Capgemini engineering

UNLOCKING THE GROWTH FRONTIER THROUGH SOFTWARE PRODUCT INNOVATION

FOREWORD

Today, software products are an integral part of your company: a critical component of product functionality, customer experience, new services, and revenue generation. They have become the primary touchpoint to take the pulse of your customers and a source of continuous innovation which is crucial to thrive in today's rapidly evolving technological and user landscape.

Naturally, enterprises want to maximize the value of their software product portfolio. However, many often struggle to deliver on this. While existing and legacy products generate significant revenue for enterprises, their maintenance consumes considerable resources, depleting R&D budgets and limiting opportunities to create new and modernized products that can lead to long-term growth. "CTOs and CIOs of scaled enterprises often spend 60-80% of their R&D budget on just the maintenance of their existing and end-of-life products and seek to strike the right balance between the funds required for innovation versus keeping the lights on.", according to Everest Group.

This sub-optimal allocation of the R&D budget is a symptom of R&D planning difficulties. Developing a cohesive R&D plan is complex because many factors need to be reconciled. These include a bloated portfolio comprising multiple software products with overlapping functionality, a deficit of software engineering talent, users' reluctance to migrate to new products, and the need to continue to cater to their legacy customer base.

The key to resolving these difficulties is greater visibility into the software product lifecycle across the three phases – innovation, development and enhancement, and end-of-life. It is the critical starting point for enterprises to make better business decisions, gain a competitive edge, and improve product efficiency.

The impact of getting it right is transformative. An industrial technology conglomerate with a U.S. and EU presence faced fragmented product challenges, impacting innovation and efficiency. They partnered with Capgemini Engineering and, using our "in-house Software Lifecycle Maturity methodology," increased development efficiency, centralized sustenance, and reduced operational costs by 10-15%. These savings allowed the company to pursue new product innovation and greatly accelerated their product roadmaps. Results like these are not outliers.

This viewpoint by Everest Group, supported by my team at Capgemini Engineering, examines how to orchestrate a comprehensive R&D strategy for your company, align resources and capital for new products, enhance existing offerings, and modernize legacy systems. This strategic allocation ensures effective outcomes and ROI assessment, paving the way for a sustainable and profitable future.

We hope you find this whitepaper enlightening and exciting.

Jiani Zhang
EVP and Chief Software Officer,
Capgemini Engineering

Everest Group®

Unlocking the Growth Frontier through Software Product Innovation

Nishant Udupa, Practice Director
Mayank Dawar, Senior Analyst

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Introduction

R&D spending on engineering software products is poised to grow at ~9% CAGR from 2022 and touch the US$650 billion mark by 2025, with the Independent Software Vendor (ISV) and internet, media and entertainment, BFSI, and healthcare and medical devices verticals driving the spend. The importance of software products is increasing with the proliferation of platform-based business models, which continue to dominate both product- and services-centric verticals. With software emerging as the key customer touchpoint across industries, enterprises should keep innovating on software products to stay competitive in the market and serve rapidly evolving user needs.

Oftentimes, however, despite knowing that innovation fuels growth and is paramount to staying ahead of the competition, enterprises struggle to craft a coherent R&D strategy. In fact, enterprises often spend way too much on continuing existing or legacy products, which drains R&D budgets and leaves little room for innovating and modernizing products to steer the top line in the medium to long term. CTOs and CIOs are, therefore, actively looking to find the right balance between the budget required for innovation versus maintenance.

In this research, we explore and answer the following questions:

- What is Software Product Life Cycle (SPLC), and why do enterprises need to understand the SPLC stage of their software products?
- Why do enterprises get caught up in innovating software products versus maintaining them?
- What are the common roadblocks inhibiting enterprises from innovating?
- How can enterprises fine-tune their R&D strategies to foster innovation and future-proof their businesses?

Understanding SPLC

SPLC refers to the entire lifespan of a software product that begins as soon as the market realizes the need for the software and ends when it is no longer supported. It involves product ideation and design, prototype creation, solution architecture, testing, deployment, rollout, performance management, and product sustenance and maintenance. All these activities fall under three broad stages of SPLC: innovation, development and enhancement, and end of life.

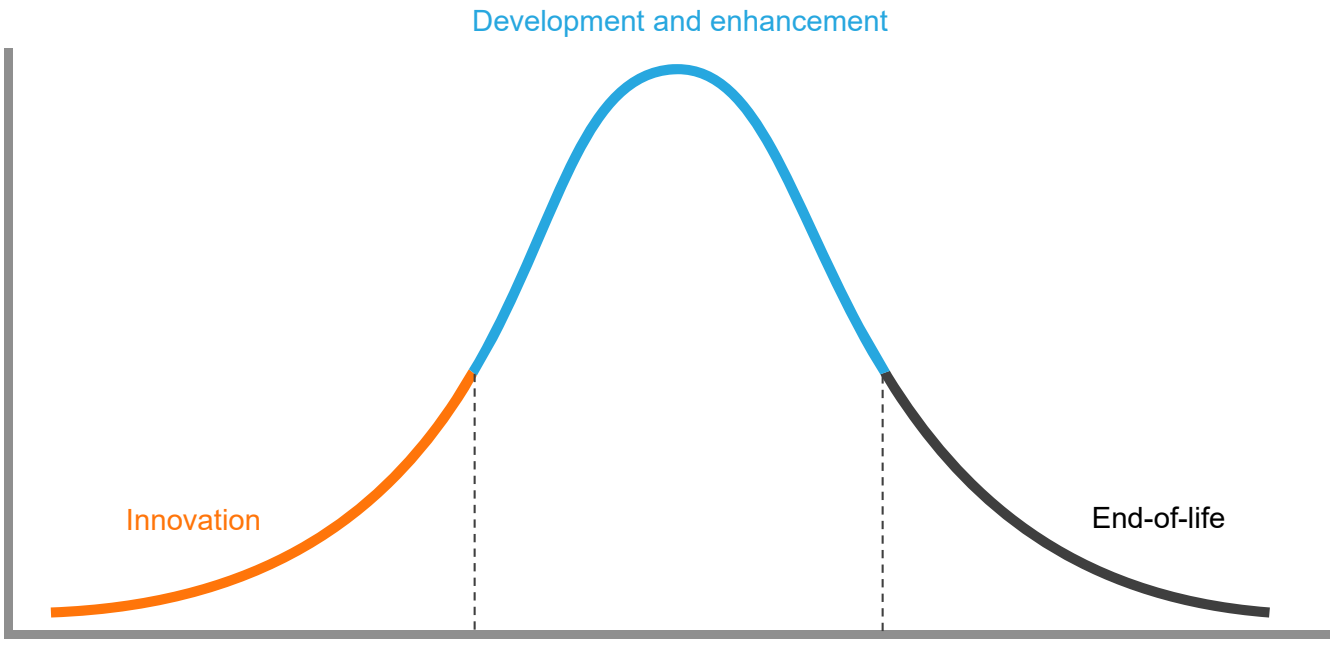
No enterprise wants its software products to become obsolete and reach the end of their life cycle before the anticipated time. Thus, to make better business decisions about when to update the software, gain a competitive edge by accelerating workflows, optimally adjust costs to align with budgetary requirements, and improve product efficiency, it is crucial for enterprises to understand at what SPLC stage their product is.

Exhibit 1 provides a snapshot of the different SPLC stages.

EXHIBIT 1

Phases within SPLC

Source: Everest Group (2023)



Technology adoption	High	Medium	Low
Time-to-market	High	High	Low
Cost involved	High	Medium	Medium
User base	Low	High	Medium

Below we take a closer look at the three stages and the key enterprise focus areas for each.

- **Innovation:** During the innovation stage, the software product has not yet entered the market. This stage requires significant capital investment and R&D without any revenue generation. It involves planning and requirement analysis, designing, software development, testing, beta-product release, and final product launch. Enterprises typically focus on aspects such as product design, user experience, quality, and time-to-market, during this phase.

  Speed has become the new currency of the software product business. Time-to-market and an interactive user experience can act as catalysts in product commercialization. Delays in innovating new software products based on emerging technologies can often result in missed market opportunities.

- **Development and enhancement:** To keep pace with evolving consumer expectations and ensure a great user experience, software products require continuous maintenance and enhancement, which fall under the development and enhancement phase. During this stage, a product receives version upgrades in line with market needs, and the user base of the software product picks momentum and reaches its peak. At this stage, enterprises focus on handling the complexity of requests for enhancement, which continues to create consumer value without impacting the product's fundamental architecture.

  The rise of automation, AI/ML, and DevOps has acted as a catalyst for the software development process. Advances in the software development methodology – from waterfall to agile and from siloed DevOps to end-to-end DevOps – have changed the entire software development landscape, with shorter time-to-market and increased scalability.

- **End-of-life:** No product can remain in a prolonged growth stage or last forever. Eventually, a software product enters its end-of-life phase, when it is no longer scalable, and the underlying technology used to build the software cannot be leveraged further to enhance the product. This is when the product's revenue begins to decline, and its user base reaches a saturation point and starts to fall. In this phase, enterprises begin to gradually phase out the product from the market, stop releasing further software updates, and optimize the costs of maintaining the product in the market.

Users' reluctance to migrate from aging software due to their familiarity with the product often forces enterprises to continue with legacy and monolith software over an extended period, leading to an astronomical rise in the maintenance budget for end-of-life products.

The key activities and enterprise priorities in each of three stages are listed below. We also explain the life cycle through a case study of Adobe LiveCycle.

	Innovation	Development and enhancement	End-of-life
Activities	• Ideation and design • Prototype creation • UI/UX ideation • Software product development • Testing and certification • Deployment and rollout	• Technical support and troubleshooting • Product upgrades • User data analysis • Testing and certification • UI/UX updates • Performance management • DevSecOps • Critical defect fixing	• Sustaining and supporting end-of-life products • Feature and UI/UX improvements • Security updates
Enterprise priorities	• Identifying and serving customer needs • Onboarding skilled talent to drive innovation and efficiencies • Accelerating the time-to-market • Product quality and compliance	• Accelerating the time-to-market • Releasing product updates to add new features and enhance software security • Product quality and compliance • Onboarding skilled talent • Optimizing enhancement costs • Optimally handling enhancement requests so that they do not change the original product's fundamental architecture	• Maintaining end-of-life products to serve the needs of the legacy product's customer base • Minimizing the cost of maintaining end-of-life software products
Case in point: **Adobe LiveCycle**	Adobe introduced the LiveCycle software in 2004 to streamline the creation and publishing of PDF forms for enterprises and government agencies. The software had capabilities such as capturing and storing form and document data and features including the drag-and-drop functionality, command buttons, and checkboxes.	Following the product's release, Adobe released multiple software updates to the LiveCycle suite to enhance capabilities around user experience, business process management, data security, information processing, and forms automation, among others. By September 2008, LiveCycle products had become one of the highest revenue-driving software products for Adobe.	Adobe LiveCycle PDF forms provided a great user experience on desktops and laptops, but it was not able to match it on mobile devices, due to which its revenue started to decline. Adobe discontinued core technical support for Adobe LiveCycle in March 2018 and offered extended maintenance and support through March 2020.

Modernizing legacy products through transformation

Innovation fuels business performance and growth across industries. Given the rapidly changing technology landscape and consumer expectations, enterprises realize the need to foster innovation in software products and are thus investing heavily into R&D to stay ahead of the competition. Global ER&D spending on software products grew strongly at 10.2% CAGR from 2017 through 2022 to almost touch US$500 billion in 2022. This trend is likely to continue in 2023 despite recessionary headwinds, with **96% of engineering enterprises planning to increase their R&D spending or maintain it at 2022 levels.**[1]

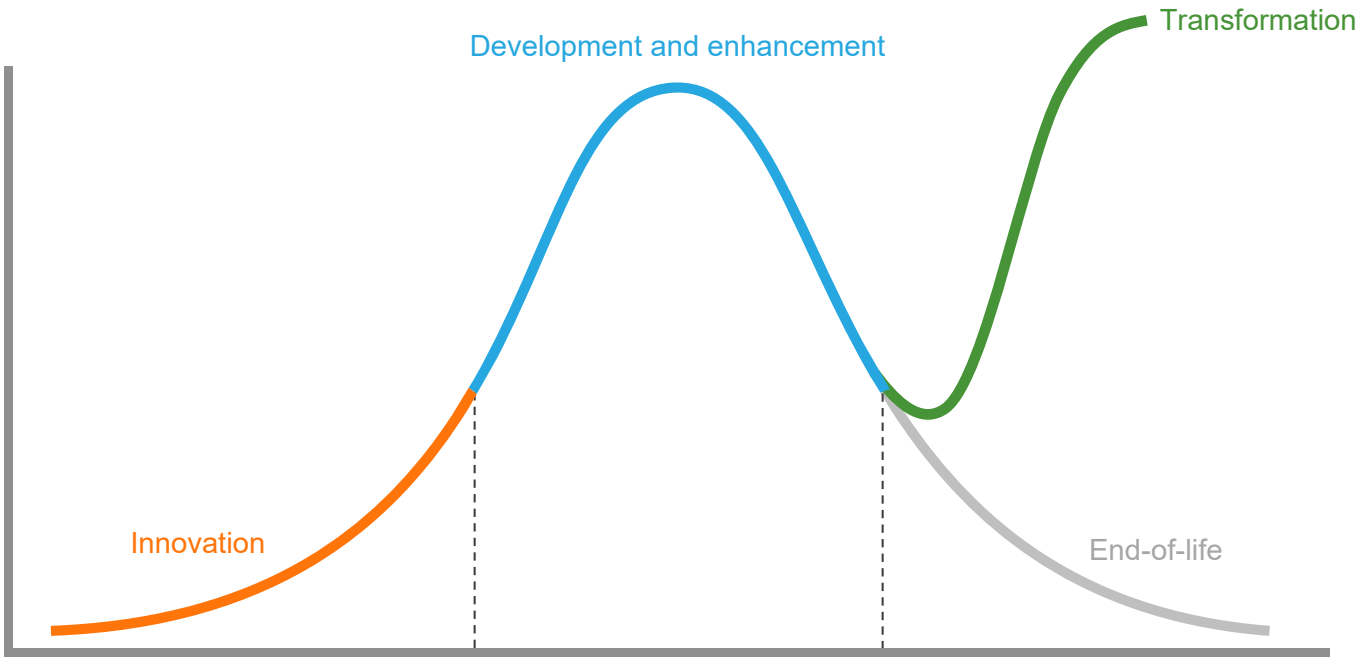
1 Everest Group Key Issues Survey 2023

The market is inundated with advanced technologies such as AI/ML, cybersecurity, and blockchain, and enterprises that come up with innovative and upgraded software products at a fast clip can unlock new business opportunities and enhance customer experience to get an upper hand in the market. Legacy software products often fail to meet these objectives and also pose challenges such as high maintenance costs and security risks. Modernizing or transforming them is necessary to address these challenges, stay competitive, and enable innovation by providing new features, better performance, integration with new technologies, and improved security and compliance. Exhibit 2 shows where this transformation phase fits in the SPLC.

EXHIBIT 2

The transformation phase in SPLC

Source: Everest Group (2023)



Enterprises typically consider modernizing their legacy products when older software versions become prone to the following problems:

- Dwindling customer interest and declining user base
- Increased vulnerability to cybersecurity threats
- Lack of scalability and inability to accommodate new features and capabilities, resulting in missed market opportunities
- Mobility issues and excessive dependency on hardware, that is, the software can only be accessed through mainframes within physical premises
- Outdated technology
- Can no longer support modern technological demands

The billion-dollar question: innovate or maintain or modernize?

Enterprises have three options when considering where to channelize their R&D dollars:

- Innovate new and disruptive software products to create additional revenue streams
- Develop and maintain legacy products that continue to act as a cash cow for now but may become obsolete in the long term
- Modernize legacy software to accelerate time-to-market and shift economies of scale

Enterprises often end up focusing on the short-term business impact of software products rather than their long-term value, leading to the misallocation of R&D funds toward maintaining legacy software products. This misallocation translates into limited budgets for innovating on new products and modernizing legacy software, eventually resulting in a software product portfolio that is skewed toward end-of-life products.

Exhibit 3 lists the factors that make it difficult for enterprises to choose the path they should take when considering whether to innovate versus maintain versus modernize.

EXHIBIT 3

Factors that lead to the enterprise dilemma

Source: Everest Group (2023)

Relevance Low ○○○○○ High

Parameter \ Channel	Innovating a new product	Maintaining a legacy product	Modernizing the legacy product
Cost involved	●●●●●	●●●○○	●●●●○
Risk involved	●●●●●	●○○○○	●●○○○
Short-term impact (+ve)	●○○○○	●●●○○	●○○○○
Long-term impact (+ve)	●●●●●	●○○○○	●●●○○

Burgeoning challenges inhibiting software product innovation

While the benefits of innovation are clear, enterprises are unable to foster it due to many reasons, including inappropriate allocation of their R&D budgets, shortage of software engineering talent, and high software maintenance costs that drain technology budgets and leave little room for innovation.

Sub-optimal allocation of the R&D budget across the three stages of SPLC is the greatest impediment to growth that prevents enterprises from taking up-front innovation-oriented initiatives.

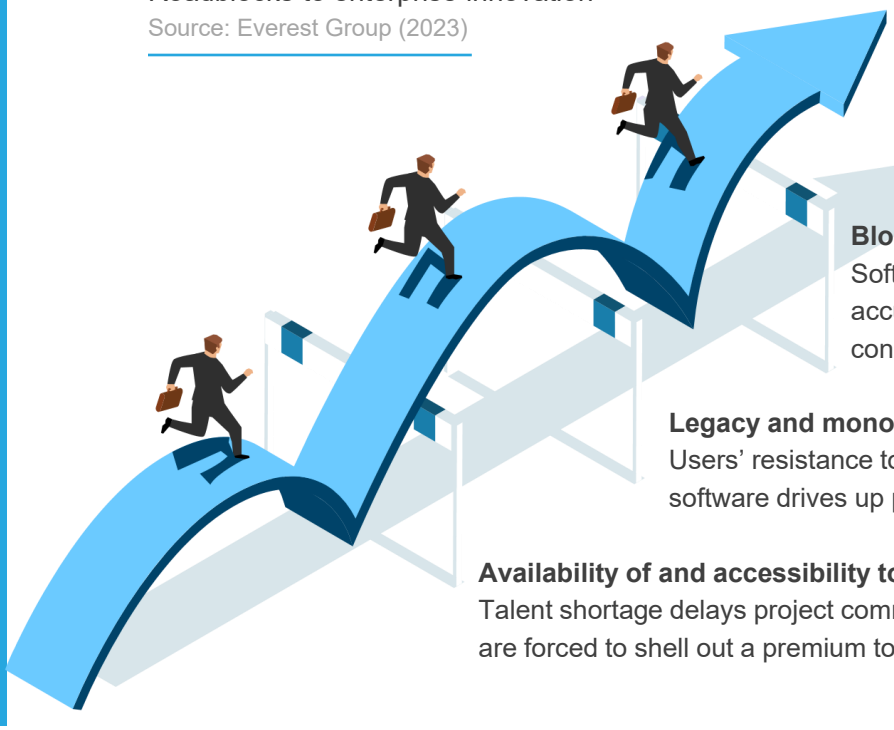
Unused capabilities, end-of-life products, and overlapping and redundant software steer the bottom lines for both product- and services-centric enterprises. The CTOs and CIOs of mature and scaled enterprises often end up spending 60-80% of their R&D budgets on maintaining existing, end-of-life products and struggle to find the right balance between the budget required for innovation versus keeping the lights on.

Exhibit 4 highlights the barriers that hinder enterprises' innovation paths.

EXHIBIT 4

Roadblocks to enterprise innovation

Source: Everest Group (2023)



Bloated software product portfolio
Software products with similar functionalities, which accumulate due to organic growth and M&As, consume the lion's share of technology budgets.

Legacy and monolith software
Users' resistance to migrate from legacy software drives up product life cycle costs.

Availability of and accessibility to talent at scale
Talent shortage delays project commencement, and enterprises are forced to shell out a premium to get the right talent.

We take a closer look at these factors below.

- **Bloated software product portfolio:** Enterprises add multiple kinds of software to their product portfolios over time due to organic growth, evolving customer demands, geographic expansion, and M&As. Some of these products may have overlapping use cases, and the need to maintain products with similar functionalities can often consume the lion's share of technology budgets. In many cases, enterprises' engineering teams are unable to downsize software products, since small sets of users continue to use these products, and enterprises do not want to lose these customers. The following factors cause the duplication of software products:
  - **M&As:** The duplication of applications, features, and products is inevitable due to the many software options in the market. Further, an acquiring organization and the acquired entity may continue to use software products that have similar or overlapping functionalities

  - **Siloed business units:** Such units/lines reside outside the parent organization's supervision and scrutiny, and they independently purchase many similar software products across geographies
  - **Zombie software:** This refers to applications for which retirement plans were not fully completed successfully or those that simply sit on the portfolio shelf without being used

- **Legacy and monolith software:** Legacy software products are innovations of the past that become liabilities with time. Enterprises continue to maintain legacy software products due to the following reasons:
  - The cost of modernizing legacy software may exceed the modernized product's business value (increased revenue or lower operating costs)
  - Despite being old and outdated, legacy software is already cost-effective in serving customer demands and hence does not require any additional modernization
  - Cultural inertia within organizations impedes innovation or modernization of products
  - User resistance and outright defiance to migrate from legacy software due to familiarity with the product

However, as the software ages, improving and maintaining the legacy architecture and code becomes a cost-draining activity. Improving the innumerable layers of legacy code for the software written by many engineers who keep on changing also becomes cumbersome. The situation reaches a tipping point when these software products become so outdated that an enterprise no longer has a technical support specialist who understands the code.

- **Availability and accessibility to talent at scale:** There is a significant supply shortage of digital and software talent. According to Everest Group's Key Issues Survey 2023, finding engineering talent availability at scale is **one of the key challenge that engineering enterprises face** across industries and geographies. This talent shortage has resulted in:
  - **Wage inflation:** Enterprises are forced to shell out a premium to access talent, especially R&D talent skilled in emerging software engineering themes, such as cloud engineering, cybersecurity, big data analytics, and AI/ML
  - **Delays in project commencement:** Several Engineering Research and Development (ER&D) initiatives and implementation programs get pushed back due to the lack of a competent resource pool in emerging technologies

However, despite the above challenges, several enterprises have succeeded in finding the optimal balance between innovation and maintenance, enabling them to gain a competitive edge by developing innovative software and modernizing legacy products. The following case study describes how one such enterprise modernized a legacy product to serve changing customer needs and overcome stagnating product revenue.

> The talent shortage has reached a crisis pitch. The lack of job-ready digital talent has become an existential threat to businesses around the world.
>
> – Gabriel Dalporto, CEO, Udacity

CASE STUDY

FROM THE DESK TO THE CLOUD: HOW INTUIT MADE THE SHIFT

Rehosting QuickBooks Desktop to cloud-based QuickBooks Online

In 2013, Intuit announced its decision to rehost QuickBooks, an accounting software product for businesses, to the cloud and rebuild it as an open platform following stagnating revenue from the desktop product ecosystem. QuickBooks Desktop limited the number of applications that could be integrated with it, causing customers to switch to other options. After being rehosted to the cloud, QuickBooks Online was able to connect with over 2,000 apps, and the open structure increased customer retention. The modernized version also offered enhanced security, remote accessibility, and better efficiency. Intuit announced the discontinuation of its older versions of QuickBooks Desktop after May 31, 2021, and of add-on services after May 31, 2023.

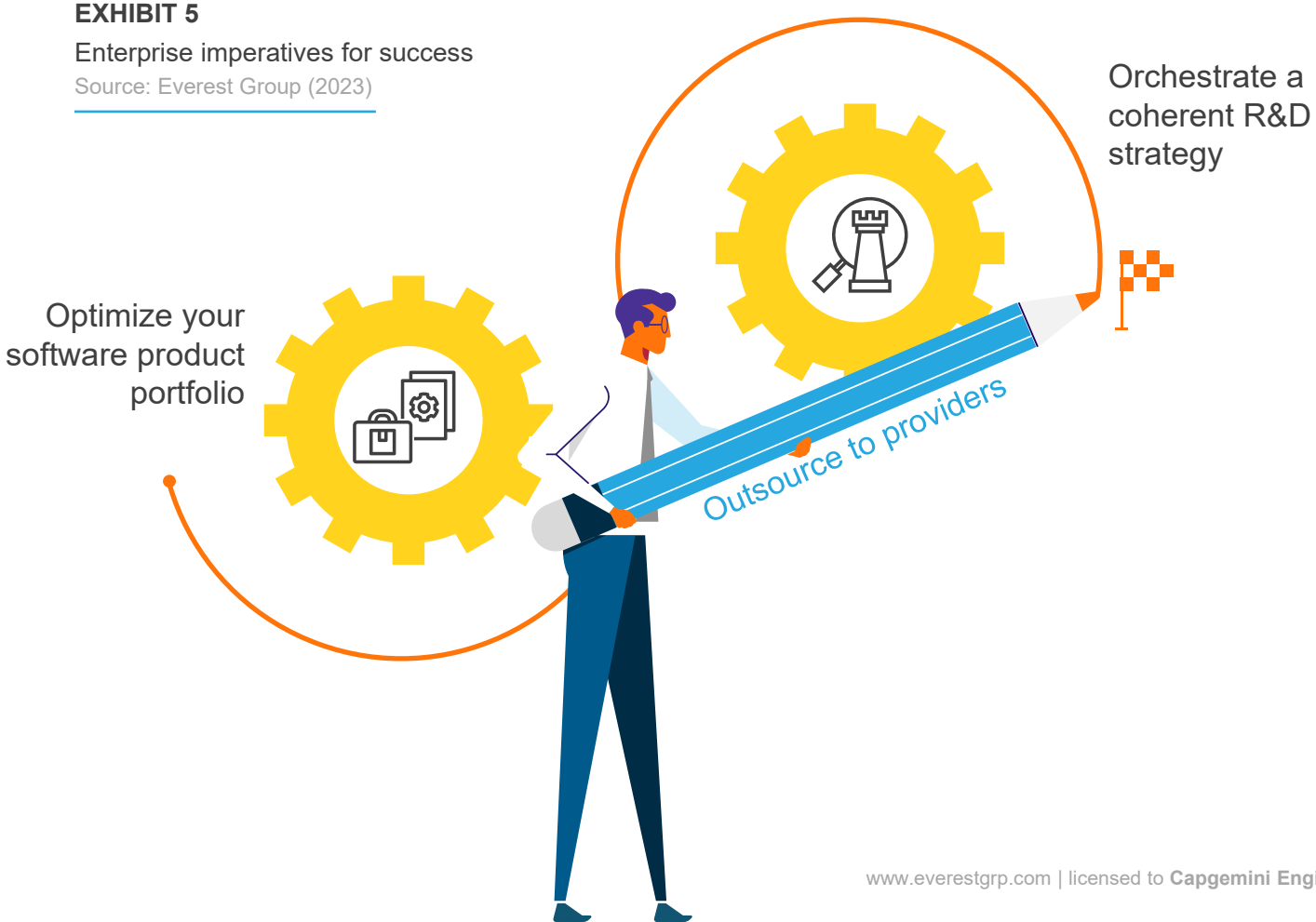
Implications for enterprises

Innovation is the common denominator for enterprises that successfully navigate the path to success. It not only helps enterprises to remain competitive, but also to stay afloat and disrupt the market by continuously introducing new products that serve evolving customer needs. However, enterprises need to recognize that maintenance of legacy products is also necessary, and they need to allocate their budgets to this aspect as well. Striking the right balance between the two is often a challenge, and we make two recommendations, as Exhibit 5 illustrates, that can help enterprises achieve it.

EXHIBIT 5

Enterprise imperatives for success

Source: Everest Group (2023)



- **Optimize your software product portfolio**: Enterprises should plan and carry out a strategic-fit assessment periodically to analyze and optimize their software product portfolios, especially after M&As. This can help them get visibility across software products, enabling them to streamline their existing portfolios by determining which products to retain, modernize, or retire.

  Enterprises typically allocate R&D budgets at the start of each financial year across software products, without considering overlapping functionalities. By adopting a portfolio-based approach, CIOs and CTOs can identify redundant, underused, and similar use-case software to eliminate or consolidate duplicate software assets. The approach will enable technology leaders to reduce the cost that is channelized to maintain such software while improving the quality of service and satisfaction of those who rely on it. The saved amount can be used to fund innovation to advance the enterprise's business goals and expedite the rollouts of new products and technologies.

  Rationalizing and optimizing the software product portfolio can also assist in:

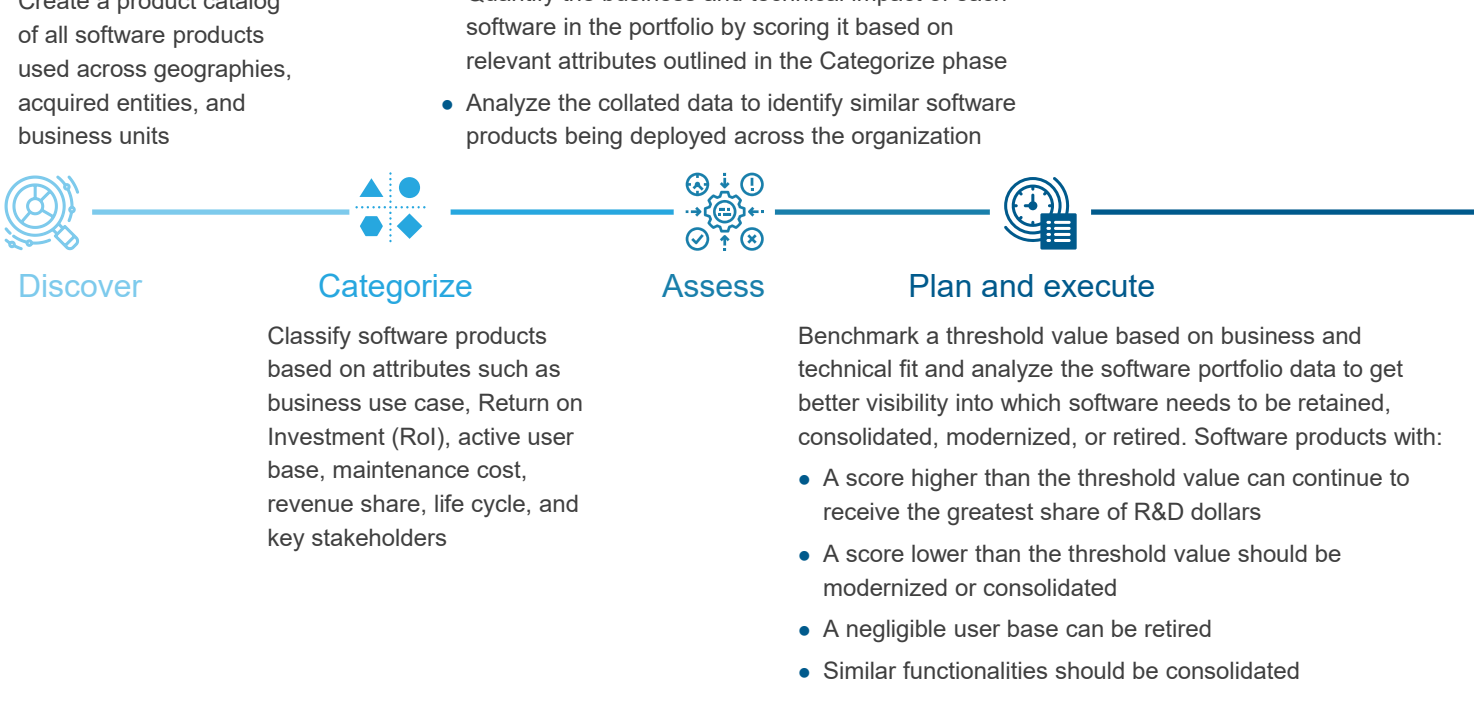
  – Reducing technology obsolescence and the total cost of ownership of software products
  – Retiring legacy, low business value, and redundant software
  – Providing insights about gaps in the existing product portfolio and introducing innovative products to enhance customer experience
  – Capturing the information about life cycles of various software products and their deployments
  – Obtaining a comprehensive understanding of the value of software products from technical and business standpoints

In Exhibit 6, we outline an enterprise roadmap to portfolio rationalization.

EXHIBIT 6

Roadmap to portfolio rationalization

Source: Everest Group (2023)



Carrying out a strategic-fit assessment periodically can help enterprises get visibility across software products, enabling them to determine which products to retain, modernize, or retire.

ROLE OF PROVIDERS

- To serve the sizable but stagnating customer base that continues to use end-of-life and legacy products, enterprises should outsource the support and maintenance of these products to service providers. This will help them to channelize their resources to innovate new products and SaaS offerings instead of sparing resources on legacy products that are not growing. It will also ensure that there is no revenue loss from legacy customers as they try to onboard these customers onto their new SaaS offerings.
- In addition, enterprises can divest legacy software to these outsourced partners. Post divestment, the service providers take full ownership of the R&D, maintenance, support, and sales and marketing of these legacy products to extend the end-of-life of products and drive innovation and growth for customers.

  According to Everest Group's Software Product Engineering Services PEAK Matrix, there has been an acceleration in such product carve-out deals, which accounted for 10-15% of service provider revenues (industry average) in 2021.

- **Orchestrate a coherent R&D strategy:** Enterprises should monitor the segmentation of their R&D budgets across the following streams:
  - Innovating new software products from scratch to expand revenue streams
  - Enhancing existing products to address customer needs and stay competitive
  - Maintaining legacy products
  - Modernizing legacy products

Exhibit 7 depicts an R&D budget that enterprises can use as a benchmark to calibrate R&D spending.

A coherent innovation strategy that translates R&D investments into short-, medium-, and long-term business goals will ensure that resources and capital are appropriately allocated and enable enterprises to assess the strategy's effectiveness and RoI.

EXHIBIT 7

Enterprise R&D allocation: a benchmark

Source: Everest Group (2023)

Enhancing existing software products

25-45%

- A major share of the R&D budget should be allocated to enhancing existing products with a high market share and growth potential to serve changing consumer needs and the technology landscape
- Loading these products with multiple features will strengthen the position in the market, grow the customer base, and drive revenue

Innovating new software products

15-35%

- Enterprises should invest aggressively in innovating new and disruptive software products, adopting next-generation technologies, and accelerating time-to-market
- These products may have a low market share initially but possess high growth potential to steer the revenue trajectory in the long term by capturing additional markets

Maintaining legacy products

10-30%

- Enterprises should spend just enough to maintain legacy and end-of-life products to serve the legacy customer base
- Often, enterprises end up channelizing the maximum R&D budget to maintain legacy products because of the short-term business impact of such software
- These products may have a high market share but may become obsolete in the future due to the rapidly evolving technology landscape

Modernizing legacy products

10-30%

- Excessive spending on legacy products and users' reluctance to migrate to new software inhibit enterprises from modernizing legacy and end-of-life products
- Modernizing products via rehosting can shift economies of scale and extend the end-of-life value of such software products

Enterprises can consider retiring, consolidating, or modernizing their legacy and end-of-life software products with a small customer base if their R&D budget allocations are heavily skewed toward maintenance.

A dedicated product management team to direct R&D investments and articulate a clear product roadmap can help avoid budget overruns and streamline operations for the entire SPLC. It can also increase the return on R&D investments as the team understands market needs and can coordinate across functions, including engineering, technical support, sales, and marketing.

Enterprises should also smartly handle incoming customer requests for enhancing software products. Changes that impact only a small user base but end up using significant resources may not be the most optimal to implement. Therefore, enterprises should assess enhancement costs, persistent maintenance costs, and the mid- and long-term value of such changes across the user base.

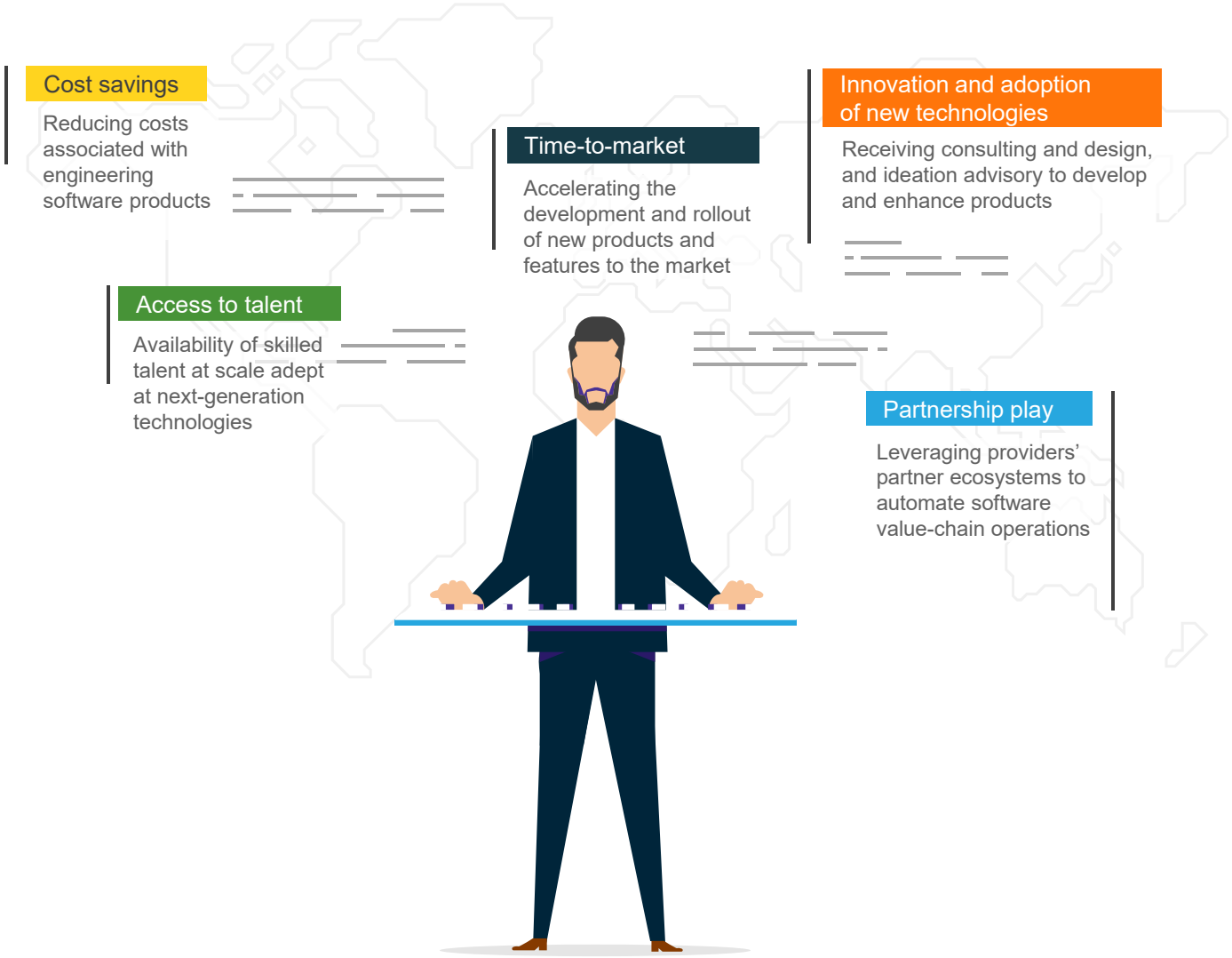
ROLE OF PROVIDERS

Enterprises can also consider outsourcing some of the R&D and development and maintenance work across SPLC to offload the efforts associated with those value chain elements. Tapping into the provider ecosystem can help enterprises navigate several challenges associated with software product engineering. Everest Group's Software Product Engineering Services PEAK Matrix identifies the key value creation levers that form the basis for enterprises outsourcing software product engineering services to third-party providers, as depicted in Exhibit 8.

EXHIBIT 8

Outsourcing value creation levers for enterprises

Source: Everest Group (2023)



Conclusion

Enhanced visibility into the life cycle of a software product across innovation, development and enhancement, and end-of-life, can enable enterprises to take better business decisions, gain a competitive edge, and optimize budgets. A suboptimal allocation of the R&D budget across the three stages of SPLC often hinders enterprises from taking up innovation-oriented initiatives. Often, enterprises end up crafting R&D budgets that are skewed toward maintaining legacy software products, leaving little room for innovating new products and modernizing legacy software.

To help enterprises overcome this challenge, we recommend two strategies:

- Optimize the product portfolio
- Orchestrate a coherent R&D strategy

This two-pronged approach can help enterprises enhance their focus on innovation by rationalizing their portfolios periodically and aligning their R&D budgets with the method(s) followed by leading enterprises in allocating funds to innovation, enhancement, modernization, and maintenance.

Additionally, we recommend that enterprises consider engaging with third-party providers and outsourcing the R&D and maintenance work of their existing and legacy products or divesting and transferring the full ownership of legacy software to these partners. Tapping into the service provider ecosystem can help enterprises enjoy benefits across cost, talent, time-to-market, ecosystem access, and innovation.

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With you on the journey

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For more information about Everest Group, please contact:

+1-214-451-3000

info@everestgrp.com

For more information about this topic please contact the author(s):

Nishant Udupa, Practice Director

nishant.udupa@everestgrp.com

Mayank Dawar, Senior Analyst

mayank.dawar@everestgrp.com

Capgemini engineering

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For more details, contact us:

www.capgemini-engineering.com

Write to us at:

engineering@capgemini.com