Role of Quality in Industry 4.0

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The 4th Industrial Revolution - "Industry 4.0"

**Drivers**
- Quality of life
- Engineering Sciences

**1st**
- Steam engine
- GB 1782
- Power generation
- Mechanical automation

**2nd**
- Conveyor belt
- 1913
- Industrialization

**3rd**
- Computer, NC, PLC
- 1954
- Electronic Automation

**4th**
- ICT
- Cyber Physical Systems
- 2015
- Smart Automation
Industry 4.0 - Characteristics

- Connectivity
  - Connected People (Increases efficiency and Safety - Personal devices connectivity),
  - Connected Products (to provide feedback on performance across lifecycle),
  - Connected edge devices (Sensors in equipment, Decentralize decision making by performing analytics at the device level)
  - Connected Processes (obtain feedback from connected people, products and equipment into processes)

- Data (On cloud to provide scalability, easy access and global reach)
  - Volume (Transactional records like CAPA, Data from connected devices like process data),
  - Variety (structured, unstructured, Semi Structured (with meta data tags)),
  - Velocity (Rate at which company gathers data),
  - Veracity (Data accuracy),
  - Transparency (ease of accessing and working with data no matter where it resides or what application created it.)

- Analytics
  - Descriptive (what happened),
  - Diagnostic (Why it happened)
  - Predictive (What will happen)
  - Prescriptive (what action to take).
- **Collaboration** – Leading to interoperability, transparency of information, technical assistance, and decentralization of decisions.
  - Collaboration between Processes,
  - Collaboration between Humans and Robots,
  - Collaboration between Equipment and processes etc..

- **Role based Apps** – to fulfil processes, collect and expose data, visualize analytics, and establish collaboration. Role-based apps rendered through:
  - **Wearables** (Sense and connect Human performance - Safety and efficiency)
  - **Augmented reality** (overlay of virtual content on physical assets or surroundings) This has many applications in operations, allowing workers to “see” machines earmarked as predicted to fail soon and how to fix them.
  - **Virtual Reality** (simulates the real world and offers value for operations and management. Increases competency and reduces risk)

- **Management systems**
  - EQMS is the hub of quality management activities, providing a scalable solution to automate workflows, connect quality processes,
  - improve data veracity, provide centralized analytics, ensure compliance, and foster collaboration
  - EQMS ties the systems like ERP, EH &S, FSM (field service mgt), CRM, SCM, MOM(Mfg Ops Mgt), LIMS (Laboratory Info Mgt) and CAE (Line Mgt and CAE), PLM etc..
  - Compliance - conforming to regulatory, industry, customer, and internal requirements. Early compliance technology required substantial custom code to address requirements.
Role of Quality in Industry 4.0

Questions???

- Will the definition of Quality change over next decade?
- Will the approach towards quality management change?
- Will the landscape of Quality management role change?
- What will be the pressure points for Quality professionals?
- How does the organization cope with this changes?
- How will it impact the people?
Potential Role of Quality in Quality 4.0

- Data Analytics
  - Systematic analysis of quality sensors/cross-functional data as a basis for preventive quality actions

- Prediction of Quality
  - Use of historic durability and reliability data as well as damage parameters to review and adapt test plans in order to predict future performance and warranty costs

- Advanced SCM
  - Virtual connection of various sources of supplier quality performance data along the value chain to identify and predict issues

- Real time Community feedback
  - Systematic evaluation of online customer feedback as early indicator for quality issues and as indicator for future targets

- Remote diagnostics and Maintenance
  - Remote diagnosis and maintenance of field quality issues to increase QOS and reduce costs

- Quality Management at Industry 4.0
  - Deep integration of quality management methods and processes, such as quality risk analysis and validation, and innovations in production

- Software Quality

- Cyber security

Courtesy - AT Kearney - Quality 4.0: Preventive, Holistic, Future-Proof
**Traditional Quality Approach**
- Focused on compliance
- Facilitator of Continual Improvement
- Model driven (ISO, Business excellence)
- Process implementation (often fragmented and not end to end)
- Reactionary (RCA, CAPA etc...)
- Competency in Process (Design, deployment and deviation management), Metric design
- Do not own business objectives, Quality seen as Cost centre

**Quality 4.0**
- Focused on real time data driven decision making
- Competency in Data analytics to predict/prevent the failures
- End to end process management in the value chain
- Gauge R & R, Advanced calibration
- Cyber security, Data Accuracy
- Embrace technology, Integrate IT, OT and AT
- Focus on User experience than product features
- Own Business objectives, speak the language of Business
Who will lead the Quality Initiative in the organisation?
Thank You