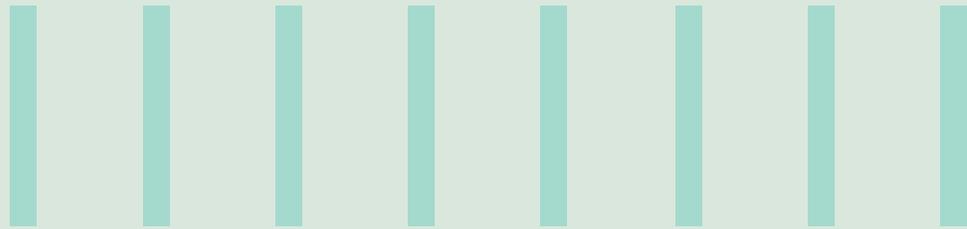


AN APPROACH TO WEB APPLICATION CONSOLIDATION



Introduction

Organizations are increasingly realizing the power of digitization as well as the benefits and new avenues it will provide for their growth. Becoming a mature, digital enterprise needs changes in both IT and business processes. New digital technologies need to be adopted by the organization, new business processes

put in place, and people must be trained in order to use them to improve their ability and provide more efficient services. One of the main challenges in adopting digital technologies is the complex nature of existing applications in large organizations, which must be replaced with a consolidated digital solution.

We need to have a robust application consolidation strategy to accomplish the goal of smooth transition. This paper will elaborate on the pain points with multiple web applications and a process that can be used by organizations to accomplish web application consolidation.





Drivers for application consolidation

Let us look at the key motivating factors for application consolidation:

- Application silos, which lead to effort duplication and quality issues
- Lack of a unified 'one-stop-shop' experience
- Impact on user and employee productivity due to varied experiences
- Non-standardized technology stack
- Lack of common standards across the enterprise such as service-based integration and HTML standards
- Simplification of business processes
- Inconsistent user experience – lacking a standard experience with easy navigation
- Difficulty in onboarding new applications
- To facilitate smoother and efficient enterprise application integration
- Implementation of security standards such as SSO
- Ease maintenance efforts and efficient user management
- Reduce functionality duplication and enhance reusability through consolidation
- Reduction of operational costs

Consolidation happens at many layers such as back-end consolidation, CMS, services, etc. In this paper, we will mainly focus on front-end web application consolidation. Wherever required, we will also call out the required consolidations needed in other layers.

Challenges with fragmented web applications

Having multiple web applications will typically increase operational costs. Some of the pain points of having fragmented web applications are as listed below:

- Complex business operating models
- High costs of managing multiple portals
- Inconsistent branding across channels and marketing initiatives
- Competitor pressures
- Saturated sales
- Dissatisfied online customers
- Multiple user IDs and passwords

The aforementioned pain points should be enough of an indication to opt for application consolidation, which will create more synergies between various organization units, and at the same time, provide a unified external interface for customers and employees. Some of the

objectives that can be achieved by a consolidated portal platform are listed below:

- Cost efficiencies
- Brand consistency
- Risk management
- Improved quality – better user experience
- Accelerated time-to-market

These disjointed applications could have come about as a result of mergers and acquisitions or the lack of a defined digital roadmap, but will ultimately be a huge drain on the organization's resources. They will affect both internal users, like employees, as well as external users such as customers and partners. Some of these effects are as listed below:

	External users (Customers / partners)		Internal users (Employees)
	<ul style="list-style-type: none">• Time consuming and inflexible• Same customer will need to have multiple accounts to avail different services• Partners may have to use multiple systems to complete transactions or may also be involved in physical transactions		<ul style="list-style-type: none">• Lack of automation and delinked portals decreases efficiency and increases duplication of effort• Multiple web applications result in multiple support teams, thus reducing support efficiency• Data inconsistency across applications may create operational issues

Enterprise and web portals are the primary tools used in application consolidation. However, the concepts discussed in this paper could be implemented using other competitive web technologies as

well. Normally, portal products have an edge as they provide many out-of-the-box components needed for application consolidation.



Web / Portal consolidation

The consolidation of web applications to a common portal platform needs to be taken

up in a phased approach and will require careful planning and execution. High

level phases that may be included are as depicted below:

Phase 1

Build the consolidated portal as a gateway to all enterprise applications and use link-based integration to expose the functionality through portal layers.

Phase 2

Implement SSO and phase-wise application migration to the new portal platform.

Required data and content migration to be done.

Phase 3

Complete migration of all applications to the new portal platform.

Phase 1

This phase will include building the base portal infrastructure and doing a UI-level integration to expose the existing applications – using portal technologies. In an iterative release, typically, this is the first phase of the release, wherein we could quickly create a landing page acting as a gateway for enterprise applications through link-based integration.

Phase 2

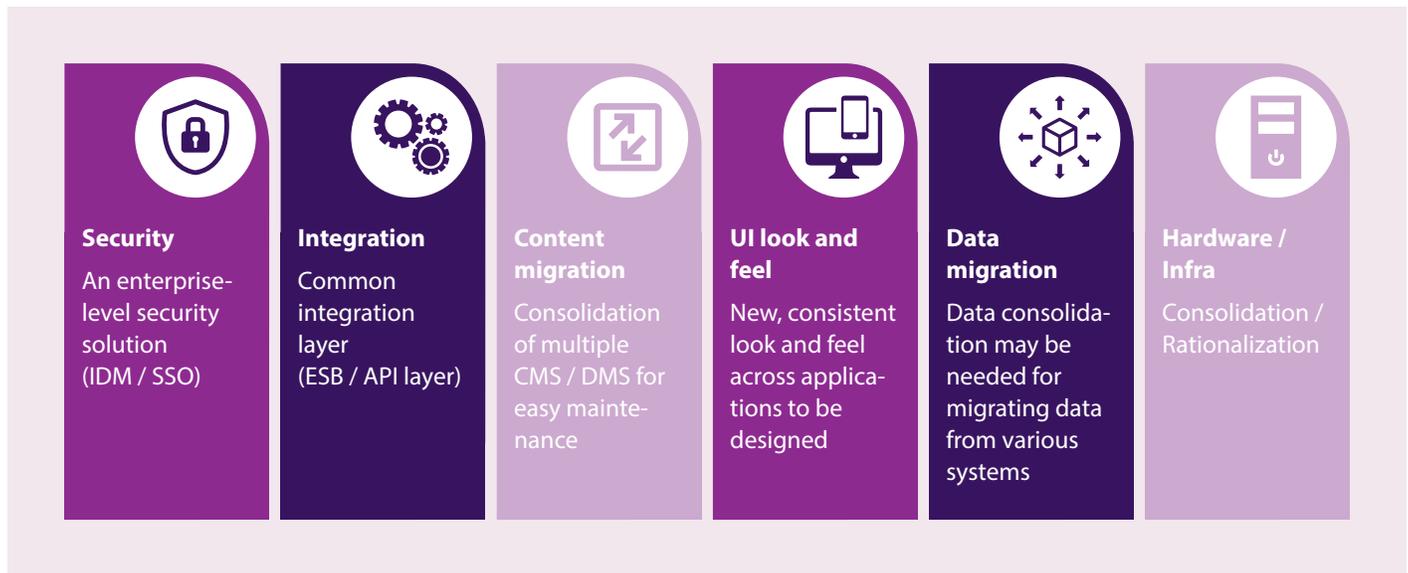
Once the initial platform is setup, we can start with the planned migration of existing web applications to the new platform. Each application migration should be planned independently and any reusable functionality should be identified to reduce the implementation effort. As a part of this phase, we should also consolidate all the back-end data. This needs database consolidation, CMS consolidation, user repository consolidation, services consolidation, asset consolidation, document consolidation, and any custom data consolidation. This can be planned in a traditional waterfall model or as an agile model based on application complexities. This phase also needs to have a central SSO solution to be put in place for seamless integration between application layers.

Phase 3

Complete the migration of all applications to the new platform to conclude the consolidation process.

Considerations for application consolidation

The diagram below shows the key areas that need to be taken into account when considering portal consolidation:



Security: During the process of application consolidation, an enterprise-level single sign-on (identity management) solution is inevitable. This solution is required to have a centralized user management and must also provide seamless navigation across applications.

Integration: While designing a new enterprise-consolidated portal, it is always recommended to have a middleware layer (ESB / MQ), which will ensure that a loose coupling between the web application and back-end systems exists. This also provides flexibility to expose generic services, which can be reused across applications and can reduce the security risk by masking the back-end systems. This will also make it easy to onboard new applications in the future.

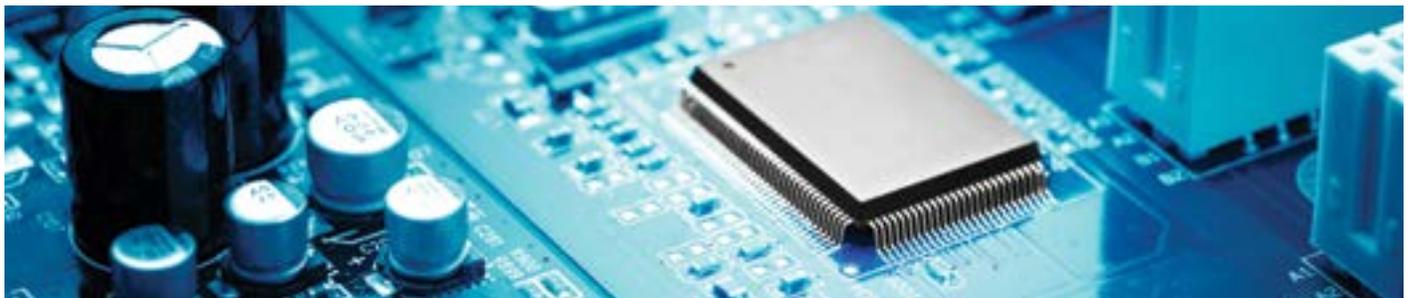
Content migration: Typically, most web applications are content-heavy and may

have content existing in multiple systems. During portal consolidation, it is also recommended to consolidate the content across these systems. This will reduce the operational effort of maintaining multiple content management systems and will reduce the effort required for content creation across varied systems.

UI look and feel: A new look and feel will be needed for the consolidated portal and should be given priority so that a user-friendly and extensible user interface with the ability to provide dynamic UI is made available. The UI should also be lightweight and highly responsive and it should satisfy multiple device configurations and resolutions. This is a very important aspect since the majority of users are moving towards mobile-based usage and transactions and the lack of a responsive UI will affect user adoption.

Data migration: Data is another area which may need to be consolidated. If any data migration is required, it should ideally be planned beforehand as the application design may vary based on the source from which the data is going to be accessed. Migration can also be a tedious task, so it needs to be well-planned to be carried out in parallel with the portal implementation.

Hardware / Infrastructure: The last consideration, but definitely not the least, is hardware, which may be one of the most time- and resource-consuming parts of the application. The infrastructure needs to be carefully planned, well in advance, and any reusable hardware needs to be identified and used as and when needed. If the cloud-based infra is being looked at, then an accurate sizing needs to be done and all aspects of security and connectivity need to be taken care of.



Various options for application consolidation

Given below are some of the various options for application consolidation. We have also listed their pros and cons to help select the method best suited for a given scenario.

Application consolidation method	Brief description	Pros	Cons	Suitable scenarios
Link-based consolidation	Gateway or landing page links to all enterprise applications	<ul style="list-style-type: none"> • Easy-to-build • Quickly consolidates various applications • Does not need any back-end changes 	<ul style="list-style-type: none"> • Disjointed user experience • Potential user login during inter-application navigation 	Could be used as the first phase of application consolidation
iFrame-based consolidation	Discrete applications consolidated through iFrames	<ul style="list-style-type: none"> • Easy-to-build • Consolidation happens without application migration • Does not need any back-end change 	<ul style="list-style-type: none"> • Inherent design issues due to iFrame-based integration • Least preferred due to security and browser support issues 	Could be used to integrate applications developed in varied technologies
Screen scraping / clipping-based consolidation	Web page content is clipped through marker HTML tags	<ul style="list-style-type: none"> • Consolidation happens without application migration 	<ul style="list-style-type: none"> • Disjointed user experience • Needs updates on source web applications 	Could be used for applications that can be modified
Application migration	Migrate all legacy and enterprise applications to the new platform. Need to migrate all related data, content, and user details	<ul style="list-style-type: none"> • Cleanest and flexible consolidation method • Aids future application onboarding 	Often time-consuming and requires a lot of effort	Used when decommissioning outdated or legacy applications
Services-based consolidation	Existing applications expose services (SOAP, WSRP, or REST), which could be consumed by the end system	<ul style="list-style-type: none"> • Elegant and flexible application consolidation • Easy onboarding of future applications 	<ul style="list-style-type: none"> • Needs extra effort in build services • Enforcing security and data integrity could be a challenge 	This method can be used when the source systems expose services for consumers.
Component-based consolidation	Source applications can be componentized in the standard forms such as portlets or widgets and they could be used as plug-ins to the new platform	<ul style="list-style-type: none"> • Provides plug-and-play architecture 	<ul style="list-style-type: none"> • Needs extra effort in building application components 	Could be used when existing applications provide support for standard components (such as JSR portlets, JavaScript widgets)

Based on our experience, the two most popular application consolidation

approaches are services-based consolidation and application migration to

the new platform, such as enterprise portal platform.

Best practices of application consolidation

The key best practices of application consolidation are given below. We have categorized the best practices into three categories.

Best practices before application consolidation

- **PoC-based feasibility evaluation:** Evaluate various consolidation approaches through proof-of-concept to understand feasibility and select the most appropriate option. We could also undertake a pilot consolidation to assess the feasibility of the approach.
- **Consolidation governance:** Define the processes, roles, and responsibilities needed for consolidating various enterprise applications.
- **Experience improvement:** Assess the existing user experience challenges and pain points and identify opportunities to improve the user experience to meet customer expectations. This includes identifying opportunities to create a uniform and consistent user interface, improving information architecture, friendlier navigation models, enabling omnichannel experience, improving accessibility, etc.
- **Stakeholder communication:** The

impact and schedule of the application consolidation should be communicated with all the concerned stakeholders. This would help get their buy-in for the application consolidation exercise.

Best practices during application consolidation

- **Iterative approach:** Always consolidate in phases as big-bang, single-shot consolidation carries a huge risk of failure.
- **Infrastructure consolidation:** The application consolidation exercise would also provide an opportunity to consolidate all underlying infrastructure components. For instance, when we consolidate enterprise content, we can migrate all the enterprise content into an enterprise CMS platform and discard infrastructure components for other CMS platforms.
- **Back-end data consolidation:** Consider and evaluate related back-end data migration along with application consolidation. Without back-end-data consolidation, we would face data integrity and data duplicity issues.
- **Security system consolidation:** Security systems of the enterprise need to

be consolidated through user data migration to single-user-registry platforms, design, and implementation of single sign-on (SSO), definition of enterprise-wide roles, and permissions.

- **Parallel site maintenance process:** If we are planning to maintain both the newly-created consolidated application and the original application, we need to establish processes to synchronize data across both applications.

Best practices after application consolidation

- **Standard technology stack:** It is always recommended to use standard components in the ecosystem post-application consolidation.
- **Usage of open standards:** Adopt open standards and industry best practices for the consolidated application.
- **Defining uniform processes, metrics, SLAs, and goals and monitoring:** Establish uniform processes for managing and enhancing the consolidated application. Define SLAs and goals to track key metrics for the consolidated application and constantly monitor the consolidated application based on these metrics.

Case study: Application consolidation exercise for a retail organization

We have considered a retail case study to illustrate various aspects of application consolidation.

Current state and pain points

In a global retail organization, the online channel has a different user experience in each of the countries that it operates in. The main front-end retail web application depends on a lot of enterprise applications such as commerce system, loyalty system, content management system, etc. Currently, each of the enterprise applications has its own security systems.

Due to this setup, a user has to log in multiple times during a navigation journey and faces an inconsistent brand experience. The purchase experience as well as the shopping process is not consistent. Multi-step, cumbersome business processes impact user productivity and cross-sell / upsell opportunities. Multiple systems and applications also result in higher operations costs.

The retail organization wants to provide a unified experience through application consolidation.

Portal-based consolidation

Let us discuss the application consolidation approach for this case study.

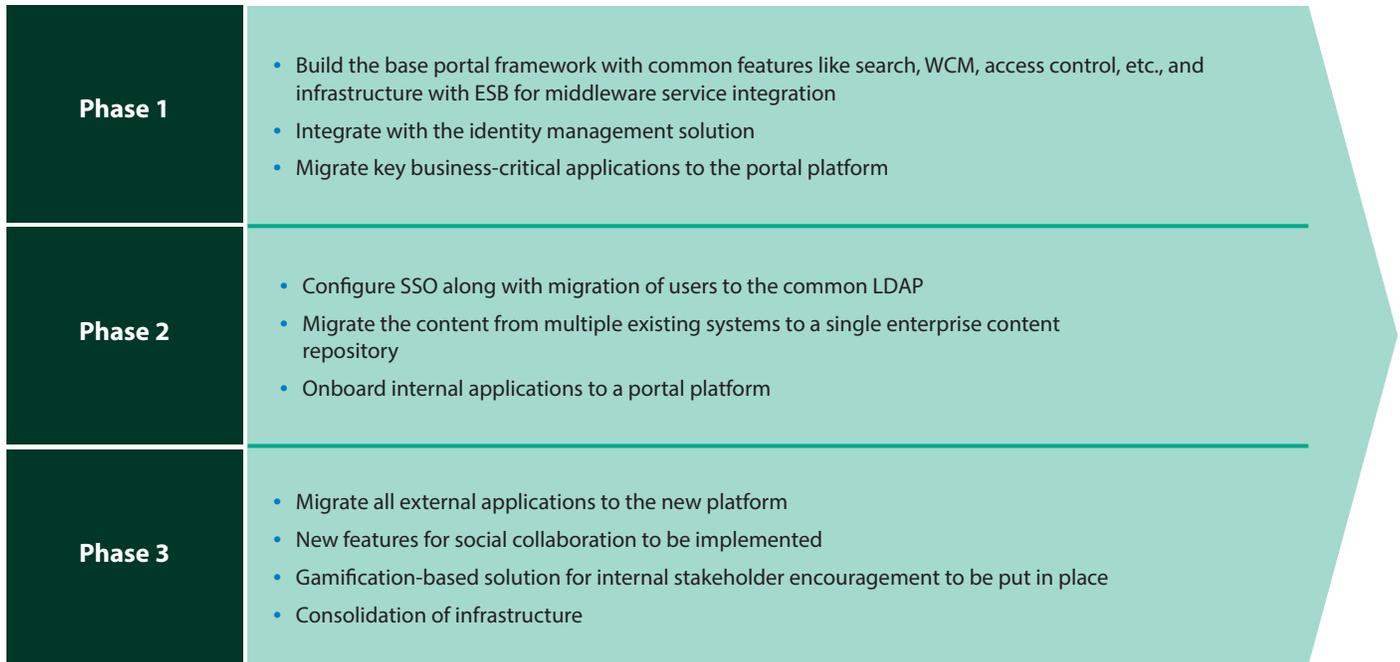
A discovery phase was planned as a part of which the application inventory was prepared with all the required details both from a technical and functional perspective. The functionalities were studied to identify common use cases, which could be consolidated across applications. Based on the current application inventory, a future consolidated application list was prepared.

The future ecosystem was brainstormed with all the required stakeholders representing all the applications. The list was taken to the IT team to design the base framework, which could support these applications and also be flexible enough to

onboard the applications in a short span of time.

In parallel, the stakeholders along with senior management, worked on the prioritization of the applications that

needed to be consolidated. A high-level plan was prepared for the consolidation work, with multiple phases spread across 18 months as shown below:



Before the start of the phase-wise implementation, standard architecture and UX designs were provided by the IT and branding teams. The UX was then extended as a part of the implementation to all the applications as they were onboarded to the new platform.

As part of the process, new features were identified, which could enhance the effectiveness of the new platform and increase the user adoption like collaboration and gamification. The list of applications that needed to be consolidated was prioritized based on their business criticality.

Phase 1: Core portal platform development

As part of this initial phase, the base framework for the new portal solution was created with all the basic integrations like security, database, and CMS in place. The integration middleware (ESB) was

put in place. Business-critical applications were selected to be onboarded to the new platform – to test all the integrations and the services consumed by these applications – and were configured at the ESB to be exposed to the portal layer. Once the initial teething issues of the environment were resolved and the environment was stabilized, the second phase commenced.

As a part of application migration, the user interface of all consolidated applications were migrated to the new platform, which provided a consistent brand experience as well as a uniform look and feel.

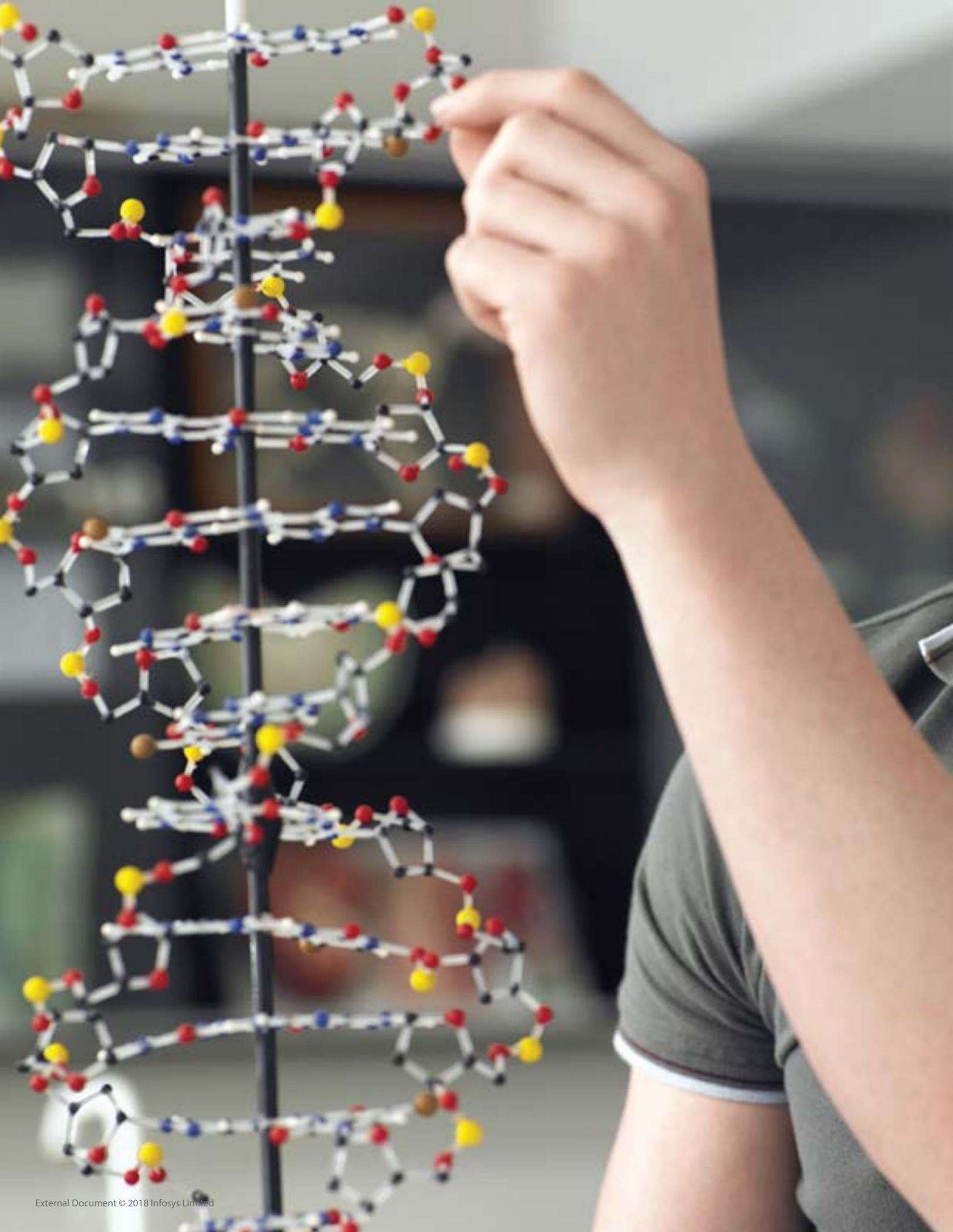
Phase 2: Iterative application migration

As part of phase 2, some of the remaining applications were migrated to the new platform in iterative mode. The services related to these applications were also configured to be exposed through the ESB. The users relevant to these applications

were migrated to the new centralized user repository to be used by the new portal platform. The content related to these applications was also migrated to the new central content management system and enterprise database respectively. The content and user consolidation was done taking into consideration the best practices to avoid duplicates and to maintain data integrity.

Phase 3: Enablement of all required capabilities in consolidated application

As part of the final phase, all the remaining applications were migrated to the new platform along with the relevant content and the users. The new features identified, like collaboration and gamification, were implemented on the portal. The governance model defined was put in place for future enhancements. Underlying infrastructure for all applications were also consolidated.

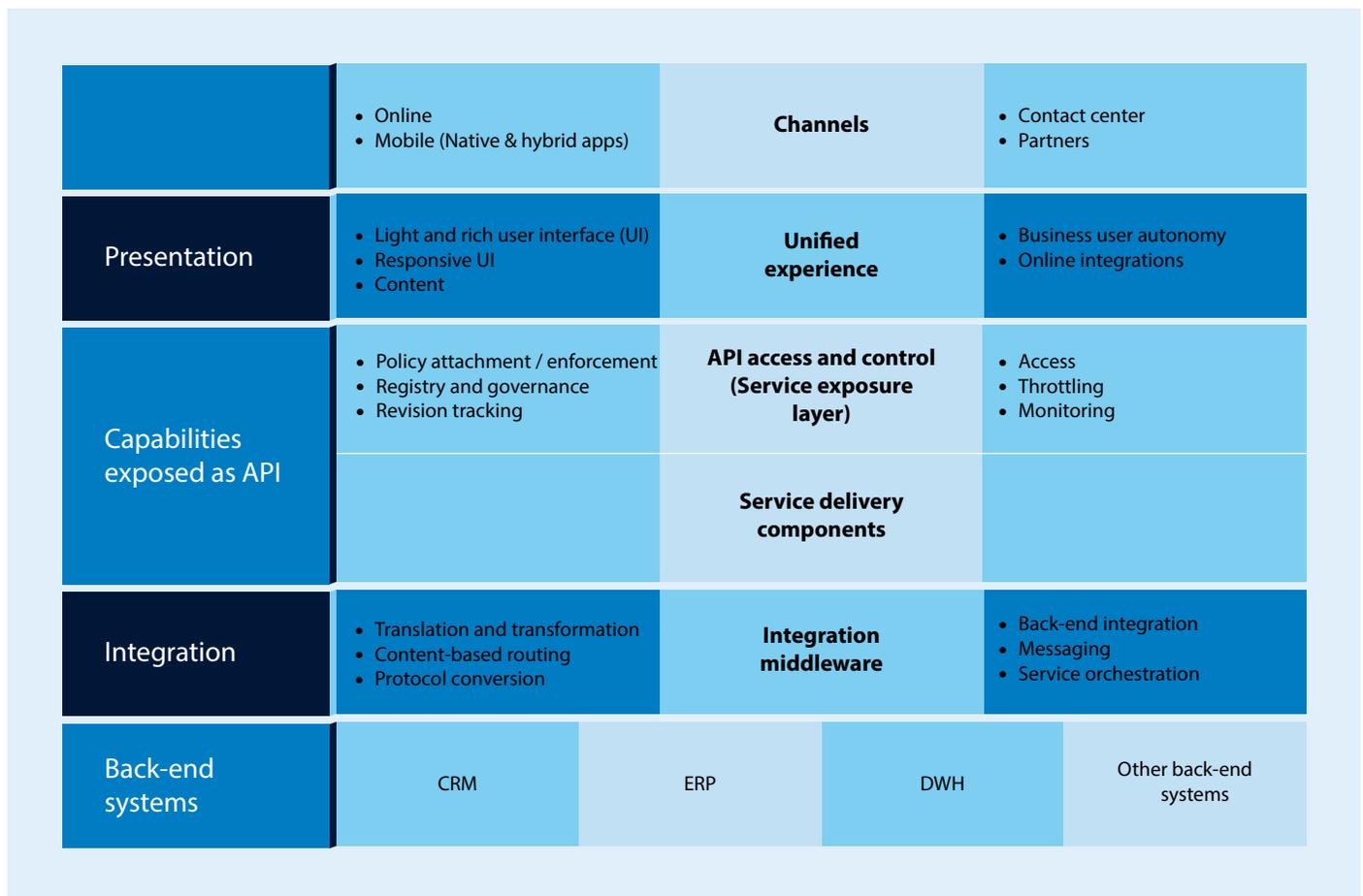


Results of application consolidation

The key outcomes of application consolidation are as follows:

- A brand new user experience was developed based on responsive technologies with a common look and feel, consistent branding, and standard and predictable navigation
- Unified dashboard views were created for users to view all their activities and transactions across various channels
- All old and outdated applications such as loyalty application, registration application, and policy application were decommissioned and migrated to the new portal platform
- Legacy platforms such as ERP systems were consolidated through services-based integration
- The new enterprise portal platform provided a lot of intuitive features such as search-based navigation, personalization, omnichannel enablement, and self-service enablement
- Most of the business processes such as the shopping and check-out processes were streamlined and optimized to have a minimum number of steps
- Role-based access control was provided to core features and enabled role-based services
- A single sign-on was used across all applications to provide seamless user access
- Back-end systems such as content management systems, asset management systems, and enterprise database, were consolidated into a single platform
- Governance processes were defined to make the enhancements easy to implement and have agile deployments and releases

Reference architecture



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