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MNsure

MNsure Phase II Project

Deliverable #5 – Technical Assessment

July 16, 2014

Document Control Information

Document Information

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1.0	June 24, 2014	Initial Submission to the State	Deloitte Consulting LLP
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3.0	July 16, 2014	Final Submission to the State	Deloitte Consulting LLP

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Lead Vendor Project Background

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Project Background and Objective

Deloitte Consulting LLP (Deloitte) was engaged by the State of Minnesota to assess, identify potential impacts, and provide recommendations for the State's consideration on the go-forward strategy for ongoing operations, 2015 open enrollment, and beyond.

Project Scope

1. Conduct an assessment of governance structure, decision-making processes, program and project management practices, and to provide recommendations for consideration to implement a governance structure, program and project management controls, and oversight
2. Conduct an assessment of the current state of the MNsure system from both a functional and technical perspective and provide recommendations for consideration for the short-, mid-, and long-term
3. Perform the following project activities:
    - Program and Project Management
    - Project Planning
    - Functional and Technical Systems Assessment
    - Release Management
    - Defect and Issue Tracking
    - Leadership and Planning of User Acceptance Testing (UAT)

Project Deliverables

Deloitte is contracted to produce five deliverables:

1. Vendor Report and Deliverable Reconciliation Matrix
2. Project Management Analysis and Considerations Report
3. Phase 1 Functional and Technical Assessment Report with a categorization of key functional and system gaps and considerations for a near-term system roadmap
4. Application Project Work Plan
5. Phase 2 Technical Assessment Report with a categorization of key system gaps and considerations for a mid-term and long-term

Scope of this deliverable

The focus of this deliverable is the Phase 2 Technical Assessment Report.

Executive Summary

Executive Summary

- Deloitte Consulting LLP (Deloitte) was engaged to conduct a two-phased assessment of the Minnesota Health Insurance Marketplace system ("the system"). The system supports the business interests of both the MNsure and Department of Human Services (DHS) organizations. The first phase of the assessment (Deliverable #3) focused on functional readiness, while this assessment focuses on certain key technical considerations.

- The scope of this assessment was a review of the existing product suite and system architecture based on system maintainability, scalability, the upgrade path, usability, and privacy and security. Considerations for managing the associated complexity are presented. In short, this deliverable comments on (1) the State's ability to make and incorporate needed changes to the system, (2) whether the system has sufficient "horsepower" to meet the likely demands placed on it in the upcoming enrollment cycle, (3) whether earlier custom design decisions to the four vendor products will prove an implementation impediment, (4) the State's ability to achieve its business imperative of providing an excellent consumer experience, and (5) prevalence of security issues that puts its customers or the State at major risk. The assessment focused on the Qualified Health Plan (QHP), MAGI Medicaid, and MinnesotaCare technical capabilities.

- The assessment was conducted through the following activities:
  - Interviewed key State staff and vendors
  - Reviewed solution architecture and Commercial Off-The-Shelf (COTS) product documentation
  - Reviewed the System Security Plan (SSP) and related security artifacts, Plan Of Actions and Milestones, Information Security Risk Assessment, and the Identity and Access Management security design documentation
  - Analyzed select screens in the Citizen and Worker portals and reviewed HTML code and front end technologies to assess the usability of the system
  - Reviewed an earlier independent vendor usability report
  - Reviewed defect tracking and change request logs, interface error data, resource consumption data, and Google web analytics metrics to understand system changes, stability, performance, and usage

- Several aspects of the MNsure system architecture are contemporary and consistent with industry practices. The system's foundation, however, centers on the integration of four unique and independent COTS products. Each COTS product in turn comprises separate and unique user interfaces, application logic, rules engine(s) and databases. Furthermore, these COTS products have been customized to meet the State's requirements. Collectively, this presents a complex system environment. This assessment did not evaluate options for replacing any of the current COTS products.

Executive Summary (cont.)

- The COTS product vendors do not anticipate any major or unique implementation impediments to their planned upgrades (which the State is dependent on for November 2014 open enrollment) due to the customization of their products. The State needs to plan for adequate testing and integration time and effort to mitigate inherent risks underlying the upgrade pathway.

- At a summary level, the primary challenge of this complexity is the need to keep all four products and related underpinnings coordinated and in harmony for both new development and ongoing maintenance purposes. The data architecture was noted as especially complex, with multiple databases (but absent a single recognized system of record), requiring significant effort to simply maintain data integrity. This critical integration demands close cooperation of all the vendors and the State, a high level of effort, staff knowledgeable in each of the components, timely systems issue and performance monitoring and a comprehensive plan that is aggressively managed.

- From a hardware perspective, the system appears to have adequate “horsepower” to scale to meet near-term processing demands; however, from a software perspective, optimization efforts may be needed to improve system performance and the user experience to meet the needs of the upcoming open enrollment. Load and performance testing will need to be performed nonetheless across all COTS products to support 2015 and 2016 open enrollment periods. While the complexity of the system might be mitigated in the short-term with tactics including increased staffing levels, long-term maintenance may prove difficult and costly.

- One of the State’s key business objectives is for users of the system to enjoy a good customer experience. This goal may be adversely impacted by the system’s complexity, as each COTS product presents its own interface to the user. The practical effect of this, from a user’s perspective, is similar to visiting three different websites with different styles and formats; this makes navigation and understanding more challenging and disrupting the processing flow, likely causing confusion and inefficiency.

- From a security and privacy perspective, the State has been very focused on it’s compliance efforts and no major issues or risks were identified. (*Please note: to protect the State’s security interests and consistent with industry practice, the Security Section details within this document have been redacted.)*

Approach and Scope

Scope

The scope of this deliverable is to provide a technical assessment of the system along the following dimensions: maintainability, scalability, product upgrade paths, privacy and security, and usability.

Maintainability, Scalability, and Upgrade Paths

Maintainability Assessment: Analysis of the ability to identify and fix faults within the system. The following characteristics of system maintainability were assessed in accordance with industry standards:

- Changeability: The amount of effort required to make system changes
- Stability: The ability of the system to remain stable when system changes occur
- Analyzability: The ability to identify the root cause of a failure within the system
- Testability: The effort needed to validate a system change

Scalability Assessment: Analysis of the ability of the system to handle future growth without impacting system response time, including:

- Availability of system resources (memory, CPU, and database space)
- Performance (measured by server response times and page load times)

Upgrade Paths Assessment: Assessment of the impact of customizations made to COTS products to vendor upgrade paths

Security and Privacy

Documentation review of the System Security Plan (SSP) and related security artifacts to analyze the following security controls for their alignment to the Centers for Medicare and Medicaid Services (CMS) Minimum Acceptable Risk Standards for Exchanges (MARS-E) security controls:

- **Operational Controls**: Security controls that are primarily implemented and executed by people (as opposed to systems)
- **Management Controls**: Security controls that focus on the management of risk and the management of information system security
- **Technical Controls**: Security controls that are primarily implemented and executed by the information system through mechanisms contained in the hardware, software, or firmware components of the system

Usability

- **Front-End Code Review**: Analysis of the generated HTML of the citizen portal, including HTML formatting, Document Object Model structure, and front-end code efficiency
- **Front-End Technology Review**: Analysis of the front-end technologies that are included in the citizen portal
- **Visual Design Review**: Analysis of the look and feel of the online application to determine if the screen's appearance is usable and satisfactory for the intended audience
- **Heuristic Evaluation**: Analysis of the user interface against recognized usability principles

Approach

1. Deloitte's approach to conducting the technical assessment of the system was to review the system against industry standard frameworks to assess the following dimensions of the system: maintainability, scalability, ability to deploy vendor upgrades, privacy and security, and usability.

2. Deloitte assessed the system using the following methods:
   - Interviews with State and vendors: Deloitte conducted interviews with State staff including MNsure, MN.IT, DHS and with MNsure vendors (IBM/Cúram, Connecture, EngagePoint, and PwC) and reviewed findings with State staff and vendors
   - Document reviews: Deloitte reviewed COTS product documents and system architecture documentation, Identity and Access Management (IAM) security design documentation, and a user experience (UX) assessment conducted by an outside vendor
   - State and federal security standards reviews: Deloitte reviewed the System Security Plan (SSP) and related security artifacts, State standards referenced in SSP documents, Plan of Actions and Milestones document, and Information Security Risk Assessment reports
   - System log analyses: Deloitte reviewed JIRA defect tracking logs, Rational ClearQuest change request logs, interface error logs, resource consumption data, and web analytics reports
   - System reviews: Deloitte reviewed select HTML code generated by the citizen portal, front-end technologies utilized by the citizen portal, the look and feel of the online application, and conducted a heuristic review of selected screens

3. Deloitte determined the impact of key technology observations:
   - Observations were documented based on interviews, document reviews, security standards reviews, system log assessments, and system reviews
   - The impact of observed issues was documented and assessed

4. Deloitte provided considerations to create a near-term system roadmap to support ongoing operations and open enrollment for 2015 and a mid-to-long-term roadmap to support long-term objectives and ongoing operations beyond 2015 open enrollment.
   - These considerations were prioritized by applying the following criteria:
     - Ongoing Operations – Is this consideration critical to enrolling applicants and managing cases for the benefit year 2014?
     - Open Enrollment – Is this consideration critical to enrolling applicants on November 15, 2014?
   - The near-term system roadmap presented in Phase 1 Functional Assessment (Deliverable 3) was updated to represent technical considerations
   - A mid-to-long term system roadmap was created to represent considerations that are proposed for implementation after the 2015 open enrollment

Maintainability, Scalability, and Upgrade Path

Maintainability, Scalability, and Upgrade Path Assessment Highlights

The following summarizes the key observations from the maintainability, scalability, and upgrade path assessment:

- The system architecture is complex, containing multiple Commercial Off-The-Shelf (COTS) products and interfaces, with each COTS product presenting a separate user interface, a separate rules engine, and a separate database architecture. The resulting architecture requires a high level of effort to maintain the system on an ongoing basis. Adequate staffing and training is necessary to be able to support the system and consideration on the long-term maintenance cost need to be made.

- The COTS product vendors have not identified any potential impediments to their planned upgrades due to the customization of the products. The State needs to plan for adequate testing and integration time and effort to mitigate inherent risks underlying the upgrade pathway.

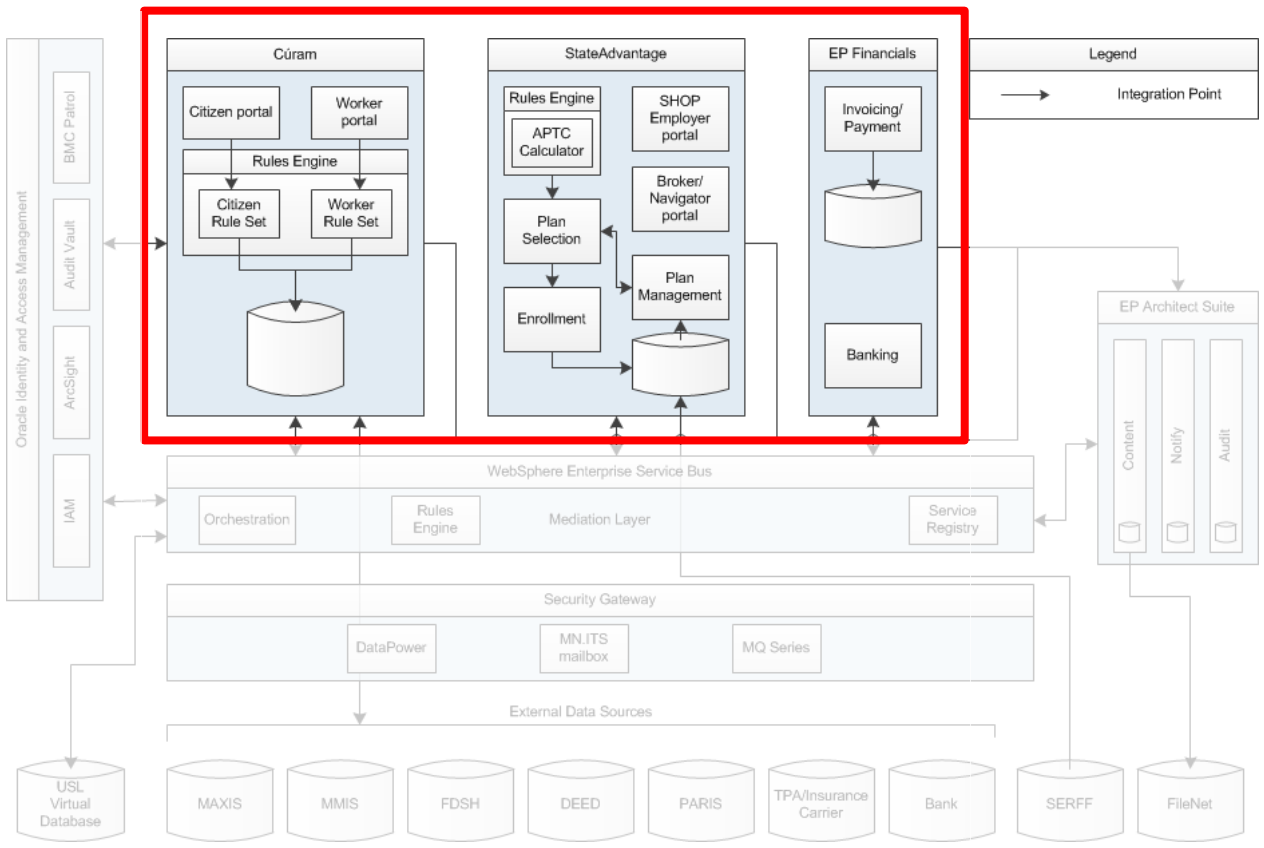
- A high number of production builds have been executed since October 2013, and the complexity and volume of system changes require significant coordination and testing and increase the maintenance effort. System complexity may also increase the effort required to test the system and remediate defects.

- Monitoring and tracking of system performance and errors in production is limited; on pages that are monitored, web errors and performance issues have been observed, suggesting an opportunity for improved monitoring and comprehensive performance testing.

- The system appears to have sufficient hardware to support the upcoming open enrollment period; nonetheless, load and performance testing will be needed across all COTS products. Additional database capacity may be required to support CMS record retention requirements and there may be opportunities to adjust resource allocation to optimize performance as usage grows.

Our Understanding – Architecture, Interfaces, and Database Components Diagram

The following diagram describes Deloitte's understanding of the interfaces, database structure, and application architecture of the system.



Key Points

- **Multiple COTS products**
- Multiple user interfaces
- Multiple database objects; system of record not established
- Multiple integration points
- Spikes in interface error rates
- Multiple rules engines
- Complex Citizen portal and Worker portal integration
- Limited monitoring of performance and system exceptions

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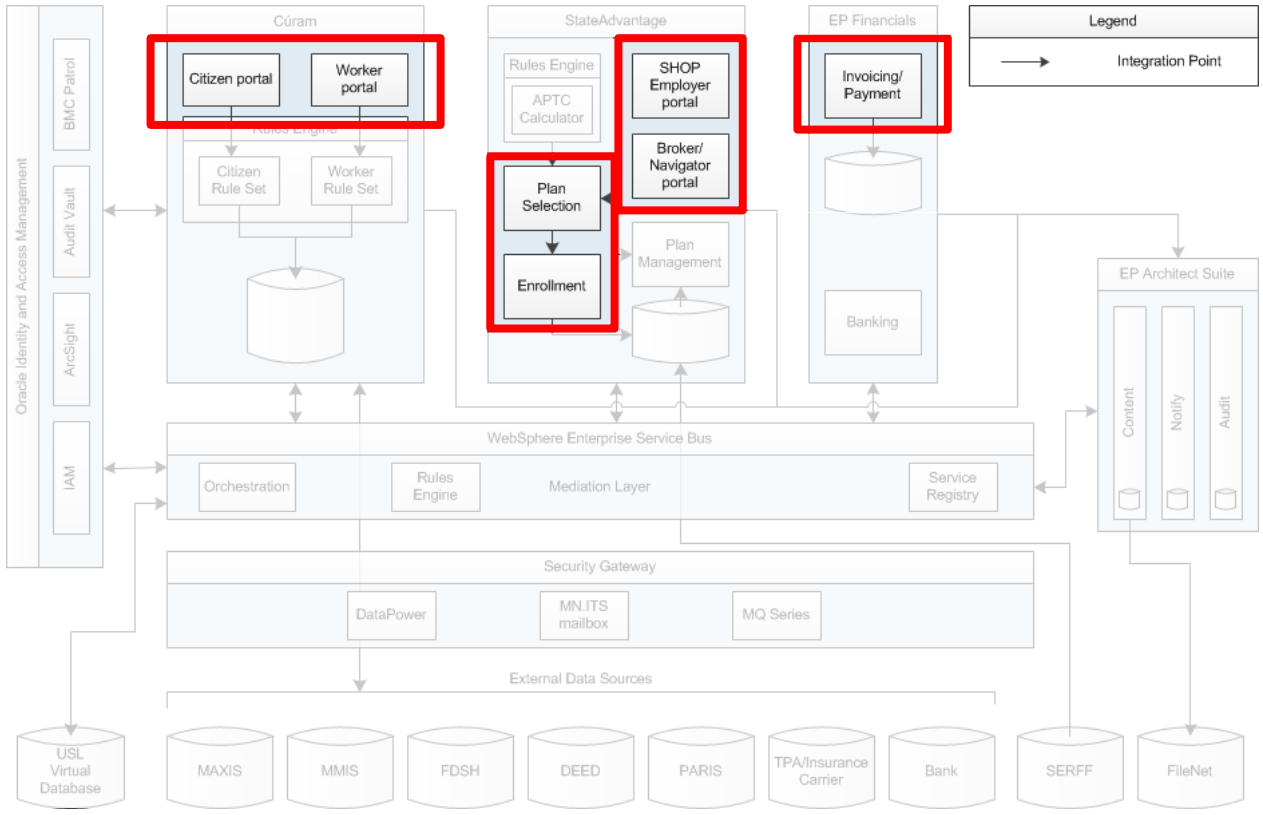

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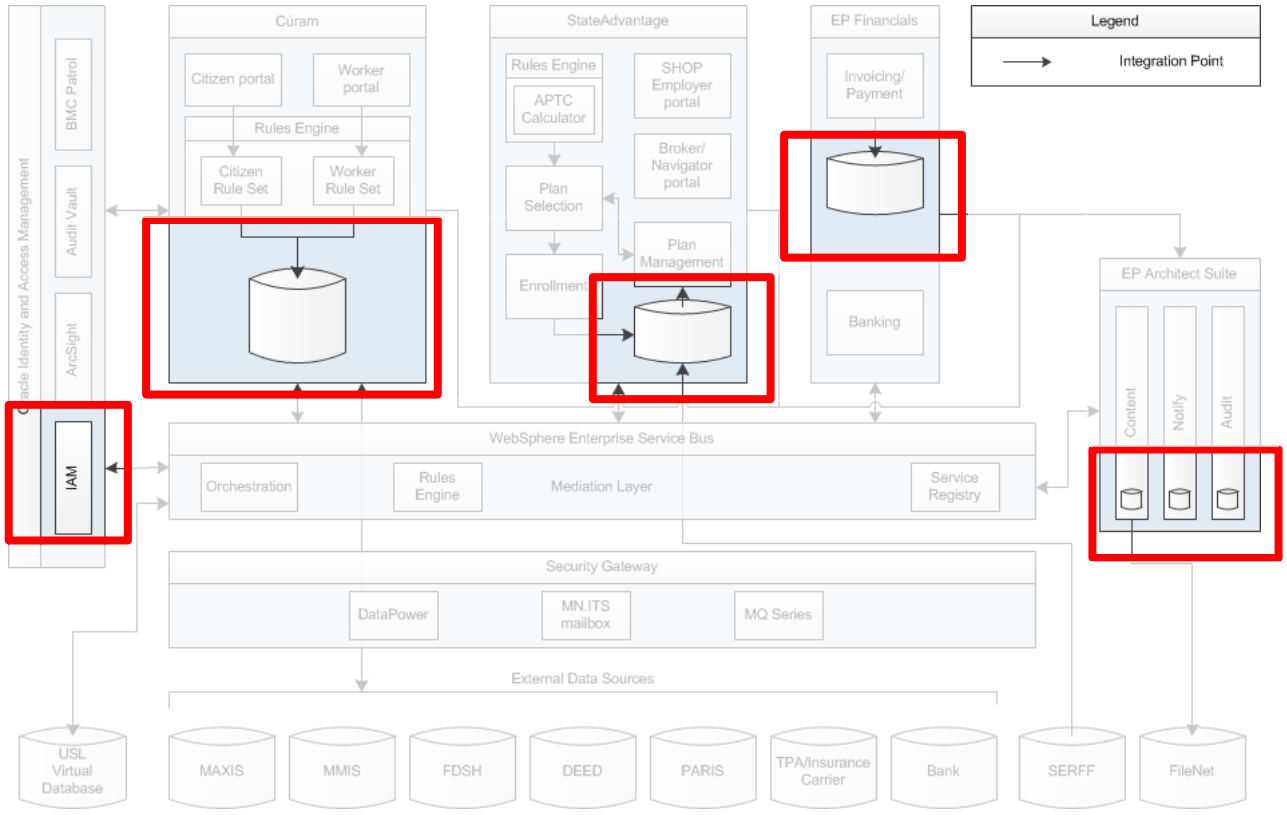

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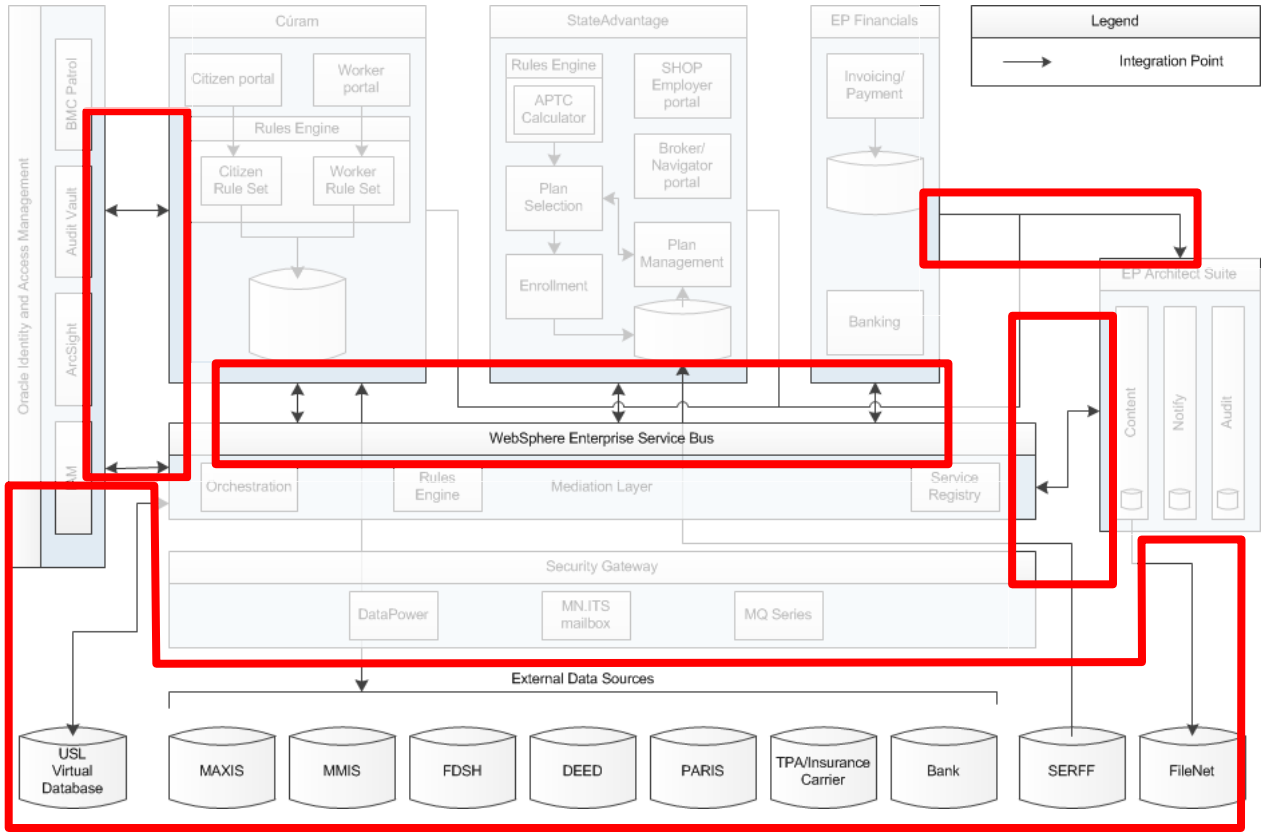

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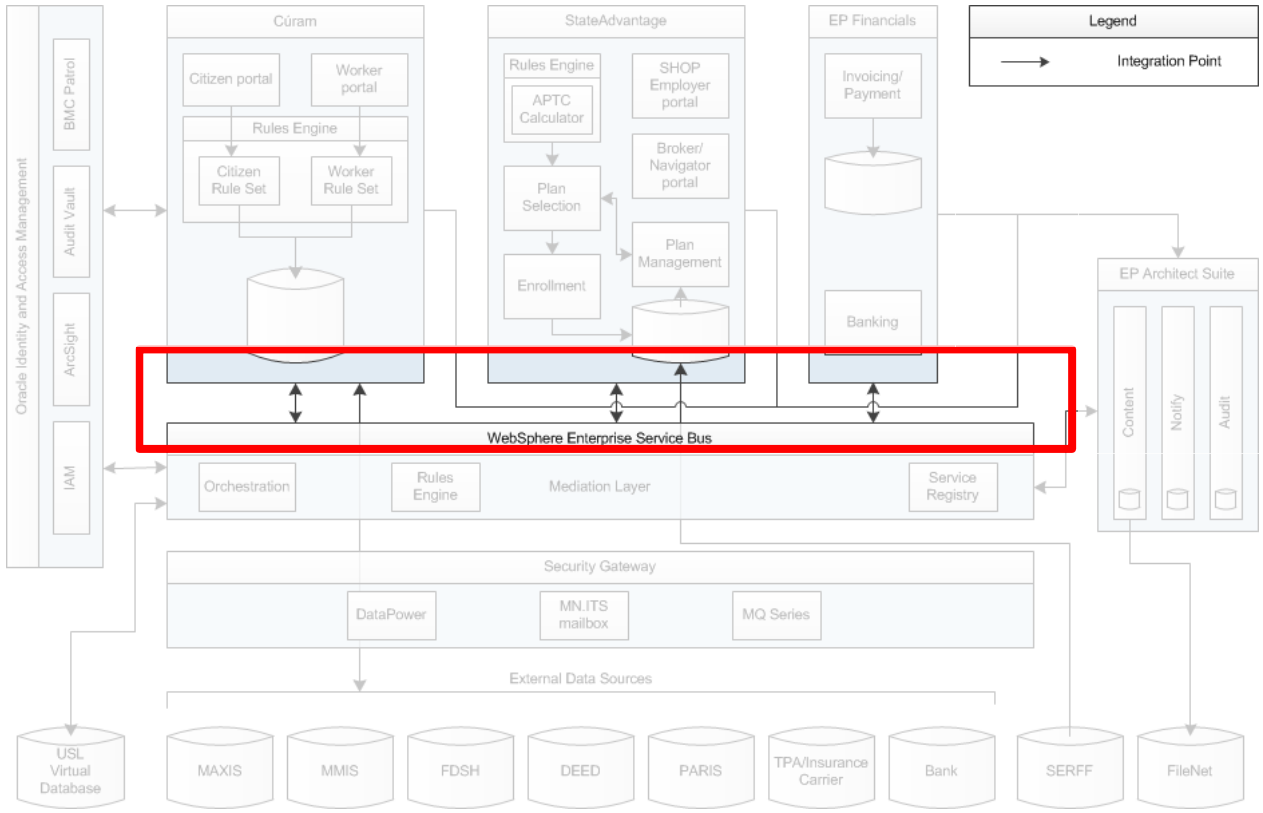

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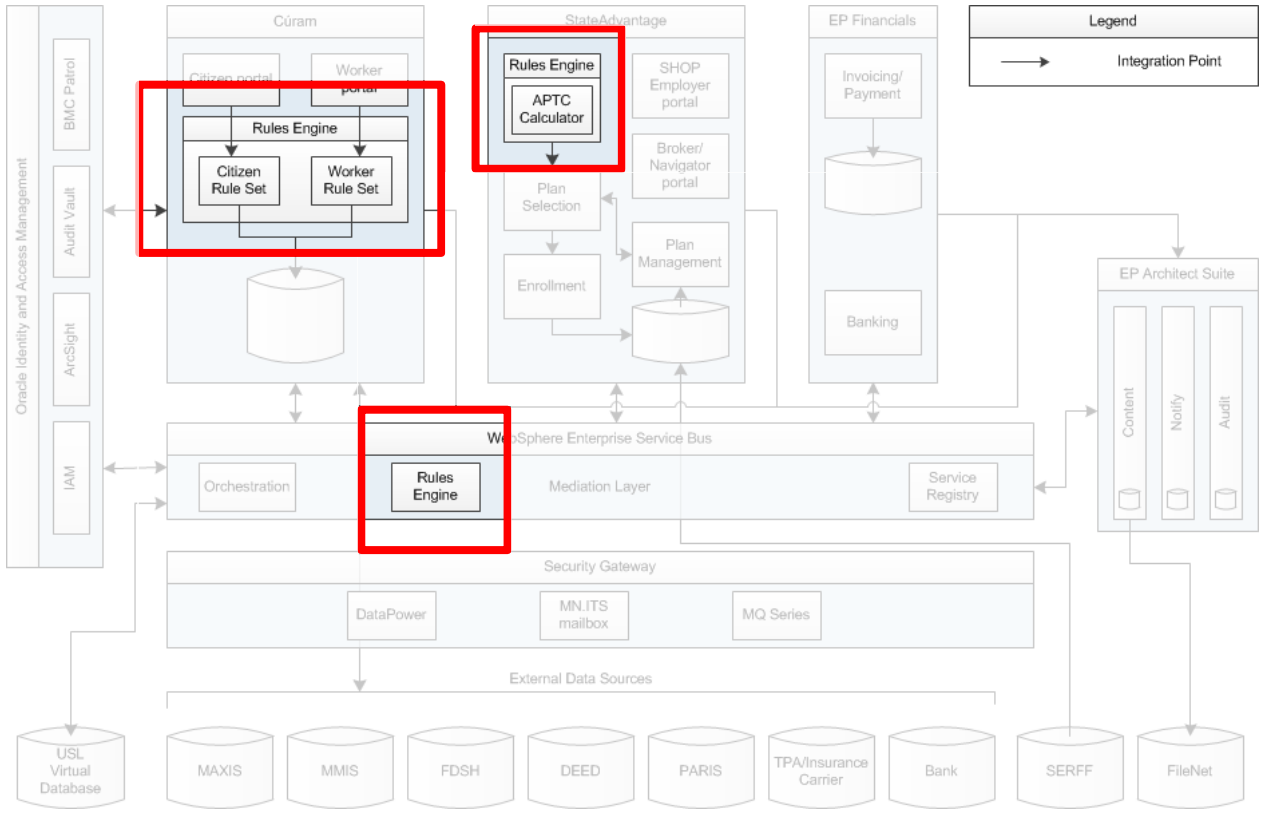

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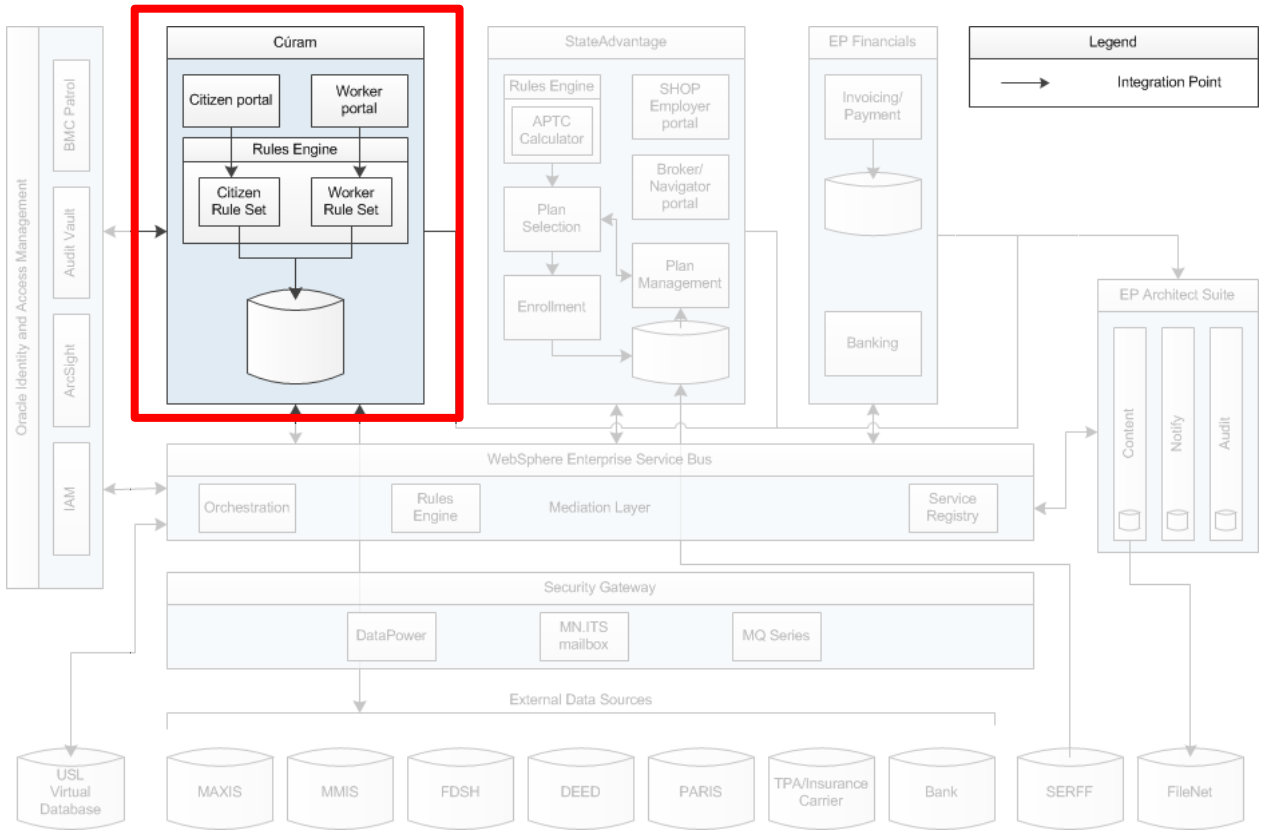

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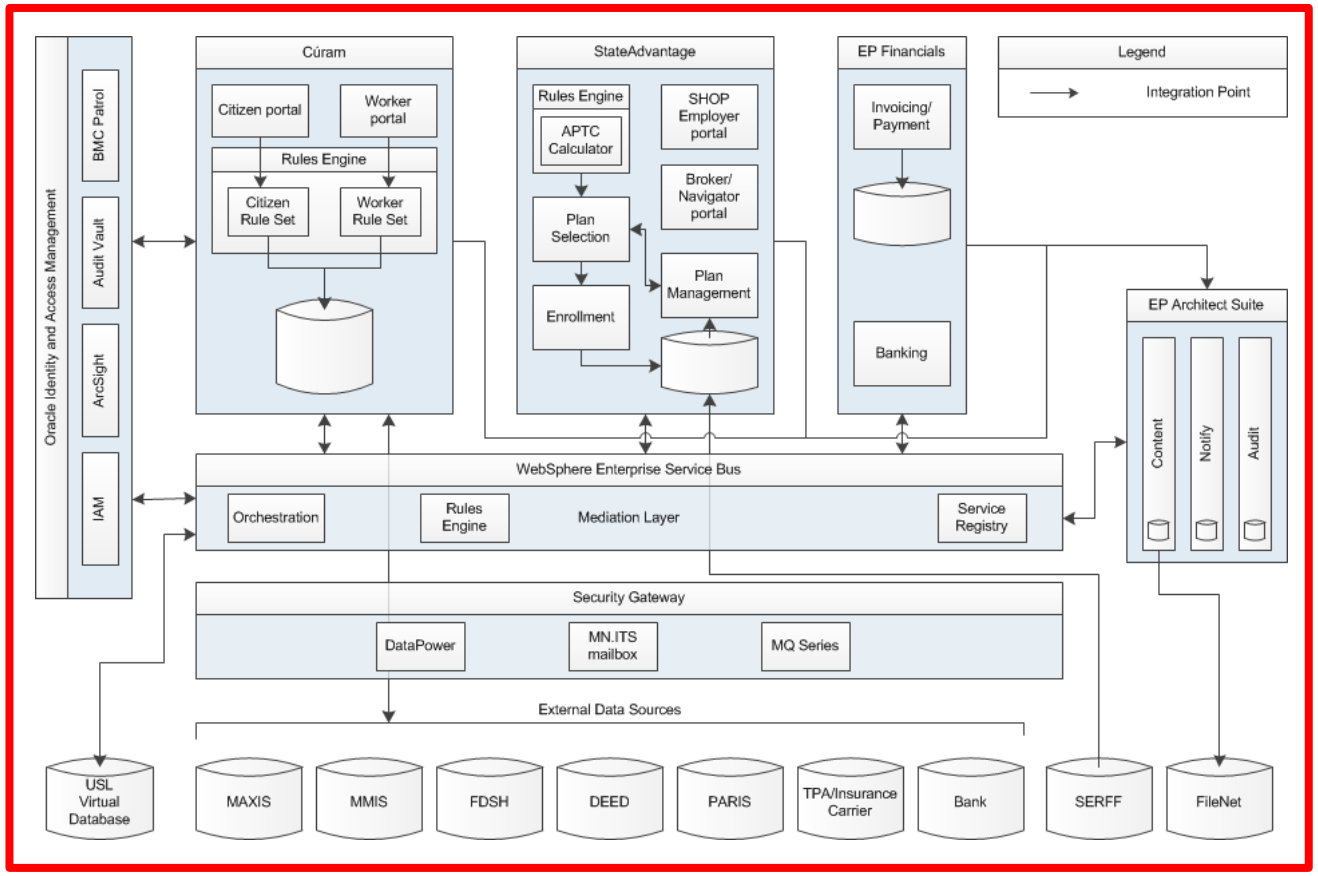

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Maintainability

ID	Observation	Impact	Consideration	Priority
1	The system architecture contains four COTS products and multiple interfaces. Web services are used for interaction between the products; however, the following factors complicate the system architecture, resulting in a high maintenance workload: ▪ Each product has its own configuration and has its own presentation (user interface) tier, business logic tier, rules engine, and data tier ▪ The data architecture is complex based on a significant number of tables across multiple databases. ▪ State database administrators report a high number of build requests per week during open enrollment. Certain deployments are complicated by a need to manually disable and enable database constraints. ▪ The State uses ClearQuest (CQ) as its workflow tracking tool for builds to production. CQ indicates the State DBAs have high number of production build requests which is compounded by the complexity of the system. ▪ State staff reports a lack of expertise in the COTS products.	The presence of multiple COTS products and a high number of databases can introduce complexity and increase the effort required to maintain the system. Staffing levels may need to account for both the volume of work and its complexity and staff may require specialized training.	Define and address IT operations needs for the four COTS products which includes establishing efficient operations support processes, tools to support the process, appropriate staffing and training for the State to support the system during the 2015 open enrollment.	1
			Consider standardization of components where possible in order to lower the effort to maintain the system.	3

Maintainability (cont.)

ID	Observation	Impact	Consideration	Priority
2	The use of multiple COTS products in the system introduces multiple databases, each with its own set of database tables with client information stored in multiple places. The State has faced challenges maintaining a system of record for client information including eligibility and enrollment data.	There is increased complexity associated with maintaining a system of record across the multiple databases. Failure in maintaining data integrity across the multiple databases results in data inconsistencies which may hinder the implementation of critical functions such as changes in circumstance and renewals for Qualified Health Plans (QHP) and public programs.	Establish and maintain a system of record across the multiple COTS products and implement necessary reconciliation processes.	1
3	The Citizen and Worker portals within the same COTS product use separate business logic, rule sets, and database objects. ▪ The lack of synchronization of the database objects may result in outdated eligibility determinations and coverage dates being presented to clients if applications have been updated on the Worker portal ▪ Differences in the rule sets have previously resulted in inconsistent eligibility determinations depending on the entry point of an application, requiring patches to synchronize rule sets Changes to these portals should be maintained in a synchronized manner to maintain data integrity.	The dual nature of the portals requires that when changes are made to one portal, the same change may need to be applied to the other portal, increasing the effort required to apply any changes. Additionally, the lack of synchronization between the two portals may result in out-of-date information being presented to clients in cases where changes have been made to cases in the Worker Portal.	Create test scripts that validate the complex integration between the Citizen and Worker portals to reduce risks associated with the complexity of the system.	2

Maintainability (cont.)

ID	Observation	Impact	Consideration	Priority
4	There is limited monitoring and tracking of system performance and web page errors in the system production environment. For the limited pages that are being tracked, web errors (custom 404- and 500- errors) and performance issues (high page load times issues) have been observed. System stability issues were reported early in the open enrollment period. Uptime reports produced by the State indicate that the number of system outages has decreased over the course of Spring 2014. The State has engaged an external vendor to conduct performance testing and has been working to understand and remedy performance bottlenecks and stability issues.	Incomplete monitoring capabilities limits the State's ability to gain an accurate picture of the system and limits their ability identify and resolve issues in a proactive and timely manner. A high error rate may limit the system's usability, resulting in a negative user experience and increasing call volume.	Configure monitoring tools across the system and capture load times by page. Analyze data throughout the system to proactively identify errors and performance issues, focusing on those issues which may impact application submissions.	2
			Identify key system performance metrics such as CPU, memory, threads, response times, and user load for executing performance test. Identify threshold limits for resource utilization and set up alerts for identified limits. Build an environment suitable for performance testing with the code and configuration matching production and conduct comprehensive performance testing to identify and remediate performance bottlenecks.	2
5	The State makes the system unavailable nightly, directing users to a maintenance page, coinciding with the regular downtime of the Federal Data Service Hub (FDSH).	While 24x7 uptime is not required of the system, nightly downtime limits client ability to use the system as clients are unable to access the system during the downtime.	Evaluate options for enabling functionality to allow users to submit an applications during FDSH and other external system outages and develop processes to reconcile the required verifications when data services become available.	3

Maintainability (cont.)

ID	Observation	Impact	Consideration	Priority
6	The occurrence of interface errors tracked by the State has generally decreased since January 2014. While the State's logs indicate improved interface stability with several interfaces maintaining minimal error rates, select interfaces have experienced extended outages and/or continue to see occasional spikes in error rates.	System errors may prevent users from completing applications and enrollments. Users who encounter errors may abandon the application or call customer support, thus increasing call volume.	Implement additional monitoring tools to track interface exceptions and continuously review error logs to determine root cause of errors and remediate underlying issues. Identify threshold limits for resource utilization and set up alerts for identified limits.	2
7	The architecture lacks a permanent reporting data warehouse. Reporting is currently done from a production recovery copy of the database which resides on the production server, impacting performance, and the data is not optimized for reporting, significantly limiting reporting capabilities.	Limited reporting may hinder the State’s ability to assess exchange operations, communicate with external parties, and deliver required Federal reports.	Design and implement a reporting data warehouse to support reporting activities.	3

Maintainability Process Considerations

The following observations reflect a number of the technical causal factors that impact the key program processes (identified in Deloitte's Deliverable #2) relating to defect triage, testing and release management. These processes are currently being implemented and the full enablement of these critical processes are heavily dependent on addressing many of the following considerations. Their continued coordinated implementation should be recognized in the detailed integrated work plan and closely monitored.

ID	Observation	Impact	Consideration	Priority
8	The State executes production builds frequently: ClearQuest logs indicate that between 10/1/2013 and 6/10/2014 production builds were executed several times per week. Build frequency is further complicated by the presence of four COTS products, each with an independent upgrade schedule, requiring increased coordination to minimize build efforts. The State release plan schedules production builds once every two weeks, which may help to reduce build frequency.	Frequent production builds require significant coordination, increased maintenance effort to synchronize production and test environments, and increased release management. It may also impact system stability and may result in system errors and/or defects.	In conjunction with implementing a new release management process, define clear prioritization criteria to determine when builds outside a production release schedule should be performed to minimize the frequency of builds. Evaluate functionalities and fixes included in COTS product upgrades to coordinate release planning among vendors.	1
9	The complexity of the system architecture and integration of multiple COTS products and databases requires increased integration testing efforts.	System maintenance and enhancements of the solution requires a thorough testing effort which in turn requires an adequate level of staff for test execution and management.	Include comprehensive integration and regression testing in the test plan to include the integration points between the multiple COTS products and the common components.	1

Maintainability Process Considerations (cont.)

ID	Observation	Impact	Consideration	Priority
10	The use of multiple COTS products in the system introduces multiple failure points, potentially increasing testing effort and complicating root cause analysis and resolution of defects. Defect logs from JIRA, the defect management system used by the State, show the average time to resolve blocker (highest priority) and critical (second-highest priority) defects in the production environment to be high.	The increased time required for defect resolution may lengthen testing timeframes as well as the time required to resolve issues in production; this, in turn, may require costly manual workarounds and may impact the customer experience.	Develop and implement strong defect management processes that include: ▪ Strictly enforcing completion of the entire defect lifecycle process, including root cause analysis ▪ Clearly defining roles and ownership of defects and allocating adequate staff to testing and defect resolution ▪ Developing a service level agreement to specify resolution times for defects by severity and impact	1
11	A high number of defects logged in JIRA have been identified as defects that cannot be reproduced in the test environment. The presence of issues that cannot be reproduced may suggest the following: ▪ A mismatch in the configuration of the production and test environments, which was similarly identified in an external vendor's report. ▪ A breakdown in the process of triaging issues ▪ A gap in training on the application for users and testers who log defects	Issues that cannot be reproduced are difficult to resolve; these may be one-off occurrences or they may indicate an issue that persists, but does not get resolved. This could necessitate business workarounds and impact customer experience.	Synchronize test and production environment configurations, code versions, and other resources to support efficient reproduction of production issues in the test environment. Implement limited logging in production environment to capture user activities for use in troubleshooting.	1
			Improve the process of intake and triage of defects with the goal of reducing the number of defects that cannot be reproduced.	1

Scalability

ID	Observation	Impact	Consideration	Priority
12	Analysis of the average daily system resource consumption data suggests the computing power and memory allocated for the system had enough capacity to handle an increased workload of 72,000 users on a high-usage day in March 2014. However, there may be room to improve system performance: ▪ Capacity issues were reported in the beginning of the 2014 open enrollment period; the State has reported having added computing resources to remediate the issues. ▪ The average daily memory and CPU utilization of the servers in the production environment was within acceptable limits for the majority of the period 10/1/2013 to 5/31/2014. There may have been spikes within the day that are not reflected in daily average data; these would be shown in more detailed (hourly) data, which was not available for the full time period. ▪ The hourly average memory utilization of the servers for the period of 6/1- 6/19 indicates a potential memory leak, suggesting that a code quality issue may have resulted in the system running out of memory. Deloitte did not conduct performance testing or load testing as part of this assessment. Findings are based on analysis of system resources logs and usage metrics available on a daily basis; hourly metrics may provide additional insight and identify spikes of CPU or memory usage that are not reflected in daily average data.	System stability during the 2015 open enrollment period relies on sufficient CPU and memory to handle usage volumes. Insufficient memory or CPU allocation or code-related issues resulting in memory leaks and/or high CPU consumption may result in impacted performance and unplanned system downtime.	Analyze memory utilization data and server logs to identify memory leak and take necessary action to resolve it.	1
			Identify threshold limits for resource utilization and set up alerts for identified limits. Continue to monitor CPU and memory utilization of all the servers. Configure and monitor Java virtual metrics such as heap utilization, garbage collection rate, and database connection at Java Virtual Machine (JVM) level for servers that have JVM installed to proactively identify and remediate memory leaks.	2
			Review system logs from the 2014 open enrollment period and execute system performance, volume and load testing to identify appropriate adjustments to scale the current infrastructure and optimize code as needed to account for issues in the software that may impact performance.	2

Scalability (cont.)

ID	Observation	Impact	Consideration	Priority
13	The current database growth charts suggest that the database space may be sufficient to handle the increased workload associated with eligibility and enrollment for the upcoming open enrollment period. However, the State may lack sufficient storage to support CMS record retention requirements.	While the databases have the capacity to support the upcoming open enrollment period, there may be insufficient space longer-term to retain data in accordance with CMS requirements or support future functionality for additional public programs.	Add more storage and/or implement archiving to retain data per CMS requirements. Monitor the database resource and review performance reporting regularly for capacity planning and to identify any database-related issues proactively. Further projection and modeling may be required to account for future growth including legacy systems conversion and future functionality for additional public programs.	3

COTS Product Upgrade Path

ID	Observation	Impact	Consideration	Priority
14	Some of the COTS products implemented have been customized to meet the State's requirements; these customizations may impact the effort associated with performing upgrades in 2014: ▪ Connecture has two planned releases but has not identified any potential impediments to the upgrade path due to product customizations. ▪ EngagePoint provides releases on a quarterly or more frequent basis. Customizations are performed in the integration layer and are not anticipated to impact product upgrades. ▪ IBM/Cúram incorporates customizations into upgrades using standard code merge processes, which have been used in the previous two upgrades. ▪ PwC has made customizations to Oracle Identity Manager, Oracle SOA Server, and Oracle Access Manager within the product boundaries. PwC has not identified any potential impediments to the upgrade path due to customizations.	COTS product upgrades require a significant effort to merge in customizations. These changes will require vendors to remain engaged to support and upgrade the code over time; alternatively, the State will need to take on these maintenance activities.	Determine the extent of customizations made to the COTS products to understand the level of efforts that would be required to upgrade each product in the future. Establish a plan for future products upgrades, including planning for adequate testing and securing support from vendors for code merge activities as appropriate. Conduct knowledge transfer activities of COTS product customizations to State staff.	3

Security and Privacy Review

Content has been removed for security purposes

Usability

Usability Assessment Highlights

The assessment of the Citizen and Worker portals was conducted against State requirements and industry standards. The following summarizes the key observations from the usability assessment impacting the user experience:

- The Citizen portal utilizes several industry standard front-end technologies. The citizen portal's front-end utilizes many industry standard JavaScript libraries.
- Much of the Citizen portal's front-end code can be further optimized to improve page load times and the ability for non-authentication pages, such as forms and help or public policy information, to be found by search engines
- There are multiple COTS products providing functionality for the Citizen portal. As such, there is a lack of consistency in page design and navigation across different sections of the Citizen portal, leading to a disjointed user experience.
- Page designs and layouts of the Citizen portal distract users from important page items, such as help information and confirmations of completion or instructional text for next steps
- Much of the Citizen portal, including the entire online application, depends on the usage of JavaScript, limiting the functionality available to persons with disabilities
- The Worker portal requires specific training to be able to be used effectively because of complex page design and navigation. Many pages display a large number of visual items, text, navigation menus, tabs, and buttons which require a degree of prior experience or additional explanation to operate.

Front-End Code Review

ID	Observation	Impact	Consideration	Priority
30	Much of the Citizen portal functionality, including the online application, requires JavaScript to be enabled. On most pages, there are multiple JavaScript files being loaded. The use of JavaScript limits some of the functionality available to persons with disabilities through assistive technologies, however without JavaScript enabled, users are only able to download a paper version of the application as opposed to filling out the online application.	The dependence on JavaScript for the online application in the Citizen portal limits the usefulness of some assistive technologies for persons with disabilities. Without JavaScript, it is not possible to access or fill out the online application. However, loading multiple JavaScript files increases page load times and length of time required to complete an application. This may reduce the user efficiency of the citizen portal.	Combine and minify JavaScript and Cascading Style Sheets (CSS) files wherever possible to the build scripts so that they are as small and combined as possible. This may speed up page load times and lower the amount of requests from the client's browser to the web server. Additionally, develop alternative Citizen portal functionality that is not reliant on JavaScript to make the site more compatible with assistive technologies.	3
31	Citizen portal metadata is not optimized for search engines.	The lack of metadata optimization makes it more difficult for search engines to index the pages of the Citizen portal and may not show the website pages in their top search results.	Develop stronger website descriptions and tags to the meta-information for the non-authentication pages for the Citizen portal.	3
32	External CSS files are not loaded before JavaScript files in the Citizen portal. Most, if not all, of the external CSS files are loaded after the JavaScript files.	When JavaScript files are loaded before CSS files, page load time increases and Citizen portal page rendering may not be smooth. This is generally associated with decreased customer satisfaction.	Across the coding for all Citizen portal pages, move the CSS entries above the JavaScript entries in the head of the pages. This speeds up the page load and enables a smoother page rendering.	3

Front-End Technology Review

ID	Observation	Impact	Consideration	Priority
33	The Citizen portal's front-end framework utilizes Foundation v4.	Foundation is an industry standard front-end framework capable of making broad, responsive web designs.	Continue to utilize the built-in functionality of front-end frameworks such as Foundation v4 for the Citizen portal or utilize a broader front-end framework to reduce the number of JavaScript libraries.	3
34	Many different JavaScript libraries and versions are being used across the Citizen portal including: ▪ jQuery v1.9.1 ▪ jQuery UI v1.10.3 ▪ Modernizr v2.5.3 ▪ jQuery Modal ▪ jQuery Cookie Plugin v1.4.0 ▪ jQuery drop-down menu ▪ jQuery scrollable tab	The JavaScript libraries being utilized are industry standards. However, the use of multiple JavaScript libraries in the Citizen portal may increase integration and incompatibility risks between different versions and libraries.	Continue use of the current JavaScript libraries. Utilize a broader front-end framework for the Citizen portal to reduce the number of libraries necessary.	3
35	The Citizen portal is only available in an English version. The citizen portal utilizes a web-based language translation as a translation tool for supporting other languages besides English.	The translation tool does not function on all pages of the Citizen portal. As a result, non-English speakers may be limited in their ability to use the Citizen portal.	Develop complete language support for additional languages, especially for target populations.	3
36	The Citizen portal's page dimensions are not optimized for some screens with some web browsers. The following dimensions were observed: ▪ Body Width: 1015px ▪ Header Height: 168px ▪ Footer Height: 180px	The body width, especially, causes some pages to be too large to fit on a screen without a horizontal scroll bar, which may make readability more difficult.	Develop consistent page dimension standards including limiting the page width to 960 to 980px to avoid horizontal scrolling when there is a vertical scroll bar.	3

Front-End Technology Review (cont.)

ID	Observation	Impact	Consideration	Priority
37	There are seven fonts being used in the Citizen portal.	The use of many different fonts makes readability of pages more difficult and increases page load times.	Utilize consistent CSS entries across different pages to consolidate the number of fonts used across the Citizen portal.	3
38	The State has implemented limited analytics functionality for the Citizen portal.	The analytics tools being utilized are industry-standard. However, the lack of analytics on all Citizen portal pages may limit performance and usage information across the entire website, including critical online drop-off points.	Continue to use the existing analytics tools in the Citizen portal. In addition, configure the analytics tools for additional pages, especially pages of the online application in the Citizen portal, to monitor usage and errors on the enrollment, plan, and payment screens.	3
39	The Citizen portal utilizes a marketing tool and has configured support for several social mediums.	The tool used is an industry standard marketing tool with the ability to support most major social mediums.	Continue to utilize the existing marketing tool and consider configuring support for additional social mediums.	3

Visual Design Review/Heuristic Evaluation: Branding

ID	Observation	Impact	Consideration	Priority
40	There are multiple COTS products providing functionality for the Citizen portal, each with its own user interface and web design elements presented to the user. For example, there are various colors, color shades, fonts, and font sizes across the Citizen portal. As a result, the branding for the Citizen portal is inconsistent.	The lack of a consistent brand can cause confusion and loss of brand recognition. This may impact user satisfaction, as users may not easily remember the Citizen portal, and may complicate marketing and branding efforts.	Develop a consistent user interface standard for the Citizen portal to be followed by the various COTS products. This includes using the same web design elements across the various COTS products.	3

**See Appendix C for visual examples of the above observations*

Visual Design Review/Heuristic Evaluation: Page Design

ID	Observation	Impact	Consideration	Priority
41	Citizen portal page design is not consistent between pages of the citizen portal: ▪ Different pages utilize different colors, fonts, and font sizes. For example, on health plan selection pages, fonts and font sizes change from what was used during the applicant information intake sections. ▪ The use of titles is not consistent (e.g. some page have titles while others do not) ▪ Some pages utilize more frames than others and each frame can be drastically different in colors and styles than other pages and other frames on the same page	The lack of consistency in page design may cause confusion for users, a decrease in user efficiency and customer satisfaction, and an increase in the amount of time spent completing applications.	Develop strict page design standards and guidelines for pages according to type and function. Page standards and guidelines should include: ▪ Standard screen-naming conventions across all screens ▪ Consistent use of colors, fonts, and frame sizes to support better visibility	3
42	The page design is not consistent across sections on some pages in the Citizen portal: ▪ Text on pages is not consistently concise or clear. Some screens have text that is difficult for the user to interpret or understand. Other screens are missing instructional text, or that text is difficult to find. ▪ The space between headings, sub-headings, and body content is often not standardized enough between pages to consistently identify separate sections. This creates a lack of a clear visual hierarchy to direct the importance of the users' tasks. Additionally, related information is often loosely grouped. ▪ Frames on some pages are sized differently, or are located within other frames, reducing the viewable space and requiring additional scrolling or zooming to view all content	The lack of effective directions, text grouping, text spacing, and proper screen visibility in the Citizen portal creates logical flow challenges for users as they attempt to find information or the correct sections and fields to fill out. This may create confusion or lead users to miss important directions and fill out forms incorrectly.	Develop standard logical page flow design standards for the Citizen portal, including: ▪ Creating detailed and effective descriptions and helper text for screens that are in need of additional guidance ▪ Using consistent spacing between headings and body content to create a logical visual hierarchy and flow of actions for users ▪ Grouping similar content together in manners which clearly delineate different sections of information ▪ Establishing proper spacing on pages for frames and between sections	3

**See Appendix C for visual examples of the above observations*

Visual Design Review/Heuristic Evaluation: Page Design (cont.)

ID	Observation	Impact	Consideration	Priority
43	The Worker portal pages require specific training in order to operate efficiently due to the complicated designs and layouts . • The user interface of the Worker portal presents many different fields, menus, buttons, links, tabs, and other visuals. It is often not clear, without prior experience or further explanation, what purpose each item serves. • Caseworker portal pages often display a large amount of information in a small amount of space. It is often not clear, without prior experience or further explanation, where important or relevant information is to be found. • Caseworker portal pages often use industry terminology, which is sometimes unclear or misleading without prior experience or further explanation, what is meant by certain language.	Complicated Worker portal pages may increase the effort required to train workers, State staff, and others utilizing the Worker portal, and may also affect the efficiency and accuracy of a worker, if the worker is improperly trained.	Ensure a thorough training course is mandatory for all new relevant users utilizing the Worker portal and all relevant State staff when new functionality is introduced to the Worker portal.	3

Visual Design Review/Heuristic Evaluation: Navigation

ID	Observation	Impact	Consideration	Priority
44	Navigation across the Citizen portal is not consistent: ▪ On some pages, there is no clear indication of what buttons need to be clicked to achieve an action. For example, on the homepage, it is unclear how to sign up for an account for the first time since there is only a “Sign-In” button. On other pages, the “Next” buttons are located in different locations, not labeled consistently, or are difficult to locate. ▪ On some pages, buttons are misleading, or do not work. For example, on some pages, links and buttons, such as the “?” icon, do not trigger any actions.	Users may find it difficult to determine which buttons to click while navigating the Citizen portal to sign up for an account, fill out applications, or otherwise find what they are looking for. This may cause a decrease in user efficiency and customer satisfaction, and an increase the amount of time spent completing applications.	Establish clear navigation buttons across each page in the Citizen portal to direct users to actions that they need to take. This includes establishing a common set of navigation buttons, such as “Next”, “Previous”, and “Cancel”, and locating them consistently on pages to make it easier to navigate across the Citizen portal.	3
45	Application progress is difficult to track in the Citizen portal: ▪ Different types of navigation panels and wayfinder/application progress bars are used between different sections of the application. For example, the navigation bar and wayfinder during the applicant information intake section is different from the navigation bar and wayfinder during the plan selection section of the application. Additionally, there is no overall application navigation or progress bar. ▪ Screens at the end of sections do not show any confirmation once users have finished the section or have additional instructional text that is difficult to find.	Users may be confused as to their application progress or status in the Citizen portal and not understand whether or not they have completed a section. This may lead to frustration, the need for a user to ask for additional assistance, and intentional or unintentional abandonment of the application.	Develop a standardized navigation panel and wayfinder across all sections of the Citizen portal to give users exact knowledge of their progress. In addition, screens at the end of sections in the Citizen portal should use confirmation messages to clearly indicate outcomes or next steps.	3

**See Appendix C for visual examples of the above observations*

Visual Design Review/Heuristic Evaluation: Navigation (cont.)

ID	Observation	Impact	Consideration	Priority
46	The Worker portal page requires specific training in order to navigate efficiently: • The user interface of the Worker portal presents many user controls via different navigation menus, tabs, links and other buttons. It is often not clear, without prior experience or additional explanation, what needs to be selected to achieve a certain function or locate particular forms or eligibility information. For example, workers had to know a very particular set and order of actions to make enter applicant information and make an eligibility determination.	Complicated user controls in the Worker portal pages may increase the effort required to train workers, or increase the amount of time workers spend processing applications and other work items.	Ensure a thorough training course is mandatory for all new relevant users utilizing the Worker portal and all relevant users when new functionality is introduced to the Worker portal. Even after the training, consider providing system screenshot manuals to maintain familiarity of users with pages and functionalities in the Worker portal.	3

Visual Design Review/Heuristic Evaluation: Form Design and Data Display

ID	Observation	Impact	Consideration	Priority
47	Form design across the Citizen portal is not consistent: ▪ On some forms, it is difficult to determine which fields are required due to inconsistent use of asterisks. For example, on the “Signature” page, fields marked with the asterisk are not the actual fields required. ▪ Many forms have vague error messages when a form is incomplete or filled out incorrectly. Often an error message may appear, but the form does not identify where exactly the error occurred or how to fix it. ▪ Help text is provided for some form sections but not for others ▪ Forms and form labels are inconsistent and located in different locations from screen to screen. Between pages, form labels vary from being in all uppercase or all lowercase, and from being located on top or to the side. Additionally, on some pages, form layouts vary from all stacked in one column or spread out in multiple columns across the screen.	The lack of consistency in form design in the Citizen portal may create confusion or lead users to fill out information incorrectly or increase the amount of time spent completing applications.	Develop a consistent form design and apply it across the different sections of the Citizen portal. This includes: ▪ Ensuring a clear understanding of which fields are required ▪ Developing purposeful error messages and help text for all sections of the application ▪ Developing a field label style and layout pattern and applying it consistently to all data entry screens	3
48	The data display across the Citizen portal is not consistent: ▪ Default drop-down text is provided on some drop-down fields in some sections but not for other drop-down fields in other sections ▪ Default values on some drop-downs are too big to fit in the field or are not ordered alphabetically	Inconsistency in the data display in the Citizen portal may cause users to overlook or not understand what to do with form data or drop-downs, be unable to find the value they are looking for, or fill out forms with incorrect information.	Develop consistent data display standards and guidelines and apply them across the Citizen portal. This includes: ▪ Using consistent default values and text ▪ Changing drop-down value orders to be alphabetical when there is no other logical method of ordering the values.	3

**See Appendix C for visual examples of the above observations*

Roadmap

Introduction to the updated Near- and Mid-to-Longer Term System Roadmap

- As part of the Phase 1 Functional Assessment, a high-level roadmap was created to outline the major activities, key dependencies and critical milestones for the State to consider in closing as many functional gaps as possible by November 2014.

- This Phase 2 technical assessment identified additional near-term considerations that have not been covered in prior deliverables. These additional considerations need to be prioritized and the State should assess and determine direction for these considerations.

- This Phase 2 technical assessment also identified considerations for the mid-to-longer term. These are reflected in the mid-to-longer term system roadmap.

- The following roadmap does not replace a detailed project work plan (which is the subject of Deliverable 4), but instead provides a high-level framework for its development. It also does not intend to imply that all of the considerations identified can be achieved but provides a framework by which the State can begin to manage expectations, the major activities, vendor and staff results needed, and the timeframes that must be met in order to deliver any of the functionality systemically or resort to contingent options.

- It is worth noting that the Phase 2 Technical Assessment did not create additional critical milestones in the roadmap. The additional activities included in the update are intended to serve as additional data points on the progress of the project as input for Leadership decision-making purposes.

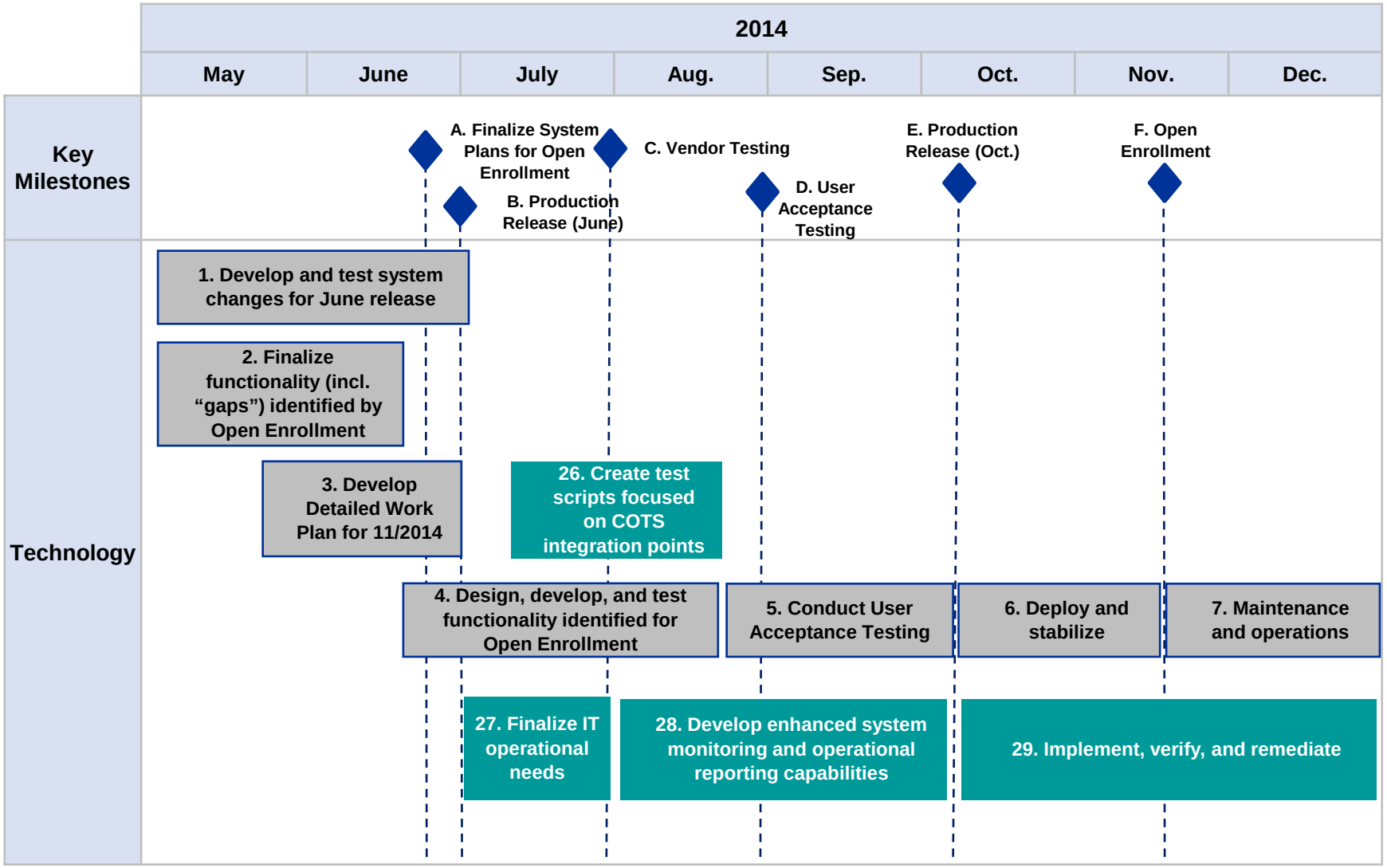
Key Assumptions and Conditions for Success

- Current vendor contracts are in place for project duration
- Levels of effort (LOE) and related costs for non-scoped/change requests by vendors, as well as additional project costs (e.g. resources for manual processing, call center resources) can be funded
- Both in-scope and non-scoped functionality gaps are fully assessed and agreed to and can be delivered by current vendors
- Adequate vendor and State resources exist/will be made available to meet all performance requirements for this project. Adequate is defined in terms of capacity, timeliness, focus/dedication, skills and experience.
- The scope of functionality, prioritization of same and detailed requirements to be implemented by November 2014 will be defined in time to allow for all downstream activities
- State policy decision-making and approval (as needed) will occur in time to support project runway
- Adequate test cases will be developed and executed to fully support the testing process (and will be conducted in upstream environments)
- Adequate systems hardware and software (licenses) will exist for all parts of systems development life cycle (SDLC)
- All governance and key program management processes are fully functional and staffed and effective
- Key issues identified in testing will be resolved in the system prior to system go-live
- That cross-vendor (sub) systems integration will not serve as a barrier to success
- Clear metrics will be developed to measure the progress of all aspects of the project
- Dependencies amongst stakeholders and external factors will be identified early in the process and planned for appropriately
- Clear check points/milestones will be utilized to assess progress and for leadership decision-making
- Contingency plans will be developed and executed when key milestones are not met

Note: No new assumptions were added as a result of this Phase 1 technical Assessment. The Key Assumptions and Conditions for Success from the Phase 1 Functional Assessment are relevant and repeated here for convenience to the reader.

Near-Term System Roadmap – updated to reflect considerations identified from the Phase 2 Technical Assessment (cont.)

Below is a potential roadmap for the State to consider in planning and execution of its efforts for November 2014.



A check-in is performed at each milestone to determine if contingency plans need to be executed

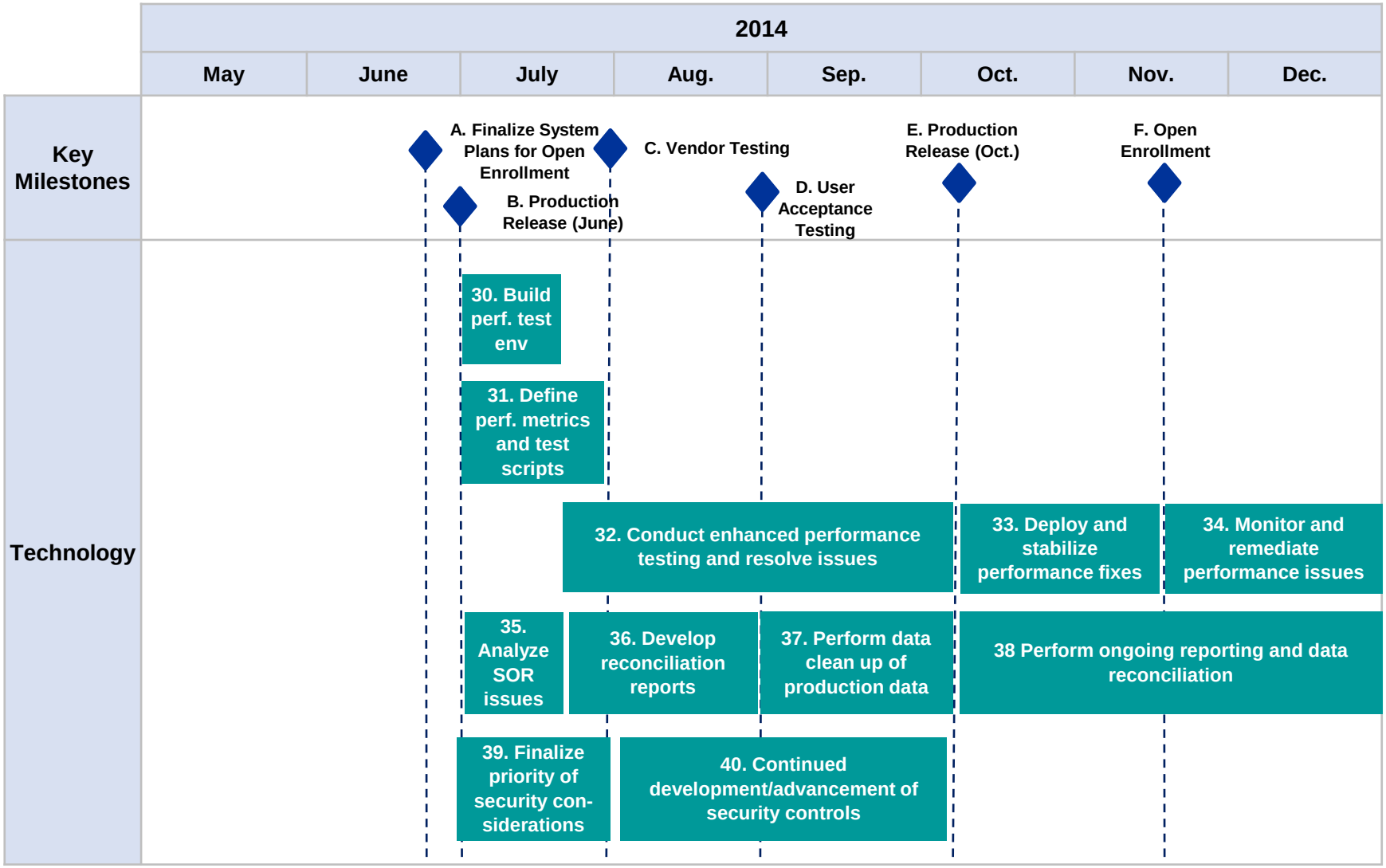
Activities already included in the P1 assessment

Activities that include additional near-term considerations for technical needs

Deloitte.

Near-Term System Roadmap – updated to reflect considerations identified from the Phase 2 Technical Assessment (cont.)

Below is a potential roadmap for the State to consider in planning and execution of its efforts for November 2014.



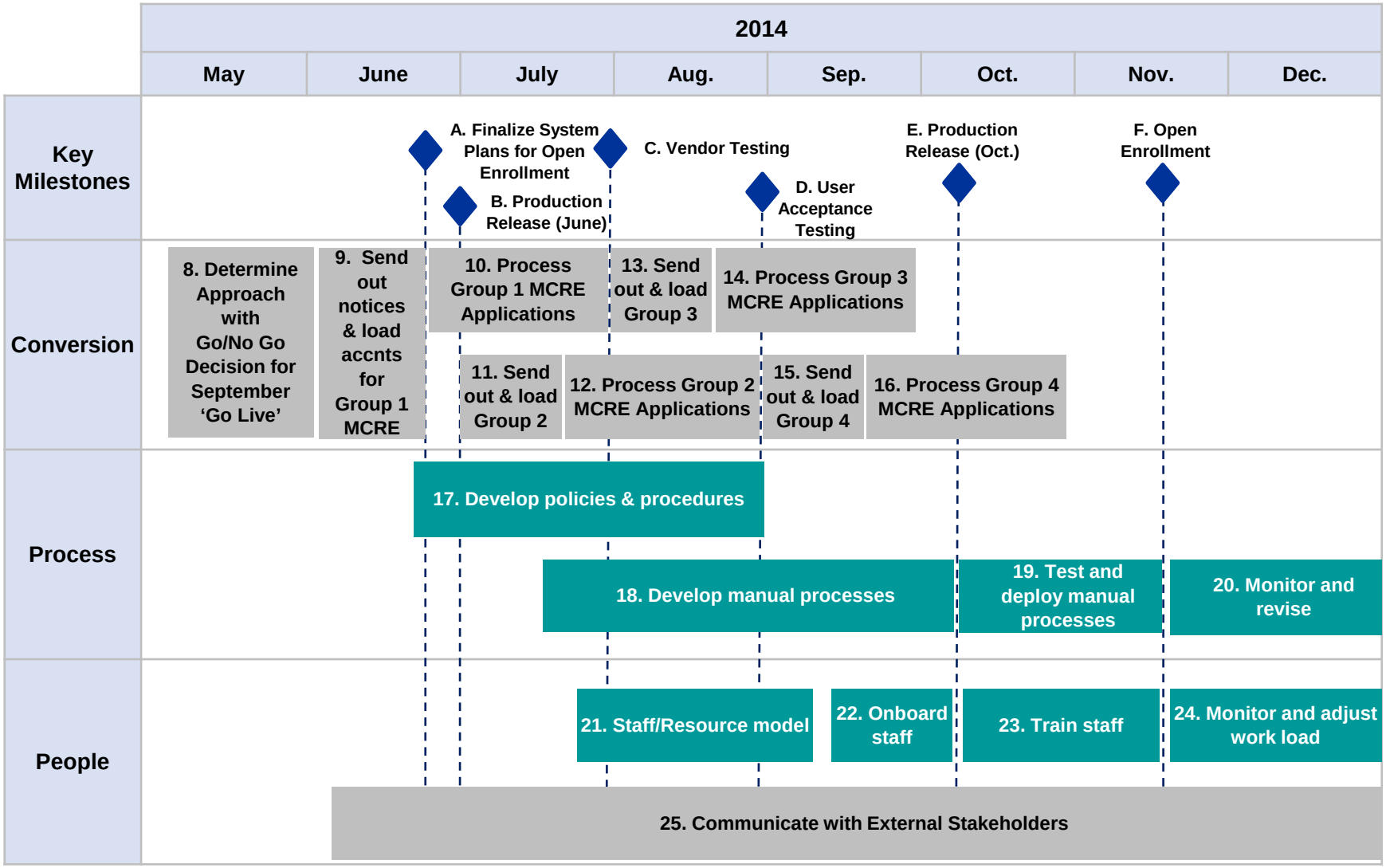
A check-in is performed at each milestone to determine if contingency plans need to be executed

Activities already included in the P1 assessment

Activities that include additional near-term considerations for technical needs

Near-Term System Roadmap – updated to reflect considerations identified from the Phase 2 Technical Assessment (cont.)

Below is a potential roadmap for the State to consider in planning and execution of its efforts for November 2014.



A check-in is performed at each milestone to determine if contingency plans need to be executed

Activities already included in the P1 assessment

Activities that include additional near-term considerations for technical needs

Deloitte.

Near-Term System Roadmap – New Activity Definitions

Below is the description of the new activities identified in the roadmap. Refer to Deliverable #3 for a description of the greyed out activity boxes in the roadmap.

No	Activity	Description
26	Create test scripts focused on COTS integration points	Define test scripts that cover the extensive testing of the integration points between COTS products and within COTS product components where the complex integration poses a high risk of integration failures or of regression issues with the new functionality being developed.
27	Finalize IT operational needs	Analyze the current system monitoring and system metrics reporting capabilities, determining the IT operations support needs for the upcoming open enrollment, planning for adequate staffing to support system changes, defining formal knowledge transfer needs from the COTS product vendors.
28	Develop enhanced system monitoring and operational reporting capabilities	Expand the current system monitoring and system metrics reporting activities across the full site. In addition, expand on the operational reports that capture system errors, system performance, and system health, and developing the processes to resolve the findings in these reports.
29	Implement, verify, and remediate	Perform detailed analysis on the additional data gathered with the enhanced system monitoring and execute the necessary actions to fix issues identified ahead of open enrollment.
30	Build performance test environment	Build a performance test environment and synchronize the configuration with the production environment.
31	Define performance metrics and test scripts	Define performance testing criteria and creating the performance test scripts that evaluate the system's performance against that criteria. Metrics from the previous open enrollment and the anticipated usage volumes should be considered to define the appropriate performance metrics.
32	Conduct enhanced performance testing and resolve issues	Execute the performance test scripts and the remediation of the issues found.
33	Deploy and stabilize performance pictures	Release performance fixes to production and stabilize the system performance.

Near-Term System Roadmap – New Activity Definitions (cont.)

Below is the description of the new activities identified in the roadmap. Refer to Deliverable #3 for a description of the greyed out activity boxes in the roadmap.

No	Activity	Description
34	Monitor and remediate performance issues	Monitor the performance of the production system using the enhanced system monitoring tools established in earlier activities. Additional performance fixes may be required based on the findings from the system monitoring.
35	Analyze System of Record (SOR) issues	Conduct an analysis of the data flow between the various COTS products to identify the areas where data integrity may be compromised and result in deficiencies with maintaining the system of record. Based on identified areas of data integrity risk, determine the appropriate operational and technical controls to address the potential data integrity issue.
36	Develop reconciliation reports	Implement the reports required to reconcile the data between the various COTS products as a result of the SOR analysis.
37	Perform data clean up of production data	Perform reconciliation of the production data impacted by the SOR issues.
38	Perform ongoing reporting and data reconciliation	Perform on-going reconciliation of production data that may be impacted by SOR issues.
39	Continued development/advancement of security controls	[Content has been removed for security purposes]
40	Continued development/advancement of security controls	[Content has been removed for security purposes]

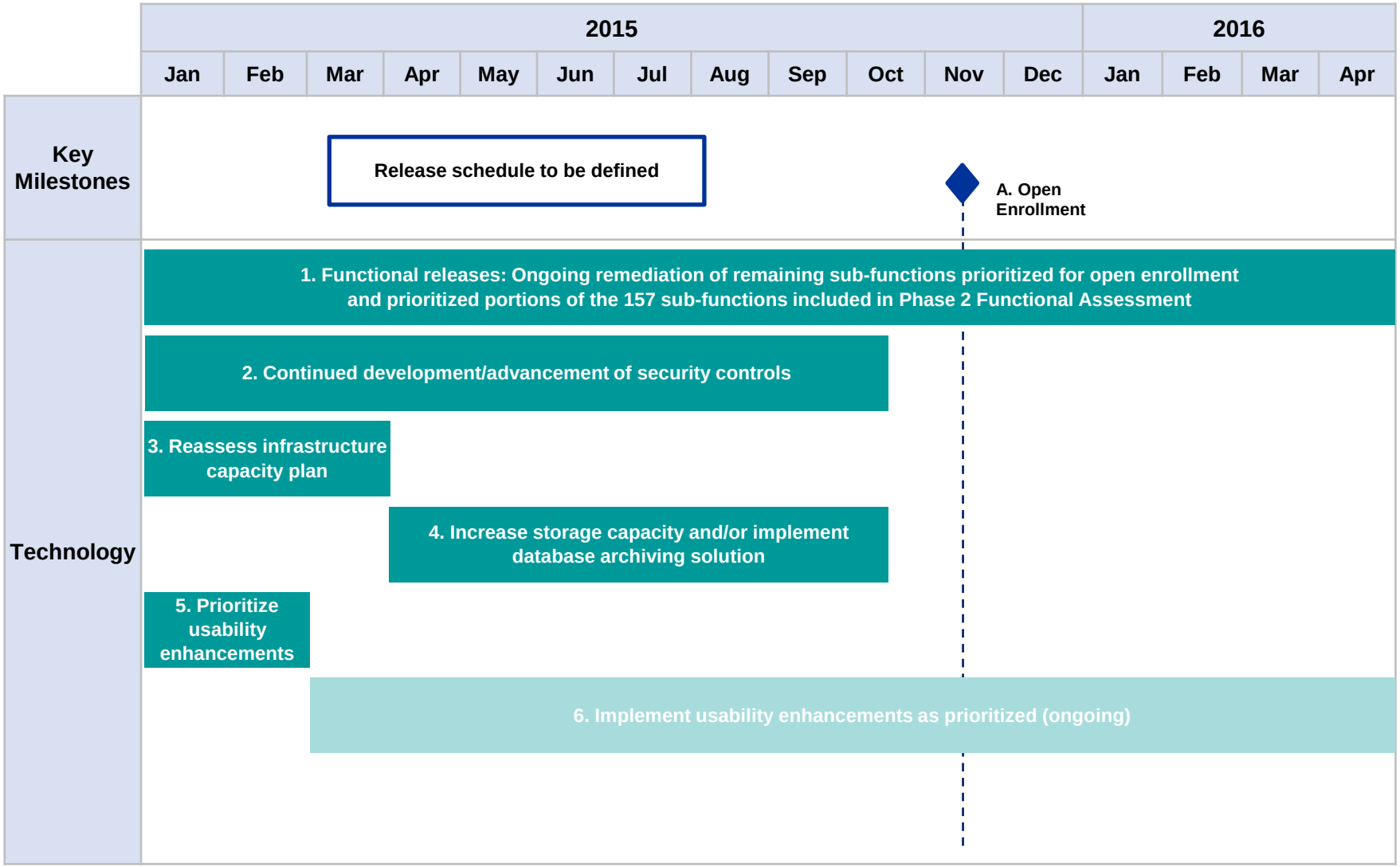
Near-Term System Roadmap – Updated Phase 1 Activities Definition

Below is the description of the new activities identified in the roadmap. Refer to Deliverable #3 for a description of the greyed out activity boxes in the roadmap.

No	Activity	Description
4	Design, develop, and test functionality identified for open enrollment	Synchronize test and production environment configurations to ensure testing activities for efforts are representative of the true production environment.
17	Develop policies and procedures	Document policies and procedures (both business and technology) to support ongoing operations and open enrollment.
18	Develop manual processes	Define the detailed manual processes to address functionality that is not planned to be automated before open enrollment.
19	Test and deploy manual processes	Verify the manual processes, refine the processes, train staff and implement across the organization.
20	Monitor and revise	Monitor and revise the processes developed. Make adjustments as necessary.
21	Staff/Resource model	Define the staff and resource requirements needed to implement the finalized scope.
22	Onboard staff	Make staff familiar with identified technology and process changes for at/post go-live.
23	Train staff	Prepare staff to appropriately use developed technology and carry out process changes at/post open enrollment.
24	Monitor and adjust work load	Confirm staff is appropriately using new functionality and carrying out processes. Conduct additional training as needed.

Preliminary Mid and Longer Term System Roadmap

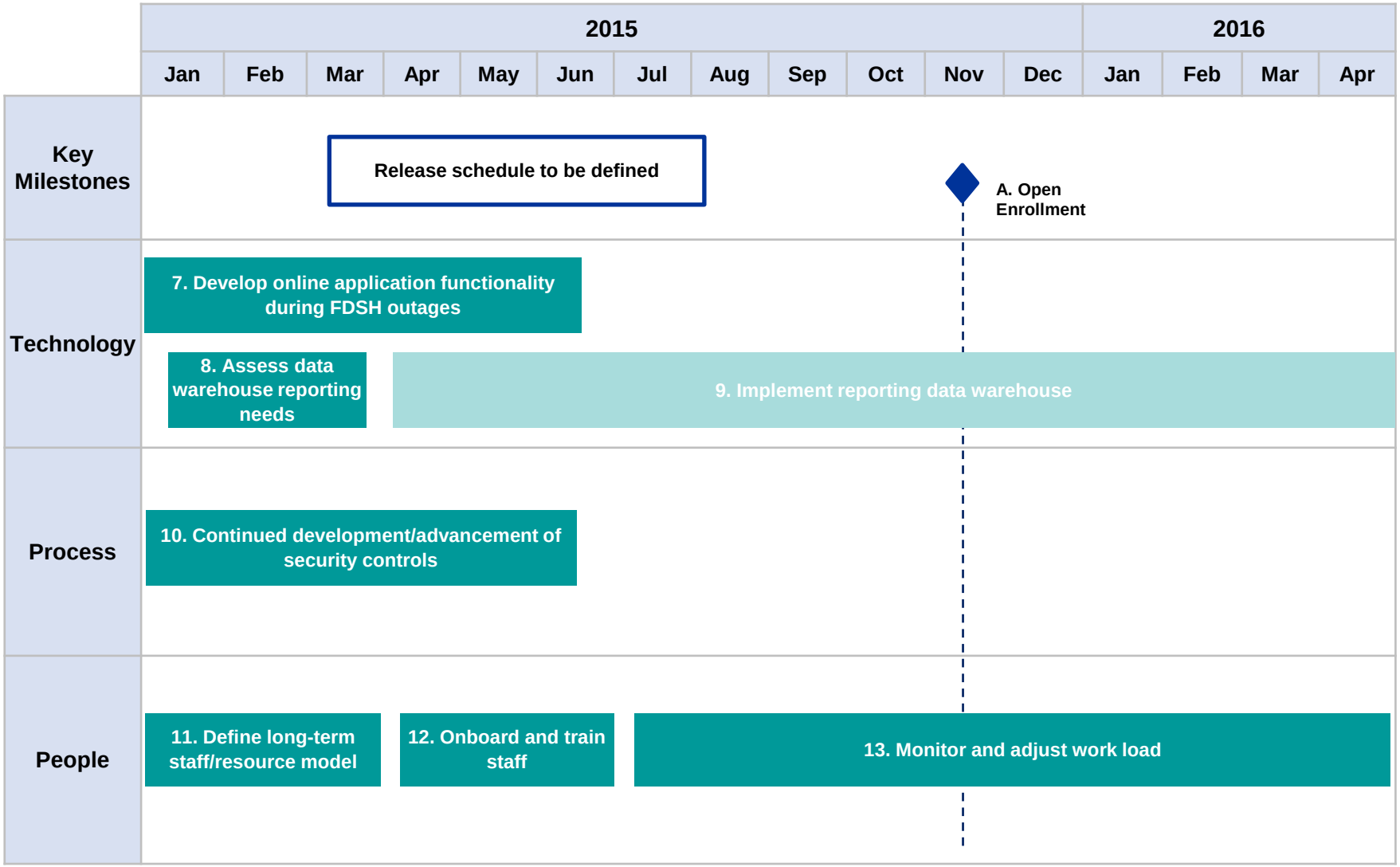
Below is a potential roadmap for the State to consider in planning and execution of its efforts beyond November 2014.



A check-in is performed at each milestone to determine if contingency plans need to be executed

Preliminary Mid and Longer Term System Roadmap

Below is a potential roadmap for the State to consider in planning and execution of its efforts beyond November 2014.



A check-in is performed at each milestone to determine if contingency plans need to be executed

Mid and Longer Term System Roadmap – New Activity Definitions

No	Activity	Description
1	Functional release	Remediate remaining sub-functions prioritized for Open Enrollment and prioritized portions of the 157 sub-functions included in Phase 2 Functional Assessment.
2	Remediate alignment of technical security controls	Remediate alignment of any technical security controls not addressed prior to the 2015 open enrollment period. These may include migrating the IAM solution to a vendor-certified infrastructure and developing and implementing MNsure-specific Disaster Recovery and Business Continuity Management plans.
3	Review database resources and reassess capacity plan	Monitor the database resource and review performance reporting regularly for capacity planning and to identify any database-related issues proactively.
4	Increase storage capacity and/or implement database archiving solution	Perform enhancement activities including adding more storage and/or implement archiving capabilities based on the monitoring of database resources and reviews of the Automatic Workload Repository (AWR).
5	Prioritize usability enhancements	Prioritize usability enhancement activities including standardizing the look and feel of the application across the various COTS products, combining and minifying JavaScript and CSS files, developing support for assistive technologies, and increasing the use of web analytics.
6	Implement usability enhancements as prioritized (ongoing)	Based on the outcome of the prioritization of usability enhancements, implement usability enhancements.
7	Develop online application functionality during FDSH outages	Develop functionality to allow users to submit an applications during FDSH and other external system outages and develop processes to reconcile the required verifications when data services become available
8	Assess data warehouse reporting needs	Define long-term data warehouse reporting needs
9	Implement reporting data warehouse	Based on the outcome of the data warehouse reporting needs assessment, design and implement a reporting data warehouse to support reporting activities.

Mid and Longer Term System Roadmap – New Activity Definitions

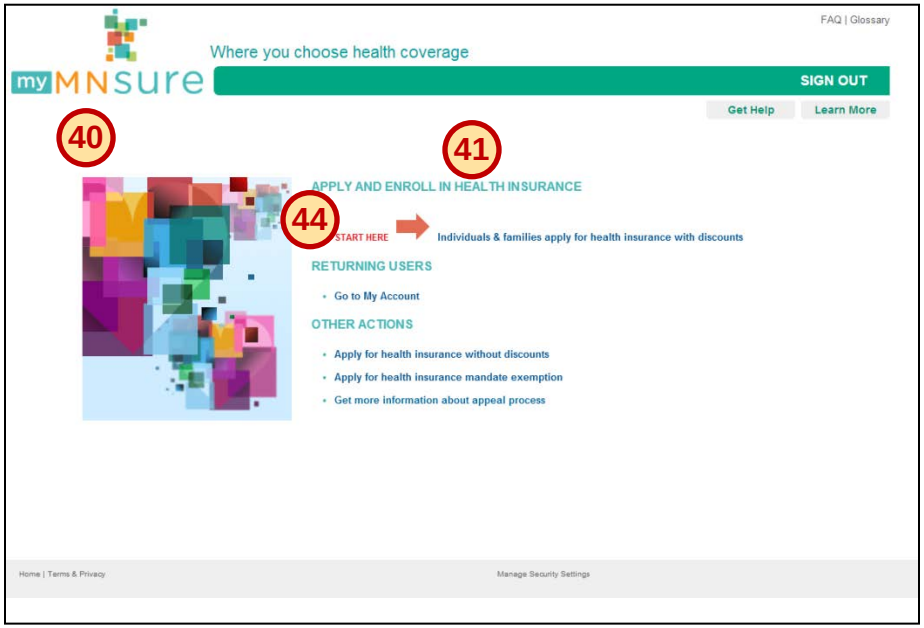
No	Activity	Description
10	Continued development/advancement of security controls	[Content has been removed for security purposes]
11	Define long-term staff/resource model	Develop a long-term staffing and training plan, updating the near-term staffing plan based on 2015 open enrollment and the implementation of long-term considerations.
12	Onboard and train staff	Provide adequate staff to support system changes and provide formal training and knowledge transfer as needed, including: ▪ Maintenance and operations of security components of the system and ▪ Employee roles and responsibilities in regards to protecting FTI and responding to security incidents.
13	Monitor and adjust work load	Confirm staff is appropriately using new functionality and carrying out processes. Conduct additional training as needed.

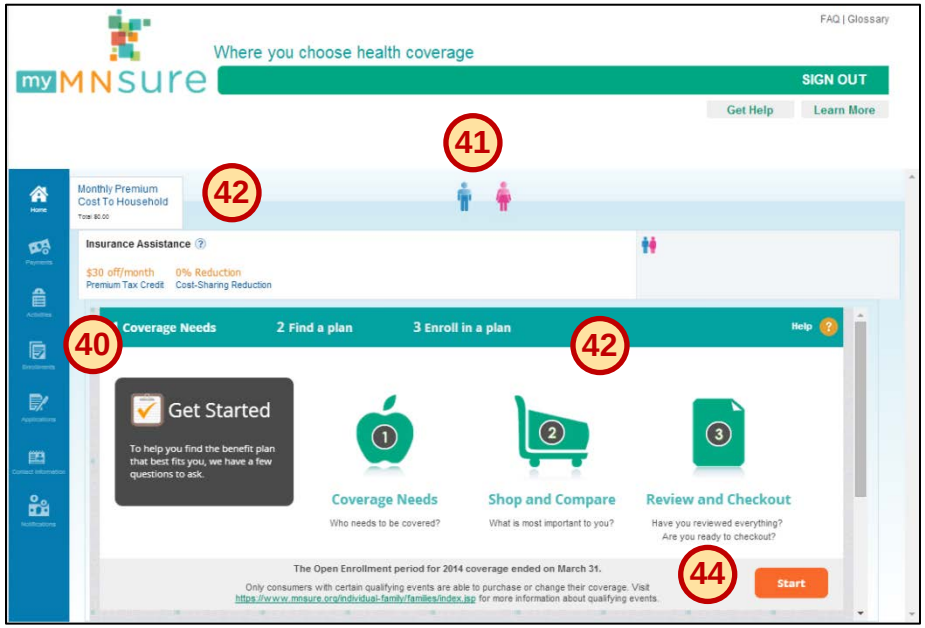
Appendix A:
Privacy and Security Rating Criteria

Content has been removed for security purposes

Appendix B:
Usability Screens

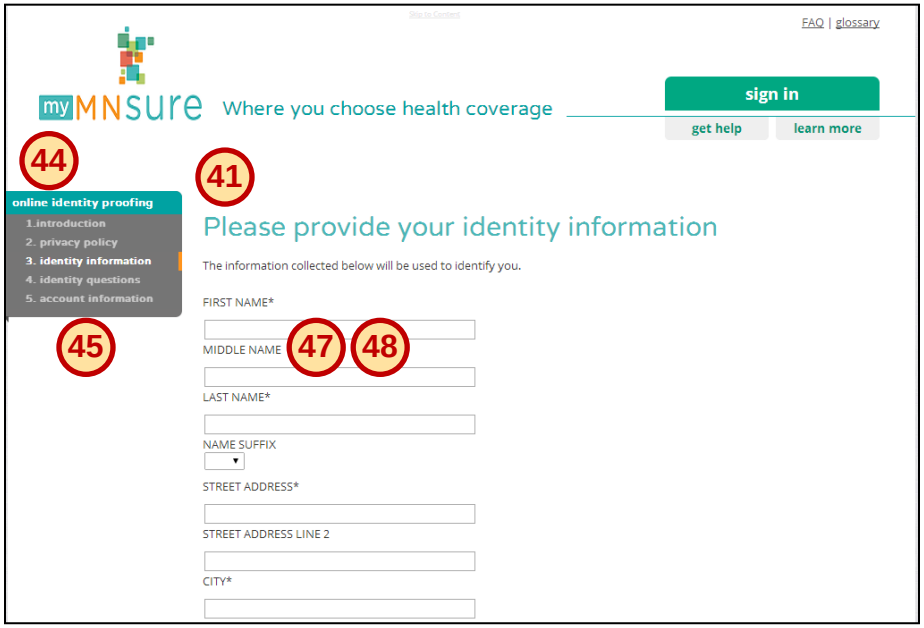
Appendix: Visual Design Review

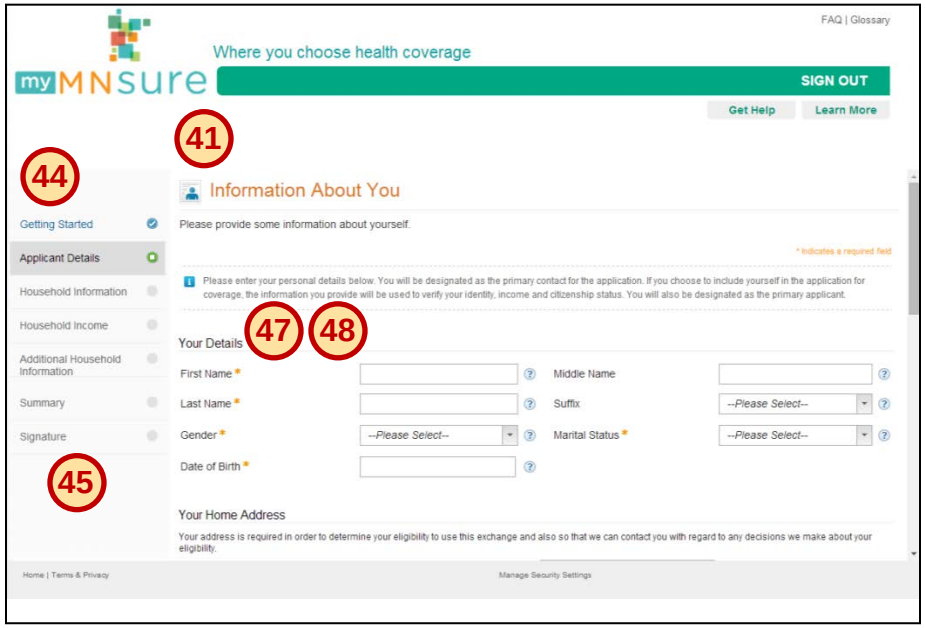




40. Branding is not consistent
41. Page design is not consistent across pages
42. Page design across sections of a page is not consistent
44 . Navigation is not consistent

Appendix: Visual Design Review (cont.)





41. Page design is not consistent across pages
44. Navigation is not consistent
45. Application progress is difficult to track
47. Form design is not consistent across pages
48. Data display is not consistent across pages

Appendix C:
Interviews Conducted

Interviews Conducted

The following interviews were conducted with the State staff and vendors:

No	Organization	Interview Subject	Interview Date
1	IBM/Cúram	Review the overall planning of the technical sessions with the functional sessions Initial overview of the IBM/Cúram solution	May 5, 2014
2	IBM/Cúram	Self Service, Session Management, Online Help, Reusability, Rules Engine, Workflow Management, Role Management	May 8, 2014
3	IBM/Cúram	System Administration & User Account Management, Disaster Recovery & Compliance, Self-Service, Session Management, Online Help, & Reusability	May 9, 2014
4	MNsure, DHS, MN.IT, PwC	Technical interviews for user account management, system administration, role management and demonstrations	May 12, 2014
5	Connecture	Review the overall planning of the technical sessions with the functional sessions Initial overview of the Connecture solution	May 12, 2014
6	EngagePoint	Review the overall planning of the technical sessions with the functional sessions Initial overview of the EngagePoint solution	May 12, 2014
7	MN.IT, DHS	Technical review discussion for SSP policies, procedures and controls	May 13, 2014
8	EngagePoint	Rules Engine, Workflow Management, Role Management, System Administration & User Account Management	May 14, 2014
9	EngagePoint	Self-Service, Session Management, Online Help, and Reusability Disaster Recovery & Compliance, MDM, Reporting Tool, Data Conversion	May 14, 2014
10	Connecture	Self-Service, Session Management, Online Help, and Reusability, Disaster Recovery & Compliance, MDM, Reporting Tool, Data Conversion	May 15, 2014
11	DHS	Usability and User Experience	May 15, 2014
12	EngagePoint	Follow-up questions for MNsure Technical Assessment	May 16, 2014
13	MN.IT	MNsure System Architecture, MNsure Integration Architecture, Semantic Layer, Enterprise Service Bus, SOA, Issues or Concerns	May 19, 2014

Interviews Conducted (cont.)

No	Organization	Interview Subject	Interview Date
14	MN.IT	MNsure System Architecture, MNsure Integration Architecture, Semantic Layer, Enterprise Service Bus, SOA, Issues or Concerns	May 19, 2014
15	PwC	Review of IAM infrastructure in terms of failover and DR perspective	May 20, 2014
16	DHS, MN.IT	Technical review discussion for SSP policies, procedures and controls	May 20, 2014
17	MN.IT	Database design, any issues with the current database design, any known performance issues, any known challenges in maintaining data, any known gaps, Database Security, System Performance Metrics, Audit log	May 21, 2014
18	IBM/Cúram	IBM/Cúram follow-up Technical Interview	May 27, 2014
19	MN.IT	Review of FileNet security services and access control information and related issues	May 28, 2014
20	MN.IT, DHS	Review of MNsure's access request process and associated issues with the current process	May 28, 2014
21	MN.IT	MNsure - System Monitoring Metrics	May 29, 2014
22	DHS, MN.IT	Review of IRS initial summary results based on MNsure's Security Audit	June 05, 2014
22	MNsure, DHS, MN.IT, PwC	Review of the findings around security configuration (non-technical//technical) for the system	June 05, 2014
23	MNsure, DHS, MN.IT, PwC	Follow-up meeting for review of the findings around security configuration (non-technical//technical) for the system	June 11, 2014
24	EngagePoint	Universal Semantic Layer (USL)	June 12, 2014
25	MNsure, DHS, MN.IT, PwC	Follow-up meeting for review of the findings around security configuration (non-technical//technical) for MNsure application	June 17, 2014
26	IBM/Cúram	Review CPU and Memory utilization for Citizen and Worker portal	June 19, 2014