ATTACHMENT 4: DISCOVERY PHASE 2 Deliverable 5

Washington State Department of Natural Resources

Forest Practices Division

Forest Practices Business Analysis

Deliverable 5: Roadmap

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Revision History

Revision Level	Date	Description	Change Summary
1.0	6/15/2018	Initial Draft	Includes changes from Treinen Internal Review
1.1	6/29/2018	Revised Draft	Includes changes from DNR FP Review

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1   Background

The Washington State Department of Natural Resources (DNR), Forest Practices Division (FP), is charged with administering laws and rules designed to protect Washington's public resources related to growing, harvesting, or processing timber. The proper implementation of these laws and rules maintains a viable forest products industry while protecting the public, soils, water, fish, wildlife, and capital improvements. The administration of these laws and rules entails a wide range of engagement with landowners, operators, and industry who are responsible for complying with them. FP staff are also responsible for responding to an increasing degree of public and legislative interest focused on impacts from harvesting timber as well as impacts to stakeholders from rules compliance. Of particular significance are time sensitive land-use impacts such as the increase in landslide risk to public safety and transportation.

The scope of related forestry practices is growing. This requires accurate yet timely professional review and permitting in an increasingly complicated field. Staff must incorporate applicant supplied data, improve it as needed, and assess targeted areas for practices related (but not limited to) road construction, road maintenance, forest thinning, salvage, timber harvesting, reforestation, brush control, and the use of fertilizers and pesticides. FP personnel are responsible for providing review, recommendation, and approval prior to the initiation of those specific activities while including inputs from a wide range of involved parties from industry, native tribal interests, and other state agencies.

Forest Practices receives thousands of applications for permits each year. They work with new permits, renewals, and manage on-going activity from approved permits. Permits may also include post-activity work that entails FP involvement for periods of time beyond the actual expiration of the permit. Information for up to 15,000 permits is handled each year.

To keep up with demand while working with existing staff levels, FP desires to develop and implement improved information systems to enhance these processes. This will improve the customer experience, aid in FP's mission, increase their ability to report to the public and management, and their ability to respond to requests for information from regulatory and legislative authorities. To achieve this goal, Forest Practices has undertaken the project to create the Forest Practices Online system.

Forest Practices Online will connect FP systems, databases, and mapping tools in a manner that achieves a single point of access for all internal staff, external agency support, public, applicants, and external support for all FP products, services and work. The Online solution will connect FP information systems, databases, and mapping tools. These will be accessed via a secure business portal. This portal will provide all process participants with a single access point for all Forest Practices products, services, and work.

One of the first steps in the envisioning of this portal was a Discovery project, the Forest Practices Integrated Business Information Systems (fpIBIS) project. This created the foundation for a deeper-dive, the Forest Practices Business Analysis (FPBA) project. The fpIBIS project was completed over the first half of 2017. A Request For Information (RFI) issued during that time frame resulted in a set of implementation options. Those options were defined as:

    a)   COTS/MOTS/SaaS solution,

    b)   FPARS enhancement solution,

    c)   Custom-built solution, and

    d)   Hybrid solution (Combination of custom-built, COTS/MOTS and SaaS)

Each option was evaluated for capability, feasibility, technologies employed, ability to meet requirements, ability to fill identified gaps, cost, benefits, and risks.

Both fpIBIS and FPBA deliverables provide DNR a recommendation for how to best implement the Forest Practice Online solution. That recommendation is a hybrid solution. This combines different aspects of custom-built, Commercial Off-The-Shelf (COTS), Modifiable Off-The-Shelf (MOTS), and Software-as-a-Service (SaaS) software into a cohesive, functionality-rich solution.

<u>The work of this project, with peer and market research, maintains the recommendation that a hybrid solution is the best option for the Forest Practices Online solution</u>. No reviewed peer organization has a solution that meets the needs of Washington's Forest Practices division in its entirety. There is no single platform solution to be leveraged. While market research discovered many options, they all need a level of customization that is above and beyond the configuration of a MOTS.

For further details, see the FPBA Deliverable 4 Options and Cost Analysis. Relevant terms from that document are defined below.

1.1 Definition of Hybrid solution (Combination of custom-built, COTS/MOTS and SaaS)

A hybrid solution is one that combines different aspects of a custom-built/COTS/MOTS/SaaS applications into a cohesive, functionality-rich solution. It is a construction approach that starts with a solid foundation, then adds elements to bring in functionality and features as the solution is 'built-out'. Existing DNR software will be leveraged where possible and integration of those products will be important to the project. The hybrid solution allows for that by having customization as an element. The hybrid option is appealing because it allows you to take advantage of the best components for each functionality that are already fully developed, used, and refined over many installations. This approach also provides clients and vendors who have current knowledge and experience from which to draw. The primary challenge with this option is getting each of the desired components to integrate smoothly and effectively. The best way to mitigate this challenge is to choose components that have been developed by the same provider, or components whose providers have strong partner relationships with concrete implementation experience as partners.

Pros
- Less functionality to build as custom software.
- Specific Forest Practices functionality may be available through other modules/components that have previously been built and implemented.

- Typically, a shorter timeline for Design, Develop and Implement (DDI) than a pure custom application.
- Resources available with experience on COTS components.
- Access to new or additional features and capabilities than the COTS/MOTS systems provide.
- Lower overall risk profile.
- Leverages DNR's existing assets wherever practicable thus protecting the investment in these systems

Cons
- Solution architecture can be more of a challenge with varying products.
- May require the assistance of an experienced systems integrator to manage.
- Challenges in maintenance and support with differing versions of components.
- Challenges in getting components to work together effectively and efficiently.

1.2   Definition of Configuration vs. Customization of Software

Configuration refers to entering information into the system in ways anticipated by the vendor that allow the stock software to work best for your business needs. Configuration means making the changes in the software; uses existing fields, values, and functionality to accomplish this. This is the flexibility that comes "out of the box" with the system. Configurations are typically supported by the software vendor through future releases.

Customization refers to changing the code, beyond configuration of the software to meet the business needs of your organization. This is, in essence, changing the source code of how the software operates. This is not "out of the box" – it is custom functionality to the specific needs of your organization. All customization has no guarantee of compatibility with future releases, is not supported by the software vendor and may need to be repaired with future versions of the software. With more complex customizations comes more inherent risk that those custom components will not be compatible with future releases. The Product Owner will know when complex customizations are being done.

2   Approach

The hybrid option requires a common approach to understanding the context of the potential problems. Several tasks were undertaken across multiple deliverables to gather the necessary and applicable information to complete this analysis. Those tasks included:

- ➢ Review existing documentation
- ➢ Review Gap analysis
- ➢ Updating and Documenting current business processes
- ➢ Exploring high-level requirements
- ➢ Performing a deep-dive on non-functional "technical" requirements
- ➢ Establishing a set of User-Driven requirements in the form of Agile User Stories

> ➤ Analyzing User Stories
> ➤ Incorporating market research of applicable products/services

With scope established by fpIBIS, quick review of system goals was conducted with management to identify the best methods to gather updated information. This established the framework for the creation of enhanced requirements.

The first evaluation step in this Discovery phase was to review existing documentation developed and accepted during fpIBIS. Time savings here allowed FPBA project members to focus on User-Centered requirement enhancement techniques. These resulted in a comprehensive set of requirements-based User Stories. These more accurately reflect the work processes, user roles, and goals. They also provide a more nuanced view of what it means for an implementation effort to meet the requirements.

Treinen employed its Requirements Elicitation and Validation (REV) process to revisit existing requirements, but with a more specific set of User Centered techniques. We developed Agile User Story and Acceptance Criteria, then trained teams of SMEs to use them. This allowed a broad range of participants representing different parts of the business processes to develop User Stories grounded in the existing requirements. Where necessary, this allowed the team to refine and update requirements and workflows. Standard REV session processes were also used to provide greater detail in the non-functional requirements. These were captured as Technical Requirements.

The resulting set of User Stories and Technical requirements provide a basis of data and information for more advanced analysis techniques. These techniques lend themselves to an Agile roadmap suitable for separation of project activities into different phases.

3   Overview

The **recommendation is a hybrid solution for implementation** of FP Online. This is reinforced by the analysis completed during this project. The project team has enhanced existing requirements into User Stories for additional User Centered design details. We've reviewed existing documentation for gap analysis. We've correlated REV sessions data, providing updated technical requirements. This also reflects previous RFI response analysis with an updated understanding of the new peer research, market assessment, and options analysis.

The recommendation anticipates a combination of primarily COTS/MOTS and potentially SaaS software. However, to meet current requirements and create a comprehensive solution, Custom-built software must be considered with new system integrations. Different teams will be involved in the overall solution creation. We anticipate moderate configuration and a pairing of resources from the solution provider with existing DNR resources. Expect limited engagement with custom-built (e.g. software development) teams. Use an Agile approach to improve the team's ability to deliver prioritized functionality rapidly while providing a comprehensive transfer of knowledge for Configurable and Custom solution components. Build this hybrid solution in an Agile approach to manage the costs and risks in contained releases.

This solution option will include customization in software development to meet requirements. Good planning and Agile methods will keep the risks and costs manageable. By developing a set of User

Stories, Agile techniques may be readily applied. We recommend following Scrum practices. These should be used to manage self-contained vendor teams while keeping their deliverables to an overall project schedule.

Business process change will be necessary to use the acquired software effectively while still achieving acceptable business practices. Consider utilizing aspects of Organizational Change Management for Training and Release Planning. Where possible, leverage COTS/SaaS software with minimal modification to avoid reduced configuration efficiencies and unnecessary training/support costs.

4 FP Online Impacts to DNR Organization, Resources and Processes

The Forest Practices Online project will impact several divisions within DNR. It will also impact a wide variety of FP customers in the general public and industry. The degree of impact to each group will be dependent on the final solution. However, the most significant impacts to groups other than the FP department are the Information Technology Division (ITD) and large land-owners.

The FP Division utilizes several systems to serve and manage their customers to fulfill their mission across the state. The Forest Practices Application and Review System (FPARS) was identified as the primary system. However, after an initial scoping workshop was conducted with management to identify the scope and systems involved, several other systems were identified for inclusion.

The other systems that are being included with FPARS are:

- Forest Practices Application Mapping Tool (FPAMT)
- Water Type Modification Form Tracking Application (WTA)
- Forest Practices Enforcement Tracking System (FPETS)
- Forest Practices Risk Assessment Mapping (FPRAM)

These systems actually represent the business processes that are included in the FP Online project and are to be included in the final solution.

In addition to these actual systems, there are several other critical tools and systems used by Regional Office staff, Foresters, and SMEs. These are generally referred to as "shadow systems." Their business-critical use creates a high expectation of continued ability to do daily, high-priority work. Different Regional offices and/or groups depend on these systems. FP Online requirements represent an assimilation of many functions of these systems. This will result in staff retraining and standardization of processes. It was important to identify and include these systems because their purpose and functionality are key to essential business processes. They must be incorporated if the solution is to be comprehensive while allowing Forest Practices to operate.

We recommend further analysis of business metrics be conducted. These are measurements the business considers essential for its success. They should also be able to be impacted by feature sets of the software. Convert business critical metrics for activities on these systems into project milestones or goals for the FP Online project. For example, the time from notification of field review to completion of field review including signatures. An alternative approach is to create key performance indicators (KPIs), then develop a mapping of User Stories to these KPIs that are expected to improve. For example, the number of FPAs processed per month, or total time for FPA in process. This will allow the project team

to measure project progress while ensuring everyday business is least impacted – practices related to consistent processing of gathering, recording, viewing and managing data.

These 'shadow systems' include:

- Master Log – an Excel file
- Small Forest Landowner RMAP checklists – an Excel file
- Road Abandonment Log – an Excel file
- SEPA Tracking Log – an Excel file
- Continuing Landowner Obligation Log – an Excel file
- Forester Checklist – a Word document
- Forester Log – an Excel file
- Compliance Log – an Excel file
- Monitoring Database – an Access database
- Forest Practices Deliverables – an Excel file
- Enforcement Database – an Excel file
- The Box / Sync Toy – a two-way sync system to synchronize the FPA network folders and GIS data with the forester's laptop and other devices.
- Forest Practices Engineers Report Tracker – an Excel file
- FP Geologists Deliverables for Unstable Slopes, CMZ, and Wetlands – a SharePoint site
- Geologist Landslide Inventory Spreadsheet – an Excel file

Although these may technically not be systems in the traditional sense, they still support or extend business processes that are important to the completion of other business processes. Consider Organizational Change Management (OCM) for training and communication as these systems are depreciated in favor of emerging features of the FP Online solution.

Potential resourcing and coordination of multiple software development teams is a risk for this project. Conducting multiple Agile teams while maintaining current ITD Operations is challenging for most organizations. There are limited resources in all the primary groups, Forest Practices operations, the Regional offices, and the ITD. Expect different cultures between "HQ", ITD, and external vendor teams. Expect challenges getting full-time, dedicated resources, especially where staff resources already have operational responsibilities. Evangelizing Scrum practices will break-down existing team barriers and focus ownership on specific system components while maintaining focus on overall project goals. However, While there is an agency standard Agile practice, expect each vendor to bring their own "flavor" and variations. These differences should be explored and a consensus on the methodology determined before implementation begins.

The ITD resourcing requirements will vary the most dependent on the final solution decision. The more components available from a COTS/SaaS vendor offering, with standard configuration and/or hosting options to fulfill the project requirements, the lower the impact on traditional ITD resources. The traditional tasks and activities supported by the ITD can be augmented to a large degree by vendor or contract resources.

It should be noted that traditional IT roles (sysadmin, developer, architect) may be delegated to roles on the implementation team, ITD members still have a considerable role to play. They become guarantors of division and state policy, consulting, and overseeing what is directly applied in technology choices. For example, where each vendor may supply a "solutions architect" or "applications architect", Enterprise

Architecture must become the trusted partner for how external architects must construct their solutions. ITD ensures that individual solutions are architected in a way that guarantees organizational policy and technology progress. ITD still maintains an operational role but typically one that is less "front-end" focused. Instead they shift focus to enabling systems integration with enterprise data end-points, loose-coupling, standardizing Application Programming Interfaces (APIs), and roles not readily externalized. These roles include Security, Application Performance Management (APM), Accessibility, Automated Testing, Automated Release Management, and Infrastructure. Thought should be taken to forward these processes within each project release. ITD shifts from an admin-client model to a trusted partner model. From developing and serving the "edge" systems to developing and serving core services.

The Forest Practices operations group will be heavily impacted. This is due to the smaller numbers of resources from which to choose and habituated dependence on shadow systems. There is also a high likelihood that traditional job tasks, which fall under systems workflow, are expected to become the responsibility of FP Online. As they do, other "application administration" type tasks will emerge. Examples include simple Configuration Change, Report building, Customer Helpdesk support, and basic Roles Elevation. Depending on the solution chosen, a new customer facing activity will be ensuring that licenses are primarily assigned to "active" users. This will help control and manage hidden licensing costs.

As the project enters the Planning stage, Forest Practices operations will also have the bulk of the phase activity related to initiation and planning. Significant decisions will be made at this point. An Agile Scrum Product Owner is a strong advocate for customers, stakeholders, and resource demands. That individual will need to plan for resourcing and sequencing the order in which requirements will be met. This will be significantly impacted by the final solution decision. There may be some resource flexibility as the project moves to the implementation phase. However, a single, continuous, and dedicated full time Product Owner is critical to project success. That individual will be the first user of the system, actively doing many of the application administration tasks listed above. The tasks and activities conducted by this group can be augmented to a large degree by vendor or contract resources. The Product Owner role itself should be owned by Forest Practices operations.

The Region office resources play a significant role as Subject Matter Experts (SMEs). They should also be significantly involved in User Acceptance Testing (UAT), which will be closely related to Training. There is no substitute in Agile for involving some subset of SMEs in UAT. This is where the iteratively delivered software begins to become "real" for the business. The Product Owner will be expected to accept each Sprint's body of work as it is completed based on the team meeting Acceptance Criteria. Agile works best when newly accepted software is put in front of real users. Consider selecting individuals that represent all system actors. Allow them to review and use new software functionality, even as a "pre-production" trial. UAT can be leveraged to determine what functions are suitable for the real world, and what design needs to be re-visited.

The requirement in an Agile project for these resources to be available is critical in the planning and implementation project stages. Their involvement in Implementation phases is essential. The constraint for this resource pool is their location and existing workload. Some of this limitation can be managed and will vary to a smaller degree based on the final solution decision. For example, UAT may be conducted remotely with sufficient planning and technical solution design. The tasks and activities supported by this group generally cannot be augmented by vendor or contract resources.

5 Long and Short Term Roadmap Activities

There are four general groups of activities, or phases, that need to be addressed to complete this project. These activity phases will happen across long project stages.

Creating a timeline for these phases can only be an approximation based on rather broad assumptions. The purpose of illustrating this timeline is simply to identify the phases and how they line up with traditional software development stages. Activities from these phases will happen during project stages - Initiation, Planning, Implementation, and Post-Implementation. During an Agile project, expect phased activities to cross traditional project stages. Activities from a given phase may overlap with other activities and be revisited.

The phases are:

Envision and Enumerate
Request for Proposal (RFP) and Response(s)
Product Backlog and Requirements
Implementation and Release

See Figure 1 below. Stages of traditional software development life cycle (SDLC) are vertical columns. Phases of related group activities are horizontal bars.

An approximate relative duration is displayed for each phase. The objective here is not to establish a specific timeline with anticipated start and end dates. Depending on the direction from management, a more aggressive approach or a more measured approach can be employed. This will impact the number and detail of individual activities happening during each phase. Phase durations can be compressed or expanded as needed. The urgency, sizing, staffing, and degree of effort necessary to complete each activity must be decided and worked accordingly. For example, an extended RFP phase would allow for more activities, like proto-typing.

It is important to note that some of these phases can overlap, especially as Agile is a preferred project methodology. A timeline does not, and should not, be a one-way waterfall type timeline. For example, once a Product Backlog is baselined, Sprints and Releases will provide updated project metrics which should be incorporated into additional rounds of re-baselining the schedule. Work can and should begin on requirements and user stories for release one, including implementation of release one. The details for a second release may be revisited once the results of release one are realized. This often results in modified requirements and user stories for Release Two.

Related activities may be grouped together as a Workstream. These groups of activities cross both stages and phases. A good example of this are Usability activities. On the graphic, horizontal pipe bars could be detailed further as additional information is uncovered through some of these activities. That may influence the direction, the what, and how components of the solution are implemented. These will result in changes to the final ready-to-build-requirements and systems integrations that are completed.
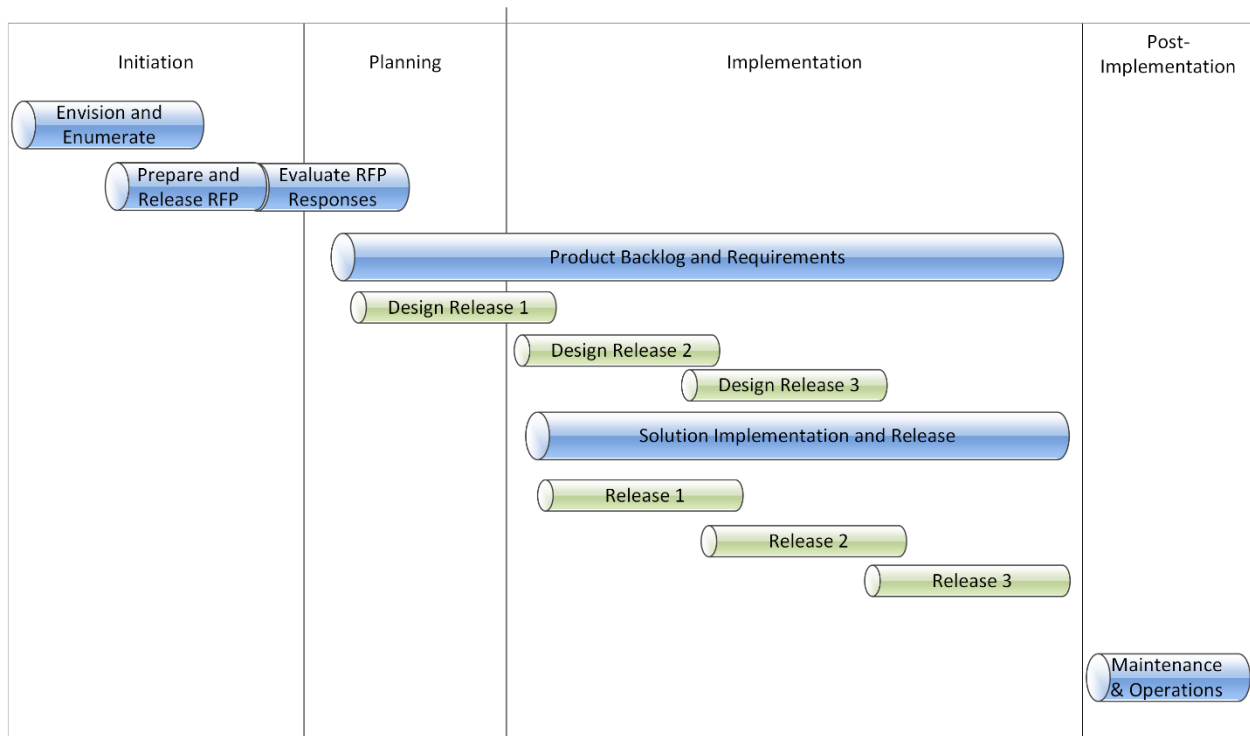
Figure 1 – Implementation Timeline

The diagram of the phases does not provide all the detailed activities that occur in a specific project. It does provide a guide for the type of activities for each phase given the release model.

The groups of activities include:

Phase 1.   Envision and Enumerate

- o   Project Charter or Vision development
- o   Identify specific business goals and funding
- o   Establish project team and roles
- o   Determine Release Strategy
- o   Stakeholder Analysis
- o   Determine Risk Tolerance

Phase 2.   RFP and Response Evaluation

- o   Create Financial Plan (funding and budget).
- o   Create Communication Plan
- o   Create Test Plan

- o Create RFP

- o Establish protype evaluation model

- o Establish agreed solution

- o Contract vendors

- o Establish Staff Management and Resourcing Plan

- o Establish Product Backlog with ITD and contracted vendor input

Phase 3.   Product Backlog and Requirements

- o Establish Product Backlog with ITD and contracted vendor input

- o Finalize details for Release One, Two, Three, etc. Expect iterative modifications to User Stories and Requirements for later releases as work begins on Release One

- o Optionally, build on results of successful prototype.

Phase 4.   Solution Implementation and Release

- o Use multiple Releases to manage risks/costs of implementation

- o Deliver fully functioning, independent solution features per release.

- o Involves design, development (configuration or customization), testing, release, and post-release operations for each release.

Stage: Initiation | Phase: Envision / Enumerate
Activities:

- ▪ Establish project Charter or Vision
- ▪ Identify specific business goals and funding
- ▪ Establish project team and roles
- ▪ Determine Release Strategy
- ▪ Stakeholder Analysis
- ▪ Determine Risk Tolerance
- ▪ Consider Organizational Change Management workstream
- ▪ Consider Usability Engineering and Accessibility workstream

Stage: Planning | Phase: RFP / Response Phase
Activities:

- ▪ Create Financial Plan (funding and budget)
- ▪ Create Communication Plan
- ▪ Create Test Plan
- ▪ Create RFP
- ▪ Establish protype evaluation model
- ▪ Establish agreed solution

- Contract vendors
- Establish staff management and resourcing Plan

**Stage: Planning and Implementation | Phase: Product Backlog / Requirement
Activities**

- Establish Product Backlog with ITD and contracted vendor input
- Release One Construction

**Stage: Implementation | Phase: Build / Release
Activities:**

- Release One Construction
  - Design
  - Testing
  - Training / UAT
  - Turnover from project to support/operations
- Release One Launch
- Release Two Construction
  - Design
  - Testing
  - Training / UAT
  - Turnover from project to support/operations
- Release Two Launch
- Release Three Construction
  - Design
  - Testing
  - Training / UAT
  - Turnover from project to support/operations
- Release Three Launch

**Stage Post-Implementation
Activities:**

- Turnover from project to production
- Provide process documentation
- Release project resources
- Project review and close-out

6   Phases and Activities

As mentioned above, there are several groups of activities, or phases, involved in the FP Online project. Work activities often impact later activities. An important Agile principle is completing "just enough"

detail for the current phase. Work activities are refined with more detail as that additional detail is needed. For example, early Test Planning may specify a preferred percentage of automated Unit Tests based on industry best practices. This plan will need modification as real working software is developed and the underlying technology is better understood within the context of the project's Risk Tolerance and evidence of defects or User Stories not complete. The following list of activities are expected but may not apply by the time the project team enters a particular phase. Expect modification as the project develops.

Envision and Enumerate

Project Initiation often includes the finalization of concepts related to Project Goals, Scope, Stakeholders, and Constraints. Within this phase drafting formal Project Initiation Documents, like a Project Charter, may be beneficial in creating clarity for future activities. For an Agile Project, beginning with a Project Vision is a simpler alternative. This should include the necessary detail to clearly define your project objectives and priorities. Define business objectives of the project. Provide clear connections between these objectives and create specific measurable goals.

Use these documents among Steering Committee and other stakeholders. It's essential at this phase that critical project members have the same vision and shared measurable goals. This will provide the ability to:

- o Identify release strategy, source, and fiduciary stakeholders.

- o Prioritize financial "backers" of the solution over interested parties.

RFP and Response Evaluation

RFP and Response evaluation will be challenging. No one vendor provides a solution capable of meeting current requirements. There will be three major aspects to the procurement activity.

The first is the preparation and release of a Request for Proposal. Based on the information gathered from the Request for Information, there are capabilities in the marketplace that could benefit the project. However, DNR will need to evaluate potential vendors based on how they meet specific sets of functionality, or components of the future solution.

The second major aspect of procurement is the response evaluation. Since this leads to a narrowing of the field of vendors, it is advisable to require a software demonstration. This will create more awareness of vendor capabilities and fit. Software demonstration is a precursor to prototyping. A detailed scoring process that evaluates the solution against the refined requirements, along with other criteria such as interface capability, vendor qualifications, and references, will result in the identification of the best finalists.

The third major aspect of the RFP and Evaluation is prototyping. This may take the form of an extended software demonstration or guest environment. Either way, DNR should use this time to determine the vendors approach to building software. Assess their responsiveness, ability to integrate with current systems, and follow policies. The prototyping should demonstrate that a Software-as-a-Solution (SaaS) option is available and practical. Contractually, this may take the form of an apparently successful vendor developing 1-2 "Sprints" worth of Product Backlog.

Product Backlog and Requirements

The requirements are currently high-to-moderate level requirements. Most are now represented by and directly related to Agile User Stories. This list of User Stories provides a greater degree of personalization and detail about how each requirement shall be considered met, and which system actor expects to perform those functions. User Stories currently have business priority. But they cannot yet be ranked into a proper Product Backlog. Prior to development activities starting, User Stories will need further refinement with the chosen vendor team(s). Product Owner and Development Team need to come to agreement on User Stories around deliverable results, testing, and demonstratable functionality. This agreement is represented by a Definition of Done and an estimate of effort to complete the story. Effort is usually calculated in a generic value called points. We do not recommend estimating in hours or dollars.

It is common to update estimates for User Stories multiple times. There is an initial estimate, then a re-estimate just before the Development Team begins to work to deliver the story's functionality. Initial estimates begin with Development and Product Owner discussing known details. The goal is to create a relative point estimate – it can be as simple as "small," "medium," and "large." Using the Fibonacci number sequence is also common. We recommend working through the stories most important to the Product Owner first. With this information, the Product Owner can order the stories based on importance to the business, complexity, and effort. This is the genesis of an ordered Product Backlog representing priority. At this stage, it is not necessary to estimate and order the entire list of User Stories into an ordered Product Backlog. The ordered (and therefore prioritized) portion of the Product Backlog should represent enough work for the next 1 and ½ sprints.

The final User Story estimate happens before the Development Team beings to work on a story. To provide a more trusted estimate, they may want more detailed workflows, business rules, design diagrams, etc. This additional information should be prepared only for stories expected to be worked on during the next sprint. It is "just in time" type work. Creating detailed User Stories that are not near the top of Backlog runs the risk of re-work, outdated information, and duplication.

Between initial and final estimates, activities necessary for that User Story to be ready for development can be scheduled. These may or may not be done by direct team members. Toward this effort, the development team must continuously estimate the effort of a set of User Stories so that timeline can be established.

User Story refinement should continue until the team achieves the level of detail necessary to support quality development. The level of detail required for early iterations is expected to be higher than later as a team coalesces. It is also likely that additional requirements will be added that were not included in these initial requirements, and that delivered User Stories will influence stories yet to be finalized. If proto-typing is used in the RFP and Response Evaluation, begin the proto-type with an Agile structured team. This will enable DNR to get a feel for how vendor teams will perform and also how they really conduct Agile development.

Not all requirements are created equally. Each requirement should be viewed from the perspective of its significance and benefit – relationship to high-level requirements, stakeholders benefited, business processes improved, technology advancement, laying ground-work for future requirements, and ratio of estimated level of work to delivered functionality. The Product Owner should be the one and only role who authorizes the adjustment of story order ranking in the Backlog. Ultimately, one role and one person makes the final decision about what is built and when.

Solution Implementation and Release

Following the selection of the successful vendor and contract negotiations the actual implementation can begin. Depending on the solution and whether a proto-type was successful, the vendor will have specific approaches and methodologies for implementation. This needs to be evaluated in relationship to any other selected vendor methods and those of other internal teams. A plan needs to be created regarding how to manage the interdependency of team deliverables. For example, a vendor team depending on ITD for API access, or a vendor team relying on Solution Architecture from another vendor's platform, or simply the coordination of project milestones between multiple dependent teams.

If an Agile approach is employed, implementation will occur in stages as iterations of the systems are ready to be deployed. For multiple distributed teams, a "Scrum of Scrums" is a workable approach which does not mandate too much change within a given team. It is a "clearing house" of sorts for respective teams to align their portions of the Product Backlog. For example, one vendor may be working on Mapping functionality while an internal team with other vendor support is configuring workflows and forms which will interact with the mapping. These both need to be delivered to meet the set of User Stories prioritized for a given Sprint. A Scrum of scrums approach allows the project to deliver business functionality that spans multiple software components, which may be the responsibility of different individual teams. Scaled Agile Frameworks (SAFe) Product Increment planning methods are also recommended.

Just because a development sprint is complete and tested, it should not automatically be assumed that the iteration's functionality will be released immediately, especially when replacing existing functionality. Instead, expect an implementation strategy that allows multiple sprints to be part of one release. This should be connected to Communication and Training. Identify what parts of the organization will need to change, how they are impacted, how that impact relates to other groups or systems, and make sure they are ready for the implementation and change. Multiple sprints or releases may be queued up in a UAT environment waiting for launch.

Since this will be an enterprise-wide solution, a robust communications program should be implemented to keep all current and future participants apprised of the project direction, status, and impact on the organization.

Ongoing Maintenance and Operations

As the project matures and the implementation timeline has been established, ongoing maintenance and system operations activity will be necessary to determine how, when and under what structure the maintenance of the new solution is provided. It may include how the day-to-day operation of the solution will be managed and executed, incorporating how future maintenance will be provided. Making Sprint Review and early technical knowledge transfer part of the regular cadence of the releases will assist in this.

Developer/Programmer

- Design, develop, test, and deploy application/system modifications to meet business requirements using established development standards for the purpose of system defect resolution or agreed enhancements;
- Analyze system problems to determine cause and make required software changes to resolve problem(s);
- Analyze, review, and alter the application/system to increase operating efficiency or adapt to new requirements;
- Provide knowledge transfer and training to persons identified by DNR for the ongoing support and maintenance of FP Online;

Tester

- Coordinate testing through all cycles for new functionality, updates, fixes and/or upgrades;
- Assist with the Quality Assurance of new functionality and system enhancements;
- Assist with documentation of the system;
- Collaborate with technical staff to monitor change requests and their prioritization;
- Coordinate communication of changes to ensure the correct information is distributed;

7   Roles and Responsibilities

There are roles that are critical to the success of the FP Online project. There are other roles that could be very valuable to the project but are not required. The critical roles, with a definition of the responsibility, are listed under the Primary grouping below. The other roles, with a definition of the responsibility, that may be considered but not required, are listed under the Secondary roles.

It is possible to combine certain roles. For example, the training manager may also write and deliver the actual training. Some roles are best filled from specific groups. An example is the best trainers are generally from a business unit and are a SME for that feature or function.

The availability of resources is a critical factor not only in the determination of what roles are included in the project but also what responsibilities will be included in each role. The Project Sponsor and Project

Manager will need to make decisions on how each responsibility will be handled based on what resources are available to the project.

Primary Project Role	Responsibility	Percent of FTE Committed to Project
Executive Sponsor	Person ultimately responsible for project, approves scope and deliverables, provides funding	5%
Steering Committee	Group leadership for project, resolves issues brought forward by Project Sponsor	Not billed on project time
Project Sponsor	Person who makes business decisions for project, is a major champion and resolves issues and changes, makes user resources available	5%
Project Manager	Person responsible for overall delivery of the project	100%
Quality Assurance Manager	Person responsible for defining the QA strategy, implementing reviews, reporting results	20%
Organizational Change Management Analyst	Person responsible for identifying skills match, need for training, communicating readiness for change activity	20%
Training Team Manager	Person responsible for training approach, oversight of development of training materials, oversight of training delivery and effectiveness	20%
Trainer	Person responsible for performing the training delivery for the new features as defined in the training plan	20%
Technology Resources Manager	Person responsible for identifying technical resources, monitoring availability of technical resources, escalating technical resource issues to Project Manager	Not billed on project time
Lead Developer	Person responsible for overseeing assigned developers and code meets standards	100%
Developer	Person involved in the configuration and coding of the system	100% x2

Test Lead	Person responsible for oversight of assigned testers, creation of test scenarios, validation of test results to requirements	20%
Tester	Person responsible for creating and executing test scenarios, validates results to requirements	50%
Business Analyst	Person responsible for providing business analysis of processes, develops business requirements/user stories, active participant in unit, system, and regression testing	50%

| Secondary Project Role	Responsibility	Percent of FTE Committed to Project
Contracts Manager	Person responsible for managing all contracts relative to the project, report contract performance and resolve contract issues	Not billed on project time
Budget Manager	Person responsible for managing all aspects of project budget, reporting on budget status	Not billed on project time
Implementation Project Manager	Person responsible for developing implementation strategy, directing, and report implementation status and results	33% (Note: This role might also be combined with the Project Manager role)
Lead Data Engineer	Person responsible for leading data engineers and approves database and/or other data repository architectures	10%
Data Engineer	Person responsible for developing, constructing, testing, and maintaining architectures such as databases and large-scale data processing systems	20%
Solution Architect	Person responsible for defining service architecture of project, align technology to enterprise architecture	10% (Note: This role might also be combined with the Lead Developer role)

8   Release Options

Currently, FP Online is comprised of 330 User Stories representing 104 functional requirements. User Stories have been categorized into 9 "Themes" based on related functionality. Approximately 80% of these requirements were rated "Mandatory" by the business. Nearly all User Stories were rated highest priority by the subject matter experts. Rather than sequencing based on traditional "Mandatory" or "Should Have" we recommend sequencing work based on analysis of the related functions. This can be projected now but must be re-visited once the RFP and Response phase is complete.

A sustainable Product Backlog can only be accurate when created and agreed to with the Scrum Development team. The tables below are intended to provide guidance in charting a course with that team. The body of 330 User Stories may be merged, divided into smaller stories, or revamped in light of project team choices once implementation beings. Currently, an individual User Story may exist in multiple themes. The tables below count stories by theme, not just number. One story may exist in both categories. The difference between unique user stories and categorized user stories reflects the complexity of the intended system. While there are 330 distinct stories, for purposes of estimating work to complete all the stories in a given category, there are 458. Work to complete a given story may change the count in each category it affects.

Reviewing the User Stories and capabilities of the potential vendors, this is the order of approach we would recommend based on the results of RFP.
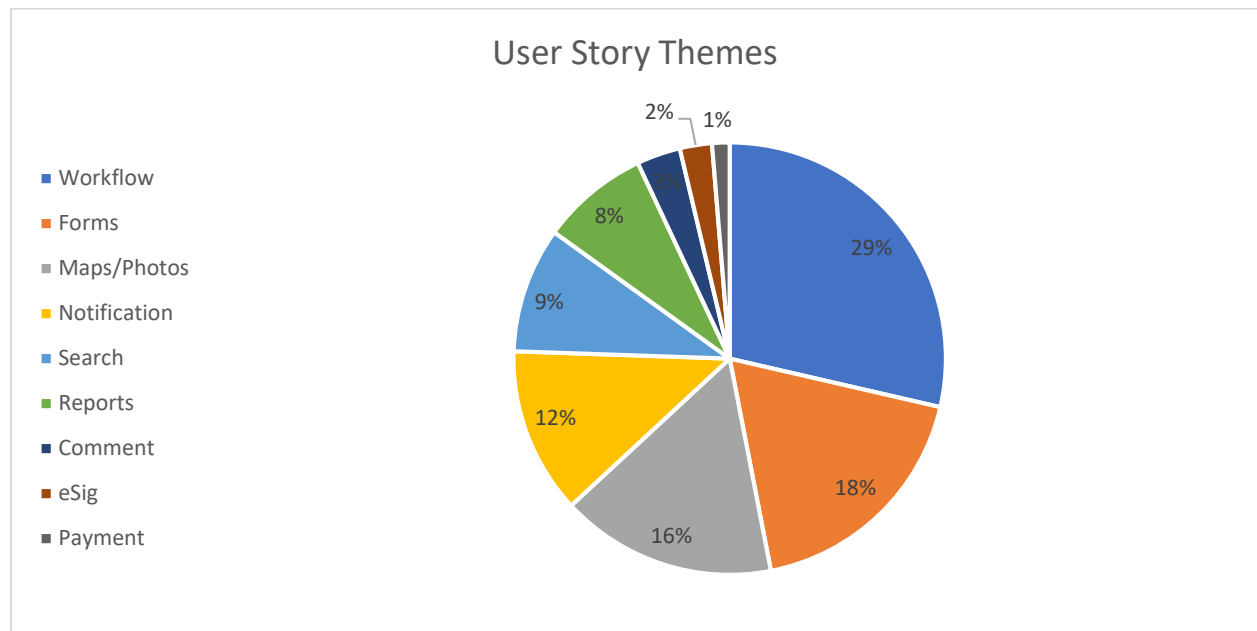
Option One – Forms/Workflow experienced vendor

Themed Stories			Release One	Release Two	Release Three
Workflow	**131**		60	31	40
Forms	84		40	20	24
Maps/Photos	74		5	30	39
Notification	57		15	25	17
Search	43		5	20	18
Reports	37		10	10	17
Comment	15		3	3	9
eSig	11		2	8	1
Payment	6		2	4	
Total by Theme	458		142	151	165

Option Two – Mapping/Attachments experienced vendor

Themed Stories			Release One	Release Two	Release Three
Workflow	131		20	50	61
Forms	84		14	30	40
Maps/Photos	74		45	15	14
Notification	57		5	15	37
Search	43		15	15	13
Reports	37		10	10	17
Comment	15		3	3	9
eSig	11			5	6
Payment	6		6		
Total by Theme	458		118	143	197

Option Three – Multi-vendor implementation

Themed Stories			Release One	Release Two	Release Three
Workflow	131		61	50	20
Forms	84		40	30	14
Maps/Photos	74		35	25	14
Notification	57		5	15	37
Search	43		5	10	28
Reports	37		3	10	24
Comment	15		3	3	9
eSig	11		2	5	4
Payment	6		2	3	1
Total by Theme	458		156	151	151

9 Estimated Costs per Release

Working with the numbers above we are providing a breakdown of estimated costs applied to major areas of functionality which follow the grouping of User Story Themes. These system "components" will be built iteratively over multiple sprints, which should be grouped into major releases. For this analysis, we are estimating three major releases, each with four sprints of one month duration. This will make cost estimates comparable over a 12 month period. In actual practice, we recommend more sprints that are shorter in length once implementation begins. This allows a team to quickly measure progress.

The approach to this estimation is based on analysis of user stories and estimated costs from Deliverable 4 Options Analysis, Appendix A. For the purpose of this estimation, we are focusing on the above "Option 1-Forms/Workflow experienced vendor "with the following approach.

- Calculate percentage of a given functional area's User Stories to the existing complete story listing. *This is a reasonable substitute for Agile "Effort", usually calculated in points. Effort cannot be calculated without the actual Agile Development team's input. Expect this number to change.*

- Apply that percentage to the Hourly Rate Project Cost Estimate and Annual Cost for two DNR Staff. Including standard practice for reserve funding of 25%, this comes to **$1,281,000**. This budget target reflects the FTE costs for Sprints/Releases (+25% reserve). Note for Option 1, this indicates two FTE provided by likely vendors and two DNR staff.

- Using the build approach in Option 1 as a model, review stories per component per release, calculating the cost and percent complete for each major area of functionality.

- Adjust estimates based on Treinen's build and implementation experience as needed.

Areas of Functionality	Percent Total Stories	Estimated Costs	R1 Cost (% Complete)	R2 Cost (% Complete)	R3 Cost (% Complete)
Workflow/Notification	41	$443,210	$177,284 (40%)	$132,963 (70%)	$132,963 (100%)
Forms/Comments	21	$227,010	$97,614 (43%)	$54,482 (67%)	$74,913 (100%)
Electronic Signature	2	$54,050	$9,729 (18%)	$38,916 (90%)	$5,405 (100%)
Payments	2	$108,100	$37,835 (35%)	$70,265 (100%)	-
Mapping	16	$172,960	$12,107 (7%)	$70,914 (48%)	$91,669 (100%)
Reports	8	$86,480	$23,350 (27%)	$23,350 (54%)	$39, 781 (100%)
Search	9	$97,290	$11,675 (12%)	$45,726 (59%)	$40,862 (100%
Totals:		$1,189,100*	$369,594	$436,616	$385,593

*Note – This figure of $1,189,100 demonstrates that after analysis, the proposed build estimated costs fall within the 25% cost over-run buffer established by Options Analysis. Some budget should be reserved for as yet undiscovered User Stories.