

ENGINEERING TODAY, FOR BETTER TOMORROW

Value | Acceleration | Compliance

CARE — FOUNDATION FOR BUILDING NEW AGE HEALTHCARE SOLUTIONS

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 centrality 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

Device	Wearable
Business Challenge	Monetization, Customer Ownership, Repeat Business
Platform Need	Social Media Integration Wellness Portals, Customer Health Tracking
Technical Challenge	Data Integration, Data Ownership
Solutions	Gym Management, Cloudfeeds Integrated patient predictive analytics

CHRONIC CARE CHALLENGES AND SOLUTIONS

Device	Pumps, Smart Tablets, Patches
Business Challenge	Adherence, Therapy Outcome/ Efficacy, Replenishment
Platform Need	Care Platform, E-Commerce, Integration, Content Management
Technical Challenge	Communication standards, Data Privacy, Security
Solutions	Cloud Connected Glucometer, Diabetes Patch, Cloud Connected Home dialysis, Infusion pumps for multiple sclerosis

ACUTE CARE CHALLENGES AND SOLUTIONS

Device	Defibrillator, EMG, MRI, Steriliser, Microbial Detector, Sedation, Lasik Surgical Device, Compounder, Hemo dialyser
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

Device	Sensors, Wearables
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

Across 5 continents | 11 Million Investment| 60K connected devices| 7 Patents

Impact

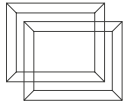
\$ 2 B Revenues enabled for 2 0 customers

8 Years of Existence | 32 Countries

Pride

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

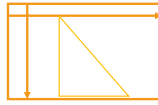
CARE FOCUS



Stay Focused on the Device

-Device Eco System
-Device Eco System

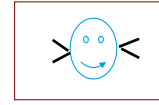
Plumbing



Expand to Premise Eco System

-Procedural System
-LIS EMR Integrations
- Provider, LAB Workflows
- Device Integration

Adjacencies & Conveniences



Expand to Player Eco System

-People System
-Patient CARE
- Monitoring & Adherence
- Episode Management

Potential Realization

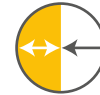
KEY CARE USAGES



Patient Monitoring & Adherence Management



Device Gateway



Preventive Maintenance



Last Mile/Edge Connectivity



Analytics Driven Patient Engagement



Replenishments & Consumables Tracking

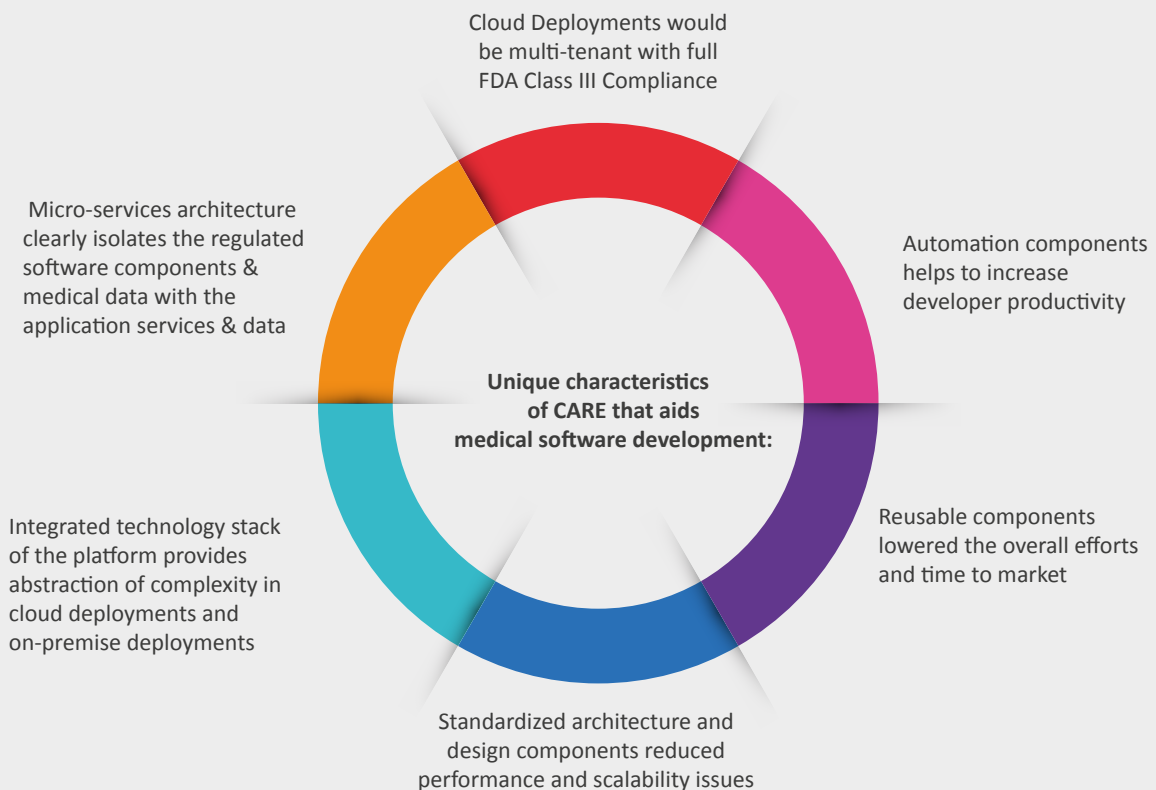


Device Data Management System

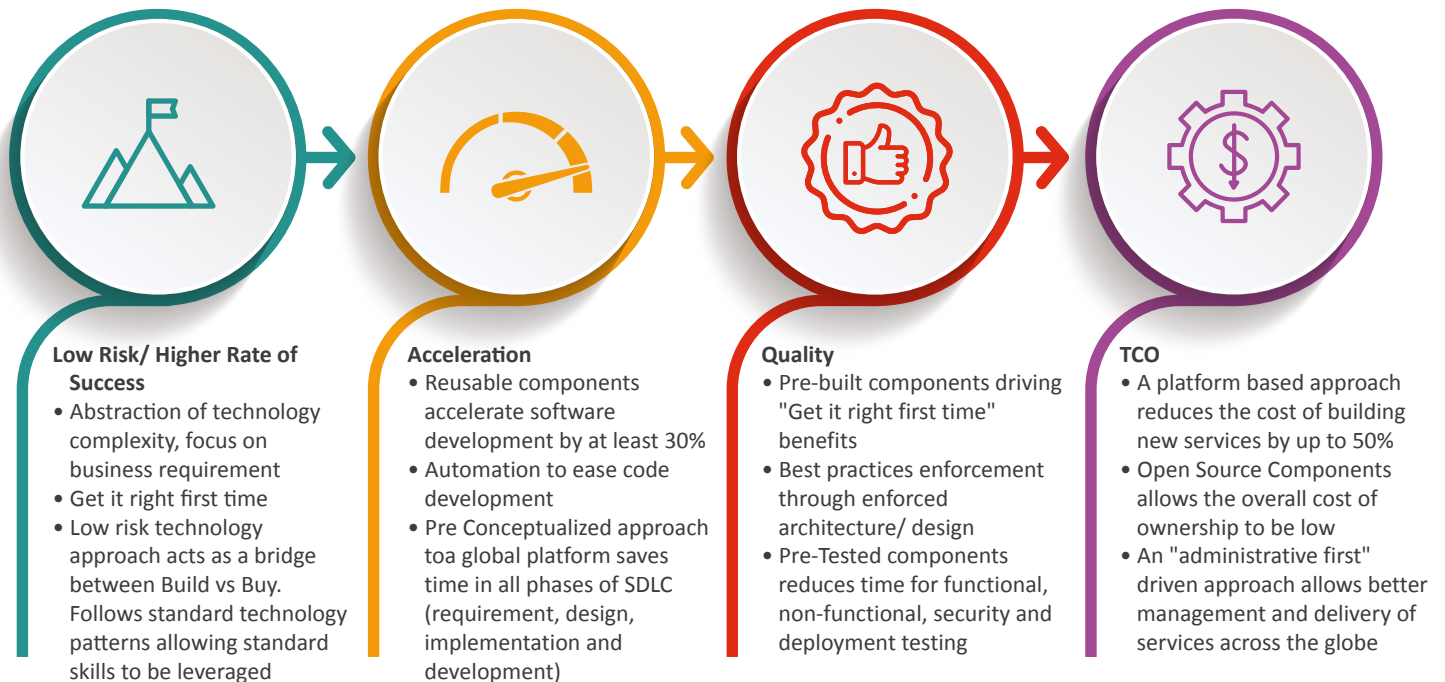


Remote Device Management

CARE CHARACTERISTICS



CARE BENEFITS



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 other, 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

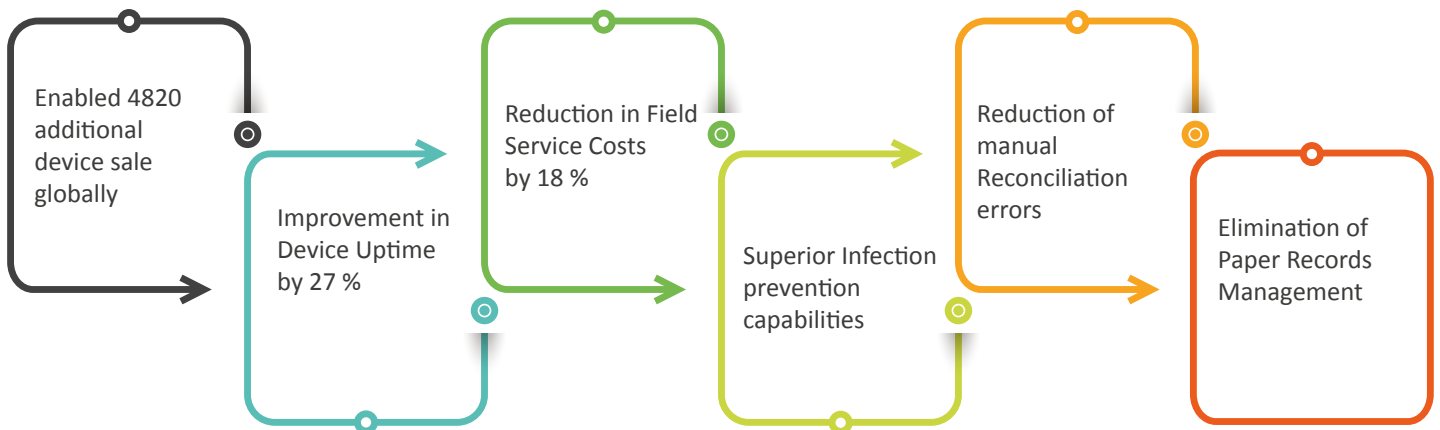
HCL's comprehensive solution included the below

- **HCL's ability to provide all services under one-roof proved very critical for the launch of the platform**
 - o 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
 - o HCL's expertise in hardware engineering ensured that the Gateway Hardware is customized with actual customer needs
 - o HCL's prior knowledge of the sterilization domain and the products itself ensured better time to market
- **Leveraging HCL's Global Device Care Platform**
 - o 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
 - o 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.
 - o Abstraction of complexity of cloud deployments and on-premise deployments using GCP

• Adoption of HCL's Medical Device Agile Methodology

- o Adoption of Agile methodology helped in keeping product requirements flexible and allowing for granular and impactful product improvements
- o 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
- o Talent centric approach ensures all areas of solutions are fully addressed resulting in lower field level issues
- o Frequent hardening cycles ensure that integration and usability issues are caught upfront resulting faster time to market and better quality
- o 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



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

HCL Technologies is a next-generation global technology company that helps enterprises reimagine their businesses for the digital age. Our technology products, services, and engineering are built on four decades of innovation, with a world-renowned management philosophy, a strong culture of invention and risk-taking, and a relentless focus on customer relationships.

We offer an integrated portfolio of products, solutions, services, and IP through our Mode 1-2-3 strategy, built around Digital, IoT, Cloud, Automation, Cybersecurity, Analytics, Infrastructure Management and Engineering Services, amongst others. With a worldwide network of R&D, innovation labs and delivery centers, and 132,000+ 'Ideapreneurs' working in 44 countries, HCL serves leading enterprises across key industries, including 250 of the Fortune 500 and 650 of the Global 2000.

Contact for more details: ers.info@hcl.com

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