

1960 ~ 2025

U.S. Quality Leaders Emerging

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

1960 Articles & Books on Quality

1960 Major Emphasis on Quality | Safety

1946 ISO Formed

1971 OSHA Regulations

'Cost of Poor Quality' U.S. Military Supply Chain

1950 ~ 2000 LNPP Design | Build Period 65 LNPP Sites & 100 Power Reactors

2000 Renaissance ~ LNPP & SMR NPPs

1957 IAEA Founded

1950 Complex Engineered Products / Systems

1962 Mil-Q-9858A UK BS-5750

1965 New Codes / Standards / Regulations

Inspection | Test Era

Quality Control Programs

Quality Assurance Programs

1970 NRC QA Public Law 10CFR50 Appendix B

1971 Industry Standards ANSI N45.2 – 1971 QA ANSI N45.2 – 1977 QA ASME / NQA-1 – 1979 QA

1974 NRC Regulatory Guides

RGs / Codes / Standards Audits / Assessments / Oversight

QA, QC, Test, Supply Chain Management

Quality Engineering, Design Assurance

1979 Accident Three Mile Island NPP

1984 U.S. NRC NUREG-1055 Report to Congress

1987 – ISO 9001 Quality Management Systems

EMS Shift 'Paper Work' to 'Information Work'

Quality Management Systems

Enterprise Management Software

Robotics

Integrated Management System

Culture - Safety - Quality - Risk - Security

Cyber Security | AI

1984 Marble-Hill Cancelled \$3.2 bil

1984 WH Zimmer Cancelled \$ 3.4 bil

1986 Accident Chernobyl NPP

2001 911 Twin Towers

2005 China AP1000 2 NPP Sites w/ 4 Reactors

2008 NuScalePower SMR -TBD

2010 BP Deepwater Horizon

2011 Accident Fukushima NPP

2016 mPower SMR Cancelled \$400 mil

2017 VC Summer AP1K Cancelled \$9 bil



1970 1980 1990 2000 2005 2010

TMI

Renaissance ~ AP1000 ~ U.S. NuStart Consortium 9 Utilities - Build 30 AP1000 Reactors

Accident Impacted - Design | Fabrication | Build | Startup | Operations < < < Knowledge Transfer Gap > > >

Quality Management Systems (QMS)

- 1987 ISO 9001 QMS Standards Released

Quality Management Tools

- SixSigma, QFD, FEMA, PDCA, C&E Diagraming, Mapping, Software, Assessments
- 1995 ISO QMS Certified 75K

Enterprise Software

- Intra- & Internet
- e-QMS
- CMM Site Wide

Integrated Management Systems (IMS)

- IMS, QMS, EMS, RM, SCM, Others
- Requirements Matrix (Advanced)
- Process Hazards Mgt
- Enterprise Software (Advanced)
- Cyber Security
- Supply Chain Mgt (Advanced)
- Post 911 Safety / Security
- 2006 ISO 9001 QMS Certified .6 million, among 155 Countries

2012 ISO 9001 QMS Certified 1.1 mil, among 178 Countries

Renaissance ~ TBD

- SMRs > 80 Reactor Designers
- MMRs ~ TBD
- LNPPs > 25 Reactor Designs
- Fusion ~ TBD
- CS & AI ~ TBD

1960 ~ 2025 65 Years ~ Will The Gap Close?

Numerous global non-nuclear industry sectors have been implementing ISO 9001 Quality Management Systems & quality tools since 1987. QMS certifications now exceed 1.5 million. Many nations require QMS certification as a part of product / service / system safety-basis certifications.

The U.S. NRC recognized ISO9001:2000 in 2003. This model also suggests the industry may require provisions for implementing "Integrated Management Systems."

2018 ~ New ISO 19443 Nuclear QMS

Will U.S. Nuclear Industry Executives Recognize & Integrate Advanced Quality Management Tools to Enhance Overall Operational Effectiveness?

- The U.S. chemical, oil, and gas industries have a history of QC, Inspection, & Testing as the methods for ensuring safety & specification compliance. In the mid-'60s, the nuclear industry initiated QA with the goal of "error prevention."
- Is the new generation of professionals well trained in U.S. NRC 10CFR50, App. B & ASME NQA-1 Quality Management Requirements?
 - Does the nuclear industry recognize the 'Management of Quality' & its focus is driven by company executives & safety-related items?
 - Do executives recognize & embrace advanced 'Quality Management Tools' available to enhance, safety, effectiveness, & compliance?
 - Will industry members realize the benefits by unconditional Quality Management support?

Paul W. Gladieux ~ CEO | CQO | Founder