

Best Practices for Selecting a Modernization Trajectory

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NTT DATA Services
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Modernization trajectories

As the risks of maintaining legacy systems in the digital age continue to grow, the market for modernization solutions has evolved to address major technical and business challenges. Enterprises now have a staggering range of options available from both system integrators and niche vendors. This paper aims to help decision makers find the right approach to their legacy challenges.

One issue in the modernization market today is a lack of consistency in terms and meanings. Words like “transformation,” “conversion” and “migration” have been used to mean so many different things that comparing solutions becomes nearly impossible. In our Application Modernization practice at NTT DATA Services, we follow a few different modernization trajectories (or approaches) to achieve an enterprise's desired modernization outcome. They include:

- **Re-hosting:** Taking the source code and data for an application on one platform (such as an IBM mainframe) and adapting or porting it to deploy on a different platform (such as Linux on x86). Re-hosting typically requires software on the target platform to provide key capabilities equivalent to those on the mainframe like transaction and batch operational environments.
- **Mid-tier migration:** A special case of re-hosting, this typically involves moving proprietary UNIX applications to Linux.
- **Rewrite:** Building a replacement application for a new platform and/or architecture. At our practice, rewrite usually means that subject matter experts define the new application requirements.
- **Re-architecture:** A specialized form of rewrite that uses legacy code and data analysis to derive detailed requirements directly from legacy assets, reducing the dependency on subject matter experts. This also helps reduce risk based on gaps in subject matter knowledge, such as existing nuance in a legacy system.

Want a more interactive experience?

We can help you navigate the legacy maze in just a few minutes. Find the right path for modernizing your applications to enable truly future-ready IT.

- **Bulk automated code conversion:** Using translation software to convert an entire application to another language. Much of the effort in bulk conversion lies in tuning the converter to handle anomalies in the source application to achieve a complete, one-click conversion.
- **Tactical automated code conversion:** Utilizing translation software to convert parts of a legacy application into a different language — and usually into a specific architectural framework — to accelerate re-architecture, or facilitate a re-host or mid-tier migration.
- **Package replacement:** Replacing all or part of a legacy application with commercial off-the-shelf (COTS) software packages. This is often combined with re-architecture to handle legacy functions or behaviors not available in this option.

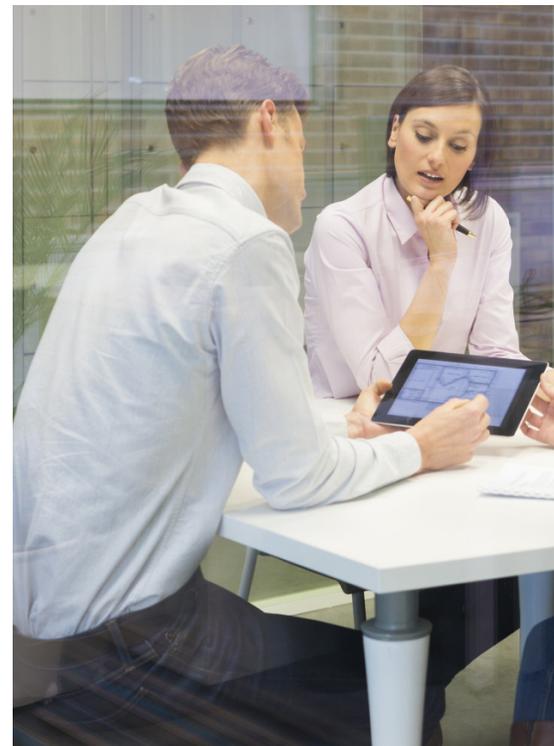
All of these trajectories have their own advantages, disadvantages and risks. Any of these could be the right choice for your enterprise, but you need to take a closer look at the attributes of your legacy system and compare them to your modernization objectives to decide. Making the wrong choice can lead to a loss in revenue, reduced productivity or even the need to write off a multimillion-dollar project. But choosing the right option can jump-start business growth and save you millions in infrastructure costs.

Defining current state

Determining the best approach to modernizing a legacy application is the critical first step in any modernization program. In many cases, multiple trajectories may be valid, and it may make sense to utilize several different approaches. For instance, you can re-host applications from a mainframe to Linux for immediate cost savings, and then use the savings to fund re-architecture for long-term results. In any case, the starting point should always be to define the technical attributes and business context of the legacy application.

Defining the current state typically requires engaging with multiple stakeholders or teams. For example, technical attributes are usually only known by operational or maintenance teams, and may require vendor technical analysis to uncover. Business context, on the other hand, comes from the application owner(s) and other stakeholders, but may require internal or external consulting to discover, verify and analyze.

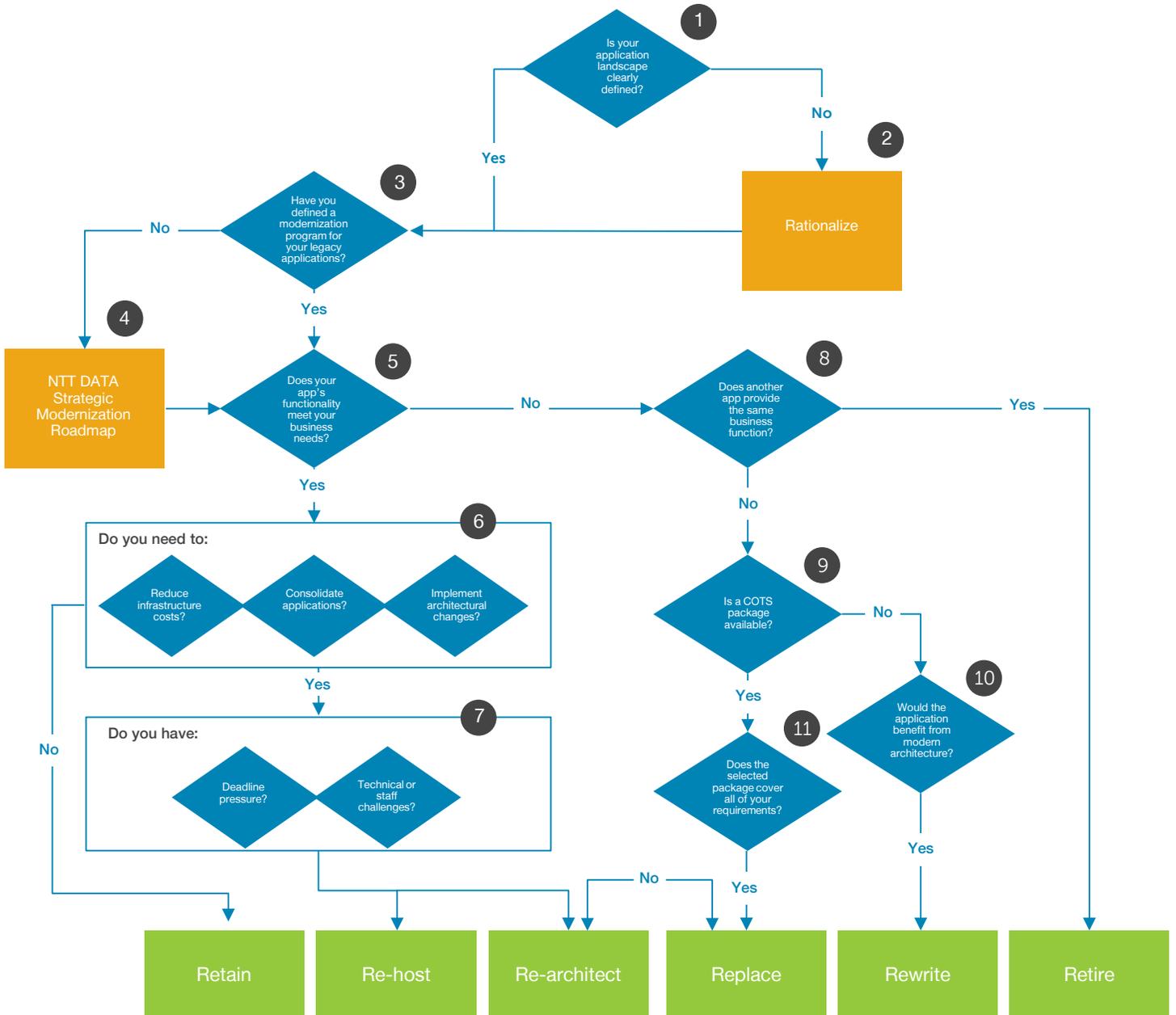
Too often, modernization initiatives are driven by technical teams with limited engagement from the business application owners. This limits the modernization results by focusing on infrastructure-based trajectories like re-hosting and automated code conversion when the business might have benefited from re-architecture or rewriting. By combining business and technical perspectives, you can hone in on the challenges faced by your end users and stakeholders, and develop a modernization solution that will deliver a return on investment (ROI) while also addressing any business demands.



Using an application modernization decision tree

The flowchart below details a high-level decision tree for selecting an application modernization trajectory. It's easy to use. Just consider an application in need of modernization and start answering the questions at, "Is your application landscape clearly defined?"

There may not always be one right answer. If following the decision tree results in multiple logical outcomes, consider the relative business cases, for each and any critical aspects not included in the tree, like your business priorities, the planned lifecycle of applications and the availability of subject matter experts.



The following table expands on the decision tree to show how to determine the modernization path that's right for you with NTT DATA.

	Decision point
1	Is your application landscape clearly defined? Determine if you have a comprehensive view of your application portfolio as well as the platform, costs, users, business objectives, lifecycle, integration points, risks and challenges.
2	Rationalize. If you're not sure what you have, NTT DATA offers an application rationalization solution to help you start your journey to modernization. We can help you capture and organize high-level technical and business attributes of your applications to drive potential application portfolio management, optimization and modernization programs.
3	Have you defined a modernization program for your legacy applications? Modernizing enterprise business applications is more than a technology project. Choosing the right approach requires strategic planning and technical analysis. Our Strategic Modernization Roadmap service takes an end-to-end look at your application landscape and business goals to create an actionable modernization plan.
4	NTT DATA Strategic Modernization Roadmap. This service delivers a complete plan for modernization based on strategic and business analysis, and a holistic analysis of your legacy systems. We find the hidden traps and plot a course around them. Not sure which modernization technique to use? We'll help you decide. Have a plan but you're concerned about the risks? Take advantage of our proven experience to mitigate them. Complex scenario? We'll figure out how to make the best use of your enterprise resource planning software, or find the functional overlaps to plan a consolidation. Don't worry about all of that complex code. We've got you covered.
5	Does the functionality of your legacy applications fit your business needs? Legacy apps are built to fit the business. Functional fit suffers when changing business needs make the legacy rules and logic obsolete. When functional fit is still strong but maintenance costs and timelines skyrocket, it's time to re-architect.
6	Consider the legacy problem you're trying to solve. Do you need to: A. Reduce infrastructure costs? Such as high mainframe or UNIX application costs. B. Consolidate applications? For example, moving applications to the cloud or a virtual platform. C. Implement architectural changes? For instance, is your business blocked from real-time processing because of batch-oriented applications? If you answered "Yes" to A or B, re-hosting or re-architecting might best meet your needs. Answering "Yes" to C suggests re-architecture. If you answered "No" to all three, modernization might not be a high priority for your organization at the moment.
7	Consider these constraints. Do you have: A. Deadline pressure? Re-host initiatives can show positive ROI in 12–18 months, whereas re-architecture break-even points are typically 3–4 years. If you need a quick return on your investment, re-hosting is the best choice. B. Staffing challenges? If your staff has a high turnover rate, re-architecture might be the best choice. Re-hosting keeps the legacy application code intact, so your current team can easily maintain it.
8	Does another application provide the same business function? Check your portfolio to ensure there are no redundancies (other applications in your portfolio providing similar business functionality as your existing legacy applications).
9	Is a COTS package available?
10	Would the application benefit from modern architecture? This is not an easy question, and may require working with business stakeholders. If you want to implement digital transformation, self-service, mobile and social integration, new markets or changing business models, then moving your legacy application logic to a cloud-enabled, microservices, HTML5, container-packaged application that's supported by cutting-edge DevOps may be the best (or only) way forward.
11	Does the selected package cover all of your requirements?



Additional considerations

To make a smart and cost-effective decision, you need to consider the challenges of your legacy application(s) and choose an available and practical modernization approach that directly addresses them. Each decision point requires careful consideration of one or more business or technical attributes, as well as consideration of the market availability and technical fit of modernization solutions. Be sure to also consider the following:

Determine the feasibility of migrating all at once. Once the scope of modernization is defined, it can be used to determine whether you can perform the modernization in a single project, weighing the risks. For smaller applications such as COBOL applications with less than five million lines of code, migrating the application all at once is likely the most efficient. For applications with larger code bases or more diverse functionality such as those addressing requirements of several agencies or departments, you might be better off dividing the modernization program into multiple projects as change management processes need to be considered.

Define platform cost savings. Re-hosting offers an opportunity to reduce the cost of hosting and managing mainframe or UNIX applications by porting them to commodity Linux- or Windows-based platforms. Can you realize cost savings by retiring your legacy applications? In some cases, removing applications from a shared mainframe does not yield any cost savings as the fixed-cost asset will remain in use for other applications. This can help you establish a business case for re-hosting and re-architecture options. When retiring your legacy footprint, you can also use these savings to fund additional modernization efforts.

Verify the viability of re-hosting. The market for re-hosting capabilities is constantly expanding to handle more complex and diverse legacy applications. For mainframe-to-Intel re-hosting, there is a core set of legacy technologies for

which open systems equivalents are available. Most solutions, including our mainframe re-hosting suite, focus on the IBM z/OS stack providing turnkey re-hosting for COBOL, JCL, CICS, VSAM, DB2 and IMS. Surrounding technologies like Assembler, PL/1 and IDMS are handled using tactical code conversion to COBOL and by automating changes to data access code. Niche solutions in the market address Unisys mainframe technologies. Leading re-hosting practices are experienced at integrating solutions for complex application modernization and delivering the required testing to mitigate risk. If you've found a re-hosting option that will work for you and save money, it's likely a quick win with little to no impact on your business users.

Determine if bulk code conversion is right for you. Many relatively young applications using Microsoft languages (such as Visual Basic, VB6, C++ and early C#), PowerBuilder, Delphi and Java have become legacy due to platform end of life and the decline of client-server architecture. Because the constructs can be mapped to modern frameworks in .NET or Java, bulk code conversion offers good, maintainable and modern code. For older applications, in procedural languages like COBOL or RPG, code conversion to object-oriented languages like Java or C#.NET yields results that may prove very difficult to modify or maintain. In these conversions, the procedural paradigm is essentially fossilized in modern syntax. The resulting code lacks the performance and maintainability benefits of Java or .NET, because it fails to follow best architectural practices. For a very static mainframe, particularly one that only has 5–10 years remaining in its lifecycle, the lower cost of infrastructure bulk code conversion is worth considering.

Strategic Modernization Roadmap

While the decision tree provides a great starting point to develop a plan for modernizing your applications, you need a comprehensive, structured and consultative approach to make a smart decision. Our Strategic Modernization Roadmap services can help you determine the best approach (or confirm your intended approach). For a portfolio of applications requiring a mix of approaches or complex projects like application consolidation, our modernization experts can assess the situation and collaborate with your stakeholders to develop an end-to-end modernization plan. Considering the input of business leaders, stakeholders and executives helps mitigate risks and enables a future-ready application environment.

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