



Discover the Value

Accepting Shewhart's Challenge Developing Statistically-Minded Leaders

Joint Research Conference on
Statistics in Quality, Industry and Technology

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Agenda

- ≡ **Today's Reality**
 - = We Need to Improve
- ≡ **Empowering Non-Statisticians to Lead Improvement**
- ≡ **How do we do it?**
 - = What works?
- ≡ **Expanding Role of Statisticians**
- ≡ **Summary**

Today's Reality – We Live in a New Era

- ≡ **“The World is Flat” - The need to improve is more important than ever before – Change is accelerating**
- ≡ **Global Competition and information technology are forcing changes in all aspects of our society:**
 - = **Business, Government, Education, Health Care**
- ≡ **Customers are demanding more**
- ≡ **We have to change how we work and manage**
- ≡ **New Paradigm – We Have Two Jobs:**
 - = **Do your work**
 - = **Improve on how you do your work**

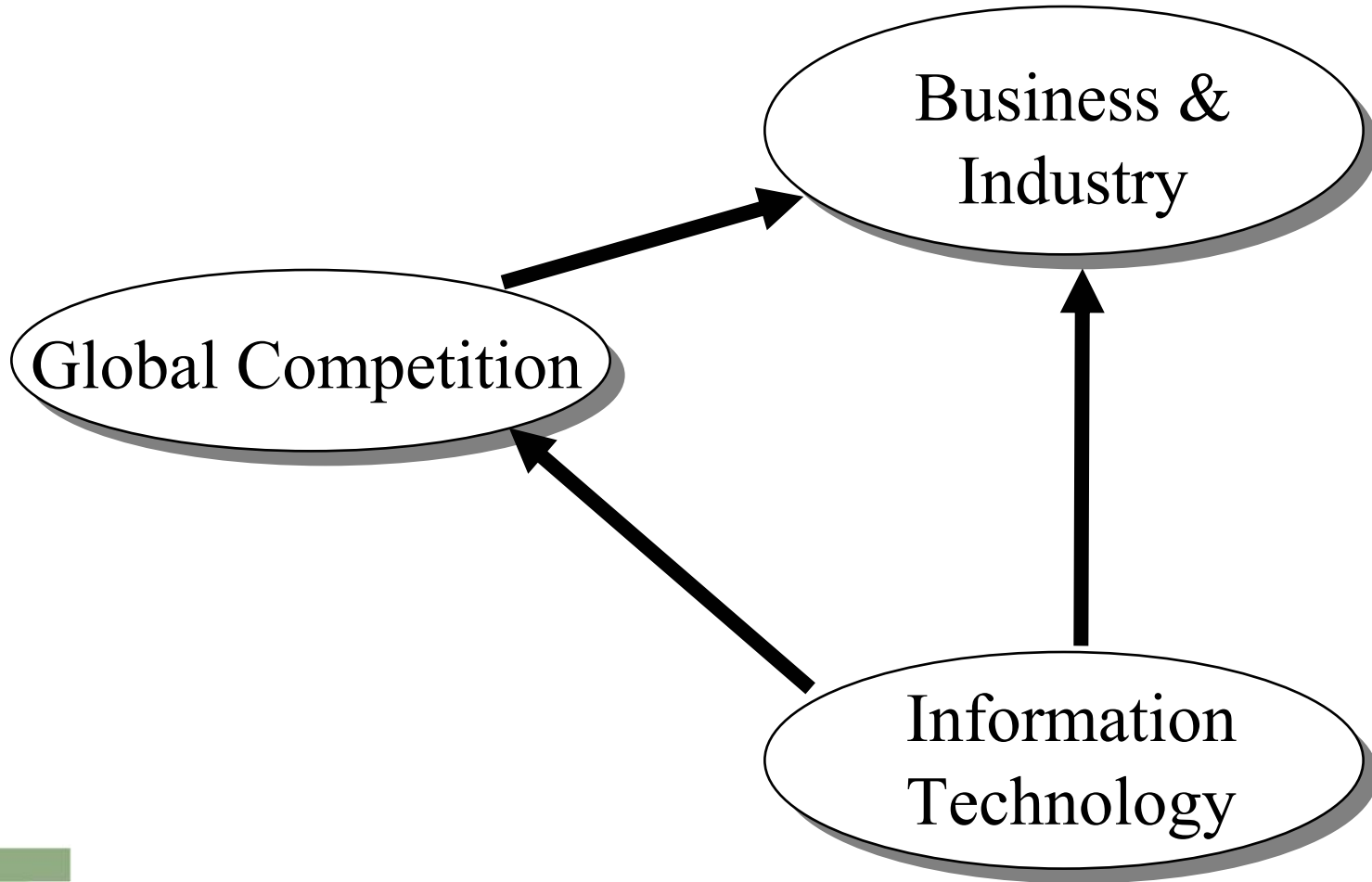
Issues Facing Business and Industry

- ≡ **Faster market introduction of products**
- ≡ **More compliant processes:**
 - = **Compliance with Federal and Environmental Standards**
- ≡ **Customer Delivery – On time and in-full**
- ≡ **Improved throughput – cost / unit – capacity – margins**
- ≡ **Improved yields – Less defects, rework and scrap**
- ≡ **Increased equipment uptime – plant utilization, capacity**
- ≡ **Robust products, processes and analytical methods**



Holistic Approach to Improvement is Needed to Effectively Deal with These Issues

Forces Affecting Business and Industry



These Forces Also Affect Role of Statisticians

The Situation

≡ Key drivers

- = **Global Competition drives need to improve**
- = **Information technology makes it easy to get data and communicate around the world**
- = **Easy to use software makes it easy to do sophisticated statistical calculations**

≡ So What Do We Do?

- = *Problem – Need to improve*
- = *Solution – Get the organization working on improvement*



What Does It Look Like?

“Empowering non-statisticians with statistical thinking and tools to drive improved business decisions.”

- ≡ Employees of all types,**
 - = Working in teams as appropriate,**
 - = Using statistical thinking and methods and other problem solving tools**
 - in combination with process knowledge and understanding**
 - = To solve problems and improve processes**

Dr. Shewhart's Challenge

“The long-range contribution of statistics depends not so much on getting a lot of highly trained statisticians into industry as it does in creating a *statistically minded* generation of physicists, chemists, engineers and others who will in any way have a hand in developing and directing the productive processes of tomorrow.”

George Box's Successful Models

≡ Japanese Industry

- = Highlighted by NBC white paper
“If Japan Can Do it Why Can't We?”

≡ Six Sigma Companies

- = Motorola, Allied-Signal/Honeywell, General Electric
- = Home Depot, DuPont, Bank of America, 3M, W. R. Grace,
and many others

George Box's Ingredients for Success

1. Simple but powerful problem solving tools are available
2. Human resources available for problem solving ...
 - = Breakthrough cannot happen until top management realizes the enormous potential of ingredients one and two
3. CEO mandated training and empowerment of total workforce to apply improvement tools in all operations on projects likely to save money

George E. P. Box
Six Sigma Forum Magazine
February 2006

How Do We Do It? What Works?

- ≡ **Provide how-to, project-based training**
- ≡ **Improvement methodology with**
 - = **Tools integrated in a improvement framework like DMAIC**
 - = **Tools linked and sequenced**
- ≡ **Provide easy-to-use software**
- ≡ **Provide management leadership**
- ≡ **Create supporting infrastructure**
 - = **Dedicated personnel and management systems**
- ≡ **Use top talent**
- ≡ **Keep a bottom line focus**



All Factors Needed for Success

DMAIC – A General Purpose Problem Solving and Process Improvement Framework

Define

Define the problem

Measure

Measure the gap, listen to the process

Analyze

Analyze data to determine root causes

Improve

**Improve the process
– Implement the solution**

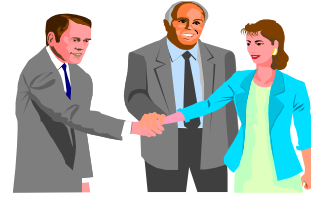
Control

Control the process, standardize, and document – sustain the gains

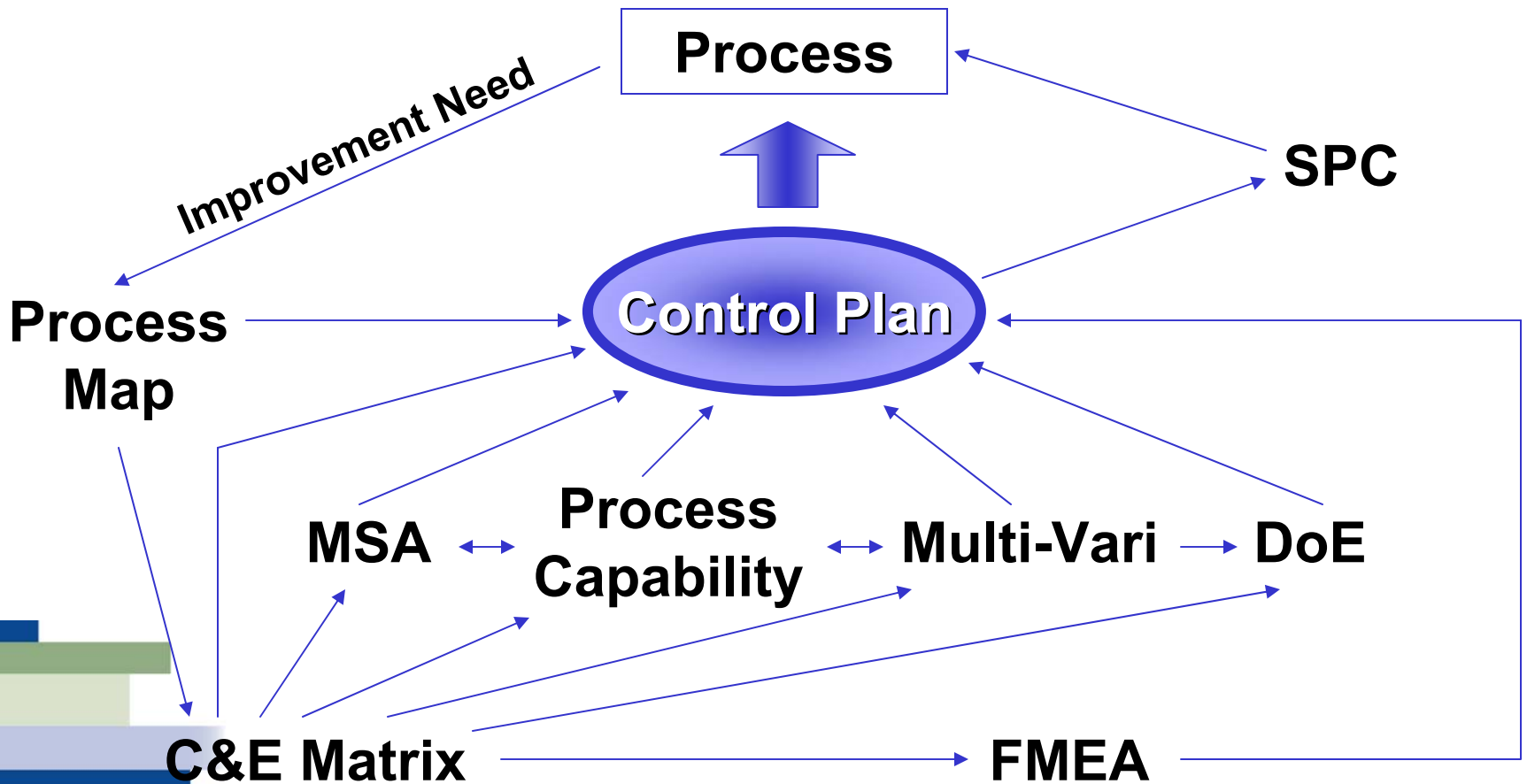
Key Improvement Tools

Tool	Define	Measure	Analyze	Improve	Control
Project Charter	Shaded				
Maps	Shaded	Shaded			
Cause and Effect Matrix		Shaded			
Capability Analysis		Shaded			Shaded
Gage R&R		Shaded			
Failure Modes & Effects Analysis			Shaded		
Multi-Vari Studies			Shaded		
Design of Experiments			Shaded	Shaded	
Control Plans and SPC		Shaded			Shaded

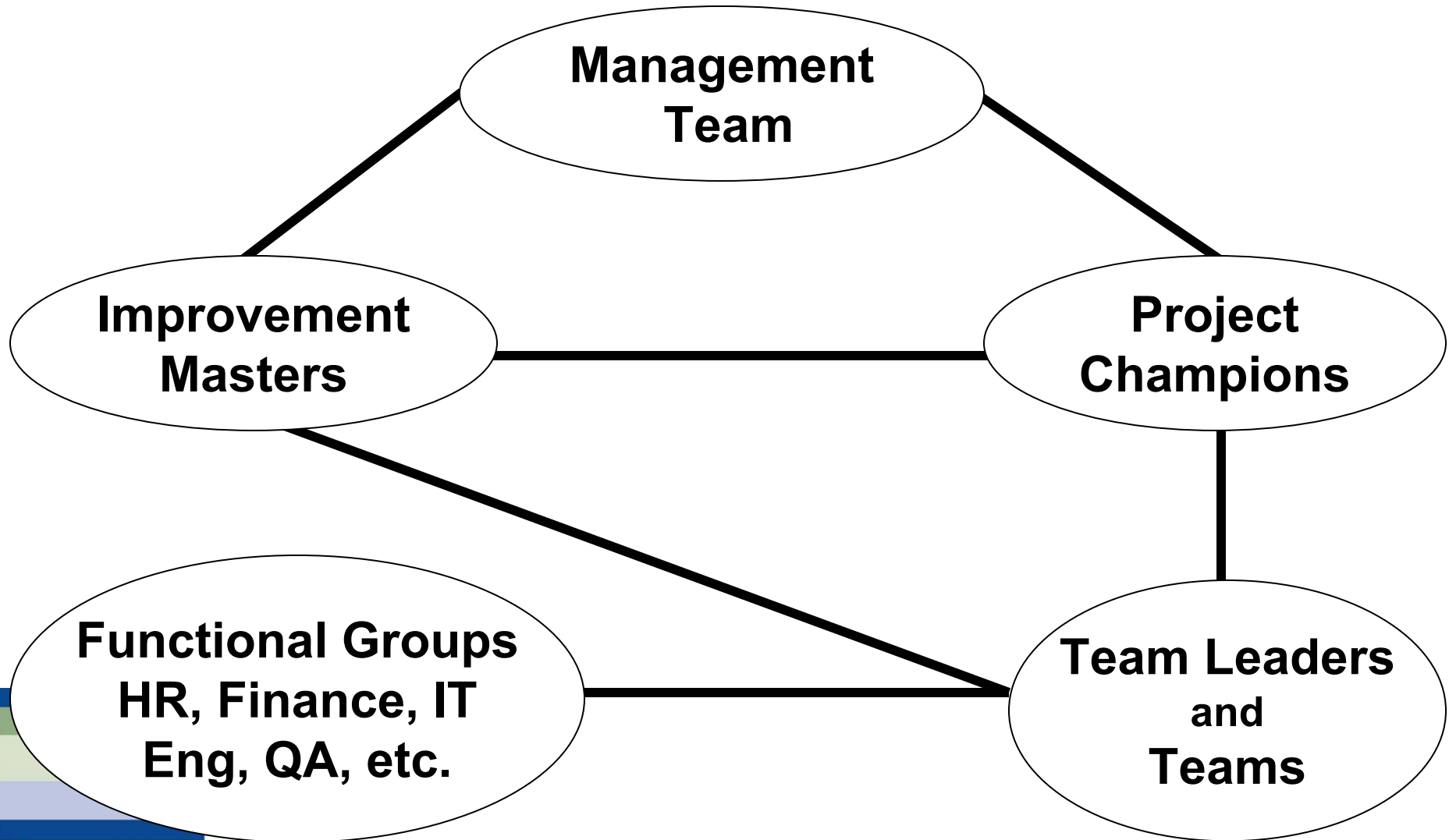
Six Sigma Tool Linkage



Customers



Infrastructure of Improvement Leaders



Make Methods and Tools Robust to User Experience

- ≡ **Provide roadmaps and step-by-step procedures**
 - = Integrate tools with improvement framework
 - = Sequence and link the tools
- ≡ **Provide mentoring by improvement masters**
- ≡ **Utilize easy to use software**
- ≡ **Use methods and tools that require graphics**
 - A robust tool

Training Success Model

Like It, Learn It, Use It, Get Results

Participants:

≡ Like the Training Experience

- = Use session surveys and end of day feedback

≡ Learn the Methodology

- = Mentoring, project reviews and certification exams

≡ Use the Methodology

- = Number of tools used

- = Number of projects completed

- = Project completion time

≡ Get Results – Improvements in

- = Process performance and bottom line results (\$\$)

The New Expanded Role of Statisticians

Old Role (Consultative)

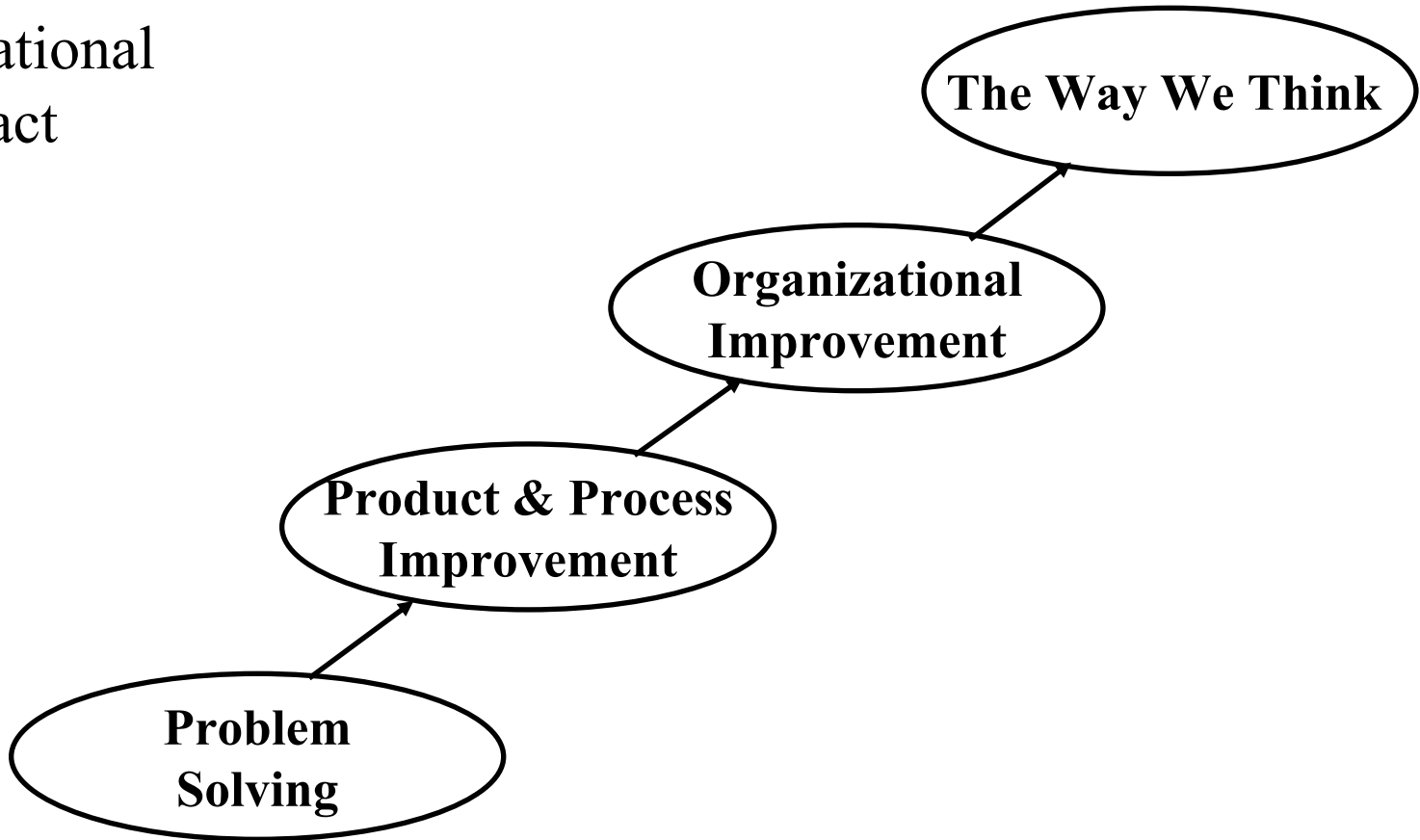
- ≡ Analyze data and design experiments
- ≡ Teach statistical tools
- ≡ Work with technical people
- ≡ Consult on other people's projects
- ≡ Narrow expertise and accountability
- ≡ Reactive

New Expanded Role (Leadership)

- ≡ Determine the appropriate strategy and approach
- ≡ Design training systems, coach and mentor
- ≡ Work with managers and technical personnel
- ≡ Lead cross-functional projects
- ≡ Broad expertise and accountability
- ≡ Leading

Expanding World Of Statisticians

Organizational
Impact



Time

Evolution of Statistics in Industry

<u>Decade</u>	<u>Driving Force</u>	<u>Focus</u>
1940	WW II	Statistical Quality Control
1950	Post WW II	Increased Production
1960	Sputnik Food and Drug Act Computer	Research, Development and Manufacturing
1970	Environmental Protection Agency	Biopharmaceutical Statistical Computing Environmetrics
1980	Global Competition	Total Quality Management
1990	Global Competition Information Technology	Six Sigma
2000	Global Competition Information Technology	Six Sigma and Lean Manufacturing

My Message

- ≡ **“The World is Flat” - The need to improve is more important than ever before – Change is accelerating**
- ≡ **Empowering non-statisticians with**
 - = **Process improvement methods involving statistical thinking and methods**
- has been shown to be an effective approach to improvement by organizations around the world**
- ≡ **The need to improve performance presents an tremendous opportunity for statisticians**
- ≡ **Change will be required by all those that get involved**

References

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- Snee, R. D. and R. W. Hoerl (2005) *Six Sigma Beyond the Factory Floor – Deployment Strategies for Financial Services, Health Care, and the Rest of the Real Economy*, Financial Times Prentice Hall, New York, NY.**



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