



# >Welcome!

## Achieving Design Excellence

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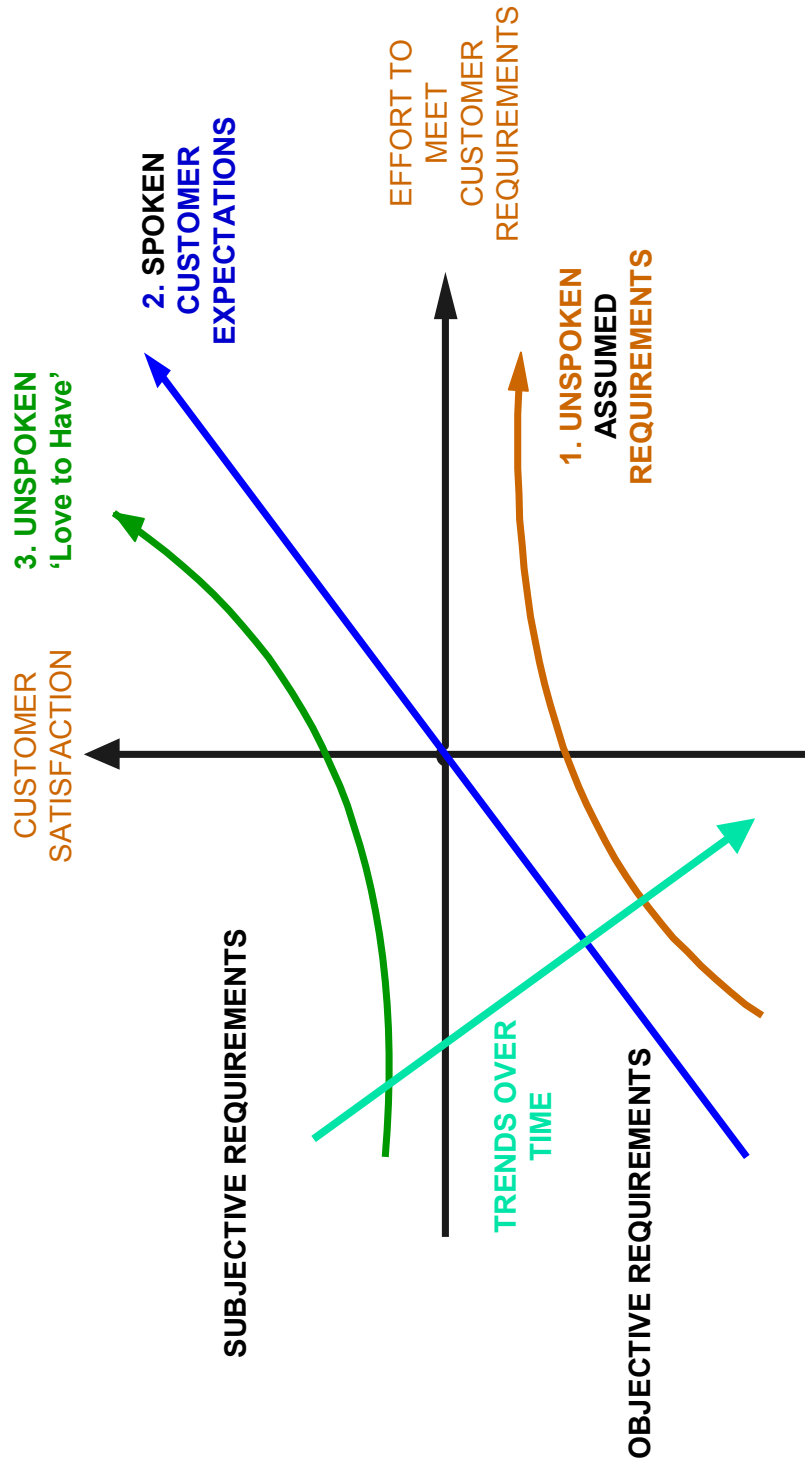
## Outline

1. Ten Killers of Excellence
2. Requirements for Excellence
3. Design Excellence - Design for Manufacturing
4. Manufacturing Excellence - Manufacturing to Design
5. The Breakthrough Innovation Framework
6. Conclusion

## Killers of Excellence

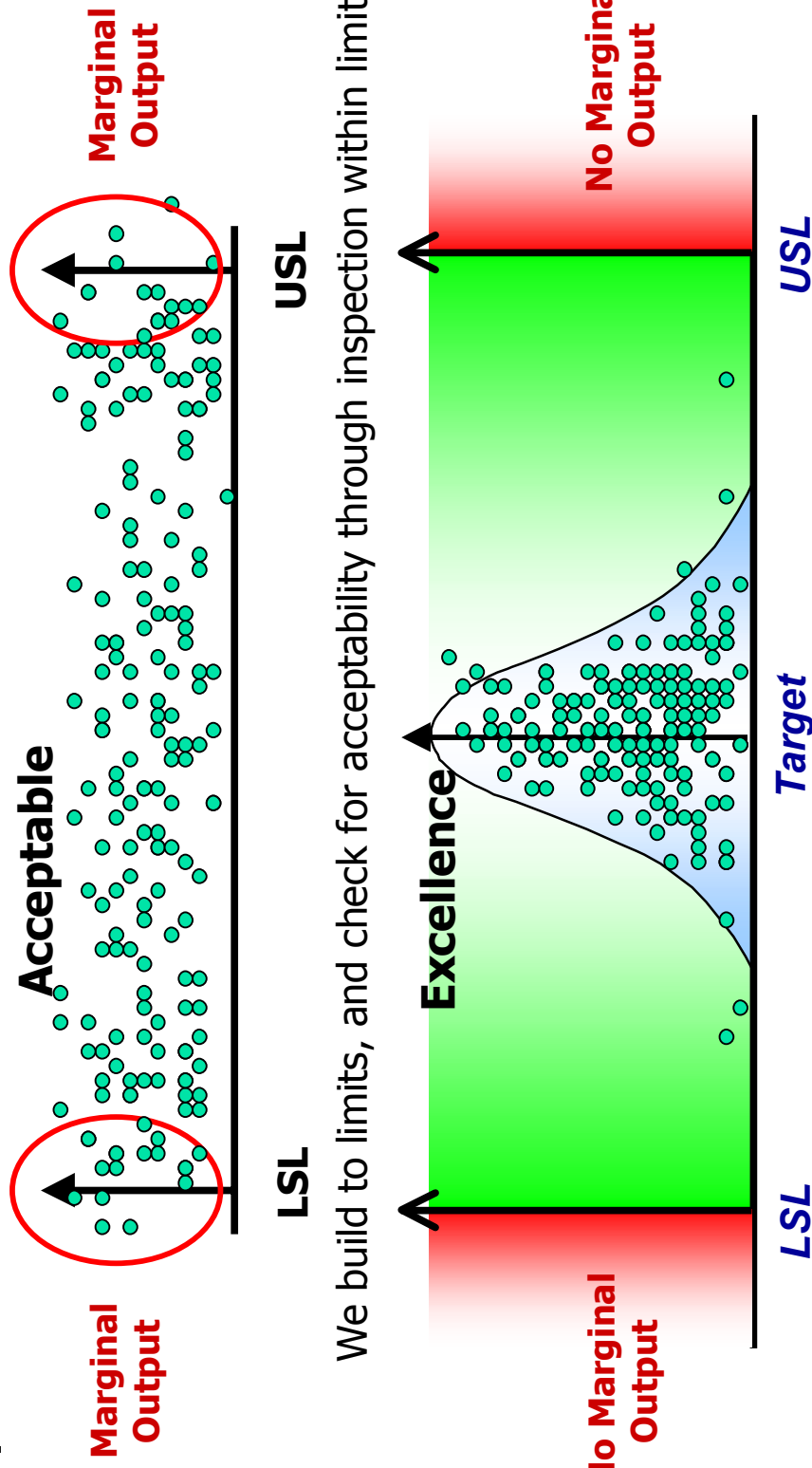
1. Executive focus on cost
2. Designs without target
3. Sub-optimized designs
4. Squeezing suppliers for cost
5. Delegation of quality to large quality departments
6. Implementation of quality management systems
7. Too much emphasis on improvement methods than results
8. Lack of incentives for learning
9. Not listening to employees
10. Conflicting political agenda

# Requirements for Excellence



## Kano's Model for Voice of the Customer

# Acceptability vs. Excellence



We build to limits, and check for acceptability through inspection within limits

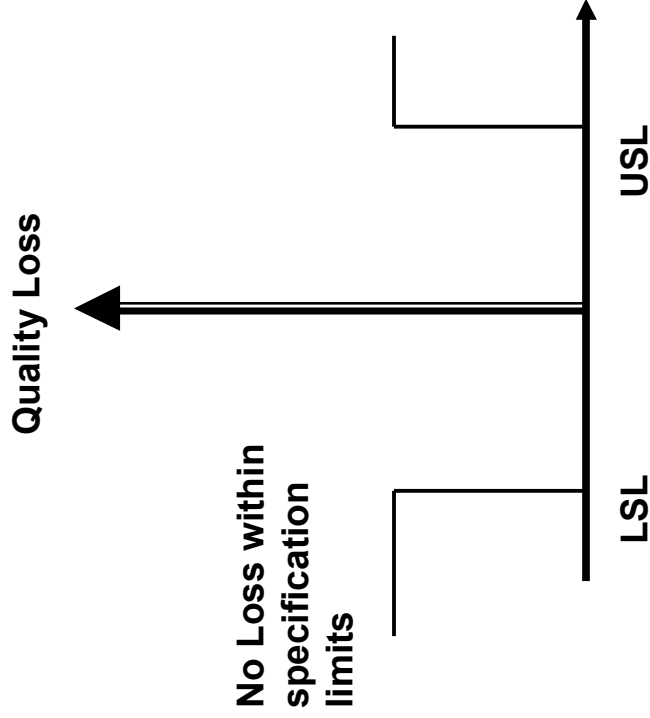
# Shooting for Excellence Demo



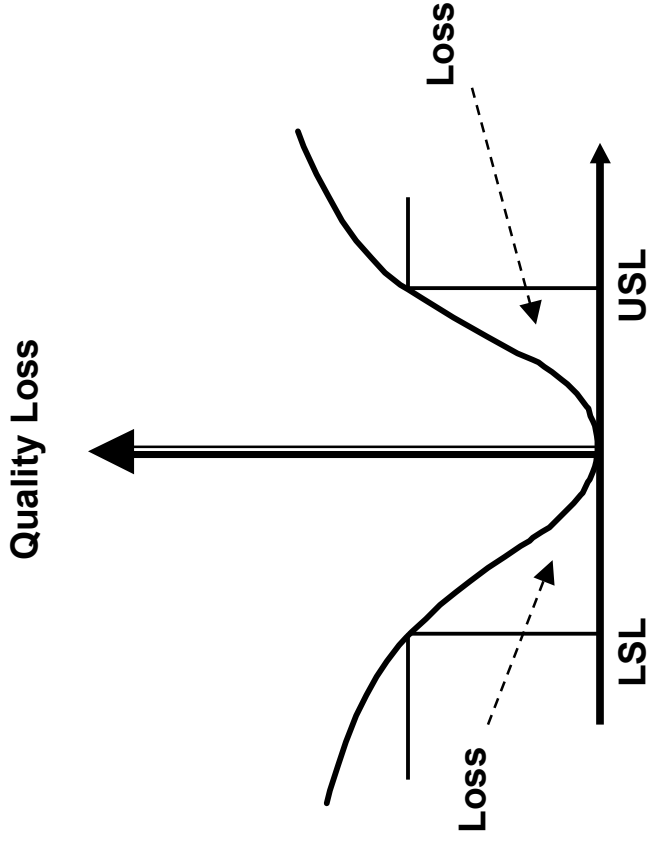
## Design Excellence

1. Most manufacturing problems are traceable to design issues.
2. Design problems are caused by approximate designs.
3. Design problems becomes part problems for suppliers
4. Part problems become manufacturing problems
5. We must emphasize excellence in design
6. Excellence in design implies design for robust manufacturing

# Robustness - A Necessity



a. Traditional SPC

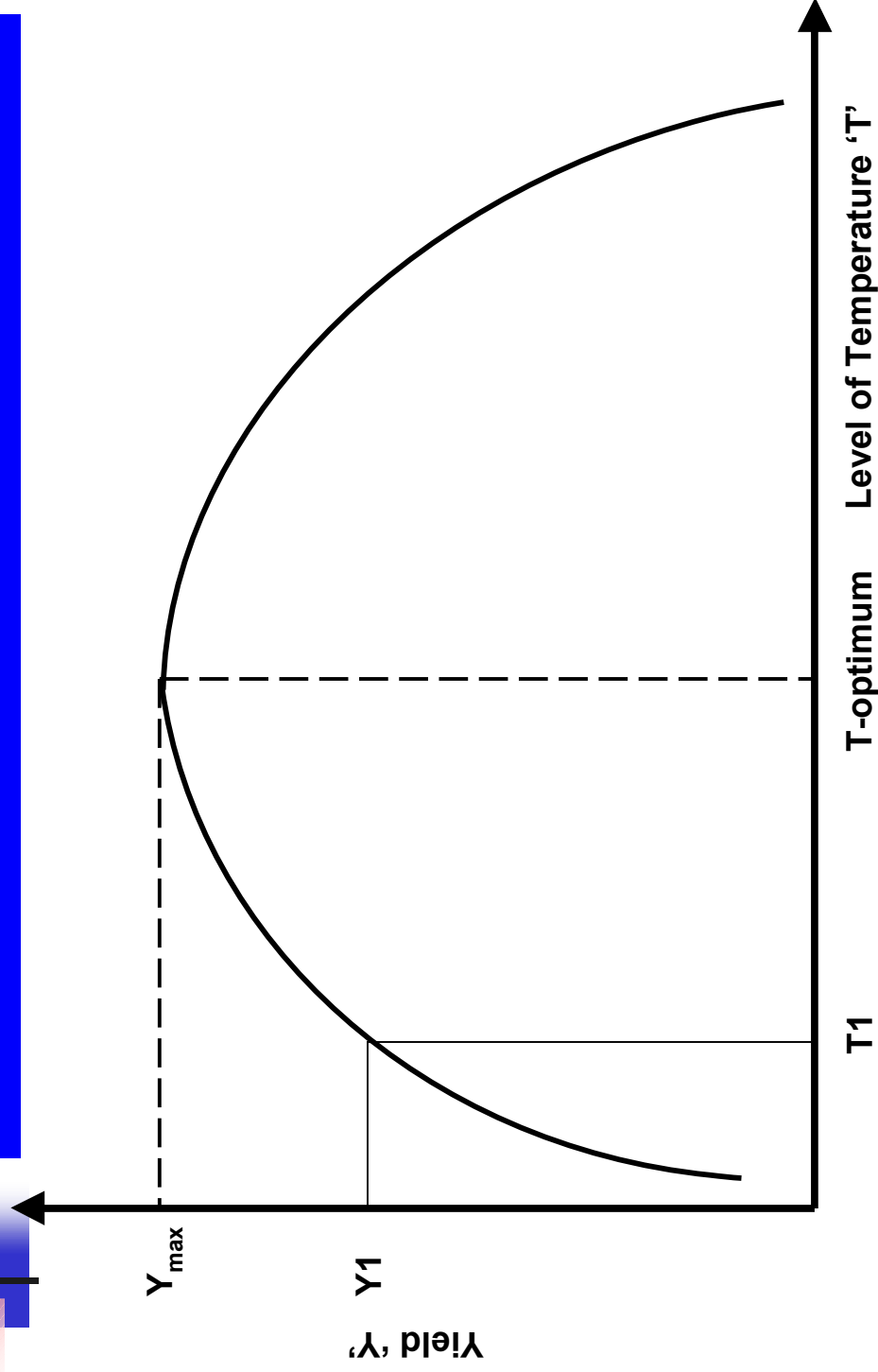


b. Quadratic Loss Function

Comparison of loss in traditional SPC and Quadratic Loss Function



# Design for Robust Manufacturing

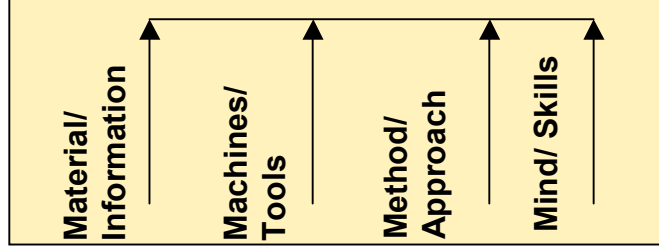


## **Manufacturing Excellence**

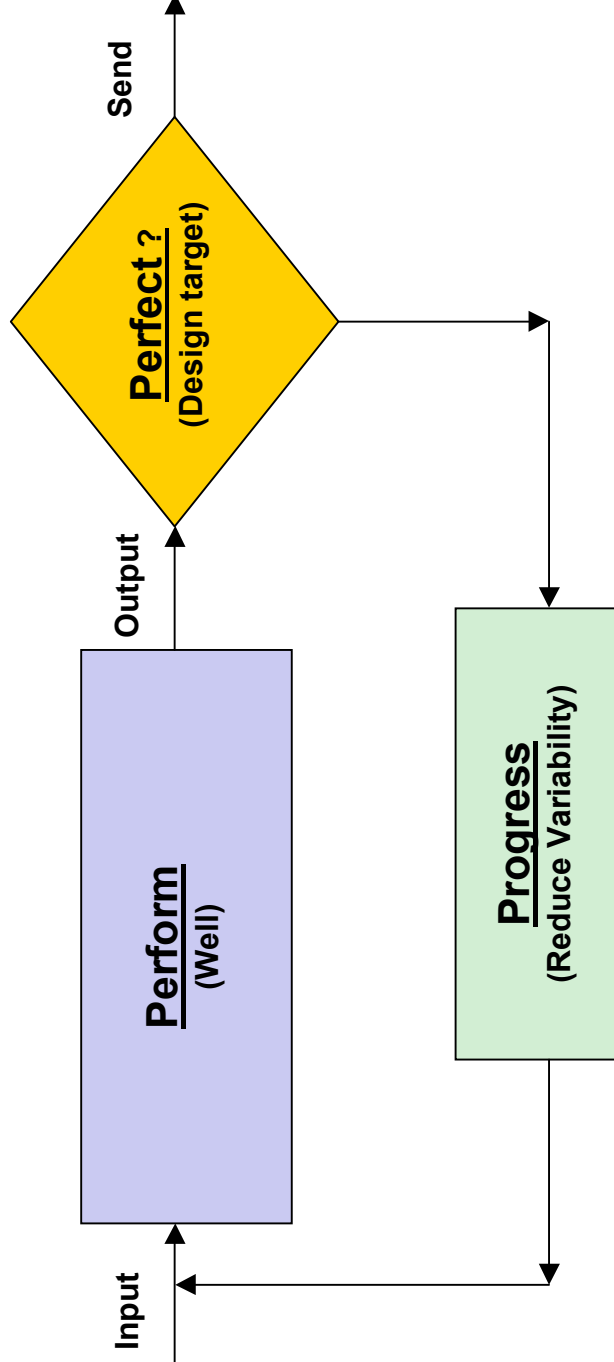
1. Typical manufacturing process is designed for quality inspection and testing
2. Most manufacturing processes are designed for producing acceptable product
3. Excellence in manufacturing means producing on target
4. Excellence in manufacturing requires excellent parts from suppliers
5. Excellence in manufacturing requires design targets
6. Design must drive excellence in manufacturing

# Manufacturing to Design

**Prepare**  
(To do well)



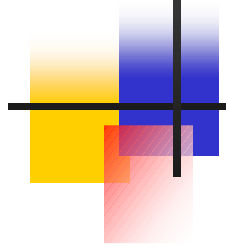
## The 4P Model for Process Excellence





## **Designing for Manufacturing Excellence**

1. Design must define performance targets
2. Design must understand manufacturing constraints
3. Design must understand supplier constraints
4. Design must participate in achieving manufacturability of the design
5. Design must work with manufacturing in achieving design objectives for excellence



# Designing Great Products Using the Brinnovation™ Framework

Brinnovation™ => **Breakthrough Innovation**



## Why Brinnovation Framework

- Growing demand for customization and new solutions
- Continually shrinking product life cycles
- Inefficient, uncertain, and ineffective current process of innovation
- Need for a repeatable and teachable innovation process

**Customers want innovation on demand,  
sometimes in real time.**

# Return on Innovation

BW Top Ten	Most	Best (RgXPg) \$	Managed (RgxPg)/ RnD(%)	ROI (\$)	ROI \$ / year
Apple	Walmart	Google	Google	Google	<b>.71</b>
Google	GE	Apple	Apple	Dell	<b>.71</b>
Toyota	PnG	Genentech	Dell	Apple	<b>.51</b>
GE	Dell	Amazon	eBay	eBay	<b>.44</b>
Microsoft	Motorola	eBay	Genentech	Genentech	<b>.21</b>
PnG	HP	Motorola	Motorola	3M	<b>.15</b>
3m	GM	Starbucks	HP	Microsoft	<b>.13</b>
Walt Disney	Target	Boeing	Boeing	Cisco	<b>.13</b>
IBM	Apple	Walt Disney	3M	Motorola	<b>.10</b>
Sony	Microsoft	Dell	Cisco	HP	<b>.09</b>

Need Acceleration

## Innovation Framework

$$\text{Innovation} = \text{Effort} \times (\text{Speed of Thought})^2$$

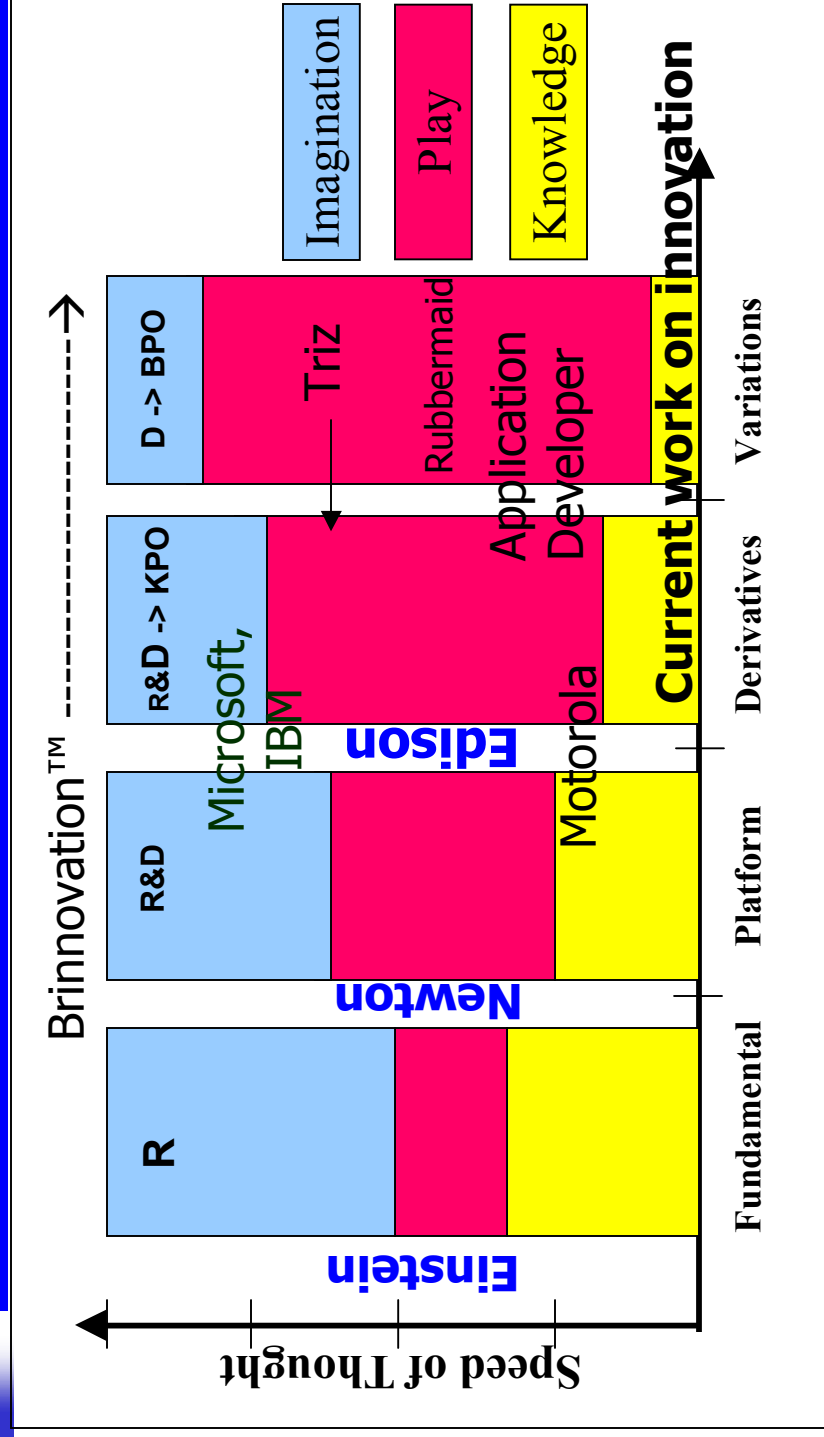
Where speed of thought is a function  
Of Knowledge, Play and Imagination.



**What is your Innovation value?**



# Activity Based Classification of Innovation



R – Research, D – Development

# Innovation Examples

**Platform**



**Derivative**



**Variation**



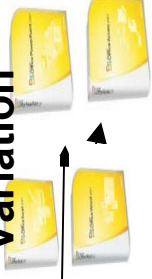
**Platform**



**Derivative**



**Variation**



**User Applications**

Word, Excel,  
Powerpoint, Access,  
Partner innovations

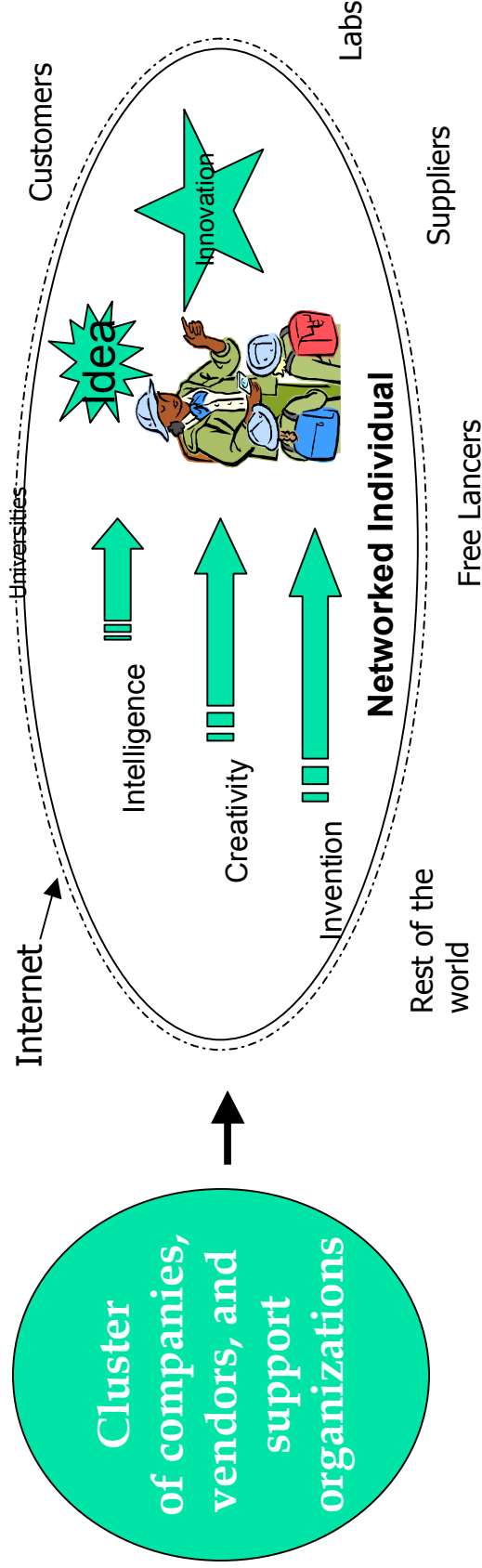
**Standard, Professional,  
Student, Home, Small Business  
Versions, Partner innovations**

(C) Accelper Consulting 2008

# Brinnovation Methodology (TEDOC)

Phase	Methods and Approaches
<b>Target (T) Opportunity</b>	Scouting, Market Research, Networking, Focus Groups, Surveys, Trade Shows, Customer Interactions, Visioning
<b>Explore (E) Evolution</b>	Technology Research, Benchmarking, Competitive Analysis, Creativity
<b>Develop (D) Innovation</b>	Knowledge Management, Business Intelligence, Process Analysis, Solution Development, Out of Box Thinking, Experimentation
<b>Optimize (O) Solution</b>	Solution Selection, Optimization Methods, Innovation Maximization
<b>Commercialize (C) Solution</b>	New Product Development, Marketing, Branding, Collaboration,

# Building Block of Innovation



**Physical Cluster** to

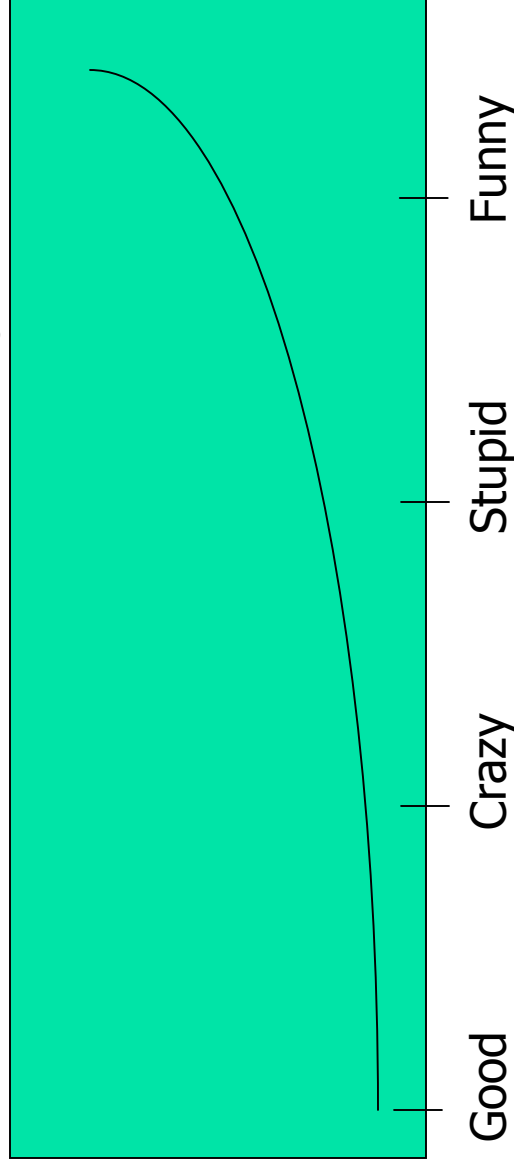
**Virtual Cluster**

## Culture of Innovative Ideas

- The most exciting phrase to hear in science - the one that heralds new discoveries - is not "Eureka!" but "*That's funny...*" (Isaac Asimov)

Innovation on Demand = Creativity on Demand

Thinking  
Time (min)  
Per Idea



# The Required Innovative Thinking

<b>Business Aspects</b>	<b>Conventional</b>	<b>Innovative</b>
<b>Purpose of business</b>	<b>Make money</b>	<b>Create value for customers</b>
Customer Demand	Satisfy	See as a larger opportunity
<b>Leadership</b>	<b>Manage for quarterly profits</b>	<b>Lead to build a business</b>
Decision Making	Reactive	Responsive or proactive
<b>Business Strategy</b>	<b>Profit or growth</b>	<b>Optimized profit and growth</b>
Innovation	Flash of a genius	Learned skill
<b>Method of Innovation</b>	<b>Brain Storming</b>	<b>Well defined process</b>
Innovators	Selected few	Everyone
Resources for Innovation	Allocated sporadically	Invested continually
<b>Building Block of Innovation</b>	<b>Clusters of people</b>	<b>Networked Individual</b>



## Engineers' Things to Do

1. Scout for innovation opportunities
  - Conflicts
  - Suffering
  - Hard work
  - Complaints
  - Pain
2. Think innovatively and develop a significantly innovative solution faster than your global competition
3. Network to commercialize your innovation rapidly

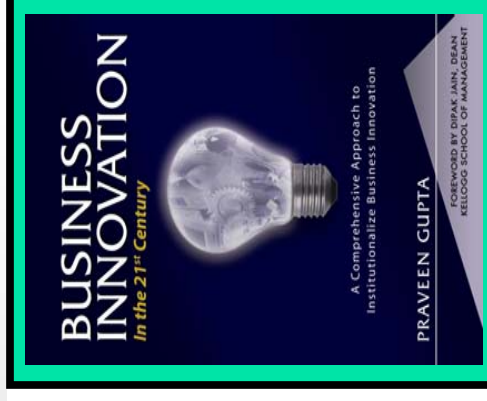
## Conclusion

- Design influences 70% of cost factors. Excellence and Innovation in design must become a mandate.
- To achieve success in business, we must do the following:
  1. **Train** employees in Excellence and innovation - Recognize and reward employees for success!
  2. **Accelerate** employee involvement - Excel in listening to all employee ideas
  3. **Collaborate** with customers to grow sales through innovative solutions

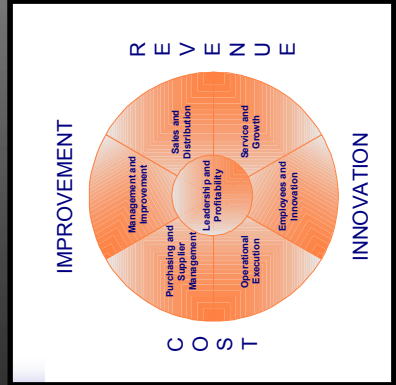


## Praveen Gupta

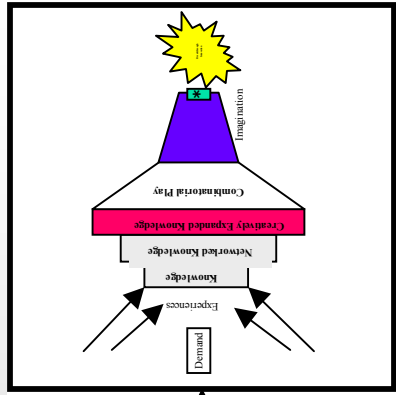
- ❑ BSEE IIT Roorkee, MSEE IIT Chicago
- ❑ Worked at Motorola, and AT&T Bell Labs
- ❑ Consulted with 100+ corporations
- ❑ Founded Accelper Consulting
- ❑ Pioneered Six Sigma working with the inventor
- ❑ Developed the Brinnovation™ methodology, the 4P Model, Six Sigma Business Scorecard, and Stat Free Six Sigma
- ❑ PE, SSMBB, ASQ Fellow, Sr. Member of IEEE
- ❑ Faculty for Operations Management at DePaul University, and Business Innovation at IIT Chicago



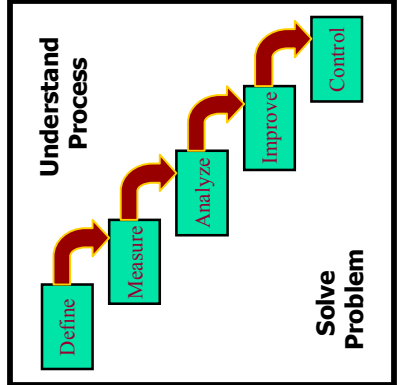
**Fundamental Strategy**  
**Sustained Profitable Growth**



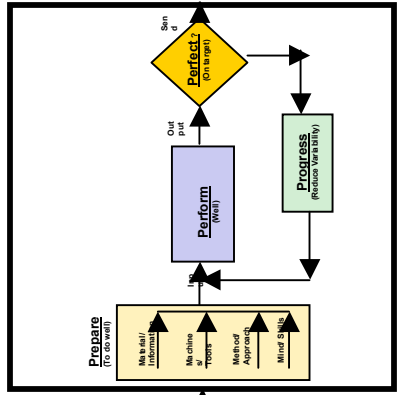
**Business Scorecard**



**Brinnovation™**



**Six Sigma/Lean**



**Profitable Growth**

**Strategy for Execution (SFE) Map**