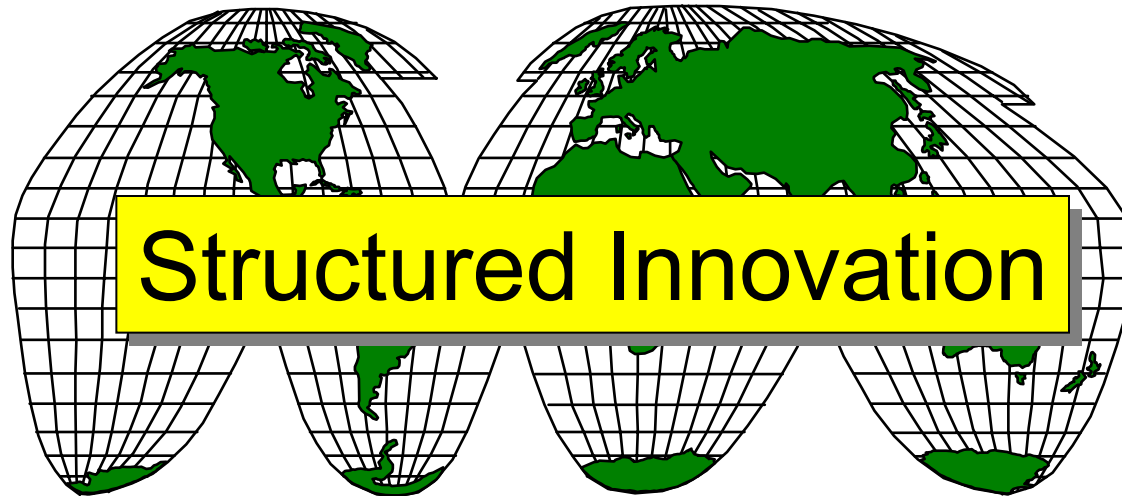


# TRIZ

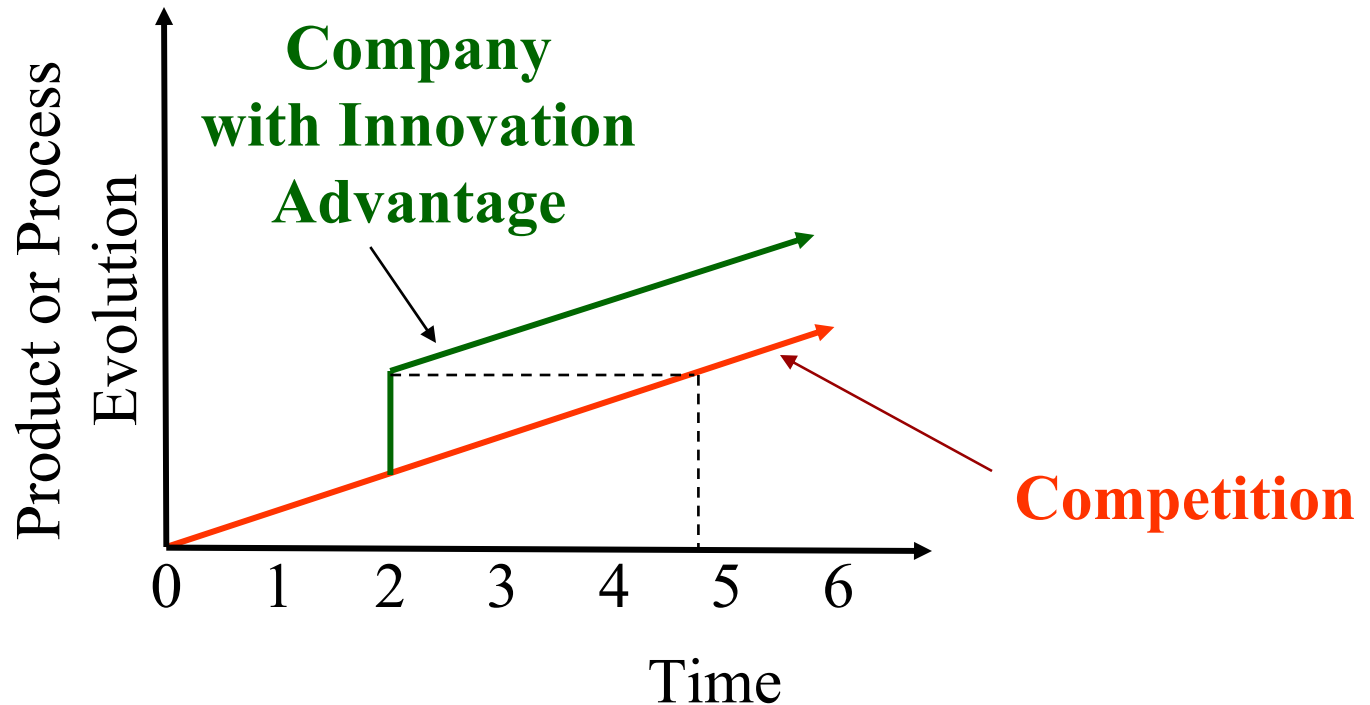
## Executive Overview



**with Ideation International  
World Leader in TRIZ Technology**



# I-TRIZ -- It's all about Innovation and gaining a competitive advantage

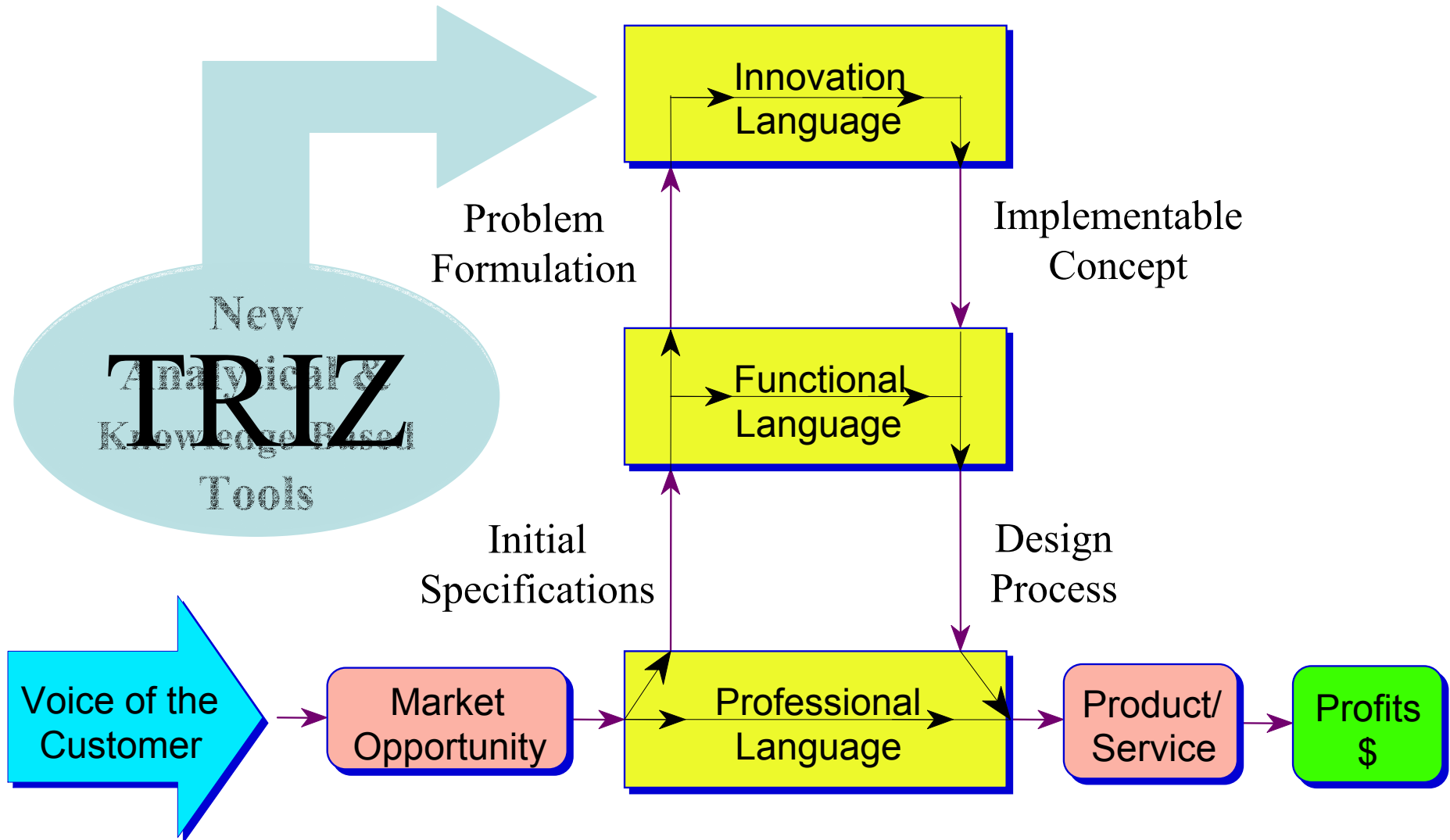


# But what is Innovation?

- **Not** just one simple flash of creative invention or the development of a new product or process
- **It is** a connected process in which a sufficient number of creative acts, from research through service, are coupled together, in an integrated manner, for a common goal

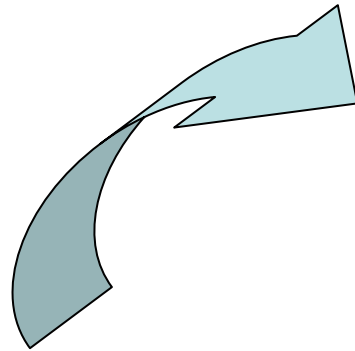
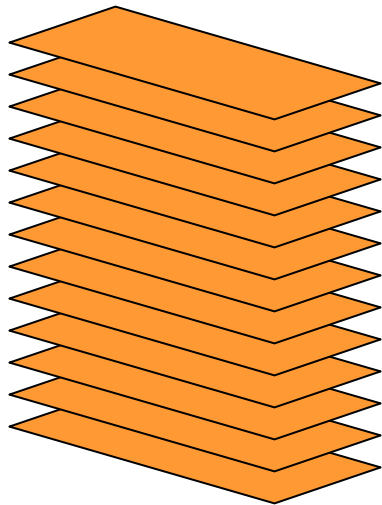


# Language of Innovation



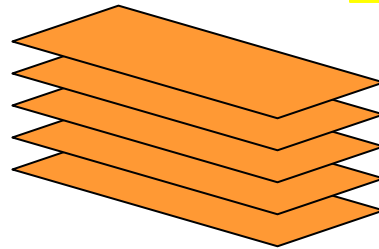
# TRIZ is Based on Abstraction of Knowledge Rather than Guesswork (Psychology)

Patents  
(worldwide)

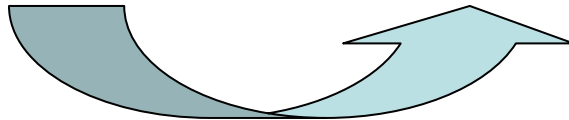


## Key Findings

- Definition of inventive problem
- Levels of invention
- Patterns of evolution
- Patterns of invention



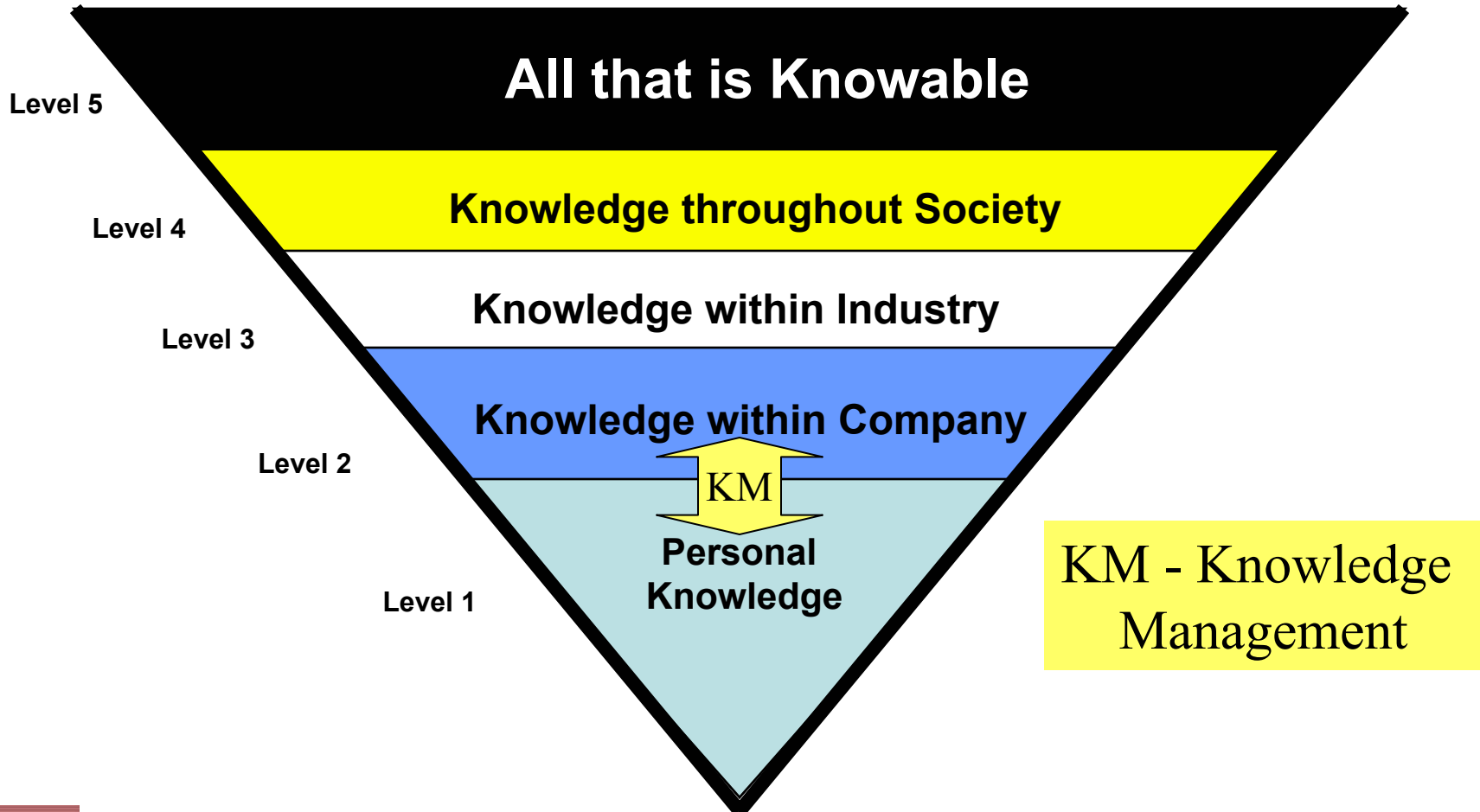
*Inventive  
Patents*



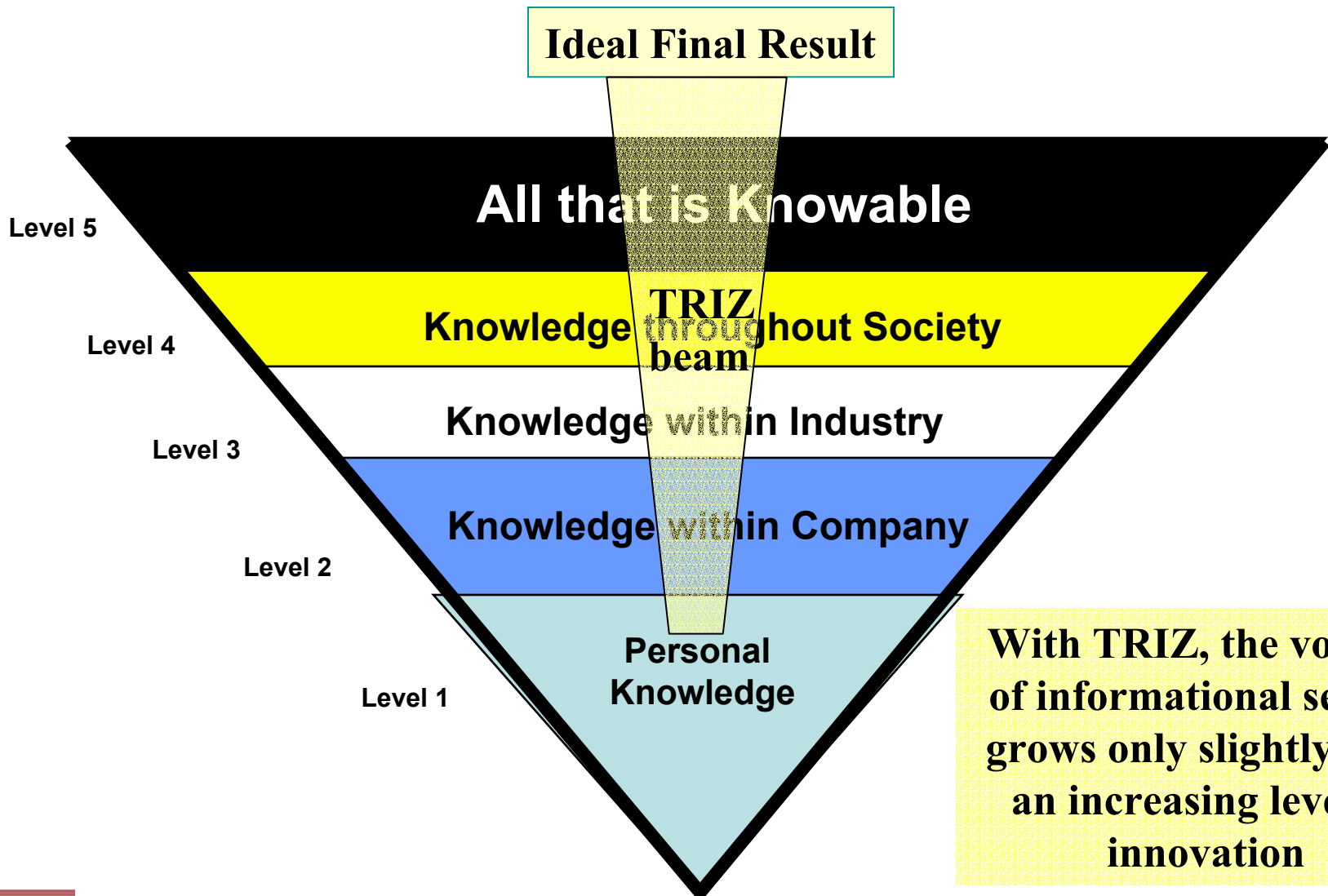
**T  
R  
A  
N  
S  
F  
E  
R  
A  
B  
L  
E**

General Purpose  
Principles

# The Knowledge Pyramid



# Tapping our Knowledge



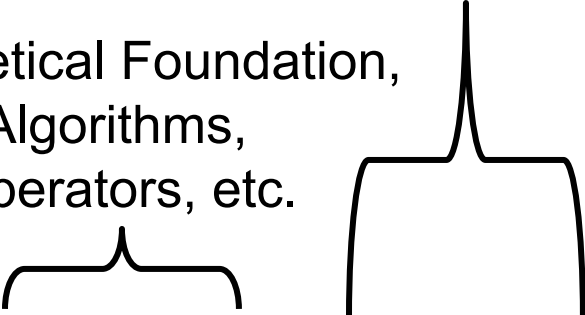
With TRIZ, the volume of informational search grows only slightly with an increasing level of innovation

# Strategically Evolving Intellectual Capital: I-TRIZ > Ideation/Invention/Innovation

The Science of  
Innovation: Structured  
like mathematics with  
methods and tools.

Theoretical Foundation,  
Algorithms,  
Operators, etc.

Computers & Software



$$\text{Results} = P_c \times P_{kn} \times (1+M) \times (1+T)$$

$P_c$  = Personal Capabilities

$P_{kn}$  = Personal Knowledge

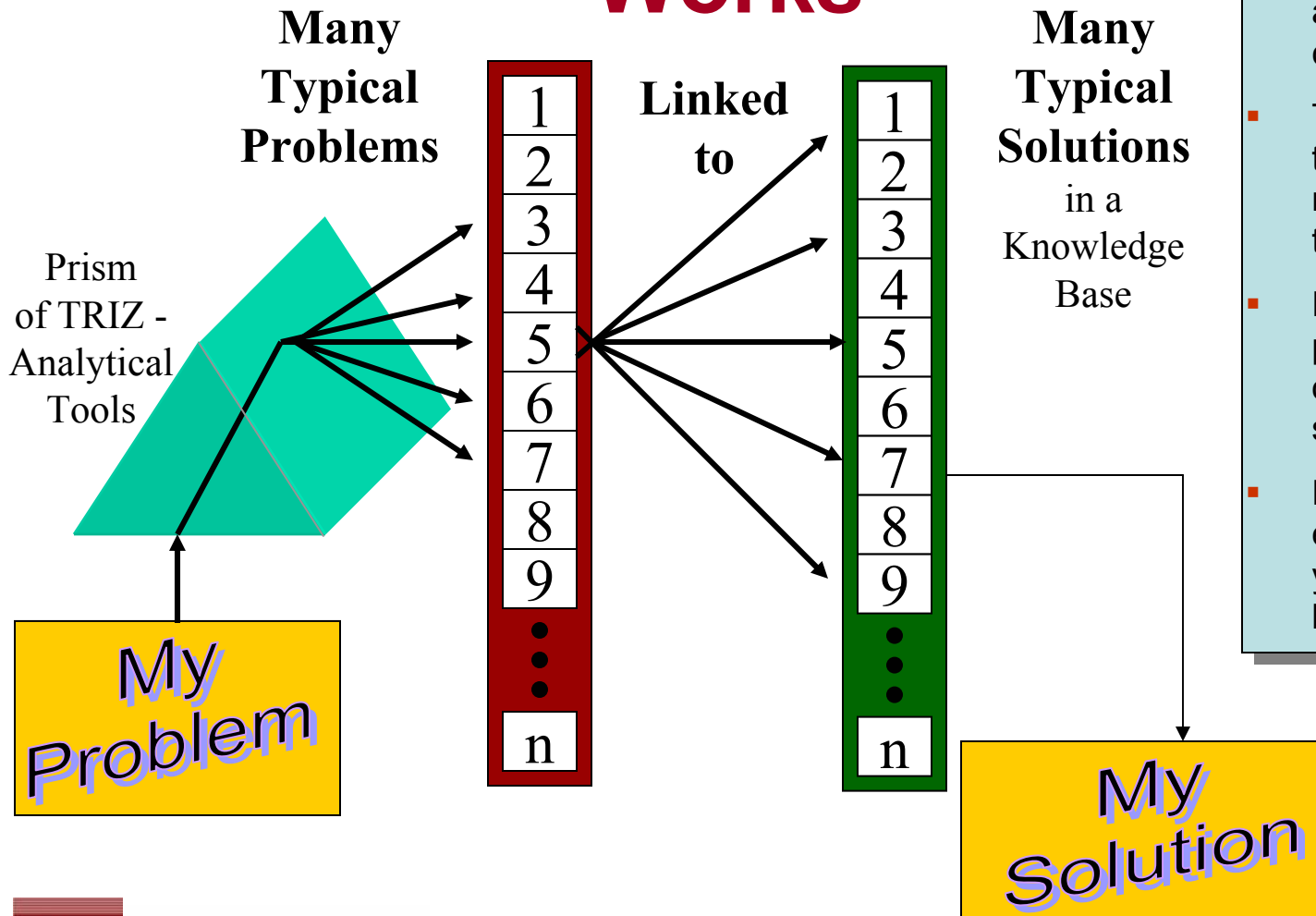
**M = Methodology**

**T = Tools**



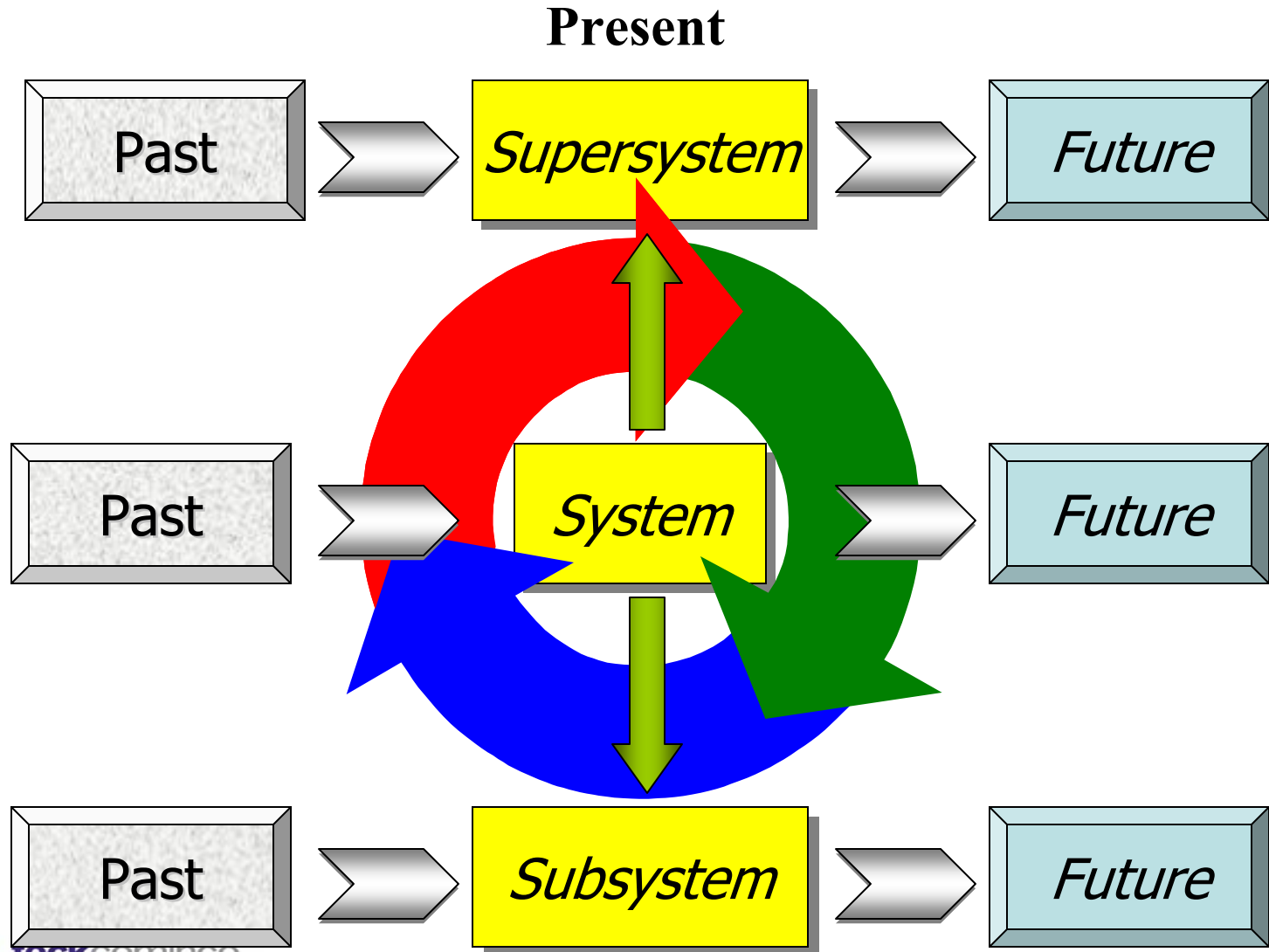


# How the IWB Software System Works



- A large number of typical problems are available for consideration
- TRIZ helps narrow the search to a manageable range of typical problems
- For each typical problem, there are one or more potential solutions
- Flexible format - more examples, specific to your technology, can be inserted-metallurgy

# System Approach



# System Approach

## Cathode Team

Bob Rogers    Sherrill Moreno  
Alberto Gonzales    Chad Wilson

Redesign horiz knife

Past

Keep FMA Current

*Supersystem*

*Future*

Treat  
Surfaces

Stamp one sheet,

2 Thicknesses

Past

**20% Increase  
in Cathode Life  
for \$0.5M/yr**

loose covers at  
solution line

*Future*

Repair

Explosion bond

Cu contacts

Past

Wash on  
every pass

*Subsystem*


All Al contacts

*Future*



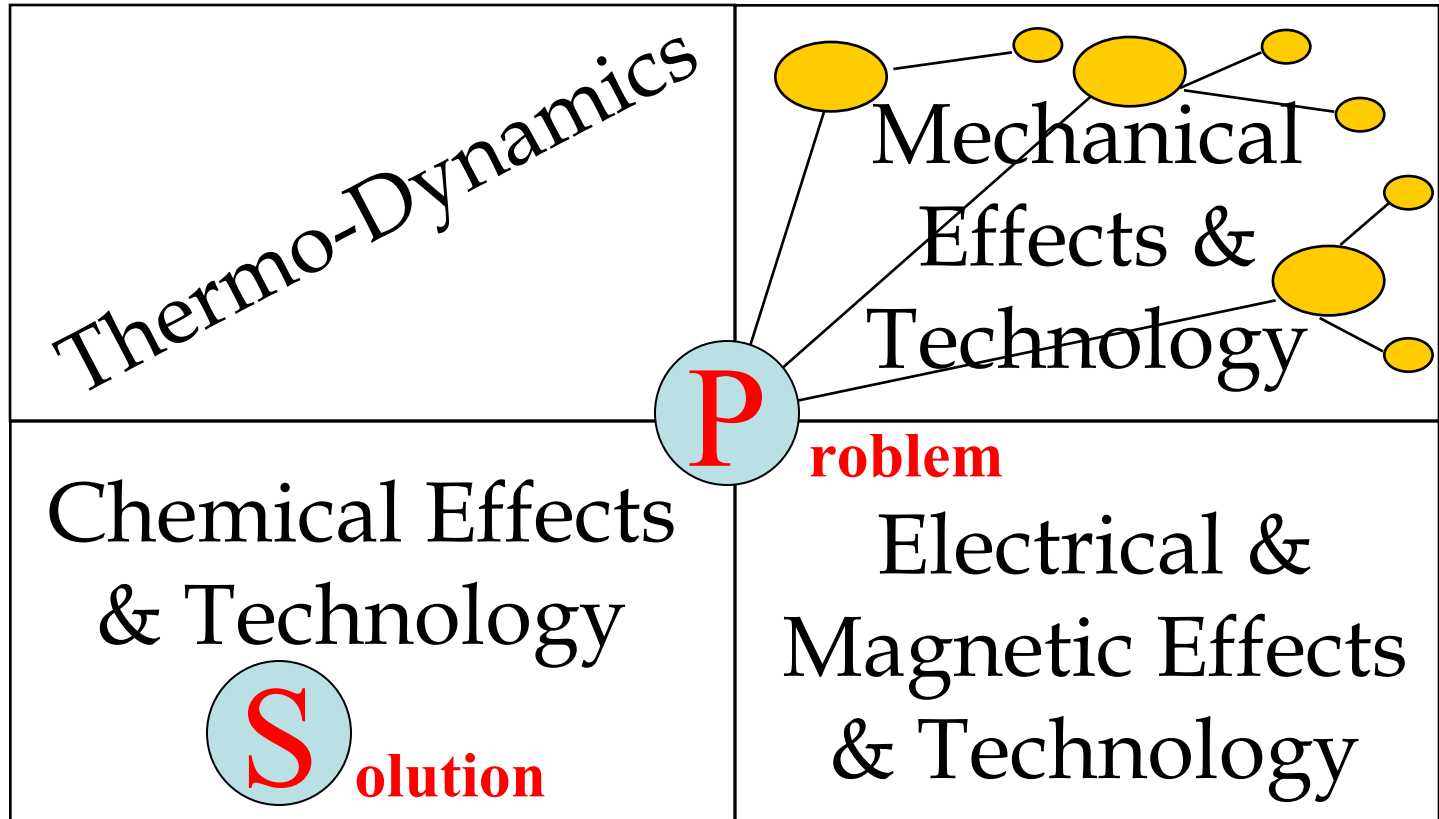
Best  
Solution

# Psychological Inertia

Idea	 Idea	Idea	Idea	Idea	Idea
Idea	Idea	Idea	Idea	Idea	Idea
Idea	Idea	Idea	Idea	Idea	Idea
Idea	Idea	Idea	Idea	Idea	Idea
Idea	Idea	Idea	Idea	Idea	Idea
Idea	Idea	Idea	Idea	Idea	Idea

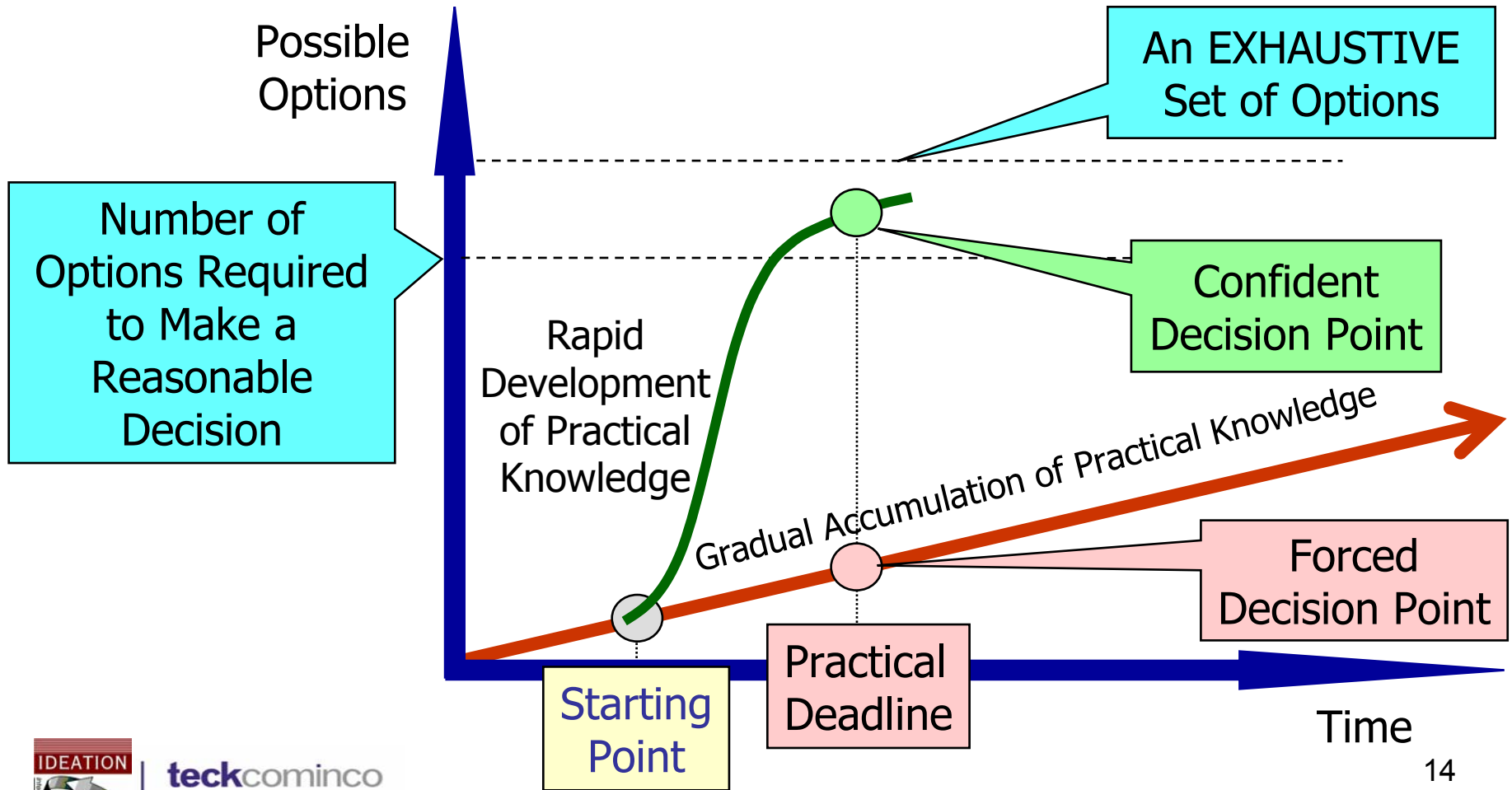


# In-Box Thinking and the Solution Space

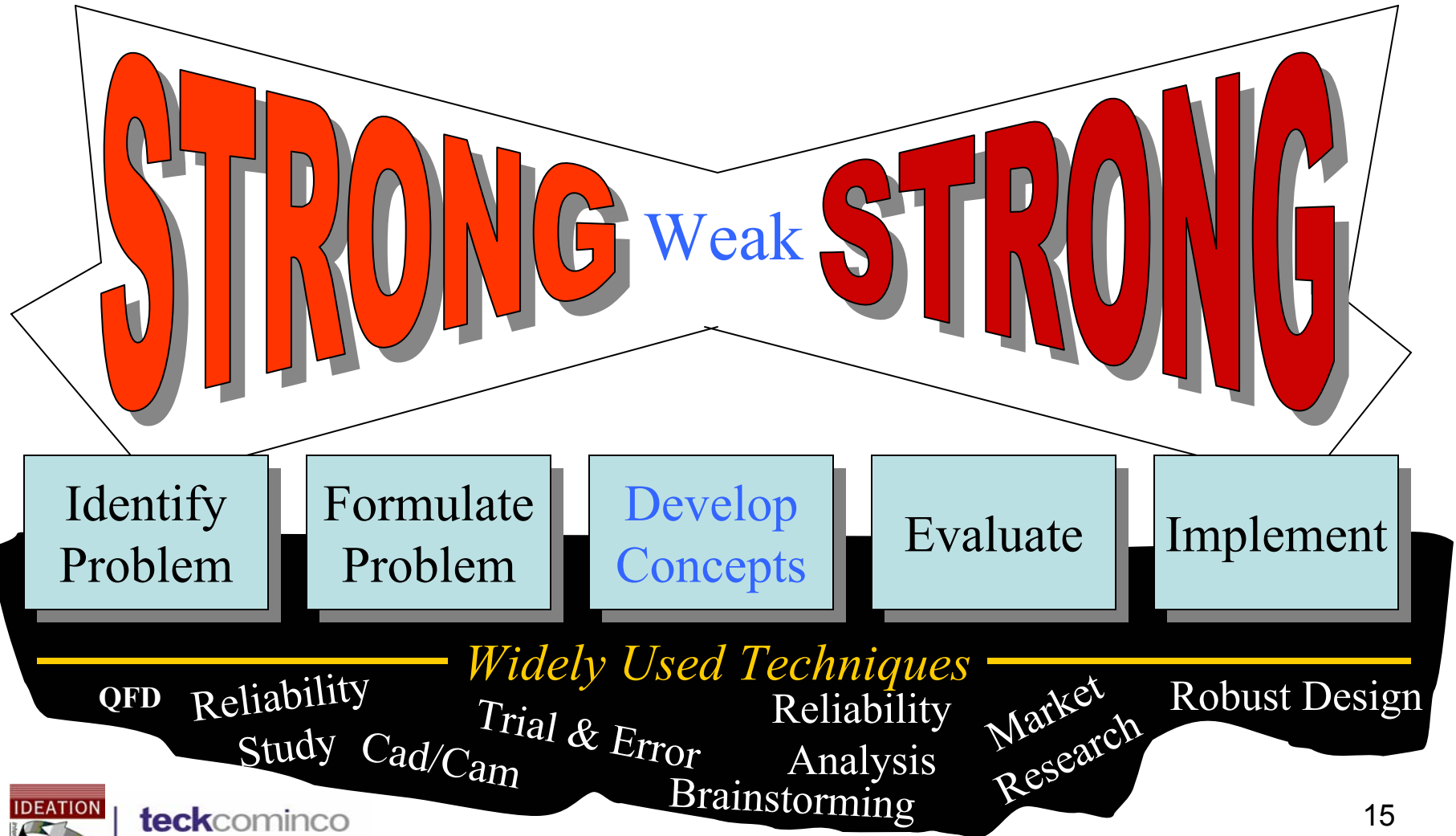


**Over 100 various techniques exist to enhance  
Trial & Error Method**

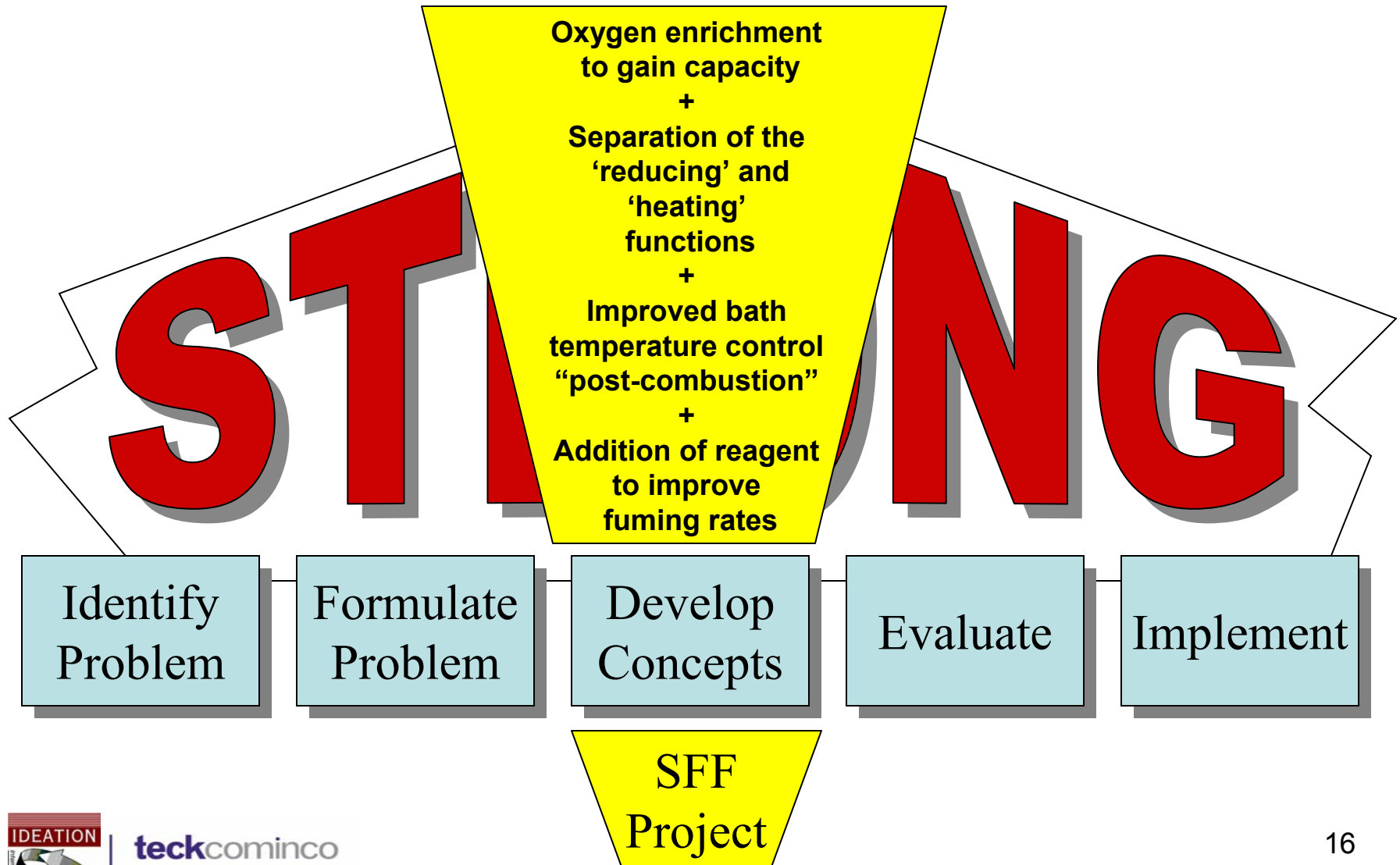
# Why the Ideation Process is Different: Enhancing Decision Making Process via Accelerated Idea Generation Process



# Traditional Innovation Process



# The Added Value of TRIZ





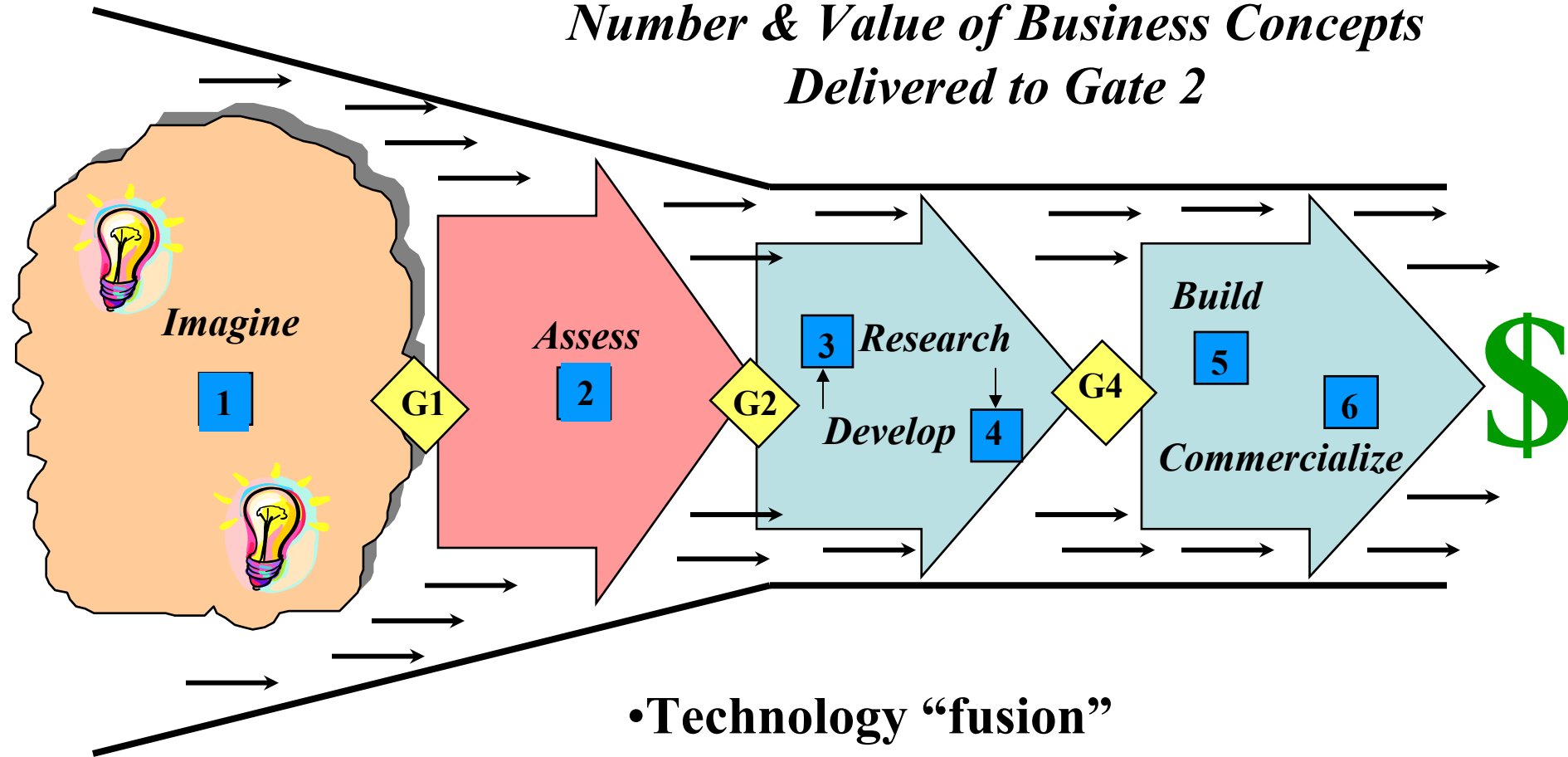
# So where do we go next ?

- **Structured Innovation**
  - in Technical Support - current objective
  - in Business Development?
- **S-curve analysis**
  - for unit operations - eg Electrowinning or Filtration
  - to guide R&D in plants - KIVCET or SLP
    - use Korea Zinc ideas to enhance this
- **Directed Evolution**
  - on a product line - eg As-Sb products or Silver
  - for Trail Operation business -- P4 project



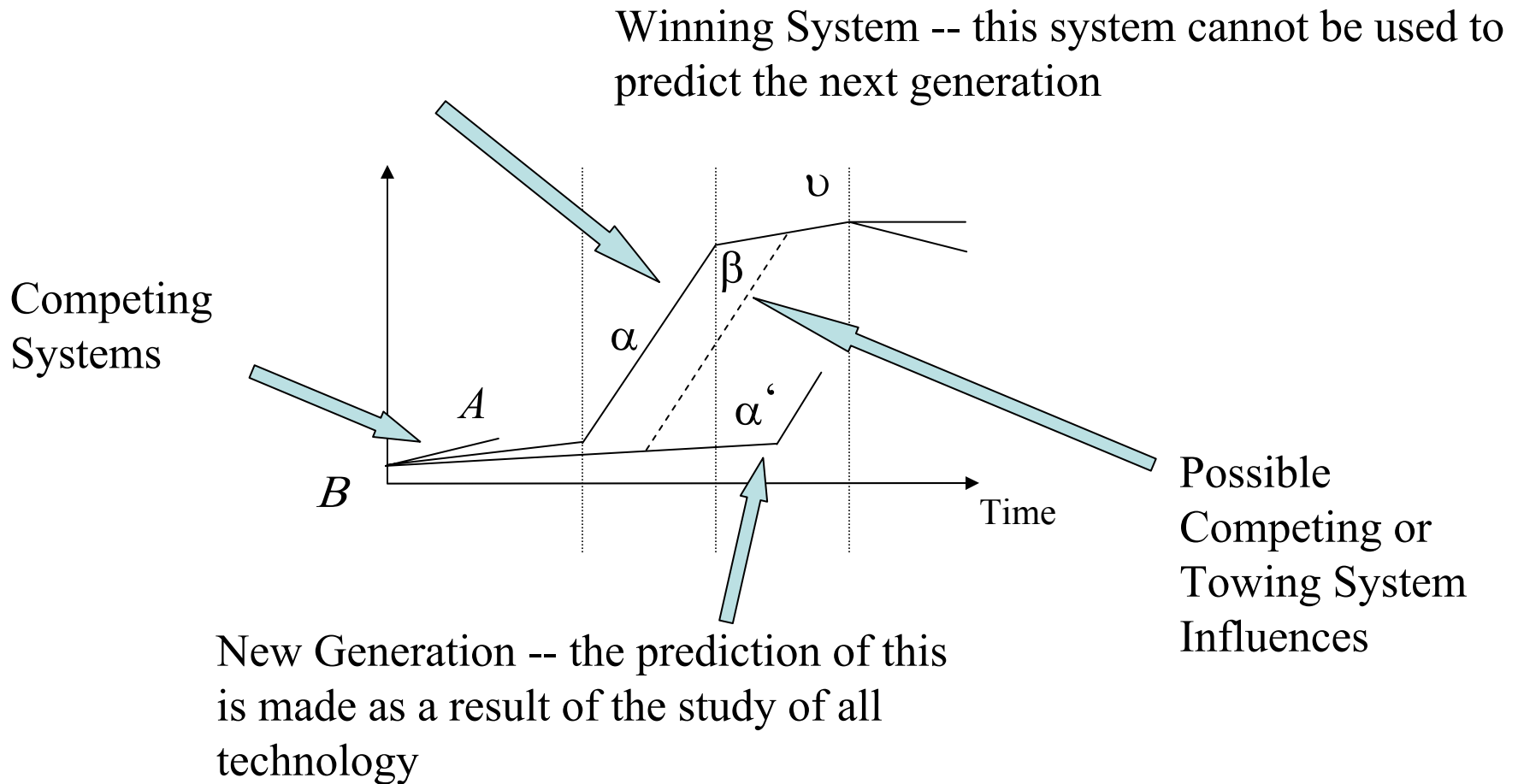
# Structured Innovation

*Number & Value of Business Concepts  
Delivered to Gate 2*

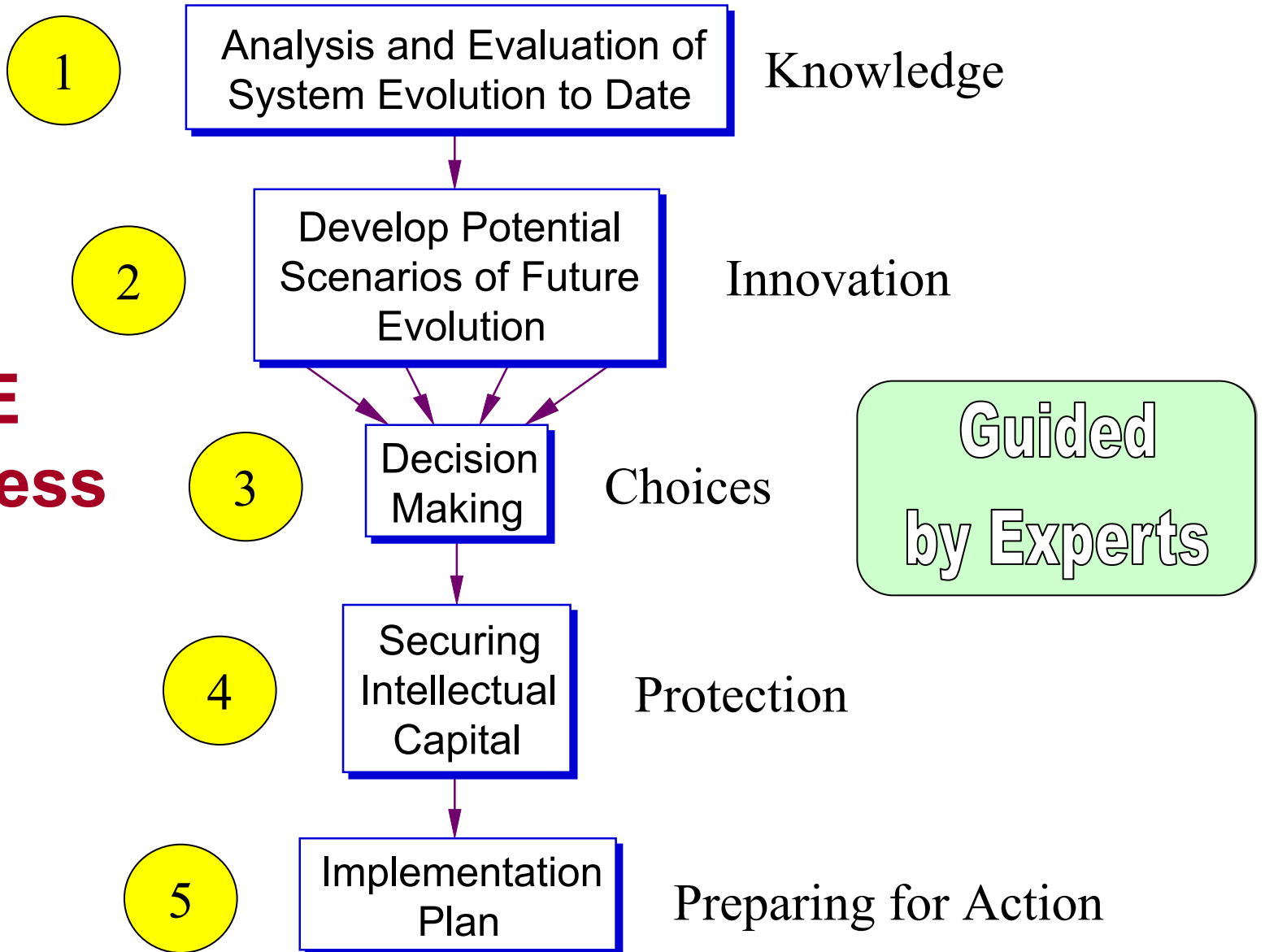


- **Technology “fusion”**
  - Internal-External Search
  - coupled with Rapid Screening
- **Cycle Time Compression**
  - frees resources

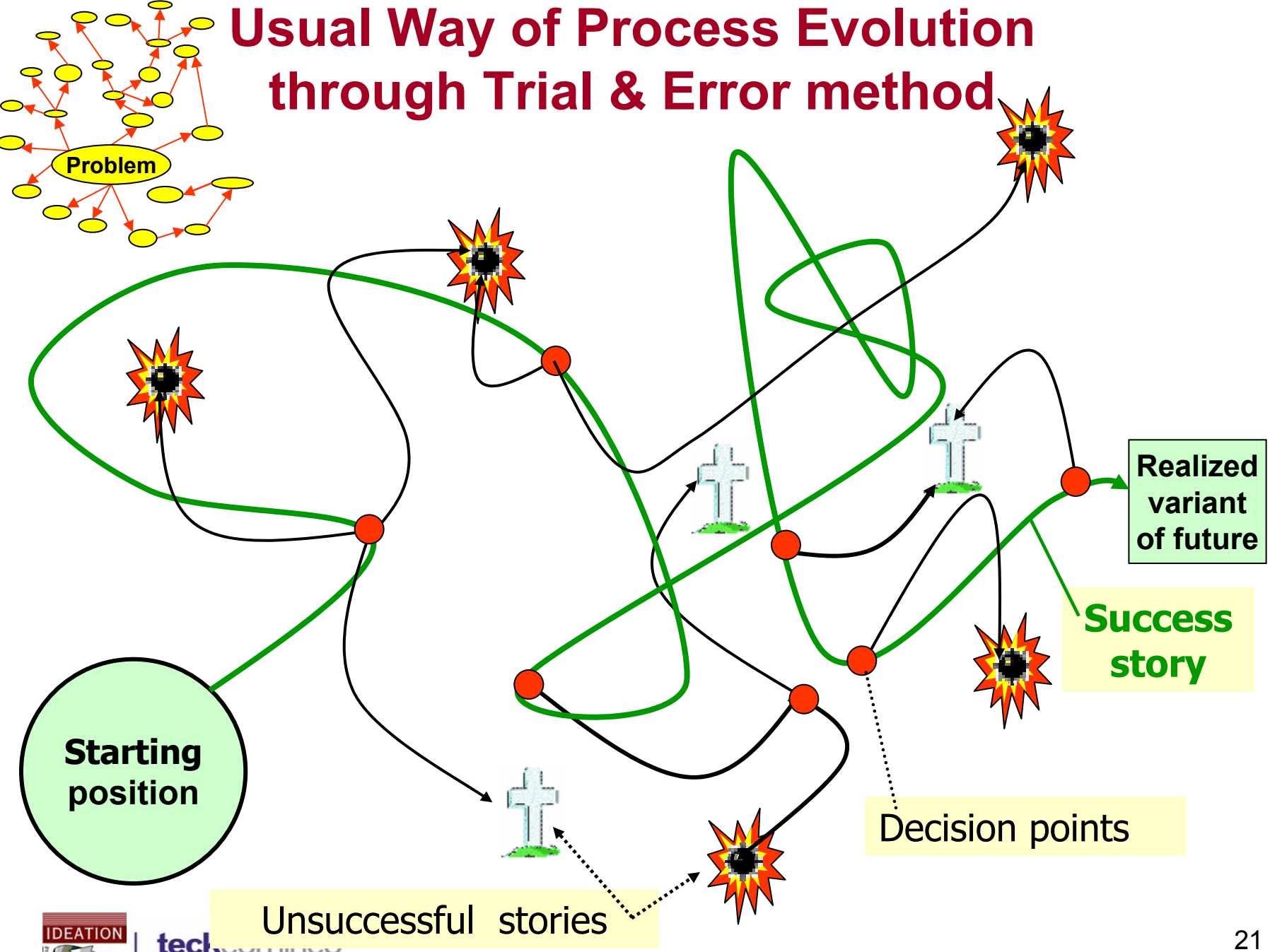
# S-Curve Analysis



# DE Process



# Usual Way of Process Evolution through Trial & Error method



# The Ideal

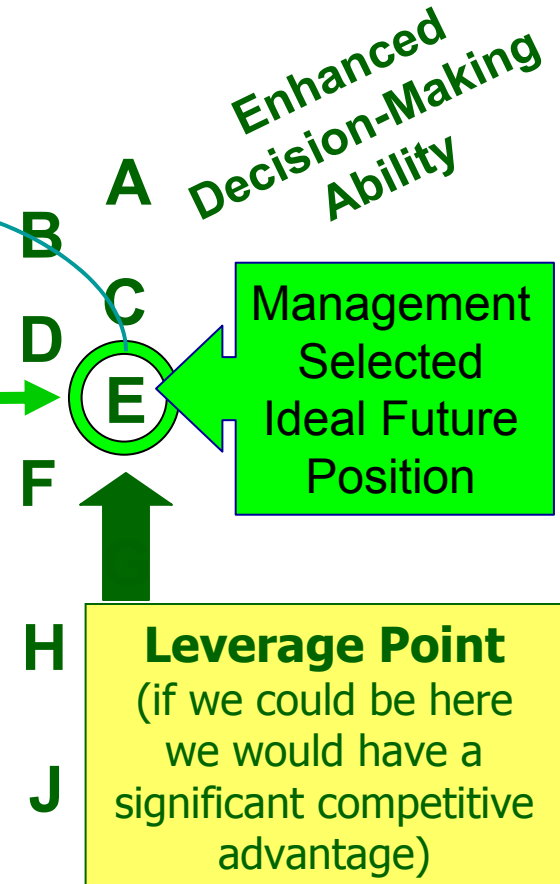
## Pre-determine Where You Want to Be

Enhanced  
probability of  
success of  
options



Plan milestones  
in reverse order

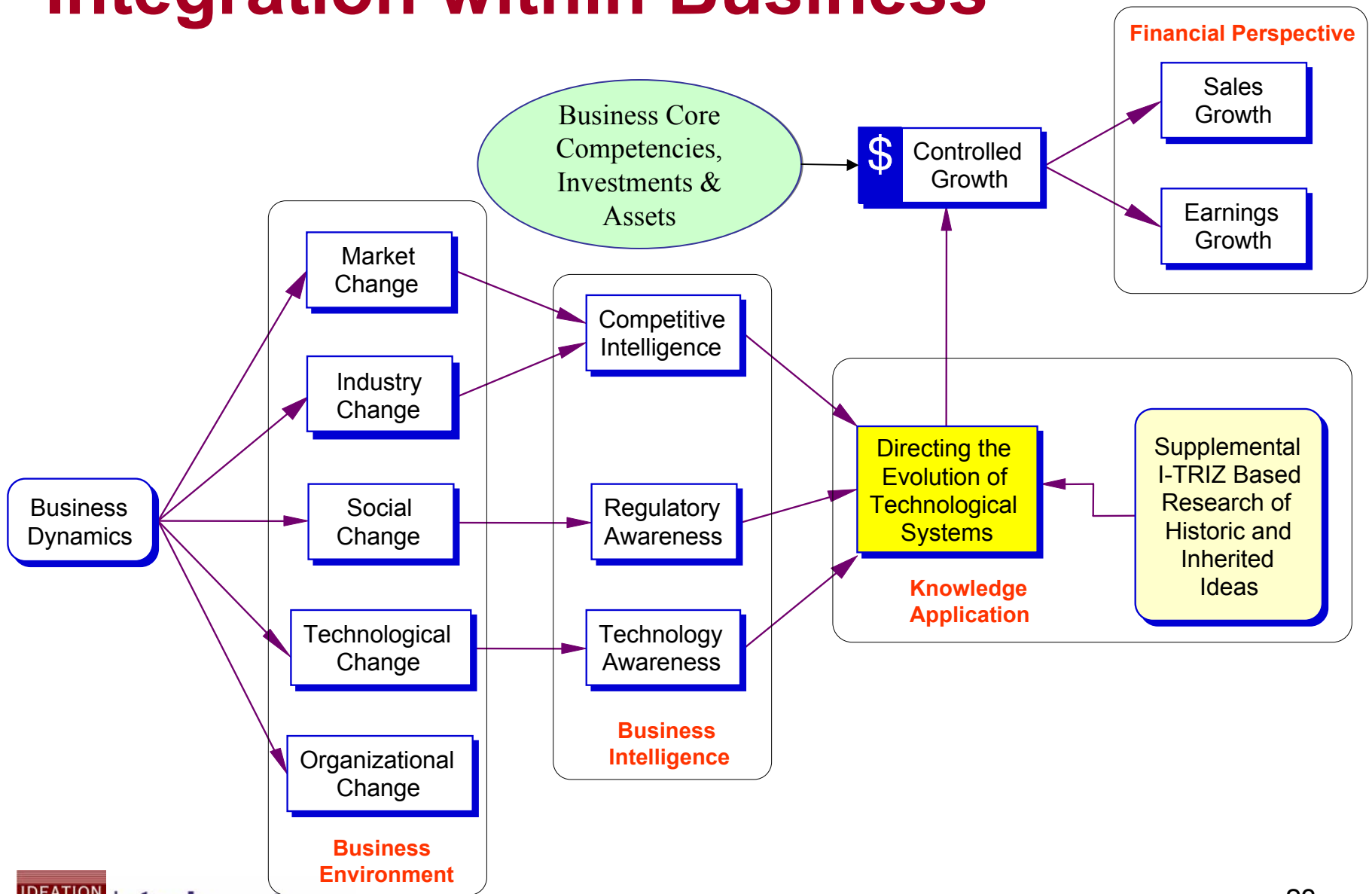
Roadmap into the future



Controllable creative process



# Integration within Business



# Business Challenges

I-TRIZ provides value by supporting a variety of business needs.

- Expanding Breadth of Business Opportunities
- Matching of Technological Solutions to Market Needs
  - Managing Technology, Society, and Market
- Increasing Probability of Success
  - Rapidly Overcoming Technological Problems
- Shrinking Time to Market
  - Development and Implementation of Products and Processes
- Reducing Cycle Time While Maximizing Quality and Reliability
  - Integration of Innovation and Six Sigma
- Maximizing Return on Capital Investment
  - Cost of Development, Capital Equipment, Facilities
  - Life Expectancy of Capital Investment
- Controlling growth and profitability





# A Characteristic of Today's Business World

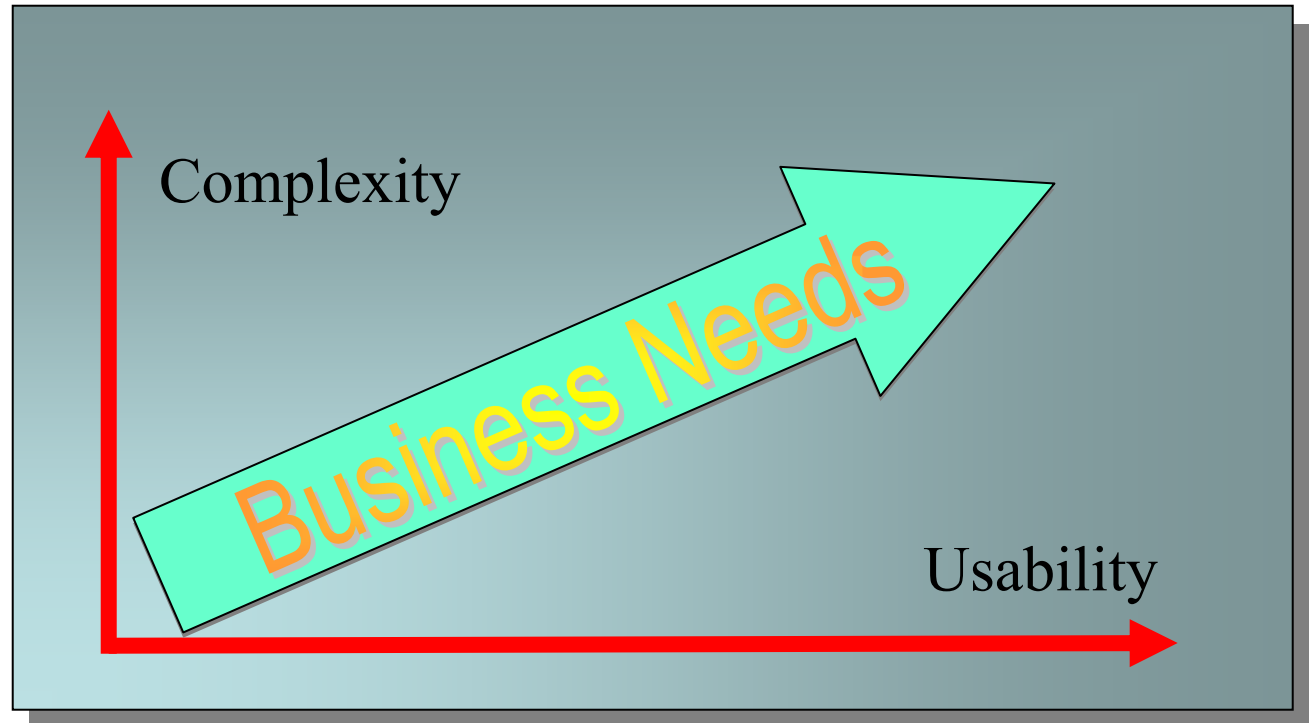
- Ever-increasing diversification of products in the market today due to:
  - Rapidly accelerating technological innovation
  - Shortened product life-cycles
  - Diversification of customer needs

*New technology spawns new markets*



# Business Drivers

Uncertainty  
Opportunistic  
Dynamic  
Parallel/Interface  
Procedural  
Context Sensitive



Incompleteness Handled  
Processes Extracted  
Data Extracted  
Modular



# Trends in the Global Marketplace

- 1950s and 60s
  - American industries dominated markets
  - American industries originated the most of the world's technologies
  - Consumers preferred “Made in USA” labels, USA meant quality
- 1970s and 80s
  - Worldwide global competition
  - Other nations capture markets
  - Innovation is no guarantee of product success
  - Ineffective U.S. response to market trends
- 1990s and 00s
  - Success requires understanding customer needs and expectations
  - Success requires meeting market needs promptly
  - Success requires providing value to all customers
  - Success requires innovative products
  - Success can be attained through Systematic Innovation using the I-TRIZ Methodology

# Based on Future Thinking



# Based on Market Knowledge and Market Future View

- Intelligence analysis
- Prioritize market segmentation
- Segment, profiles & trends (market lifecycles)
  - Value sets, buyer criteria, price elasticity
  - Trends -- emerging and declining value attributes
- Competitive analysis and trends
- Market share tracking
- Market forecasting
- Customer readiness assessments
- Strategic planning
- Intellectual property planning and licensing -- technology, patent fences
- Readiness assessments: organizational competencies

# Refined Values, Beliefs, Norms and Behaviors

## The Domains of Customers and Technology

Culture Element	Customers	Technology
<i>Values</i>	We must always strive to add value for our customers	Technology must be pushed to its limits
<i>Beliefs</i>	Customer satisfaction is the key to our business	Technology leads to new products that lead to the ability to stay ahead of the rivals
<i>Norms</i>	Always do what the customer asks	Pursue each technology advance as if the firms future depended upon it
<i>Behaviors</i>	Managers spend time with customers at their locations	Managers spend extensive time with external technology sources

# Managing the Strategic Challenge of Change

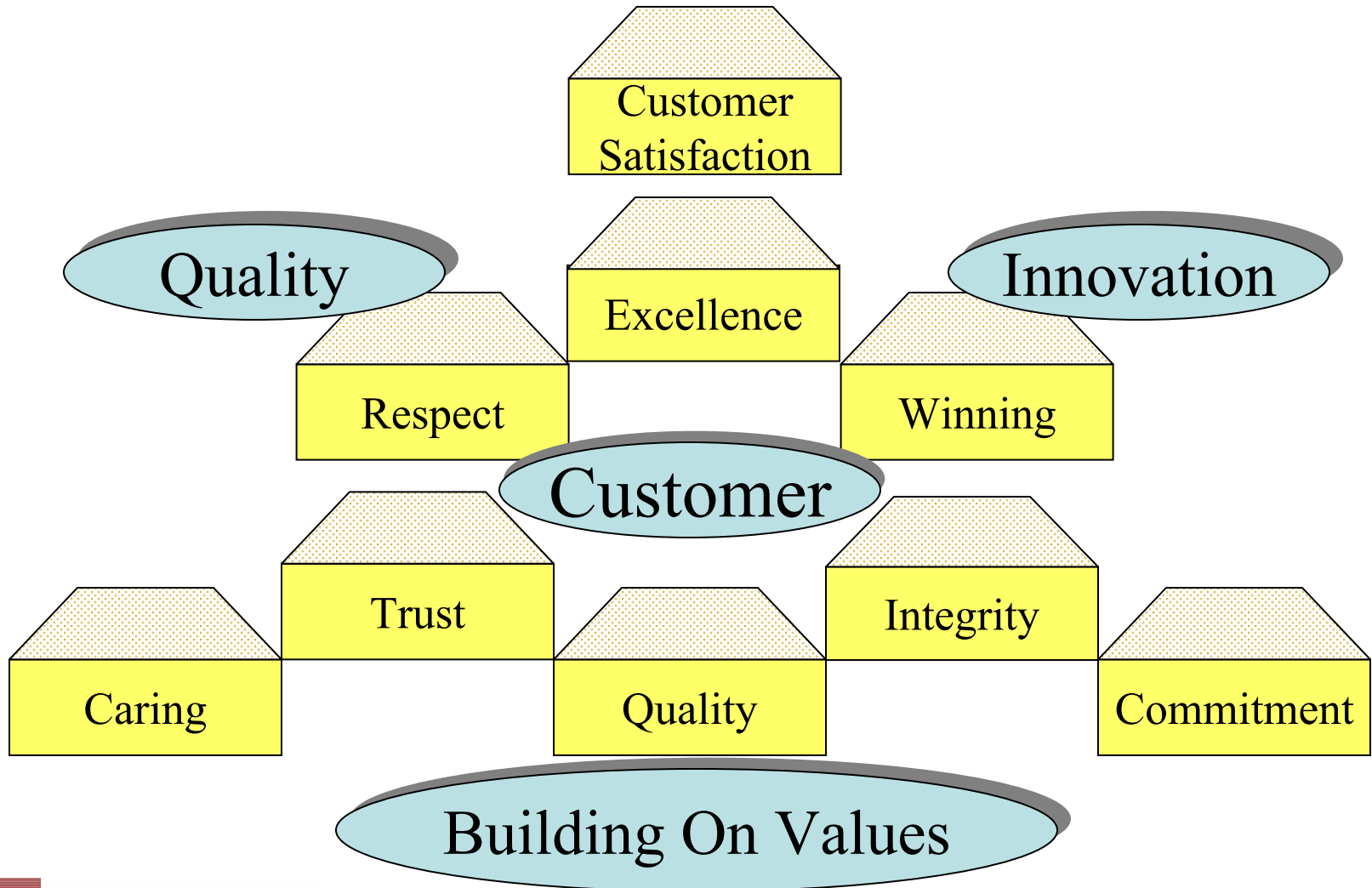


# Ideation's Vision Enablers





# Ideation Business Philosophy



# Measures of Success

## A. Creativity

- Were viable approaches developed in areas not considered by Subject Matter Experts and management?

## B. Logic

- Were the Concepts of Solution selected justified, prioritized, and clearly presented?

## C. Practicality

- Will the Concepts of Solution be testable and/or implementable within a reasonable time period and with reasonable resources?

## D. Detail

- Were Concepts of Solution thought through sufficiently so that they did not contain obvious logical flaws or oversights?
- Were they quickly comprehended?
- Was the information provided adequate to take the next steps (for example, concept testing or engineering design)?



# Measures of Success (continued)

## E. Efficiency

- Was the interaction between company's personnel efficient?
- How much of the SMEs time and any additional resources were required to develop the Concepts of Solution?

## F. Communications

- Quick to comprehend the problems/issues?
- Was the technical expertise adequate?
- Were the questions asked pertinent?
- Were the responses clear and concise?

# Measures of Success (continued)

## G. Applicability

- Was the power of the Modern TRIZ methodology demonstrated?
- Was it clear that the methodology is more systematic, wider ranging in its solution search, and more efficient than alternate approaches?
- Was the methodology's general applicability to other company problems evident?
- Will Systematic Innovation be easily adapted within the company through support and utilization of Ideation's software and service capabilities?

## H. Value

- How much time and how many dollars will Systematic Innovation save for this project?
- Were the results worth the price and effort?



# Successes To-Date

- Chemical Industry
  - New Generation of Existing Chemical Processing Plant
  - Processing of New Chemical
- Heavy Equipment
  - Lifting Cranes
- Automotive Industry
  - Parking Brakes
  - Doors
  - Cable Applications
- Medical Industry
  - Surgical Instrumentation
- Oil Industry
  - Control of Oil Production
- Materials Development
  - Super Absorbent Fibers
  - Plastics
  - Packaging
- Fluid Systems
  - Water Pumps
  - Hazardous Materials Pumps
- Commercial Products
  - Sanitary Products
  - Foot Massagers
  - Electric Shavers
  - Hair Care Products
    - Combs, Hair Dryers, Curling Irons, Hair Clippers
- Stock / Commodity Exchange



# Successes-To-Date: Oil Industry

- Exxon
- Amoco
- Mobile
- Shell

Cost reduction, reliability, failure analysis, new design, training

- Exploration
- Method of discovery
- Refineries
- Post processing
  - Gas
  - Fuel oil
- Enhanced oil recovery
- Dual grading drilling
- Expandable casing
- Hydro carbon processing
  - on shore
  - off shore
- Transportation



# Successes-To-Date: Chemical Industry

- Dow
- Amoco
- Dupont
- Conoco
- Solutia

Cost reduction, breakthrough/discovery, manufacturing processes, safety, quality, reliability, failure analysis, training

- Plastics
- Chemical processing
- Catalysts
- Reactor
- Aromatic oxidation
- Distillation/separation
- New material development/design



# Successes-To-Date: Automotive Industry

- GM
- Ford
- Toyota
- Chrysler
- Eaton
- Dana Corporation
- Rockwell Int'l Automotive
- TRW Automotive
- ITT Automotive
- Jaguar

Cost reduction, warranties, recalls, new design, patent circumvention, failure analysis, failure prediction, training

- Break squeal
- Brake roughness
- Noise and vibration
- Transmission
- Air bag
- Electrostatic paint
- Tail light
- Seat cover
- Wind tunnel
- Plastic fuel tank



# Successes-To-Date: Aviation Industry

- Boeing
- Pratt & Whitney
- Techspace Aero
- Honeywell
- Allied Signal
- Rockwell International
- Rolls Royce
- McDonnell Douglas Aerospace
- NASA
- Hughes Aircraft
- TRW
- BF Goodrich
- Litton

Cost reduction, safety, reliability, quality, new design, failure analysis and prediction, training

- C-17
- F-22
- Engines
- Valves
- Containment ring



# Successes-To-Date: Electronics/Electrical Industry

- Honeywell
- Motorola
- Philips Electronics
- Hitachi
- ITT
- Artech
- Visteon
- Northern Telecom
- Solarex
- Helix
- Toshiba
- Sony
- LG Electronics

Cost reduction, new technologies, reliability, manufacturing processes, training

- Cell phones
- Microchips
- PC boards
- Radio
- Headset
- High voltage transformers
- Power supplies
- Navigation systems



# Successes-To-Date: Medical Industry

- Johnson & Johnson
- Bristol Myers
- Cardiovascular
- Zeneca
- LaRoche

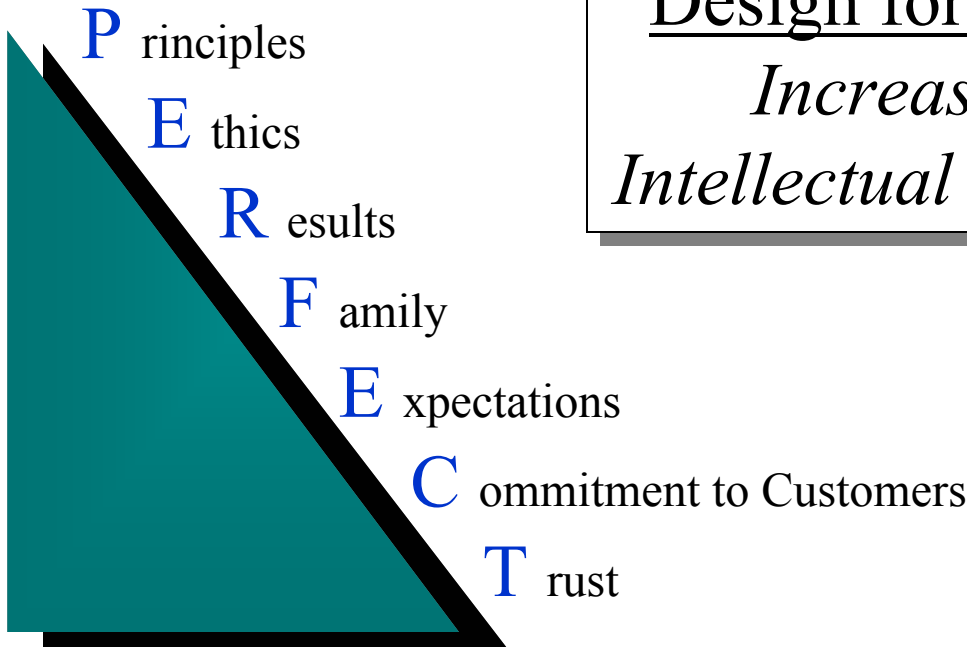
New design, patent circumvention, cost reduction, failure prediction, training

- Medical instrumentation
- Sanitary products
- Blister packaging of pills



# Ideation International Inc.

Design for Worldwide Innovation  
*Increasing the Value of the  
Intellectual Capital of an Enterprise*



*INTEGRATED SOLUTION*

Ideation + Innovation(Methodology + Tools) =



Competitive Advantage  
Technical Superiority  
Greater Market Share  
Increased Profit  
Greater Return on Investment  
Value, Value, and More Value



# The Innovation Platform:

