

# System Thinking and Transformational Skills

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Presentations to the MIT Community

2016

ECONOMICS

## What to do about jobs that are never coming back

Stern tells a persuasive story about a rapidly emerging economic order in which automation and ever smarter artificial intelligence will make even cheap foreign labor obsolete and give rise to a society that will be highly productive—except at creating new jobs. Today's persistently stagnant wages and rageful political populism are early signs of the trouble this could generate.

### Personal Questions

- Why will these jobs not come back?
- Which jobs will come back?
- How can I position myself for these jobs?

What should we do then? ----- **Leadership Questions**

Let us address the Personal Questions first,  
Then the Leadership questions at the end.

# Related topics are addressed in our company Web Blog

**Can the economy continue to grow while creating fewer well paying jobs? – the answer is “YES”**

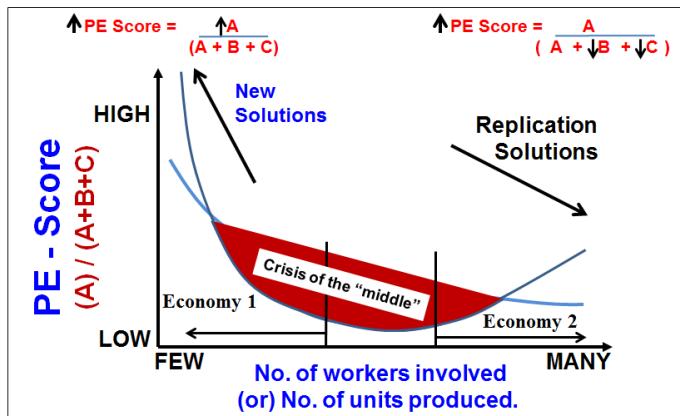
<https://stimsinstitute.files.wordpress.com/2014/02/growth-with-out-jobs.jpg>



<https://stimsinstitute.com/2016/05/27/dont-count-on-mfg-to-create-large-number-of-future-jobs/>

**Don't count on Mfg. to create large number of future jobs**

Today there are two alternatives for high PE - Score



**Opportunities that should not be lost in the current Presidential Election Cycle?**

<https://stimsinstitute.com/2016/03/29/opportunities-that-should-not-be-lost-in-the-current-presidential-election-cycle/>

**It may be a mistake to get a degree in Chemistry, unless you have also figured out how to use your knowledge!**

<https://stimsinstitute.com/2014/04/18/it-may-be-a-mistake-to-get-a-degree-in-chemistry-unless-you-have-also-figured-out-how-to-use-your-knowledge/>

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# Dr. K. (Subbu) Subramanian

- B.E. (Mech. Engg.) Osmania University, India 1970
- S.M, M.E and Sc.D degrees. 1972 – 77  
Mech. Engg. Department at MIT
- Worked in the industry in the manufacturing sector for over 34 years, leading to
  - Basic research, New product development,
  - New business development, New market development
  - Establishment of Technology Centers across the globe (USA, Germany, Japan, China, India and Brazil).
  - Development of grinding process solutions leading to
    - Thin Film Magnetic Recording Heads and
    - Machining to Grinding of Jet engine parts and Wind Turbine gears



- He started his new company [www.STIMSIInstitute.com](http://www.STIMSIInstitute.com) in June 2011.

According to Dr. Subramanian,

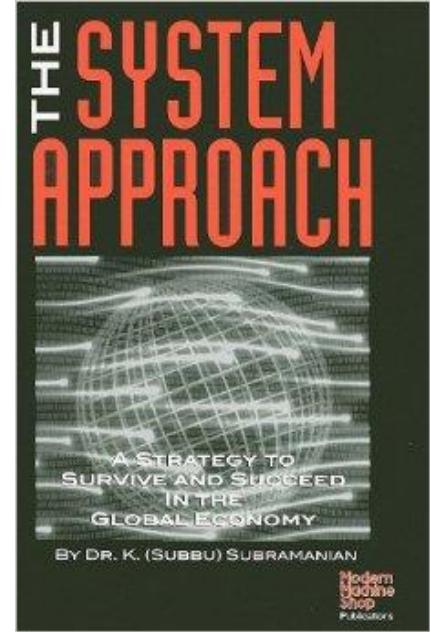
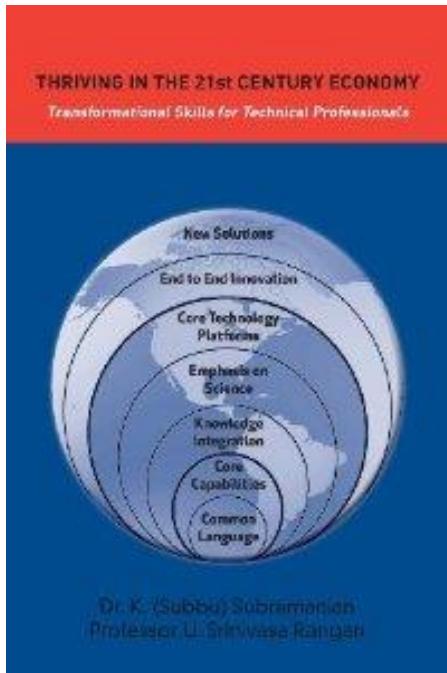
*The goal of our company is Knowledge Integration :*

*(i.e.) to develop people and industrial outcomes (products, business models, education, etc.) that exploit human skills as a parallel and in synergy with what computers can do (which is almost everything) !”*

- Fellow of ASME and SME
- Author of two books.
- He continues to be engaged with research, teaching and mentoring.
- Over the years, he has taught over 1000 engineers and managers in the industry from across the globe on System Thinking and Transformational Skills. He has mentored over 200 among them, who are now leaders in their own merit in industry and research.

## References:

- **The system Approach**
  - *A strategy to survive and succeed in the Global Economy (2000)*



- **Thriving in the 21<sup>st</sup> century economy: Transformational skills for Technical Professionals (2013)**

# STIMS Institute

*Science Based Technology, Innovation and Management Solutions.*

## **A Knowledge integration Company**

***“At a time when computers can do everything (read, write, speak, calculate, analyze, decide and direct), professionals and companies have to do something more!***

***This requires System Thinking and Transformational Skills”***

***At a time when the products and services of any company have to serve one of two extremes –***

- (a) High Volume and Lowest Cost or***
- (b) High Value and Unique Capability***

***– with no survival in the middle, companies and enterprises need to adapt System Thinking and Transformational Skills to survive and succeed in this Binary Economy***

***– Dr. K. (Subbu) Subramanian, President.***

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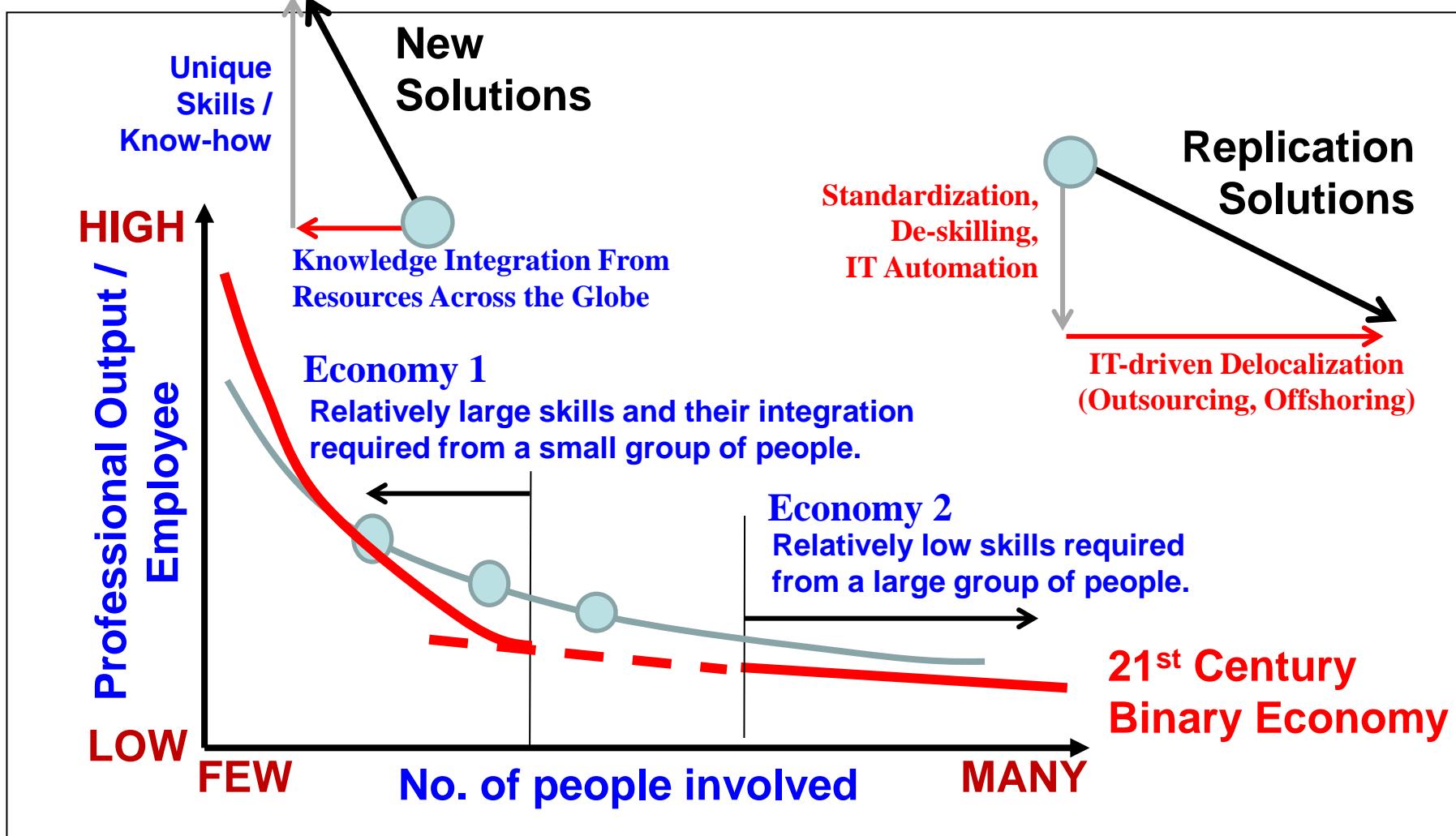
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# Binary Economy

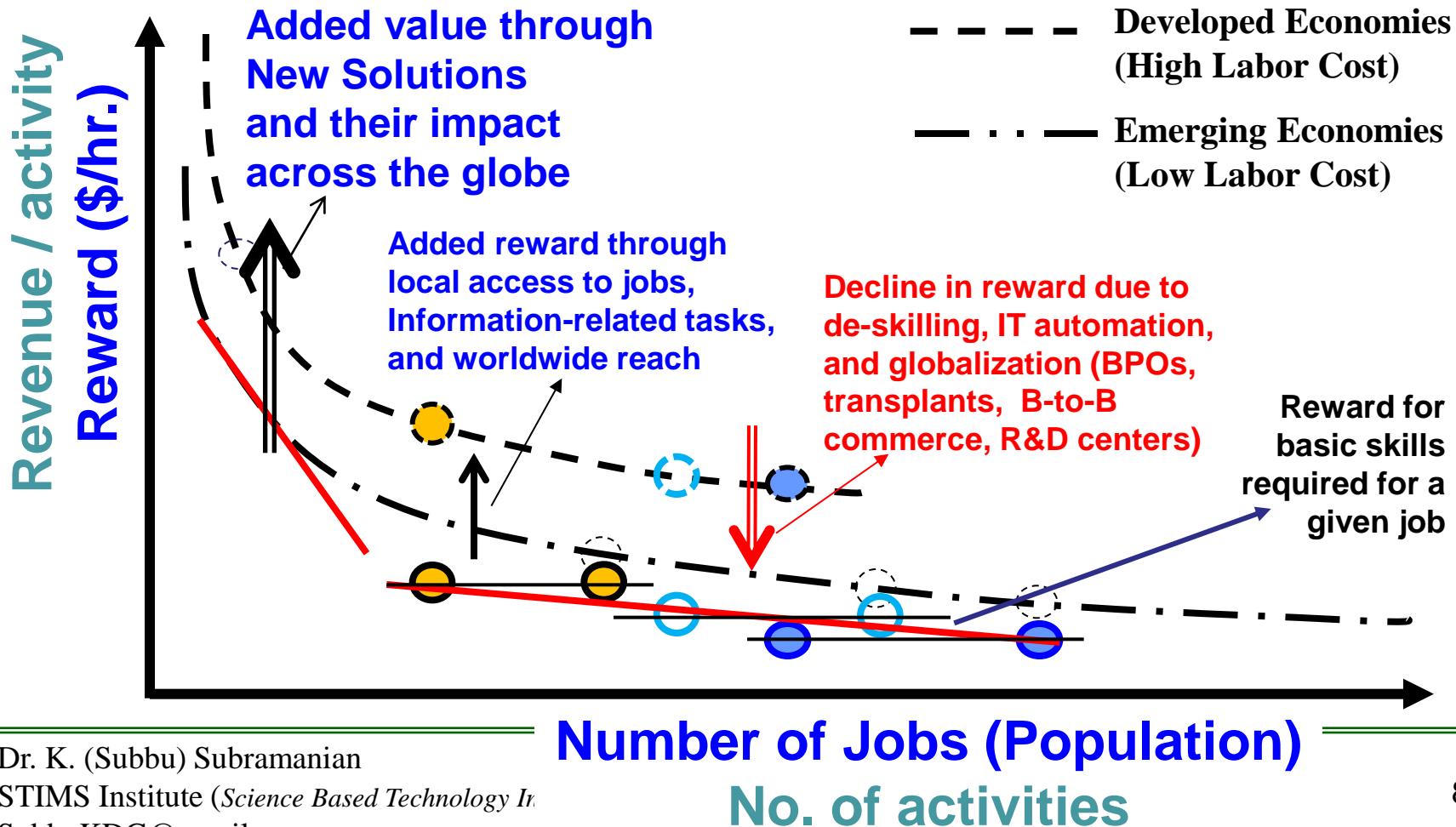
The continuum of skills required is giving way to a well identified pair of or Binary needs.



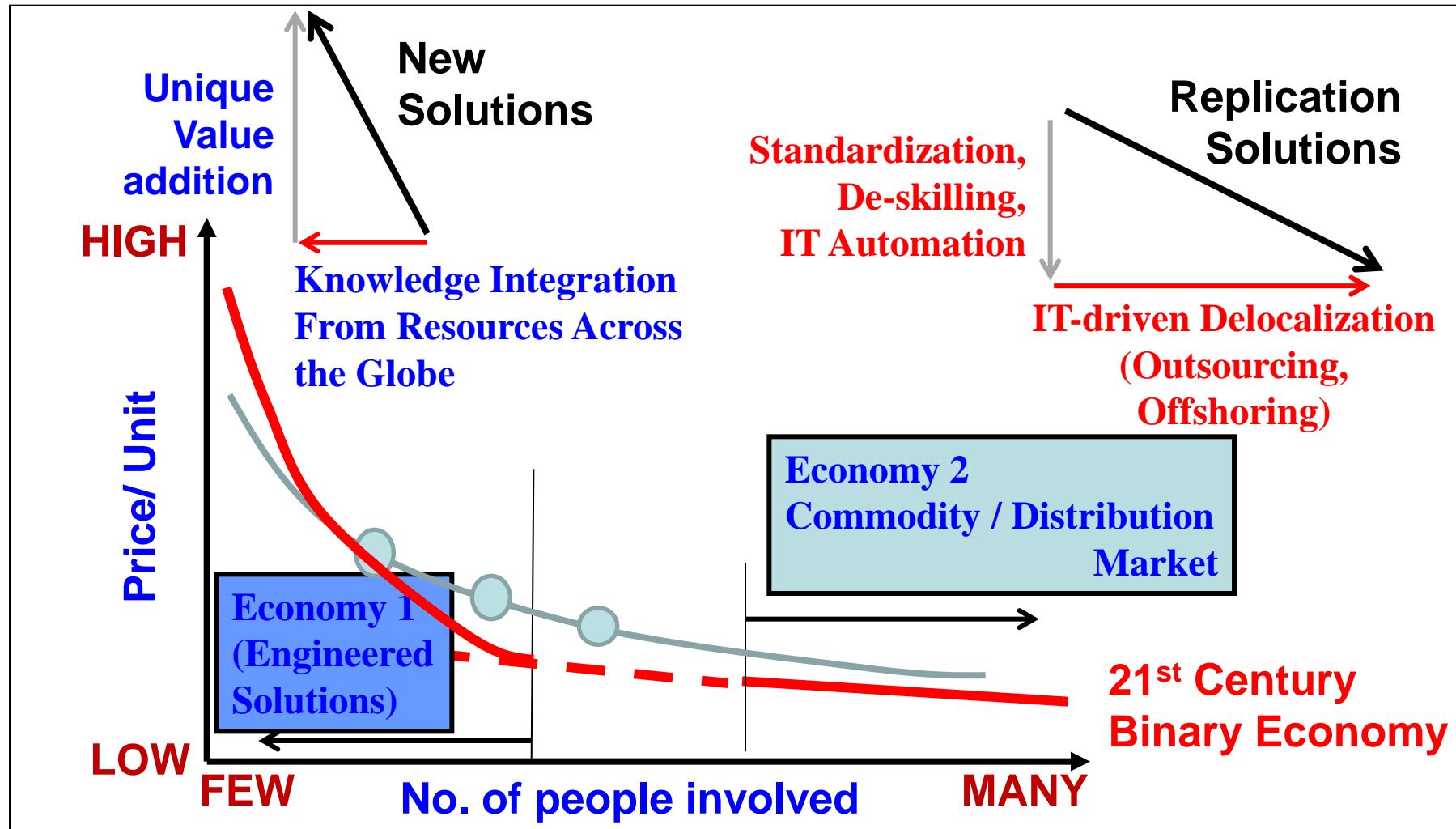


# High Skill (wage) jobs are selective and fewer than before?

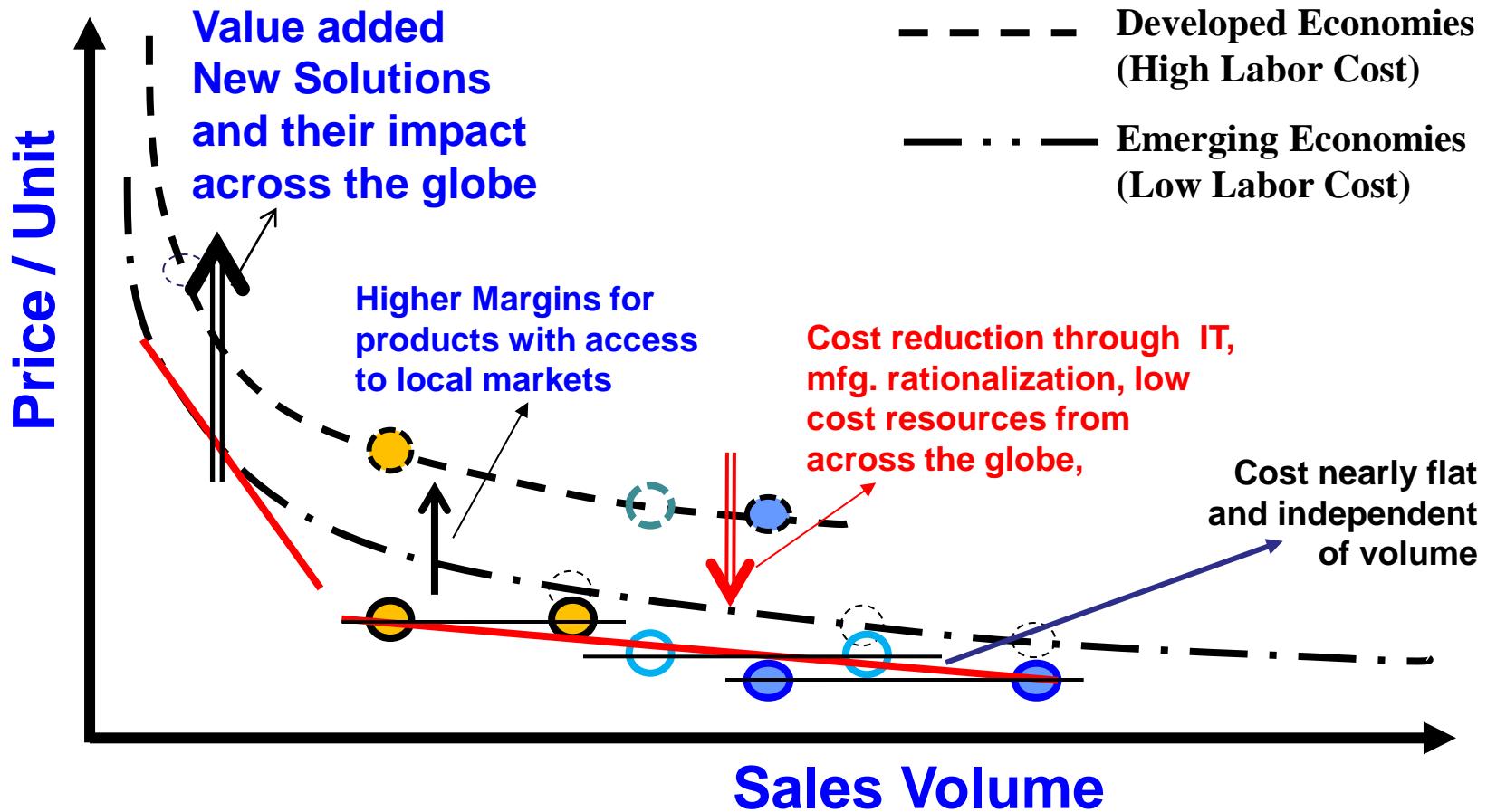
This development is across all nations, all industries and in all sectors of activities and for ever?



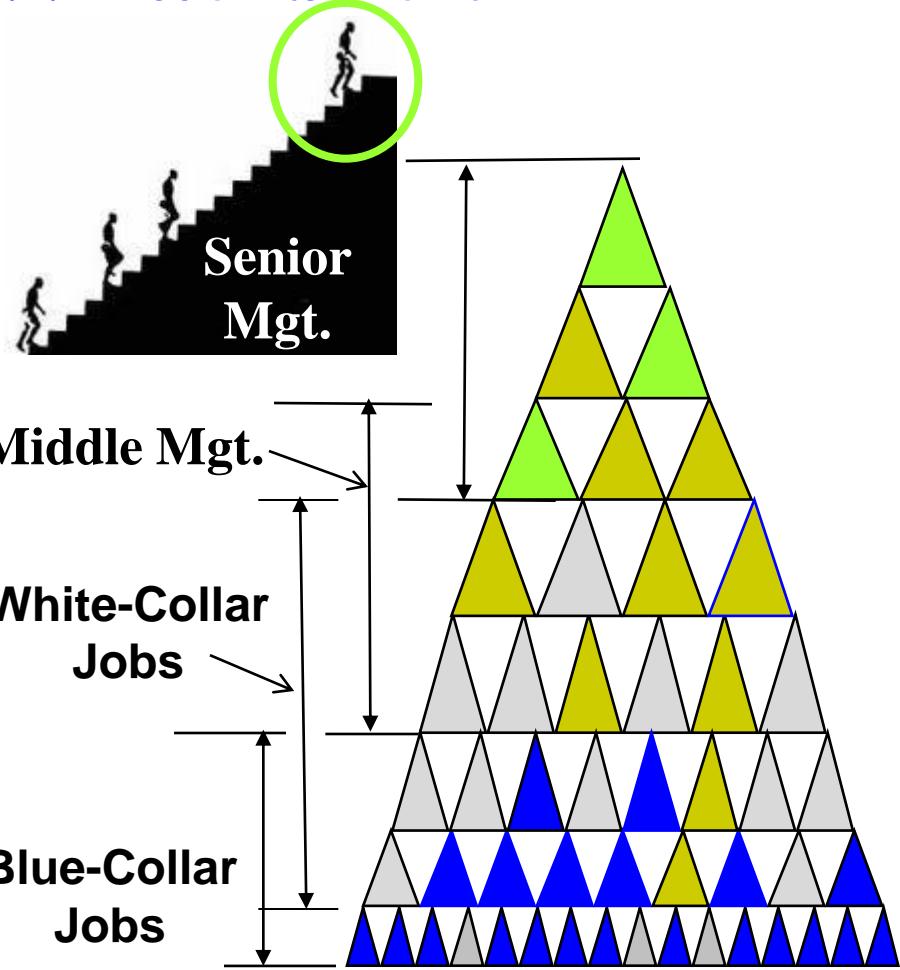
# Binary Economy – viewed as Business Segments



# Product / Market Segmentation?



# Work – What is it ?



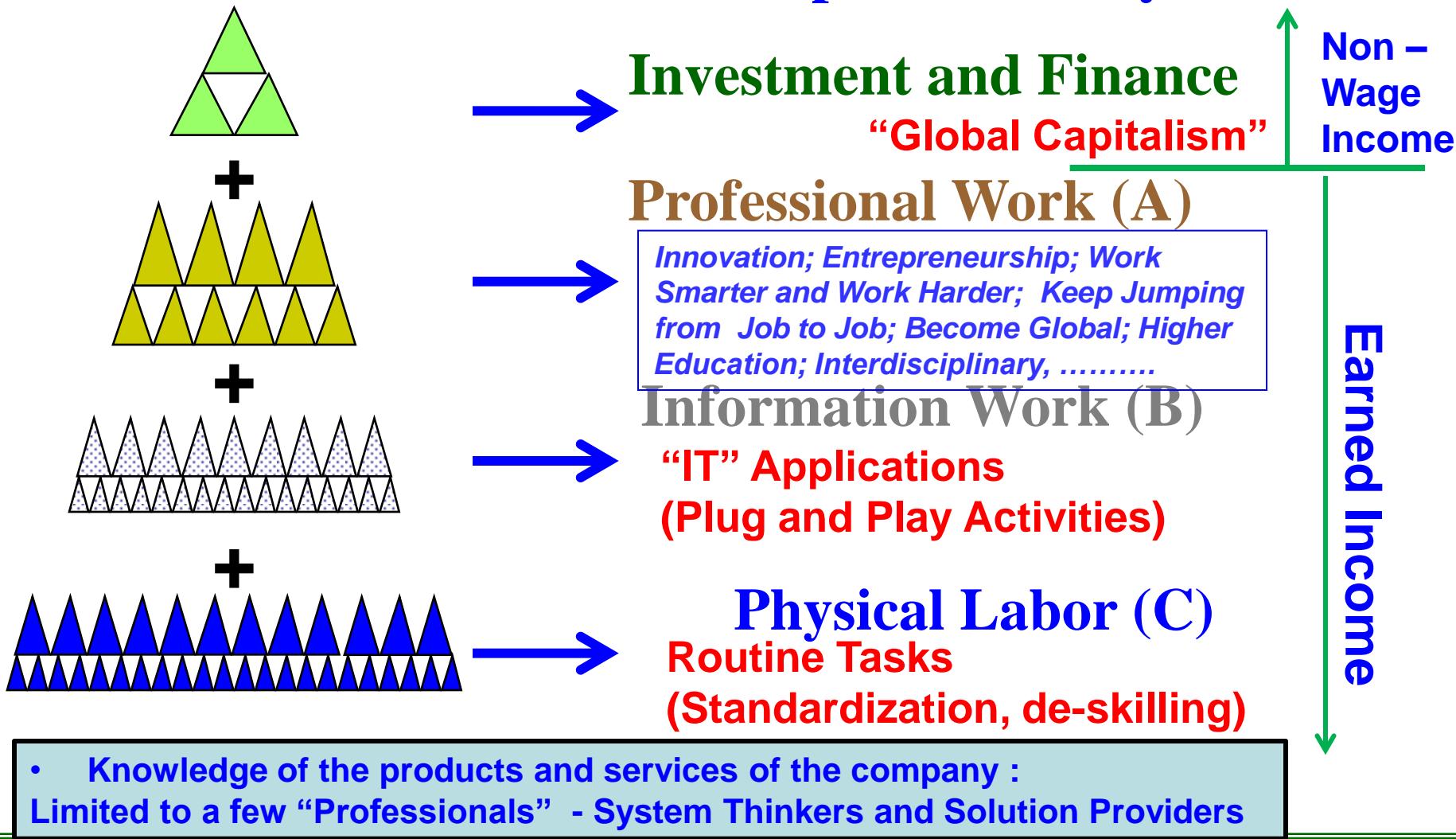
## Traditional Organization

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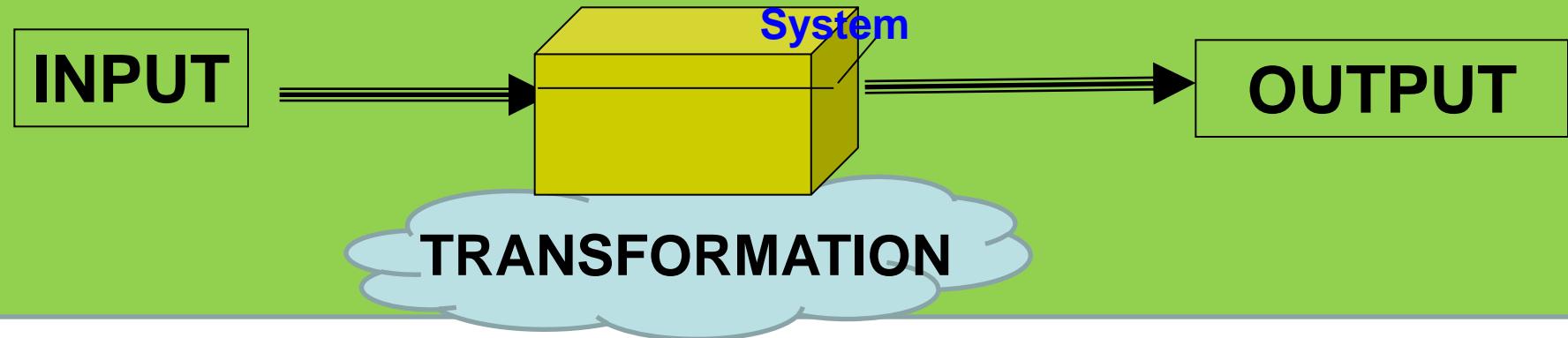
# Work – How is it Changing?

Stratification into four impermeable layers.



# What is a solution?

Every Solution is an  
INPUT / TRANSFORMATION / OUTPUT  
System



## Who is a Professional?

Professional is a Knowledge Worker

Professional's Output:

**KNOWLEDGE and its USE** --- A

**Information Work** --- B

**Physical Work** --- C



**Professional's Efficiency: PE Score = A / (A+B+C)**

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# Employee Engagement Model

Replication Solutions

New Solutions

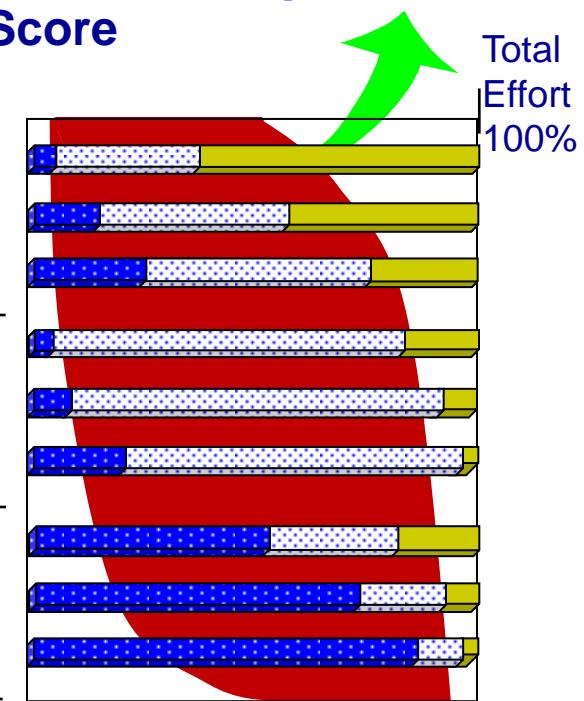
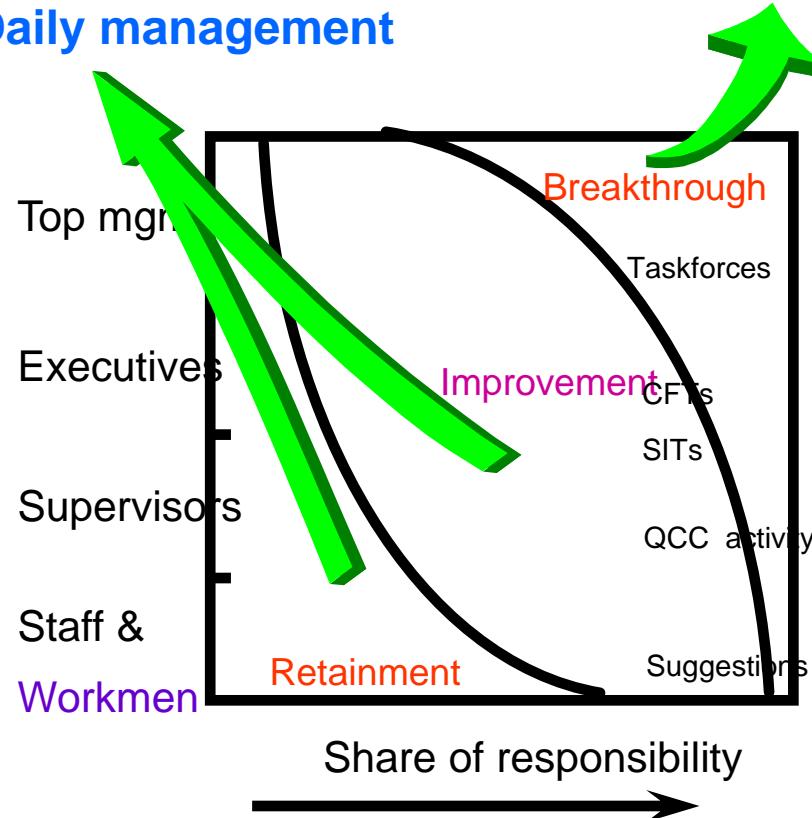
$$\text{PE Score} = A / (A+B+C)$$

Daily management

Professional Work

Low PE Score

High PE Score



Knowledge and its use



Information Work



Physical Work

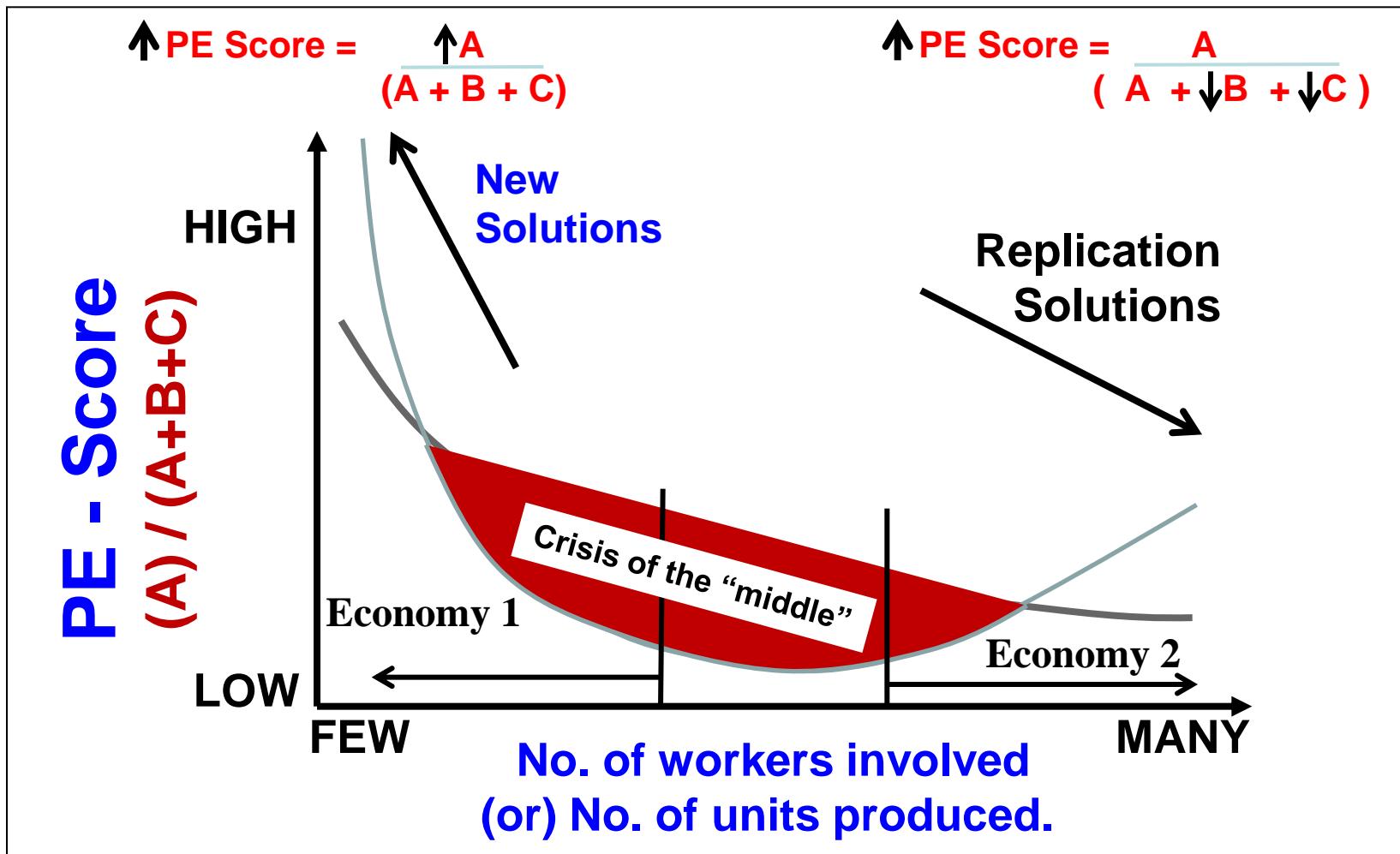
Mid Level effort  
Depleted through  
IT Applications

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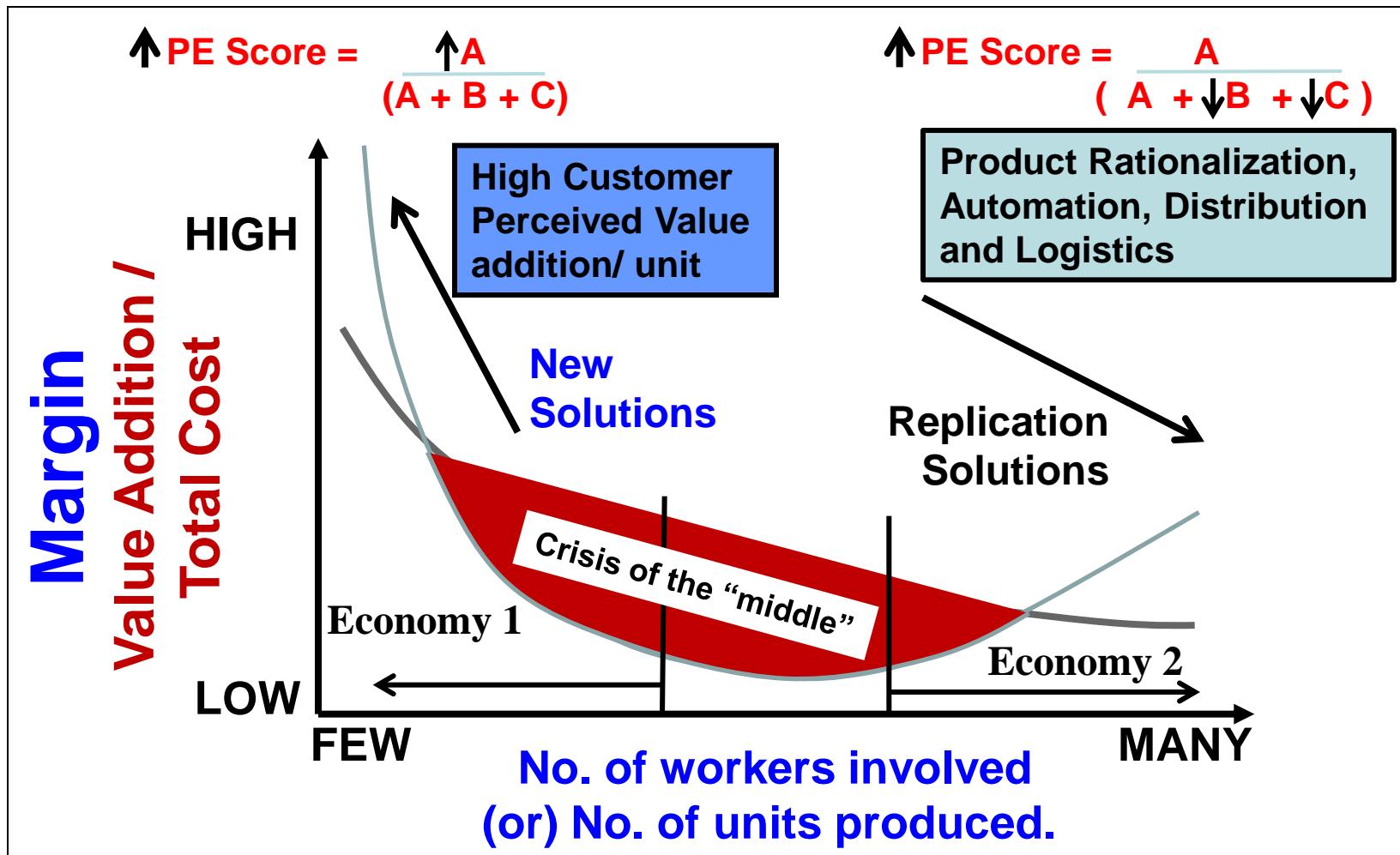
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# Today there are two alternatives for high PE - Score

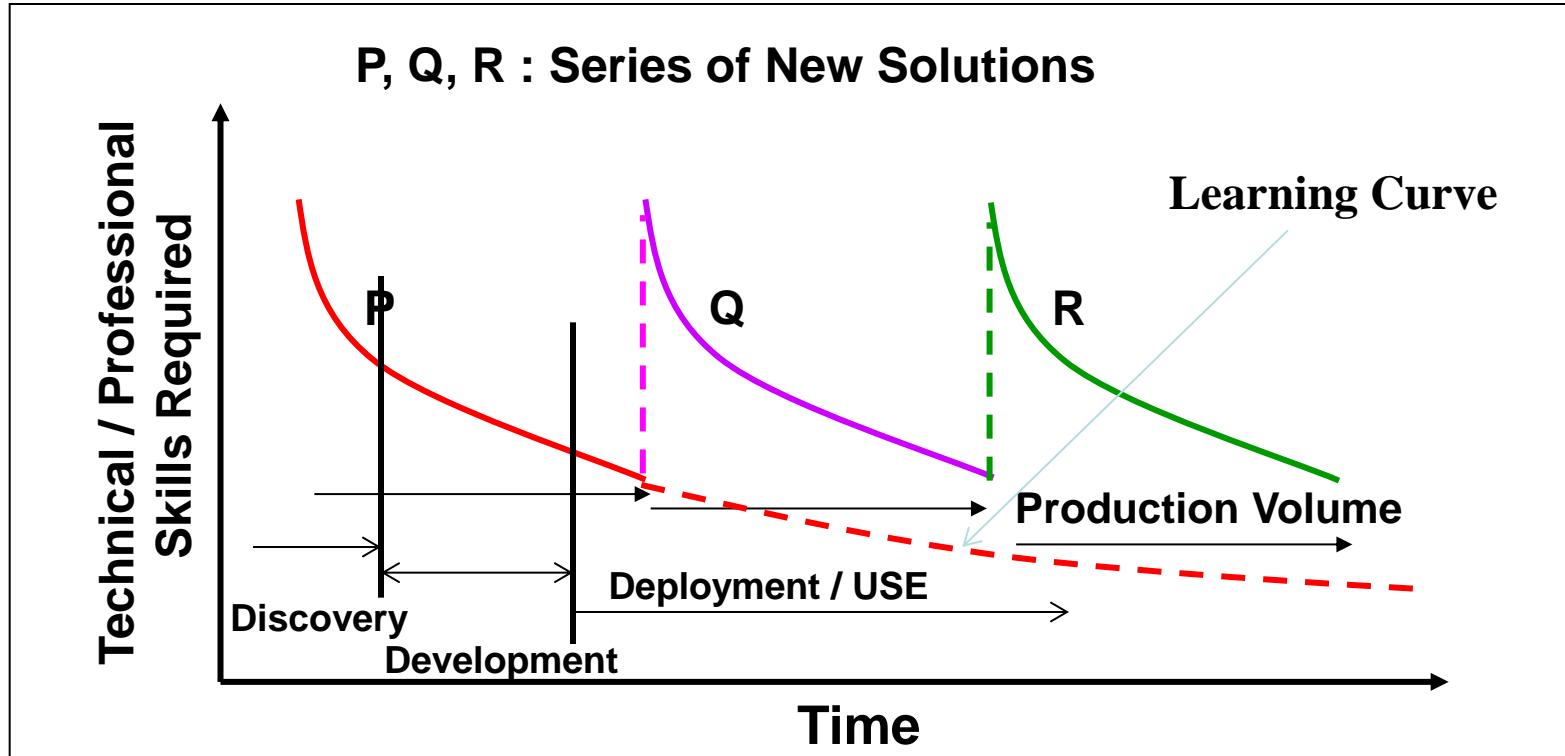


# Today there are two alternatives for high Margin BUs



# Traditional model for Innovation: Saw Tooth model

- Series of sequential and time phased solutions.



**Invention: Discovery or New Idea**

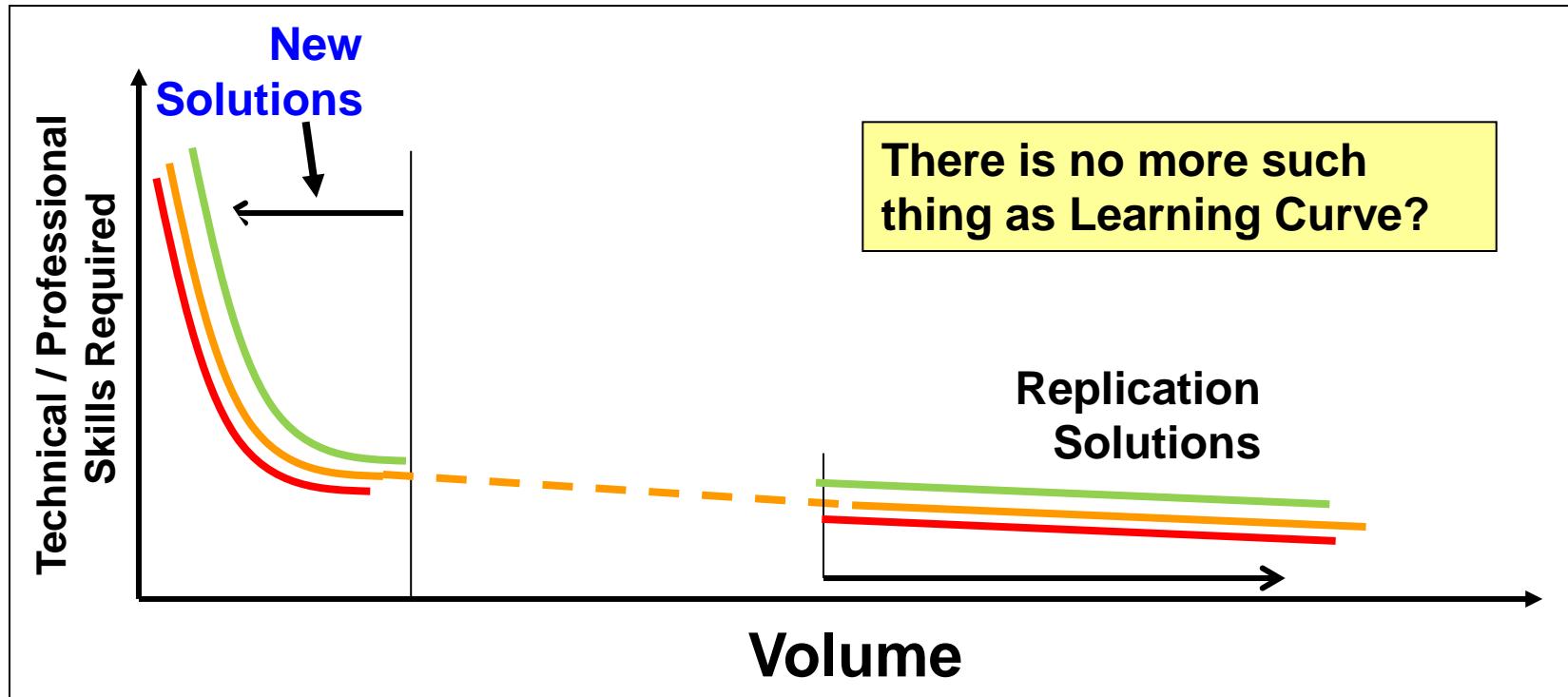
**Innovation: Discovery X Development X Deployment / USE**  
: Learning Curve

# Binary Innovation:

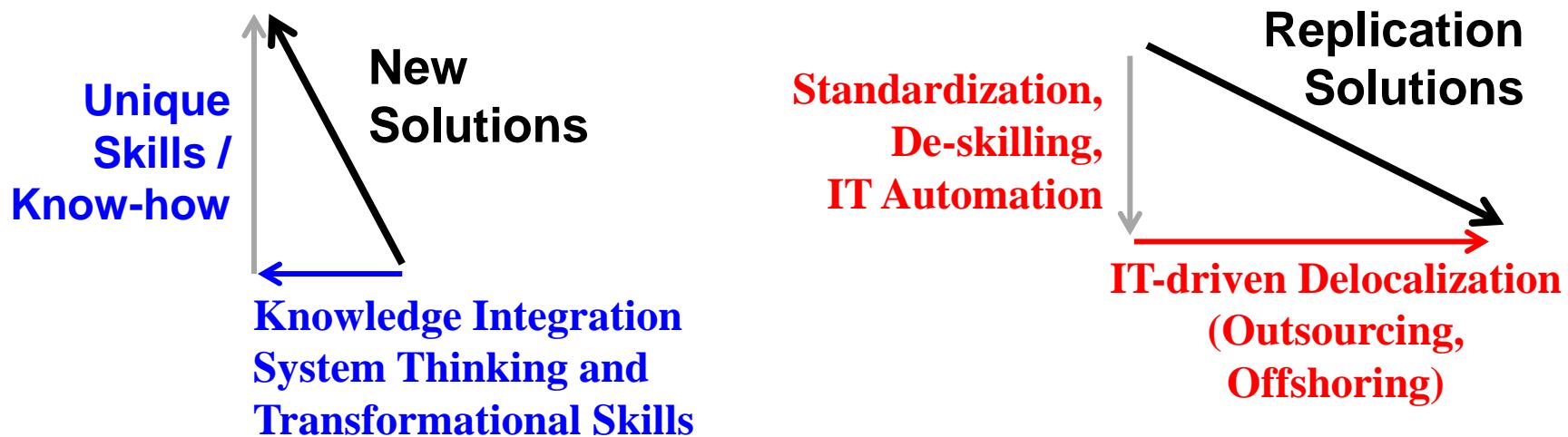
Parallel streams of: New and Replication Solutions

New Solutions : New Product, Process, and/or Use driven by core capability from all sources of knowledge

Replication Solutions: Copy Exact, Toll manufacturing, Plug and Play, driven by IT applications.



# Higher Education in the Binary Economy



- **Need:** A relentless stream of new solutions ?
- **Education / Training:** Means to the above end?

# New Solutions Vs. Replication Solutions

Features	New Solutions	Replication Solutions
Domain specific knowledge	Intensive (critical)	Neutral and useful (not critical)
IT solutions	Custom and tailored	Standard (plug and play)
Organization/team	Small and specialized	Large and flat
Team skills	Cross functional	Narrow and common
Rules and standards	Create new rules as needed	SOP and follow the rules strictly
When you need to break the rules?	Be creative, wise, and considerate of others	Don't try: you will be shut out of the "system"
Authority	Belongs to those with specialized know-how	Belongs to those in charge of the operations mgt.
Risk and uncertainty	High, thanks to new ideas and their experimentation	Low, thanks to proven "plug and play" solutions
Reward	Team reward such as IPO, growth, and stock options	Individual reward based on task execution

# **“Professional”**

**Some one who provides a “solution” that meets the need and gets paid for that.**

**Carpenter: Makes furniture that some one wants to buy and USE (Furniture Provider)**

**Plumber: Identifies the leak in a pipe line and fixes it to the satisfaction of the home – owner (Plumbing Service Provider !)**

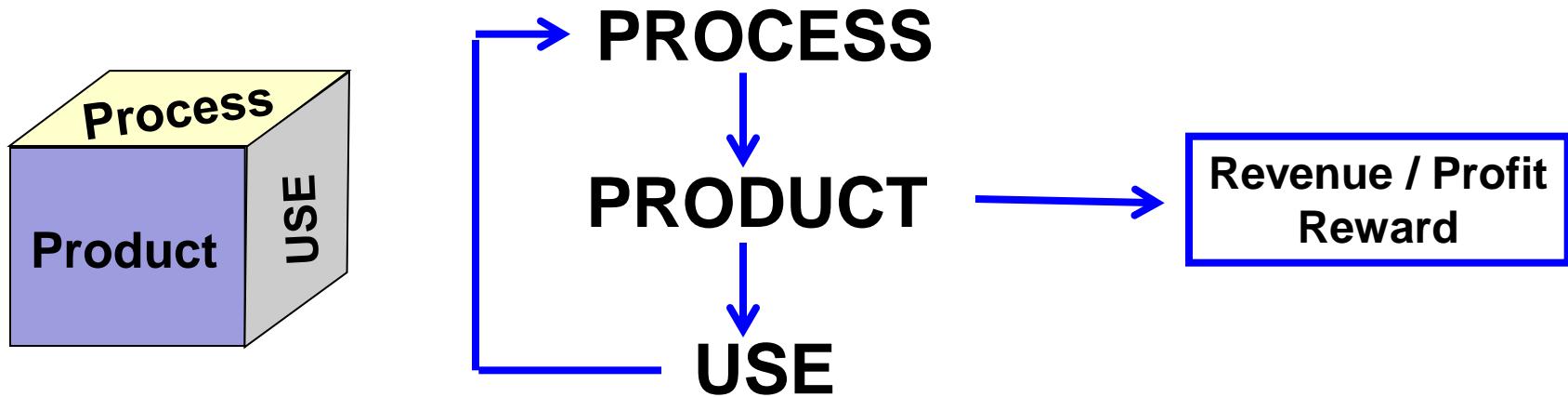
**Cardiac Surgeon: Fixes the broken heart and restores it to good health**

**Engineer: Develops and implements a series of “Solutions” of value to the user**

**Your Job: ???**

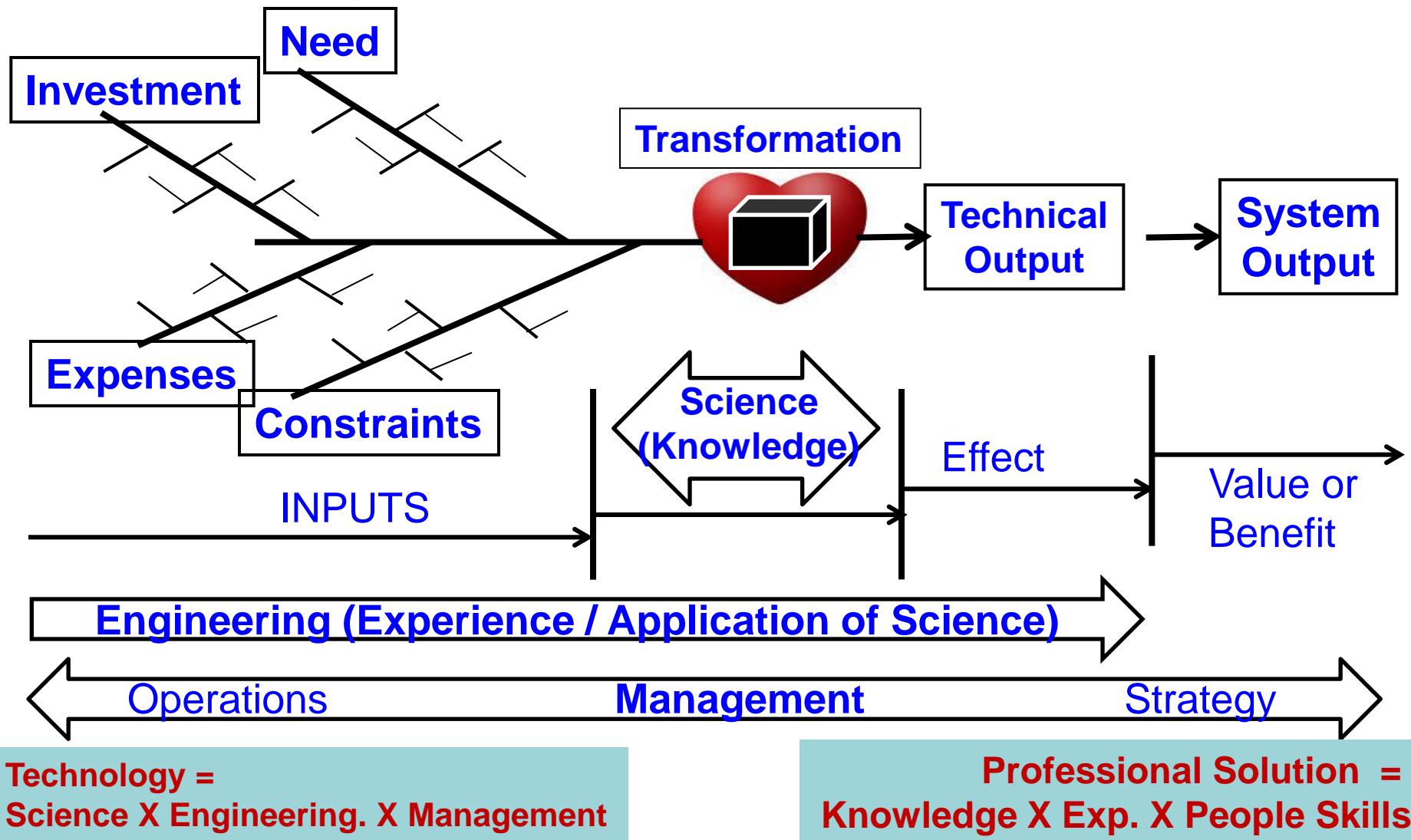
# Outputs of every solution:

- Every “Solution” is an:  
***“input/transformation/output”*** System
- “Outputs” of every professional solution are:
  - PRODUCT
  - PROCESS
  - Application / USE



# System Thinking

**Solution: Integrated deployment of core capabilities as a system**



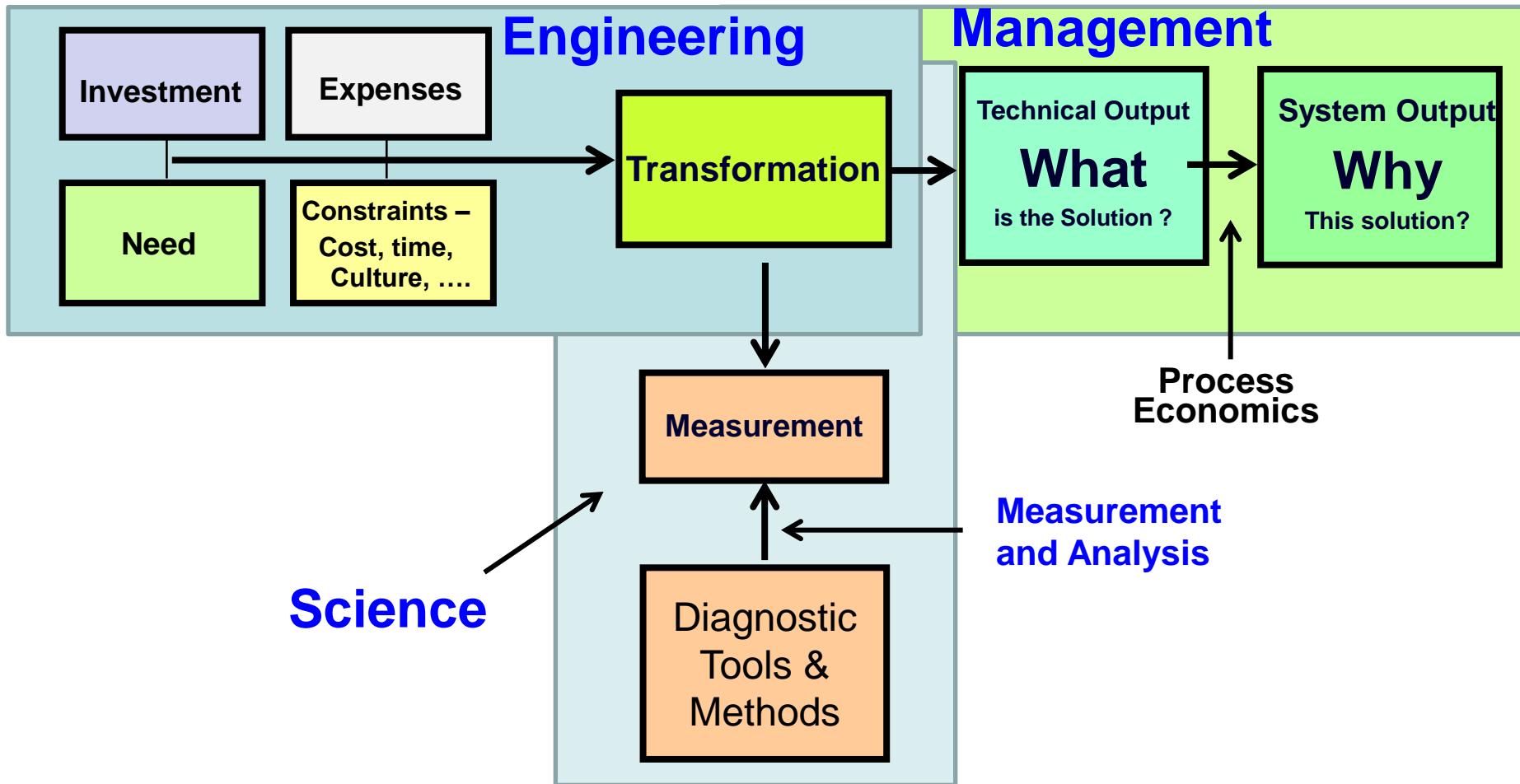
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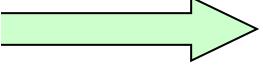
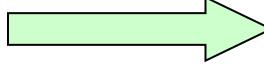
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# Technology = Knowledge and its Integration !

= “Science” X “Engineering” X “Management” (Operations + Strategy)

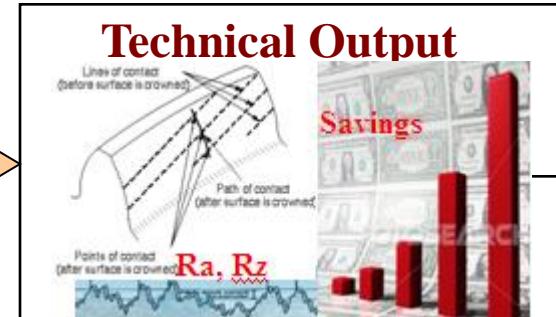
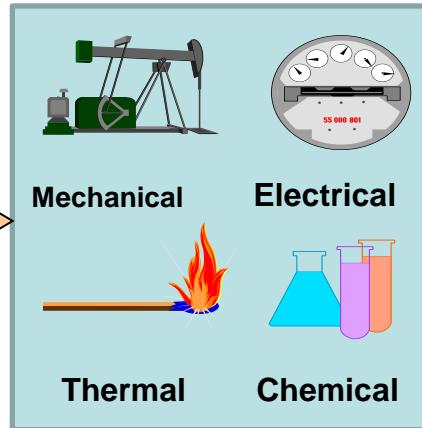


# Every Industrial Process is a “System”

Input  Transformation  Output



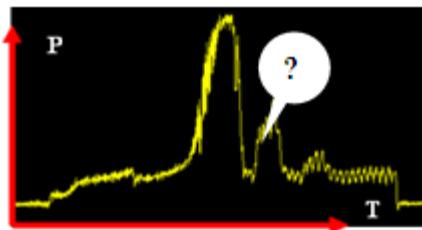
## Microscopic Interactions



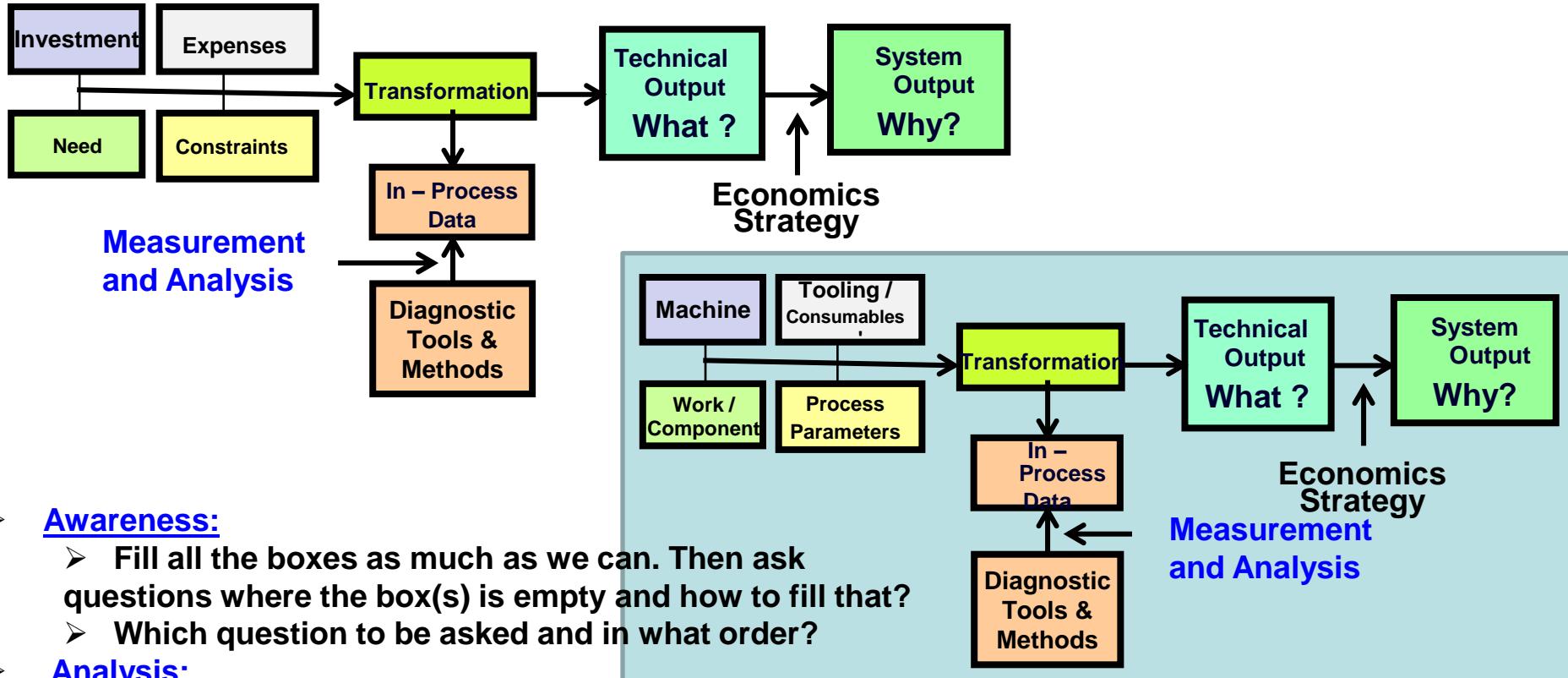
## Economic/ System Output



## Macroscopic Variables/Measures



# Three levels of system Skills



- **Awareness:**
  - Fill all the boxes as much as we can. Then ask questions where the box(s) is empty and how to fill that?
  - Which question to be asked and in what order?
- **Analysis:**
  - Apply the principles of Science, Engineering and Management in an interdisciplinary manner.
  - Resolve process problems; Develop solutions and validate impact
- **Synthesis:**
  - Configure “New Solutions” based on knowledge gained through Awareness and Analysis;
  - Develop them into “New Solutions”;
  - Implement and validate and get rewarded

# Source of Knowledge



Academic

Transformational  
Skills

Knowledge  
Experience  
People Skills

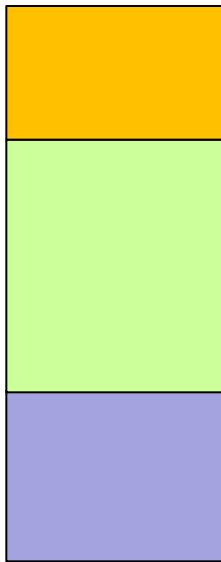
Industry/  
Specific



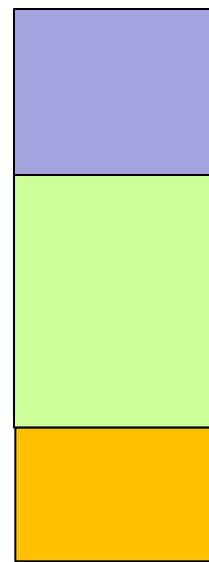
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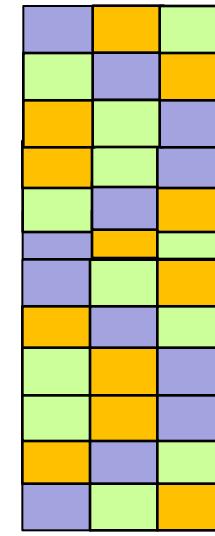
# Sources of “Knowledge” – recap:



**20<sup>th</sup> Century**



**End of 20<sup>th</sup> Century**



**21<sup>st</sup> Century**

## Legend:

**Academic Education:** **Industry / Sector specific Skills:** **Transformational Skills:**

# Transformational Skills

- Emotional Intelligence for New Solutions
- End-to-End Innovation

Deploy

- Build Ecosystem for Core Technology Platforms

- Emphasis on Science and Mobile Diagnostics

Develop

- System Thinking and Knowledge Integration

X

- 3-D View of Core Capabilities

- Develop a Common Language

X

Discover / Define

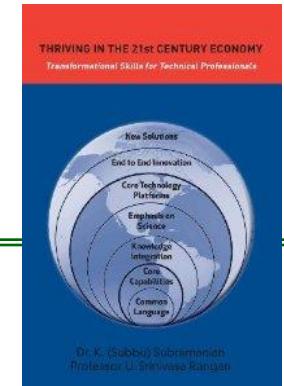
Transformational Skills are a set of skills to Discover, Develop and Deploy / Exploit a stream of New Solutions.

Each Transformational Skill is an opportunity to foster “System Thinking” and New Solutions.

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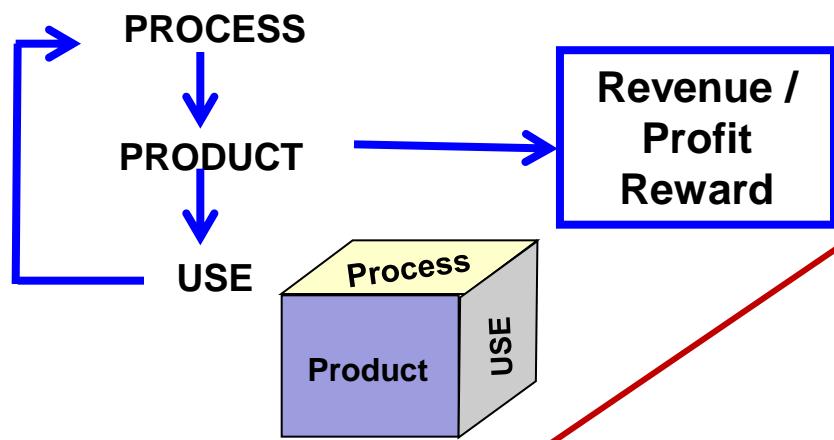
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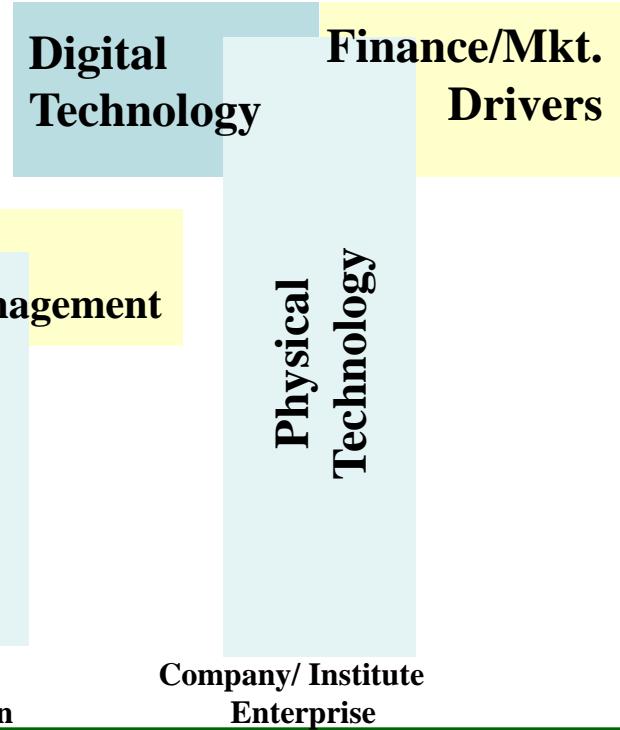


# Common Language and 3 – D Core capabilities:

- Every “Solution” is an: ***“input/transformation/output”*** System
- “Outputs” of every professional solution are:

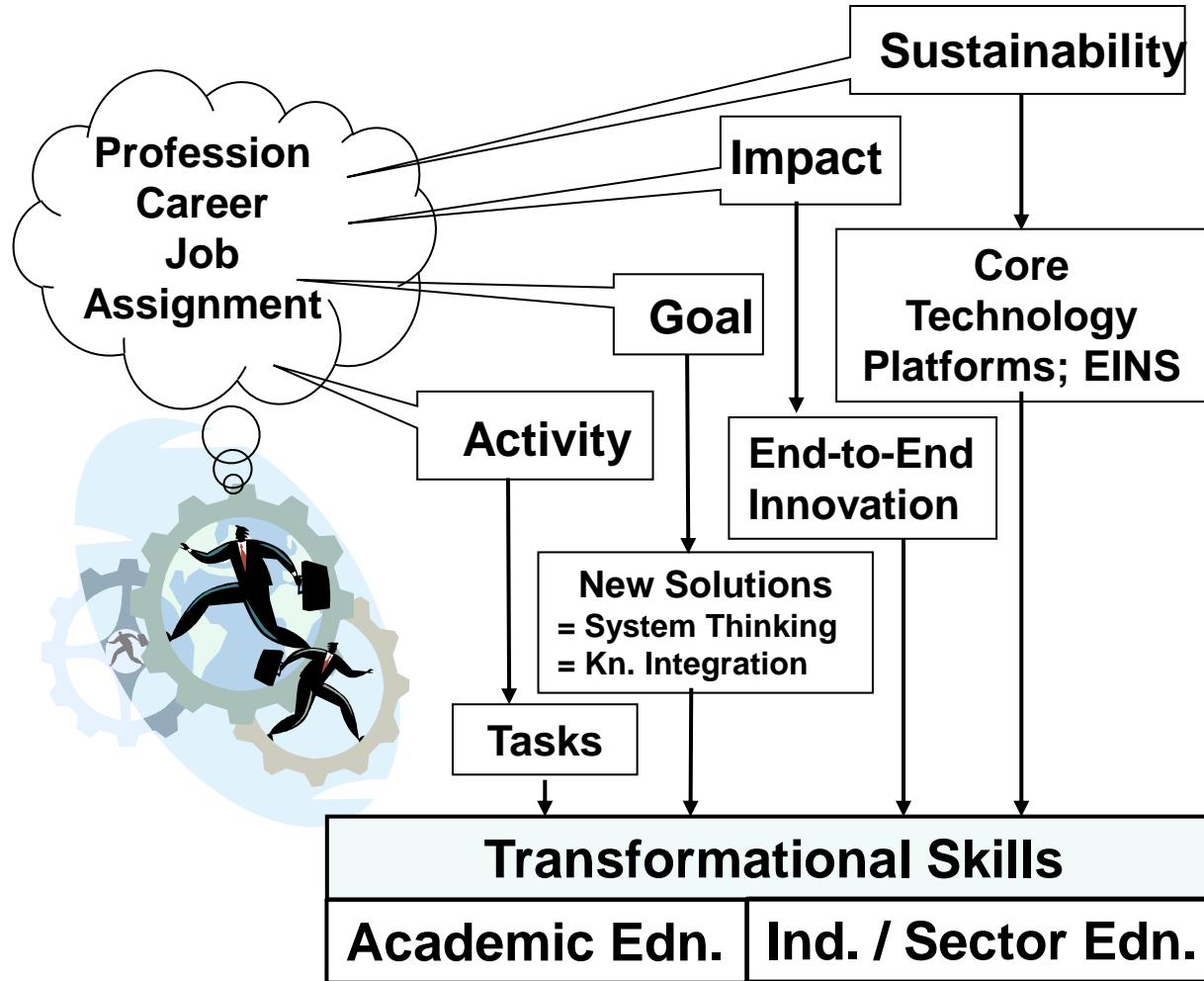


3 – D Core Capabilities:



**Technology =**  
**Science X**  
**Engineering X**  
**Management**

# Progressive Evolution of a professional through Transformational Skills.



# How to create High Wage jobs that are locally accessible?

**Tax the rich to create new high wage jobs!**

<https://stimsinstitute.com/2014/05/10/tax-the-rich-to-create-new-high-wage-jobs/>



- Invest in areas to (a) educate and (b) employ a large number of skilled professionals, who are also educated and trained on System Thinking with Transformational Skills.
- Start thinking of “Technology” not limited to IT – as is the current or prevailing notion.
- Start thinking of Technology as a means to solve a wide variety of problems and meet a broad range of needs of the global population.
- This would be like investing in NASA, NIH, rails, roads and bridges, many times over!
- These programs must be targeted not only for the immediate needs of the nation, but for the larger needs of the globe as a whole: Drinking water, food, home and shelter, better climate, low cost energy, better use of natural resources, better use of the ocean and the outer space, renewable energy, etc. Pollution in China need not be a crisis for China alone! Lack of adequate food distribution and hence hunger need not be India's problem alone!
- Global leadership requires ownership of global needs!

# Tax the Non-wage income to create new high wage jobs!



<https://stimsinstitute.com/2014/05/10/tax-the-rich-to-create-new-high-wage-jobs/>

- **Investment has to come from the federal government**, since federal jobs can be protected and preserved to remain within the shores.
- Like the peace core that created good-will across the globe, we need **Professional Core of high wage workers that can work in the USA and create a stream of new solutions** based on a wide variety of technologies (beyond IT) for the betterment of the human kind across the globe as well as for a better planet tomorrow.
- **To this end Non-Wage income can contribute through higher taxes** and the government can target this additional income for creating such high wage jobs.
- The **workers in these high wage jobs through their system thinking and transformational skills have to be truly mindful of the outcome of their work and not become government employed bureaucrats** merely pushing papers and administering programs, as they are perceived to be in the current work force.

# Thank You

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