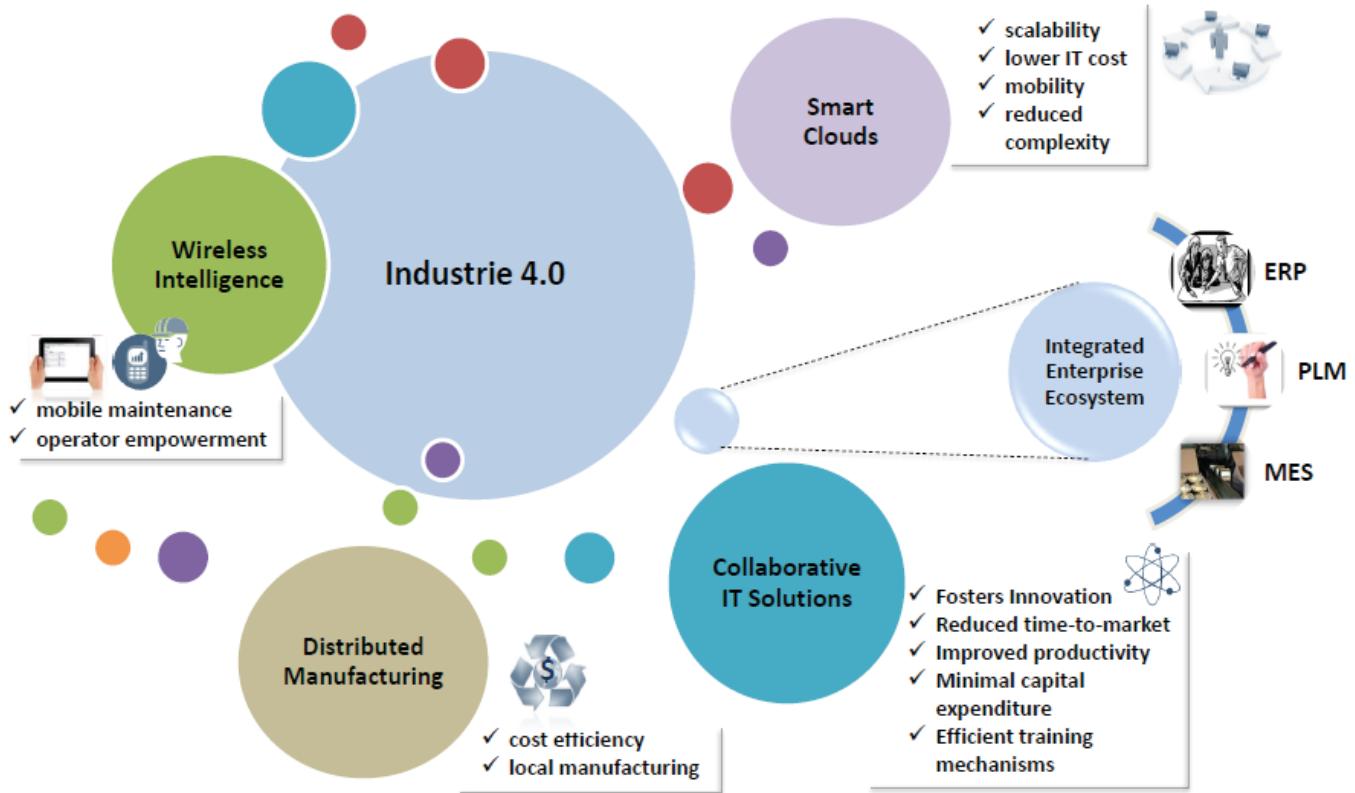


Digital Manufacturing

Vision



An integrated approach to Digital Manufacturing from Planning, Design, Testing, Supply Chain and Manufacturing using a Digital Thread and based on industry standards

Product Planning → Product Design → Testing → Sourcing → Production → Sell & Service

Digital Manufacturing Practice Snapshot

People

- 250+ strong team:
 - Dedicated team of industry, solution experts and consultants with in depth knowledge on industry best practices and processes
 - Team spread across the globe: leverage local presence
 - Focused Lateral hiring with industry and domain expertise
 - High investment in training & solution development

Assets & Infrastructure

- Engineering Infrastructure Lab - A platform for Product conceptualization and development
- Dedicated Testing Lab - For software quality testing

Alliances



Verticalized Offerings

- Verticalized offerings with both Integrated and point solutions spanning discrete and process industries



Solutions

- Plant in a Box - A unique MES implementation methodology
- Proactive Plant monitoring - An EMI solution for Plant metrics monitoring
- ISEAD - Energy Efficiency Framework
- PATWare - Enablement Framework in Pharmaceutical Manufacturing process
- Track & Trace - Generalized traceability solution for ensuring compliance



HCL Solution: Smart Production Monitoring

Current Challenges

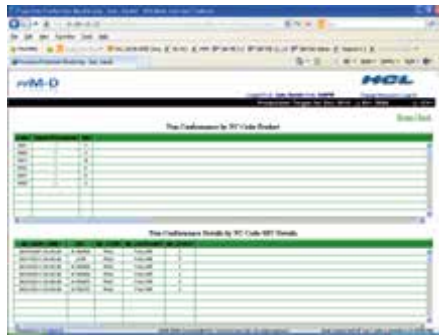
- Multiple smaller manufacturing facilities
- Different MES, plant automation and shop floor systems along with legacy systems
- Limited visibility into Production Process
- Cross Plant Production comparisons are not available
- KPIs are not calculated in real-time (delayed calculations at the end of shift / week / month)

Solution Features

- SPM solution homogeneously integrate multiple data sources such as ERP, plant MES, data historians, LIMS etc.
- PPM provides role based dashboards for multiple roles on a common platform (e.g. CEO, Plant Manager, Plant Supervisor)
- Calculates KPIs in real-time and in standard way for multiple plants

Benefits

- Real time alerts and actionable intelligence as raw data (both sensor machine data) is converted into meaningful information
- Common Cross plant comparison enable potential production, inventory or quality problems
- Facilitates faster root cause analysis



HCL Solution: Smart Maintenance Analytics

Business Problems

Are there indications that a major component failure is likely to occur in the immediate future?



How do low level failures cumulatively affect the life span of components?



What kinds of failures are likely to occur together?



Analytical Resolution

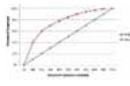
Classification model to Predict Major Component Failures

- Sensor Data
- Alarm Data
- Repair History



Regression models to Predict Component Life Based on Specific Machine History

- Repair History
- Events



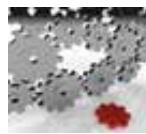
Association Models to Identify Failures that Occur Together

- Warranty Data
- Repair History



Business Benefits

Product health score used to predict impending failures



Understand impacts of individual low level failures, estimate component life



Identify components that have a high probability of experiencing similar failures



HCL Solution: Smart WIP Inventory Tracking

Current Challenges

- Poor visibility into location, quantity and status of the WIP Inventory
- WIP location is frequently moved and can not be tracked using conventional MES
- WIP Inventory on hold is not properly tagged in MES
- Rapid WIP Buildup as Equipment downtime Vs WIP buildup analysis is not done online

Solution Features

- Provides RFID based WIP movement, location reference and Ambient conditions
- Provides easy configuration and can be plugged into conventional MES as a separate module
- Leverage latest IoT Technologies and available in .NET and J2EE versions
- Ability to link WIP Inventory with Production order, equipment and shifts

Benefits

- Improved Geolocation based WIP tracking
- Real-time alerts on Inventory buildup, locations anomalies and shelf-life expiry
- Reduction in WIP (smart management of Inventory buildup) and ability to operate lean



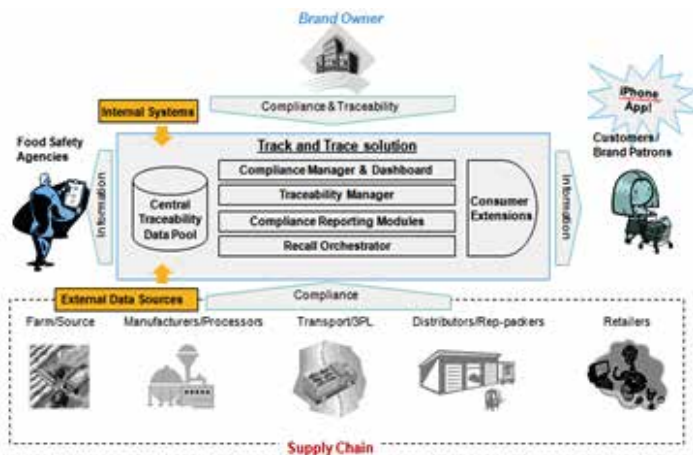
HCL Solution: Smart Track & Trace Through Product Value Chain

Solution Features

- Ability to traverse the product genealogy without going into multiple systems
- Common data platform for disconnected legacy and cots systems
- Quick identification of faulty subassemblies
- Minimize chances of recalls by identifying "compliance gaps" in the supply chain
- Implement complete traceability both backwards and forwards in a Supply Chain including manufacturing systems
- Minimize the impact of recalls - if they do happen by initiating a rapid recall process
- Portal integration for supplier collaboration
- Both web based and Mobile front-end

Benefits

- Supply chain wide compliance
- Lesser preparation time for Inspections
- Minimize chances of recalls
- Implement bi-directional traceability
- Rapid reaction to recalls thereby reducing impact



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