Quality Cor	ntrol   Quality Assu	rance	Quality Ma	nagement	Quality Lea
1900 ~ 2020	QC   <i>Quality</i>	QA   's Path	QM <i>to Lead</i>	QL ership	<b>Quality Mana</b> Risk Mitigation,
Quality Affecting Significant Events• 1912RMS Titanic Atlantic Ocean (UK)• 1941World War II Mass Production (U.S.)• 1955Post-War Aerospace (U.S.)• 1955Naval Nuclear Program (U.S.)• 1955Atoms for Peace (Global Effort)• 1960Global Space Race (NASA, U.S.)• 1968Commercial Nuclear Power (U.S.)• 1979TMI Unit 2 (Pennsylvania, U.S.)• 1984NRC NUREG-1055 Report to Congress Nuclear Industry Quality / Safety / Management Failures (U.S.)• 1986Challenger Shuttle (U.S.)• 1988Piper Alpha Oil Spill (North Sea)• 1989Exxon Valdez Oil Tanker Spill Prince William Sound (Alaska, U.S.)• 2001911 (New York City, U.S.)• 2002Prestige Oil Spill (Spain)• 2003Columbia Shuttle (U.S.)• 2008Metrolink Train (Southern CA, U.S.)• 2008B2 Bomber Crash (U.S.)• 2010Deepwater Horizon BP Oil Spill, Gulf of Mexico, 87 Days, (UK)	<ul> <li>U.S. Quality Leaders Emerge</li> <li>Dr. Walter A. Shewhart</li> <li>Dr. Armand V. Feigenbaum</li> <li>Dr. Joseph M. Juran</li> <li>Dr. W. Edwards Deming's Period of Influence <ul> <li>'System of Profound Knowledge'</li> <li>Encompassed System, Variation, Knowledge, Psychology</li> </ul> </li> </ul>		ance to Require Free concept 1975 Crosby 1977 DOE Formed SHA Formed ce Emerges Formed Power Plant itary Suppliers	2000 Work Cultures Emerge         1990 Shift from 'Error Detection' to 'Error         1990 U.S. Dept of Navy CNO Enacted To         1990 U.S. Dept of Navy CNO Enacted To         077 DOE Formed       Quality Leadership         A Formed         Emerges         med         ver Plant         ry Suppliers         U         U         Quality Management Consultants         QRs	
<ul> <li>2011 Fukushima Daiichi (Japan)</li> <li>2020 Coronavirus Pandemic Global COVID19</li> </ul>	Inspection / Testing Mass Production			Quality Manageme	nt
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	World War II QRs QC / SPC In - Process Inspection QRs	Challenge 1986 Accie Cherno	eered ems / Structures r Shuttle, U.S. dent byl, Russia r Power Plant	Exxon Valdez, Princ 1989 Oil Tanker Spi 911, Twin To 2001	II, Alaska, U.S.
QRs Self - Inspection Productivity Studies (SPC) 1900 1910 1920 1930	uality Control 1940 1950 196	Three Mile Islan Nuclear Power F 1979 Accident 0 1970	Plant V	990 2000	Fukushima Dai Nuclear Power 2011 Accident 2010 2020

# ty Leadership



### ity Management Tools

litigation, SixSigma, QFD, FEMA, PDCA, C&E aming, SPC, Control Charts, Remote Audits, Design / act Assurance, Lean, Process Mapping, Software, ing, Self-Assessments, CAPA, Drone Site Monitoring, Inspections, Cyber Security, Others

#### **Emerge as Key Element to QMS Effectiveness**

#### n' to 'Error Prevention'

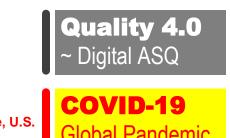
nacted Total Quality Leadership Concepts & Practices Selected Fleet Units. Goal: Process Improvements.<sup>(1)</sup>

## Who's Your ~ Chief Quality Officer ?

#### ns (QMS)

## Management Systems

- Industry & Government Driven
- Environmental / Health / Safety Mgt
- **QRs** Enterprise / Information Mgt
  - Integrated Mgt
  - Requirements Mgt
  - Risk Mgt
  - Emergency Prep Mgt
  - Supply Chain Mgt
  - Process Hazards Mgt
  - Cybersecurity Mgt



pwater Horizon, UK Spill

QRs **Quality Requirements** 

ushima Daiichi, Japan lear Power Plant Accident

2050 2020 2030 2040