HCL’s CARE (Connected Assets in Regulated Environment) Platform is a Micro-services architecture featured multi-tenant platform that helps in building a regulated medical class software within a significant reduced time. CARE brings together packaged application frameworks, re-usable software components, automation tools for developers & testers, support for best of breed architectural patterns and best practice templates to provide acceleration to the development of software / platforms.
CONNECTED CARE - INDUSTRY TRENDS

Hyper Connectivity and Digitization transformation have impacted the core elements of the value chain by focusing on ubiquitous and simplified customer experience, continuous customer engagement and continuous innovations in customer touch points. Amazon.com, Airbnb, Uber, Spotify and Square are a representative examples of organizations that have disrupted their industries with digital connected value chain innovation. Healthcare industry is going through a similar shift from patient centricity to continuous patient engagement.

There is an increasing urge to move from continuous monitoring to disease prediction, patient initiated admissions to continuous interventions and data ownership to data sharing. Every Healthcare company needs to focus on an integrated hyper connectivity and Data driven approach to business, no matter which among the four care settings [Wellness, Chronic, Acute or post-acute care] it represents.

HEALTHCARE INDUSTRY CHALLENGES

The growth in medical devices industry has shrunk from a two-digit figure in the past decade to a mere 2% figure in the recent years signifying reduction in large scale innovation, tightened regulatory norms, tougher reimbursement procedures, presence of alternatives and higher efficiencies. New opportunities for the Healthcare companies thus is by moving away from provider & payer centric approach towards a patient engagement approach and to move from a device centric approach to data centric approach. Connected Digital Health Ecosystem has become a manufacturer’s ammunition to fuel-differentiated value creation.

Each healthcare company finds itself at a different stage of Connectivity and Digital maturity level. There are unique challenges at each maturity level. General Challenges that hold back healthcare companies are

- Lack of a clear end user centric business case
- Lack of a clear approach towards monetization of data
- High Upfront costs
- Longer pay-off periods
- Device, Software interplay challenges and unknowns causing stability issues [solution]
- Understanding and preventing ever increasing cyber security threats
- Extensibility of a solution across product families
- Navigating the regulatory maze with the device and software interplay

Besides this, the challenges vary based on the care setting a company represents.

WELLNESS CHALLENGES & SOLUTIONS

<table>
<thead>
<tr>
<th>Device</th>
<th>Wearable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Challenge</td>
<td>Monetization, Customer Ownership, Repeat Business</td>
</tr>
<tr>
<td>Platform Need</td>
<td>Social Media Integration Wellness Portals, Customer Health Tracking</td>
</tr>
<tr>
<td>Technical Challenge</td>
<td>Data Integration, Data Ownership</td>
</tr>
<tr>
<td>Solutions</td>
<td>Gym Management, Cloudfeeds Integrated patient predictive analytics</td>
</tr>
</tbody>
</table>

CHRONIC CARE CHALLENGES AND SOLUTIONS

<table>
<thead>
<tr>
<th>Device</th>
<th>Pumps, Smart Tablets, Patches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Challenge</td>
<td>Adherence, Therapy Outcome/ Efficacy, Replenishment</td>
</tr>
<tr>
<td>Platform Need</td>
<td>Care Platform, E-Commerce, Integration, Content Management</td>
</tr>
<tr>
<td>Technical Challenge</td>
<td>Communication standards, Data Privacy, Security</td>
</tr>
<tr>
<td>Solutions</td>
<td>Cloud Connected Glucometer, Diabetes Patch, Cloud Connected Home dialysis, Infusion pumps for multiple sclerosis</td>
</tr>
</tbody>
</table>
### ACUTE CARE CHALLENGES AND SOLUTIONS

<table>
<thead>
<tr>
<th>Device</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defibrillator, EMG, MRI, Steriliser, Microbial Detector, Sedation, Laser Surgical Device, Compounder, Hemo dialyser</td>
<td>Connected Infusion Pumps, Connected Surgical Sterilizers, Connected Medical Optics</td>
</tr>
</tbody>
</table>

**Technical Challenge**

- Analytics, Informatics, Device Integration, Cyber Security, Integration

**Device**

- Business Challenge: Low MD Play besides Device Sale

**Platform Need**

- Device Integrator, EMR Integration Care Continuum, Analytics

**Technical Challenge**

- Analytics, Informatics, Device Integration, Cyber Security, Integration

**Solutions**

- Connected Infusion Pumps, Connected Surgical Sterilizers, Connected Medical Optics

### POST ACUTE CARE CHALLENGES AND SOLUTIONS

<table>
<thead>
<tr>
<th>Device</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensors, Wearables</td>
<td>CloudFeeds, Sensor Integration</td>
</tr>
</tbody>
</table>

**Technical Challenge**

- Data Creation, Device Connectivity

**Device**

- Business Challenge: Adherence, Monitoring

**Platform Need**

- Data Management

**Technical Challenge**

- Data Creation, Device Connectivity

**Solutions**

- CloudFeeds, Sensor Integration

### HCL’S APPROACH & SOLUTION

HCL uses the Asset, Service & User Value Chain approach as our approach to Digitization and connectivity enablement. HCL’s CARE (Connected Assets in Regulated Environment) Platform is a

- Micro-services architecture featured multi-tenant platform that helps in building a regulated medical class software within a significant reduced time
- Comprehensively addresses the business, solution and technical challenges of all the care settings
- Is a healthcare specific solution that solves the higher level as well as the last mile problems of the healthcare industry

---

**Impact**

- Revenues enabled for $2B customers

## Pride

- We are working with 6 of the top 10 Medical Devices company, and overall with 15 Healthcare and other industry customers
**CARE FOCUS**

- **Stay Focussed on the Device**
  - Device Eco System
  - Device Eco System

- **Expand to Premise Eco System**
  - Procedural System
  - LIS EMR Integrations
  - Provider, LAB Workflows
  - Device Integration

- **Expand to Player Eco System**
  - People System
  - Patient CARE
  - Monitoring & Adherence
  - Episode Management

**KEY CARE USAGES**

- **Patient Monitoring & Adherence Management**
- **Device Gateway**
  - Preventive Maintenance
- **Last Mile/Edge Connectivity**
- **Analytics Driven Patient Engagement**
  - Replenishments & Consumables Tracking
- **Device Data Management System**
- **Remote Device Management**

**CARE CHARACTERISTICS**

- **Cloud Deployments**
  - Multi-tenant with full FDA Class III Compliance
- **Micro-services architecture**
  - Clearly isolates the regulated software components & medical data with the application services & data
- **Unique characteristics of CARE**
  - Aids medical software development:
    - Automation components help increase developer productivity
    - Reusable components lowered the overall efforts and time to market
    - Standardized architecture and design components reduced performance and scalability issues
- **Integrated technology stack**
  - Provides abstraction of complexity in cloud deployments and on-premise deployments
SUCCESS STORY

DATA MANAGER FOR STERILIZATION EQUIPMENT AND ENABLING CONNECTIVITY WITH HOSPITALS FOR ONE OF THE LEADERS IN THE MEDICAL DEVICE SEGMENT

Customer wanted to launch smarter and more connected products for the future. They wanted to progressively connect the devices among one another, connect them with the hospital systems and eventually connect them on to the internet.

- Global company manufacturing sterilization devices.
- Require differentiated service offering from competitors.
- Need to launch connected device platform that would help hospitals overcome manual tracking of sterilization reports
- Enable dual access to service, from the cloud and within the premise.

BUSINESS CHALLENGE

- Create a common platform that can deliver the connected sterilization device services both on premise and from the cloud
- Track all compliance centrally.
- Enable a Personal Health Data Platform in the long run to launch multiple digital services.

HCL APPROACH AND SOLUTION

HCL’s long experience in the Embedded, Hardware and Software Digital Engineering and the investment in the connected devices space were leveraged to launch a first of its kind connected platform enabled product Globally

HCL’s comprehensive solution included the below

- HCL’s ability to provide all services under one-roof proved very critical for the launch of the platform
  - HCL’s partnership with Intel ensured that the best gateway board from Intel, Embedded OS from WindRiver and security enablement from McAfee is in place
  - HCL’s expertise in hardware engineering ensured that the Gateway Hardware is customized with actual customer needs
  - HCL’s prior knowledge of the sterilization domain and the products itself ensured better time to market

- Leveraging HCL’s Global Device Care Platform
  - Leverage HCL GCP to build the solution that can be deployed on premise as well as on the cloud thereby reducing the time to market by 50 % and the cost of the Gateway significantly low
  - Leverage a local gateway to deploy the solution within the hospital with an integrated monitoring and management service for the gateway. Manage the gateway as a device using GCP Device Management Capability.
  - Abstraction of complexity of cloud deployments and on-premise deployments using GCP
Hello there! I am an Ideapreneur. I believe that sustainable business outcomes are driven by relationships nurtured through values like trust, transparency and flexibility. I respect the contract, but believe in going beyond through collaboration, applied innovation and new generation partnership models that put your interest above everything else. Right now 176,000 Ideapreneurs are in a Relationship Beyond the Contract™ with 500 customers in 50 countries. How can I help you?

For more information please contact ERS.info@hcl.com

**Adoption of HCL’s Medical Device Agile Methodology**
- Adoption of Agile methodology helped in keeping product requirements flexible and allowing for granular and impactful product improvements
- The metric based approach ensures high quality of solution resulting in lower wastage of efforts towards defect fixing during verification cycle which in turn impacts time to market
- Talent centric approach ensures all areas of solutions are fully addressed resulting in lower field level issues
- Frequent hardening cycles ensure that integration and usability issues are caught upfront resulting faster time to market and better quality
- Performance engineering specific approach ensures that non-functional requirements of the system are addressed well ahead resulting in limited system changes towards the end of the program

**VALUE DELIVERED / BENEFITS**

- Enabled 4820 additional device sale globally
- Improvement in Device Uptime by 27%
- Reduction in Field Service Costs by 18%
- Superior Infection prevention capabilities
- Reduction of manual Reconciliation errors
- Elimination of Paper Records Management

**FUTURE BENEFITS**

- Enabling consumables purchase stickiness through automated monitoring and replenishments
- Remote Diagnostics and Predictive Maintenance leading to lower sterilization cycle failures
- Sterilization Guidance to Operators