R&D, such as organisational changes, training, testing, marketing and design.... Innovation, thus defined, is clearly a much broader notion than R&D"
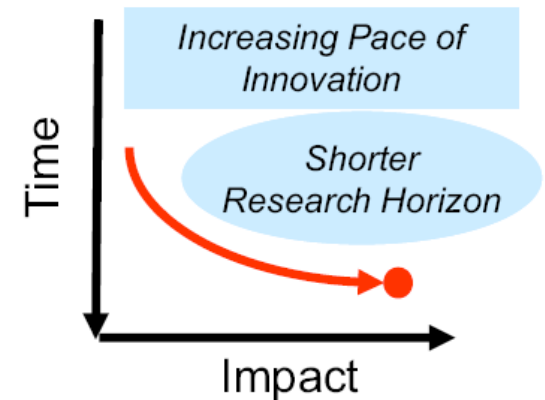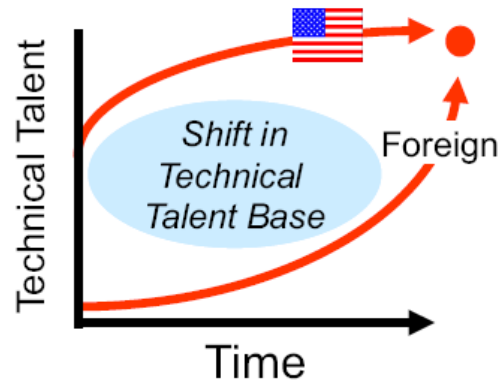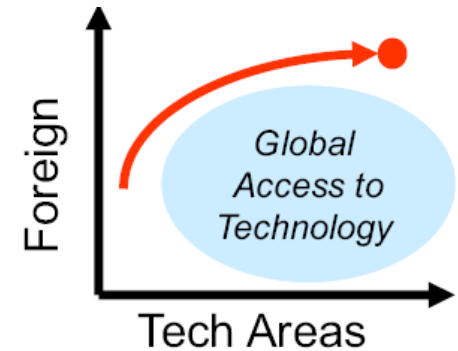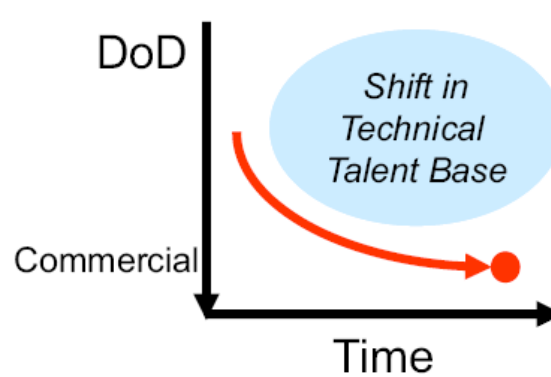
Fact Check: Defense Key Challenges - S&T

Department of Defense S&T Priorities

22 June 2011

The Honorable Zachary J. Lemnios
Assistant Secretary of Defense for Research and Engineering

Fact Check: Expert Views on Innovation

Corporate

- "I can't sustain a significant research activity at IBM if our research is not relevant to more than half of the company's revenues going forward" Dr. Paul Horn, Senior VP of Research at IBM, 2006.

Academia

- In "Innovation: The Classic Traps" professor Rosabeth Moss Kanter of the Harvard Business School says the most common mistake companies make is to apply traditional corporate processes to new project

Fact Check: Innovation Type & Academic Discipline

Product

- NAICS: 54171 (Physical, Engineering and Life Sciences) for Hard products (Goods)
- NAICS: 54172 (Social Science, Humanities) for Soft products (Services).
- Examples: iPhone, ATM…..iTunes, Amazon, PayPal

Process

- NAICS: 54172 (Social Sciences and Humanities; Management and Information Sciences).
- Examples: Apple Apps Development environment, CMMI, eCommerce
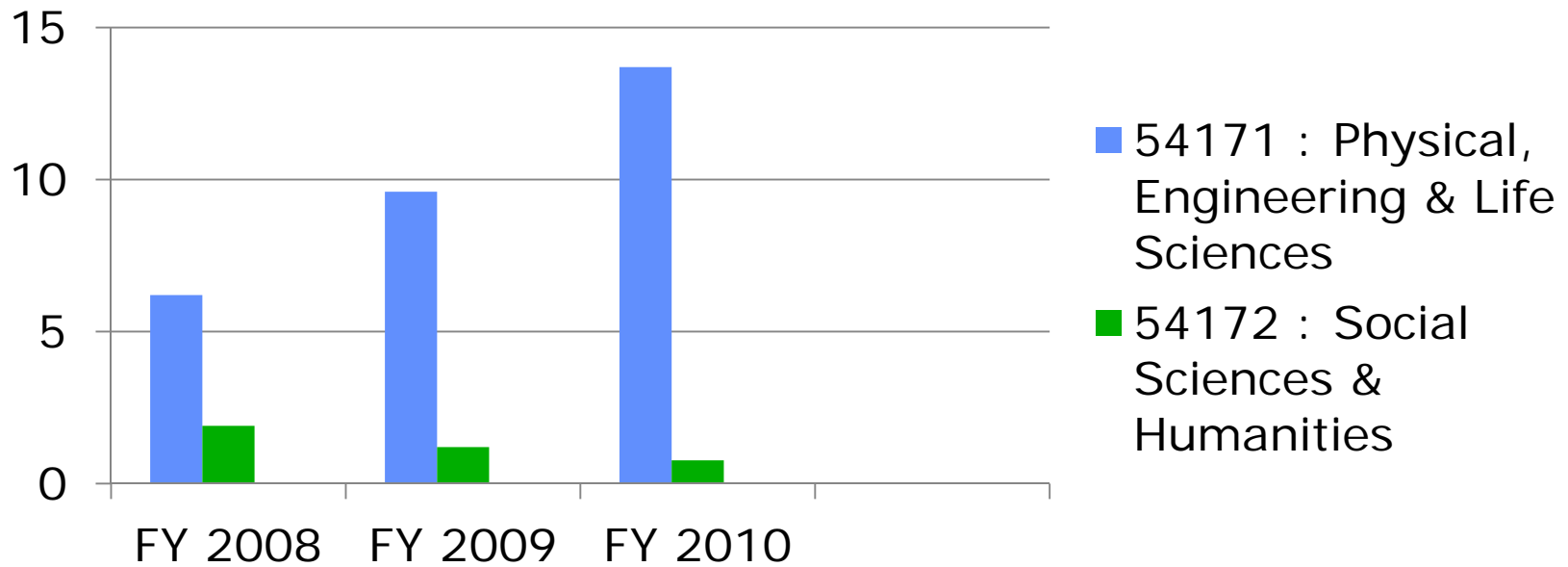
Execution

- NAICS: 54172 (Social Sciences and Humanities; Management and Information Sciences).
- Examples: Apples store, Google Pay-per-click model

Fact Check: Global Innovation Spending

2012 GLOBAL R&D FUNDING FORECAST

- Global $ 1.4 T
- USA Total $ 436 B
- USA Federal $ 125 B
- USA DoD $ 75 B RDT&E (BA 1-7)
- USA DoD $ 12 B S&T (BA 1-3)

Fact Check: DoD S&T (BA 1-3) Contract Spending by R&D NAICS ($ Billions)

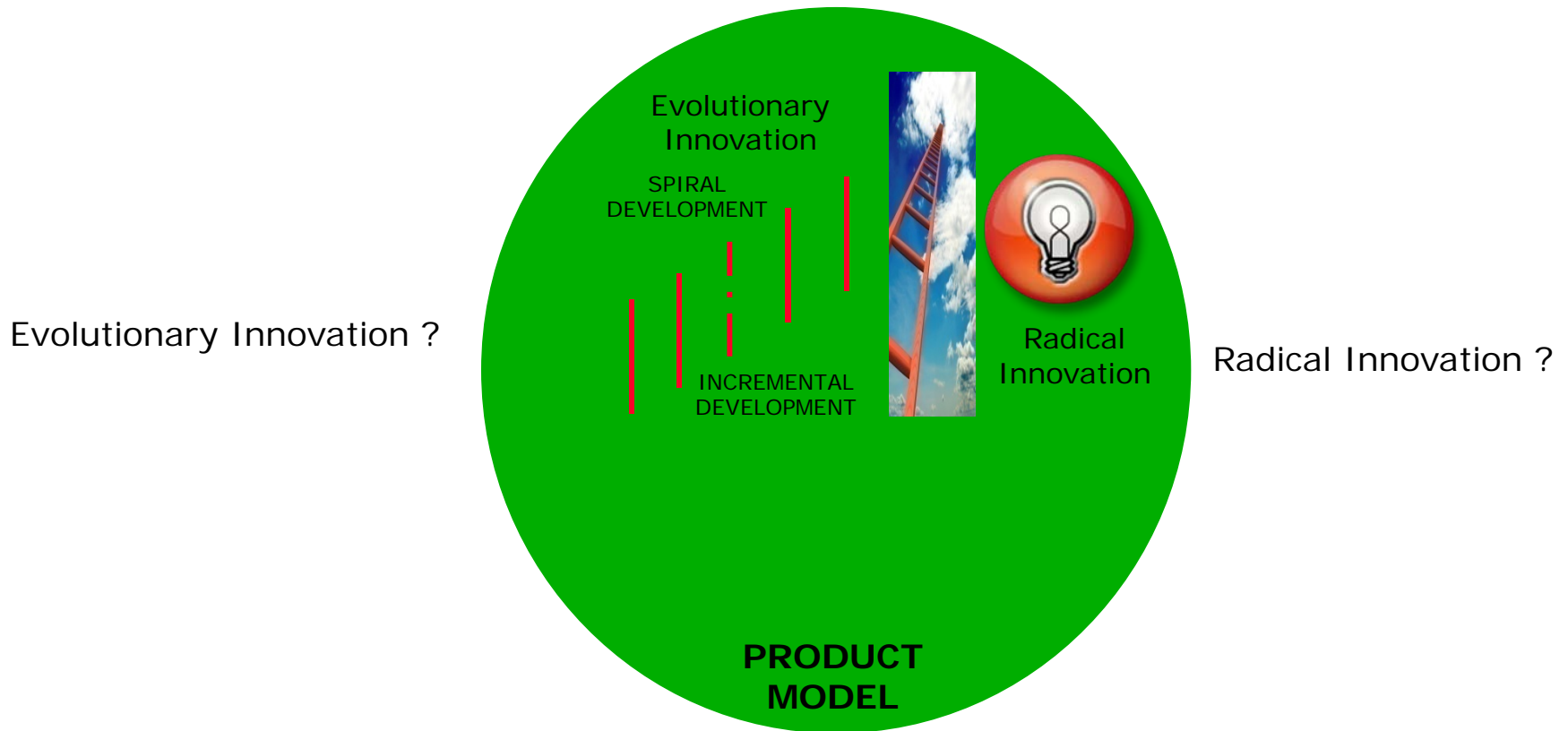# Defense Innovation – a broader notion than S&T

Innovation

Agenda

- Innovation: Radical and Evolutionary R&D into Products (including Services); Processes, and Execution models
- Platforms: Open Innovation, Integration, Stakeholder Involvement, Technology Transition and Transfer
- Analytics: Technology Maturity Analysis, Capability Maturity Model, Enterprise Performance Model

Innovation = f (Product, Process, Execution) : $I=p2e$©

Product

Process

Execution
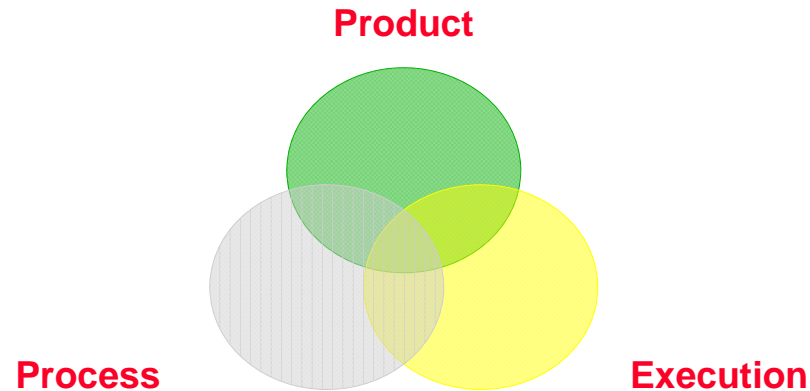
- **Product:** Hard (GOODS: A product that you can touch, e.g. Airplane, iPhone) OR Soft (SERVICE: A product that you can't touch, but experience, e.g. iTunes, Amazon, FedEX)

- **Process:** Any critical business process to ensure the success of product (e.g. Apps Development platform for iPhone, CMMI ® for Software)

- **Execution:** Management policies, plans and strategies to ensure that Innovation produces desired outcomes and ROI (e.g. Apple store, Google Pay-per-click model)

Evolutionary
Innovation

SPIRAL
DEVELOPMENT

INCREMENTAL
DEVELOPMENT

Radical
Innovation

Evolutionary Innovation ?

Radical Innovation ?

**PRODUCT
MODEL**

Model: Product – Platforms
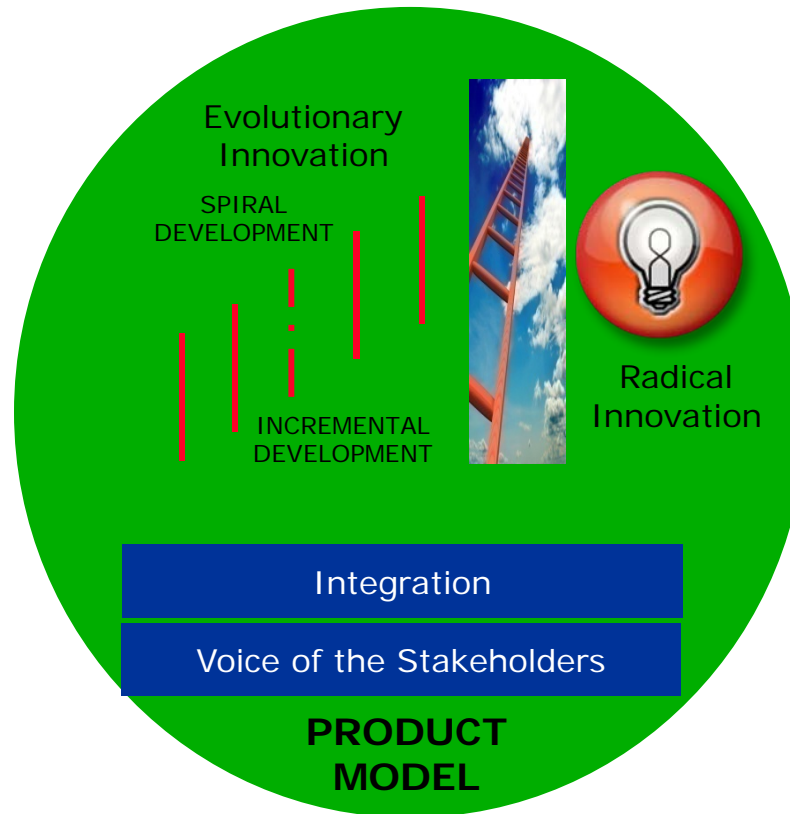
- Integration
- Voice of stakeholders?

Evolutionary Innovation

SPIRAL DEVELOPMENT

INCREMENTAL DEVELOPMENT

Radical Innovation
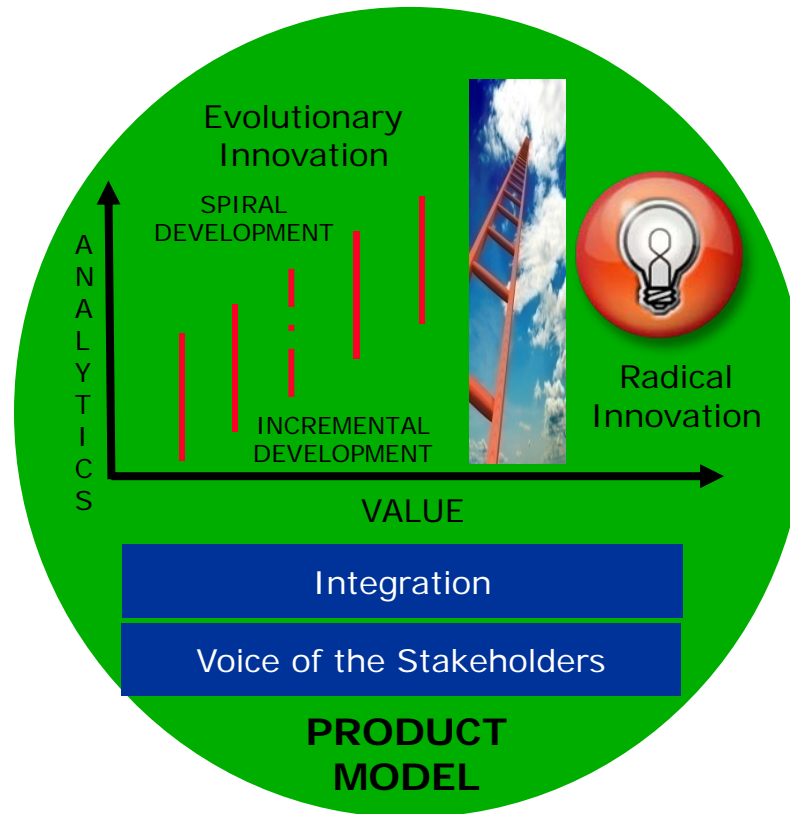
Integration

Voice of the Stakeholders

PRODUCT MODEL

Model: Product — Analytics
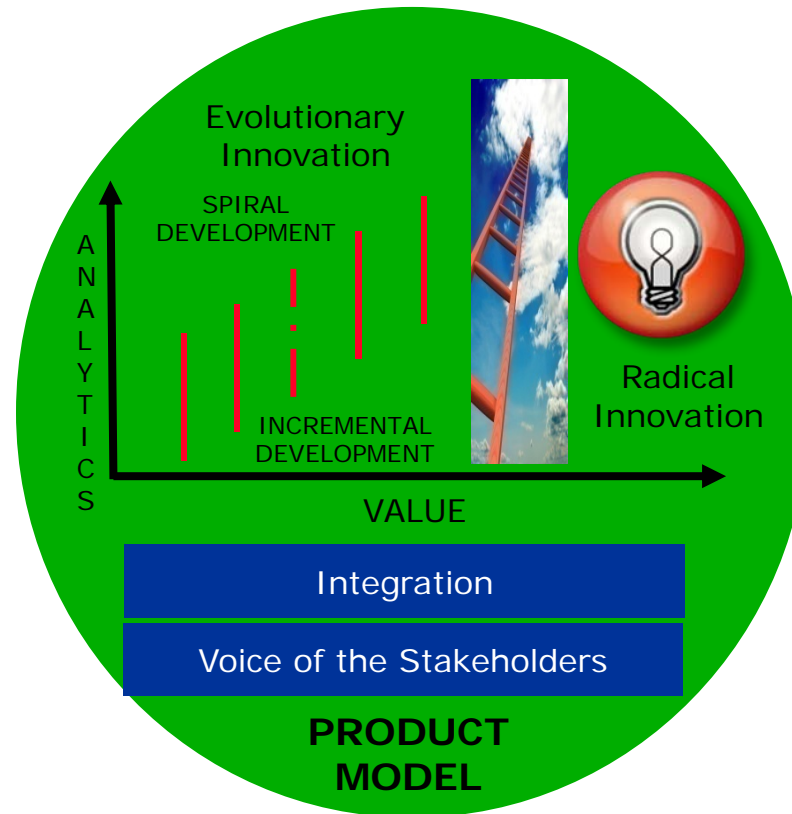
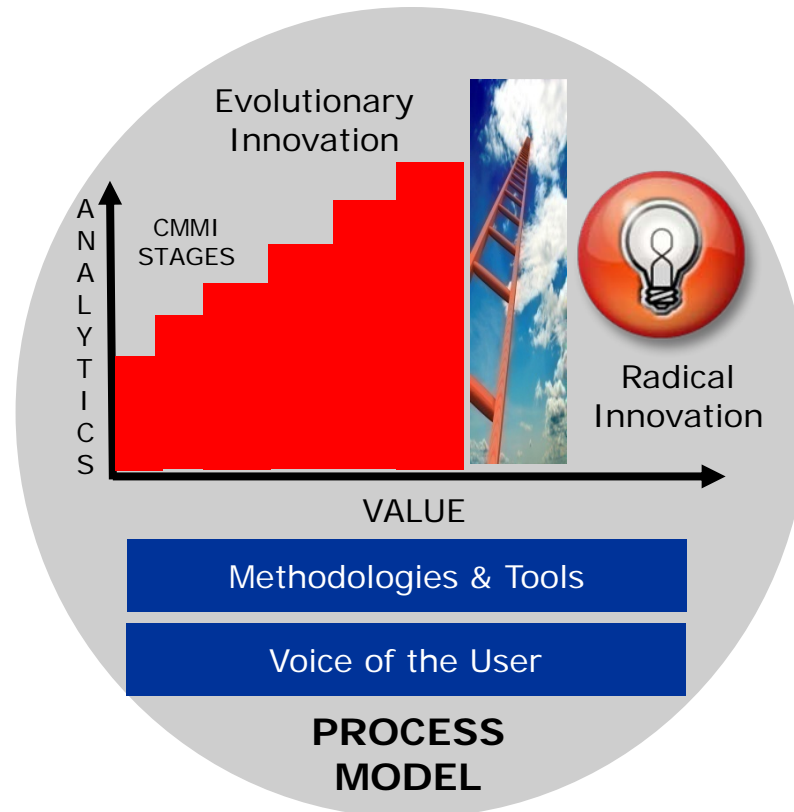- Research Maturity ?

- Product Maturity?

- Risk reduction methodologies: TRL / MRL / SRL

Model: Product

Currently, this function is conducted **partially** by traditional S&T Programs and R&D Laboratories

Model: Process

Currently, this function is conducted **partially** by various corporate organizations, e.g. CTO office, PMOs, Operational units, IT, Corporate planners and consultants

Model: Execution
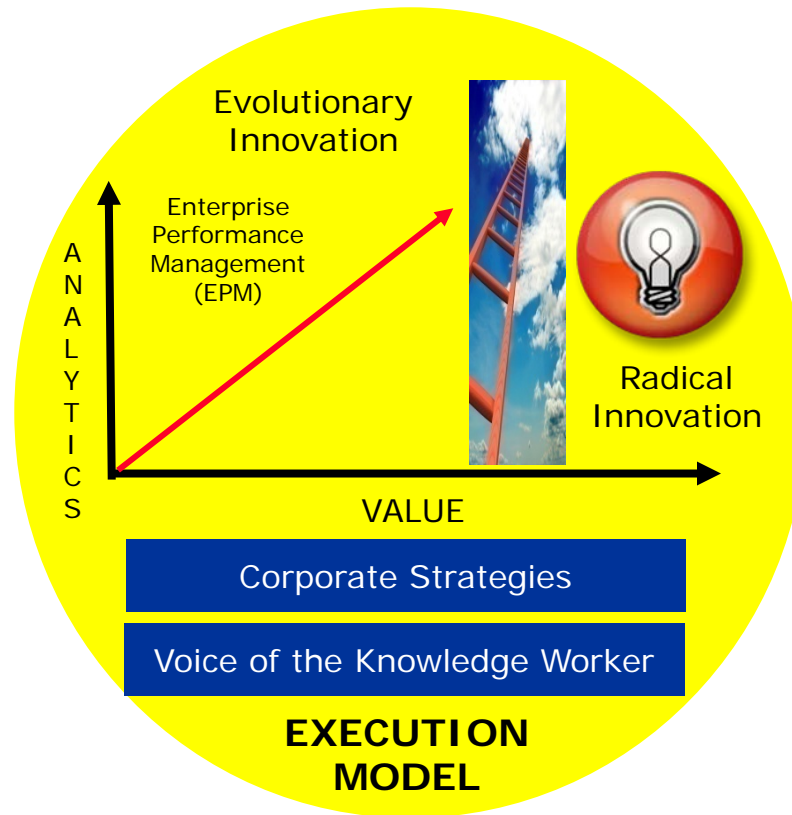
Currently, this function is conducted **partially** by Executive & senior management, CTO, CIO, and Business Process Reengineering groups and consultants.

Innovation = f (Product, Process, Execution) : *I=p2e©*

PRODUCT MODEL

EXECUTION MODEL

PROCESS MODEL
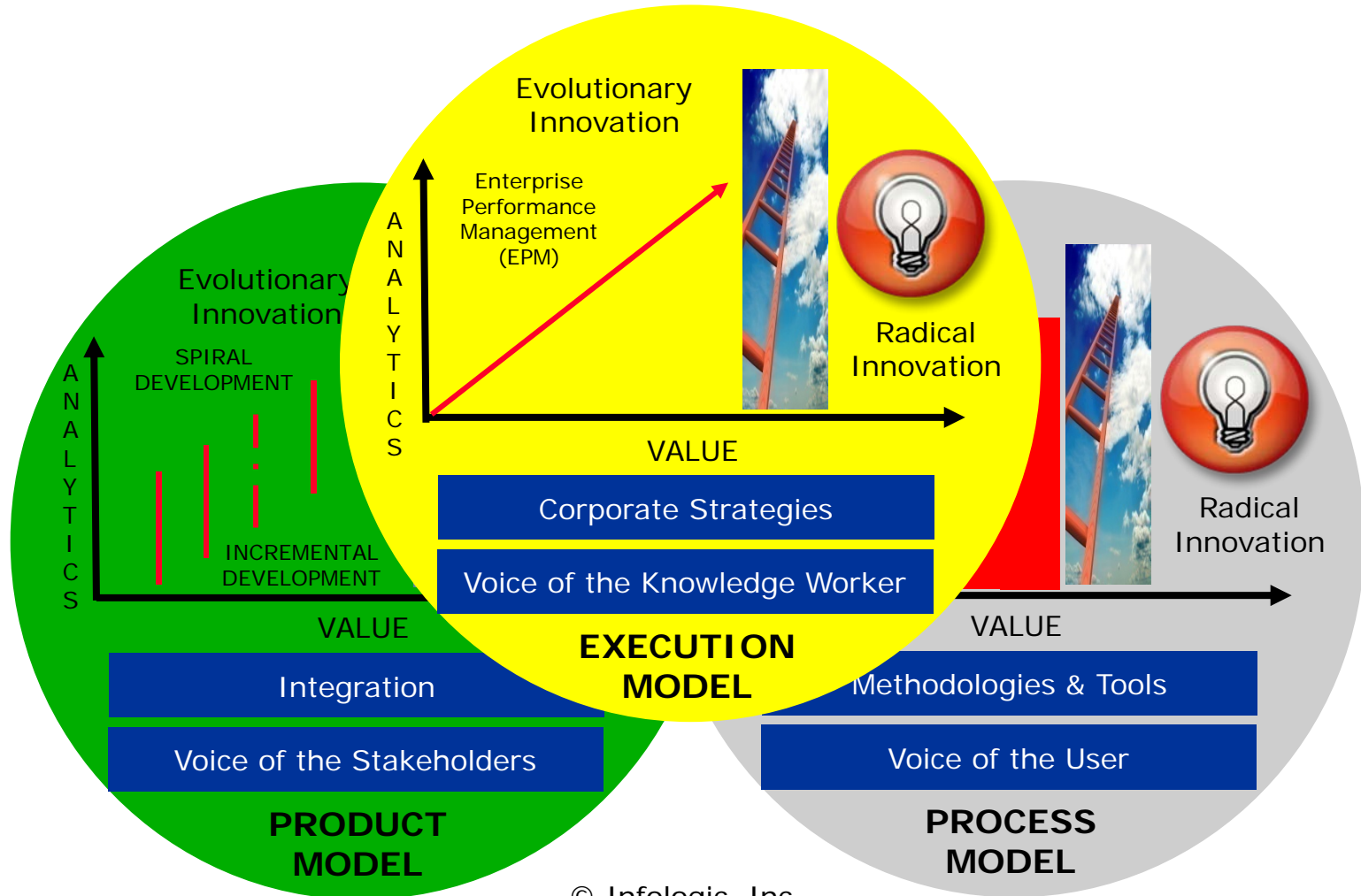
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Reinventing Defense Innovation Ecosystem: "S&T Programs" to "Innovation Programs"

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S&T Programs

Innovation Programs

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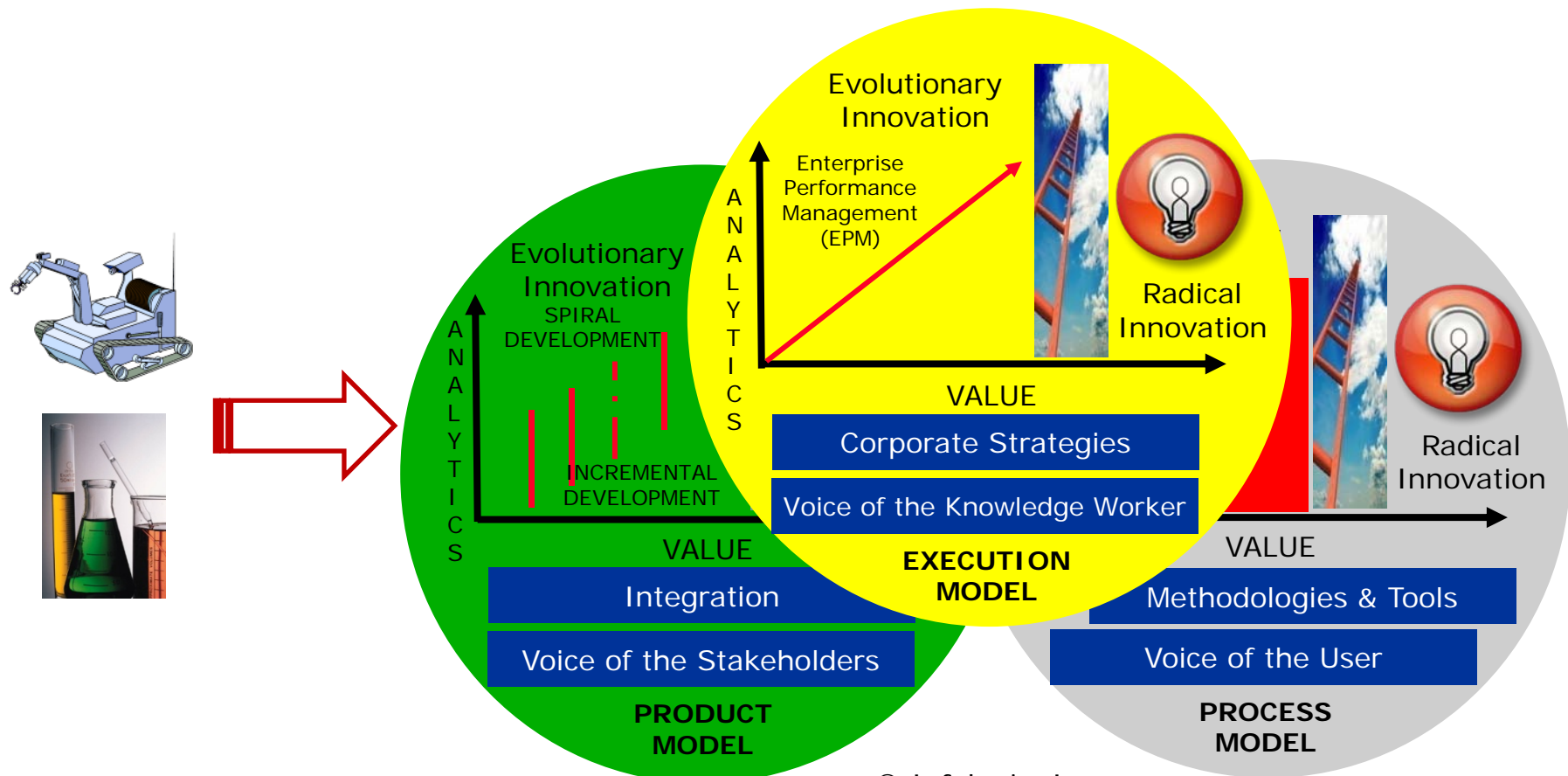**Missions**
- National Defense Strategy
- **Quadrennial Defense Review**
- Space Posture Review
- Nuclear Posture Review

Operational Challenge

JUONs, UONs, COCOM IPL

Objective Architectures

Critical Capabilities

Enabling Technologies

Laboratory Program

Basic Research Program

STEM Program

Industry IR&D
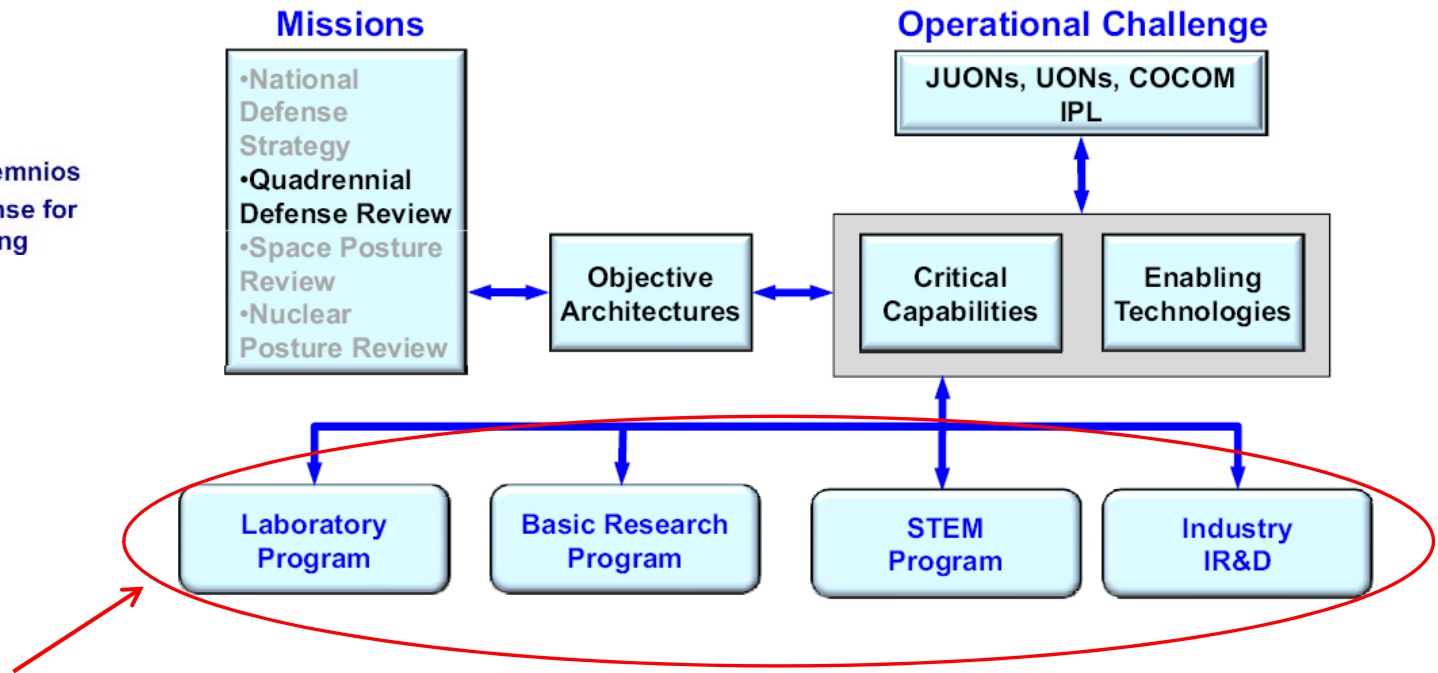
Defense Innovation Ecosystem

How ? – Implementation Steps

Secure Sponsorship & Develop Proposal
- DoD Science & Engineering Enterprise and Lab Management

Conduct R&D into the "Innovation Programs" Model
- Use $I=p2e$ as a straw-man model, and conduct R&D activities

Migrate to new Model
- Develop or acquire necessary tools and processes to fully implement the model

Communicate & Coordinate
- Keep all stockholders in loop

Track Progress & Evolve
- Continuously evolve the model thru maturity analyses and experiences

Who ？ - Innovation Stakeholders

Federal Government
- Promote basic research into services, processes and execution sciences.
- Develop grand challenges and provide incentives to academia and enterprises for *I=p2e activities*

DoD Research & Engineering Executive Management
- Fund R&D into *I=p2e* Innovation Programs model
- Redistribute S&T (BA 1,2 and 3) funding
- Continuously Enhance model *to address DoD S&T challenges*

U.S. Innovation Community
(Non-DoD Labs; Academia; Enterprise R&D, Ventures, Innovation advocates)
- Develop new courses & train T-professionals
- Promote *I=p2e* programs
- Exchange Scientists & Engineers

DoD Innovation Community
(RDT&E, PMOs, Prime Contractors & Small Businesses)
- Incorporate *I=p2e* Innovation models into plans, policies and IRAD
- Advocate and incorporate in proposals.
- Employ T-professionals

Conclusion : DoD Innovation Gap !

Product

Process

Execution

The U.S. federal government's FY 2012 R&D budget is $125 Billion – a hugh amount. Over 50% of the U.S. federal R&D spending is allocated to the DoD RDT&E, but there is an Innovation Gap! DoD now consumes more Services than Products; however, most of the DoD RDT&E investments are in the Products. So... there is an imbalance in DoD RDT&E funding in favor of Products which are less than half of DoD consumption.

.... but wait, there is even more ...Traditionally, R&D is equated to Product Innovations. According to OECD, academia and forward-looking corporations, such as IBM, Apple and Google, the notion of Innovation is much broader than Product R&D. The broader notion include innovations into (a) Processes which are needed for success of Products, and (b) Execution or Business models to ensure that new products produce desired outcomes and ROI.
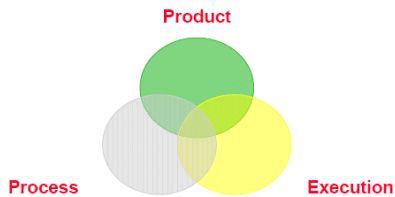
In addition, to mitigate the DoD recognized S&T challenges, such as shifting talent base and global availability of technology, basic research should be conducted to develop new knowledge, and innovative RDT&E processes and execution strategies.

In summary, to maintain the Defense Innovation superiority, we need to reinvent the DoD Innovation ecosystem by incorporating innovations into Service, Process and Execution Sciences, hence evolving the "S&T Programs" to "Innovation Programs".

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San Diego, CA**

Questions and Suggestions:

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