

2021 Strategic Roadmap For The Composable Future Of Applications

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Future application experiences will be built from composable business capabilities that can quickly enable new business scenarios. Application leaders should use this roadmap to navigate from static application experiences to this new dynamic paradigm.

More on This Topic

This is part of two in-depth collections of research. See the collections:

- [IT Market Clock for ERP 2020 — Preparing for the 4th Generation of EBC](#)
- [Research Roundup for Higher Education CIOs Responding to Disruption](#)

Overview

Key Findings

- Monolithic application experiences no longer meet the requirements, expectations or preferences of innovative business users and their customers, now that they demand continuous business agility.
- Business leaders are looking for application experiences that are creatively assembled, suited to users' roles and contexts, and continuously refined to reinforce their business differentiation.
- Productive and inspired business-IT partnerships are essential for organizations to realize the full potential of the future of applications, which is to have a transformative business impact.
- Technologies to support the future business application experience are already in place. However, inertia caused by old IT and business practices, outdated organizational and cultural norms, and technical debt inhibits adoption of a more agile business and IT environment.

Recommendations

Application leaders and their CIOs responsible for strategic business change in an organization should:

- Reject any new monolithic solutions, whether for sale or proposed in-house, and plan to renovate or replace old ones in order to start moving to assembled application experiences.
- Accelerate product-style delivery of application capabilities, packaged as building blocks for application assembly, using agile and DevOps techniques, rather than traditional methods.
- Fuse business and IT teams — so that they have shared accountability for business outcomes — by tying incentives and performance metrics to joint success criteria.
- Realign application and other vendor selection criteria by focusing on the ability to deliver composable, packaged business capabilities (PBCs), not monolithic solutions.
- Avoid failures and cost overruns arising from poor planning by adopting a gradual Prepare-Build-Scale roadmap approach toward the future of applications.

Strategic Planning Assumptions

By 2023, 30% of new applications will be delivered, priced and consumed as libraries of packaged business capabilities, up from less than 5% in 2020.

By 2023, over 75% of small and midsize SaaS vendors will use product-style delivery and the architecture of packaged business capabilities to compete with less agile mega-SaaS providers.

Analysis

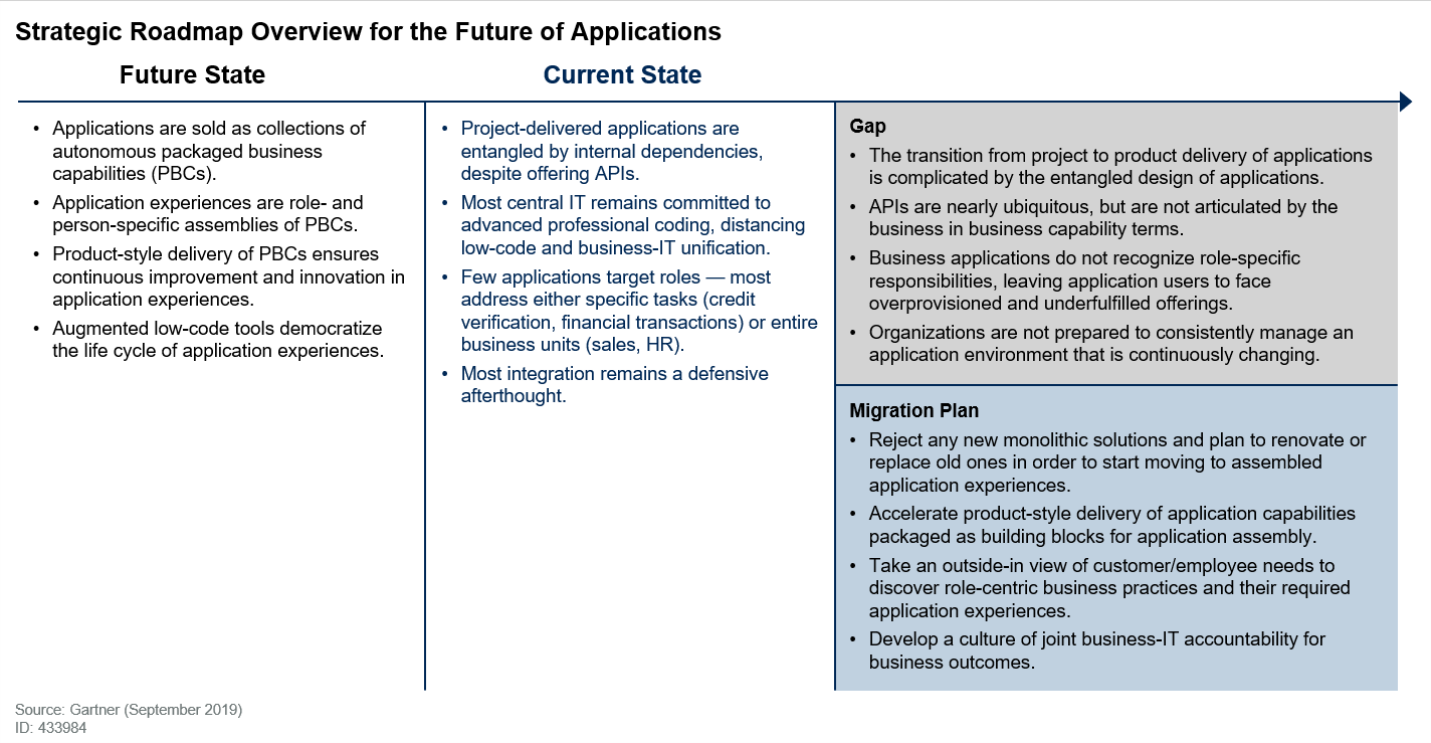
Organizations have built up sophisticated portfolios of applications to meet the needs of their business units. Packaged applications, SaaS, partner and social applications, legacy and other enterprise resources form the IT foundation of a modern business.

Much of the enterprise environment has been managed historically by a central IT department, but recently the increasing pace of business-driven technology innovation has shifted many IT decisions to business units and business users. The often distant nature of the relationship between “the business” and “IT” has emerged as a barrier to organizations’ progress toward digital transformation.

To form a productive partnership with the business, IT must reconfigure its application portfolio, update its application development practices and embrace its new role as a guide and advisor to the business. In the process, business users must obtain increasing levels of self-service for technology-dependent business innovation, while IT must ensure uninterrupted stability and operational integrity of the organization.

Application leaders must guide their organization toward a future business-IT alliance and next-generation application experiences through a gradual evolution, following the Prepare, Build and Scale stages of this roadmap. This report provides strategic guidance for this journey (see Figure 1).

Figure 1. Strategic Roadmap Overview for the Future of Applications



Future State

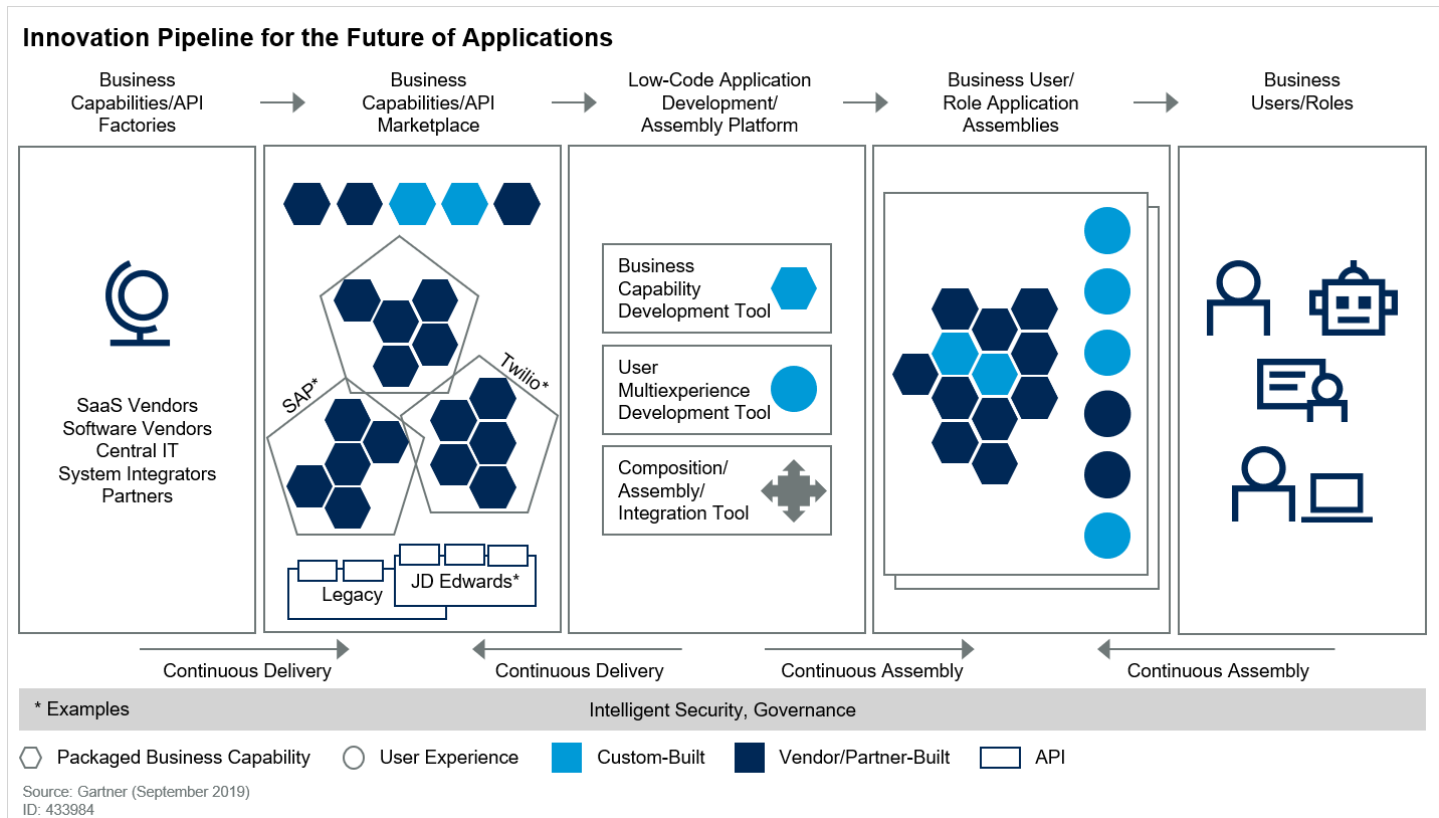
The future application experience of creating and consuming business application capabilities is based on the concept of packaged business capabilities (PBCs) — see further Notes 1 and 2.

PBCs are delivered in product style by SaaS vendors, central IT and other application “factories” to business capability repositories (internal libraries or external marketplaces). They are then assembled in the organization, by central or business unit IT teams, to deliver uncluttered fit-for-purpose support for specific job roles’ or individuals’ practices (see Figure 2).

In the future state, the application experience becomes an active, role-centric assembly of business capabilities to dynamically reflect an organization’s differentiated business practices.

Product-style delivery of business capabilities ensures continuous innovation and change in those experiences (for a detailed look at the product-style application delivery model, see “2019 Strategic Roadmap for Becoming a Digital Product Delivery Organization”).

Figure 2. Innovation Pipeline for the Future of Applications



1. The Business-IT Relationship Becomes a Continuum

A continuous business-IT partnership for application innovation develops a cross-organization culture of collaboration focused on achieving business outcomes through product-style delivery.

In the future state, shared responsibility for the success of business innovation and the distribution of technology-related skills and budgets across an organization transforms the relationship of the business and IT. It changes from one that is distanced and often adversarial to one that evolves over time into a continuum of collaboration in pursuit of a business outcome. As professional skills become more available in business units and as business insight is developed more in central IT, and as development and integration tools are democratized to operate across the organization, a cross-organization business-outcome-driven model of operations becomes pervasive.

2. Product-Style Delivery Partitions Applications Into Business Capabilities

Application vendors and enterprise developers using product-style delivery methods deliver applications as collections of discrete business capabilities, designed and packaged for assembly and integration.

In the future state, cloud computing reduces the cost of entry for application vendors, which results in an increasing number of small SaaS providers delivering new, typically vertical, specialized applications. They are prepared for integration by including a comprehensive collection of APIs and/or event channels. Some are delivered “headless,” with only a basic “starter set” user experience. Assembly of solutions using these specialized capabilities becomes common and forces the major SaaS and

application vendors to rearchitect their relatively strongly coupled application suites into more discrete business capabilities. Users, through their own in-house development, increasingly create the headless application components as well, which are prepared for “multiexperience” and integration.

The granularity of PBCs varies by vendor and over time. The more advanced designs borrow from the architecture of digital twins and represent the complete life cycle functionality and data of a single selected entity, such as a bank account or a work order or a product. Other designs have a larger scope, such as encapsulated management of the procurement process or warehouse management. The best-fit granularity is found in an acceptable balance between the complexities of integration (small building blocks) and change (large building blocks). Vendors deliver PBCs in suites that represent the business responsibility of an entire business unit (such as HR or finance), hoping that customers adopt the entire set. But the more advanced customers make an effort to support multivendor assemblies for greater innovation agility and reduced lock-in.

Business capabilities are delivered in product style, which continuously improves them in terms of operation and intelligence, and the collections of business capabilities are continuously expanded with new capabilities, supported by the product-style development and delivery model.

3. Application Libraries Become Libraries of Business Capabilities

Internal, vendor and open marketplaces emerge to offer preassembled collections or individually packaged business capabilities, which offer access via APIs and event channels.

In the future state, vendor applications and SaaS are sold as libraries of PBCs and priced to reflect the consumed capabilities, thus reducing the overhead of “shelfware” and overprovisioning.

The now fast-adopted API management platforms evolve to support event channels and to recognize related sets of APIs associated with individual PBCs. The PBC sets of APIs, not just the individual APIs common today, become subjects for subscription and governance. API management platforms expand beyond APIs to become marketplaces for PBCs.

4. Democratized Tools Support Business-Managed Assembly of Application Experiences

Organizations use democratized design and development tools, augmented by artificial intelligence (AI), to draw on business capability marketplaces and custom development in order to form role-specific (and individual-specific) business application experiences.

In the future state, assembly of role-specific application experiences and additional custom development may initially be performed by technology professionals in business units or central IT, but it is also performed incrementally by users in different roles. The tools that support this process are designed for developers of different levels of technical skill, and are AI-augmented to guide developers to better and more consistent outcomes (see [“Innovation Insight for AI-Augmented Development”](#)).

The role of democratized tools is crucial, as they are essential to facilitate dynamic business-IT collaboration toward continuously assembled application experiences.

Democratized tools' responsibilities include the design of integration and assembly, development of user experiences (see Note 2), and development of some new PBCs. The leading low-code application and integration platforms are the closest to supporting the new model for the application experience.

5. Integration Is an Essential Enabler of New Application Experiences

At runtime, assembled application experiences operate on a hybrid integration platform that provides governance, security, interoperability, scale and adaptability.

In the future state, runtime governance and security assurance for such assembled application experiences are critical to success. They are managed by advanced hybrid infrastructure suitable for supervising, scaling, and securing deployment and integration of PBCs over time and across platforms, technologies and architectures.

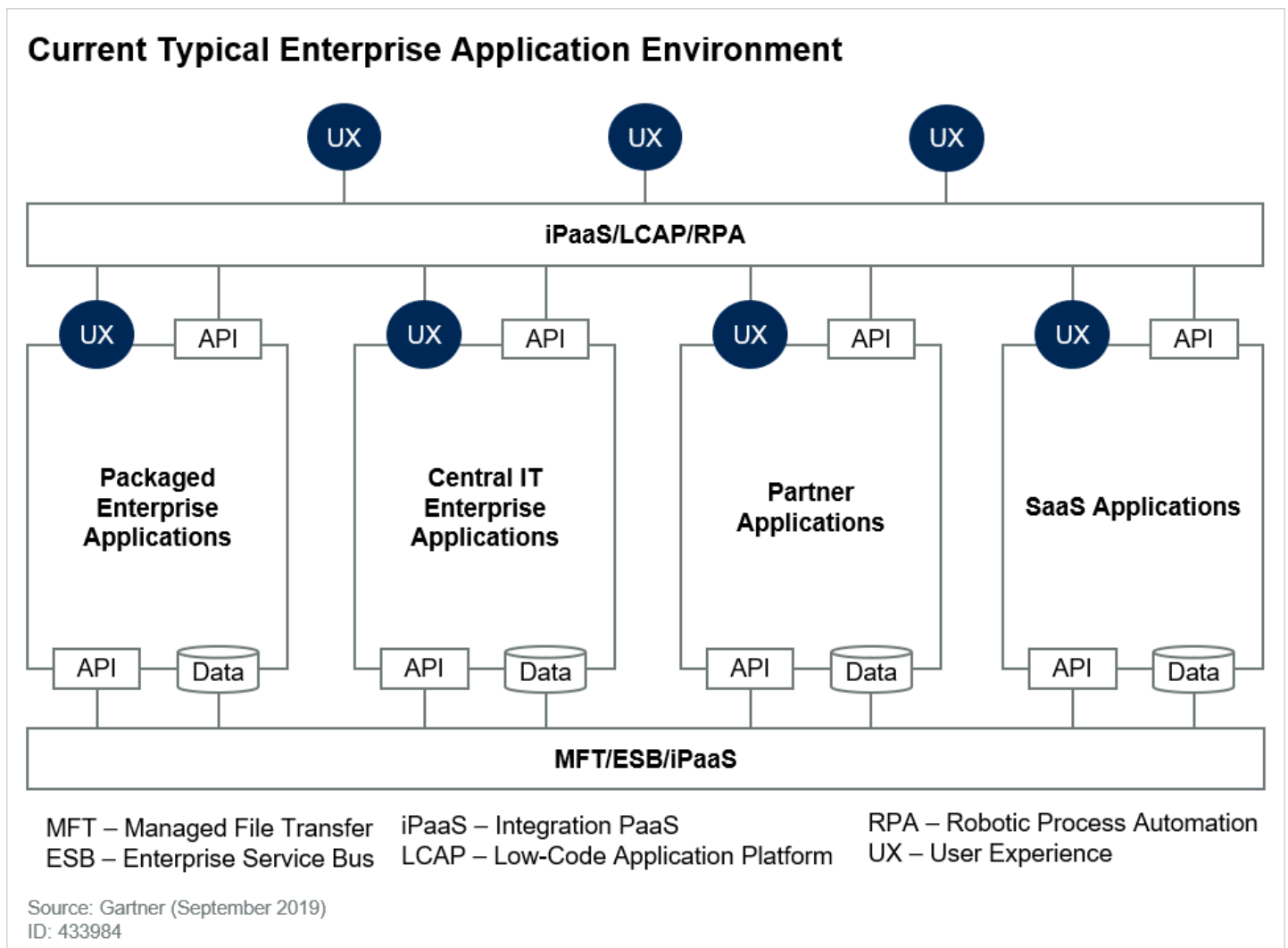
Tools that enable assembly of custom experiences by business users and that then facilitate secure runtime operation of the integrated assembly are crucial to this model's success. Today's low-code development, integration, composition and governance tools are early representations of these capabilities.

Current State

The current state of the business application experience reflects the long-established premise that major applications, created by vendors or enterprise IT teams, deliver monolithic collections of capabilities to manage the operation of whole business units (for example, sales, HR and accounting). Employees performing individual tasks and carrying out the responsibilities of specific roles are left to figure out the relevant subset/superset of available capabilities and cope with frequent changes to the applications, which may target different roles. This has led to individuals or business units procuring their own applications to augment the major applications in order to access the additional or different capabilities needed for certain jobs (the "shadow IT" phenomenon).

Increasingly, applications expose APIs to add some agility and open up some access, but these APIs are still used mostly for tactical postprocessing (see Figure 3). Even with APIs, most applications are internally entangled and must be deployed and used as a whole. As the number of APIs increases, the complexity of integration increases as well. API management and integration technologies are now widely deployed to manage this challenge. Leading application vendors, such as SAP, Workday and Oracle, are gradually partitioning their major applications into smaller components, which will lead to the PBCs of the future.

Figure 3. Current Typical Enterprise Application Environment



1. Business-IT Relationship Is Partly Distant

As IT competence and budget are increasingly distributed across an organization, central IT may seek to retain control, with the result that collaboration with business units is strained.

The consumerization of IT and ubiquitous access to the cloud have liberated business units from complete dependence on central IT for access to information systems. Over time, the increasingly central role that information and technology plays in business across organizations has given business units the skills and budgets to operate increasingly independently of central IT. Leading organizations see the role of their IT departments changing from paternalistic provider to peer advisor (see [“Scaling Digital Business Requires an Enterprise Operating Model Perspective”](#)).

Most organizations continue to pursue defensive central IT strategies and their business-IT relationships still result in partly adversarial experiences.

The future demands change in the direction of productive business-IT collaboration.

2. Applications Are Project-Delivered in Their Entirety

Vendors and central IT mostly “project deliver” applications as self-contained suites designed and packaged for independent (stove-pipe-style) operation. Although some product-style delivery is beginning to be used, the full impact of this new approach has yet to be absorbed into the organization’s culture and practices. Integration is typically a postdeployment afterthought.

According to [Conway’s law](#), rigid organizations are incapable of delivering agile applications. As most organizations are structured to operate large-scale built or purchased applications, delivered in project style, they are experiencing difficulties producing and managing product-style application life cycles (see [“2019 Strategic Roadmap for Becoming a Digital Product Delivery Organization”](#)). The traditional structure of an organization forces a project-style approach to application management, and traditionally funded and project-delivered applications reinforce traditional organizational practices, thus creating a self-fulfilling loop of obstruction. Most applications continue to target large swaths of customer responsibilities, contain significant internal entanglements, and use integration mostly for interapplication postprocess data sharing.

Few applications target roles — most address either specific tasks (such as credit verification and processing of financial transactions) or entire business units (such as sales and HR).

The future demands a transition to incremental delivery and active assembly of business capabilities aimed at delivering role-centric application experiences.

3. Applications Retain Internal Interdependencies Despite APIs

Application APIs expose some functionality, but are used mostly for integration or user experience connectivity, and act as veneers on otherwise still internally tangled applications.

APIs are widely recognized as a modern feature of business applications. However, the internal design of applications remains relatively monolithic, and APIs are typically used for interapplication integration or for mobile or other client access to applications. Few APIs represent encapsulated and independently deployable business capabilities. As their name suggests, most are simply programmatic interfaces to application software that retains a large scope of functionality and, with that, dependencies that “lock in” the use of APIs. Some APIs are published as marketable products, but most of these expose data, not business capabilities.

Gartner’s model of the future of applications depends on active assembly of significantly autonomous PBCs, their APIs untangled from the semantics of the rest of their application suite.

4. Low-Code Tools Are Used Mostly for Tactical Development

Low-code development tools are gaining acceptance, but central IT often remains committed to advanced professional coding environments.

Most major applications sold as a service (as SaaS) or software, or that are developed in-house, deliver a complete set of capabilities that represents part of the business organization. But, in their various roles, business users carry out tasks that are both a subset and a superset of the formal business models implied by these applications' vendors.

Low-code tools are available, but their "assembly" of external capabilities mostly represents an API integration action between major applications. Business capabilities are not isolated. APIs offer extensibility but require access to the entire holding application that delivers them, which degrades the assembly experience. Low-code tools themselves are not designed for the creation of autonomous PBCs, either.

The future will require business users to be equipped to create application experiences that support their responsibilities without the "noise" of overprovisioned features and with the ability to adjust the experience using dedicated low-code tools.

5. Integration Is Mostly Dedicated to Correcting Application Incompatibilities

We estimate that 90% of organizations deploy applications across a hybrid cloud/on-premises environment, but half lack the systematic investment to operate efficiently in this way or to innovate at scale.

Although application integration has posed a challenge for decades, it remains an afterthought for over half of organizations, judging from discussions with users of Gartner's client inquiry service. This is because the architecture of applications used by their organizations remains largely semantically, if not physically, monolithic. Such applications do not require much internal integration, and interapplication integration is a lower priority than direct application services, often still being achieved through managed file transfer and traditional enterprise service bus technologies.

The increasing investment by many enterprises in a hybrid integration platform as a strategic cross-organization initiative is a sign of significant progress.

Future applications will be in part assembled from PBCs, and their application experiences and business outcomes will therefore depend on the integrity and competitive quality of the underlying platform for assembly and integration.

Gap Analysis and Interdependencies

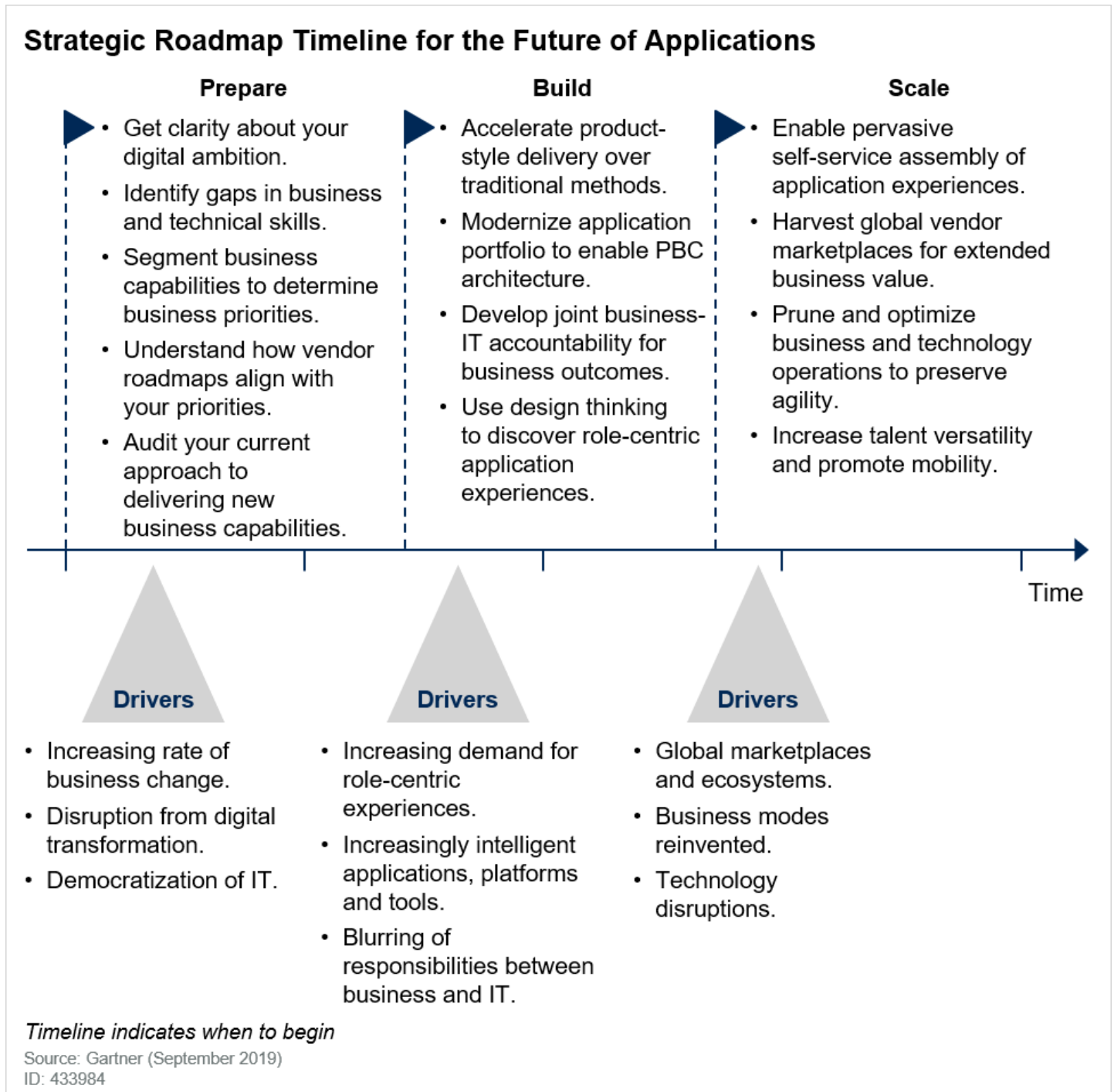
The process of modernizing and transforming the business and IT for the application experiences of the future is one of gradual evolution across the gaps between an organization's current operating and cultural environment and the essentials of its future state. These gaps may include:

- The relationship between the business and central IT, which is typically characterized by a lack of full trust and which remains a work in progress. Best practices and tools for collaboration are insufficient. Cultural attitudes are not yet broadly established to enable pervasive joint business-IT application innovation.
- Most applications continuing to be delivered as projects, despite improvements from the shift to agile development practices. This keeps an organization's application costs high and its pace of innovation relatively slow.
- Nascent API management, which is not articulated in terms of self-contained business capabilities. Little attention is paid to role-specific and dynamic application experiences.
- Business applications, built or bought, not recognizing the diversity and uniqueness of role-specific or individual user responsibilities. Application users are left in their various roles to cope with excessive application complexity in order to fulfill their specific responsibilities. As a result, employee engagement in business innovation suffers.
- Integration remaining largely fragmented. Organizations are not prepared to consistently manage an application environment that is continuously changing and expanding.

Migration Plan

The journey to the future of applications will be gradual, and different organizations will travel at different speeds. All organizations will have one thing in common, however: they will find it perilous to skip stages in the process of learning and building maturity. The stages of the roadmap are the same for everyone, although actual experiences and timings will differ (see Figure 4).

Figure 4. Strategic Roadmap Timeline for the Future of Applications



Drivers of Change Build Up Over Time

Various drivers that force an organization to move forward become significant at different times, depending on its history, context and culture.

Early Drivers Are Here Today

Early drivers may include:

- **Increasing rate of business change:** The more competitive markets are more sensitive to this driver.

- **Disruption from digital transformation:** The more risk-tolerant organizations are more likely to face the transformative demands of digital business innovation early.
- **Democratization of IT:** Business units that are actively taking charge of their information and technology resources force organizations to rethink the distribution of their IT responsibilities and budgets.

Innovation Is Contagious: New Drivers Emerge to Push Organizations Further

At later stages on the roadmap, new drivers will emerge to propel an organization's innovation and transformation forward:

- **Increasing demand for role-centric experiences:** To increase the quality of business outcomes and the pace of business innovation, organizations look to provide employees with application experiences suited specifically to their roles and personal responsibilities. This avoids the complexity inherent in having to cope with overprovisioned general-purpose applications.
- **Increasingly intelligent applications, platforms and tools:** AI and machine learning are penetrating applications and platforms. Organizations are looking to provide application users with a new generation of development tools that are easier to use for more advanced outcomes, pose less risk and entail less cost (see ["2019 CIO Survey: CIOs Have Awoken to the Importance of AI"](#)).
- **Blurring of responsibilities between business and IT:** Early experiences of collaborative efforts involving contributions from business and IT make it clear that new policies, technologies and cultural norms are essential for the later stages of digital transformation in which business and IT become part of a continuum.

With Digital Maturity Increasing, Innovation Becomes Transformation

Approaching maturity in the transformation of their application experiences, businesses take on larger challenges, aiming for larger business outcomes:

- **Global marketplaces and ecosystems:** Business opportunities that exist outside the traditional space of an organization's operations become more accessible as its competencies, culture and technology progress toward digital business competence. Participation in marketplaces and ecosystems, and the ability to form them, becomes essential to most business and technology decisions.
- **Business modes reinvented:** New business models, such as platform business and decentralized commerce, become accessible that depend on "digital native" technologies and business policies.
- **Technology disruptions:** New technologies, such as blockchain and quantum computing, can open up opportunities for brand-new business outcomes. Organizations that have progressively evolved toward digital business are the first to take advantage of them.

Navigate the Roadmap Gradually: Prepare, Build and Then Scale

In response to emerging drivers for change, organizations gradually navigate their priorities on the road to the future of applications:

- The early priority on this path is to *prepare* for transformative changes by adjusting and engaging in new forms of activity and technology (the more advanced organizations may be well into, or already past, this stage in 2020).
- Once prepared, organizations are ready for the next priority, namely to *build* new solutions and organizational practices (this is the challenge awaiting most organizations in 2020).
- Once successful with early transformative changes, an organization needs to *scale* its innovation, investment and business in order to maximize the benefits of digital business transformation.

Higher Priority (Prepare)

- **Get clarity about your digital ambition:** How is your business strategy changing to support digital transformation goals (see [“Propose a Digital Ambition Workshop to Jump-Start Your Digital Journey”](#))? This will help prioritize activity to deliver the future of applications. Your efforts will vary significantly, depending on whether the strategic focus is continued optimization of existing products and services or business model transformation (or a combination of both).
- **Understand how vendor roadmaps align with your priorities:** Understand how their roadmaps help or hinder your emerging roadmap. How could the mix of vendors change, based on which are more aligned with your digital ambitions? Start identifying and planning for changes in how software is purchased, delivered and consumed to avoid erecting barriers to achieving your desired outcomes.
- **Identify gaps in business and technical skills:** Strive to understand the current IT team’s capabilities, skills and knowledge (both technical and business) and where there are gaps, in relation to the emerging roadmap. Identify different approaches to upskilling current staff (use of job rotation, multidisciplinary teams and mentoring, for example) and start redefining job descriptions to ensure you hire for future needs, not past needs. You will likely have to use third-party service providers to augment your capabilities, which can also be an opportunity for training.
- **Assess the current technology base:** Can you access technology for integration, low-code development, product-style DevOps, API management, event processing, security and governance to support the gradual transition of applications from monolithic suites to collections of building blocks in the form of PBCs? Develop a technology inventory in preparation for “filling in the blanks” where technology is lacking and to avoid duplicating technology investment where it is not necessary.
- **Audit your current approach to delivering new business capabilities:** Check the mix of approaches (including waterfall, iterative and agile), the time horizons for delivery, and the success rates. Your digital ambition will almost certainly require a major shift toward agile delivery to match the desired pace of business change. Look for deficiencies in current delivery capabilities to identify targets for improvement. Use Gartner’s IT Score maturity assessment to identify a benchmark and get recommendations for where and how to improve (see [“IT Score for Enterprise Architecture &](#)

Technology Innovation"). Many organizations are adopting product management disciplines to create the right mix of speed, quality, focus on outcomes and life cycle management.

Medium Priority (Build)

- **Accelerate product-style delivery over traditional methods:** To deliver application functionality gradually and continuously, an application must be designed to consist of significantly independent components, each representing a concise and complete business capability. Development and DevOps tools must recognize this architecture and support encapsulation and adaptive assembly. Reject external applications that remain monolithic.
- **Modernize the application portfolio to enable PBC architecture:** Give preference to application and platform vendors that recognize the architectural principles and structural consequences of the assembly-based model of delivering application experiences. In your design, use APIs and event streams everywhere and gradually repackage older applications in a way that isolates their discrete business capabilities. Look for opportunities to retire or consolidate applications to evolve to a more rationally funded and manageable architecture.
- **Develop joint business-IT accountability for business outcomes:** Partitioning of an application into its business capabilities is best accomplished when technical and business values are considered together. The success of the future of applications therefore depends on organizations' ability to bring business and IT together for collaborative and continuous creative work.
- **Use design thinking and customer journey maps to discover role-centric application experiences:** To serve application users well, whether they be employees, partners or customers, start by understanding the priorities and objectives of individual roles inside the organization and allow personal preferences and best practices to be accommodated during application assembly. Begin with the end in mind: The customer's application experience should drive the technical design, not the other way around.

Lower Priority (Scale)

- **Enable pervasive self-service assembly of application experiences:** From dedicated specialists trained to assemble business capabilities for role-centric application experiences, the initiative must migrate eventually to the users of the applications. Well-implemented, democratized, augmented tools and well-designed PBCs will help make self-service pervasive. You will also need to evolve your approach to sourcing packaged capabilities to reflect new consumption and delivery models from vendors.
- **Harvest global vendor marketplaces for extended business value:** Well-functioning assembly, integration and secure governance operations enable organizations to broaden their business innovation opportunities by looking beyond familiar sources of business capabilities to global PBC markets and ecosystems populated by smaller and more specialized vendors.
- **Prune and optimize business and technology operations to preserve agility:** To retain the openness and agility required for fast, safe and effective continuous innovation, organizations must

continuously work to prevent (or reduce) the growth of technical debt. To do so, they must learn not just how to create great new solutions, but also how to replace or remove solutions that have lost most or all of their business utility.

- **Increase talent versatility and promote mobility:** Success of the transition to the future of applications will depend on the organization having continued access to required and inspired competencies. The fast pace of innovation puts significant pressure on people in an organization because they are required to learn and change at a faster pace. To take new applications and business models from isolated success to pervasive presence, an organization must retain, train and inspire all its people. The development of joint business-IT product teams is a proven way to develop versatility in an organization and to promote a culture of collaboration.

An inclusive organizational culture of innovation and learning is essential for success on the road to the future of applications.

Additional research by Jason Wong and Chris Howard

Note 1

Packaged Business Capabilities

Packaged business capabilities (PBCs) are miniapplications — sometimes “headless” (that is, having minimal or no user experience components) — designed to represent an isolated business capability. A PBC takes the form of an encapsulated software package, designed as a building block for the assembly of custom application experiences.

Organizations have become burdened by full-scale applications such as today’s ERP and CRM offerings. These applications’ size and internal entanglement result in high costs, difficult-to-maintain customizations and slow innovation — all of which act as barriers on the road to digital transformation and the future of applications.

APIs represent an early response to these challenges. Each exposes a specific function of an application for external access. All major applications today expose APIs for integration and extension. However, the APIs of large multifunctional applications cannot eliminate the internal entanglement of their architecture: The semantic dependencies are still present and changes for the benefit of individual APIs cannot be delivered independently. Use of the APIs fronting major applications also does not eliminate lock-in to those applications’ core business models. Additionally, most APIs (being *programming* interfaces) are designed by technical engineers and are not easily understood or used by business designers.

PBCs are emerging as the middle ground between full-scale applications and APIs. Many organizations, including application vendors, planning or executing digital transformation roadmaps are gradually modernizing (or replacing) their tightly coupled traditional application suites as they move toward modular collections of PBCs. PBCs may collectively have the same business scope, but they are implemented with openness for product-style delivery and assembly.

Note 2

User Experience vs. Application Experience

A user experience is the experience of interacting with an application at any given time.

An application experience is the experience of obtaining and evolving an application's capabilities. It includes the practices of selectively assembling business capabilities, upgrading and replacing these, and seizing opportunities to add new capabilities and user experiences using suitable tools.

Recommended by the Authors

[Kick-Start Your Composable Business Journey With 2 Key Strategies](#)

[Use Gartner's Reference Model to Deliver Intelligent Composable Business Applications](#)

[How to Derive Value From APIs Using API Marketplaces](#)

[Application Leaders: Master Composable Enterprise Thinking for Your Post-COVID-19 Reset](#)

[2021 Strategic Roadmap For The Composable Future Of Applications](#)

[Innovation Insight for Packaged Business Capabilities and Their Role in the Future Composable Enterprise](#)

[Toolkit: Composable Business Index From the 2020 Gartner IT Symposium/Xpo Keynote](#)

[The Applications of the Future Will Be Founded on Democratized, Self-Service Integration](#)

[Managing the Consumption of Third-Party APIs](#)

[The Future of ERP Is Composable](#)

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