Evolving Horizons: The Changing Generation of Legacy System

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ABSTRACT

According to Organising for Digital Delivery, an independent report written by the Digital Economy Council, the UK spends half of its $5.832 billion (£4.7 billion) IT spend on maintaining and managing legacy systems. The systems were 8 to 51 years old. According to the report by the Government Accountability Office, each year, the U.S. government spends over $100 billion on information technology. Most of that will be used to operate and maintain existing legacy systems. These systems are costly to maintain and vulnerable from cyber security point of view. For the need of the time, legacy applications are going for a transformative shift, based on technical advancements, change in business demands and need of digital innovation in industry. This white paper deep dive into the dynamics of the changing generation of legacy applications through user experience and design. As well as explore the impacting factors to evolve the legacy applications and provide insights to make informed decisions for sustainable and viable system. We'll be exploring the benefit of better design and user experience principle can help the organisations and businesses in this transformative journey and the impact of AI in this process.

1. Introduction: What is legacy system?

A legacy system is an outdated computing system, software application that is still in use within the organisations. Legacy system can be identified with the usage of outdated hardware, software, design pattern, GUI elements, programming languages or architecture. These systems may not be upto date and are in similar condition and position from long time. Design trends are totally different from today to 20 years back, new principle and best practices have been changed. Additionally, software product from bigger organisations such as infrastructure companies like Oracle, Pega, SAP and etc. Such example highlights the diverse nature of legacy system and need tailored modernisation strategies.

2. How it is impacting businesses?

Businesses place great significance on legacy systems, as they serve as the foundation of operations and represent substantial investments in technology infrastructure. These systems have played a crucial role in supporting vital business functions throughout time, from overseeing transactions and data management to facilitating communication and storing

valuable information. Despite of evolution in technology, many businesses still rely on these systems due to their stability and the internal processes. Furthermore, these systems have important historical data and business logics that contribute to operational stability and employee understanding of existing system and processes.

However, it comes as a set of challenges along with its importance. Legacy systems often face compatibility issues when integrating with modern technologies which can compromise overall efficiency. Additionally, security concerns arise due to outdated software vulnerabilities or lack of updates for protection against emerging threats. Moreover, finding skilled resource who has knowledge of maintaining such complex system becomes a challenge for organisations. Finding the right balance between benefits offered by legacy systems while strategically modernising them is essential for companies aiming to optimise efficiency levels whilst staying competitive within today's evolving business landscape.

3. What is the need of changing design and experience of legacy systems?

Many companies have difficulties while working with outdated systems that obstruct the progress, increase expenses, and create security concerns. However, decommissioning a legacy system poses significant obstacles and demands substantial resources. Consequently, organisations may choose to employ tactics like modernising the system, replacing components, or integrating it with newer technologies in order to increase its lifespan while accommodating evolving business needs.

3.1 Challenges of legacy systems

1. Outdated Technology: Legacy systems often use outdated hardware or software that may not be supported by modern technologies. Legacy applications often show outdated design technologies that possibly not aligned with modern design principle and user experience (UX) standards.

Example: The use of text-heavy interfaces in Enterprise Resource Planning (ERP) systems from previous decades has been reduced. These interfaces, designed to maximise information density in early computing environments, may lack the visual appeal and user-friendliness expected in modern applications. In such legacy ERP systems, users may encounter complex, non-intuitive interfaces with minimal graphical elements, compromising usability and overall experience for the users.

2. Competitive Edge: Legacy systems are unable to adapt and integrate the latest technology or it will be very expensive to do that because of that organisations loosing in the market competition.

Example: A retail e-commerce platform updates the user interface of their product to incorporate responsive design and streamlined checkout and payment processes, different and latest kind of payment methods provide better and faster experience. Incorporation of UPI payment in Indian digital products increased the growth and revenues of businesses. 15 years

back to make a bill payment on has to go to service provider stay in queue to make payment through cash or cheque but after digital payments. Payment has become faster and delay in payments and late payment charges were reduced. That helped business and customers both.

3. Productivity and Efficiency: Legacy systems with outdated designs may impact the workflow, slow-down processes, and increase the likelihood of errors, negatively impacting the overall operational efficiency of system.
Example: An outdated project management system with a cluttered interface or disconnect experience will break the journey of end users and increase the touchpoint, which will impact the efficiency, productivity and duration to complete the task.

4. Adaptability to New Technologies: Legacy systems often struggle to integrate with or adapt with the new technologies and devices. Legacy systems process and old design create compatibility issue with the latest technologies.
Example: Today's smart TV can be mirrored with mobile devices but can't be done with old CRT TV or a banking application with a legacy design might struggle to integrate with mobile devices. The lack of adaptability to new technologies results in compatibility issues, causing the application to display incorrectly, experience slow loading times, or even become non-functional in modern browsers. Users encounter broken layouts, navigation errors, and reduced responsiveness, leading to a frustrating and bad user experience.

5. User Satisfaction and Engagement: Outdated design may create challenging experience which leads to lower user satisfaction and engagement. This is critical for employee productivity and satisfaction in enterprise systems and for customer retention in consumer-facing applications.
Example: End users find it challenging to navigate through the system, input data efficiently, and extract meaningful insights. The outdated and non friendly design reduce their ability to perform tasks swiftly and impacting the overall productivity.

6. Compliance and Accessibility: Outdated Design often unable to address new compliance with industry standards and regulations, including accessibility requirements in legacy systems. Ensuring that systems are accessible to users with diverse needs is not only a legal requirement but also promotes inclusivity.
Example: An educational software system undergoes a design overhaul to meet accessibility standards, including features for users with visual impairments such as colour blindness.

7. Security: Legacy systems with outdated designs and technology may lead to security vulnerabilities. Outdated design and technology leading to security concerns, lack of authentication mechanisms, and data theft.
Example: A legacy systems can't incorporate modern security protocols, such as biometric authentication and encrypted communication. This causes security concerns associated with the outdated login methods.

4. How legacy systems are changing through better design and user experience?

Legacy systems are changing through better design and user experience (UX) by undergoing the process of modernisation. This involves updating the system's architecture, users interface design, interaction design and functionalities to meet users expectations. Legacy System Modernisation has two primary methods: revolutionary and evolutionary. First revolutionary methods involve complete re-implementation, while second evolutionary methods focus on incremental changes, such as adding feature on specific part of application. In both the methods user research and user experience is really helpful for informed decision making and more intuitive flow, which is leading to less cognitive load on users mind and provide higher customer satisfaction and increase the efficiency of modernised systems.

4.1 Evolving legacy systems through improved design and UX

1. User-Centric Redesign: Legacy systems are being redesigned using latest design principles and best practices with a focus on user needs and preferences. User-centric design involves understanding the users' workflows, pain points, and expectations, leading to users interfaces that are more intuitive and user-friendly.

Example: An outdated Customer Relationship Management (CRM) system is redesigned with a user-centric approach. The interface is simplified, and features are organised based on user needs, resulting in a more intuitive and user-friendly experience for sales representatives. Businesses need to stay competitive and innovative to grow in this cutting-edge competitive market and a positive user experience is a key. Upgrading the design of legacy systems ensures that they remain competitive and innovative in the market and meet or exceed the user expectations.

2. Responsive Design: Modernising legacy systems includes implementing responsive design principles for seamless and cohesive experience. This ensures that the user interface adapts easily to different devices and screen sizes, providing a consistent and optimal experience whether users access the system from a desktop, tablet, or mobile device.

Example: A legacy e-commerce platform is modernised with responsive design. The website now seamlessly adjusts its layout and content to provide an optimal shopping experience, whether accessed from a desktop computer, tablet, or smartphone.

3. Streamlined Workflows: Redesign efforts often involve streamlining workflows to simplify complex processes. This includes minimising the number of clicks required to perform a particular tasks, improving navigation, and eliminating unnecessary steps, resulting in increased efficiency.

Example: A manufacturing ERP system undergoes a redesign to simplify the production workflows. The user interface is re-idealise to reduce the number of steps required for order processing, leading to increased efficiency on the shop floor. Usage of single page application

has also in trend so that maximum potential of the screen can be used and time latency can be reduced to access data quickly.

4. Enhanced Visual Design: A well-designed user interface enhances productivity and efficiency both at the same time. Legacy systems are benefiting from improved visual design elements. This includes the use of modern colour schemes, typography, and graphical elements to enhancing visually and engaging interfaces, contributing to a positive user experience. Example: A financial software application receives a visual overhaul with enhanced design elements. As human brain will recognise the visual faster instead of reading the information and visualising it after. Usage of icons repetitively at such places has increased the task completing time and reduce the cognitive load on users.

5. Integration of Modern Technologies: To align with current technological trends, legacy systems are integrating modern technologies such as artificial intelligence, machine learning, and cloud computing. These technologies enhance the system's capabilities and contribute to a more dynamic and intuitive user experience. Example: A healthcare information system integrates machine learning algorithms to enhance diagnostic capabilities. The system's user interface is updated to present relevant insights from machine learning models, providing a more dynamic and connecting user experience for healthcare professionals.

6. Accessibility Compliance: Redesign efforts often address accessibility standards to ensure that the system is usable by individuals with disabilities. This involves incorporating features like screen readers, keyboard navigation, Alternative (Alt) Text, colour usage for colour blindness and other accessibility enhancements. Example: A government portal is redesigned to comply with accessibility standards. The new design includes features such as text-to-speech functionality and keyboard shortcuts, ensuring that the portal is accessible to people with disabilities.

7. User Feedback and Testing: User feedback is actively sought during the redesign process. User testing, surveys, and usability studies help identify areas for improvement, allowing designers to make informed decisions that align with user expectations and preferences. Example: During the redesign of a insurance company, designers actively seek feedback from project managers, team members and test the prototype with end users. That helped in identifying the issue in existing application, while asking the input information from end user.

8. Training and Onboarding Enhancements: Redesigned legacy systems often include improvements in training and onboarding processes. User documentation, tutorials, and interactive guides are developed to help users quickly understand and become proficient with the updated system. Example: A university's student information system is redesigned with improved training and onboarding features. Interactive tutorials and documentation are integrated into the interface, helping faculty and staff quickly adapt to the updated system.

9. Long-Term Cost Savings: While there is a cost associated with redesigning and modernising legacy systems, the long-term benefits often outweigh the initial investment. Improved efficiency and reduced support and maintenance costs contribute to long-term savings.
Example: The manufacturing company faces operational inefficiencies and increased costs associated with its legacy inventory management system. The current system's lack of user-friendly interfaces hampers usability, leading to higher training expenses, increased errors in inventory management, and elevated support and maintenance costs.

10. Security Upgrades: Modernisation efforts extend to enhancing the security of legacy systems. This includes implementing robust authentication mechanisms, encryption protocols, and other security features to protect user data and ensure compliance with contemporary security standards.
Example: A financial institution upgrades the security of its online banking system. The redesigned interface includes advanced authentication measures, such as 2 factor authentication and biometric identification, to enhance the protection of user accounts and financial transactions.

5. Benefits of replacing legacy systems

The benefits of replacing legacy systems can enhance the growth and progress of organisations and businesses.

1. Enhanced Performance and Speed: Modernisation of legacy system will directly impact the performance, and efficiency of resources from the usage of modern technology and platforms.

2. Improved Security: New advance systems and technology will reduce the risk of vulnerabilities and enhance the data protection against cyber threats and enable advanced security features.

3. Advanced Features and Functionality: Modern system comes with new advance features and functionality, which will aligned better with evolving and expanding business requirements, improved operational capabilities, and supporting innovations.

4. Cost Savings in the Long Run: Modernisation will also help reducing the cost of maintenance for legacy application and improved efficiency will minimise the cost of running existing applications. Risk associated with using outdated technology will also reduced.

5. Scalability and Future-Readiness: It will be better to scale up with modern technology instead of outdating systems. Futuristic technologies can also be integrated easily with latest

technology. By replacing your legacy system you'll make sure your business is ready to evolve and expand. This trend creates an internal culture of business agility and innovation in the organisation as well.

6 . Transformation of legacy system with AI

AI brings a data-driven, predictive, and personalised dimension to the design of legacy applications with more user-centric, and engaging digital experience.

1. Automated User Research: AI can analyse user interactions and patterns within legacy applications, providing valuable insights in user behaviour. This data-driven approach helps in understand the user needs, preferences, and pain points, allowing for more informed and user-centric design decisions.

2. Personalisation: Leveraging AI, legacy applications can offer personalised user experiences. By analysing user data, AI can dynamically tailor interfaces, content, and features to individual preferences, optimising the overall user journey and engagement. And todays users need can be filled through personalisation. That kind of special attentions to specific needs to each user will help in improving the efficiency and productivity.

3. Predictive UX Design: AI can help in predicting user actions and preferences based on historical data. This enables design adjustments proactively and help in providing more intuitive and seamless experience.

4. Automated Testing: AI-powered testing tools can automate the testing process for legacy applications. This will not only accelerates the testing phase but also ensures that the user interface remains consistent and error-free across various scenarios, devices, and user tasks. It will be faster in analysing the testing data more accurately.

5. Chatbots and Virtual Assistants: Integrating AI-driven chatbots or virtual assistants into legacy applications enhances user interactions to another level. These intelligent systems can provide instant support, answer queries, and guide users through complex processes, improving overall user experience.

6. Natural Language Processing (NLP): NLP capabilities of AI enable legacy applications to understand and respond to natural language inputs. This enhances the conversational aspects of the user interface, making interactions more intuitive and user-friendly.

7. Adaptive User Interfaces: AI can enable adaptive user interfaces that adjust based on user preferences, accessibility requirements, and usage context. This will ensures a more inclusive and accommodating experience for a diverse user base.

8. Textual Content Recommendation: AI can help in enhancing the textual content for different texts being used in applications such as instructional text, error messages, inline messages etc. This will enhance user engagement and guide users toward discovering and utilising the full range of application capabilities.

7. Conclusion

The changing generation of legacy applications presents both challenges and opportunities for organisations and businesses. The transition from a legacy system to a modern system requires a strategic, iterative, and user-centric approach. This white paper will help understand the challenges of working with legacy systems and how to win over such challenges. It will demonstrate the benefits of transition to modern systems and how design and better user experience can guide you to success in the evolving horizon and changing generation of legacy systems.

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