



Transforming the Engineering Organization with Systems Engineering and Quality Management

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Join 2nd **Quality Revolution**



**Quality
Management
Working
Group**

- **Engineering Leadership Training**
- **Systems Thinking / Tools Workshops**
- **Case Studies / Research Projects**
- **Networking and Collaboration**

Join 2nd Quality Revolution



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A Virtual University for Training in Management and Leadership

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Course Catalog





QUALITY MANAGEMENT WORKING GROUP

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We are in the process of creating a charter and our goal is to have our first official meeting at the INCOSE IW on January 28-31, 2017. Our objectives include creating awareness of the essential nature of Quality Management in today's workplace and to encourage and ignite a "Second Quality Revolution." [Read More on 2QR™](#)

This will be an active working group with free educational programs and research projects available to all QMWG members. Actions being considered include:

- Specialized QM workshops and curriculum for systems engineers;
- Outreaches to all engineering disciplines re: QM and systems thinking;
- Cross-training collaborations with leaders from other professions;
- Research projects to quantify the program-specific influence of QM.

We will emphasize QM as a cornerstone of professional development for systems engineering and that it adds value to the engineering disciplines by:

- Defining systems engineering as a leadership discipline with the skills to manage process quality and increase profitability;
- Considering the organization as a system, fully integrating the process, the person and the job description;
- Managing the human factors related to output reliability, safety and the promises we make to our customers;
- Raising the level of professionalism, corporate and technical influence, job satisfaction and the career path.

(Please email us at: INCOSE@QMNation.com for details about our next steps.)



INCOSE Webinar 91
August 17, 2016
Engineering Leadership: The Call for a Second Quality Revolution
Speaker: Dr. Larry Kennedy
Presentation: 42 Mins.
Questions/Answers: 17 Mins. [Click Here to Watch the Video](#)

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QMI Curriculum
(Click Icons for Details)

COURSE DESCRIPTIONS



QMI Course Details

Certified Quality Manager Training



Free Video Lessons

Learning Online



How We Do It Videos

QMI HR Solutions
(Click Icon for Details)



Team-Builder HR SOLUTIONS

QMI VC-Lab
(Click Icon for Details)

DiSC Assessments

QualityManagementInstitute.com/INCOSE

Apollo Program



The Challenge for Leadership



➤ Keeping the Promise to Our Customers

- Quality Products and Services
- Reliable Customer Service Responses



➤ Hiring and Training Reliable People

Quality Management



- **An Educational Technology with:**
 - **Systems**
 - **Methods**
 - **Language**
- **To Reach Your Business Goals**

Quality Management

- QM, in its orthodoxy, provides **values-based** and facts-driven solutions to a variety of issues affecting the design and production processes.
- **Engineering** managers must now be capable of functioning as effectively in **team-building** and **values-based discussions** as they are in task delegation and production management.
- "Human factors integration" is no longer limited to solving the problems of people interacting with machines. It has become the "code word" for the **vulnerabilities of a workforce with deficits** in education, experience and work-ethic.

Join 2nd Quality Revolution

- Restore the Skills and Values That Supported the Quality Revolution

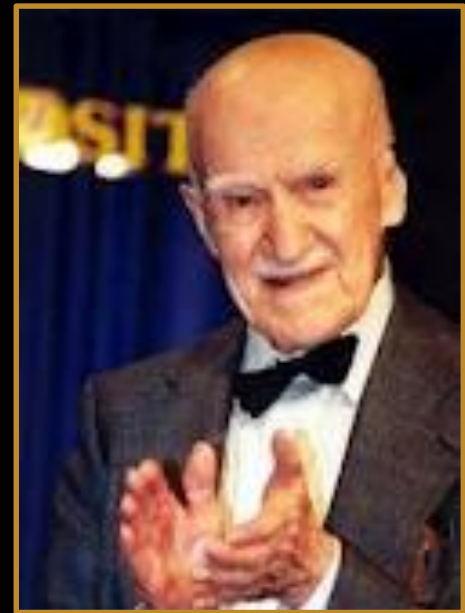
2QR



W. Edwards Deming



Philip Crosby



Joseph Juran

2QR Complete QM: Engineer, Manager and Leader

- Empowers the traditional goals of improving products and services, and reducing expense and waste.
- Provides the tools to evaluate and solve the people problems that threaten the success of our work and vision.



Quality Marketed



Definition of Quality



- **Conformance to Requirements:**
What the Customer Needs, Wants or Expects in a Product or Service
- **Promises That Are Specifically Stated or Implied in Advertising**

Managing Quality Requires



- **QM Methods**
- **QM Values**
- **Reasonable Discussions**

System of Quality

➤ **Prevention:**

*Prevent Errors
From Occurring
and/or Reaching
the Customer*

➤ **An Ounce of
Prevention is Worth
a Pound of Cure**

Benjamin Franklin



QM Prevention Methods

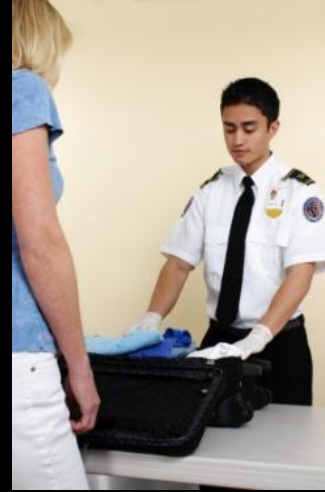


- **Quality Control:** Taking Bad Things Out of Processes
- **Quality Assurance:** Putting Good Things Into Processes

QC - Taking Bad Things Out

Eliminates the Defects

- Editing
- Inspecting
- Testing
- Monitoring
- Auditing



QC: After Errors Occur

Quality Control (QC)

- **Quality Control Has Its Limitations**
- **Too Expensive to Inspect Every Single Product or Service**



Capsule



Zipper

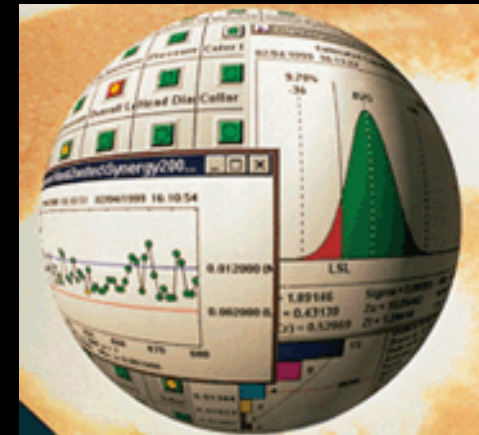
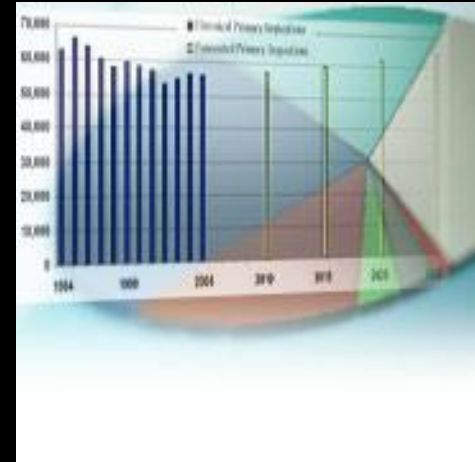
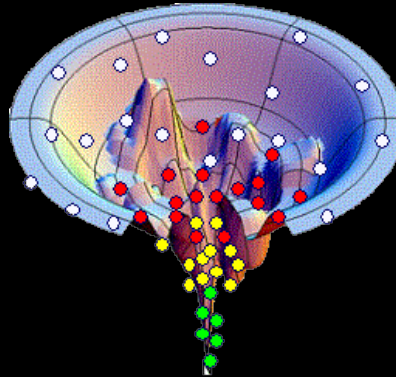


Repairs



Classroom

Statistical Methods



➤ Sampling

➤ Testing for Reliability

Testing for Reliability



- Testing Them Until They Fail
- Carefully Counting Repetitions
- Calculating the Failure Rate

Testing for Reliability



- **Certified for Intended Purpose**
- **Routed to Reasonable Use**
- **Reliability = Quality Assurance**

QM Prevention Methods



- **Quality Control:** Taking Bad Things Out of Processes
- **Quality Assurance:** Putting Good Things Into Processes

QA - Putting Good Things In

Eliminates the Causes



- **Reliable Human Resources**
- **Policies and Procedures**
- **Equipment and Training**

Quality Assurance (QA)



- QA – Reliability Engineering
- Calculate the Statistical Probability of Failure
- From Systems to Units to Components and Materials

Standard of Quality



- **Zero Defects:
Not Satisfied
With Any Defects
Reaching
Our Customers**

Zero Defects Attitude



- **Pride of Workmanship**
- **Not Expecting Perfection**
- **Always Keeping the Promise**

Good Experience Gone Bad



- Unsatisfied Hunger
- Lost Moment of Comfort

A Simple Question



➤ **How Many Worms Are Too Many?**

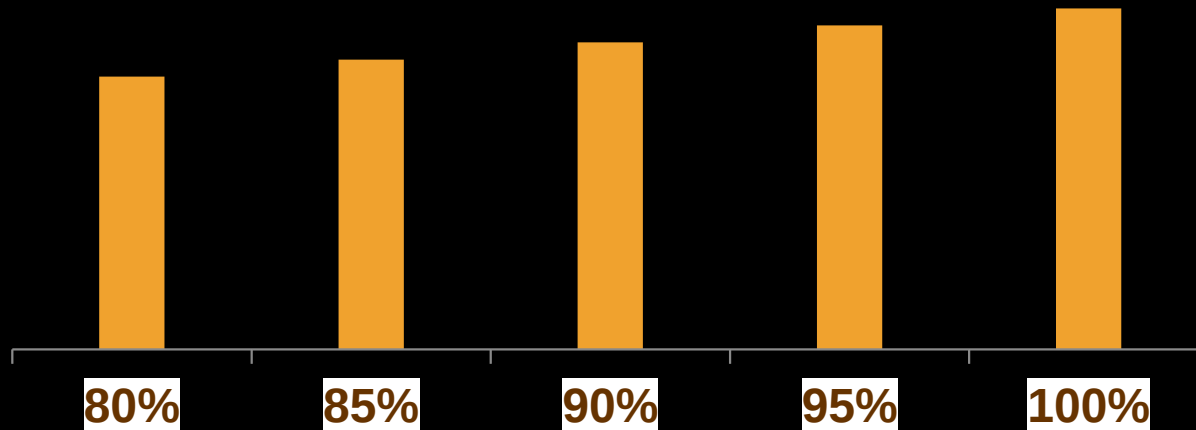
A Simple Answer



➤ How Many Worms Are Too Many?

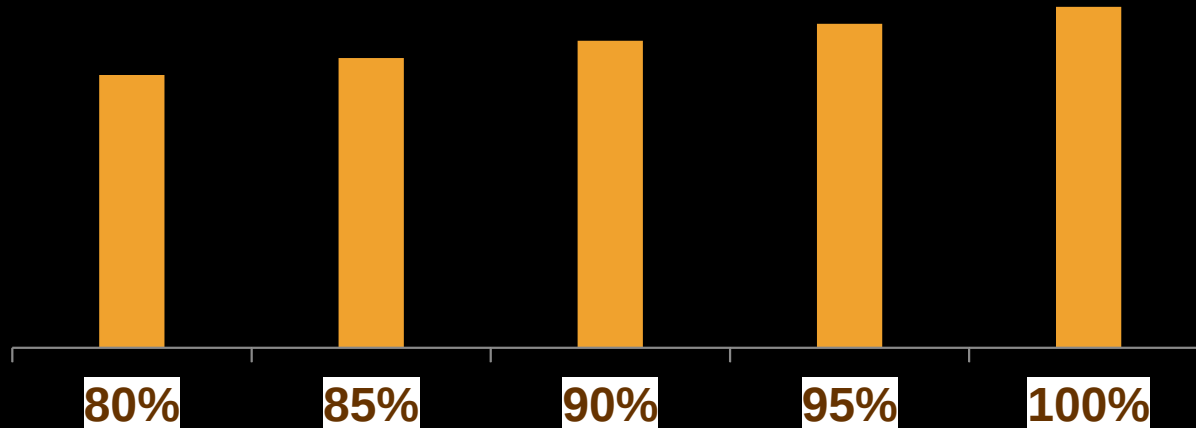
Acceptable Quality Level

- **AQL's Are Designed to Give Relief From Work Pressure**
- **Avoid the Perceived Threat of a Standard of Perfection**



The Problems With AQL's

- How Many Are Too Many?
- Humans Make Mistakes
- **Incremental – Continuous**



The Problems With AQL's

➤ Processes Have Multiple Steps or Actions



The Problems With AQL's

- Four Step Process: 90% AQL
- Right: 90 Times Per Hundred



Calculating AQL Defects

A Four Step Process With 90% AQL

- Step 1: $100 \text{ Actions} \times 90\% =$
90 Defect Free Products or Services
- Step 2: $90 \text{ Defect Free} \times 90\% =$
81 Defect Free Products or Services
- Step 3: $81 \text{ Defect Free} \times 90\% =$
73 Defect Free Products or Services
- Step 4: $73 \text{ Defect Free} \times 90\% =$
66 Defect Free Products or Services

How About A 98% AQL?

A Four Step Process With 98% AQL

- Step 1: $100 \text{ Actions} \times 98\% =$
98 Defect Free Products or Services
- Step 2: $98 \text{ Defect Free} \times 98\% =$
96 Defect Free Products or Services
- Step 3: $96 \text{ Defect Free} \times 98\% =$
94 Defect Free Products or Services
- Step 4: $94 \text{ Defect Free} \times 98\% =$
92 Defect Free Products or Services

Measurement of Quality



- **Price of Non-Conformance:
What It Costs When We Do
Things Wrong**
- **Dollars and Human Values**

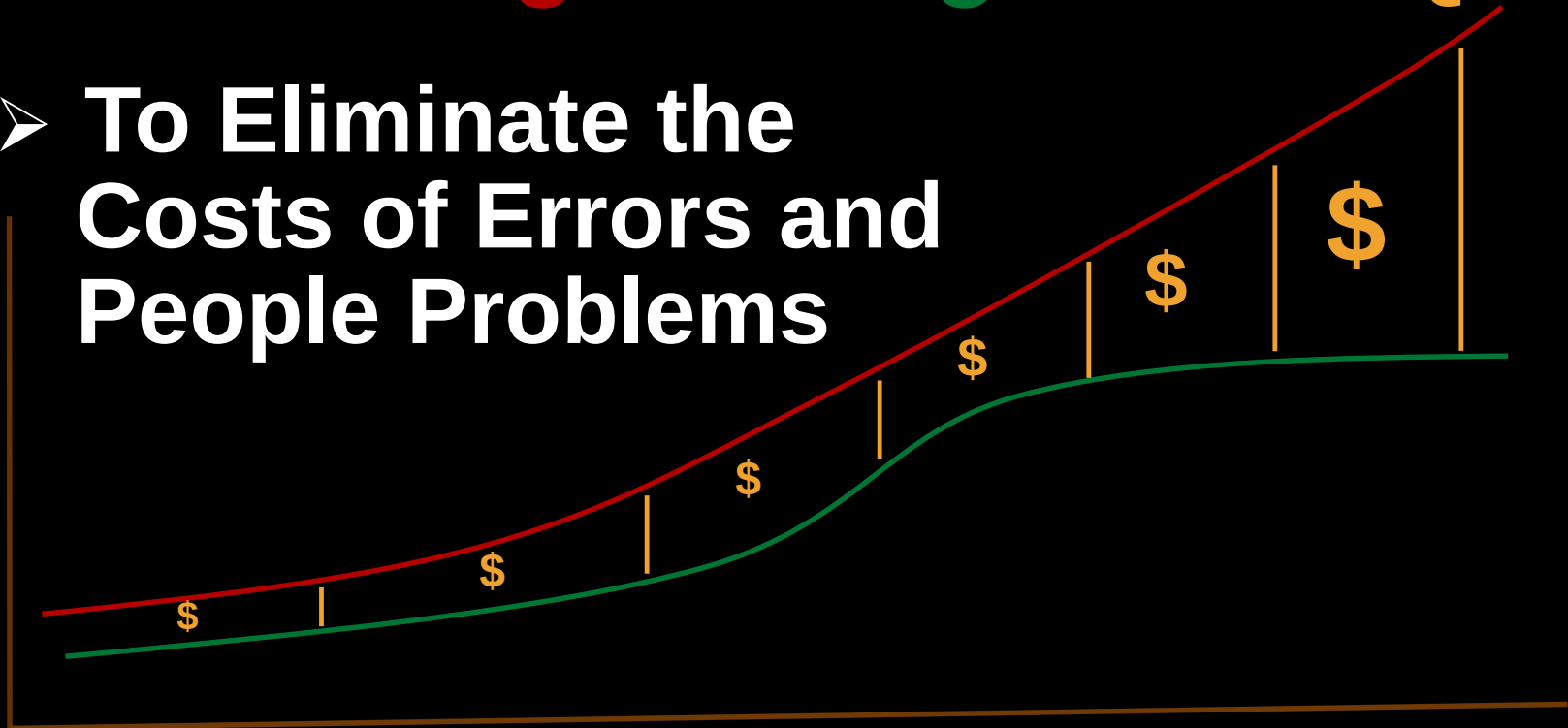
The Cost of Quality

- **Cost of Doing Things Wrong**
Warranties, Rework, Repairs,
Replacement, Customer Loss
- **Cost of Doing Things Right**
Inspections, Audits, Checking
Human Resources, Procedures,
Equipment, Training, etc.

The Cost of Quality

➤ **\$\$ Wrong - \$\$ Right = COQ**

➤ **To Eliminate the Costs of Errors and People Problems**



The Cost of Quality

➤ **\$\$ Wrong - \$\$ Right = COQ**

➤ **To Eliminate the
Costs of Errors and
People Problems**

➤ **QUALITY IS FREE**

Philip Crosby



Cost of Poor Quality

- A general rule of thumb is that the costs of poor quality *in a thriving company* will be about **10 to 15 percent of operations**. Effective quality improvement programs can reduce this substantially, thus making a direct contribution to profits.

American Society for Quality

- Philip Crosby said that companies lose as much as **20% of their operating budget** through errors, rework, customer service problems, etc. but often “choose to continue to pay for poor quality.”

Quality Digest (February 2001)



Errors, Defects, Re-Work and Failed Customer Service

Everyone Has A Story . . .



. . . about supposedly reliable people and companies who have failed to keep their promise.

- Have you tried to update your cell phone or cable service lately; **and had to sift through the confusing and often misleading facts?**



Lost Time, Money and Opportunities = Lost Profits

➤ One in Six IT Projects Have a Budget Overrun of 200%

Avg. Schedule Overruns



Avg. Budget Overruns



Features in Final Product



Harvard Business Review

Lost Time, Money and Opportunities = Lost Profits

All Projects Avg. Success = 29%

Success = On-Schedule, On-Budget and Fully-Featured



The Standish Group Chaos Manifesto

Lost Time, Money and Opportunities = Lost Profits



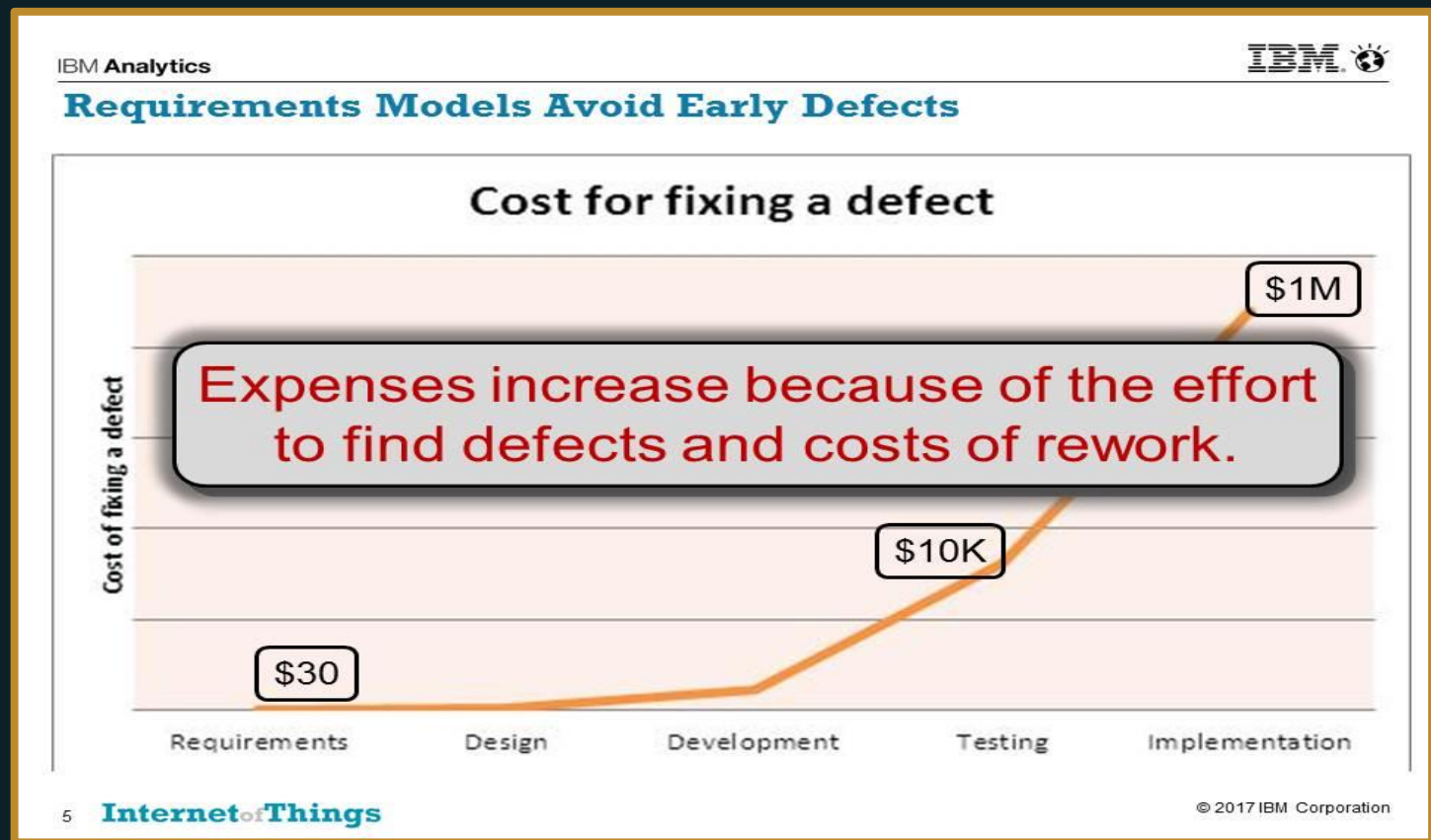
The Data Indicates Culture and Process
are the Root Causes of Lost Profits
NOT the Development Method

DEVELOPMENT METHOD	PROJECT SIZE	SUCCESS RATE
Agile	All Sizes	39%
Waterfall	All Sizes	11%
Agile	Large	18%
Waterfall	Large	3%
Agile	Small	58%
Waterfall	Small	44%

The Standish Group Chaos Manifesto

Lost Time, Money and Opportunities = Lost Profits

Failure to Document - Take Action



Everyone Has A Story . . .

. . . about supposedly
reliable people and
companies who have
failed to keep their
promise.

WHY?



Most workers hate their jobs or have 'checked out,'
Gallup says

70% Disengaged or
Actively Disengaged

HATE THEIR JOBS

Gallup / Purdue University

- **Disengaged employees shift the load to the engaged employees - frustrate high-performers.**
- **Organizations with high employee engagement.**
 - **21% Higher Productivity**
 - **22% Higher Profitability**
 - **25%-65% Lower Turnover; 37% Less Absents**
 - **28% Lower Shrinkage; 48% Less Accidents**



Four-Year College Graduates

50%

Lack Math Skills and
Proficient Literacy

Two-Year College Graduates

75%

Can't Summarize
A Newspaper Article

American Institutes for Research

2QR[®] is Systems Thinking

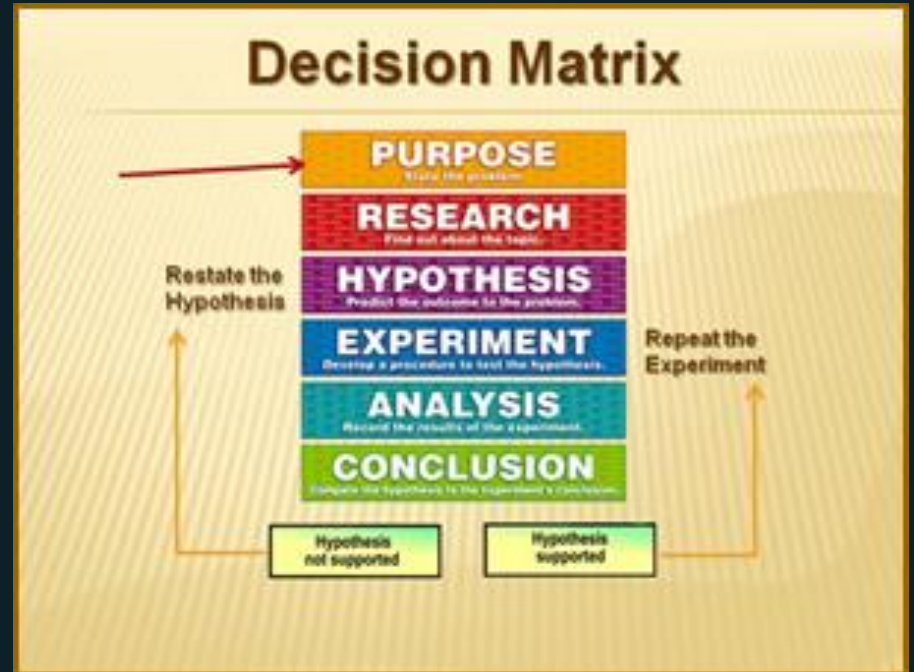
An approach to problem solving, that considers and evaluates “facts and events” as parts of an overall system.

- **Avoids the failures created by** reacting to specific parts, outcomes or events in isolation.
- **Considers specific strategies and tactics** to overcome known limitations.

2QR® is the Scientific Method

Empowered by

Due Diligence



*Facts-Driven
Tool of
Systems Thinking*

2QR[®] is the Scientific Method



VS.



- **An Application of Systems Thinking That Discovers Best Practices**

2QR® is the Standard for Deploying Standards

Regulatory Compliance - Corporate Governance
Planning - Budgeting - Development

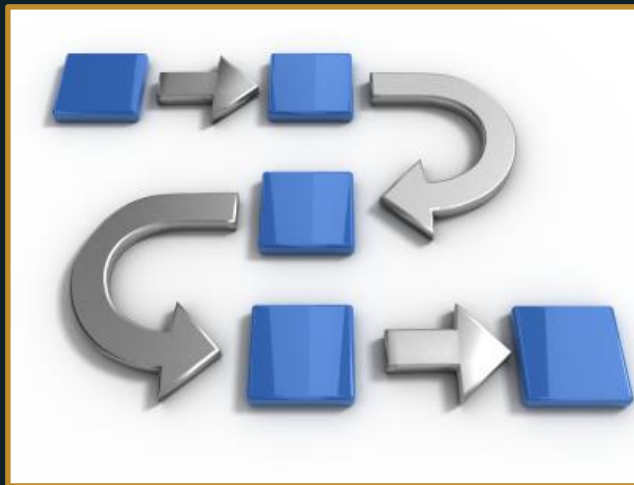


2QR[®] Complete QM is People, Processes and Tools



Work Culture

Team of Engaged, Well-Trained High-Performers



Policy / Procedure

Artfully Designed and Deployed Work Standards



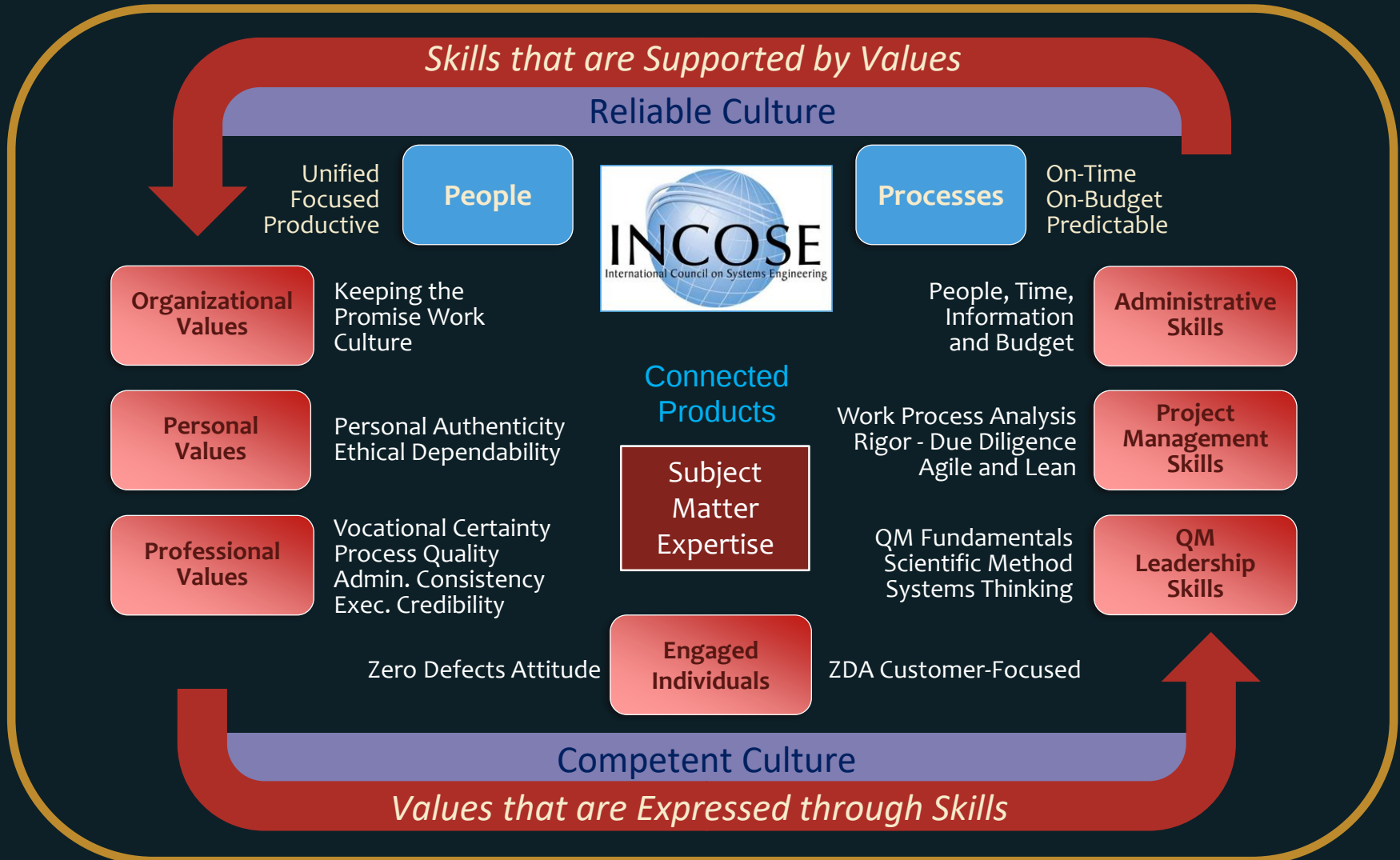
Technology

Fully-Utilized Tools and Efficiencies

2QR[®] Complete QM Culture

People • Tools • Processes

Integrated Values and Skills Development



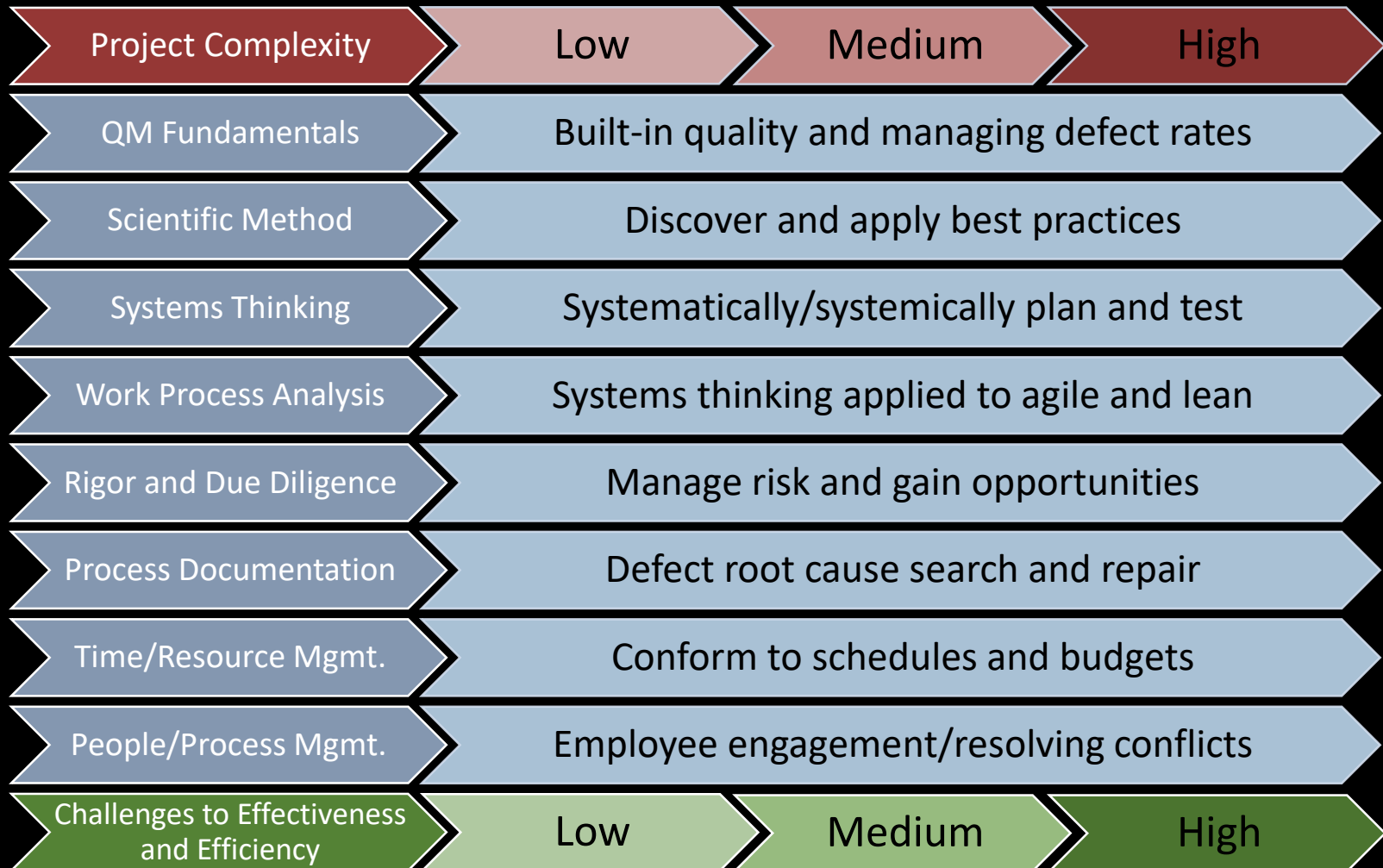
2QR[®] Complete QM Culture

The Definitions and Measures of the 8 Attributes/Values of a Quality Manager

1. Vocational Certainty	A measure of our faithfulness to our career agenda. QM's are disciplined about developing their skills and talents and acquiring earned confidence.
2. Zero Defects Attitude	A measure of our commitment to keep our promises and to initiate systems with the reliability goal of preventing even one defect from reaching our customers.
3. Process Quality	A measure of our mastery of planning and budgeting disciplines and how effectively we apply them to create viable work processes.
4. Admin. Consistency	A measure of our attention to details. QM's carefully listen to their customer's to identify and conform to their requirements and assure customer satisfaction.
5. Executive Credibility	A measure of our sincerity and skill with people. Sincerity comes naturally from the heart but skills can be sharpened and improved to gain reliable influence.
6. Personal Authenticity	A measure of our resolve to be consistent with our customers and co-workers. Authentic leaders work diligently to make exceptional service feel normal.
7. Ethical Dependability	A measure of our trustworthiness in practical matters. QM's are the people we turn to when we want things to work right, run on time and be there when needed.
8. Create a KTP culture	A measure of the mutual respect, accountability and professionalism in a work culture. These are the practiced values of effective leaders.

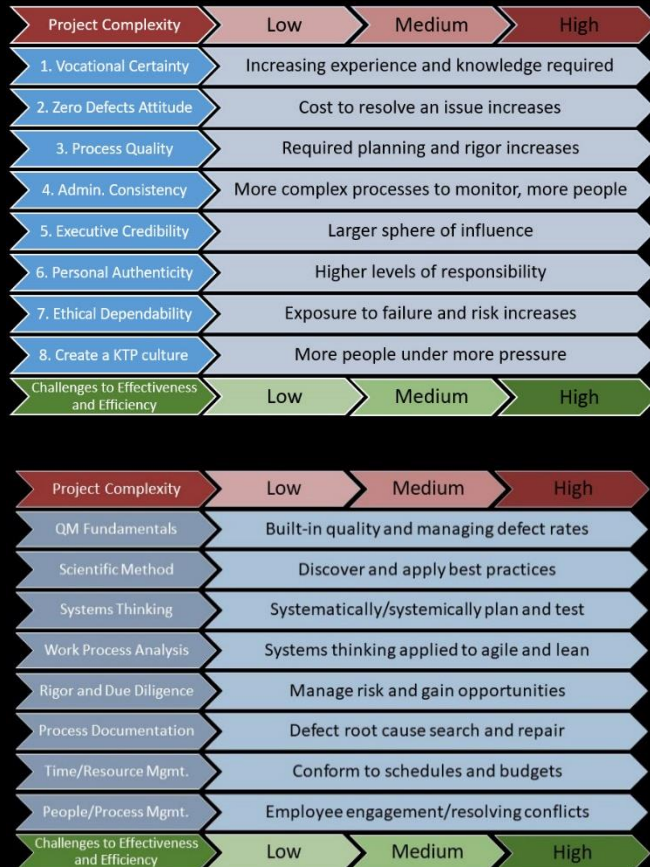
2QR[®] Complete QM Culture

Skills Impact on Process/Productivity



2QR[®] Complete QM Culture

Values, Skills and Organizational Impact



Organizational Maturity

- Engaged High-Performers
- Agile and Lean Projects
- On-Schedule and Budget
- Less Defects and Rework
- Lean Human Resources
- Effective Communications
- Self-Correcting Culture
- Delighted Customers
- Stable Workplace

Profitability and ROI

2QR Work Culture
(Values and Skills)

2QR Corporate Environment
(Protocols and Enablement)

2QR® People are Engaged



- **Learn the Facts** and Take Action to Create Reliable Solutions
- **Within** the Scope of their Responsibility
- **Within** Available Resources

2QR[®] People are Productive

- **Fully Utilize** the Right Processes and Tools
- **Create** Reliable and Predictable Projects
- **Produce Outcomes** On-Time, On-Budget and Free from Chaos



A 2QR[®] Complete QM Culture is



- An Engaged Team Performing with Excellence
- It's Agile, Lean, Predictable and Profitable

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