GQM advisors

QL | QM | QA | QC

Quality Leadership | Quality Management | Quality Assurance | Quality Control

1900 ~ 2020

The 4 Quality Disciplines

MADE IN USA

1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050

Quality Affecting Significant Events

- 1912 RMS Titanic Atlantic Ocean (UK)
- 1941 World War II Mass Production (U.S.)
- 1955 Post-War Aerospace (U.S.)
- 1955 Naval Nuclear Program (U.S.)
- 1955 Atoms for Peace (Global Effort)
- 1960 Global Space Race (NASA, U.S.)
- 1968 Commercial Nuclear Power (U.S.)
- 1979 TMI Unit 2 (Pennsylvania, U.S.)
- 1984 NRC NUREG-1055 Report to Congress Nuclear Industry Quality / Safety / Management Failures (U.S.)
- 1986 Challenger Shuttle (U.S.)
- 1986 Chernobyl (Russia)
- 1988 Piper Alpha Oil Spill (North Sea)
- 1989 Exxon Valdez Oil Tanker Spill Prince William Sound (Alaska, U.S.)
- 2001 911 (New York City, U.S.)
- 2002 Prestige Oil Spill (Spain)
- 2002 Davis Besse' Reactor Head (Ohio, U.S.)
- 2003 Columbia Shuttle (U.S.)
- 2008 Metrolink Train (Southern CA, U.S.)
- 2008 B2 Bomber Crash (U.S.)
- 2010 Deepwater Horizon BP Oil Spill, Gulf of Mexico, 87 Days, (UK)
- 2011 Fukushima Daiichi (Japan)
- 2020 Coronavirus Pandemic Global COVID19

U.S. Quality Leaders Emerge

- Dr. Walter A. Shewhart
- **Dr. W. Edwards Deming**
- Dr. Armand V. Feigenbaum
- Dr. Joseph M. Juran
- Philip B. Crosby

Conformance to Requirements

Concept Emerges 1979

"Quality is Free"

Philip B. Crosby

Quality Management Tools

SixSigma, QFD, FEMA, PDCA, C&E Diagraming, SPC, Control Charts, Remote Audits, Design / Contract Assurance, Lean, Process Mapping, Software, Modeling, Self-Assessments, CAPA, Drone Site Monitoring, Robot Inspections, Others

2000 Work Cultures Emerge as Key Element to QMS Effectiveness

1990 Shift from 'Error Detection' to 'Error Prevention'

Leadership | **~ Engineers, Auditors, Managers, Directors ~ Not in The Boardroom** | **Who is Your Chief Quality Officer ?**

Period of Influence - His 'System of Profound Knowledge' - Encompassed System, Variation, Knowledge, Psychology - 4 Lenses of Reference.

1990 U.S. Dept of Navy CNO Enacted Total Quality Leadership Concepts & Practices to Selected Fleet Units. *Goal: Process Improvements.* (1)

1987 Quality Management Systems (QMS)

- ISO 9001 QMS Certifications 1.4 Million
- U.S. Baldrige Quality Performance Program (Department of Commerce)
- Quality Management Consultants

Management Systems Industry & Government - Driven

- Environmental / Health / Safety Mgt
- Enterprise / Information Mgt
- Integrated Mgt
- Requirements Mgt
- Risk Mgt
- Emergency Prep Mgt
- Supply Chain Mgt
- Process Hazards Mgt
- Cybersecurity Mgt

"Cost of Poor Quality"
U.S. Military Supplier Chain

1950s Increased Emphasis on Quality | Safety

1971 | OSHA Formed

QC Evolves to Formal Quality Assurance

Mass Production

World War II

1913, U.S. DOL Created

1911, U.S. ASME BPVCs Boiler / Pressure Safety

1907, 60 Workers Died in Pittsburgh Factories

1884, U.S. BLS Collects Data

QRs — **Self - Inspection** — **Productivity Studies (SPC)**

QRs — **QC / SPC In - Process Inspection**

QRs — **Complex Engineered Products / Systems / Structures**

QRs — **Complex Software**

QRs — **Quality Management**

QRs — **Quality Control**

Quality Assurance

Quality Management

Challenger Shuttle, U.S. 1986 Accident

Chernobyl, Russia Nuclear Power Plt 1986 Accident

Three Mile Island, U.S. Nuclear Power Plt 1979 Accident

Exxon Valdez, Prince William Sound 1989 Oil Tanker Spill, Alaska, U.S.

911, Twin Towers, U.S. 2001

Columbia Shuttle, U.S. 2003 Accident

BP Deepwater Horizon, UK 2010 Oil Spill

Fukushima Daiichi, Japan Nuclear Power Plt 2011 Accident

COVID-19 Global Pandemic

QRs Quality Requirements

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(1) https://gqmadvisors.com/wp-content/uploads/2020/03/U.S.-Dept-Of-The-Navy-TQL-In-The-Fleet-Theory-to-Practice-J.Wasik-B.Ryan-1993-AD-A275-444-92pgs.pdf