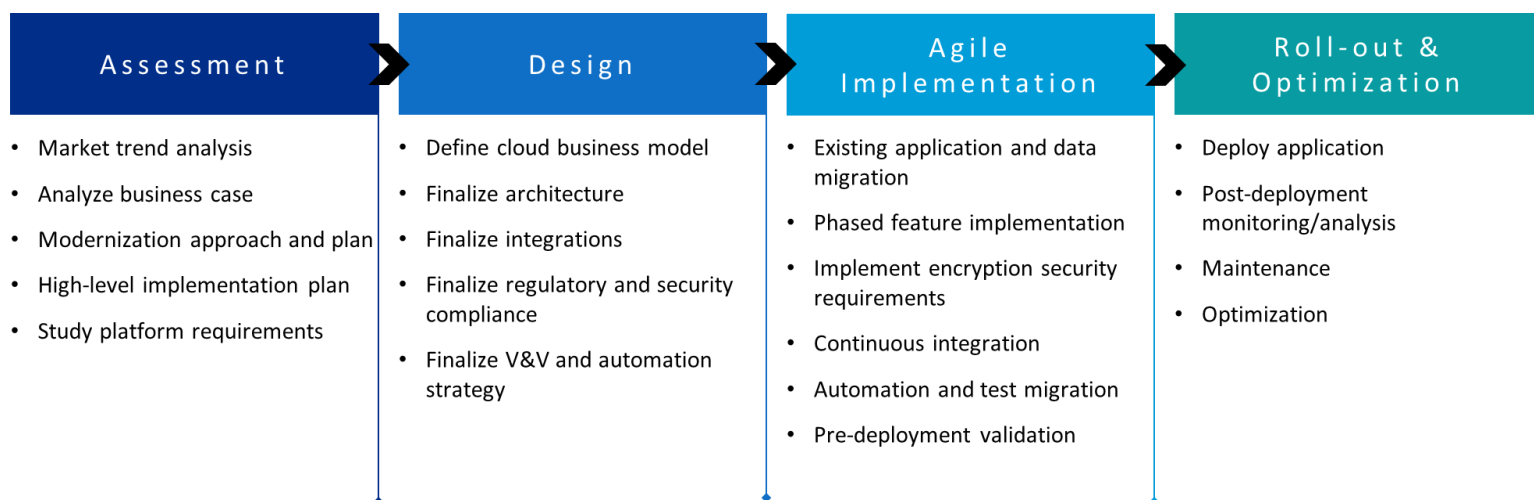## TATA ELXSI

Taking a Structured Approach for Healthcare Software Modernization

With providers facing unprecedented demand, the need for efficiency and quality in care delivery is ever increasing. The software applications in the provider and clinical settings are thus expected to be more scalable, integrated, intelligent, user friendly, and secured.

While many legacy applications by medical devices and healthcare IT companies have been proven effective in their primary functions, they lack the core technologies necessary to integrate these features into the software. In a rapidly growing and highly competitive healthcare market where the providers and clinicians are starting to see these features as essential for efficient care delivery, the need to rapidly modernize the legacy applications is pressing amongst healthcare organizations.

Organizations often take modernization in an incremental product and technology-wise approach as a reaction to market and competition. However, complete digitization requires a more comprehensive strategy for a specific product as well as portfolio transformation. This strategy should consider market and consumer needs, technology trends, gaps in existing products for modernization scope, areas of workflow improvement for efficiency with cost reduction, and the latest regulatory and quality requirements.

Healthcare application modernization should be a structured and closed-loop process to meet the desired product outcomes with faster development cycles, reduced program costs, and superior performance and quality.

Assessment	Design	Agile Implementation	Roll-out & Optimization
• Market trend analysis • Analyze business case • Modernization approach and plan • High-level implementation plan • Study platform requirements	• Define cloud business model • Finalize architecture • Finalize integrations • Finalize regulatory and security compliance • Finalize V&V and automation strategy	• Existing application and data migration • Phased feature implementation • Implement encryption security requirements • Continuous integration • Automation and test migration • Pre-deployment validation	• Deploy application • Post-deployment monitoring/analysis • Maintenance • Optimization

Understanding key technologies for modernization

Companies often rely on few key technologies to modernize their applications to serve the customer needs of connectivity, experience, and efficiency. Let's understand each of these technologies in brief.

Cloud in Healthcare

Cloud has become an industry norm to achieve high performance, scalability, and higher ROI. In fact, cloud-based applications in healthcare have also been named 'software for life', helping providers and researchers offer better care delivery.

Some of the key benefits cloud offers are:

- Cloud with healthcare security stacks complaint with various cybersecurity, HIPAA, HITECH guidelines provides some assurance against potential breaches
- Lower costs as compared to maintaining servers and easier use with less time spent on IT related issues
- Centralized data with seamless access from anywhere through various types of applications and devices
- Secured data backup and recovery
- Offers reliability and scalability

For healthcare organizations, migrating software to the cloud can be a challenging task. Various interoperability issues, compliance and security needs, application re-design requirements, etc., has to be taken care of. Cloud migration thus requires a strategic roadmap assessing the short-term and long-term costs, applications and data portability, security and compliance efforts, and many unique challenges that each cloud migration project brings.

However, with the proper detailed phase-wise plan and experienced team, most of these challenges can be mitigated for timely project completion and savings costs.

UI/UX Modernization

"Never judge a book by its cover," as the saying goes. That is, nevertheless, something we still do. And, as one can see, we're not just talking about reading. The same can be said for any software. As a result, UI and UX are essential.

Medical innovations are designed to increase healthcare quality, improve the

patient experience, and make doctors' jobs easier. The user experience (UX) design of a health app will decide whether it achieve these objectives or not. Today healthcare stakeholders are looking for smart healthcare solutions for both home and hospital use; design and experience will play a significant role in humanizing the care delivery experience.

Healthcare companies often hesitate from important changes in 'Design' in healthcare, as small changes can have severe implications on the health of possibly millions of users of those apps. However, for transforming your healthcare application from 'technical and scientific' to something 'Interactive working together with patients and providers for improving patient outcomes' is possible:

- **A structured process for user-centric design thinking:** Designing applications in healthcare requires the highest levels of empathy with a deep understanding of all stakeholders, including patients and providers, while prowess in design and software technologies allows crafting of appropriate solutions. Blending design thinking and technology needs a structured approach as given below.
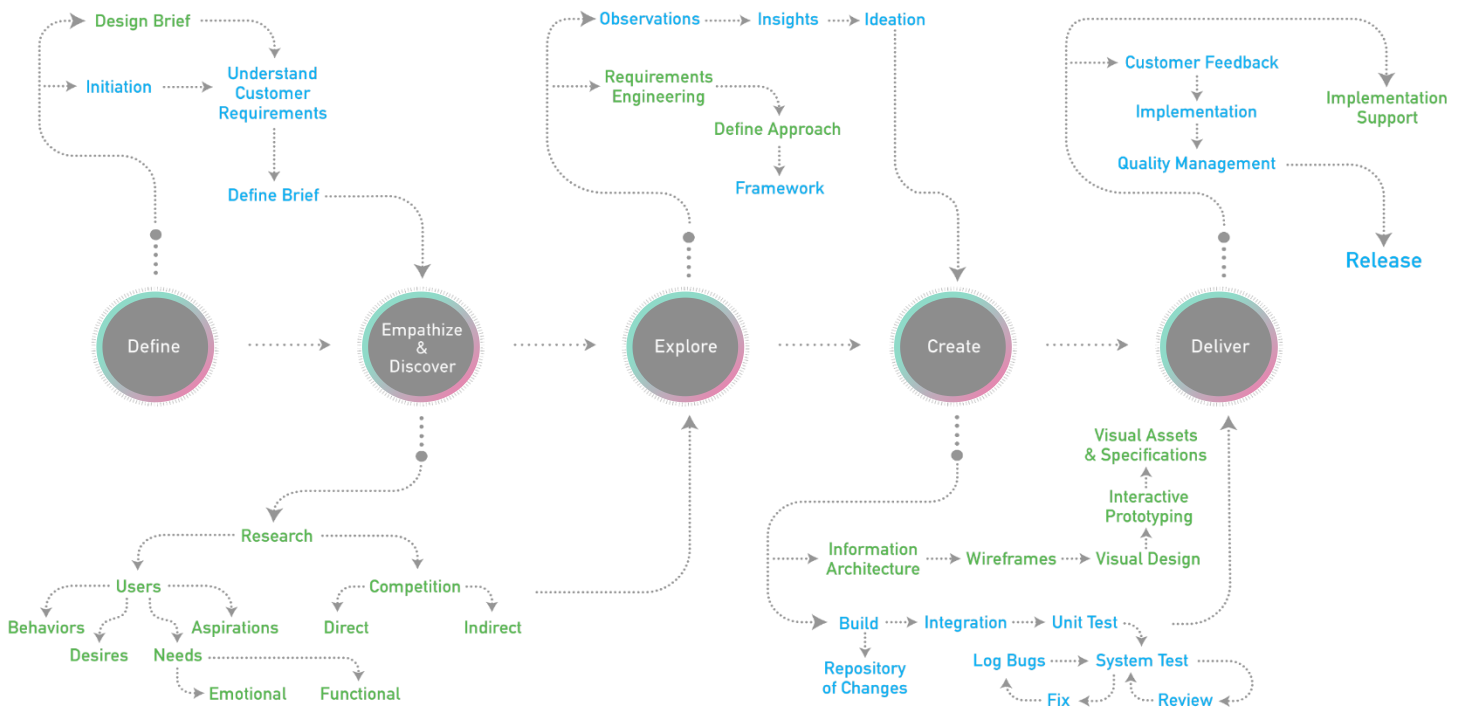
- **Collaboration with design team:** Healthcare applications need to be 'simple' yet personalized, visually interactive, and embrace the growing 'integrated health ecosystem' trend. Collaboration between designers and technologists is essential to design applications that consider the healthcare ecosystem and its regulatory environment and show empathy for patients, providers, and other stakeholders.

- **Adhering to regulations:** The most significant challenge in designing a healthcare application is taking care of the bureaucracy and legislation. Adhering to these requires strict limitations on various aspects of design, higher development costs, and increased product-to-market timeliness. Thus, designing a healthcare app requires thorough planning, consideration, and collaboration between technology, regulatory, and design teams.

Design and experience seem to be the next evolution in healthcare software; with inter-team collaboration, careful planning, and strategy, organizations can successfully create differentiation.

Healthcare Analytics

According to Statista, 2,314 Exabyte of healthcare data was generated in 2020. Utilizing this data to gain actionable insights for business and patient outcomes necessitates consolidating and analyzing it using specialized healthcare data analytics tools.

Data analytics has made a substantial impact in improving the existing care delivery ecosystem, predictive and preventive health, decision support systems, clinical research, provider process improvements, and supply chain management, payer data analytics and automation, etc. Companies need to consider certain factors to cope with these large volumes of data generation at an unprecedented pace with a wide variety.

- **Data management**: In healthcare data analytics, data from various sources is leveraged in software such as decision support, robotic process management, predictive patient health, etc. Data management practices can significantly impact patient's health and safety as all the data being used in analytics software needs to be described, formatted, and checked for accuracy; the volume of the incoming data makes this a great challenge for healthcare companies.

- **Data interoperability:** Various health organizations work together to create better patient care by sharing and leveraging big data generated by their respective systems. It is estimated that soon healthcare will be driven by radically interoperable data and open, secure platforms. Going beyond the necessary interoperability compliances and taking a rather strategic approach for secure data transmission will give companies an advantage in terms of insights, affordability, and consumer engagement.

- **Data Integration:** Payers, vendors, research institutes, and healthcare organizations all have their data silos. The complex nature of healthcare data, along with necessary privacy and security regulations is the most significant challenge for the effective use of big data in clinical and non-clinical settings.

However, the unification of this data can improve the hospital's holistic view of patient's health and bring easy interfaces between different systems from multiple vendors. To achieve this, specialized platforms can be developed based on customer requirements and complying with regulations such as HL7, HIPAA, DIACAP, etc.

Healthcare data analytics aid in responsible and fast decision-making. Companies must create a clear road map for investing in infrastructure, software, and data sets to benefit from healthcare data analytics.

IoT in Healthcare

In 2019, global IoMT market was valued at $104 billion. It is projected to expand at a CAGR of 18% from 2020 to 2025. In the healthcare industry, IoT has a range of successful applications. Apart from remote patient monitoring in both home-based and hospital-based settings, IoT also has significant applications in improving patient

outcomes, streamlining clinical operations, self-maintenance of medical devices, and inventory control of medical products. While IoT in healthcare has many advantages, it also has some challenges that must be addressed before the IoMT technologies can be considered for implementation.

- **Data Security:** HIPAA and various regulations categorize much of the data obtained by medical devices as protected health information. Evidently, according to HIPAA Journal, 82 percent of healthcare organizations say hackers have targeted their IoT devices. System developers, administrators, and healthcare professionals must ensure that data collected and transferred by IoT devices are appropriately protected through secure and robust hardware and software.

- **Protocol Integration:** In the healthcare IoT space, each manufacturer creates its ecosystem of IoT devices that are often incompatible with competing manufacturers' devices and applications. In this case, there is no synchronous data aggregation protocol that can be used. The integration of these devices necessitates the use of common standards. With the lack of a centralized body, careful consideration is thus required while integrating such systems.

- **Data Overload:** IoT healthcare devices generate a large amount of data. Organizations thus need a pre-planned strategy to handle the data produced by IoT devices. A robust IT infrastructure and the proper implementation strategy can help organizations store sensor-generated data and leverage big data technologies to generate intelligent insights.

The IoT in healthcare helps to monitor and analyse real-time patient data providing personalized and cost-effective services to patients. This data is an excellent source of information for healthcare stakeholders looking to enhance patient wellbeing and experiences while also increasing revenue and streamlining operations.

RPA in Healthcare

According to Gartner, 50 percent of healthcare providers in the United States will invest in RPA in the next three years. COVID-19 has accelerated the need to optimize overall costs and concentrate scarce resources on higher-value tasks, driving RPA adoption. Automation can be implemented in various use cases such as patient scheduling and practice management, claims analysis and processing, inventory management, workflow management, compliance risk reduction, and improving overall accuracy and efficiency of the care cycle, etc.

RPA promises efficiency and cost-effectiveness benefits. It helps focus attention towards critical tasks by automating the routine, repetitive activities. However, to reap the full benefits of RPA, organizations must consider the following factors throughout the RPA lifecycle:

- **Implementation:** RPA implementation in a healthcare company is a unique and critical activity that necessitates excellent teamwork among all employees involved in process automation. It requires trained professionals to guide the team through the automation process. The presence of strong IT teams in the design of the architecture reduces risk and maintains security standards.

- **Maintenance:** Even after the critical implementation phase, dedicated technical personnel is needed to resolve technical and operational problems. RPA maintenance is critical; following the standard procedure for RPA maintenance is, therefore, must abide by the core objective of RPA.

With RPA, healthcare organizations can effectively automate various manual activities and thus achieve better ROI through enhanced operational efficiency and resource optimization. Organizations can achieve improved, cost-effective, and prompt services with proper RPA implementation and maintenance.

Parting Thoughts

The recent pandemic has sparked a heavy growth in digital transformation amongst businesses, especially healthcare businesses, necessitating agile and scalable product portfolios and connected health ecosystems with enhanced data interoperability, infrastructure, and streamlined workflows. The transformation process requires a systematic modernization plan that assesses the existing portfolio and gives a phase-wise approach for portfolio-wide modernization of technology and architecture, keeping stringent regulatory guidelines in mind. To meet evolving customer demands and stay abreast of the competition, healthcare businesses must ramp up their digitization game and start approaching it from a strategic perspective.

TATA ELXSI

ABOUT TATA ELXSI

Tata Elxsi, a part of Tata Group, is among the world's leading providers of design, engineering, and regulatory compliance services. With 15+ years of experience in catering to medical device and healthcare companies, Tata Elxsi has built a comprehensive services and solutions portfolio that adds value at every stage of the customer's product development lifecycle. Tata Elxsi is an established name in technology consulting, new product design, development, verification and validation, and regulatory compliance services.

Tata Elxsi also provides solutions and services for emerging technologies such as IoT (Internet of Things), Big Data Analytics, Cloud, Mobility, Virtual Reality, Cognitive Computing, and Artificial Intelligence (AI). Tata Elxsi has a global presence and is supported by a talent pool of over 6,500 employees, a network of ISO 13485 certified design and development centers, and a robust ecosystem of technology, manufacturing, and internationally accredited testing partners.

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