

July 2018

Modernisation of Legacy Software

Written by Tony Wilson & Ian Hight

Introduction

Legacy applications remain vital to the success of many organisations. They remain in place because they perform the functions that they were designed for, and they deliver consistent reliable performance.

Yet, legacy applications are increasingly constraining digital transformation initiatives. Restricting the agility of an organisation, and preventing it from responding to a changing market landscape in a timely way. Legacy applications can therefore be a reason why organisations are becoming less competitive in a fast-changing market.

The increasing speed of change is the primary reason that legacy applications are under fire. More functional, high performance, low-cost systems enter the market every day. A wave of agile development and cloud enabled applications is engulfing the wider market landscape. CIOs and IT Managers face growing pressure to keep up with developments on many fronts. All the while dealing with requests to improve customer experience, provide faster and wider access to information, oh and yes, to deliver all this whilst reducing costs.

These challenges can be daunting. What's required is an IT strategy that ensures an organisation remains competitive by adopting new systems whilst not disrupting or placing at risk existing business functions. In other words, providing a bimodal environment.

Total legacy application replacement is ideal but for many, idealistic. The practical reality for most organisations is that replacing core legacy applications, which may have existed for decades, is complex and very risky.

Some organisations choose to adopt a bimodal IT strategy; this is also not without its challenges because it essentially involves operating two IT organisations, one looking after the existing IT systems and one in pursuit of the new.

Legacy application modernisation is about ensuring business continuity by leveraging past strengths and incorporating new technologies and new capabilities. Some commentators have defined legacy application modernisation as simply converting aging applications to more modern architectures.

The challenges with legacy software

Most legacy applications have been operating for decades and have been adapted/modified to fit the business. Whilst changes and enhancements will have been undertaken it is unlikely that these software changes will have kept pace with the market and additionally, the modifications/customisations that have been undertaken could have created new problems.

Legacy application enhancements often result in either silo's, or increased complexity, and in both cases the need for extra maintenance effort. To complicate matters further it is not unusual that documentation about the system has not been kept up to date.

Mostly the code used will be of a past generation which means that finding and retaining software developers can be difficult. If they can be found, the relative scarcity of these developers will probably mean paying more to gain access to their services.

It is common for legacy applications to lack the programming interfaces now seen as essential to facilitate the interchange of data between both internal and external systems. Where integrations have been coded these are not typically easy to maintain given the fact that API management was probably only in its infancy at the time the legacy system was implemented.

Business intelligence is now considered to be a fundamental requirement of a modern IT system, however, the architecture of most legacy systems is such that data extraction, and syncing, is often difficult to achieve.

In recent years regulations and standards have undergone significant change and the result is that many legacy applications now face compliance challenges.



Often legacy applications are running on legacy hardware. Legacy hardware platforms also give rise to a number of challenges, not the least of which is the cost of maintenance. It is a fact that all hardware has a limited life. The mean time between failure may seem impressive, but inevitably hardware will fail, if the system is mission critical, it should be kept under maintenance, and the cost of that maintenance is likely to rise year on year.

Overall it is probably technology debt that represents the biggest challenge with legacy software. Technology debt is the thousands of hours and money spent over the lifetime of the system. Essentially it is the investment made by an organisation in programming languages, databases, architectures and in software developers. The value of this investment in the context of the modern business environment is declining at an alarming rate.

The big question: Replacement or Modernisation

Modern highly functional systems have obvious appeal, but the potentially negative impacts associated with change and disruption, along with the financial costs, mean this is a decision that should not be rushed.

Reaching the right decision requires careful analysis: What are the problems associated with the legacy system? To what extent are these problems impacting the business? What are the projected benefits of the new system? How well will the new system align with the strategy of the organisation? How risky is the change? What level of disruption is likely?

Usually, there is no obvious answer to the question: replace or modernise? Rather it is more likely that detailed analysis and a business case will be required to get to the right answer. Additionally, because the business environment, and the business systems in use, are subject to ongoing change; the question should be asked on a regular basis.

The reasons for choosing modernisation

Modernisation is a broad term that can involve a variety of actions in support of digital transformation. It is more than a single event. It is the process of rethinking how to approach the creation and maintenance of applications, including deciding what can be done to leverage value from existing legacy applications.

Modernisation aims to improve customer experience, and quality access to the data essential to digital enablement, and growth. Usually, a key technical enabler is to add some form of service, or API, to the legacy system. The wider objective is to move to a modern technology set where agility is achieved, and costs are reduced. This new capability is best approached in stages by steadily reducing the effort applied to the legacy system over time.

Achieving the objective of using modern tools and methodologies should, of course, improve productivity and reduce costs whilst positioning applications for the next decade.

In recent years modernisation tools and methodologies have undergone significant transformation, improving functionality, usability, and productivity. Today modernisation can be achieved using reusable, and portable, service-oriented architectures that will allow componentisation of applications over time.

The primary reason organisations choose modernisation over replacement is that it is a lower risk strategy. To remove an old system particularly one that has been customised over decades of use can very quickly become complex and difficult. Additionally there is the critical issue of whether the new system will be able to replicate all of the functionality that has been removed.

The benefits expected from a modernisation include:

- **Improved agility – speed to market:** The increasingly competitive nature of today's environment means that organisations have to be able to respond quickly to opportunities and competitive threats. Legacy systems typically do not provide the required agility. Modernisation enables organisations to be more responsive using modern software tools and integrations.
- **Cost savings:** Legacy systems can be expensive given the human resources required to maintain and manage them. Often the cost of maintaining legacy systems will be the greatest single cost in an IT budget. Additionally, legacy systems are likely to incur higher costs related to operational stoppages as well as general running costs. Having said that, many of these systems have been wound down, and as such the cost to run and support is not unreasonable – unfortunately the required agility is no longer available.



- **Improved integration:** With the world becoming increasingly digital, integration is now an issue of competitive survival, however, legacy systems were typically developed with the objective of keeping core business systems isolated, and in-house. Modernisation enables integration.
- **Leverage of new technology:** Modernisation enables the use of new tools and services to create wider choices and boost innovation.
- **Making it easier to find staff:** Many legacy systems are dependent on code developed in old programming languages. Finding and retaining staff with these skills is becoming increasingly difficult.
- **Facilitates a move to a new platform and/ or architecture:** Legacy application software often resides on legacy hardware, which can be unreliable and expensive to maintain. Modernisation facilitates moving to a more current architectures and lower cost platforms.
- **Risk mitigation:** If the legacy application software including the operating system and associated hardware has reached the point of no longer being supported by the original manufacturer, the organisation is dangerously exposed. Modernisation can decrease this risk substantially.

The extent to which these benefits apply to a specific organisation will be dependent upon the unique circumstances of that organisation. Stated below are some comments from individual customers which highlights this point.

“We had already wrapped our software system. Continuing that approach would not solve the aging developer issue. We wanted new technology to take us into the future to support current and future technological advances”

“We need a system capable of taking us into the digital age at a much faster and cheaper pace. And, we wanted to provide that digital experience for our customers”

“The core of our system works great and serves the current and future needs of the business. However, the look and feel along with the navigation need some work. We need a more modern look and feel. These changes should make the system more intuitive and easy to use, reducing the on-boarding time, as well as attracting and retaining talent”

“In the past we felt it important to ensure that we had all the business offerings running through the same software. The realisation came that other companies put a front-end on their systems to service their contracts, thereby not requiring conversion of incompatible contracts to a new system and incurring the cost to make the contracts work within the new system”

Modernisation approaches whilst variable can be grouped into three strategy types, and in some cases, an organisation might use all three strategies.

- **Outsource:** This involves transferring responsibility and risk. Depending upon the skills and capabilities of the outsourcer, legacy applications will undergo an element of transformation ranging from simply re-hosting, optimising and supporting - through to application migration. Outsourcing is a popular option for legacy applications because it transfers risk and removes the need for technical management of the solution (hardware and software). At the same time, this strategy has some limitations given that the business logic and systems architecture is likely to remain largely unchanged.
- **Retool:** Retooling involves modifying the underlying application software, including languages and databases, as well as changing the technical architecture or presentation layer of the application. Dependent upon the age and state of the technology stack the modernisation effort will be sized accordingly. When the application is “up to date” more functionality can be added on top. That functionality could be obtained from custom code and/or third-party integrations including cloud integrations.
- **Retire:** Retirement involves a process concluding with the elimination of the legacy application as a result of a conversion of policies and/or consolidation of software applications. A retirement strategy is commonly used to reduce the number of applications and/or software environments.

Creating the right roadmap

A modernisation initiative, although technology enabled, is very much a business change project, and must be treated as such. Because core mission-critical business systems are being altered, there are a number of important considerations at each stage of the process.

Before getting started it is useful to reflect on the broad challenges: People dislike change and even though a modernisation project will be far less dramatic than a system replacement project, change will happen and therefore people will need to be informed, motivated, coached, and encouraged.

Often organisations will have more than one legacy application, but it unlikely to be workable to undertake simultaneous modernisation projects. Prioritising and sequencing will be required.

Over a period of decades, the way in which the technology stack is used by applications has changed significantly and this is likely to mean greater complexity. Unlike modern software development, software developers of the past often coded in a way that involved the hardware and operating system, dealing with this difference will almost certainly make modernisation difficult.



Also likely to be technically challenging is the code itself particularly if not well documented. Possibly there will be hundreds of thousands or even millions of lines of code that have been modified over years and in many cases, the developers who wrote it are no longer available, and the documentation either out of date, or incomplete.

Whilst the specific circumstances will determine the detail of the modernisation roadmap, there are some common steps that should be followed:

Firstly, identify all of the organisations IT systems and applications. Consider their purpose, their age and status, the resources they require and their integrations. These systems should be mapped against their associated business processes, and the strategy of the organisation. From this analysis and mapping, an appropriately tailored roadmap will start to emerge. Then by considering resources and timelines, the roadmap will be further refined.

In parallel with the work above the targeted benefits and identified risks should be considered in detail. Benefits sought and risks managed will result in yet further refinements to the roadmap. The roadmap will be a central component of the overall business case which should be reviewed in detail by all of the key stakeholders, not just the IT team. It is almost always better to start small and ramp up based on success. Something critical but often overlooked is a fall-back plan. Be clear about the course of action in the event that it is discovered that the desired outcomes cannot be obtained for any reason.

If you intend to engage the services of a technology services provider, ensure that they are provided with a comprehensive briefing about the environment and what is required. They should be engaged only after careful consideration of their knowledge and experience.

To summarise the key points to consider in developing a modernisation roadmap:

- Asses the business and technology value before finalising the approach to modernisation
- Ensure that the modernisation initiative aligns with business strategy and objectives
- Develop the business case early and socialise it often with all stakeholders
- Choose a services provider based on knowledge and experience
- Start small and increase scope and velocity with initial success
- Rigorously pursue benefits to achieve the expected results
- Have a fall back plan

Modernisation best practice

As highlighted in this article what amounts to “best” will vary across organisations. However, that said, there are broad lessons and insights gained from others experience that are beneficial in determining the best practice for any organisation.

Let’s consider why modernisation initiatives fail: The following reasons are often cited:

- Lack of management commitment to the initiative
- The organisation is too tightly wedded to the legacy environment and lacks the motivation to change
- Legacy systems are not under control: not well understood, managed, or documented
- Requirements analysis is not sufficiently detailed or validated
- The modernisation roadmap becomes flawed because of a lack of careful analysis
- The software architecture is not given sufficient priority
- The organisation selects external parties not sufficiently skilled or experienced

To avoid these pitfalls here is our checklist for best practice:

- 1. Comprehensively assess the current state of legacy systems,** focusing on application software. The assessment needs to be detailed and identify all serious issues impacting the business plan and objectives today as well as into the future.
- 2. Identify the optimal modernisation strategy(s) for your organisation.** Depending upon the scope and timing this may involve more than one strategy. Of paramount importance will be early success delivering value to the business.
- 3. Develop a well-constructed business case** and ensure strong and ongoing executive ownership. Include a set of financial measurements and baselines, measure the metrics, and attach a value to the achievement of business outcomes based on a direct relation to the modernisation project objectives. Some outcomes may be unplanned, but by measuring and monitoring, you are able to re-plan and manage them.

- 4. Focus on establishing a new architecture.** Ideally, the architecture will simplify the environment. A microservices approach will assist with scalability.
- 5. Implement a technology stack suited to the long-term objectives of the organisation.** The technology stack will directly determine reliability and performance as well as have a major influence on the cost of operations and support.
- 6. Ensure the ongoing priority of the change initiative.** Modernisation is rarely achieved quickly, it requires a sustained commitment from all involved if the identified benefits are to be realised. It's critical that the modernisation team not only focus on the technology but also recognise the impact that the changes will have on the people and processes using these applications.



If your organisation is challenged because of legacy software, we can help you create a better future using our consulting, project, operational, and support services. We specialise in legacy system modernisation including analysis, design, build, implementation, and support.

If you would like to engage SASIT to discuss the possibilities for your organisation please contact us:

Tony Wilson: tony.wilson@sasit.co.nz

Ian Hight: ian.hight@sasit.co.nz