

## Appendix C – Project Management and Implementation Methodology

The following subsections provide a more detailed, comprehensive overview of our Project Management and Implementation Methodology, as required of **Section 9.0 Implementation, Staffing and Support** in the Technical Proposal Attachments for both Labor Exchange and Case Management solutions.

### Project Management

Our unique and effective approach, called Rapid Implementation and Development, is centered on agile design and development processes and is Geographic Solutions' standard methodology for managing projects. Developed by our certified Project Management staff, this is an adaptable process framework that enables the project management and software development teams to select the elements of the process that are appropriate for the needs of a specific project and then adapt them for quick implementation.

In accordance with the Project Management Institute (PMI), as articulated in the institute's *A Guide to the Project Management Body of Knowledge (PMBOK®)* Seventh Edition, our methodology is a tested and proven collection of project management practices gained from many years of experience creating and implementing state Labor Exchange and Case Management systems. Geographic Solutions uses this methodology throughout all phases of a project. This provides a formal, yet flexible, approach to formulating, implementing, and maintaining workforce systems. Utilizing the Kaizen approach in creating continuous improvement, our staff continually revisits the process and incorporates updates to the *PMBOK®* and Agile Practice Guide where applicable.

The Rapid Implementation and Development methodology combines the strengths of traditional scope planning, feature-driven development, and agile software delivery. Our project management approach utilizes industry best practices as identified and supported by PMI and the International Organization for Standardization (ISO), among others.

Geographic Solutions leverages the strengths of these best practices to drive a proven, collaborative, and winning project management methodology. These practices give our Project Managers a high degree of project control to meet the DWD's expectations. Our value-driven and collaborative approach to software development practices enables our team to align development with the State of Indiana's business needs. This ultimately ensures a higher return on investments through continuous inspection of quality, better alignment with customer requirements, and frequent delivery of high-quality software features.

Six guiding principles govern our Rapid Implementation and Development project management methodology:

1. We must implement a quality solution as quickly as possible.

2. The finished product should take full advantage of our existing Modifiable Off-The-Shelf (MOTS) software functionality.
3. The system must adapt easily to client-specific requirements.
4. The implementation must result in a smooth transition from the legacy system.
5. The final product must be easy to modify for state or federal requirement changes and advances in technology.
6. The project will be delivered within the proposed timeline and budget.

Our Rapid Implementation and Development project management approach ensures the delivery of a specific end product and deliverables based on a set of specific client requirements. Our approach focuses on meeting a specific agreed-upon Go Live date for the required deliverables. These traditional structured steps with a continual emphasis on meeting the established deliverable goals guide the planning, requirements gathering, analysis, and implementation stages of each project.

Our Rapid Implementation and Development methodology follows the Agile framework for the design and development of the solution. New components or modifications to existing components are designed, developed, and tested in an iterative manner. Cross-functional teams manage the design, coding, and testing through sprint planning meetings and daily stand-ups known as the Scrum. DWD conducts testing of the specific functional changes as part of every sprint. However, we deploy the new functionality into the live system only when all development is complete.

After the completion of all the sprint iterations, the new system goes through comprehensive functional regression testing by our Quality Assurance (QA) staff with automated scripts, testing of converted data, interface testing, performance and stress testing, and the final end-to-end regression testing of the system. Then, a team of client representatives conduct user acceptance testing (UAT) for the new system. Only upon successful completion of all testing and a signed acceptance of the new system by DWD will the site be released.

## Benefits of Our Approach and Methodology

Geographic Solutions has a demonstrated successful record of rapid implementation of Case Management and Labor Exchange System for government agencies using our Rapid Implementation and Development project management methodology, which offers the following benefits:

- Modular approach divided into phases and stages that we can include or exclude, depending on a project's requirements.
- Process that combines the flexibility, speed, and transparency of the Agile framework for system design and development with the structure, predictability, and low risk of traditional methods for planning, analysis, and implementation.
- Scalability to any size project, from our smallest to largest customers.
- Inclusiveness of all possible items required for a successful implementation.

- Flexibility to allow us to rearrange and adjust to meet client-specific requirements.
- Proven approach based on industry standard best practices.
- Process-oriented structure providing the ability to define inputs, tools, techniques, and outputs (deliverables).
- Encourages transparency throughout the project by providing real-time project status.

Geographic Solutions' value-driven, iterative, and collaborative approach to the software development lifecycle enables our Project Management Office (PMO) to align development with business needs. This ultimately ensures higher return on our customers' investments through continuous inspection of quality, better alignment with customer requirements, and frequent delivery of high-quality software features.

## Project Management Plan

A key deliverable for the Case Management and Labor Exchange System is to produce and communicate an effective and workable Project Management Plan (PMP) that follows the guidelines outlined in *A Guide to the Project Management Body of Knowledge (PMBOK®)*. The Project Management Plan will report on the health of the project monthly, including Project Schedule variance, development outcomes, defect rate, and milestone delivery.

The project planning process determines the scope of the project management and technical activities and identifies outputs, project tasks, and deliverables. The process establishes schedules for the project tasks, acceptance criteria, and the resources required to accomplish the project tasks. The schedule will specify all project phases, milestones, tasks, deliverables, and resources necessary to provide a quality Case Management and Labor Exchange Solution that is successfully adopted by users. At minimum, the phases will include gap analysis, iterative design and development (from prototypes to production), unit testing, system integration testing, user acceptance testing, user training, cutover, post go-live support, and ongoing operations and maintenance.

The planning process will culminate with the delivery of the final Project Management Plan for DWD approval during the project Inception Phase. Geographic Solutions provides our Project Management Plan as a single document that is a compendium of subsidiary detailed management plans. Each subsidiary management plan will provide effective and workable plans.

The Project Management Plan will include an overview of the project approach, schedule, and work locations, as well as plans for submitting deliverables, facilitating DWD's review and approval of deliverables, requirements validation activities, and other areas of coordination necessary between DWD and Geographic Solutions.

DWD and Geographic Solutions will collaborate to review, refine, and accept the PMP during the project Inception Phase. The Geographic Solutions' Project Manager will prepare all plans for execution of the

project. The plans associated with the execution of the project will include descriptions of the corresponding activities and tasks and identification of the software products delivered.

Geographic Solutions may develop supplemental plans as deemed necessary to facilitate the successful completion of the project and deliverables. Our PMO will be responsible for revising and maintaining the Project Management Plan throughout the duration of the project in collaboration with DWD. This includes documenting revisions based on changes in scope, resources, timelines, or budget. Our experience shows that timely and clear communication is key to effective revision control. It is critical to the project's success that all project changes are managed and resolved as quickly as possible.

Geographic Solutions provides our Project Management Plan as a single document that is a compendium of subsidiary detailed management plans. Each subsidiary management plan will provide effective and workable plans. The project plan may include the following subsidiary plans, as per the final contract and project scope:

- Master Project Work Plan
- Implementation Plan
- Project Risk and Mitigation Plan
- Communication Plan
- Project Resource and Staffing Plan
- Configuration Management Plan
- Data Conversion and Migration Plan
- Environments Work Plan
- Security and Compliance Plan
- Problem Resolution Plan
- Backup and Recovery Plan
- Disaster Recovery and Business Continuity Plan
- Change Management Plan
- Test Management Plans
- Organizational Change Management Plan
- Training Plan
- Deployment Plan

## Internal Control Procedures

Geographic Solutions designs all project plans, estimates, schedules, quality standards, and baselines based on the initial project scope. Any change to project scope during execution leads to a review of the entire initial project plan to determine the impact to budget, schedule, and quality. Scope changes impact the project resources as they divert from the original activities identified in the original project scope, leading to pressure on the project timeline and budget.

To control scope change, Geographic Solutions uses change management and a proactive approach that involves the DWD project stakeholders and incorporates their needs throughout the project lifecycle. We identify key success factors that measure the success of attaining project scope. We will clearly define the goals and scope of the project based on requirements. This will guide the Case Management and Labor Exchange System to stay on track and ensure the solution is performing as intended.

The Geographic Solutions' Project Manager will document all items that presume a project scope change, prepare detailed evaluation materials for DWD's acceptance, and manage all requests to change either the scope or requirements of the project.

If the original project scope requires change, the Geographic Solutions' Project Manager will follow the Scope Change Control Plan and perform the following steps:

- Complete the Project Change Request form
- Analyze the scope change
- Approve the scope change
- Update the Project Scope Statement and project plans
- Communicate scope changes
- Incorporate approved scope changes to baseline
- Update and communicate approved Project Scope Statement and Work Breakdown Structure (WBS)
- Register lessons learned

The Geographic Solutions Rapid Implementation and Development methodology and project management approach demand the consistent and clear dissemination of information for administering the project activities. To that end, the Geographic Solutions' PMO has developed administrative templates to facilitate the management and dissemination of coherent project information for all aspects of the project.

The PMO develops these administrative templates within the Microsoft Office platform, using Microsoft Word and Excel – industry standards for the content creation and management of text and numeric-based documentation. These templates are exchangeable and easy to attach to emails and records within the Online Project Communication (OPC) system.

## Monitoring Project Performance

Issues with scope and project delays are inherent in many projects, due to a number of factors, most of which Geographic Solutions can mitigate or avoid by using a proper project performance monitoring and control system that integrates all the key activities of each phase of the project. Weekly project status meetings and status reports will track the status of the project deliverables and milestones. Project monitoring and controlling identify potential or realized project delays. We employ risk and issue management to monitor issues, risks, and risk triggers.

The Geographic Solutions' Project Manager will evaluate any issues that may result in scope change. The Project Manager will identify the specific scope changes or threats to the existing defined scope and

present those items for review to the project team (for effort and cost estimates) and, ultimately, to the appropriate DWD staff for full vetting and approval.

To increase the probability of project success, Geographic Solutions uses a number of tools and tracking mechanisms to balance the triple constraint of scope, time, and cost. A project is defined by its scope, schedule, and budget and, if we change one of the three, we influence the other two. At a closer look, the constraints of project management are mainly due to limited resources.



Time



Scope



Cost

- **Human Resources** – There are only a limited number of people with the appropriate skill levels.
- **Time** – There is a limited amount of time to complete a project.
- **Cost** – The budget is limited.

Geographic Solutions follows the *PMBOK*® processes to monitor and control scope, time, and cost.

## Time and Cost Management

Geographic Solutions estimates the time required to produce a deliverable using several techniques – prioritizing tasks, identifying dependencies, and estimating durations.

Geographic Solutions designs the project schedule baseline in accordance with the PMI's standards for scope, schedule, and cost performance. After baselining the final plan, Geographic Solutions can change it when DWD generates a change request and Geographic Solutions approves it through the Integrated Change Control process. Geographic Solutions combines the scope, schedule, and cost baselines into a performance measurement baseline to use as an overall project baseline against which it can measure integrated performance via earned value measurements.

Geographic Solutions uses the following *PMBOK*® processes for time management:

- Activity Definition
- Activity Duration Estimating
- Activity Sequencing
- Schedule Development
- Activity Resource Estimating
- Schedule Control

Geographic Solutions utilizes time management planning and activities to ensure the timing of the project deliverables are within a level of accuracy that is appropriate for the complexity of the project.

Geographic Solutions bases its cost estimates on the costs of resources and the duration to complete the project tasks. Geographic Solutions uses several cost-estimating tools, such as:

- **Analogous Estimating** – Using the cost of similar projects.
- **Bottom-up Estimating** – Using the lowest level of work package and summarizing the cost at the highest level.
- **Parametric Estimating** – Measuring the statistical relationship between historical data and other variables.

## Project Management Tools

Geographic Solutions uses project management tools that are industry-wide, proven mechanisms for successful project management and project implementation. The following describes the main tools that will be used in the implementation of the Case Management and Labor Exchange System:

Project Management Tool	Description
<b>Application Lifecycle Management (ALM) Toolset</b>	To create and maintain the requirements, Geographic Solutions will employ Hewlett Packard's Application Lifecycle Management (ALM) toolset. ALM is a visual tool that converts text requirements into easy-to-understand diagrams, improving the productivity and efficiency of this important step in managing the project. Using ALM, Geographic Solutions can easily visualize end-to-end traceability for the Case Management and Labor Exchange System. The tool allows us to create advanced traceability diagrams using simple point-and-click and drag-and-drop techniques. The tool allows us to visualize and manage all the trace links.
<b>Microsoft Project</b>	Microsoft Project is used to develop and track the project schedule, assigning resources to tasks, tracking progress, and analyzing workloads. From a baseline project schedule, we can track projected versus actual completion of scheduled tasks and track progression of the project.
<b>Requirements Traceability Matrix (RTM).</b>	The RTM provides a roadmap from the lowest level data elements associated with each function or process to the many places where the system uses them. We use this tool to trace each requirement and deliverable to the design components, test cases, database tables, code models, etc. Using the RTM enables us to create, modify, and delete traceability relationships to trace requirements throughout the life of the project. This will provide an efficient mechanism to check coverage.



Project Management Tool	Description
<b>Pivotal Tracker</b>	<p>Geographic Solutions uses a third-party tool called Pivotal Tracker to manage project velocity using Agile methods. Pivotal Tracker is a story-based, project-planning tool from Pivotal Labs that allows teams to collaborate and react to real-world changes instantly. Pivotal Tracker maintains a prioritized backlog of project deliverables, broken down into small, estimated pieces called stories. It dynamically groups these stories into fixed segments of time, called iterations, and it predicts progress based on real, historical performance known as velocity. By utilizing this process, the development teams complete more work and the client satisfaction with productivity increases.</p> <p>Geographic Solutions uses Pivotal Tracker during the Construction Phase of the project to assist DWD and staff in managing tasks and deliverables in a real-time Agile setting. Pivotal Tracker offers the project team an online space to manage projects, which is integrated with the OPC system via a web service.</p>
<b>Online Project Communication (OPC) System</b>	<p>As a cornerstone of our Rapid Implementation and Development project management methodology, the OPC system acts as a single repository for project issues. It includes detailed status tracking, problem reporting and tracking, and management of change requests and enhancement requests. The OPC site enables DWD to report incidents using online forms and monitor the project's status in a dynamic mode.</p> <p>OPC access requires only an internet browser and an assigned client login. To report incidents or request changes, DWD completes online forms, which can contain attached files to demonstrate the requested change, or the problem encountered in the system.</p>
<b>Microsoft SharePoint</b>	<p>Geographic Solutions uses Microsoft SharePoint for the project documentation repository. We use SharePoint to actively manage document version control, tracking, storage, and sharing.</p>
<b>Microsoft Word</b>	<p>Geographic Solutions uses Microsoft Word to create project documents including all project-related plans and Agile Requirement Documents.</p>



Project Management Tool	Description
Microsoft Visio	Geographic Solutions uses Microsoft Visio to diagram workflows that are integrated into the Agile Requirement Documents and system specifications.

One of the greatest project management tools is Geographic Solutions' staff. Many of our staff have been practitioners in the Case Management and Labor Exchange System field, from Directors of Workforce Development to management staff and field staff. Several of Geographic Solutions' Project Management staff have years of experience in implementing both Case Management and Labor Exchange System projects. Geographic Solutions maintains dedicated workforce teams for Business Analysis, Application Development and Quality Assurance. Our staff knowledge, education, and experience are a paramount of project management tools utilized by Geographic Solutions.

### Virginia Employment Commission

"The stellar collaboration of customer (VEC) and vendor (Geographic Solutions) is an example of the past success of a major project at the VEC. Our collaboration with your team remains an unforgettable, positive professional accomplishment for us."

## Staff Organizational Structure

Geographic Solutions' unparalleled corporate history and structure, combined with the qualifications of our staff, uniquely position us to complete and maintain the Case Management and Labor Exchange System successfully. Geographic Solutions' professional staff has decades of experience to include development, project management, account management, and client support. While Geographic Solutions assigns single points-of-contact to its clients, as needed and as appropriate, it often cross trains staff to ensure the company does not become over-reliant on just one or two people in key areas of responsibility. Operations and QA managers, for example, provide continuity and oversight to multiple concurrent projects.

Geographic Solutions will staff the new Case Management and Labor Exchange System with experienced, full-time staff located in our Palm Harbor, Florida headquarters. All Geographic Solutions' personnel are located in the United States. Geographic Solutions does not outsource using either freelance or offshore development resources for any of our software development. As a result, our approach minimizes risk for DWD. Our entire team is familiar with our project approach and experienced in our implementation methodology.

## Steering Committee

A key to the project organizational structure is the Project Steering Committee. This Committee, made up of key Geographic Solutions' staff members, is responsible for defining oversight and for cross-organizational information exchange in the Case Management and Labor Exchange System. In

collaboration with the other work groups, the Committee will help define the project items and tasks that require oversight (governance structure, processes, and bylaws), the team members who will govern those items and tasks (governing body participants), and how the team members will govern those project items and tasks.

The Committee will create trust and consensus on an approach for the Case Management and Labor Exchange System and provide oversight and accountability of the effort. One of the primary purposes of a governance entity is to develop and maintain a multi-stakeholder process to ensure compliance with applicable policies and laws.

## **Project Management Office (PMO)**

Geographic Solutions' PMO will provide oversight and recommendations regarding the Case Management and Labor Exchange System, as well as support the project team with advice, training, methods, standards, and tools to ensure successful project delivery. The PMO assists in planning and executing the steps of the entire project. Geographic Solutions' staff review all project plans, project deliverables, and project control documentation and hold them to strict quality standards. At an administrative level, the PMO assists in the administration of project-specific data, such as schedule and resource management, risk management, project communication, status reporting, and project metrics.

The PMO ensures transparency throughout the project by providing DWD real-time web access to the internal Agile Project Reporting website. This deeper visibility into the project at all stages ensures that DWD is aware of progression and can make informed decisions and instantly visualize the project as a whole.

## **Project Staffing Assignment**

Geographic Solutions uses a team approach to software implementation. It has developed small, efficient teams focused on specific aspects of project development (conversion, interfaces, training, documentation, etc.).

Geographic Solutions' team members have many years of experience in the Case Management and Labor Exchange System arena. The primary project manager will be [REDACTED]

Geographic Solutions has refined the development, implementation, and training tasks involved in delivering systems similar to the Case Management and Labor Exchange System. Our processes and strategies will reduce the amount of time and effort required on the part of DWD's staff to bring the new Case Management and Labor Exchange System to Go Live.

Geographic Solutions' unparalleled corporate history and structure, combined with the qualifications of our staff, uniquely position us to complete and maintain the Case Management and Labor Exchange System successfully. Geographic Solutions' professional staff has decades of experience to include development, project management, account management, and client support.

## Communication and Progress Reporting

Guided by section 10.1.3.1 *Communications Management Plan* of the *PMBOK*® Seventh Edition, our approach to communication and reporting utilizes best practice standards and tools to ensure clear, concise, and consistent communication. The Geographic Solutions' PMO and Project Team will take a proactive role in ensuring effective communications on the project.

To ensure clear communication, project status meetings and reports are standard deliverables in our Rapid Implementation and Development project management methodology. The Geographic Solutions' Project Manager will manage and promote effective communication across internal and external project staff and DWD stakeholders to evaluate, problem-solve, and improve communication flow across the project. The Project Manager establishes and reinforces predictable communication routines to ensure timely and appropriate generation, collection, and dissemination of project information.

The Geographic Solutions' Project Manager will effectively and efficiently communicate by exercising the following principles:

- Ensuring timely and appropriate generation, collection, and dissemination of project information.
- Conducting project status meetings and attending other project-related meetings as needed.
- Tracking both positive and negative cost and schedule variances for milestones that accumulate for the duration of the project.
- Providing flexibility while promoting accountability with revised budgets or scheduled baselines that are based only on scope changes that Geographic Solutions and/or DWD could not have foreseen during the planning phase.
- Ensuring project documents are consistent by using the most up-to-date software (e.g., Microsoft Project, Word, and Excel) to document deliverables and generate work papers.

## Project Status Meetings

Geographic Solutions proposes that status meetings will occur weekly to address overall project status and that any topics that Geographic Solutions and DWD need to address to remain on schedule and within budget. The Geographic Solutions' Project Manager will use the approved PMP to monitor and report progress at these meetings. The Project Manager will lead the meetings. Prior to each project status meeting, the Project Manager will prepare and distribute a meeting agenda and the latest status report. In the status meeting, the Geographic Solutions' Project Manager will review the status report with DWD's staff and key stakeholders and will present and discuss the latest project schedule. DWD's Project Manager and/or other members of the project team will participate in the project status meetings.

## Project Status Reports

The Geographic Solutions' Project Manager prepares and submits weekly project status reports throughout the project lifecycle. The Project Manager will send the status reports, via email, to DWD's Project Manager and other key stakeholders. Geographic Solutions will use a standard format and layout for the status reports, which the Project Manager will present to DWD for approval/agreement.

## Flexibility in Meeting Program Changes

As a partner, Geographic Solutions will address the unique requirements facing DWD not only during the initial implementation, but also for the life of the project. Geographic Solutions will continue to enhance the *VOS Sapphire 22* solution with each release to make it the most effective solution for the State of Indiana's administrators, staff, employers, and job seekers. In addition, the company's expert staff continually adds value by sharing the knowledge and experiences gained from working with similar workforce agencies and by incorporating system enhancements.

As part of our futureproof maintenance agreement with DWD, we will make any modifications to the new system that are required due to changes in the federal program at no additional cost to the State of Indiana.

DWD can also easily request changes to the system or scope of services when there is a change in program requirements. Any authorized DWD staff user of the new system can initiate change requests, as can Geographic Solutions.

The change request will describe the change, the change's effects on the services provided, and the impact of the change. For any submitted change, Geographic Solutions will immediately provide written documentation outlining the change. The documentation will include a thorough analysis of the change as it impacts the project plan, scope, schedule, work products, project requirements, cost (if any), and other important factors.

Geographic Solutions will not make any change until DWD has approved it. If Geographic Solutions determines that a requested change will affect the execution of the application adversely, we will communicate this concern to DWD in writing.

## Major Decision-Making Sign-off Procedures

Geographic Solutions' change order workflow starts with DWD's submission of a Change Order and includes clear steps for review and estimation for time and money. As the Change Order moves through the workflow, DWD will review, test, and sign off on each iteration of the development leading to final approval of the change.

Team members from both DWD and Geographic Solutions play an important part in making decisions and signing off for changes to the system. The following table summarizes the roles and responsibilities in the decision-making process:

Roles	Responsibilities
<b>DWD</b>	<ul style="list-style-type: none"> <li>• Submits Change Order request through OPC.</li> <li>• Approves Change Order Proposal, which includes: <ul style="list-style-type: none"> <li>▪ Effect of implementing the requested change on all other services required under the contract.</li> <li>▪ Specific effort involved in completing the change.</li> <li>▪ Expected schedule for completing the change.</li> <li>▪ Maximum number of labor hours required for the change.</li> <li>▪ Maximum cost for the change, based on the time and contract rate.</li> </ul> </li> <li>• Approves Contract Change Order.</li> <li>• Performs User Acceptance Testing.</li> <li>• Approves final deliverable into production.</li> </ul>
<b>Geographic Solutions' Technical Support Team</b>	<ul style="list-style-type: none"> <li>• Reviews and acknowledges Change Order request in OPC.</li> <li>• Clarifies DWD request, if needed.</li> </ul>
<b>Geographic Solutions' PMO</b>	<ul style="list-style-type: none"> <li>• Oversees entire Change Order Workflow.</li> <li>• Clarifies DWD request, if needed.</li> <li>• If change is billable, ensures completion of Acceptance Certificate and required documentation and notifies Accounting Department to invoice DWD.</li> </ul>
<b>Change Control Board (CCB)</b>	<ul style="list-style-type: none"> <li>• Reviews Change Order request and decides whether to approve or reject.</li> <li>• Determines how proposed software version change will appear, and whether change is Base, Base on a Switch, or Custom.</li> <li>• Indicates whether change is billable.</li> </ul>
<b>Geographic Solution's Sales and Marketing Department</b>	<ul style="list-style-type: none"> <li>• Prepares price quotes for billable changes and sends to DWD.</li> </ul>
<b>Geographic Solutions' Business Analyst Department</b>	<ul style="list-style-type: none"> <li>• Performs initial review of change request to determine: <ul style="list-style-type: none"> <li>▪ Whether the change will improve the functionality and usability of the system.</li> <li>▪ An initial estimate of the scope and amount of work involved.</li> </ul> </li> </ul>

Roles	Responsibilities
	<ul style="list-style-type: none"> <li>■ Whether the change is needed to meet state and federal reporting and program requirements.</li> <li>■ Whether the change is key to a specific customer and its unique business needs or if it is a base change, beneficial to all clients.</li> <li>● Gathers time estimates from Development and QA.</li> <li>● Performs thorough review of the project plan, scope, schedule, work products, project requirements plan, and other important factors.</li> <li>● Drafts Change Order Proposal.</li> <li>● Creates new specification(s) for the change or modifies existing one.</li> <li>● Performs initial testing of change.</li> </ul>
<b>Geographic Solutions' Development Department</b>	<ul style="list-style-type: none"> <li>● Designs, codes, and tests changed system functionality (includes Unit and Integration Testing) through sprint cycles.</li> </ul>
<b>Geographic Solutions' QA Department</b>	<ul style="list-style-type: none"> <li>● Creates test scripts.</li> <li>● Performs full testing of changed system functionality in multiple environments, including: <ul style="list-style-type: none"> <li>■ Systems Testing</li> <li>■ Functional Regression Testing</li> <li>■ Interface Testing</li> <li>■ Performance Testing</li> <li>■ Stress Testing</li> <li>■ End-to-End Regression Testing</li> <li>■ Data Conversion</li> </ul> </li> </ul>
<b>Geographic Solutions' Technical Writing Team</b>	<ul style="list-style-type: none"> <li>● Drafts release notes for clients, which contain specific details related to new or changed system functionality.</li> </ul>

The determinations made by the CCB and Executive Steering Committee are documented in the OPC system and include a thorough analysis of the change order as it impacts the project plan, scope, schedule, work products, project requirements plan, and other important factors.

## Risk Management

Risk management and assessment are important components of our Rapid Implementation and Development methodology and are important components of the overall security at Geographic Solutions. Large, complex projects like the Case Management and Labor Exchange System Project can encounter many issues. These potential problems can place the project at significant risk; therefore, effective risk management is a key component of the project plan. Geographic Solutions will plan for and manage risk throughout the project lifecycle.

## Risk Management Approach

Geographic Solutions employs a structured process for issue resolution and opportunity engagement. The primary objectives of this process are to identify all elements affecting the project and provide guidance toward delivering the desired solution. The proposed approach offers a formalized venue for addressing the evaluation of risks, issues, and opportunities over the life of the project.

Our approach employs methods to identify, analyze, and respond to both initial and ongoing risk factors throughout the project lifecycle.

We address risks in the acquirer-supplier relationship, contractual and technological risks, risks caused by the size and complexity of the product, risks in the development and target environments, risks in personnel acquisition, skill levels and retention, risks to the schedule and budget, and risks in achieving acquirer acceptance of the product.

## Identifying Risk

The risk management process includes identifying, analyzing, and prioritizing project risk factors. The process also includes contingency planning and developing the methods to track the various risk factors, evaluating changes in the levels of risk factors, and then, responding to those changes. Risk considerations include the following areas: system development, system interfaces, data conversion, data integrity, operational transition, testing, training, organizational change, disaster recovery, system security, and data security.

As part of the risk management methodology and normal operating processes, Geographic Solutions employs the following steps in our risk management strategy for development projects:

- **Risk Planning** – Forecast the risks and identify and document the major risks that may affect progress.
- **Risk Assessment** – Place risks into characteristic categories, such as technical and operational, and quantify them on a numerical scale according to likelihood, impact, and level of control.



- **Risk Analysis** – Develop appropriate responses to minimize the realization of each risk and document them according to response type, such as avoidance, acceptance, or transfer; perform contingency planning.
- **Risk Handling** – Handle risk across the project and employ ongoing evaluation, aggregation, and status reporting of risks to reduce the overall risk exposure.

During the Case Management and Labor Exchange System Project, Geographic Solutions will be responsible for identifying risks, issues, and opportunities, and we will organize and participate in project risk, issue, and opportunity meetings as needed. Our Project Management Office (PMO) will define and document how Geographic Solutions will manage, mitigate, or eliminate risks. The PMO's assessments will be part of regular status reviews but may require ad hoc meetings to address urgent matters outside the timetable of regularly scheduled meetings to prevent occurrences that could have a major impact on project delivery.

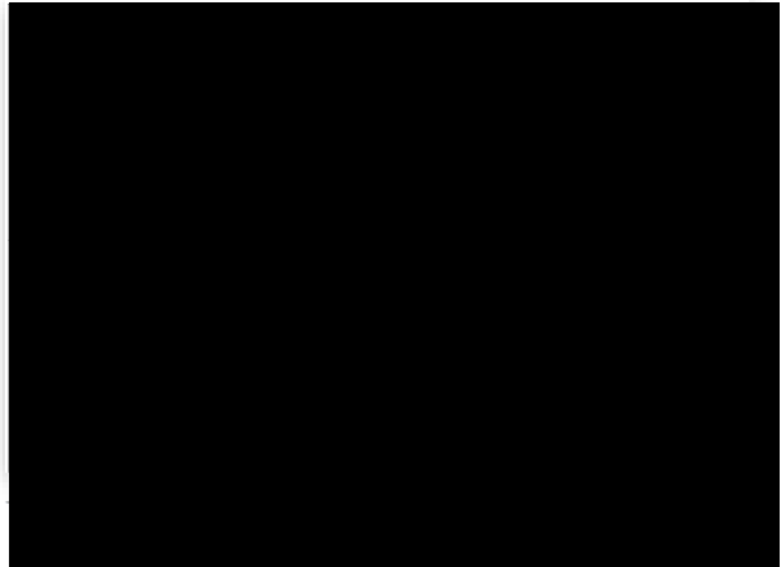
## Coping With Problems

Geographic Solutions delineates the differences between a project issue and a project risk. Similar to risks, issues are problems that occur during a project. Where issues differ from risks, however, is that they generally do not persist throughout the project, and they may be unknown at the outset of a project. The issue list will not be persistent – the risk list will be. Issues will open and close as we identify and resolve them. Once Geographic Solutions classifies the severity of the issue in a category of predetermined issue severity metrics, the issue may escalate to management for resolution.

## Issues and Problem Resolution

The Geographic Solutions' Project Manager is responsible for identifying risks, issues, and opportunities, and for organizing and participating in project risk and issue/opportunity meetings. The Project Manager will define and document how Geographic Solutions will manage, mitigate, or eliminate risks. These assessments will be part of regular status reviews but may require ad hoc meetings to assess urgent matters outside the timetable of regularly scheduled meetings to prevent the occurrence of issues that could have a major impact on project delivery.

The primary objective of Geographic Solutions' structured process for issue resolution and opportunity engagement is to establish a standard method to identify all elements affecting the project, and guide action toward the most advantageous ends with respect to delivering the desired solution. Geographic Solutions' proposed assessment approach provides a formalized venue for evaluating risks, issues, and opportunities over the life of the project. Should an issue arise that the project team cannot resolve readily, the Geographic Solutions' Project Manager documents the issue in the Project Status Report and seeks DWD's guidance.



Geographic Solutions is committed to delivering high-quality products and support to our customers. In the event that a customer needs to escalate a problem or issue, Geographic Solutions' senior technical and project management staff are ready and available to help bring the problem or issue to closure.

## Issue Tracking

As a cornerstone of the Geographic Solutions' Rapid Implementation and Development project management methodology, the OPC system acts as a single repository for project issues and includes detailed status tracking, problem reporting and tracking, and the management of change requests and enhancement requests. The OPC site enables Geographic Solutions' clients to report incidents using online forms and monitor the project's status in a dynamic mode.

OPC access requires only an Internet browser and an assigned client login. To report incidents or request changes, clients complete online forms, which can contain attached files to demonstrate the requested change, or the problem encountered in the system.

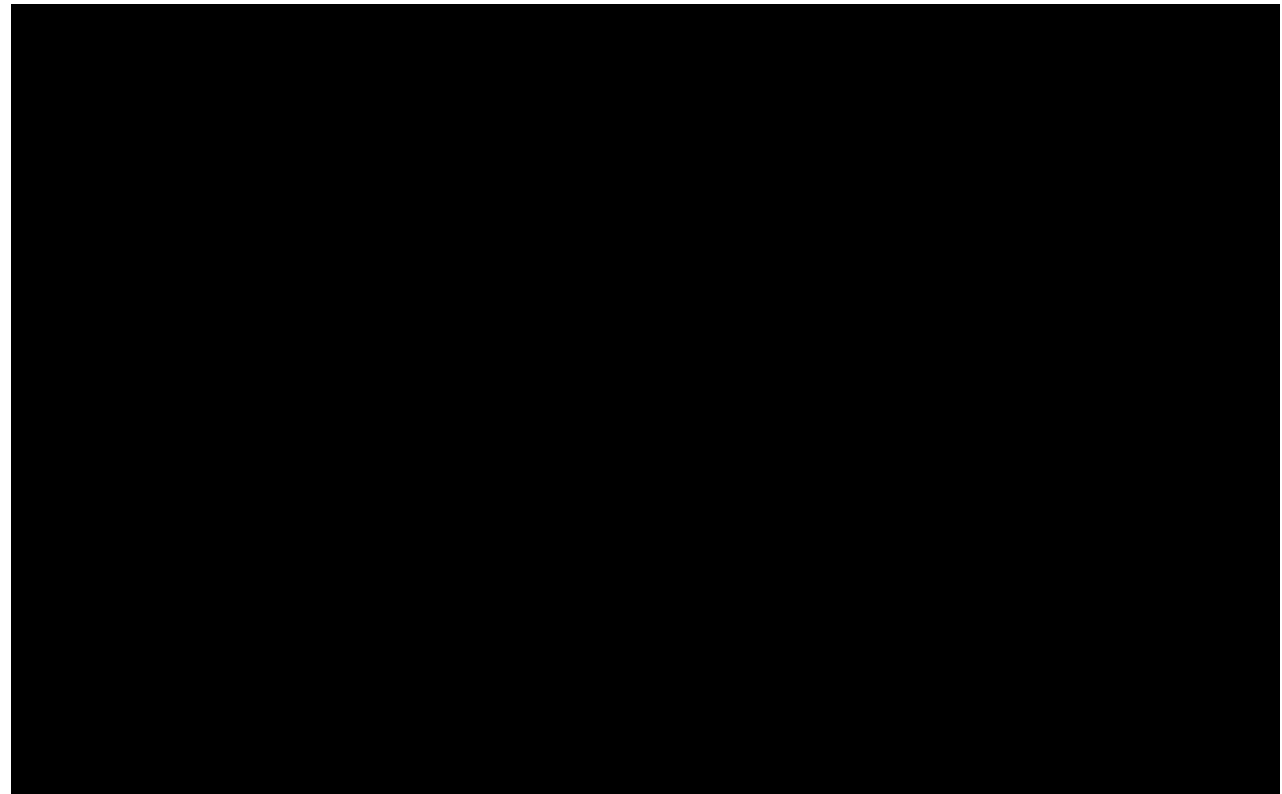
As Geographic Solutions' developers and project managers address issues that affect a project, they update the status of these items online. The client simply logs onto the OPC site and reviews the updated status of the project. This dynamic reporting of issues helps our staff speed up the resolution process.

## Project Phases and Lifecycle

The Rapid Implementation and Development project lifecycle is our mechanism for planning, monitoring, and managing activities across the entire project, from requirements analysis through design, development, testing, and implementation.

The project lifecycle is sequential and provides a structured approach to project completion. The lifecycle covers the *PMBOK*® process groups (Initiating, Planning, Executing, Monitoring, Controlling, and Closing) that will guide the decision-making that occurs throughout the project.

The Geographic Solutions' PMO oversees the methods and techniques used in the Rapid Implementation and Development lifecycle to manage each phase of the project. The following subsections explain the Rapid Implementation and Development phases in detail.



## Inception Phase

The Inception Phase involves the initial review and analysis of the project scope required to prepare a contract and statement of work. This phase includes the initial planning of the project and the project kickoff meeting. In this phase, Geographic Solutions will work closely with State of Indiana staff to develop the final scope. Work will commence with the signing of a contract.

### Inception Phase – Project Kickoff Stage

The Geographic Solutions' PMO organizes the project kickoff meeting. The meeting will take place onsite in State of Indiana with key representatives of the State, the *VOS Sapphire 22* Project Team, Geographic Solutions, and other designated stakeholders. At this meeting, Geographic Solutions will provide DWD with a detailed presentation that includes an overview of our project management methodology and demonstration of *VOS Sapphire 22* application functionality. This meeting will focus

on the responsibilities of Geographic Solutions and our interactions with the *VOS Sapphire 22* Project staff. We suggest the meeting agenda include the following topics:

- Detailed overview and demonstration of the *VOS Sapphire 22* application by Geographic Solutions to familiarize DWD key stakeholders with the system.
- Review of roles and responsibilities of Geographic Solutions and State of Indiana team personnel, including the key agile team members.
- Detailed overview of the draft Project Schedule, including an overview of each phase of the project and the deliverables.
- Review of the Rapid Implementation and Development methodology we will use to manage the project.

## Inception Phase – Project Planning Stage

The goal of the Project Planning stage is to produce and communicate an effective and workable project plan and schedule that follows the guidelines outlined in *PMBOK*®. The project plan will report on project health of the Case Management and Labor Exchange System monthly, including Project Schedule variance, development outcomes, defect rate, and milestone delivery.

The project planning process determines the scope of the project management and technical activities and identifies outputs, project tasks, and deliverables. The process establishes schedules for the project tasks, acceptance criteria, and the resources required to accomplish the project tasks. The schedule will specify all project phases, milestones, tasks, deliverables, and resources necessary to provide a quality solution that is successfully adopted by users.

Geographic Solutions uses the *PMBOK*® as a guide when conducting our overall project/scope planning. During the Project Planning stage, the PMO will create a set of initial project planning documents that include the draft Project Schedule. This schedule includes tasks, durations, start dates, finish dates, task predecessors, and resources for completing the project, as well as a specific work breakdown structure (WBS) for all project phases and deliverables.

The planning process will culminate with the delivery of the final PMP for DWD approval during the project Inception Phase. Geographic Solutions provides our PMP as a single document that is a compendium of subsidiary detailed management plans. Each subsidiary management plan will provide effective and workable plans.

The Geographic Solutions' PMO will work with DWD staff to determine which of the following project planning documents will be included as part of the overall Project Plan deliverable during this stage:

- Master Project Work Plan
- Project Risk and Mitigation Plan
- Implementation Plan
- Communication Plan

- Project Resource Plan
- Data Conversion Plan
- Configuration Management Plan
- Data Conversion and Migration Plan
- Environments Work Plan
- Security Plan
- Problem Resolution Plan
- Backup and Recovery Plan
- Contingency Plan
- Change Management Plan
- Test Management Plans
- Organizational Change Management Plan
- Training Plan
- Deployment Plan

## Analysis Phase

During the Analysis Phase, Geographic Solutions transitions from the project vision to guiding the construction and deployment of State of Indiana's customized installation of the [VOS Sapphire 22](#) application. Our Business Analyst Team will lead this phase with support from the Geographic Solutions' PMO through a series of Joint Application Design/Joint Application Review (JAD/JAR) meetings. These JAD/JAR meetings will include our experienced professionals, State of Indiana representatives, and stakeholders and partners who will use the new system. This series of meetings includes a detailed, systematic review of the system architecture, data structure, interfaces, web page designs, and program functionality. During these meetings, we will cover the validation of required business rules, default values, sources of information, and method(s) of transferring information to and from the system.

As part of the analysis, the participants review the project scope, risks, critical success factors, goals, and objectives of each required item from the system specifications. Specifically, the analysis will achieve the following goals:

- Review the system's pages and functionality.
- Determine changes to the system's specifications that will be required to meet the State of Indiana documented requirements.
- Determine new functionality that will require additional specifications to be created.
- Identify and document each system change decision.
- Finalize a detailed Project Schedule that will identify all tasks required to complete the project, including a time estimate for task completion, task dependencies, and a list of required staff resources.

We divide the JAD/JAR meetings into separate sessions based on manageable areas of the system, which may include Functional, Non-Functional, Reports, Conversion, and Interfaces. These meetings can be run sequentially or in parallel depending on available State of Indiana staff resources.

## Analysis Phase – Requirements Analysis Stage

To ensure client satisfaction and effective project management, the Geographic Solutions’ Project Team will work with State of Indiana staff to develop a comprehensive set of requirements materials.

During each of the JAD/JAR meetings, Geographic Solutions’ staff will walk through the existing system functionality for that component of the *VOS Sapphire 22* application. We document the modifications and additions (if any) that are necessary to meet DWD requirements. Where possible, the existing specification documents will be projected on a screen with another projector displaying the Base System. In this way, State of Indiana staff can get a clear picture of the functionality that the specifications are describing by looking at an actual system.

It is essential to capture all project requirements, as they will become the baseline for the project. Requirements analysis and gathering takes place during the Analysis Phase, but there are subsequent opportunities throughout the project lifecycle to refine these requirements and configuration documents.

During the Requirements Analysis stage, Geographic Solutions identifies and categorizes the project’s requirements into the groups described in the following table:

Requirement Group	Description
Functional	Functional and technical requirements for all required software components and any necessary, additional functionality, as well as basic system business rule configurations and options.
Non-Functional	Specific requirements for security, network and hardware infrastructure, accessibility, audits, standards redundancy, data transfers, training required to implement the system, and the support and maintenance required after implementation.
Reporting	Outline of any new reports that are required, including management and operational reports, as well as mandated federal reports.
Conversion	Identification of legacy systems that will require data conversion and transformation and programs that Geographic Solutions will need to develop for importing or presenting data in a different format.
Interface	Interfaces that exchange data with legacy systems that Geographic Solutions will create, including real-time interfaces and batch overnight interfaces, which may be one- or two-way data exchanges.

## Analysis Phase – Configuration Analysis Stage

During the Configuration Analysis stage, Geographic Solutions will work with DWD staff and subject matter experts to determine the appropriate configurations for the new *VOS Sapphire 22* application. The *VOS Sapphire 22* application has hundreds of configuration options, which are documented in detail within the system's configuration documentation. These configurations include switches to determine if functionality is available to the user and variables that determine key values, such as the content of system messages and data entry fields to be displayed or hidden.

The appropriate configuration settings are reviewed and updated in joint meetings between the DWD and Geographic Solutions. These meetings, led by our PMO and Business Analyst Team by functional area of the system, involve a detailed, systematic review of the configuration options that are available in the system. This review includes validation of the business rules that are involved, as well as the options and default values.

The Configuration Analysis stage results in the creation of a final configuration document. Geographic Solutions will use this document to create the base system for the *VOS Sapphire 22* Solution as described in the next section.

Configuration documents will identify which elements of the *VOS Sapphire 22* application Geographic Solutions will configure from the Component Library and which we will need to customize. Examples of system elements we will configure are the following:

- State-specific look and feel
- State-specific forms and correspondence
- Lookup tables and crosswalks
- Specific web content

Elements of the system we would need to customize include the following:

- Interfaces with legacy systems
- Data conversion scripts
- State-specific requirements
- Test scripts



## Analysis Phase – Base System Assembly Stage

Our customers find great benefit in this unique stage of the Rapid Implementation and Development methodology. Geographic Solutions will use the information gathered during the Requirements Analysis and Configuration Analysis stages to select the appropriate components from the *VOS Sapphire 22* Component Library to configure a system that will meet DWD's needs. The new system will be functional and will include elements such as the required look and feel, specific business rules, and client-specific system settings.

This base system will help form the baseline for the gap analysis. In our experience, analysis is more rapid and effective when clients can review a live, working website instead of simply reviewing paper designs and other documentation.

## Analysis Phase – Gap Analysis Stage

Gap analysis is a technique and a traceability strategy. We use this process to analyze customer requirements that have been identified and determine if the *VOS Sapphire 22* application meets them. We assess the differences between the current and expected functionality and document how we will remove any gaps.

Any significant gaps will be identified in a series of onsite meetings between the DWD and Geographic Solutions' staff. In these meetings, the *VOS Sapphire 22* application will be thoroughly reviewed on a component-by-component basis. The differences between the observed "as is" functionality of *VOS Sapphire 22* and what the client requires will be documented in a Gap Analysis Report. This report will indicate the requirement, the use case (if any), and the level to which *VOS Sapphire 22* currently meets the requirement. If there is a gap for a specific requirement, the report will include notes about the gap and how the gap will be resolved.

The results of the gap analysis as outlined in the Gap Analysis Report act as a check point to focus on those areas of the system that need significant design or redesign to meet the State of Indiana's requirements. Each gap results in a change order, which then follows our change control process. Geographic Solutions uses our proprietary OPC system as the repository to track and manage changes. Our change management process applies our approach to controlling changes in scope, business requirements, technical requirements, and other project deliverables. The process will ensure the systematic documentation of these changes, as well as their assessment for need, impact, and appropriateness.

[REDACTED]

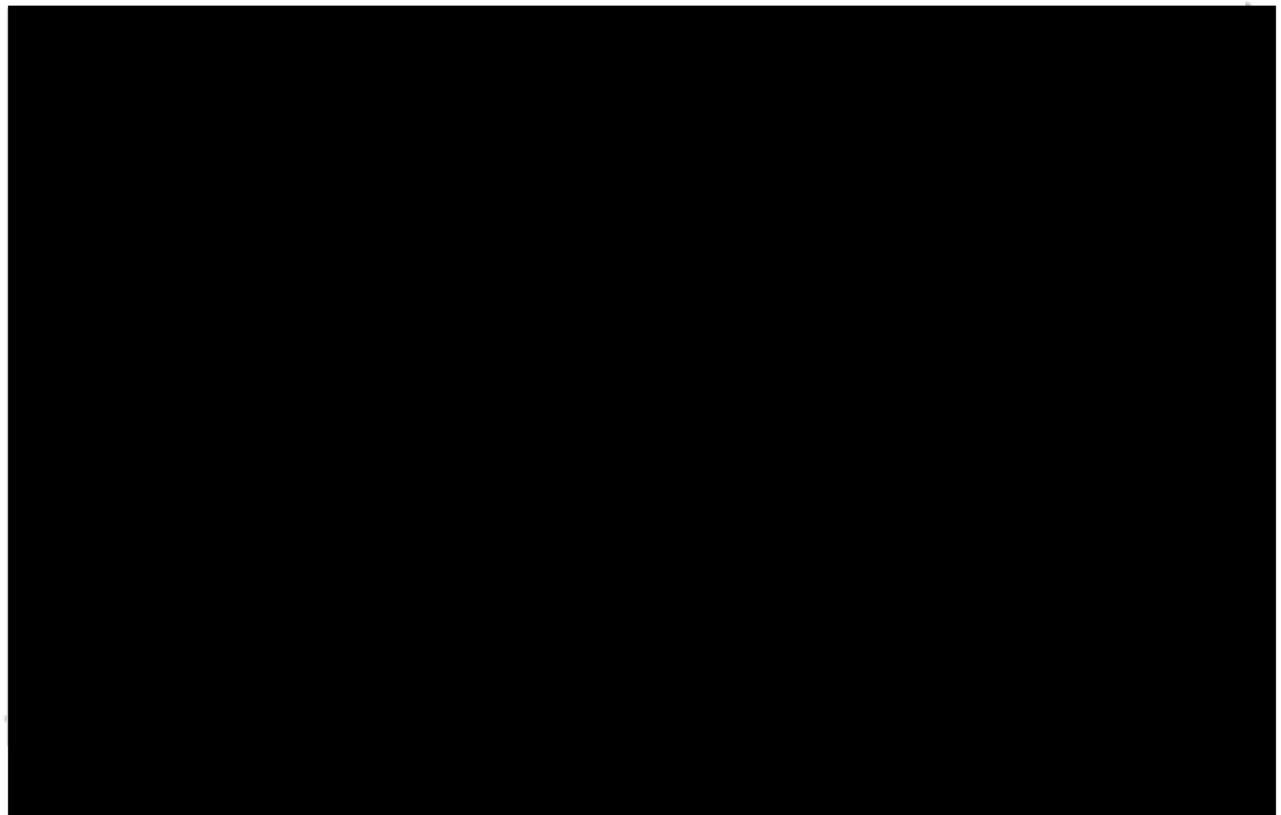
[REDACTED] The State of Indiana's subject matter experts and staff that are knowledgeable in the project's requirements should attend the sessions.

## Analysis Phase – Requirements Traceability Stage

During the Requirements Traceability stage, a series of JAD/JAR meetings result in a set of final configuration documents, including the Requirements Traceability Matrix (RTM) and Project Schedule, which provide the basis for demonstrating the system satisfies all defined requirements.

A key component of our philosophy and approach to requirements gathering is the creation of a comprehensive RTM. We use this tool to trace each requirement and deliverable to the design components, test cases, database tables, code models, etc. The RTM provides a roadmap from the lowest level data elements associated with each function or process to the many places where the system uses them.

Using the RTM allows us to create, modify, and delete traceability relationships to trace the State of Indiana Case Management and Labor Exchange System Project requirements throughout the life of the project. This will provide an efficient mechanism to check coverage requirements and identify gaps earlier in the development lifecycle when it is easier to make adjustments and corrections and perform an impact analysis. The RTM helps us identify how requirement changes will affect other segments of the system.



We will also provide the State of Indiana with the final Project Schedule that will be used as the blueprint to develop the final system. The State of Indiana will be able to track project performance

against the project baseline of the Project Schedule based on the cost and schedule metrics Geographic Solutions uses. Performance metrics provide measurement that the Case Management and Labor Exchange System is operating within the approved time and cost constraints and the project is performing according to plan. The use of performance metrics also is a means to alert management if a project begins to run over budget or behind schedule so the appropriate parties can take action to get the project back on track.

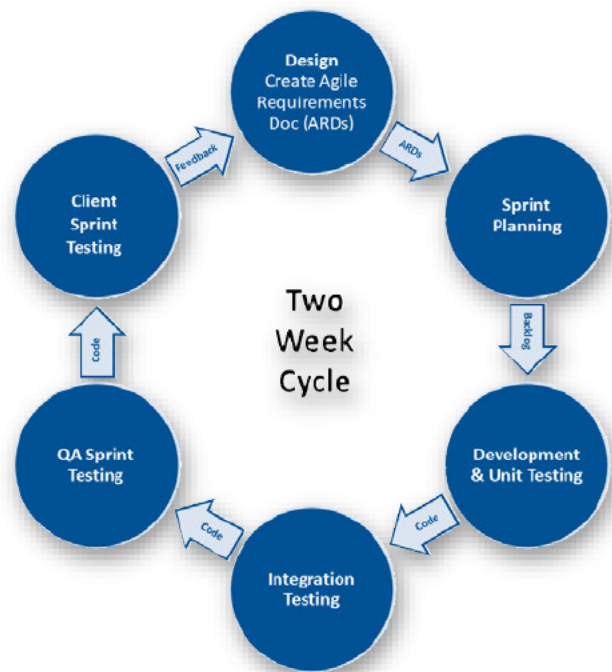
Geographic Solutions uses Microsoft SharePoint for the project documentation repository. We use SharePoint to actively manage document version control, tracking, storage, and sharing.

## Construction Phase

Geographic Solutions adheres to the Agile software development framework where we utilize short, iterative cycles called sprints to focus development efforts on feature sets that are most critical and provide the highest value to the Case Management and Labor Exchange System. Teams work iteratively to produce working and tested code sets during two-week sprint cycles. This process enables us to deliver the most valuable features and gather feedback early in the project.

In contrast to traditional waterfall processes, where it is assumed that all requirements will be identified up front before any code is written, being agile enables the project to adapt when new information about requirements become known. Similarly, the DWD can review code sooner and provide feedback throughout the project, as opposed to traditional methods where code is reviewed by the customer only at the end of the project.

With a minimal number of sprints completed, Geographic Solutions will be able to produce demonstrable prototypes of State of Indiana's requested functionality. In this iterative development model, each subsequent sprint undergoes testing of the new functionality, regression testing, and integration testing of the new and existing functionality. Our agile approach provides flexibility to refine the requirements, the detailed design, and the presentation to the user.



*Teams Produce Working and Tested Code Sets  
During Each Two-Week Sprint Cycle*

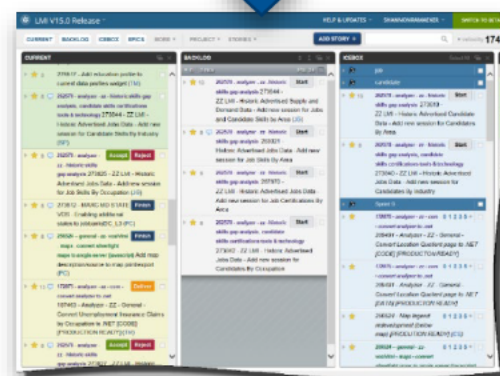
## Construction Phase – Agile Design

The Construction Phase begins with the creation and approval of Agile Requirement Documents (ARDs), which involves working with the DWD to define the initial product backlog to be used during agile development. The backlog is an ordered list of all enhancements and change orders that may need to be developed in a product. Each item in the product backlog contains a description of the desired functionality or change, an estimate of the relative size and complexity, and an assigned value.

Each ARD consists of the following elements:

- Outline of the requested modification
- Areas of the system affected
- History of the original setup
- User types affected
- Required configurations
- Required security privileges
- Required changes
- Printed documents and reports affected
- Required table changes

Prior to the beginning of each iteration, the Scrum team, which includes the Scrum Master, Business Analysts, QA Analysts, and Developers reviews, defines, and prioritizes the features in the Case Management and Labor Exchange System's product backlog. The State of Indiana user stories from the prioritized backlog will guide these sprints. The team identifies the items they will work on during the next iteration by associating ARDs and user stories with each feature set.



*Estimation Planning in an Agile Sprint Review*

## Construction Phase – Agile Sprint Planning

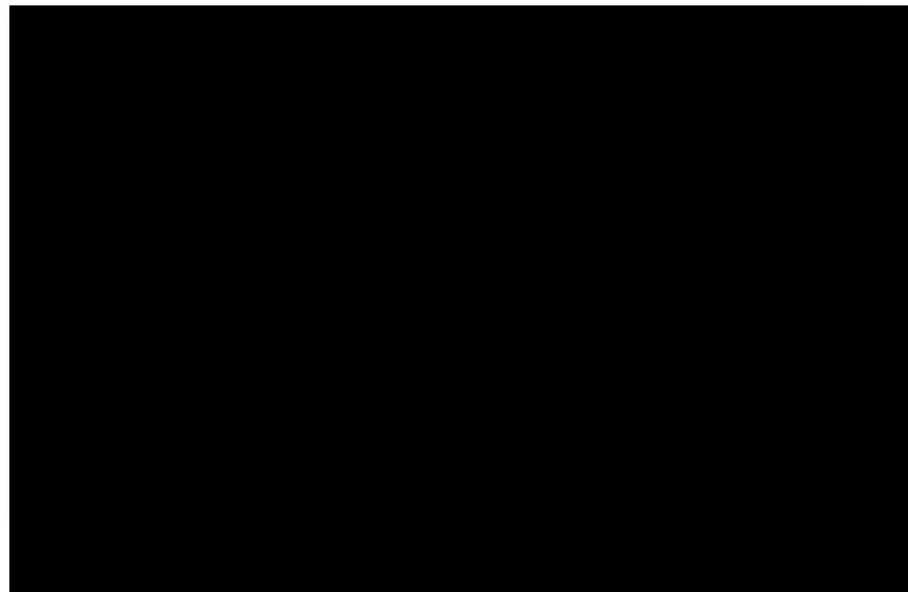
At the sprint planning meeting, the entire Scrum team collaborates to define the goal and the work to be completed during the sprint. Once the sprint begins, it is locked, and no changes are

made that would endanger the sprint goal. If the work turns out to be more complex than initially thought, the Development Team works to re-negotiate the scope of the work to be done while still allowing the team to attain the sprint goal. As required, the team will always deliver a working piece of software at the end of each sprint.

Working in sprints allows developers and testers to become deeply familiar with the features and focuses efforts on a specific deliverable, resulting in greater collaboration, less waste, and fewer production level errors. During the sprint planning meeting, the Scrum team must estimate the development effort required to complete the highest priority features from the product backlog.

The team estimates using story points to size the relative effort and uncertainty involved in completing a task. Using abstract story points instead of hours helps the team make tough decisions about the difficulty and complexity of the work. For example, our teams use a Fibonacci sequence to assign story points to a task (i.e., 1, 2, 3, 5, 8, and 13, with 13 being the largest). This means that each task in the sequence is the sum of doing two tasks from lower on the scale. If an item from the backlog is more than a 13, it signals to the team that the item needs to be broken down into components so that it can be completed in a single sprint. Each team will discover its own method of estimating that best promotes integrity and collaboration, leading to better estimates over time. Before committing to completing the sprint in the allotted time, the team compares the total story points to its “velocity,” which is the average number of backlog story points that the team has been able to complete during a single sprint.

As the sprint progresses, the team holds a daily Scrum meeting, often referred to as a daily stand-up, where team members discuss work completed during the previous day, goals for the current day, and barriers slowing or preventing progress. The team works together to identify and mitigate risks that could derail the successful completion of



the sprint. Team members frequently collaborate immediately after the daily Scrum to further discuss details, adapt to a change, or re-plan work. This collaborative activity improves communication, helps to eliminate the need for other meetings, promotes quick decision-making, and helps to identify and remove roadblocks that are preventing a team member from completing a sprint task.



Geographic Solutions uses a third-party tool called Pivotal Tracker to manage project velocity using agile methods. Pivotal Tracker is a story-based project planning tool from Pivotal Labs that allows teams to collaborate and react to real-world changes instantly. Pivotal Tracker maintains a prioritized backlog of project deliverables, broken down into small, estimated pieces called stories. It dynamically groups these stories into fixed segments of time, called iterations, and it predicts progress based on real, historical performance known as velocity. By utilizing this process, the development teams complete more work, and client satisfaction with productivity increases.

## **Construction Phase – Agile Stakeholder Sprint Reviews**

Geographic Solutions uses Agile Stakeholder Sprint Reviews to demonstrate progress achieved on project deliverables during our iterative development process. These reviews are a collaborative practice in which all participants play an important role in assessing Case Management and Labor Exchange System's overall health and quality of execution. During these reviews, the DWD's designated representatives will be able to make an informed decision about whether the Case Management and Labor Exchange System is making proper progress toward meeting their requirements.

Agile Stakeholder Sprint Reviews take place at the end of each iteration. When appropriate, the Scrum Team meets with DWD stakeholder representatives to receive feedback on the code that was developed during that sprint. The DWD stakeholders will also have the opportunity to review on the UAT environment for each completed component of code. During the meeting or review process, the DWD stakeholders will review what was completed and provide input on what was developed, as well as what should be prioritized next to complete the desired feature or set of features. Because working code is the primary measure of progress on project deliverables, some features may be small enough that they can be completed in one iteration and formally approved during the sprint review. Larger features often require more than one sprint to complete.

The advantage in using the Agile Stakeholder Sprint Review is that, for these larger features, the Scrum Team can confirm with client stakeholders several times that they are on track to meet the requirements as the feature is being developed, rather than waiting until the end for feedback. This process reduces the need for rework and serves to build trust and a collaborative relationship between the Scrum Team and DWD stakeholders.

After each Agile Stakeholder Sprint Review, the DWD will formally sign off on project deliverables through the OPC system. Once the proposed system is ready for UAT, DWD representatives and subject matter experts review the system in detail to determine that functionality meets requirements, and that the product adheres to standards. Upon successful completion of UAT, DWD officially signs an acceptance certificate.

## **Construction Phase – Agile Development**

Geographic Solutions developers take a reuse-based approach to defining, implementing, and composing loosely coupled independent, modular components, which are part of the software

development and maintenance libraries for shared components. This modular design separates code that integrates specific system components such as reports from the parts that use system services components and customized components from core components. *VOS Sapphire 22* is supported by a relational database management system (RDBMS) using Microsoft's SQL Server Enterprise Edition with Windows Server. This provides exceptional performance for groups, even with thousands of concurrent users.

Geographic Solutions develops and customizes the *VOS Sapphire 22* application using Microsoft Visual Studio .NET, a tool specifically designed to build sophisticated, dynamic web applications. Additionally, Geographic Solutions uses both Team Foundation Server and our own OPC system for source code storage and version control and to ensure that code is compiled and error-free prior to deployment.

A consistent, predictable user interface provides a seamless user experience, shortens learning curves, and lowers the total cost of development. Current products built from the *VOS Sapphire 22* Component Library primarily use the .NET programming language. The product line also utilizes such technologies as HTML 5.0, CSS, JavaScript, JQuery, and Ajax to render the user interface.

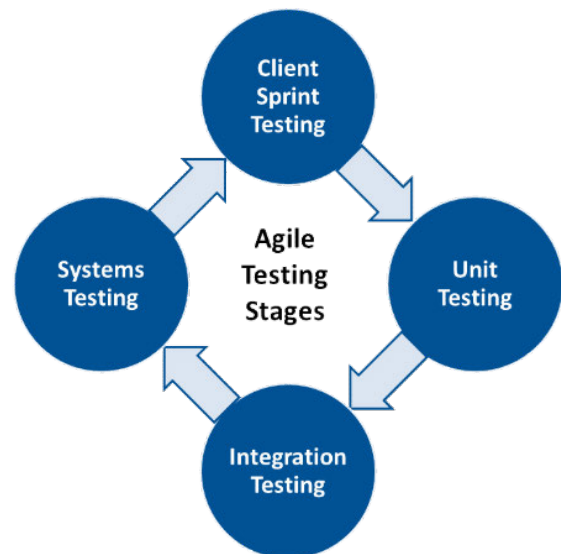
## Construction Phase – Agile Testing

The following sections summarize the comprehensive Agile testing that is conducted by Geographic Solutions in the Construction Phase.

**Unit Testing** – Geographic Solutions' unit testing involves the removal of defects in an individual software unit. Unit testing, which is the most granular level of testing, takes place on a volume of code that is small and defined. Developers conduct unit testing during the code development process to ensure that each developer has achieved proper functionality and code coverage both during coding and in preparation for acceptance into iterations testing.

The Geographic Solutions unit test environment is in Microsoft Visual Studio and uses the .NET Framework. This environment enables a developer to check the values of metrics and ensure they are being properly collected and calculated correctly. Geographic Solutions uses mock objects, mock views, and mock services to isolate the tested code. Unit testing successfully concludes when the actual test results match expected test results within the documentation covering the unit of code.

**Integration Testing** – After unit testing, we begin software integration testing where we integrate progressively larger groups of software components and test them until the software works as a whole.



*Agile Testing Stages During the Construction Phase*



Our business analysts and subject matter experts conduct this testing after the code is committed. Integration testing verifies that each new or modified software unit works together with the other software components. Geographic Solutions employs an “umbrella” approach to integration testing. This involves testing along functional data and control-flow paths with all the modules that form the complete system.

Integration testing takes place in an environment that emulates the configuration of the target production environment. In the Rapid Implementation and Development process, integration testing is an extension of unit testing. Unit and integration testing conclude when actual test results match expected test results within criteria specified by the project.

**System Testing** – The Geographic Solutions Quality Assurance Team performs systems testing to ensure that each solution component meets its objectives and requirements and that all component units work properly together and meet all client requirements. Systems testing verifies the functionality of the entire system to ensure it meets the configuration documentation finalized during the Analysis Phase. The Quality Assurance Team tests this documentation against the system to ensure that the system is configured correctly.

Before systems testing begins, we create test scripts that include formal test scenarios written for each new function that we have modified or added to the system. These scenarios show the individual steps required to complete the function, as well as inputs, outputs, and expected results. The automation and manual testing groups run each module test case. Systems testing successfully concludes when the individual steps required to complete the function, as well as inputs, outputs, and the expected results, are verified as correct.

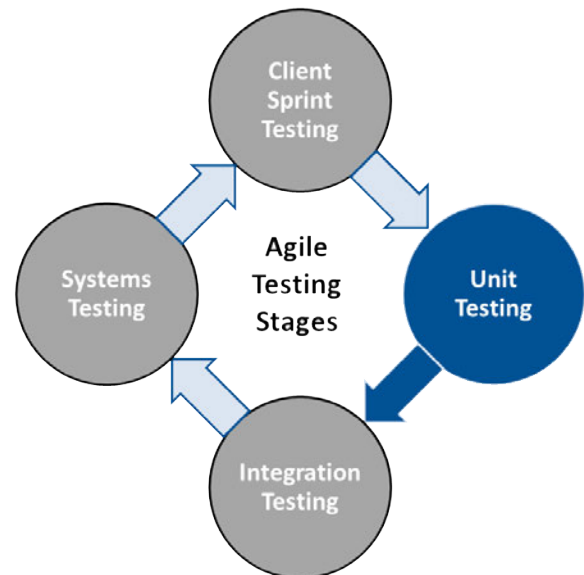
**Client Sprint Testing** – In the final stage of the sprint cycle, client subject matter experts perform sprint testing to ensure that each solution component meets its objectives and requirements and that all component units work properly together. Sprint testing is performed on each change order so that no change order is placed in the build without client approval. Change orders rejected by the client are moved to a future sprint.

Testing takes place on a dedicated UAT environment. Client sprint testing successfully concludes when the client completes testing of the changes in that sprint.

## Construction Phase – Agile Unit Testing

Unit testing is the first level of testing Geographic Solutions will conduct as the *VOS Sapphire 22* solution is being developed. Our unit testing involves the removal of defects in an individual software unit. Unit testing, which is the most granular level of testing, takes place on a volume of code that is small and defined. Developers conduct unit testing during the code development process to ensure that each developer has achieved proper functionality and code coverage both during coding and in preparation for acceptance into integration testing.

The Geographic Solutions' unit test environment is in Microsoft Visual Studio and uses the .NET 4.5 Framework. This environment enables a developer to check the values of metrics and ensure they are being properly collected and correctly calculated. Geographic Solutions uses mock objects, mock views, and mock services to isolate the tested code.



*Rapid Implementation and Development  
Sprint Workflow – Unit Testing*

The following are examples of the areas of the project that must be unit-tested and signed:

- Databases, stored procedures, triggers, tables, ASP code, .NET code, and indexes
- Database conversion
- System code, including .ASPX, .OCX, .DLL, .EXE, and other binary-formatted executable code

Unit testing is the responsibility of the Development Department, which records the test results in the Geographic Solutions' OPC system.

## Construction Phase – Agile Integration Testing

After unit testing, we begin software integration testing. During integration testing, we integrate progressively larger groups of software components and test them until the software works as a whole. This testing verifies that each new or modified software unit works together with the other software components.

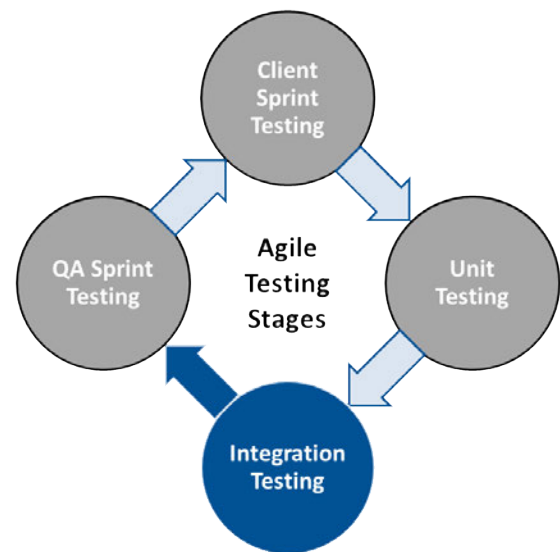
Integration testing will include multiple daily business cycles, as well as testing of weekly, monthly, quarterly, annual, and on-demand processes. Geographic Solutions will test all interfaces to external systems in conjunction with DWD staff and will ensure compliance with all federal and state interface requirements.

Geographic Solutions employs an “umbrella” approach to integration testing. This involves testing along functional data and control-flow paths with all the modules that form the complete system. Developers perform unit testing to verify their code change has fixed a problem or implemented a desired change.

The Continuous Integration automated build processes developed using Microsoft’s Team Foundation Server will identify any build conflicts or compiler errors that the developer will need to fix. After successfully committing code changes to the integration testing environment, the developer will perform integration testing to verify functionality, performance, and reliability. This is a high-level test that covers all the aggregate parts of those areas, including the menu system, privileges, site-specific configuration, wizard framework, business logic, and database layer functionality.

Integration testing takes place in an environment that emulates the configuration of the target production environment. In the Rapid Implementation and Development process, integration testing is an extension of unit testing. Unit and integration testing concludes when actual test results match expected test results within criteria specified by the project.

The Geographic Solutions’ Development Department performs integration testing and verifies that each tested software configuration item is ready for software systems testing. The Development Department staff record the integration testing results in the OPC system.

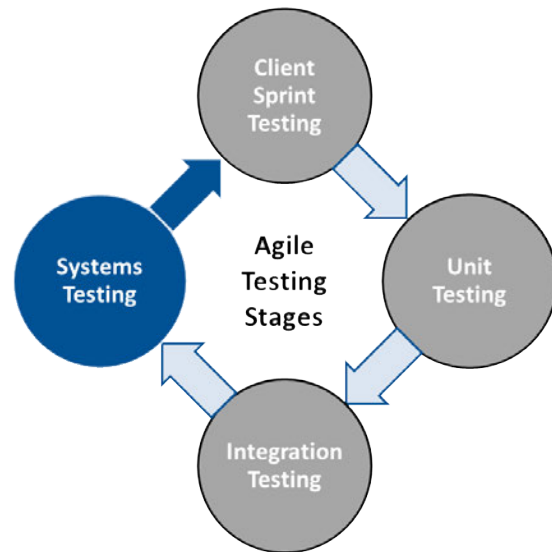


*Rapid Implementation and Development  
Sprint Workflow – Integration Testing*

## Construction Phase – Agile Systems Testing

The Geographic Solutions' QA Team performs systems testing to ensure that each solution component meets its objectives and requirements and that all component units work properly together and meet all DWD requirements. Systems testing verifies the functionality of the entire system to ensure it meets the configuration documentation finalized during the Analysis Phase. The QA Team tests this documentation against the system to ensure that the system is configured correctly.

Before systems testing begins, we create test scripts that include formal test scenarios written for each new function that we have modified or added to the system. These scenarios show the individual steps required to complete the function, as well as inputs, outputs, and expected results. The automation and manual testing groups run each module test case. Systems testing successfully concludes when the individual steps required to complete the function, as well as inputs, outputs, and the expected results, are verified as correct.

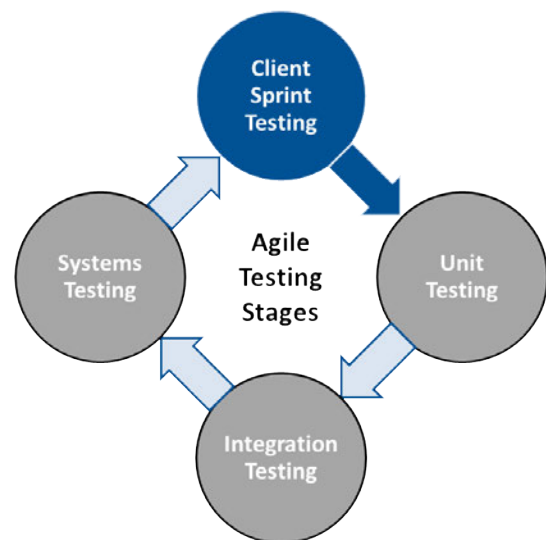


*Rapid Implementation and Development Sprint Workflow – Systems Testing*

## Construction Phase – Agile Client Sprint Testing

In the final stage of the sprint cycle, DWD subject matter experts perform sprint testing to ensure that each solution component meets its objectives and requirements and that all component units work properly together. Sprint testing is performed on each change order so that no change order is placed in the build without client approval. Change orders rejected by DWD are moved to a future sprint.

Testing takes place on a dedicated UAT environment. DWD's sprint testing successfully concludes when DWD completes testing of the changes in that sprint.



*Rapid Implementation and Development Sprint Workflow – Client Sprint Testing*

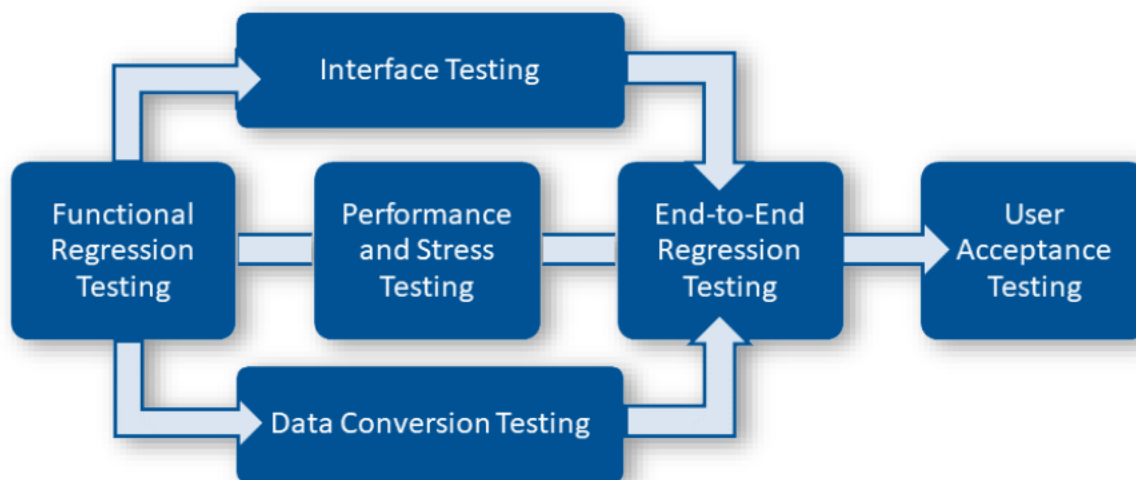
## Transition Phase

During the Transition Phase of the project, the system moves from development to the end user environment while continuing the conversion activities that began in the Construction Phase.

The activities of this phase also include training end users, final data conversion, creating documentation to support the end users and administrators to the system, and final acceptance testing of the system. This final acceptance testing will validate the system against the end users' expectations and test the installed system in DWD's final production environment with all functionalities and any applicable converted legacy data. The process will also check the system against the quality level set in the Inception and Analysis Phases.

## Transition Phase – Transition Testing Stage

Upon completion of all development sprints, Geographic Solutions' QA Department will be responsible for testing the new product against documented specifications and ensuring the deliverables derived from their test efforts comply with the requirements.



*The Connection of the Testing Stages That Occur During the Transition Phase*

QA activities under our methodology include planning, developing, and implementing a Quality Assurance Management and Testing Plan that embraces the entire project lifecycle. Geographic Solutions' QA Team will follow the plan using both manual and automated testing methodologies after construction is complete.

**Functional Regression Testing** – During the implementation of a new system or an upgrade to a new version, both the Manual Quality Assurance and Automation Quality Assurance Teams thoroughly regression test the entire system. Both teams review checklists of use cases, tested on the production environment during a deployment event. The Automation Quality Assurance Team runs hundreds of test scripts on the production environment during Go Live deployment events to verify system quality. Before testing any modified software, we run the current production software against test data using the test scenarios and record the results. We restore the database and run the modified software against the same test data. We then compare the outputs from the modified software to the outputs from the production software and investigate and resolve any differences.

If the new software requires coding changes, we log the problem in the OPC system and send the software from Quality Assurance back to the developer for resolution, where our teams perform unit and integration testing again. After completing test iterations, we hold a debriefing of the test results. Specifically, the testing results report must show that, to the best degree achievable during the iteration testing phase, we have communicated and addressed all identified severity one and severity two issues. Functional regression testing successfully concludes when the outputs from the modified software is equal to the outputs from the production software and all use cases are successfully completed.

**Conversion Testing** – We perform several stages of testing to verify and validate the conversion process. The Geographic Solutions Data Conversion Team applies unit and integration tests on the conversion data in the data conversion development environment. They follow this with integration testing in the system, UAT, and production environments by the functional test teams. The teams perform multiple automated and manual tests in each of these environments to ensure the data is ready to move on to each testing stage. Using multiple iterations minimizes issues experienced in the final production conversion.

**Interface Testing:** Interface testing is a special part of Geographic Solutions' systems testing. We test the client's unidirectional and bidirectional interfaces as part of end-to-end testing and as part of the interface testing. The client can have one interface or hundreds of interfaces, and we will test them all to ensure they are functioning correctly prior to the system Go Live. Test data goes through the interfaces to ensure the data emerges from the back end correctly. If a wrapper is attached to the interface data packet, testing will compare it to the data retrieved at the end of the test to ensure all of the data made the round trip intact.

**End-to-End Regression Testing** – We are a strong proponent of end-to-end regression testing whenever possible. This protocol not only validates the software system under test conditions but also checks its integration with external interfaces. The purpose of end-to-end testing is to execute a complete, production-like scenario. Along with the software system, this testing validates the interfaces and data exchanges from the legacy systems are communicating with the new system.

End-to-end testing uses actual production data in a test environment to simulate real-world settings. This will require that DWD provide test environments for the connected legacy systems. End-to-end regression testing is the complete testing of all functions of the site by all testing groups. For example, we conduct this testing as an individual would go through the site from registration to final exit through the system. We then conduct the same end-to-end testing as an employer who is entering the system for the first time, and we will test all test cases to the conclusion of each area the employer enters.

**Performance and Stress Testing** – The Geographic Solutions Quality Assurance Team will conduct performance testing to ensure that all components of the new Case Management and Labor Exchange System meet performance and benchmark requirements. Before performance testing begins, we create test scripts and scenarios for each function critical to performance. These scenarios show the individual steps required to complete the function, as well as inputs, outputs, anticipated user load, and response



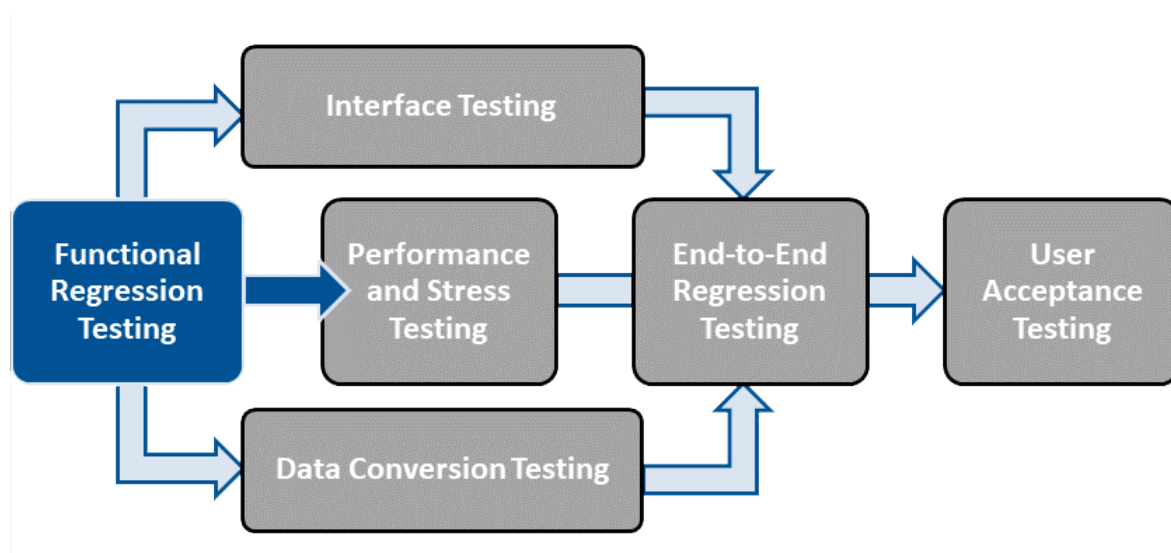
time. Performance testing identifies specific performance requirements and verifies the functions of the system perform within benchmark standards designated by DWD as defined during the Inception Phase.

In addition to performance testing to simulate anticipated load and worst-case load, we conduct tests for resource contention scenarios, such as server connections going down, bad stored procedures, and heavy reports running. After running the tests, we then double or triple the load to reach worst-case load, which evaluates system performance. One common result of this test effort is to identify evidence of stored procedure execution degradation. These results enable improvements and changes to address any load and resource contention issues.

The following sections outline the comprehensive testing conducted by Geographic Solutions in the Transition Phase.

## Transition Phase – Functional Regression Testing

We establish the scope of a regression test by examining the scope of a new release and testing points of its impact on prior functionality.



*Rapid Implementation and Development Testing Workflow – Functional Regression Testing*

During the initial Go Live of a new system or an upgrade to a new version, both the Manual QA and the Automation QA Teams regression test the entire system. Both teams review checklists of use cases tested on the production environment during a deployment event. The Automation QA Team runs hundreds of test scripts on the production environment during Go Live deployment events to verify system quality.

Before testing any modified software, we run the current production software against test data using the test scenarios and record the results. We restore the database and run the modified software against the same test data. We then compare the outputs from the modified software to the outputs



from the production software and investigate and resolve any differences. If the new software requires coding changes, QA staff log the problem in the OPC system and send the software back to the developer for resolution; after which, the Development Team will perform unit and integration testing again.

After completing test iterations, we hold a debriefing of the test results. Specifically, the testing results report must show that, to the best degree achievable during the iteration testing phase, we have communicated and addressed all identified severity one and severity two issues. Severity is a measure of how critical an issue is. Based on availability of resources, we prioritize the critical issues and address them in priority order. At a minimum, we will resolve all first and second priority issues prior to entering the beta phase. Geographic Solutions creates a development Hit List to communicate and track issues in need of immediate resolution.

We release the production environment to DWD for approval only after both QA Teams have tested all of the use cases thoroughly. Any incidents created during Go Live testing will go through the incident workflow, and we will resolve them by the time DWD receives the site. During the Go Live testing deployment, we may put up a maintenance page or a banner on the site to let all end users know that the site is undergoing maintenance. DWD policy practices dictate whether users are permitted access to the site during testing. At the conclusion of Go Live testing, we will delete all test users and the Geographic Solutions' PMO will inform DWD that its designated users can enter the site for their inspection and approval.

## **Transition Phase – Data Conversion Testing**

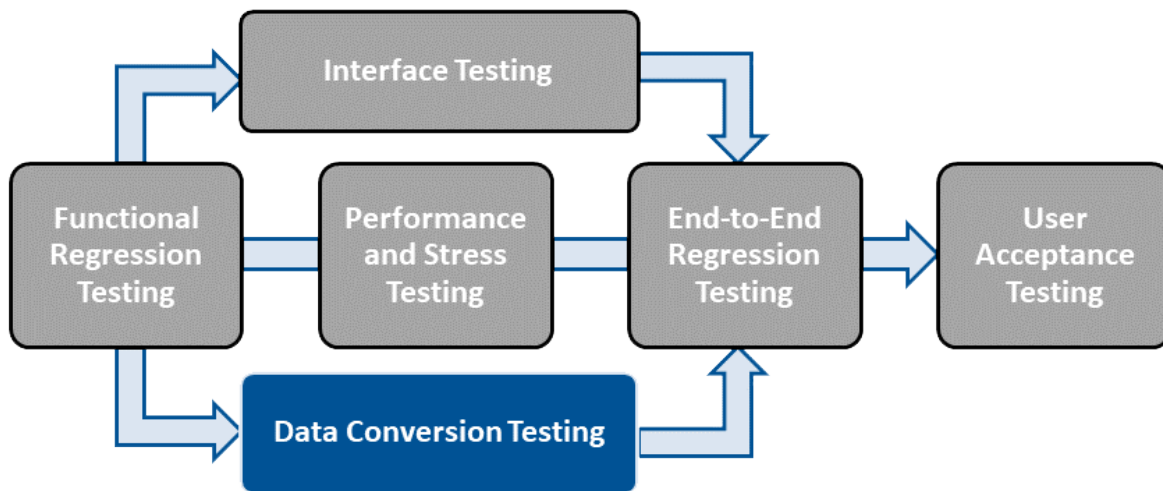
Geographic Solutions uses several stages of testing to validate and verify the conversion process. The data conversion team applies unit and integration tests on the conversion data in the data conversion development environment. Integration testing in multiple environments by the functional test teams follows. The teams perform multiple automated and manual tests in each of these environments to ensure the data is ready to move on to each testing stage. Using multiple iterations minimizes conversion issues experienced in the final production conversion.

Unit testing occurs at each stage of the conversion process – cleansing, extraction, transformation, and loading. We use automated test scripts where possible. We develop these unit test procedures from the data conversion specification documents.

Integration tests begin in the data conversion development environment before the data is moved to the graphical user interface (GUI) test environment. Integration tests in the conversion environment analyze the integrity and accuracy of the converted data set compared to the original legacy data set.

Validation testing to verify business rules accuracy begins in the GUI testing environment and may force conversion program changes until the data set meets the desired accuracy and integrity objectives. Geographic Solutions' QA specialists perform extensive internal QA testing. Once we are satisfied that

the converted data meets the objectives, it is ready for full customer acceptance testing in the training and UAT environments before moving to the implementation and production stage.




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*Rapid Implementation and Development Testing Workflow – Data Conversion Testing*

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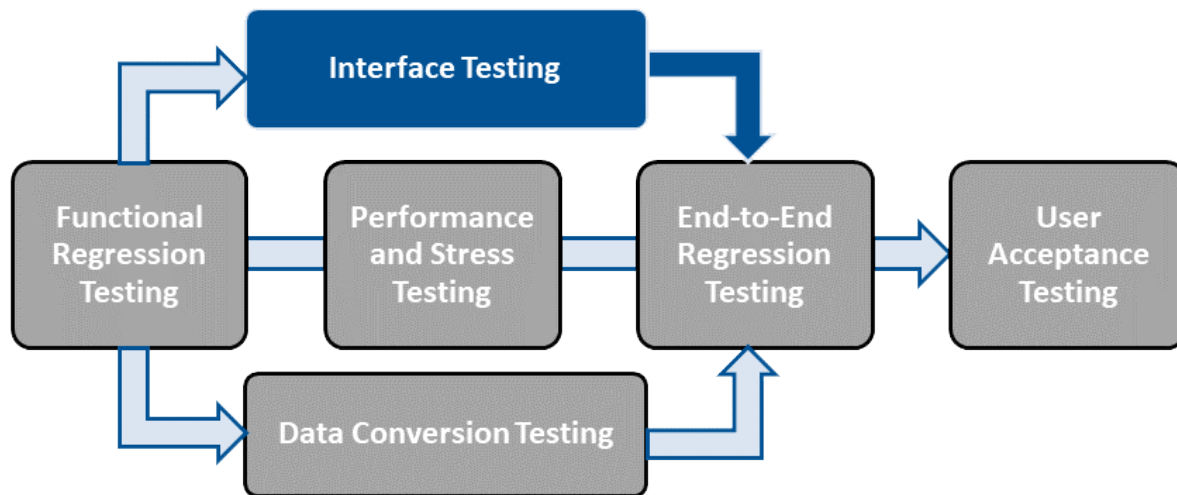
Geographic Solutions uses a three-phased approach to initially determine the accuracy of a data conversion run:

- Initial sanity checks to see if the appropriate amount of data has been migrated. Geographic Solutions' QA specialists conduct a comparison of record counts for each data type that is converted. Any discrepancies result in required modifications to the conversion scripts.
- A side-by-side comparison of a sampling of the converted data in the *VOS Sapphire 22* database against the legacy databases. The sample of data records will be representative of the overall data set and the variety of data that it may contain. This comparison is carried out by displaying the converted data via the *VOS Sapphire 22* user interface and the legacy data via the legacy user interface. The same data records from each system will be displayed on monitors next to each other and any differences will be logged as issues in the OPC system.
- Key federal reports are run against the converted data in *VOS Sapphire 22*. This includes reports such as the ETA 5159, ETA 227, ETA 207, ETA 9054, ETA 9055, ETA 9052, ETA 191, and ETA 581 reports. These new reports are then compared against reports for the same time period from the legacy system. Any differences are logged as issues in the OPC system.

The Geographic Solutions' QA Department performs data conversion testing in close cooperation with the Business Analyst Team. The QA Department is responsible for verifying that the conversion scripts are ready for UAT and for recording the results of data conversion testing in the OPC system.

## Transition Phase – Interface Testing

During interface testing, we test DWD’s unidirectional and bidirectional interfaces as part of end-to-end testing and as part of the interface testing. DWD can have one interface or hundreds of interfaces, and we will test them all to ensure they are functioning correctly prior to the system Go Live.



### *Rapid Implementation and Development Testing Workflow – Interface Testing*

Test data goes through the interfaces to ensure the data emerges from the back end correctly. If a wrapper is attached to the interface data packet, testing will compare it to the data retrieved at the end of the test to ensure all of the data made the round trip intact.

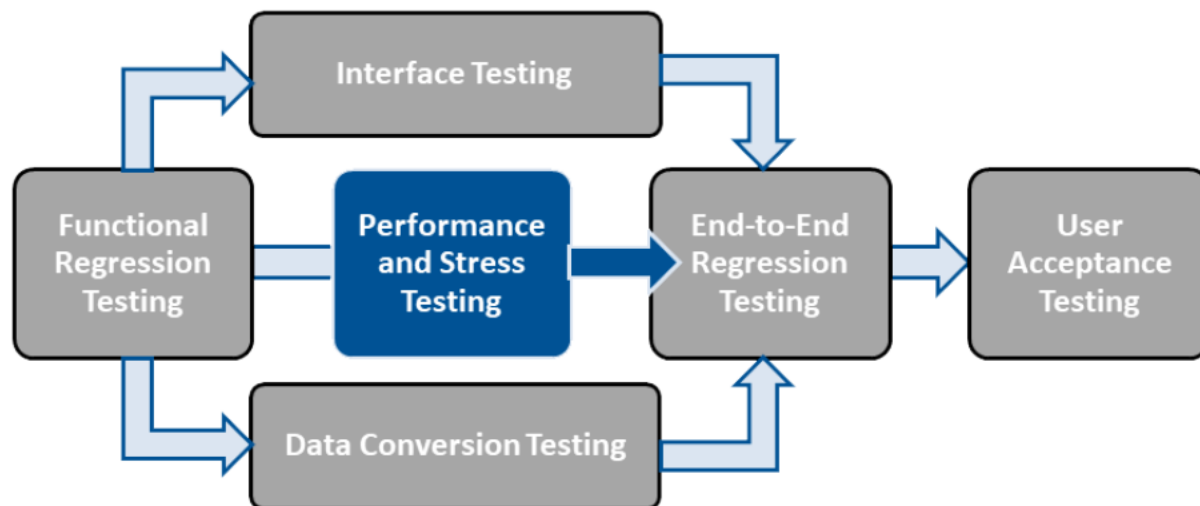
If a third-party vendor receives the data sent through the interfaces, Geographic Solutions’ Interface Development Team will coordinate testing among all systems receiving the data with both our PMO and the third-party vendor. It is vital that all third-party vendors cooperate with interface testing to ensure they receive all data correctly and in a timely manner.

We create nightly processes for the transfer of some data scripts through the interfaces. Our Database Management Team carefully monitors these nightly job scripts to ensure the jobs run correctly. In the event of a script or job failure, the system will notify the on-call Database Administrator to restart the script or job and follow it through to success.

The Geographic Solutions’ QA Department performs interface testing in close cooperation with the Systems Integration Team and is responsible for verifying that each interface is ready for software regression testing. The Systems Integration Team records the results of interface testing in the OPC system.

## Transition Phase – Performance and Stress Testing

The Geographic Solutions’ QA Team will conduct performance testing to ensure that all components of the new solution meet performance and benchmark requirements. Before performance testing begins, we create test scripts and scenarios for each function critical to performance. These scenarios show the individual steps required to complete the function, as well as inputs, outputs, anticipated user load, and response time.



*Rapid Implementation and Development Testing Workflow – Performance Testing*

Performance testing identifies specific performance requirements and verifies the functions of the system perform within benchmark standards designated by DWD as defined during the Inception and Analysis Phases. Performance testing identifies specific performance requirements and verifies the functions of the system perform within benchmark standards designated by DWD as defined during the Inception and Analysis Phases.

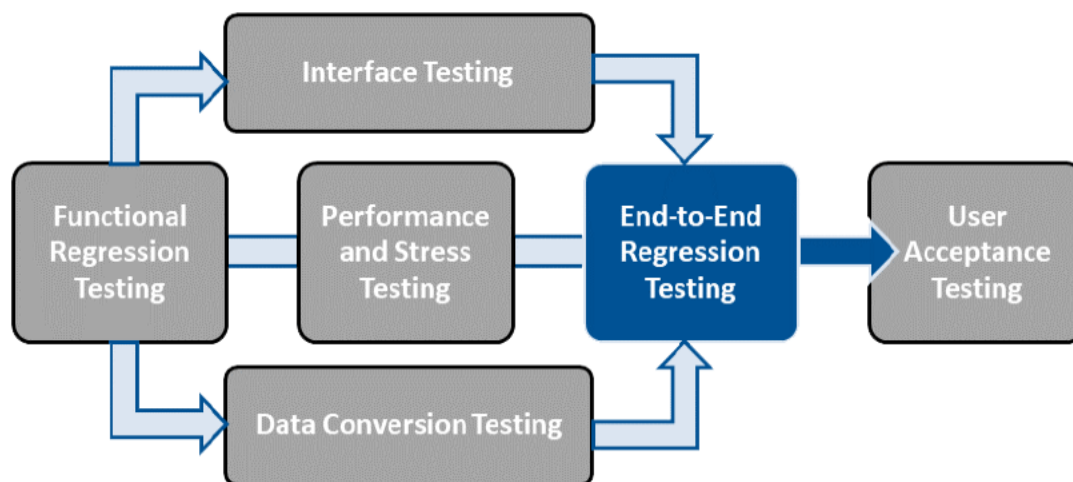
In addition to performance testing to simulate anticipated load and worst-case load, we conduct tests for resource contention scenarios, such as server connections going down, bad stored procedures, and heavy reports running. After running the tests, we then double or triple the load to reach worst-case load, which evaluates system performance. One common result of this test effort is to identify evidence of stored procedure execution degradation. These results enable improvements and changes to address any load and resource contention issues.

We will provide DWD with a report showing metrics and results from performance testing as part of project documentation. We will negotiate the actual performance measures for the proposed system with DWD staff. The system will meet these performance goals within the given system parameters outlined by DWD.

The QA Automation Testing Team is responsible for verifying the achievement of performance requirements and will record the results of performance testing in the Geographic Solutions' OPC system.

## Transition Phase – End-to-End Regression Testing

Geographic Solutions is a strong proponent of end-to-end regression testing whenever possible. This protocol not only validates the software system under test conditions but also checks its integration with external interfaces. The purpose of end-to-end testing is to execute a complete, production-like scenario. Along with the software system, this testing validates that the interfaces and data exchanges from the legacy systems are communicating with the new system.



*Rapid Implementation and Development Testing Workflow – End-to-End Regression Testing*

End-to-end testing usually occurs after functional regression testing. End-to-end testing uses actual production data in a test environment to simulate real-world settings. This will require that DWD provide test environments for the connected legacy systems.

Note that due to the age or lack of availability of test environments for some legacy systems, this is not always possible.

End-to-end regression testing is the complete testing of all functions of the new State of Indiana Case Management and Labor Exchange System site by all testing groups. We conduct this testing as a claimant going through the site from registration to final exit in the system. We also conduct end-to-end testing as an employer who is entering the system for the

### CalJOBS System End to End Regression Testing

End-to-end testing was a key factor in the successful implementation of the new CalJOBS system for the State of California in March 2013.

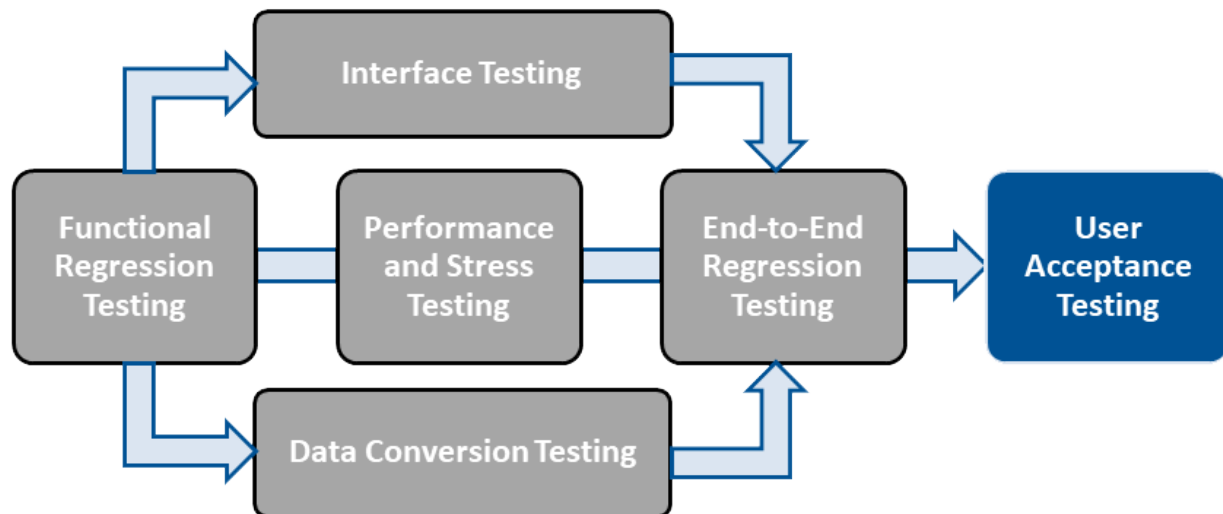
first time, and we will test all test cases to the conclusion of each area the employer enters.

The next rendition of end-to-end testing is when we run tests as a staff member using the system from the beginning of a process to its conclusion.

End-to-end testing includes the exercising of all interfaces to determine whether the data are making a unidirectional or bidirectional loop and returning the expected result.

## Transition Phase – User Acceptance Testing

Geographic Solutions will support a full UAT process against DWD' configurations and converted data prior to deployment. Upon successful completion of UAT, an authorized DWD representative will sign a formal acceptance certificate.



### *Rapid Implementation and Development Testing Workflow – User Acceptance Testing*

Upon concurrence of the Geographic Solutions' Project Manager and the DWD's Project Manager that the system has undergone full testing for quality and performance, Geographic Solutions will notify the DWD's Project Manager through the OPC system that the application is ready for UAT.

DWD representatives and subject matter experts will conduct UAT on each sequence of related or dependent modules and on converted data from existing legacy systems with the support of the Geographic Solutions' Project Team. This team of knowledgeable staff will review the system in detail to determine that functionality meets requirements, and the product adheres to specifications. DWD will use the system specifications documents to verify whether system functionality is acceptable. We will incorporate DWD's specific procedural requirements into the Rapid Implementation and Development methodology to ensure we achieve them as stipulated.



We will allocate a fixed period for UAT that both parties agree upon. During this period, Geographic Solutions will address any problems with the product to meet the requirements and specifications.

## User Acceptance Testing Environment

UAT will take place on a dedicated test server, providing test data that function according to program specifications. This test database will remain active throughout the entire project lifecycle, including post deployment. Geographic Solutions and DWD will utilize this UAT data for testing purposes. The UAT environment will duplicate the operational environment as much as possible, including underlying software, tools, and databases. Stress and performance testing also will occur during this phase.

A team composed of various stakeholders will perform the acceptance testing. Geographic Solutions' personnel will participate in testing, as well, and will offer their help and support during testing. Geographic Solutions will provide UAT training prior to the beginning of the actual testing. Geographic Solutions provides this training to all those individuals who will take part in UAT, typically through web conferencing. The training provides enough familiarity with the system to be able to conduct a thorough test. The training also explains how to use the OPC system to document issues encountered during testing.

## User Acceptance Testing Procedures

Geographic Solutions will use the following procedures during the UAT process:

- Troubleshoot all test result anomalies to determine the source of the problem.
- Update the Test Plan, test cases, and test scripts and modify and retest the system.
- Following any software change or test script change made during the UAT period, perform a regression analysis of tests already executed to determine which test results the change may have affected and whether we need to execute them again.
- Base test data on actual data provided by DWD but cleanse the test data to remove all confidential information, such as actual names, addresses, Social Security Numbers, and Federal Employer Identification Numbers.
- In strict adherence to quality control, implement the system only after securing a final user sign-off from DWD for the complete system. We will not consider any Acceptance Test Case complete until DWD representatives of the joint test team concur.

During UAT, DWD and project stakeholders will verify the following:

- Adherence to all requirements and design documentation
- Documentation of any defects existing in the new DWD Case Management and Labor Exchange System

- Conversion of legacy data
- Completeness and accuracy of system documentation
- Response time and overall system performance
- System hardware, software, and telecommunications performance
- System, data, and application security
- Accuracy and performance of system interfaces
- Accuracy of any federal, state, and local report

Geographic Solutions will plan, support, and report on acceptance testing to demonstrate that the solution meets all requirements. Both DWD and Geographic Solutions' project staff will use the Geographic Solutions' OPC system to track and manage defects, errors, issues, and enhancements reported in the UAT process, including the date and manner of resolution.

## Additional Testing

Geographic Solutions continually conducts the additional testing activities outlined below.

### Usability Testing

For usability testing, Geographic Solutions asks individuals, with no previous experience with the system, to run through realistic scenarios using the system, such as registering or filing an initial claim. After this exercise, we ask the individual a series of questions to determine which areas and aspects of the system provided usability challenges and require improvement. The Business Analyst Team oversees this form of testing.

This type of testing has led to many changes and innovations in the site that have improved the experience for claimant, employers, and staff. For example, we carried out a series of usability tests on *VOS Sapphire 22* that included both staff and customers in the State of Louisiana. The feedback from the testing resulted in significant improvements to the system.

Geographic Solutions will conduct face-to-face usability testing with individuals who are representative of different demographic groups and education levels. In addition, if DWD wishes, we can conduct usability testing with employers and DWD staff. This testing will provide feedback on problem areas we will address prior to system Go Live.

In addition to this testing, our Development, Project Management, and Business Analyst staff frequently visit local offices to view *VOS Sapphire 22* in action. They obtain feedback from clients using the system as well as from staff members. This feedback has led to some of the most significant improvements in *VOS Sapphire 22* over the years.

Geographic Solutions develops and tests all versions of our software for accessibility compliance and ease of use by persons with disabilities. We investigate, test, and integrate new third-party software

regularly to ensure that our products remain current with other assistive technologies. Accessibility testing is performed at all stages of new development, during code updates, and in the review of current pages. Geographic Solutions employs testing and development personnel with experience using assistive technologies.

Geographic Solutions also conducts usability testing prior to a new major version release. We always create an iteration of the next upcoming release of new functionality and make this site available to our customer base for review. The purpose of this review is for staff to become familiar with the new system and provide us with feedback on any potential usability issues. Our business analysts collect feedback from the testers to determine if any usability issues exist in the system and then recommend design adjustments based on the feedback.

We test *VOS Sapphire 22* continually using the two latest versions of Edge, Firefox, Opera, Netscape, Chrome, Safari, and Internet Explorer. We perform testing on multiple operating systems including Windows, Mac OS X, and mobile device operating systems. This testing is both manual and automated.

## Failover Testing

Geographic Solutions periodically tests the capability of the redundancy built into the *VOS Sapphire 22* application and the hosting and network infrastructure. We test the backup capability of internet service providers as well as the disaster recovery facilities.

## Security Testing

As a standard part of our security procedures, Geographic Solutions' systems undergo penetration and vulnerability testing. We conduct this testing internally and contract with a third-party vendor to conduct this testing, as well. We also review system updates weekly to determine what new vulnerabilities have surfaced, and we test the critical operating system patches on internal development and test environments before loading them to production or passive production systems.

Geographic Solutions performs internal penetration and vulnerability testing continuously and conducts third-party testing annually. We then correct any vulnerabilities and risk factors when we find them.

Geographic Solutions uses several methods of physical, technical, logical, and personnel security to ensure against attacks. These methods include software to protect against worms and Trojan horses and testing to protect against denial-of-service attacks. Other security methods include security privileges appropriate to the user's role and registration restrictions, Transport Layer Security (TLS) cryptographic protocols, and various levels of access security.

Geographic Solutions continually tests the *VOS Sapphire 22* product for vulnerabilities with MicroFocus Fortify on Demand software. The Security and Compliance Team corrects and retests any risks they identify to protect against attacks, such as denial-of-service. Fortify OnDemand automates security testing, leveraging static analysis and delivering comprehensive defect analysis. These applications offer environment-specific recommendations for fixing security flaws. They also combine simultaneous web

crawl and audit phases of security analysis into a single process that gives Geographic Solutions' Systems Team a comprehensive view of the entire system's attack surface. These applications assess and address potential security breaches that may be undetectable by traditional methods.

Geographic Solutions has subjected the *VOS Sapphire 22* application and infrastructure to numerous external vulnerability tests, and the system has passed them all.

## Accessibility Testing

Geographic Solutions develops and tests all versions of our software for accessibility compliance and ease of use by persons with disabilities. We investigate, test, and integrate new third-party software regularly to ensure that our products remain current with other assistive technologies.

We perform accessibility testing at all stages of new development, during code updates, and in the review of current pages. Geographic Solutions employs testing and development personnel with experience using assistive technologies. We test new features for accessibility at the development level in Mozilla Firefox, Google Chrome, Opera, Microsoft Edge and Apple Safari browsers, Microsoft Internet Explorer, Samsung Internet, and Android WebView. We test these browsers on multiple operating systems including Windows, Mac OS, Apple iOS, and Google Android.

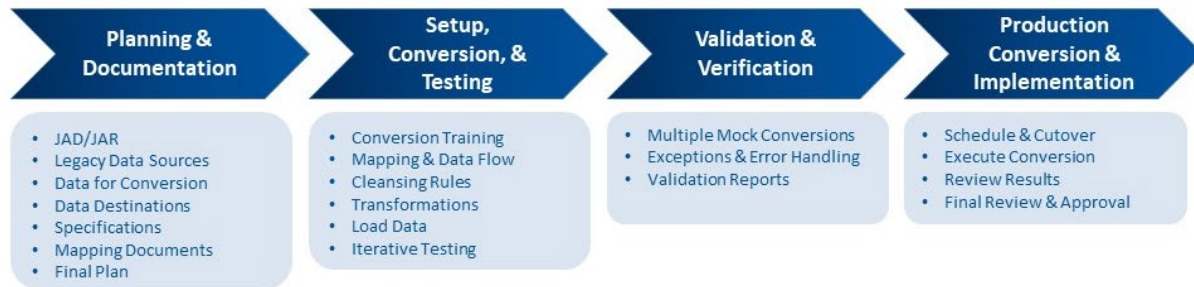
QA testing cycles weekly through the different browsers for testing. QA testing uses Windows, Mac, and mobile device operating systems. We follow a checklist of the WCAG 2.1 guideline standards at a minimum AA level during this process.

## Transition Phase – Conversion Activities

Typically, data conversion to a new system requires mapping old data elements to new elements, in a new data structure. Since table structures that existed in the legacy system no longer are valid in the new system, mappings and transformations are necessary to load the existing legacy data into a new data structure. Our process includes the use of intermediate databases to stage the transformed data before it migrates and integrates to the final *VOS Sapphire 22* database structure and tables.

We use several stages of testing to verify and validate the conversion process. The Geographic Solutions' Conversion Team applies unit and integration tests on the conversion data in the data conversion development environment. They follow this with integration testing in the system, UAT, and production environments by the functional test teams. The teams perform multiple automated and manual tests in each of these environments to ensure the data is ready to move on to each testing stage. Using multiple iterations minimizes issues experienced in the final production conversion.

The Geographic Solutions' QA Team performs data conversion testing in close cooperation with the Business Analyst Team. The QA Team is responsible for verifying that the conversion scripts are ready for UAT and recording the results of data conversion testing in the OPC system.



### Geographic Solutions' Data Conversion Components

## Transition Phase – Training Stage

Geographic Solutions has an outstanding record of providing training support for customers across the country. Geographic Solutions provides UAT training, staff training, Train-the-Trainer training, and/or administration training, depending on user roles. Training normally occurs before final deployment, but the Training Team can adapt the training schedule to fit the needs of the client.

Geographic Solutions' skilled instructors have experience using and implementing systems in many different situations. We train users in a classroom setting, with opportunities for questions and answers. We emphasize real-world examples and carry out "hands on" training exercises to promote kinesthetic learning. Geographic Solutions also offers web conference training as a distance-learning tool to reduce costs. The system also features training videos for many aspects of the system.

Geographic Solutions creates training materials to support training content. Examples include training agendas, training registration templates, and the Staff Quick Reference Guide. Geographic Solutions makes these documents available to our customers electronically, so they may edit, disburse, reproduce, and otherwise utilize them for both pre- and post-deployment training.

Training participants may take advantage of our base system user guides to reinforce classroom or webinar training. Each guide presents screenshots from the [VOS Sapphire 22](#) application and provides additional information and step-by-step details to help training participants perform desired functions. User guides are available electronically in [VOS Sapphire 22](#) for staff selection.

## Transition Phase – Documentation Stage

The Geographic Solutions' Business Analyst Team creates system design and planning documentation during the Analysis Phase. We also have a full technical writing staff dedicated to creating procedural user documentation for the final system.

Authorized staff will have access to all documentation through the OPC system. [VOS Sapphire 22](#) can also post user documentation and other online resources to the Staff Online Resources portal of the [VOS Sapphire 22](#) solution by using the Web Content Management module. Staff members (with the appropriate administrative permissions) can post static pages, such as PDF files, Word documents, Excel

spreadsheets, and PowerPoint files. DWD staff and other authorized users can access these documents for reference purposes, or they can download them for their own personal access.

User documentation features clear organization of content, easily understood language, useful graphics, and a thorough index or glossary. The technical writing staff writes the materials to accommodate an eighth grade reading level and incorporates screen graphics with step-by-step explanations of system procedures. Geographic Solutions continually revises our user documentation as appropriate, throughout the life of the project and with subsequent system upgrades, as required.

Geographic Solutions also creates a Feature Enhancement Release Notes (FERN) document to provide high-level descriptions of new base features with each *VOS Sapphire 22* release. We maintain a separate document for each system version to complement the more detailed documentation found in the appropriate User Guides and System Guides.

System users can access the appropriate *Quick Reference Cards* through the *VOS Sapphire 22 Assistance Center* to help quickly learn how to access the main features of the system. The system will display the appropriate reference – for individuals, employers, or staff – based on the user’s login. Registered staff members have access to all three of the *Quick Reference Cards*.

## Transition Phase – Implementation and Go Live Stage

The Implementation and Go Live stage of the Rapid Implementation and Development lifecycle is an intricate process that culminates Geographic Solutions’ entire project management methodology. This process is a combination of many defined steps conducted by Geographic Solutions to ensure the effective deployment of the solution to the production sites.

After the initial phase of final testing is complete, Geographic Solutions’ Conversion Team will perform the multi-tiered process of conversion and inclusion of legacy data. Once the Conversion Team converts the data from the legacy system into the new system, Geographic Solutions’ staff will conduct additional tests and will follow development procedures before the system is ready for the final stages of production testing.

During production testing, Geographic Solutions’ staff will perform complete regression testing and the final stages of quality assurance testing. Our teams will execute additional health checks due to the inclusion of legacy data. When production testing is complete, a DWD representative will review and set the privilege groups and the staff associated to those groups. Once the DWD representative provides official acceptance of the site, we will perform final health checks on the entire system and, when complete, notify DWD that the site is live. Geographic Solutions will assume full responsibility for the implementation of DWD’s application and will ensure it is operational for users.

Agile software deployment has many advantages, including faster deployment, fewer failures, and quicker recovery times. Agile deployment is generally defined by several best practices, all of which we follow in our deployment process: develop and use a deployment checklist, use the right deployment tools for the effort, use a continuous integration server, adopt continuous delivery, automate the

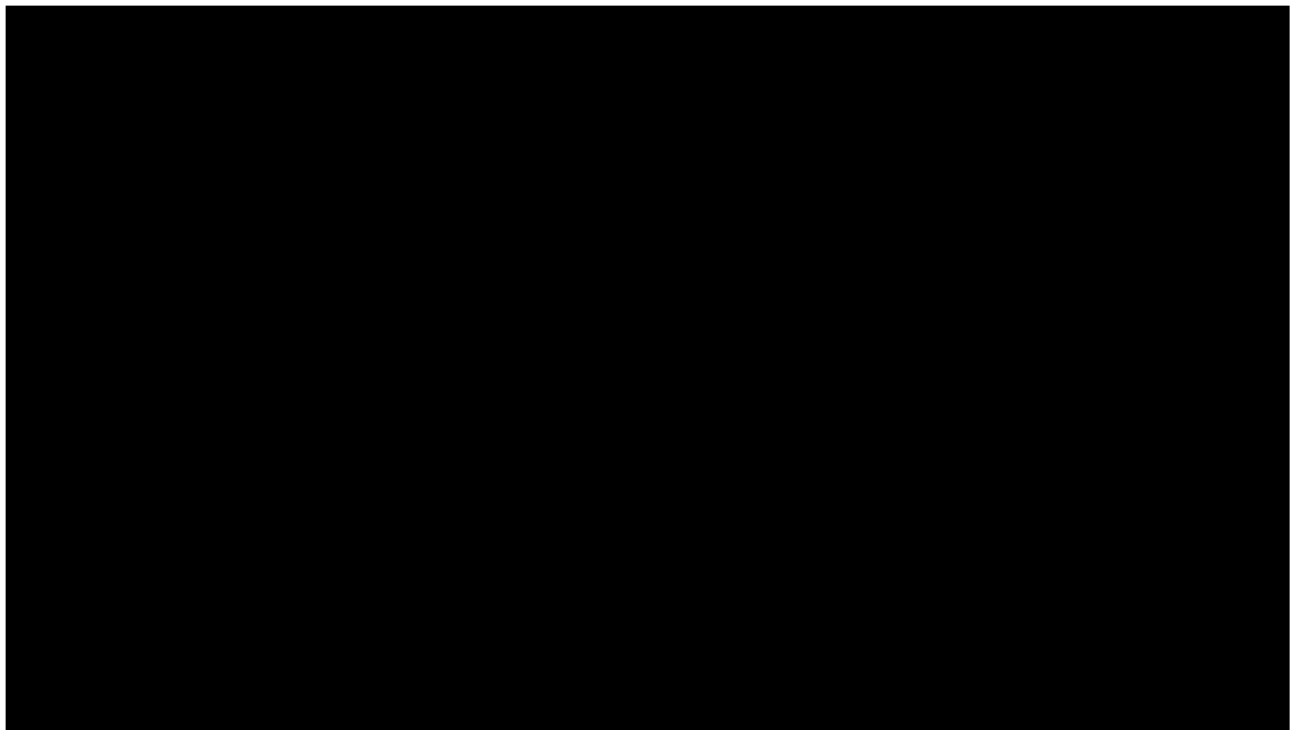


deployment process, monitor Key Performance Indicators (KPIs), and have a roll-back strategy. In preparation for, during, and after deployment of the new Case Management and Labor Exchange System into the operating environment.

## Maintenance Phase

Geographic Solutions is committed to delivering post-implementation services to all our customers. Our team has offered these high-quality services, including warranty and upgrade services, to Case Management and Labor Exchange System agencies in over 35 states and territories in the last 30 years. With every system implementation, Geographic Solutions has met all negotiated Service Level Agreement performance levels.

During this Maintenance Phase, Geographic Solutions will provide all support level services, upgrades, and system enhancements, including the daily operations of the system. Our Rapid Implementation and Development methodology includes a full plan for software maintenance and support. The DWD can identify any issues for warranty or software maintenance at any point and can document and track them using Geographic Solutions' OPC system. The DWD can report issues that involve patches, upgrades, and distribution of necessary product fixes, including those resulting from revised federal or state reporting requirements.



Full-time staff is available to monitor the system status, the OPC system, and the office telephones to take requests and provide rapid response and resolution of automated system alerts and manually reported events.

Geographic Solutions understands that only part of the success of the Case Management and Labor Exchange System Project stems from successfully deploying the system on time and within budget. We also measure project success in terms of vendor support by offering the highest level of service possible within a reasonable timeframe.

Geographic Solutions is committed to delivering responsive operations, maintenance, and support services to all our customers. We have offered these high-quality services, including maintenance and upgrade services, to state agencies in more than 35 states for 30 years. During this time, we have always met our negotiated performance levels.

During the Maintenance Phase Geographic Solutions will provide all support level services, upgrades, and system enhancements, which include the daily operations of the system, including the following services:

## Software Support and Help Desk Services

Geographic Solutions understands the importance of managing and resolving problems and incidents in the new *VOS Sapphire 22* Solution as quickly as possible. It is equally important to be flexible and enable escalation, either when the impact of an issue passes an established threshold or when delaying a resolution is unacceptable.

To provide the best possible technical support service in the most efficient manner possible for the new Case Management and Labor Exchange Solution, we divide our support into tiers. They are as follows:

- **Tier 1** – DWD can handle these issues internally. DWD staff is the first tier to resolve system issues for staff, employers, and individuals. Typically, these are simple user issues, such as problems navigating the system, etc. If staff cannot resolve the issue, they will escalate it to Tier 2 support – the Geographic Solutions’ help desk.
- **Tier 2** – These are issues escalated from Tier 1 by DWD or reported directly as Tier 2 issues by DWD staff. If Geographic Solutions’ help desk support staff cannot resolve the issue, they will escalate it to Tier 3 – Geographic Solutions’ subject matter experts.
- **Tier 3** – These are issues escalated from Tier 2 by Geographic Solutions’ help desk or reported directly as Tier 3 issues by DWD or Geographic Solutions staff. Subject matter experts, such as project managers, business analysts, systems analysts, developers, database administrators, etc., handle these issues. We handle all incidents (bugs), system issues, and network issues at Tier 3.

Customers can report any system issue to Geographic Solutions’ Network Operations Center (NOC), which is available 24/7/365, via telephone, fax, email, or the Internet through our Online Project Communication (OPC) system. The OPC system provides clients with real-time access to their project’s status and allows them to track the progress of incidents, enhancements, and changes

To create an incident (issue) record via the Internet, authorized DWD staff simply log on to the OPC system using their assigned User ID and password. The staff member completes a template to record details of the issue, and can include an attached file (e.g., a screenshot) to demonstrate or document the problem encountered in the system.

## Software Maintenance Services

Geographic Solutions will provide all maintenance solutions, including upgrades, enhancements, bug fixes, and other agreed-upon customer support services, within response times as documented in the service-level agreement. We will ensure that the proposed system will be available 24 hours a day, seven days a week, 365 days a year, including holidays.

Geographic Solutions values long-term relationships with our customers. [REDACTED] software maintenance program provides our customers with upgrades for the life of the maintenance agreement. The [REDACTED] maintenance program is our highest-level support service and is the most comprehensive service available in the industry.

[REDACTED] assures that DWD is not just getting a modern Case Management and Labor Exchange system on the first day the system is implemented, but for the life of the system, included with our fixed-cost proposal.

Benefits of Geographic Solutions' [REDACTED] maintenance program include the following services for the fixed annual maintenance fee:

- A dedicated Project Manager for the life of the system
- System changes required by state legislative mandates
- System changes required by federal legislative mandates
- Major version releases annually
- Minor version upgrades quarterly
- Maintenance updates monthly
- Critical hot fixes immediately as needed
- Technical Support 24/7/365
- Support via the Internet through our Online Project Communication tool
- System upgrade and deployment event support
- A discount registration to our national user conference to share best practices, request enhancements, and preview major releases

## Core Software Upgrade Services

Geographic Solutions has a long history of responding rapidly to user needs and changing conditions. Regular updates and version upgrades to the core solution introduce new functionality and keep the solution current with industry standards, as well as state and federal requirements. Our history in working with Case Management and Labor Exchange agencies over the last 30 years has demonstrated our ability and willingness to respond quickly to change.

Geographic Solutions maintains the *VOS Sapphire 22* solution and deploys updates in a manner reflecting the needs of state government clients like DWD. We follow strict controls regarding infrastructure modifications and technology change management. Technology change management helps to minimize service disruptions and maintain the system. Geographic Solutions' technology change management includes such items as regular updates, version upgrades, special patches, and necessary hardware and software changes, which improve system availability.

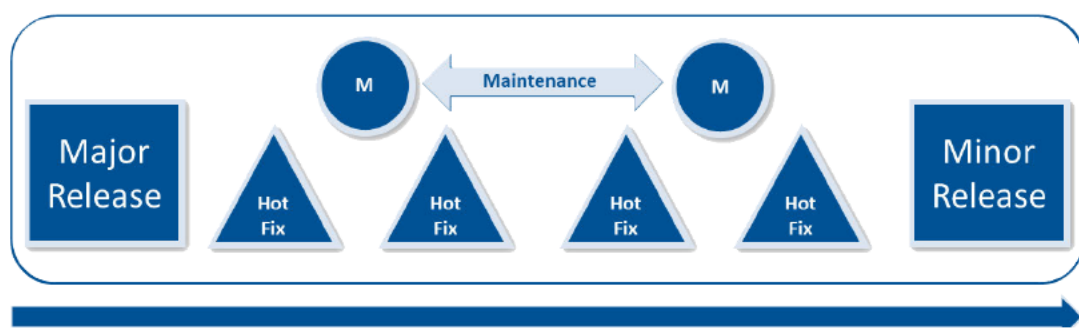
Geographic Solutions schedules and plans regular updates and version upgrades with the client, to prepare the client for the release. Special patches are immediate releases Geographic Solutions loads to the system, via coordination and communication with the customer, to address an immediate need.

Clients can hold patches for scheduled client staging events or Geographic Solutions can load them as emergency hot fixes, as mutually determined by Geographic Solutions and the client. The *VOS Sapphire 22* solution does not require the reinstallation of patches after the initial deployment. After deployment, a patch becomes part of the base application, thus eliminating the need to reinstall.

The proposed frequency of *VOS Sapphire 22* updates for the Case Management and Labor Exchange Solution is as follows:

- Major Releases (new full version) – Once a year
- Minor version upgrades – Once a quarter
- Maintenance updates – Every month
- Critical hot fixes – Immediately as needed

The graphic below illustrates an example of the update frequency and progression.



*Proposed Frequency of Updates – Example of 1st Quarter*

## System Administration Services

Geographic Solutions manages and routinely performs maintenance for the hosting infrastructure, including the web and database servers running components or modules that are required for the *VOS Sapphire 22* solution's operation. We have a documented management and control program for all of the maintenance and support requirements. Regularly scheduled preventive maintenance events support all hardware component operating systems, firmware, service pack upgrades, and normal disk maintenance activities. We schedule web servers, database servers, reports servers, and SFTP servers for these events.

Geographic Solutions schedules all events after normal production hours to ensure minimum impact to DWD's internal users and customers. We also schedule emergency maintenance as needed, for urgent hotfixes and any unscheduled, emergency maintenance needs.

The following summarizes the general system administration services that we will provide:

- **Servers and Network Infrastructure Management** – Web server management, database server management, SFTP server management, operating system monitoring, network perimeter and firewall management, operating system installation and upgrades, hardware/software installation and configuration, service pack installation, hotfix installation, hardware driver updates, registration of Dynamic Link Libraries (DLL), server operation log monitoring, manual log rotation, hard disk defragmentation, server restart/reboot (as required)
- **Infrastructure Health Checks and Security** – Periodic webserver health checks, analysis of system security, analysis of application logs, analysis of Internet Information Server logs, update of all anti-virus and security software, installation of latest updates and vulnerability hotfixes, monitoring and enforcement of access controls
- **Microsoft Cluster Services** – Periodic Microsoft cluster services health checks, analysis of system security, analysis of application logs and scheduled failover testing to ensure state of both nodes
- **System Monitoring** – Continual website monitoring and health checking from multiple geographically diverse locations and error monitoring to ensure proactive solutions for any issues that arise, and root cause analysis for critical events
- **Production Support** – System upgrade and deployment event support, code deployment, software configuration management, support for code changes, and implementation of service pack updates
- **Interfaces and File Transfer Support** – Job banks updates, database extracts containing key, client-specific database tables and updates, and exchange of interface data via SFTP

- **Manage Backups and Replication** – Full and incremental backups of all application and data files, transactional data log backups, transfer to tape management, tape storage management, and replication infrastructure management
- **Disaster Recovery Services** – Geographic Solutions will provide a disaster recovery site and will participate in disaster recovery exercises with DWD staff

## Database Administration Services

DWD's database will be monitored and maintained by our database administration and development experts who will provide the following services:

- **Database System Monitoring** – Periodic database system performance monitoring, periodic audit of database for security issues, and system resource and capacity planning
- **Database Maintenance and Recovery** – Database transaction log backups, full-text catalog maintenance, system catalog and resources maintenance, and data replication and recovery management
- **Database Performance Tuning and Automation** – Data fragmentation maintenance, database density and indexes maintenance, interface automation (nightly processes) monitoring and maintenance
- **Database Code Deployment** – System upgrade and deployment event support, database object deployment, new or changed data transformation packages (DTS) implementation, new code for interfaces implementation, and software configuration management support for database changes
- **Production Support** – Service pack updates implementation, code and database object support, data hot fixes deployment and code fixes implementation

## Infrastructure Maintenance (Services Packs and Patches)

Geographic Solutions maintains the *VOS Sapphire 22* solution and deploys updates in a manner reflecting the needs of large government clients like DWD. We follow strict controls regarding infrastructure modifications and technology change management. Technology change management helps to minimize service disruptions and maintain the system.

Geographic Solutions has established standards for the technical currency of hardware and software. We support the N/N-1 standard where N is at least one minor release behind the latest major general availability version (e.g., .1, SP1, RC1, etc.). We provide at least a one-year buffer before any N-1 version is in risk of becoming unsupported. We also have a standard that hardware is on at least a five-year refresh cycle.



Clients can hold patches for scheduled client staging events or Geographic Solutions can load them as emergency hot fixes, as mutually determined by Geographic Solutions and the client. The *VOS Sapphire 22* solution does not require the reinstallation of patches after the initial deployment. After deployment, a patch becomes part of the base application, thus eliminating the need for reinstallation.

These technical currency standards would apply to all software, server, operating systems, data storage, virtualization, cables, cards, connectors, as well as other hosting, imaging, and server-related equipment required to support the *VOS Sapphire 22* application. This includes equipment necessary for development, testing, user acceptance, training, and final production processing environments.

## System Performance Monitoring

The key to dealing successfully with performance issues is early detection. With early detection, Geographic Solutions can resolve the problem often before it affects any users significantly. Geographic Solutions' Network Operations Center (NOC) monitors hosted systems around-the-clock, every day of the year for network, hardware, software, or operating system problems. Specially designed sensors and alarms ensure support personnel receive alerts immediately in the event of service degradation and therefore provide rapid response and corrective action.

Our software is capable of meeting response times of one second or less for routine direct record access and screen-to-screen movement throughout the application. Supporting our datacenter facilities, we set up special network testing services at 18 locations throughout the United States to test and monitor average response times for basic transaction scenarios. We monitor these results continuously to ensure consistency, recognize network degradation, and to assist in correcting any problems.

Performance issues can come from a variety of sources including the application, the database, hardware, the network, or a combination of any of these. It is important to identify the source of the issue quickly and pinpoint the problem. Geographic Solutions uses the following strategies to detect and locate any potential performance problems:

- Automated Network Performance Monitoring
- Automated Database Performance Monitoring
- Automated Error Detection
- External Website Monitoring

## Management of Interfaces and Batch Jobs

Geographic Solutions staff will work with DWD staff to coordinate, execute, maintain, and monitor all aspects of production processing, both online and batch. This includes real-time, online transaction interfaces provided largely through web services and batch processing procedures, which we primarily write using the .NET framework and Microsoft SSIS. We monitor the production processing manually

and use automated tools, such as SolarWinds network performance monitor and Quest Spotlight database performance monitor.

The following summarizes the general interface and batch job operational services that we will provide:

- Geographic Solutions will actively monitor batch processing to ensure all jobs complete and that appropriate DWD staff receive alerts when problems arise.
- Geographic Solutions will monitor and manage online system response times and the overnight batch processing windows. This monitoring will be both manual and automated through services such as Neustar's Web Performance Management.
- Geographic Solutions will inform appropriate DWD information systems staff, via daily email, of the status, online availability, and results of regular and special batch processing. The status also will be available online.
- Geographic Solutions will maintain and monitor the scheduling of production jobs.
- Geographic Solutions will work with DWD information systems operations personnel to coordinate special batch job scheduling and interactions with other systems.

## Configuration Management Services

To support DWD's needs that may result in changes to *VOS Sapphire 22*, the Geographic Solutions' Software Configuration Management (SCM) process will track and control changes in the software and systems for the *VOS Sapphire 22* Project. SCM practices include revision control and the establishment of baselines.

Geographic Solutions utilizes Team Foundation Version Control (TFVC) as its centralized version control system. This tool allows team members to check out code to their local workstations to complete tasks assigned to them through the OPC system while maintaining historical data on the server.

Geographic Solution's Software Configuration Management (SCM) Team will:

- Establish tools for new site creation and build the base code set and databases
- Deploy code from the appropriate development branch associated with the version used for the new DWD Project
- Document, implement, and report changes of configuration and functional changes of the *VOS Sapphire 22* solution to Geographic Solutions staff and DWD staff
- Custom build the build scripts, which define the steps used to create and deploy a new build
- Create and maintain these scripts within TFVC

- Set up a separate build definition for each environment on each active version of the *VOS Sapphire 22* solution
- Ensure all builds use their respective branch and configuration files to obtain source code from the TFVC repository, build it, and deploy
- Install and unit test all facilities, services, and components for the production environment

After the establishment of each environment, the SCM team will use normal source control and deployment control processing procedures to make updates until the sites are ready for regression testing. Once completed, we use the tested code set in staging to build the Training and Review environments where customer UAT participants train and customer UAT takes place.