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The evolution of APR with AWS: Modernizing for a cloud-native future–Series II

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Application portfolio rationalization (APR) and modernization are intrinsically connected, and Cognizant's tailored APR approach aligns with client objectives and portfolio requirements.

Prior to initiating modernization and cloud migration, it is crucial for businesses to evaluate their application portfolios to identify which applications require modernization or cloud migration.

This evaluation process includes:

- Identifying key business applications, assessing their complexity and determining their cloud readiness. Applications not suited for the cloud may need further modernization before migration.
- Updating or replacing outdated legacy applications and strategically prioritizing these modernization efforts.
- Retiring or replacing obsolete or redundant applications to minimize cloud migration costs and maximize cloud investment benefits.

Cognizant leverages extensive experience in conducting APR assessments across diverse client landscapes, catering to unique needs and characteristics ranging from enterprise-wide portfolios to specific business lines, encompassing 100 to over 1,500 applications.

How customers leverage application portfolio rationalization (APR)

Based on our experience and several assessments performed across industries, customers leverage APR for different purposes as shown in Figure 1.

Prioritize apps for cloud migration (rehost) and modernization program	Use modernization roadmap and business case as input for budgeting process	Identify potential replacement by a SaaS/ PaaS solution
Align portfolio with enterprise architecture strategy	Identify reengineer apps for API-enabled cloud-native microservices ecosystem	Identify quick wins and self-fund some of the modernization/ transformation initiatives
Optimize IT portfolio providing best-in-class business capability	Optimize tools licensing and maintenance costs	Identify tech upgrade needs and leverage cloud-based services

Figure 1

Application portfolio rationalization (APR) enables businesses to evaluate their application suite, pinpointing opportunities for cost optimization, performance enhancement and strategic alignment with organizational objectives. The choice of the APR assessment method hinges on specific organizational needs and aspirations as shown in Figure 2.

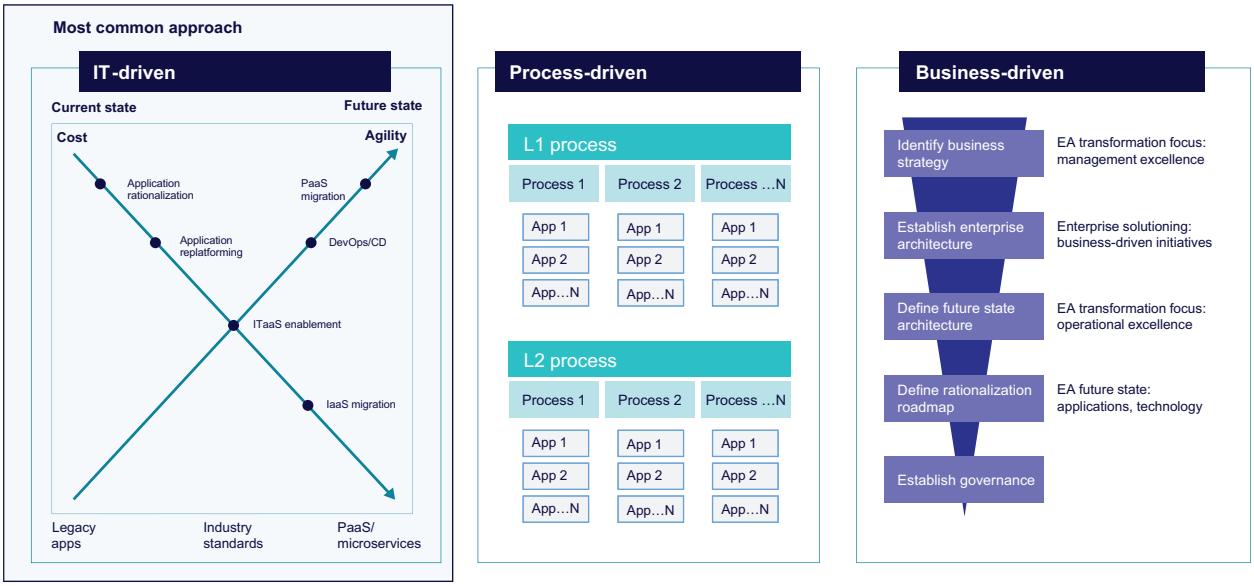


Figure 2

IT-driven approach:

Predominantly employed for diverse legacy applications requiring modernization, this method prioritizes cost-effective maintenance and strategic business alignment. With insights into business relevance and technological value, it recommends cost optimization strategies.

Process-driven approach:

Suited for post-merger scenarios, this approach focuses on aligning IT support with business capabilities and consolidating redundant applications. Recommendations are made based on technological currency, functionality and business strategy, often leading to rehosting, refactoring, replatforming or replacement.

Business-driven approach:

Ideal for joint ventures or spin-offs, this strategy concentrates on enterprise architecture transformation, crafting a technology roadmap that marries technology with business goals to achieve desired outcomes and establish a future state architecture and rationalization roadmap.

> “AWS-driven APR for transforming application landscapes enables a business to simplify, modernize, optimize and secure its digital assets to accelerate transformation through application portfolio rationalization.”

Addressing APR through an AWS MAP assessment in alignment with Cognizant's STEP framework

The AWS Migration Acceleration Program (MAP) is a comprehensive, proven cloud migration program based on AWS's experience migrating thousands of enterprise customers to the cloud. MAP uses a proven three-phased framework (assess, mobilize, migrate and modernize) to help businesses achieve migration goals.

During the mobilize phase, the discovery and planning step covers the detailed application portfolio rationalization, as highlighted in Figure 3.

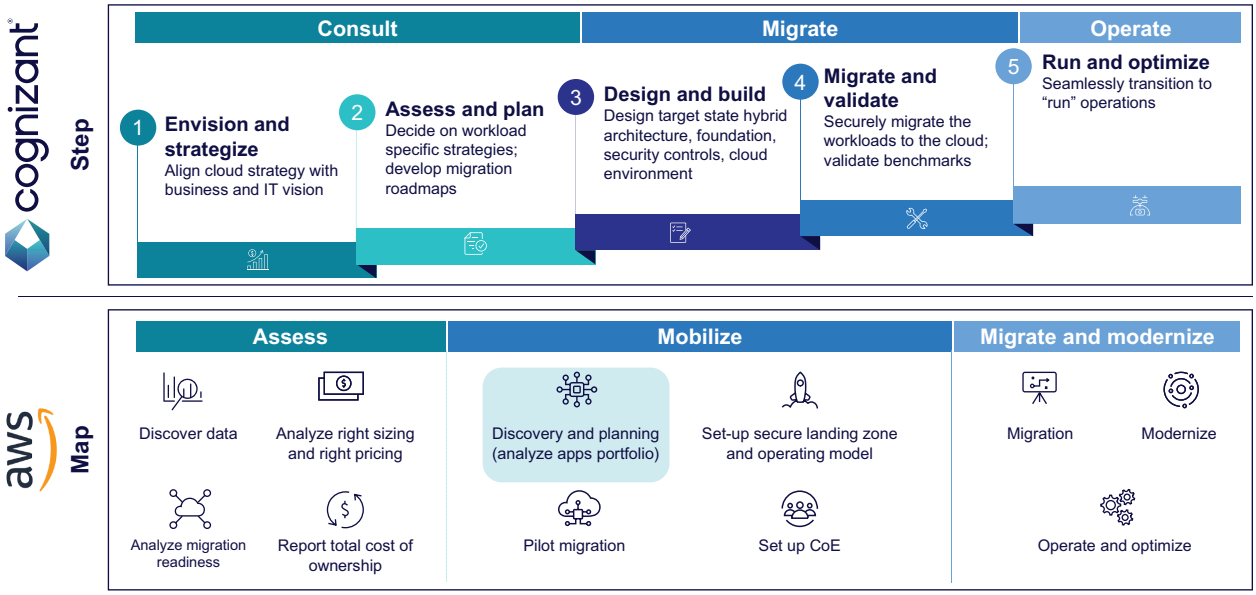


Figure 3

Cognizant's proven application portfolio rationalization framework

Cognizant has many years of experience in performing application portfolio rationalization and deriving proposed benefits through a proven framework, as depicted in Figure 8. The framework covers data collection, application value analysis (disposition analysis and correlation of insights, and code analysis using well-established techniques and tools), opportunity mapping and recommendations with an implementation roadmap and derived benefits in Figure 4.

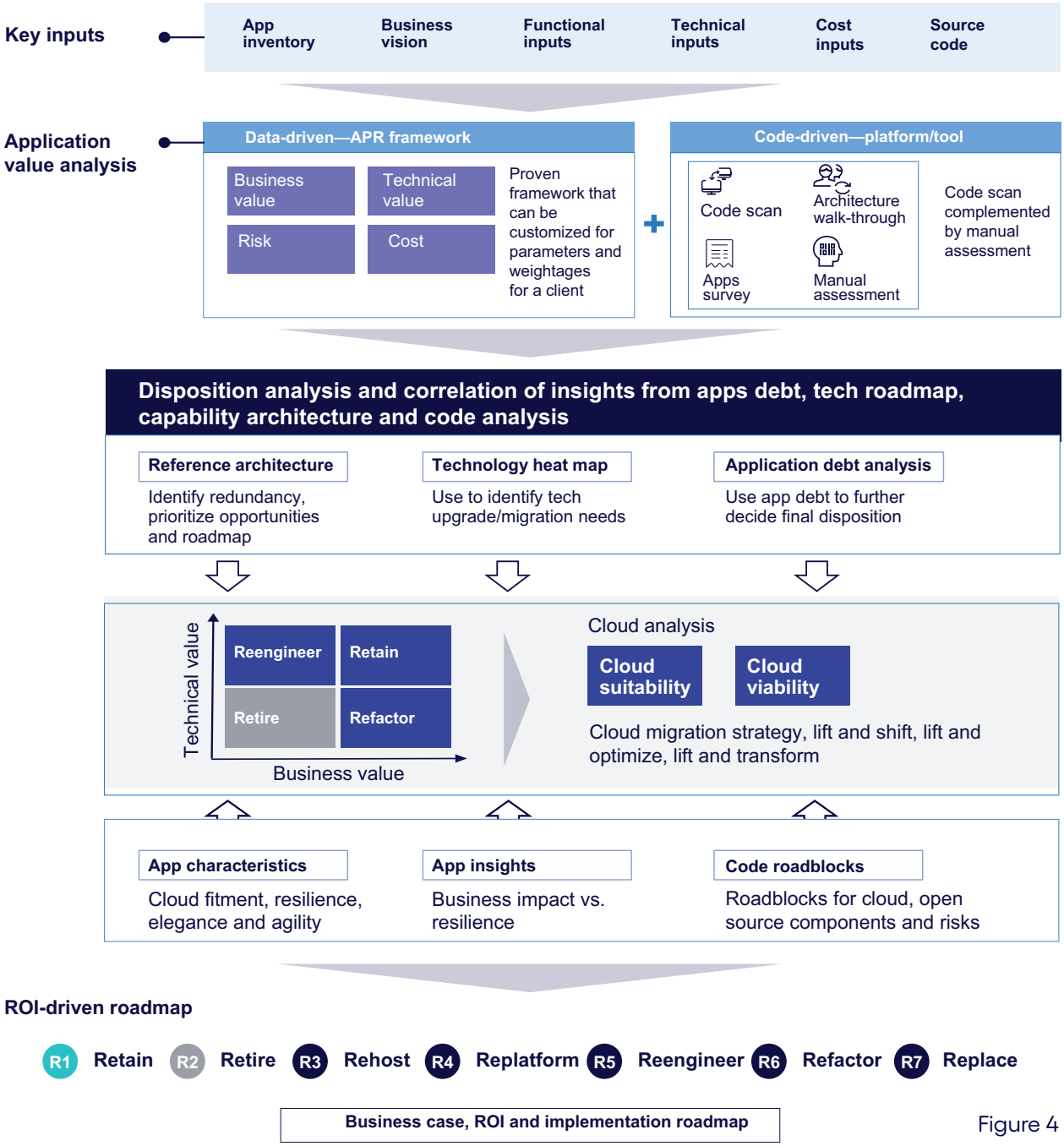


Figure 4

Data collection:

The key inputs for data collection include application inventory and business vision; functional, technical and cost inputs; and operational characteristics and source code to use in performing the application value analysis. Application value analysis starts with issuing a questionnaire that assembles data elements across business value (BV), technology value (TV), and risk and cost dimensions. The questionnaire can be customized to capture the essence of the domain to ensure the most accurate and useful information is secured for analysis. The primary information is obtained using the questionnaire in interviews with application service managers and business system owners of the process.

Application value analysis:

Model factors in the key parameters that influence the business value and technical health of an application are illustrated in Figure 5.

- Data-driven analysis: Each of the parameters identified under the business and technical dimension is assigned a weight based on its relative importance to the other parameters within a dimension, as individual applications are assessed on each parameter. The business value and technical health index identify each application's lifecycle positioning, assess the opportunity for improvement, calculate the cost savings and determine the actions needed to optimize the application's business effectiveness and associated risk. The qualitative data for parameters is collected using surveys and interviews and quantitative data is collected from existing data sources where available.

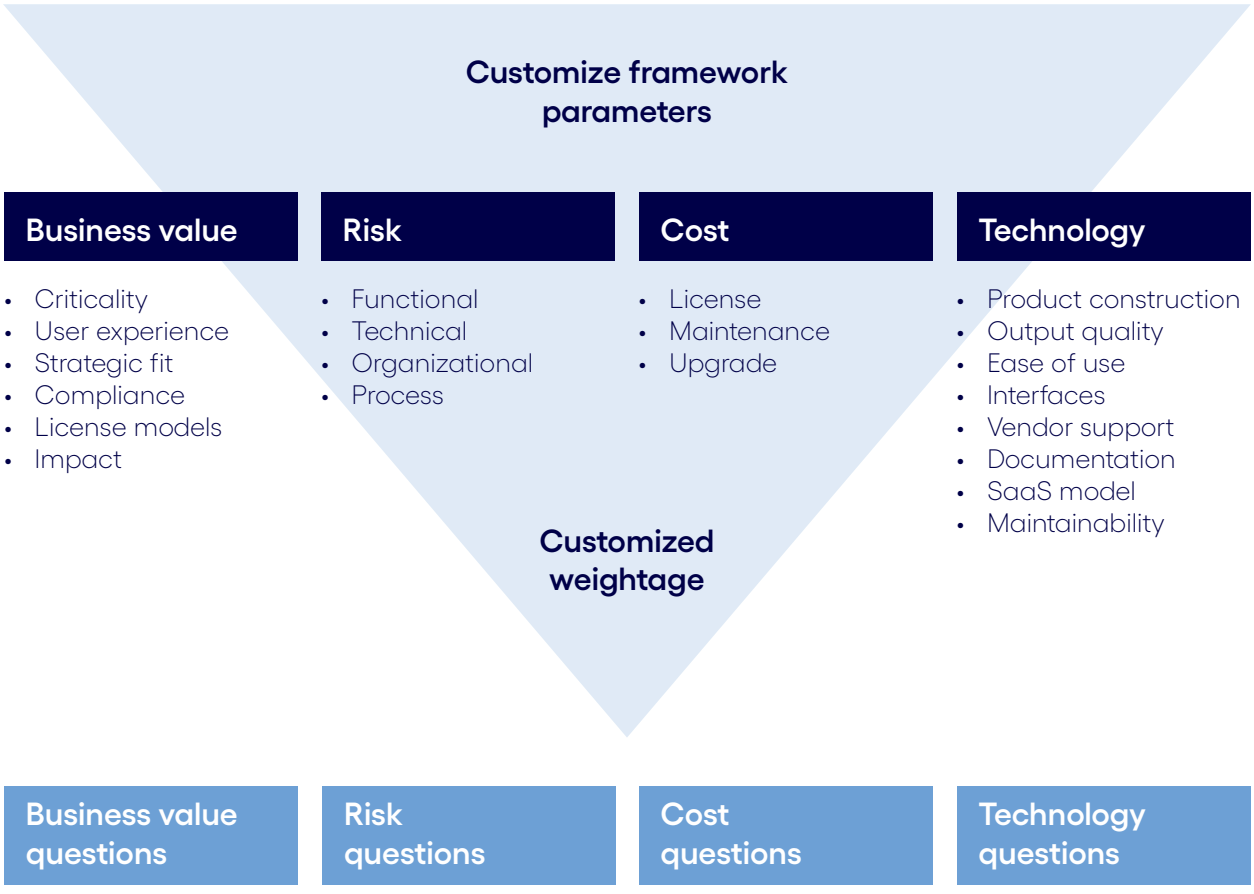


Figure 5

Code-driven analysis:

Code-driven analysis helps to extract application characteristics (cloud fitment, resilience, elegance and agility), application insights (business impact versus resilience), and code roadblocks (roadblocks for cloud, open-source components and risks), etc., as shown in Table 1.

C-CAP (Cognizant Cloud Acceleration Platform) leverages Cognizant's proprietary platform to perform code scanning and gather insights. The platform provides automated portfolio assessment to analyze cloud readiness for Java, .NET and PHP applications as shown in Figure 6.

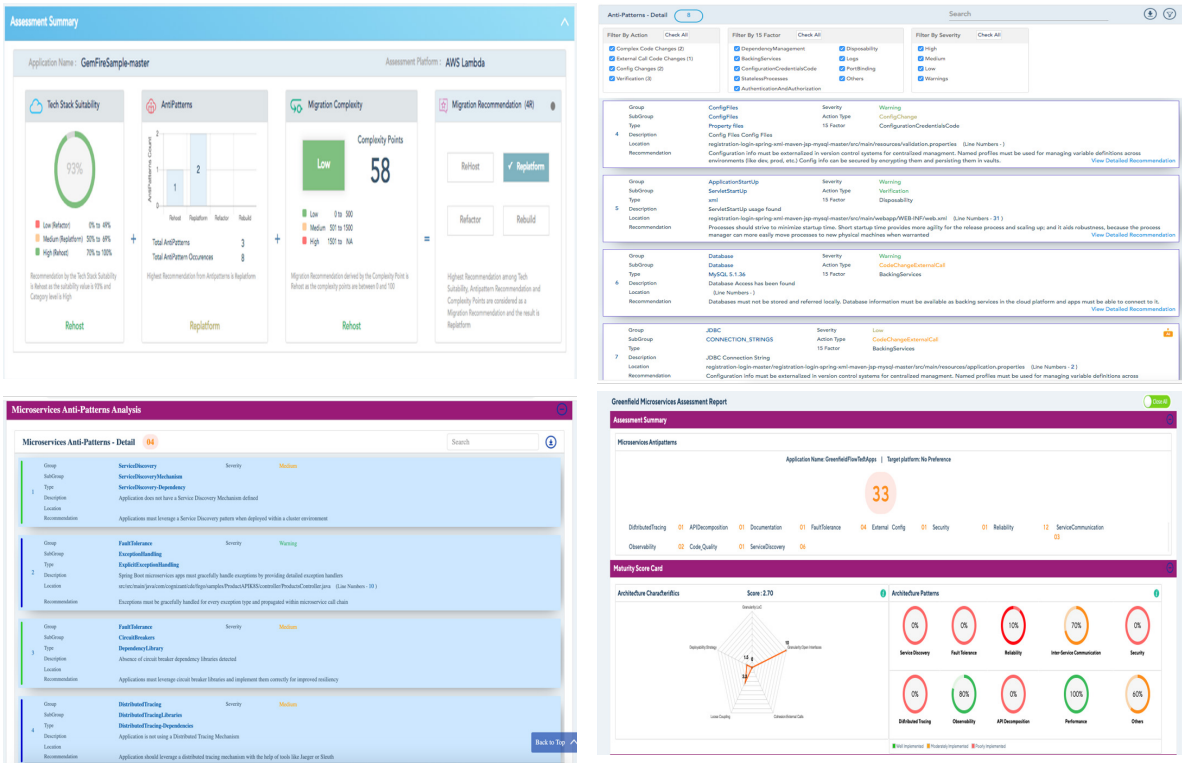


Figure 6

CAST Highlight (third-party) is a SaaS-based platform that helps scan source code and gather insights on software health, cloud readiness and more across technologies, as shown in Figure 7.

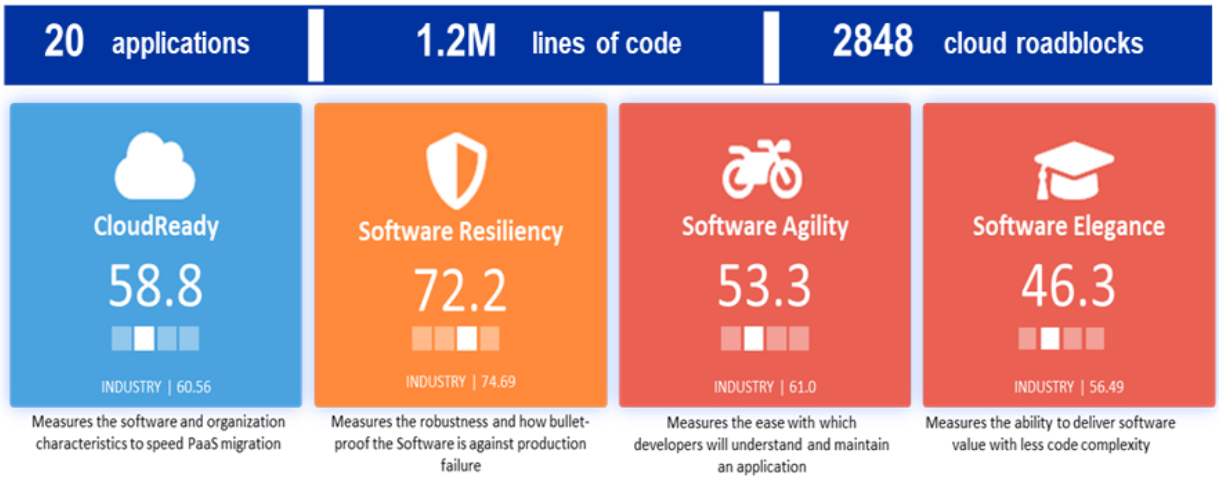


Figure 7

Disposition analysis and correlation of insights

Cognizant uses key analysis techniques to augment application portfolio analysis and derive inferences to strategize application modernization and cloud migration, as shown in Table 2.

Below are five technology analysis methods used to identify tech upgrade/migration needs.

Cognizant's tech currency clock/radar technique effectively maps enterprise technology currency, using radar to visually segment the technology lifecycle into four parts, as depicted in Figure 8. This technique highlights applications and technologies in the "expired/perilous" and "act-now/rescue" segments, providing a clear indication of the urgency for action. It aids stakeholders in making informed decisions on consolidating primary programming languages, tech stack versions, operating systems, databases and other frameworks and libraries. This consolidation is crucial for plotting a roadmap for technological upgrades, replatforming, or rearchitecting in alignment with cloud migration and application modernization strategies.

For more information, please see the paper on Cognizant's tech currency clock/radar technique. [link TBD]

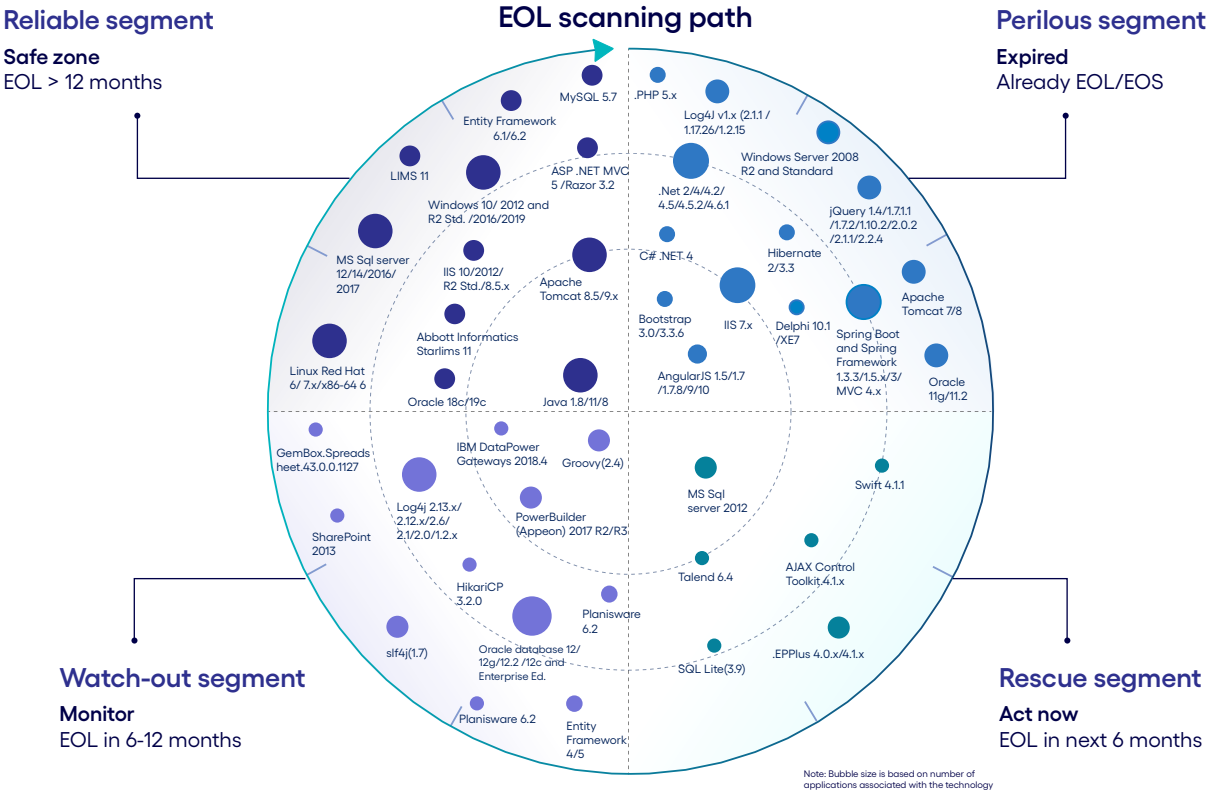


Figure 8

Cognizant's technology heatmap technique effectively delineates software categories such as programming languages, databases, operating systems, middleware servers, frameworks, libraries and third-party products. It maps the lifecycle of these components as primary or secondary, identifying key areas for prioritization. This facilitates strategic planning for the upgrade of software that is critical to the development of custom-built applications, databases, operating systems and related software, as illustrated in Figure 9.

Technology lifecycle	Continue to maintain	Declining	Attempt to eliminate
App. development (language/ framework)	**84** • Java 1.8/11/8 • LIMS 11 • ASP .NET MVC 5/Razor 3.2 • Entity framework 6.1/6.2 • Log4j (2.17) • Maven 3.8 • Node.js 16.9 • Spring Boot (2.x) • Telerik.UI.for.AspNet. Mvc5.2018.1.131 • Unity.Mvc5.1.2.3 • AngularJS 13	**16** • Oracle database 12/ 12g/12.2/12c and enterprise Ed. • Log4j 2.13.x/2.12.x/2.6/2.1 /2.0/1.2.x • Groovy (2.4) • SLF4j (1.7) • PowerBuilder (appeon) 2017 R2/R3 • Entity Framework 4/5 • Planisware 6.2 • AJAX Control Toolkit.4.1.x • Swift 4.1.1 • ClosedXML.0.76.0.0 • DocumentFormat.OpenXml 2.5 • Inspinia framework-2.5	**121** • .NET 2/4/4.2/4.5/4.5.2/4.6.1 • Spring and Spring Boot (Framework) 1.3.3/1.5.x/3/MVC 4.x • jQuery 1.4/1.7.1.1/1.7.2/1.10.2/2.0.2 /2.1.1/2.2.4 • C# .NET 4 • Log4J v1.x (2.1.1/1.17.26/1.2.15 • AngularJS 1.5/1.7/1.7.8/9/10 • PHP 5.x • Bootstrap 3.0/3.3.6 • Delphi 10.1/XE7 • Hibernate 2/3.3 • ASP .NET MVC 4 • HTML5 • Oracle Apex(4)
Database	**76** • MS Sql server 12/14/2016/2017 • Oracle 18c/19c • MySQL 5.7 • PostgreSQL 11.5 • SQL Anywhere 17	**46** • MS Sql server 2012 • SQL Lite(3.9)	**13** • Oracle 11g/11.2 • MS Sql server 2008 • MySQL 5.6
Operating system and servers	**52** • Windows 10/2012 & R2 Std./2016/2019 • Linux Red Hat 6/7.x/x86-64 6 • Apache Tomcat 8.5/9.x • IIS 10/2012/R2 Std./8.5.x • Apache server 2.4 • Android 11 • iOS (15) • SharePoint 2019	**13** • IBM DataPower Gateways 2018.4 • SharePoint 2013 • Tableau (2020.2.5)	**23** • IIS 7.x • Windows Server 2008 R2 & Standard • Apache Tomcat 7/8 • Jasper report(5.6.0)
3rd party products (COTS)/ vendor apps	**32** • Abbott Informatics Starlims 11 • Molecular Devices metaXpress 6.7 • Elysia-Raytest GINA 10.4 • GDM ARM 2021 • IDBS Activity Base 9.7 • KNIME KNIME 4.14.1 • Thermofisher Chromeleon 7.2 SR5 • Waters SDMS 9 • Xam.Plugin.DeviceInfo 4.0.0.13 • Xam.Plugin.Geolocator 4.5.0.6 • Xamarin.Forms. GoogleMaps 3.0.3	**8** • EPPlus 4.0.x/4.1.x • Talend 6.4 • GemBox. Spreadsheet.43.0.0.1127 • Planisware 6.2 • HikariCP3.2.0 • JSON 20170516 • Super-CSV2.1.0 • Xam.Plugin.Media 4.0.1.5 • google-maps-services 0.2.6	**3** • VM Workstation Pro (15)

Figure 9

Cognizant's reference architecture analysis Identifies redundancy and prioritizes opportunities and a roadmap based on the application's functional capabilities map. By examining applications from level 0 to levels 3 and 4, it provides a clear understanding of the application's capabilities and geography, as illustrated in Figure 10. This approach offers a comprehensive view of applications with similar or identical capabilities, those that are region-specific, or those that are unused. Following a review by business stakeholders, applications can be evaluated as candidates for consolidation, retention, retirement, replacement, etc., to shape the future state application estate and action roadmap, as depicted in Figure 10.

Figure 10

Cognizant application debt analysis uses data to further decide final application disposition by collecting 6 to 12 months of ticketed data (incidents, service requests, CRs, problem tickets and enhancement requests) to perform analysis and categorize debt into categories: technical, functional, operational and knowledge. This information offers a clear view to augment application 'R' disposition (refactor, rearchitect, replatform) as shown in Figure 11.

Debt assessment results for analysis performed on 3923 tickets received for four months

Classification

67.7% operational debt	15.2% technical debt	14.0% functional debt	3.1% knowledge debt
...causes high manual effort	...causes high number of incidents	...high number of SR and long turnaround time	...high number of SR and short turnaround time.
Avoidable 2.0%	Avoidable 15.2%	Avoidable 14.0%	Avoidable 3.1%
Unavoidable 62.0%	Unavoidable -	Unavoidable -	Unavoidable -
Residual 3.8%			

Top issues

Enable user access—drive/folder/file 9.4%	Outlook—error handling/configure/setup 3.0%	User account—update/modify/transfer details 5.1%	How "to"—information request 2.8%
Build/configuration/connectivity/peripheral 8.9%	Miscellaneous—data or error handling/configure/setup 1.8%	Password reset 3.4%	Browser—connectivity/configure/setup 0.3%
Installation/provisioning access 7.1%	Petral—data and error handling/configure/setup 1.0%	Account unlock 2.2%	
Enable user access/permission 5.8%	MS team—configure/setup 0.9%	SAP—password reset 0.9%	
Screen—standard 4.2%	PI—configure/setup 0.8%	MobilePass—new/refresh token 0.8%	
Leaver—account deactivation/delete phone/remove from AD 4.1%	Global protect—connectivity/configure/setup 0.8%	MobilePass—password reset 0.8%	
New start—user account creation 3.9%	Documentum—date and error handling/configure/setup 0.7%	MobilePass—new enrollment link 0.7%	
VDI session reset/reboot/configuration 1.6%			
SharePoint site access 1.6%			
Printing/scanning issue 1.5%			

Figure 11

Cognizant source code analysis identifies application characteristics, insights and cloud blockers. Using an agent/agentless application source code scanner, developers and architects scan the code and observe software health (resilience, elegance and agility), cloud readiness, open-source security vulnerabilities, etc. The output informs a recommendation for application modernization and cloud migration, as shown in Figure 12.

Figure 12

Opportunity mapping and prioritization

When transferring the application rationalization map to an opportunity grid, the rationalization map identifies opportunities for application decommissioning/consolidation, technology/platform upgrade and functional enrichment. Based on disposition analysis and correlation insights, the applications are mapped across four quadrant grids (the opportunity grid) to categorize between the business value (BV) and technical value (TV) index, as shown in the Figure 13.

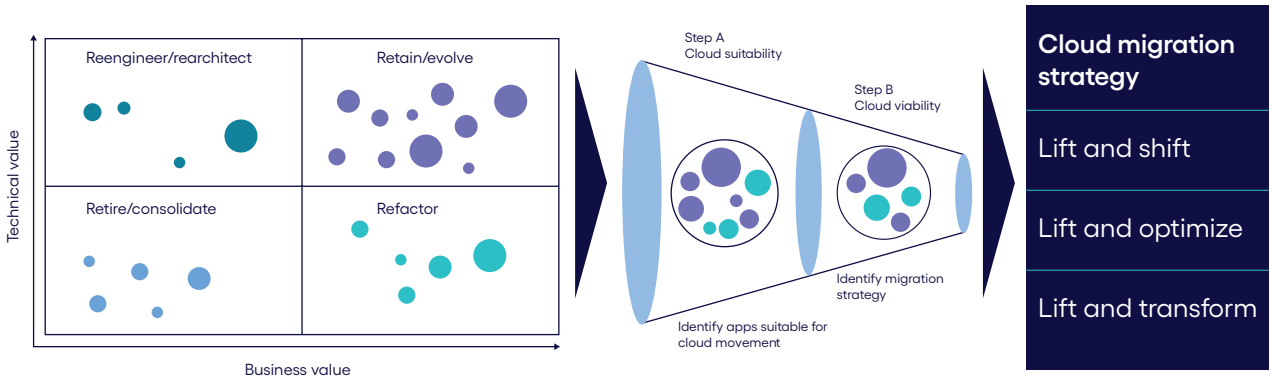


Figure 13

An application modernization and cloud migration strategy can be derived by appropriately mapping the seven R's defined in Table 3. This process provides the customer with a clear application modernization and cloud migration strategy, as shown in the examples in Figures 14 and 15.

Example 1: Pipeline view

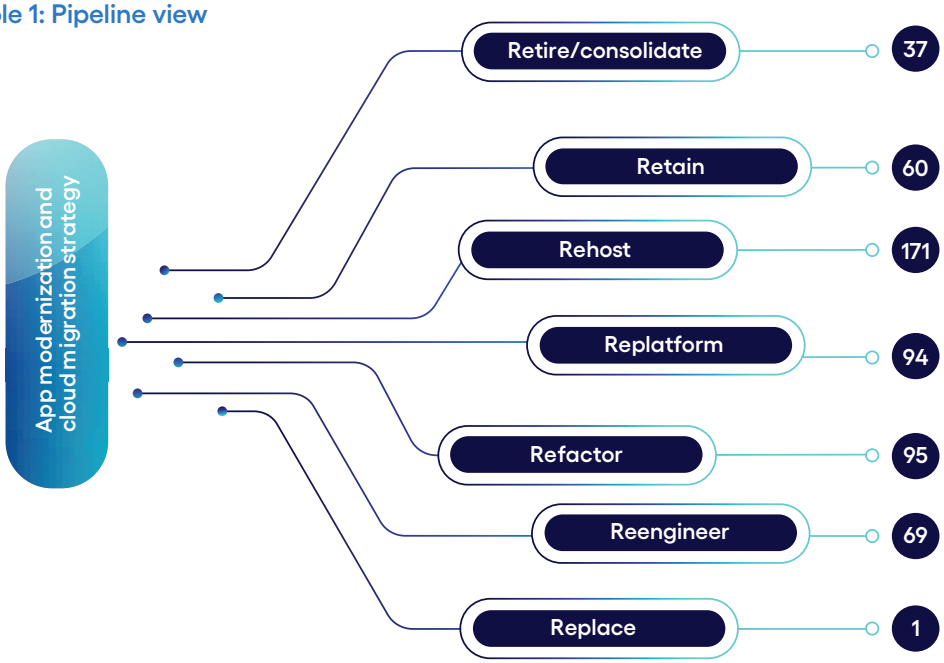


Figure 14

Example 2: Parliament seater view

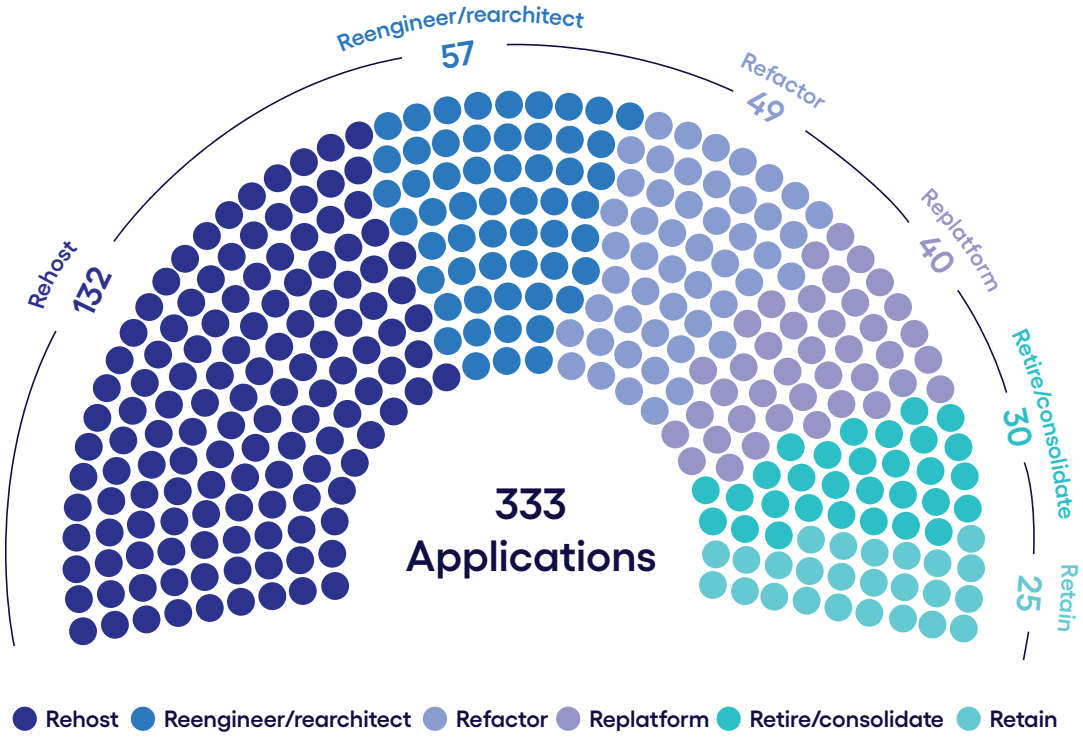


Figure 15

Retire/ consolidate	**Application closure to retirement/decommission of the application:** • Not relevant to the business • Very low on business and technical value • Merged into or replaced by another app • Redundant functional capability • Optimize licenses • Archive application and data
Retain/ evolve	• Application is fully utilized by business and delivers strategic business capabilities • Application must be maintained to support business needs • Invest further to evolve application
Refactor	**Improve technical value:** • Functionally good, but not aligned with future technology objectives in time-to-market and scalability • Address issues through code optimization, technical debt, security vulnerability fixes, performance improvement, technology upgrades, etc. • Reduce debt (code fixes and minor enhancements) • Refactor with cloud-native (microservices, APIs, state management, caching, workflow, serverless functions) • Optimize licenses
Reengineer/ rearchitect	**Rearchitect (altering the architecture) or rebuild/rewrite the application with cloud native features:** • Functional gaps • Not aligned with future business objectives • Similar functionality across different lines of business • Rearchitecture and code rewrites in new/upgraded technology/data lakes • Legacy modernization • New business functionality implementation • DB redesign (new schema and data migration) • Application consolidations
Rehost	• Suitable and viable to migrate app and infra to cloud with minimal configuration changes and no changes/modification application code/design • Application lift and shift to cloud
Replatform	**Application deployment platform modernization:** • Lift and transform—PaaS adoption, containerization, reinstallation, same DB schema and data migration • Leverage managed cloud-based services that are close to existing technology/ infrastructure without requiring too many code/designs changes • Tech upgrades—OS, middleware, tech lifecycle, patches • Application functionally good and ready to be technically assessed for cloud solution
Replace	**Drop an existing application and bring the new app:** • Customized new app, new software • Replace with SaaS, COTS, low code
Retain	• Not fit for cloud migration • Applications that are heavily dependent on local availability (Specific hardware/physical components/bio-metric specs must be running for legal purposes, etc.) • For example, applications running the lab instrument or have heavy data exchange (like image processing) that may require on-premises capabilities

Recommendation and implementation roadmap

For portfolio modernization and cloud readiness segmentation, prioritization criteria will group the applications strategic prioritization based on business impact and cloud readiness, as shown in Figure 16.

Quick wins:

- Early cloud adopters—cloud readiness is good, however business value is low
- Good candidates to begin with cloud migration to realize quick benefits at lower business risk

Core cloud to PaaS:

- Best suited for PaaS adoption—strategic applications with high business value and cloud readiness
- Near-term modernization candidates—improve application value through cloudification, containerization, DevOps integration, etc.

Long-term bets:

- Longer-term modernization candidates—application can be rehosted to cloud and refactored further to improve application value to make use of cloud-based services

Pursue later:

- Retire/consolidate or retain/replace with other apps—applications can be considered for retire/consolidation or replaced with other apps in the long run

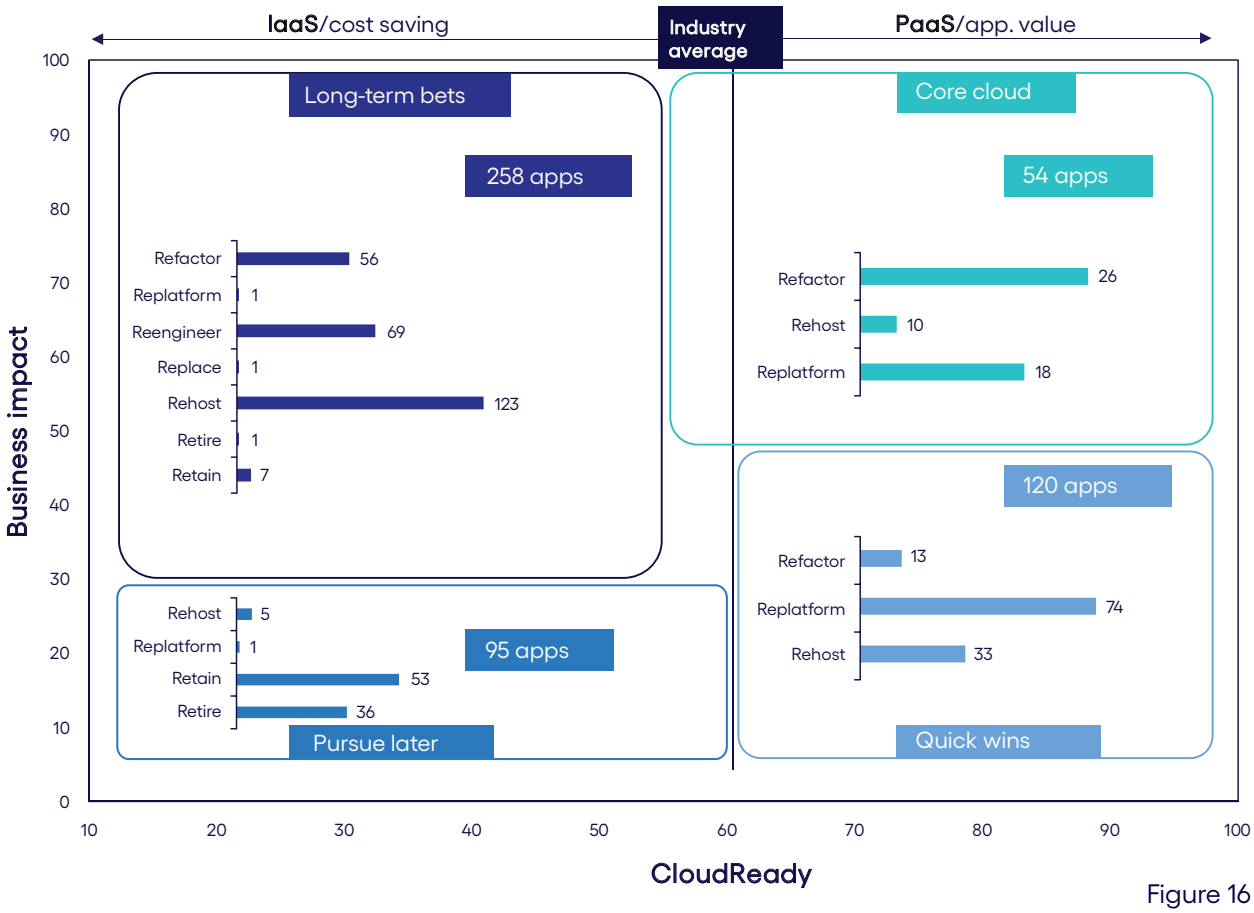
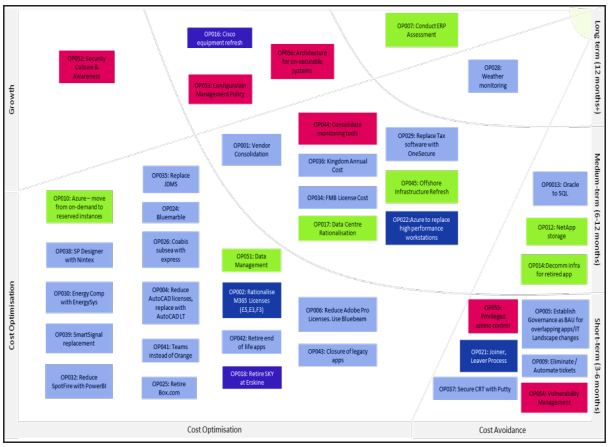


Figure 16

Based on prioritization, the implementation roadmap is created, along with a set of actions clustered on a time-scale basis that are required to achieve sustainable business results. An opportunity prioritization is performed based on cost avoidance, cost optimization and growth perspective with respect to timeline. A further roadmap is prepared, as shown in Figure 17, to supply the organization with short-term, mid-term and long-term opportunities to improve the application portfolio. The opportunities can be prioritized based on the ease and cost of implementation, savings and interdependencies.



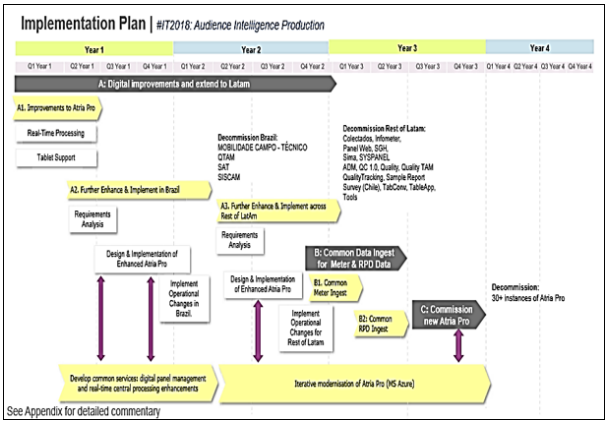


Figure 17

Conclusion

This white paper offers insight into the significant impact of AWS-powered application portfolio rationalization (APR) on application modernization and cloud migration. It outlines Cognizant's strategic approach to APR, emphasizing the importance of aligning with AWS's migration acceleration program (MAP) to streamline and secure digital transformation. The paper presents a comprehensive framework for assessing, prioritizing and implementing modernization initiatives, ultimately guiding businesses toward a more agile, cost-effective, and innovative future in the cloud.

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