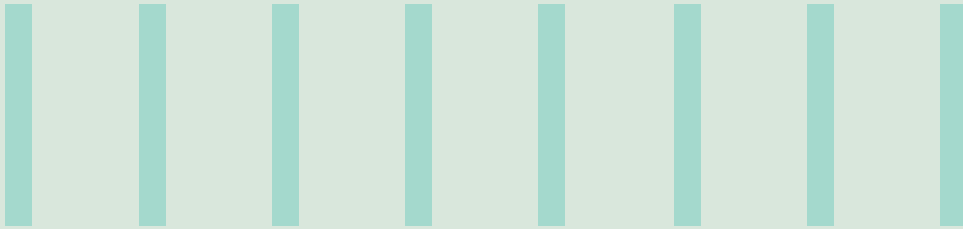




EVOLUTION OF PORTALS AND DIGITAL EXPERIENCE PLATFORMS





Introduction

Horizontal portals and experience platforms are quintessential elements of digital transformation exercise. In this paper we look at the evolution of horizontal of portals into experience platforms and discuss various aspects of technology fitment, digital transformation roadmap and digital transformation tools and methods.

Horizontal portals are information aggregation platforms that provide unified and personalized and secured user experience. Horizontal portals

played a key role in Digital transformation journey for enterprises. Portals played the role of presentation engines and were effectively used as gateways for enterprise applications. The salient points of horizontal portals are given below:

- Horizontal portal provided a gateway platform for enterprise and provided a personalized user experience based on user preferences
- Legacy horizontal portals were mainly used as information aggregation platforms
- Horizontal portals lack the agility, light

weight components needed for modern digital enterprises

- With emergence of modern UI technologies, horizontal portals are replaced by lean, light-weight technologies
- Information Aggregation from multiple information sources.
- The main portal standards are JSR 168, JSR 286, WSRP

Enterprises used portals to have a single integrated view of all information and to provide rich, unified and self-service user experience.

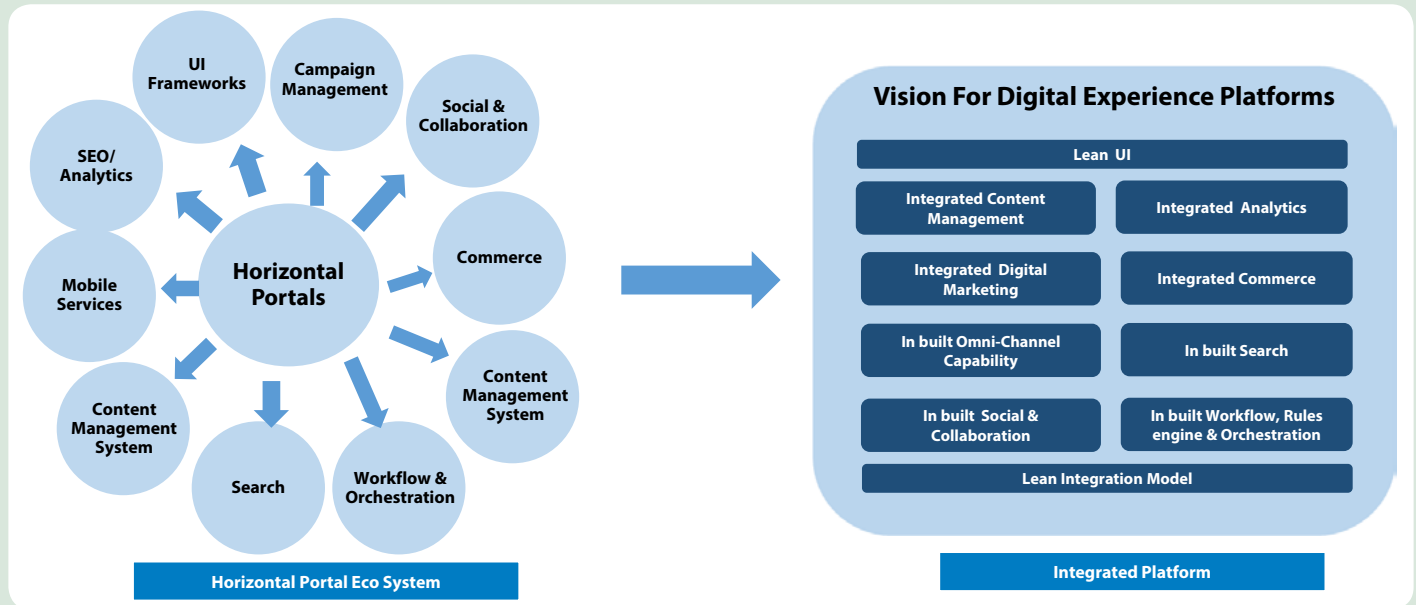
Horizontal portal to digital experience platforms

Traditional horizontal portals need to be integrated with multiple systems to provide the capabilities and given below are some of the key drawbacks of horizontal portal based eco-system:

- Involvement of multiple products leading to higher license and maintenance cost
- Multiple integrations with other products leading to lower performance
- Difficult to get cross-channel analytics information across all user journey steps

Hence modern digital platforms use digital experience platforms (DXP) that provide an integrated set of capabilities in a product suite. DXPs provide Unified, Seamless Integrated cross-channel consistency, Omni-Channel user insights and active user engagement at every touch point.

The evolution journey is depicted in the figure below:

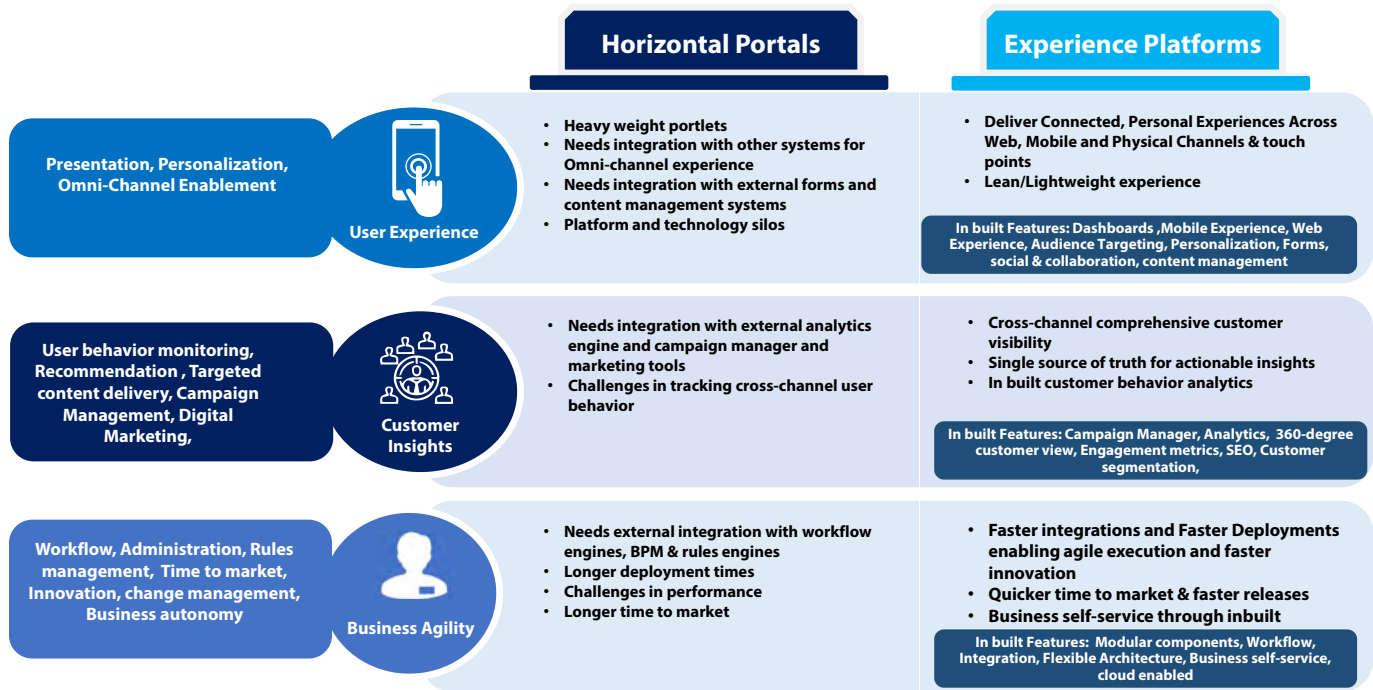


The main capabilities needed for any digital transformation journey are:

- User experience: This includes presentation components, personalization aspects and Omni-channel enablement
- Customer insights: In this category we have user event monitoring, reporting, user behavior monitoring, targeted content delivery, digital monitoring, campaign management and such
- Business agility: This includes business self-service, faster time to market, business autonomy, change management and such

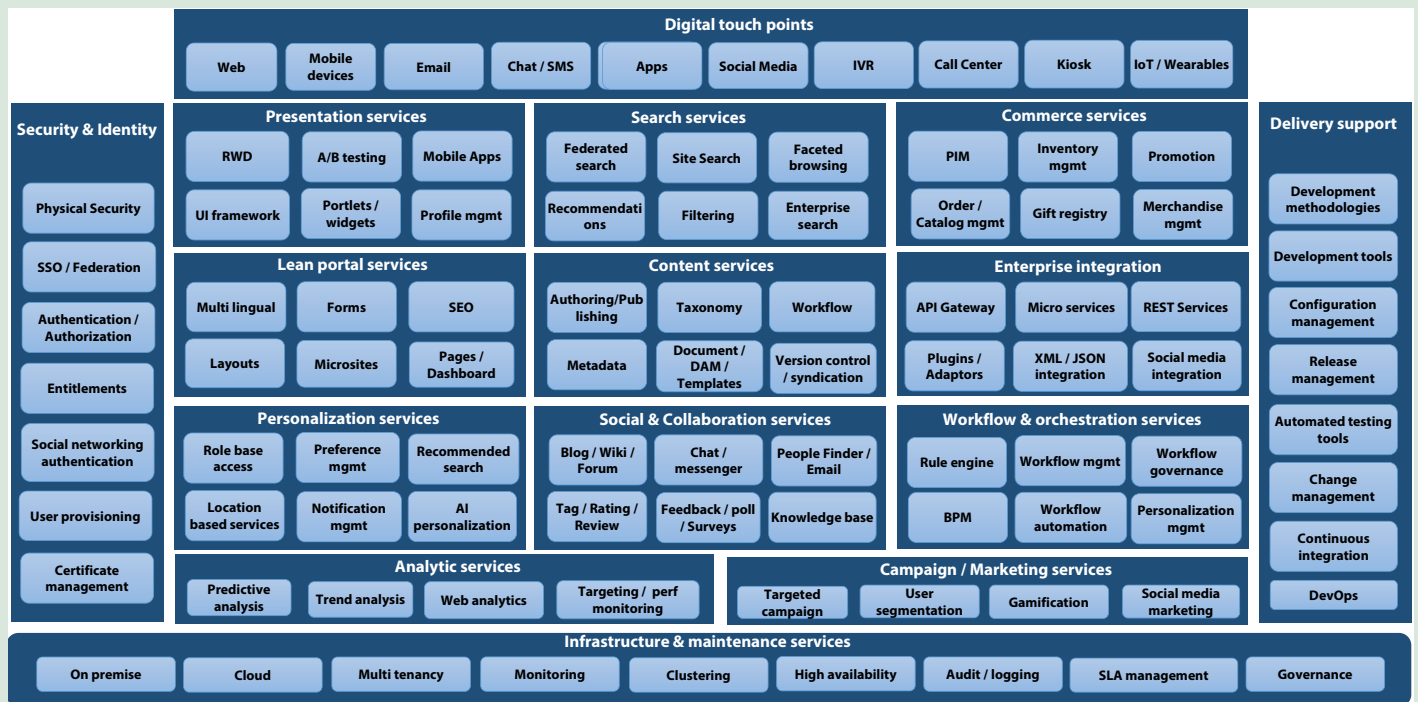


We have given the capabilities, strengths and weakness of traditional horizontal portals and experience platforms for each of these capabilities in the below given diagram:



As depicted in the figure, DXP is well positioned to do the business transformation for modern digital platforms.

A reference architecture for a typical DXP is given below:



Digital transformation scenarios enabled by DXP

In this section we will look at main scenarios and use cases enabled by DXP.

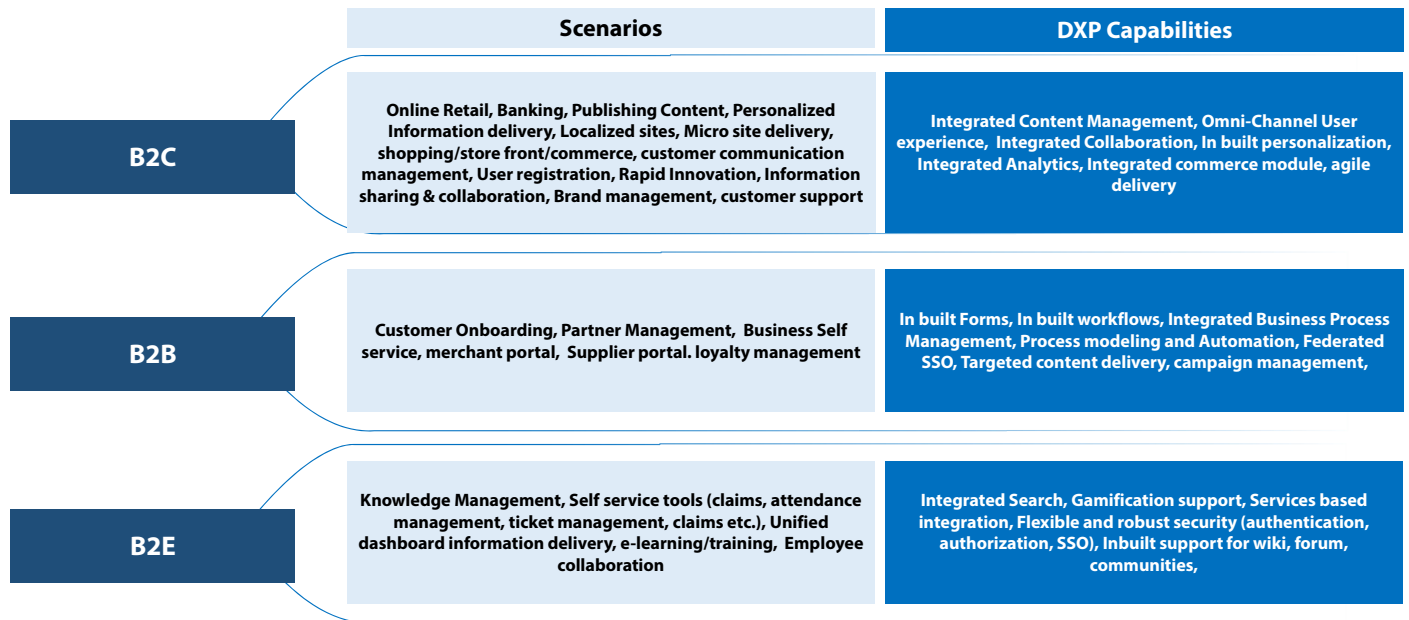
Enterprise scenarios enabled by DXP

Broadly three main channels for enterprise application are

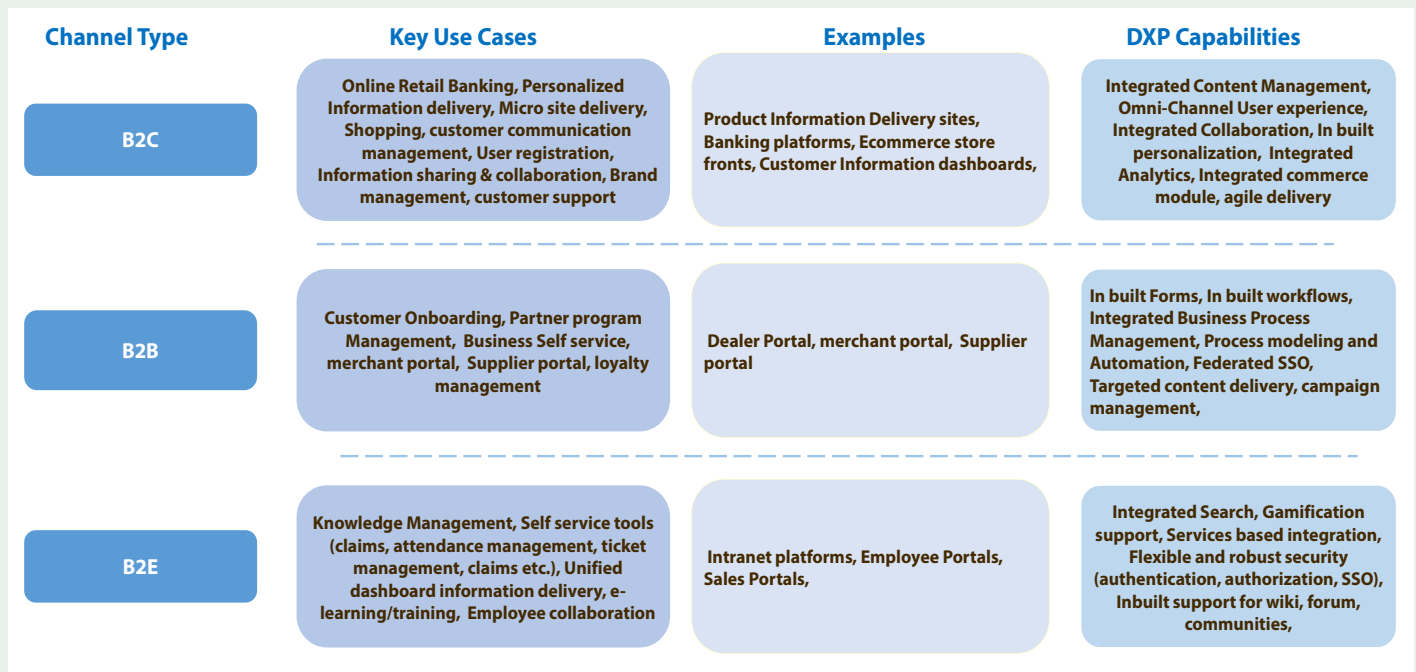
- B2C applications are mainly developed for Internet users. User experience, performance, security are key requirements.
- B2B applications need robust integration, security and transaction handling capabilities.
- B2E applications need optimized

information aggregation, information discovery, personalization and robust security.

In the below given diagram, we have illustrated the main scenarios in each of these channel types and the in-built DXP capability that can be used to implement those scenarios.



We have further elaborated examples for each of the channel types in the following diagram:



Fitment analysis of DXP, CMS and UI technologies

There exist multiple technology choices for a given enterprise application. Top three technology choices are DXP (Digital experience platforms), CMS (Content management systems) and lean UI frameworks. Brief details of each of these technology choices are given below:

- **DXP:** DXP provide integrated set of technology to provide various capabilities such as presentation,

content, search, campaign, personalization for enterprises. We have elaborated DXP in earlier sections

- **CMS:** CMS are content management platforms that are specialized in managing web content and enterprise content throughout the content lifecycle. CMS provide intuitive features for content authoring, content editing, content publishing, content translation. Supporting features such as content tagging, metadata management,

taxonomy, content services are also provided.

- **Lean UI frameworks:** End users expect responsive and interactive modern web applications. UI frameworks such as Angular, React are popular choices for developing modern web platforms.

Given below are various digital scenarios along with their attributes and the preferred technology choices for each of the scenarios.

Scenario	Key Attributes	DXP	CMS	Lean UI Framework
Digital Marketing Site	Heavy personalization, Multiple touch points, Heavy integrations, Customer analytics, Omni-channel experience, Targeted content delivery, customer segmentation	Best Fit: DXP Provides personalization, campaign OOTB	Only provides the web content	Needs Custom integration
Content Intensive Site	Predominantly static content, Needs greater control on content operations, publishing, translation, workflow	Provides basic content management. Needs integration with CMS	Best fit: Provides all content operations OOTB	Needs Custom integration with CMS
Ecommerce Site	Heavy transactions, Rich interactive UI, Targeted content delivery, Self-service, Heavy integrations, campaigns	Best Fit: DXP with commerce module or integration with commerce platform	Does not provide commerce OOTB	Needs Custom integration with commerce
Information heavy sites	Site heavy with content pages, minimal dynamic content, minimal personalization	Best Fit: DXP Provides personalization, campaign OOTB	Best Fit: CMS provides full content delivery	Needs Custom integration
Rich Experience	High interactiveness, Rich UI components	DXP would be overkill	Does not provide interactiveness	Best Fit: Provides high instructiveness

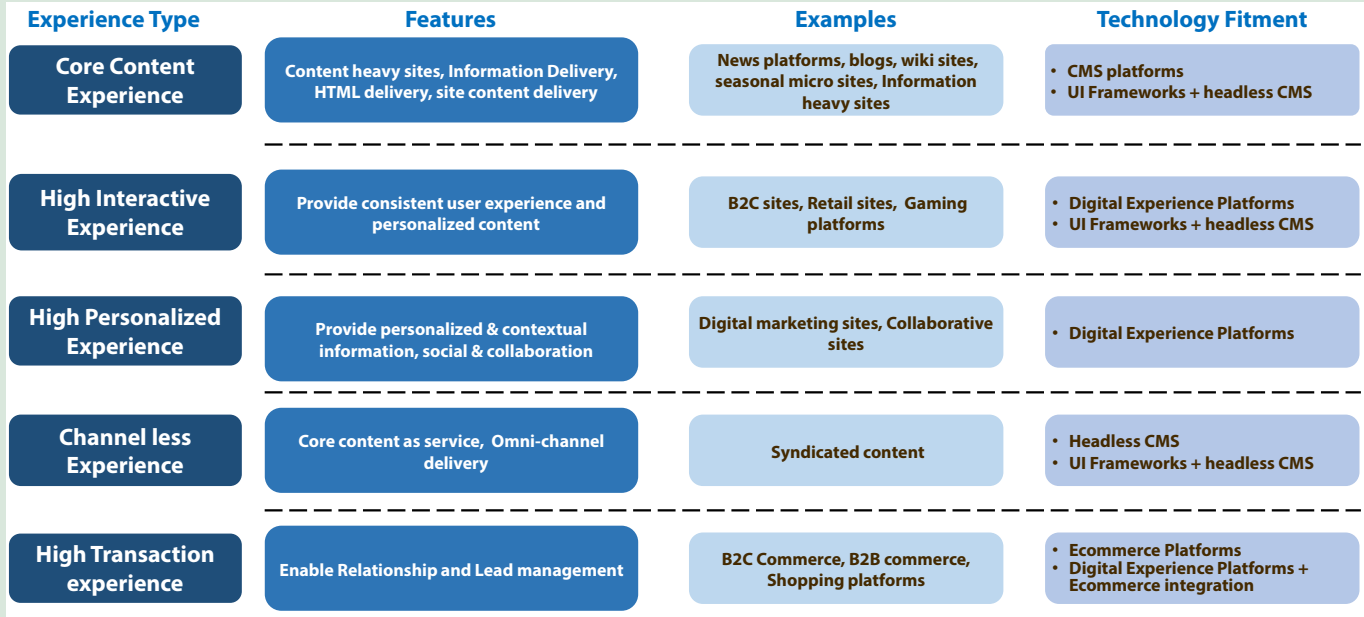


Fitment analysis for various experience types

We have defined five main experience types in digital solutions. An experience

type defines the key features of a digital platform. For instance, content experience is heavy on content features and personalized experience is heavy on personalization features.

We have identified the sample web platform for each of the experience types and the most suitable technology fitment for each of the experience type in the following diagram:



Fitment analysis for solution tenets

We have the main solution tenets/characteristics such as personalization, transaction percentage. Various profiles are used for grouping the solution tenets. We have then identified the most appropriate platform for each of the profiles as shown in below table.

Solution Tenets	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5
Personalization	High	Low	Low	High	Low
Static Content %	Low	High	Low	Low	Low
Transaction %	High	Low	Low	High	High
User Experience	High	High	High	Low	High
Integrations	High	Low	Low	High	High
Most Suitable Platform	DXP	CMS Platforms	UI Frameworks	DXP	DXP

As depicted in the above table, a solution profile heavy on personalization, transaction percentage, user experience and integration

needs DXP; a profile heavy on static content, user experience and low on integration can be implemented using CMS

platforms; a profile high on user experience and low on other solution tenets can be implemented using lean UI frameworks.

Digital transformation roadmap

A roadmap defines the timelines and priorities for the enterprise capabilities. A digital strategy roadmap provides the list of various capabilities to realize the strategic vision of an organization. A typical digital transformation roadmap is depicted in the following diagram.

Weeks	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24	Week 25	Week 26	Week 27	Week 28	Week 29	Week 30	Week 31	Week 32	Week 33			
Blue Printing, Requirement Elaboration	Requirement gathering, Fit Gap analysis. Solution blue printing.																																			
MVP Release 1.0: User Experience				Mobile enablement, Responsive UI, Dashboard experience, Lean UI																																
MVP Release 2.0 Integration Redesign										Light weight REST services, Micro services, API Gateway usage, Two Speed Digital services																										
MVP Release 3.0 Content & Search																			Content Lifecycle management, Headless CMS, Site Search, Content Search, Content Authoring, Content editing, Content publishing, Content tagging, Headless CMS, Taxonomy, Metadata management																	
MVP Release 4.0 Social & Collaboration																											Forums, Wiki, Messenger, Chat bot, Knowledge base, Calendar, Survey, Polls, Email, Review & Rating									
MVP Release 5.0 Other Digital Capabilities																											Personalization, Commerce, Digital Marketing, Workflow & Orchestration, Web Analytics, Artificial Intelligence & Machine learning, Big Data									
Security				Authentication, Role based access, Permission Model, Entitlements, Federated SSO, Single Sign on (SSO), Security testing																																
Infrastructure & DevOps				Cloud Deployment, High availability, Monitoring setup, Source control, Automated release management, Continuous integration, Continuous testing, Automated deployment, Automated code Quality, Project management, Continuous Improvement																																

D E V O P S





Digital transformation tools and methods

In this section we will look at various tools

and methods for transforming existing/ legacy features into modern digital platform in a digital transformation journey. In the following diagrams

we have identified the main digital experience capability, key features, migration tools and migration methods.

Digital Experience Capability	Key Features	Key Tools for Migration	Key Methods for Migration
User Experience	<ul style="list-style-type: none"> Mobile enablement, Responsive UI, Dashboard experience, Lean web oriented architecture, Mobile App, Forms, Microsites, Multi-lingual, Layouts, Easy and fast information discovery 	<ul style="list-style-type: none"> Cordova for cross-platform development, Robotium and Selenium for test automation, Robolectric and Mockito for mobile app unit testing Bootstrap, CSS3 based responsive design Cognitive search tools 	<ul style="list-style-type: none"> Use MVC UI frameworks (Angular, ReactJS) for lightweight widgets & personalized dashboard. Develop existing Dynamic contents/pages with UI JavaScript frameworks and static contents/pages with headless CMS Convert existing static JSP/HTML into responsive using CSS3 Media queries. Web oriented architecture Information Architecture Redesign Search Implementation
Integration Model	<ul style="list-style-type: none"> Light weight REST services, Micro services, API Gateway usage, Two Speed Digital services 	<ul style="list-style-type: none"> MuleSoft, IBM ESB, Micro services, IBM BPM, Jboss BPM, TIBCO, MQ, Apache Kafka, Apache Camel, ServiceMix, WSO2, Spring Boot 	<ul style="list-style-type: none"> Service Enable Existing interfaces Develop granular micro services on top of existing legacy services to implement 2-speed digital services. Deploy microservices in containers for individual scalability.
Social & Collaboration	<ul style="list-style-type: none"> Forums, Wiki, Messenger, Chat bot, Knowledge base, Calendar, Survey, Polls, Email, Review & Rating 	<ul style="list-style-type: none"> Liferay SocialOffice, MS Sharepoint, Skype, Adobe Connect, IBM Connections, Zoho Connect, Google G-Suite, Yammer, Jive, OpenText First class collaboration suite, Slack, OneDrive, 	<ul style="list-style-type: none"> Implement centralized knowledge base and enable search on knowledge base Implement collaboration capabilities using tools Harness collective intelligence using forums and communities. Integrate external social platforms for enhanced user engagement

Digital Experience Capability

Key Features

Key Tools for Migration

Key Methods for Migration

DevOps

Source control, Automated release management, Continuous integration, Continuous testing, Automated deployment, Automated code Quality, Project management, Continuous Improvement

- Key CI tools: Jenkins, Ansible, Hudson, Puppet, Chef, Bamboo
- Build Tools: Maven, ANT, Gradle
- Source control: Git, Bitbucket
- Code Quality: SonarQube, CheckStyle, Appscan, PMD,
- Testing: SOAPUI, Junit, Jmeter, Nunit, Corbertura, Fortify, Selenium
- Containers: Docker, Kubernetes
- Project Management: Jira

- Implement continuous integration using CI tools
- Automate release management pipeline using automated tools
- Setup notification for build and quality reports

Web Analytics

Track user behavior actions to get insights, cloud based reports, performance monitoring, traffic reports, exit reports

Google analytics, Open web analytics, Piwik, Adobe marketing cloud, IBM Unica, Live chat, WebTrends

- Include the necessary JavaScripts to the page
- Populate the JavaScript variables with the run time values

Content Management

Content Authoring, Content editing, Content publishing, Content tagging, Headless CMS, Taxonomy, Metadata management

Drupal, Wordpress, Joomla, Alfresco, LiferayCMS, Kentico, Adobe AEM,

- Migration of contents from File system, DB to content management systems
- Create reusable content layouts and structures
- Create metadata strategy for content tagging and easier information discovery
- Provide content services to implement headless CMS

Digital Experience Capability

Key Features

Key Tools for Migration

Key Methods for Migration

Other Digital Experience Capabilities

Search, Personalization, Commerce, Digital Marketing, Workflow & Orchestration

- Search: Elastic search, Solr, Lucene, Splunk, Jena,
- Digital Marketing: OpenEMM, CampaignChain, IBM Unica, Oracle Eloqua
- Personalization: Adobe Target, Google Optimize 360, HubSpot, Marketo,
- Workflow: Activiti, Jboss JBPM, Copper, Camunda

- Enable site search, enterprise search using search tools
- Implement role based access and targeted content delivery using personalization
- Enable commerce features using commerce plugin
- Promote campaigns using digital marketing
- Implement business processes using workflow and orchestration tools

Security

Authentication, Role based access, Permission Model, Entitlements, Federated SSO, Single Sign on (SSO), Security testing

- SSO: Okta, OpenSSO
- Authentication: CAS, OpenAM
- Security testing: OWASP Zed Attack Proxy (ZAP)
- Standards: oAuths, OpenID, SAML

- Service Enable Existing interfaces
- Develop granular micro services on top of existing legacy services to implement 2-speed digital services
- Deploy microservices in containers for individual scalability

Social & Collaboration

Forums, Wiki, Messenger, Chat bot, Knowledge base, Calendar, Survey, Polls, Email, Review & Rating

Liferay SocialOffice, MS Sharepoint, Skpe, Adobe Connect, IBM Connections, Zoho Connect, Google G-Suite, Yammer, Jive, OpenText First class collaboration suite, Slack, OneDrive,

- Implement centralized knowledge base and enable search on knowledge base
- Implement collaboration capabilities using tools
- Harness collective intelligence using forums and communities.
- Integrate external social platforms for enhanced user engagement

ANALYTICS DASHBOARD

Last Updated: 3 min ago

92%

Data Availability

More info

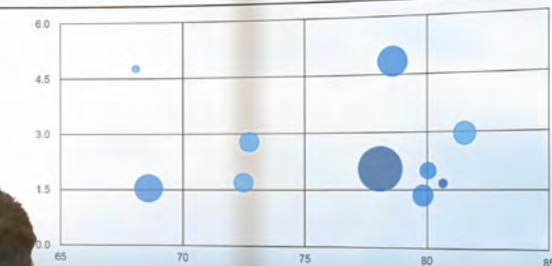
95%

Actual vs Target

More info

Evolution	Metric	Actual vs Target	Actual	Target
	Revenue		\$3.4M	82.0%
	Profit		\$1.2M	108.7%
	Avg. Order Size		\$850.3	71.0%
	On Time Delivery		96.0%	96.0%
	New Customers		15432	145.0%
	Cust. Satisfaction		98.3%	105%
	Market Share		46.9%	80%

Products positioning



Top 10 products

Digital Experience Capability

Key Features

Key Tools for Migration

Key Methods for Migration

Infrastructure

Cloud Deployment, High availability, Monitoring setup

- Cloud: Amazon AWS, EC2, MS Azure, Google Cloud
- Monitoring Infrastructure: New Relic, Nagios, Graphite

- Clustered Deployment model
- Appropriate infrastructure sizing based on expected growth and user traffic, data volume and transaction rate.
- Setup real time application monitoring (APM), Real user monitoring (RPM) and notification infrastructure.

Artificial Intelligence & Machine learning

Self learning, Continuous Improvement, Text Analytics, Predictive analytics, Chat bots, Virtual Assistants, Intelligent Recommendation engines, Robo advisors, Process automation

- NLP: OpenNLP
- Key Tools: H2O.ai, Apache PredictionIO, IBM Watson, Google TensorFlow,
- API.ai, Facebook messenger platform, Botsify, Telegram bots, Botkit, ChattyPeople,

- Train the models using machine learning algorithms.
- Leverage AI and ML tools for implementing the recommendations, search and chat bots.

Big Data

Structured and unstructured data processing, real time insights,

- Big Data Processing: Apache Spark, Apache Hadoop,
- NoSQL DB: Apache Cassandra, MongoDB, CouchDB,
- Search: Splunk

- Implement Map Reduce Framework to process Big data
- Implement Big data to process structured and unstructured data (text, email, video etc.) processing to get 360-degree insights.

About the Author



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Shailesh has 17 years of experience in the IT industry. He has done executive management program from Indian institute of Management, Calcutta and holds a Bachelor's degree in Computer Science and Engineering from reputed university in India.

His expertise lies in Portal technologies, content management, enterprise search, enterprise architecture, JEE technologies, performance engineering. He has been involved in architecture, design and development of portal based applications in large projects for marquee clients of Infosys. He is the sole author of four internationally published books on portals, web architecture and content management and authored 12+ white papers. He is the sole inventor of two granted US patents. He can be reached at Shailesh_shivakumar@infosys.com

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