

Phase II Final Recommended Solution Report

Second Project Deliverable for:

**Pesticide Permitting and Use Reporting IT System Analysis and
Recommendation Project**

Presented To:

**California Agricultural Commissioners and Sealers Association
And California Department of Pesticide Regulation**

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1. Recommendations Overview

This report is the second deliverable of the pesticide IT recommendation project, the work product from Phase II of the project. Phase I concentrated on gathering information from state, county, and private vendor stakeholders in order to make findings on user needs for pesticide IT software applications, as well as circumstances surrounding governance, funding, and characteristics of the two incumbent software system vendors and their products. The Phase I Needs Assessment report concluded with a discussion of potential strategies to select a vendor, design and implement a software system, provide funding, and perform oversight on a single 58 county pesticide IT solution.

As this project was envisioned originally, the purpose of Phase II was to select one of the incumbent systems (either AgGIS developed by Patrick Way Consulting, Inc. or RMMS developed by Streamline Business Solutions, Inc.) to be designated as the preferred system for future deployment in all California County Ag Departments. Based on several of the findings in Phase I, the *geographIT, Inc.* consulting team became convinced that the agencies directly responsible for pesticide IT – CACASA (California Agricultural Commissioners And Sealers Association) and California DPR (Department of Pesticide Regulation), as well as management and staff within county Ag Departments – would be better served by charting a slightly different course for this project and the general direction of pesticide IT implementation.

This new direction was discussed at a March 27, 2009 meeting attended by *geographIT* and all members of the CACASA Pesticide IT Consultant Committee which is overseeing this project. The recommendations herein reflect *geographIT's* analysis of Phase I findings and strong input from the project Committee.

Key recommendations detailed in Sections 2 – 4 of this report are as follows:

- 1) Conduct a competitive Request for Proposals (RFP) process to select a vendor that can most effectively deliver the system functionality, cost effectiveness, and system sustainability required of a 58 county pesticide IT solution. Develop a formal System Requirements Specification as an RFP supplement to inform potential vendors about the scope of work.
- 2) As the first contract deliverable, require the selected vendor to prepare an industry standard Technical Specification describing all design details of the system they intend to build, deploy, and maintain.
- 3) Designate that CACASA, within its existing leadership and committee structure, will assume control of contract administration, funding, and program oversight for all contracted pesticide IT products and services.
- 4) Conduct a budget analysis in conjunction with the IT vendor selection process that identifies sources and amounts of funds necessary to support all near and long term activities associated with pesticide IT in a manner that is predictable and sustainable.

Sections 5 and 6 of this report contain narrative descriptions of the expectations a 58 county solution and its vendor should meet, as well as brief evaluations of how the two incumbent vendors' systems are faring relative to those expectations.



2. System Selection Strategy

There is broad agreement that Ag Departments need a pesticide IT solution that achieves the best combination of functionality, cost effectiveness, and long term sustainability. Obviously, these objectives depend on characteristics of both a vendor and of the software products they offer. Perhaps less obvious is that the approach used to evaluate and select a system can itself influence the ultimate quality and effectiveness achieved by the selected system.

Several key findings from Phase I of this project were instrumental in determining the best way to structure a system selection strategy. Those findings include:

- A) Functionality: Based on an independent investigation considering a comprehensive set of user needs criteria, neither of the existing systems (AgGIS and RMMS) could be declared clearly superior in terms of functionality.
- Both systems are incomplete, resulting in significant gaps between what each system offers and what is needed in a statewide 58 county pesticide IT solution.
 - For the most part these gaps are different for each evaluation criterion, meaning that a system that is superior in some areas is deficient in an equal number of other areas, making it difficult to compare the two systems on overall functionality.
 - Users generally express satisfaction with whichever system they currently have. That has created a perception that each county's needs are best served by one particular system. But the number of counties whose system choice was based on performing a functional comparison, and the number of individual users knowledgeable about both systems are both extremely small. Therefore, user satisfaction may be primarily a function of resistance to change based on exclusive familiarity with one system, as well as the patience or ingenuity of users to surmount the functional shortcomings of their current system.
 - While the diversity of situations surrounding pesticide use and reporting is broad, it does not follow that one system cannot cover all the bases. Either one of the existing systems could be built out to provide a 58 county solution – the biggest unanswered question is, for what cost?
- B) Cost Effectiveness: More than enough money has been spent since 2000 to have a fully functional pesticide IT system in every county, but that hasn't been accomplished yet. This issue needs to be addressed by changes in funding oversight as well as the system selection strategy.
- Inconsistent and unpredictable IT funding at times has forced counties to seek out unconventional funding sources and required vendors to pursue inherently inefficient marketing and contracting strategies with individual counties.
 - State funds were spent unproductively on planning for the never implemented Statewide Pesticide Use Reporting System (SPURS).
 - A consistent funding source was established with the 2006 Memorandum of Understanding between CACASA and DPR (the residual mill assessment fund), but



the money has been spent equally on two systems designed to fulfill the same basic functional requirements, and without the oversight and competitive incentives needed to maximize the value returned.

- Oversight of the residual mill fund needs to be improved in order to better account for the levels of service being purchased in terms of software product features, performance, and technical support. Current accountability controls on expenditures are not sufficient to make a cost-to-value comparison of the two systems as they currently exist, nor is it clear exactly what enhancements will be purchased with money that has been allocated but not yet spent.

C) Sustainability: Besides long term predictable funding, sustainability considerations include the technical scalability of a software system over time as needs expand and technology changes, and the ability of a software vendor to provide long term support.

- Vendors have primarily focused on meeting immediate, user-driven needs. This places opportunities to address plans for future scalability and innovation in the background. The system selection process should be designed to give vendors a chance to describe their approaches in these key areas.
- Both existing vendors have small staffs either at or close to 100% committed to the development and support of pesticide IT. Current staffing is adequate to support their respective customer bases, but the transition to a single 58 county solution will require additional staff, particularly in the first year or two.
- After the selected system is built to meet all initial functional requirements, revenues will decline to levels required to meet technical support commitments and an undetermined, but presumably modest, amount to fund ongoing technical upgrades. This means that the selected vendor will require an already broadened client base or the capability to pursue and secure new projects outside the realm of pesticide IT in order to retain staff and maintain business viability.
- In order to mitigate the risk of a vendor being unable to meet its contractual obligations, and to guard against being charged excessive (non-competitive) rates for service, CACASA must secure full ownership and reuse rights for all custom software that public funds (from CACASA, its member counties, and the State of California) have paid to develop and support. This is necessary to smooth the transition to a successor vendor if a change is warranted, without having to build an entirely new system from scratch.
- Neither vendor has been required to demonstrate industry best practices regarding technical and design documentation such that their system could be seamlessly transferred to another firm for on-going support or upgrade. Sustainability requires sufficiently detailed technical documentation so that it is always a realistic possibility to transition to another firm smoothly and with little disruption in service through a competitive process.



2.A Recommended Strategy Overview and Rationale

The selection strategy alternatives identified during this project (Section 10 in the Phase I Needs Assessment Report) can be broken down into three categories:

1. Retain both existing systems, deployed as is in approximately equal numbers of counties. This is essentially a “no action” alternative.
2. Choose one of the existing systems to fund and deploy in all counties based only on Phase I findings. This is a non-competitive choice alternative.
3. Conduct a supplemental process to solicit and evaluate proposals from the existing vendors and, optionally, from qualified non-incumbent vendors. This is a competitive choice alternative.

The rationale for choosing or not choosing each of these alternatives is summarized below.

Alternative #1 – “No Action”

In the Phase I report this is referred to as “Scenario F.” It constitutes the default status quo if system selection recommendations arising from this project were not accepted and implemented. At one time it was put forth by the consulting team as one of the possible “Options” to be actively pursued, but feedback from the CACASA and DPR members on the pesticide IT Consultant Committee demonstrated a clear lack of support for rationalizing and maintaining the status quo. The primary reasons for its rejection are:

- *Financial* – The practice of spending money redundantly to create duplicate functionality in two different systems must cease. Nothing can be done to recoup past expenditures, but significant savings can be realized over time by going forward with funding that is sufficient to build and maintain a single system.
- *Functional* – With two systems, information exchange between counties operating different systems is compromised. This issue is manifest now in buffer zones along some county boundary areas, and is likely to become more important over time as spatial data in particular come into broader use and converge on uniform standards.
- *Standards* – Two application standards create inefficiencies in the increasingly important interfaces with third party grower management software applications and with DPR.
- *Cohesion* - Some of the bargaining and decision making associated with supporting two systems has been divisive within the Ag Department community. Cohesion is also undermined when advances appear in a system but can only be enjoyed by the fraction of the community using that particular system.



Alternative #2 – “Non-competitive Selection”

In the Phase I report this is referred to as “Option A or B.” It is essentially the course originally envisioned for this project, in that one of the incumbent systems would be picked to become the standard in all counties – with the selection assisted by independent review and evaluation by *geographIT*. The primary reasons for its rejection are:

- *System Parity* – Neither AgGIS nor RMMS emerged as clearly superior overall despite a wide ranging investigation of system functionality and vendor capabilities. Some positive and negative characteristics were expressed equally in both systems, and in cases where differentiation was evident, strengths and weaknesses in the two systems tended to cancel one another out.
- *Financial* – The information needed to evaluate existing systems based on value (capability obtained per dollar spent) was incomplete and difficult to analyze. Also, picking one system without a solid idea of future costs would establish a de facto monopoly in which the vendor retains too much negotiating leverage.
- *Functional* – Both vendors have had trouble meeting schedules for delivering functional enhancements. This will not change without additional incentives, controls, and oversight – all of which are difficult to enforce unless established in advance as part of the process used to designate a single vendor.
- *Fairness* – The competition between incumbent vendors has not been effective in a true business sense. They don’t compete on price because they have been able to establish their own price in terms of what they will do for the money that is allocated. They are also effectively locked into separate markets because counties have no financial incentive to switch systems. These are examples of “rules of the game” that must be changed in order for CACASA to get maximum value for its future IT investments. It would not be equitable to either vendor if the rules were changed without fair warning and the opportunity to compete for all county Ag Department business under the revised rules.

Alternative #3 – “Competitive Selection”

In the Phase I report “Options C and D” both envision a competitive process used to select the best system. This is the recommended strategy because it conveys all the advantages of going forward with a single system, but without any of the disadvantages associated with a non-competitive selection process weighed down by incomplete information and lacking the controls needed for effective future oversight.

Basic elements of this alternative include:

- a) Develop a Request for Proposals (RFP) that thoroughly describes what is expected from the pesticide IT system (based on criteria identified during this project as well as a formal technical requirements specification), and that asks vendors to describe their technical approach, schedule, implementation plan, and compensation required to meet these expectations.



- b) Draft a sample services contract with conditions the winning respondent is expected to meet. In addition to boilerplate contractual requirements, these conditions should include:
- Binding the winning contractor to its cost estimate and schedule (with performance incentives and/or penalties for non-performance),
 - Conveying all software ownership and reuse rights to CACASA,
 - Requirements to provide comprehensive “as-built” technical documentation of their system architecture, database schema, process logic/data flow, and source code following industry best practices,
 - Requirements to follow specific project management and status reporting procedures to facilitate contract oversight.
- c) Distribute the RFP, sample contract, and essential background materials to the existing vendors and make it openly available as well to other firms offering custom software development and systems integration services (*geographIT* excluded).
- d) Provide a reasonable period of time for vendors to have questions answered, receive supplemental information (if needed) and prepare responses.
- e) Develop and execute a rigorous proposal evaluation process including scoring and weighting methods used to quantitatively rate and rank RFP responses.
- f) Award the single system pesticide IT contract to the vendor with the winning proposal.
- g) Manage the implementation and deployment lifecycle.
- h) Maintenance contracts will be renewable and of three to five years duration. Optionally, periodically re-bid the ongoing lifecycle maintenance contract to ensure cost competitiveness and adequate levels of support.

The difference between Options C and D is that one would invite only the incumbent vendors to submit proposals (Option D) and the other would expand that to also solicit proposals from new vendors who would build a new system from scratch (Option C).

There is some uncertainty about the level of interest among outsiders to compete against two incumbent vendors, and about the additional effort needed to evaluate outside proposals on a par with proposals from the incumbents. However, the solicitation of proposals from any qualified vendor (excluding *geographIT*) is recommended, because it would be a mistake to allow untested assumptions about the market to preclude viable and attractive solutions that may exist. For any outside vendor to prevail, they would still have to meet the same expectations as an incumbent vendor and also convincingly demonstrate superior cost effectiveness, functionality, or innovation.

The primary advantages of the competitive proposal recommendation are:

- *Financial* – An open competitive process is the only way for CACASA to ensure that it is getting the best possible value for its pesticide IT investment.



- *Functional* – The fastest way to deliver the universal functionality needed in a 58 county solution is by setting a clear and binding standard, establishing the oversight needed to monitor compliance, and allowing vendors to give their best price for meeting those standards within a defined time frame.
- *Fairness* – As described above, selection Alternative #2 would have set up a “shadow competition” between existing vendors (based only on past performance) without giving them adequate opportunity to build the best case for themselves going forward. Since CACASA wants to establish new conditions regarding (among other things) oversight, predictable costs, and software ownership, it is only fair to allow vendors to propose their own responses to those conditions.
- *Sustainability* – The vendor that emerges from this process with the contract award will have demonstrated the business skills needed to survive in a competitive environment. Since the money spent on pesticide IT will not, by itself, be enough to sustain any vendor’s enterprise over the long run, it is critical for CACASA to employ a process that reveals a vendor’s ability to compete for new business with other clients.

2.B Selection Process Tasks

Competitive selection process tasks are listed on the previous two pages in bullets a) through f). The very first task, though, is to develop a detailed process plan and schedule to be followed. A workable schedule can best be determined by working backwards from the earliest possible, yet realistic system implementation timeline. Key points affecting the implementation timeline include:

- System stability during permit issuing season (December through February in almost all counties) is of paramount concern.
- Ideally, those counties transitioning to a new system will have that system in place for at least two months prior to permit season in order to train personnel, work out any post-installation hardware and connectivity issues, and gain some on the job familiarity with the system.
- The need to complete a detailed technical specification (including both system requirements and system design) prior to commencing development work. There are a few different ways to incorporate this requirement into the selection process and they are described below under the Technical Specifications Requirement heading.
- In order to make the transition as smooth as possible, it is best if the system is as complete as possible (meaning that it fulfills all statewide functional requirements) before it is installed for the first time in a transition county. To install a system version that is incomplete (or poorly documented) and needs a major upgrade the following year would unnecessarily prolong the transition.



- Even if a system selection was made today, there are significant development tasks required before either of the existing systems could meet the expectations listed in Section 5 of this report. The amount of work required is more than the incumbent vendors could realistically finish in time for the start of the 2010 permit season.
- If one of the incumbent systems is chosen, the vendor must be prepared to complete new installations in half the counties and upgrade installations in the remaining counties. If an outside vendor is chosen, new installations would occur in all counties. In either case, all of these installs should be completed by the end of October prior to the first permit season with the selected system.

Technical Specifications Requirement

There hasn't been much prior discussion about the need to prepare technical specifications in advance of an enterprise software development effort, so an overview is included here because this requirement has significant schedule ramifications for both the selection process and system development timelines. There are several ways to fulfill this requirement, as outlined at the end of the discussion.

What are Technical Specifications?

Technical specifications are to a software application system the same as blueprints are to a building. A complete set of technical specifications includes both System Requirements Specifications (SRS) and System Design Specifications (SDS).

“Requirements” refer to the functions and capabilities from the application consumer perspective. It defines, in great detail, exactly *what* the system must be capable of doing in terms of data or user inputs, business processes, and outputs. The SRS documentation breaks each task the software has to perform down into component parts, describes key interdependencies and constraints, identifies inputs and outputs, etc. The SRS does not address solutions, designs, or specific technologies. A complete SRS enables the customer to perform a comprehensive audit to determine if all of the user and system requirements have been fulfilled as part of the final system acceptance process.

“Design Specifications” describes *how* the Requirements will be implemented. It includes detailed technological architecture, logical and physical database designs, interface layouts, data input forms, software modules, process logic and data flows, and output products such as maps, reports, charts, etc. that get written into software code. A Design Specification cross-references each element in the design to the corresponding user and/or system requirements in order to confirm through audit that all requirements have been addressed. The Appendix of this report is a document that more completely describes what SRS and SDS documents include and what they are used for.

Why are they Important?

The primary benefit of technical specifications (like blueprints) is to make the software construction process more efficient and to think through the design in order to improve application quality. Also (like blueprints), any competent software developer can take



a detailed design and build the actual application code. Furthermore, specifications serve as a punch list to track software development progress, comprise the backbone of user documentation, and provide a permanent record for what was built in a more accessible form than raw code - though it's still necessary to update design specifications as modifications are made during "construction" in order to have a complete as-built design specification in the end.

If incumbent vendors had prepared as-built specifications (even after the fact) it would have greatly assisted this project's evaluation task and would have made it possible to have better oversight prior to this. Since one of the main objectives in this project is to learn and recover from past mistakes by essentially "resetting" the system, it is fairly critical to follow solid software development protocols, regardless of whether an incumbent or outside vendor is selected to provide the 58 county solution.

Who prepares them and when?

Requirements Specifications come first and can be prepared by anyone with appropriate skills and experience. Some of the Phase I work for this recommendation project could be considered a rudimentary SRS, but there is not enough detail or enough bases covered yet for that work on its own to become the basis for Design Specifications.

The SDS can also be prepared by any qualified software development firm, but as application complexity increases, it is more advantageous to have the same firm do both design and development. Typically, many different technologies and system architectures can be proposed to architect and design a system that meets all the user and system requirements, and this is where innovative software firms can demonstrate how their technical approach is superior to others.

What are the options and ramifications?

The three best options for preparing the SRS and SDS are as follows:

Option #1 *Make SRS part of RFP creation; selected vendor will be awarded contract for SDS, development and implementation.*

Advantages:

- Gives respondents better information to refine proposals
- Allows requirements to be prioritized before proposals come in

Disadvantages:

- Delays RFP release by 8-10 weeks (but may save time overall)
- Less potential for synergy between SRS and SDS when done by different vendors

Option #2 *Contract award includes SRS, SDS, development, and implementation*

Advantages:

- RFP can be released sooner
- Greater chance for synergy between SRS, SDS, development

Disadvantages:

- Less information for RFP respondents



- Requirements can't be prioritized in advance, leading to greater likelihood that development and implementation costs must be renegotiated after SDS is complete and priorities set
-

Option #3 *One RFP for SRS and SDS only, subsequent RFP for development, and implementation*

Advantages:

- First RFP can be released sooner
- Greater chance for synergy between SRS and SDS
- Second RFP has sufficient technical information to require responding firms to provide fixed price cost for full implementation and maintenance in all 58 counties.

Disadvantages:

- Two RFP processes lengthens overall process by at least a few months
 - Possibility of different vendors for design and development
-

Note that an additional advantage of all three options (or any option that includes SRS and SDS being done by someone at any point) is that it helps to level the playing field between incumbent and outside vendors. The SRS and SDS provide the objective yardstick for exactly what is being proposed and how it will be built. Without this, it is difficult to measure how well each existing solution meets all of the needs for a 58 county solution. And, because the incumbent vendors have never submitted a comprehensive SRS or SDS for their respective solutions, they could very well leave this critical level of documentation out of their proposals unless it is required.

Recommendation: Option #1 Because it balances the combination of providing better information to RFP responders, saving time, and introducing fewer complications into the contract award and negotiation process. The timelines and tasks described below assume that a comprehensive System Requirements Specification will be prepared as information to include with the RFP.

All of the preceding considerations in this section point to October 2011 as the most realistic date to complete new and upgraded system installs in time for the 2012 permit season. In order to allow at least 18 months to design, develop, and test the selected system, and another five months to perform and test installations, the selection process must be finished by November 2009, about seven months from the date of this report.

This is considered an ambitious pace to complete a proposal solicitation and evaluation process for an enterprise software development project of this magnitude, particularly one that includes a formal SRS. The extensive groundwork already accomplished during Phases I and II of this recommendation project will make it much easier to meet this schedule.



The three main parts of the selection process are:

1. Preparation of RFP (including System Requirements Specification), sample contract, and other proposal information documents.
2. Publish the RFP, answer respondent questions, await vendor responses.
3. Evaluate responses, conduct finalist interviews, make selection, and execute a contract.

RFP and SRS preparation will require no less than 14 weeks, leaving seven to eight weeks each for parts 2 and 3. Some key considerations and subtasks for each part of the process are outlined below:

1. Prepare proposal information documents

Duration: 14 - 15 weeks

Subtasks:

- Create proposal solicitation task plan and schedule
- Conduct research and interviews to investigate System Requirements
- Create System Requirements Specification
- Draft RFP
- Draft contract language
- Assemble background information documents
- Determine evaluation procedure and high level scoring methodology
- Create list of vendors and announcement sites to which RFP will be distributed

Considerations:

- ⇒ Higher quality RFP responses are much easier to evaluate efficiently. Publishing comprehensive, detailed, and unambiguous proposal information documents increases the chances for higher quality responses.
- ⇒ Defining the exact structure that respondents must follow when preparing technical and cost proposals and schedules helps to streamline the evaluation and comparison process. Including the full System Requirements Specification (SRS) as well as major portions (or even all) of the recommendation project's Phase I and II reports as supplemental information will eliminate a considerable amount of guesswork for vendors during proposal preparation.
- ⇒ The recommendation to invite proposals from non-incumbent vendors makes a technical specification (SRS and SDS) requirement more critical in order to provide parity with incumbent vendors who are already familiar with the organic (undocumented) requirements and undocumented design of their respective systems and would presumably continue to avoid creating a technical specification if it was optional.



- ⇒ At some point prior to proposal evaluation, CACASA/DPR should have budget numbers in mind for both short term development/deployment and long term support. However, it is not mandatory for budget information to be disclosed to RFP recipients. There are arguments both ways on whether disclosure is beneficial or not, and a decision on that will have to be made. If a budget is not disclosed, the financial information in the Phase I report on past pesticide IT expenditures should give RFP respondents a good idea of the funding support that may be available.
- ⇒ The RFP should specify a preferred implementation timeline (e.g. all deployments complete by late October 2011 as described above), but vendors should be offered flexibility to propose an alternative timeline and/or phased deployment if they believe it would lead to a smoother or less costly transition. It should be made clear, however, that evaluators may penalize any proposed timeline extension to the extent it would prolong any increased system support costs for existing systems.
- ⇒ The desire to attract the attention of non-incumbent vendors must be balanced against the possibility of receiving a large volume of lower quality, “shot in the dark” responses. Therefore, outlets where the RFP will be announced should be carefully targeted, and emphasis placed on informing the likeliest of qualified responders such as companies who expressed interest in this recommendation project (including those that withdrew upon learning that the recommendation consultant was prohibited from performing any system development work).

2. Publish RFP, Responses prepared by vendors

Duration: 7 - 8 weeks

Subtasks:

- Post the RFP, SRS, sample contract, and other supplemental materials on the web
- Announce RFP release to incumbent vendors, pre-selected likely respondents, and targeted proposal information outlets.
- Prepare answers to anticipated pre-bid questions
- Hold a pre-bid Q & A event (physical meeting, virtual conference, or both at once)
- Distribute answers to pre-bid questions
- Develop a detailed evaluation scoring system with criteria rating and weighting.
- Create preliminary list of questions to be asked at shortlist interviews.

Considerations:

- ⇒ The time needed to complete the entire process has been compressed by making preparations for the evaluation task (e.g. detailed scoring methodology) while vendors are writing proposals.
- ⇒ If short and long term budget targets have not been established by this time, they must be established now so that cost proposals can be compared to funds available.



3. Evaluate responses, select a vendor

Duration: 7 – 8 weeks

Subtasks:

- Record proposals received by the deadline, provide receipt confirmation to senders.
- Begin first cut evaluation to eliminate non-responsive and least attractive proposals – those with clearly no chance to win.
- Have reviewers individually score and rank proposals still in the running. Use the scoring system that was developed.
- Based on preliminary rankings, make a determination whether a short list and vendor interviews are warranted, and how many vendors to shortlist.
- Contact vendor references to gather additional information to share with all reviewers, and have all reviewers discuss their preliminary scores.
- Reviewers revise and refine scores as needed based on reviewer discussion and new information. Compute final pre-shortlist scores and ranks.
- If a short list and vendor interviews are warranted, notify senders of the top proposals that they are short listed and schedule interviews. Notify lower ranking senders that they will not be selected.
- Conduct shortlist interviews, reviewers discuss and revise scores once again after hearing from all short listed vendors.
- Compute final scores and ranks, select highest ranked proposal for contract award.
- Notify the winner and all others on the short list of the final selection results.
- Negotiate terms of the final contract with the selected vendor.

Considerations:

- ⇒ Review and score the qualifications, technical approach, deliverables, and schedule first so the most qualified technical proposals are clearly identified. Then, rank the cost proposal as a separate process in order to compare the highest ranked technical versus cost proposals.
- ⇒ When deciding whether to create a short list, and how many vendors to include on it, factors to consider are whether certain systems rank consistently high among reviewers, and how close together the highest ranking proposals are to one another. Unless there is unanimous agreement that one proposal is far and away superior, then a short list with interview is called for.
- ⇒ In deciding how many to include in a short list, only go down far enough in the rankings to include those whose interview performances could raise them to the top.

2.C Ramifications for the Current System Recommendation Project

If the recommendation to conduct a proposal solicitation process is accepted by the CACASA membership, it will constitute a change in the recommendation project scope that requires renegotiation. The *geographIT* consulting team has been asked to prepare a tentative, not to exceed cost estimate to provide significant assistance with the tasks outlined in the preceding Section 2.B. This estimate will be made available prior to April 28th, 2009



when the CACASA membership votes on whether to authorize a proposal solicitation process and renegotiate the scope of the recommendation project accordingly.

The practical effect of this change is that an additional step is inserted into the project. The original scope assumed that the task following this recommendation report would be to develop an implementation plan for the selected system. When a system is eventually selected there will still be a need for implementation planning and oversight, but as it stands right now it is assumed that this work is on indefinite hold, at least until the proposal solicitation process (if approved) is completed. The selected vendor should be required to provide a proposed implementation schedule based on the time needed to design, build, and deploy their solution in all 58 counties.

3. Pesticide IT Governance Recommendation

3.A Governance Recommendation Overview and Rationale

The findings during Phase I could not have been more clear-cut regarding which of the potential overseeing entities: DPR, individual counties, or CACASA, is best positioned to govern pesticide IT. The difficulties encountered during planning for a modern centralized successor to the obsolete RMPP system (SPURS) illustrate DPR's constraints in providing the flexibility and responsiveness needed to meet all of the counties' business needs. As a consequence, individual counties have gone out on their own or in groups, which has led in turn to the current situation where a variety of solutions and standards exist side by side without effective centralized coordination.

The nature of CACASA as a statewide association of members representing every county lends itself very well to the governance role because it embodies elements of both central coordination and local influence with a democratic decision making structure. The May 2006 Memorandum of Understanding (MOU) with DPR establishing joint control over expenditures from the residual mill assessment fund was a major step forward in promoting a viable leadership role for CACASA regarding pesticide IT. All that is left is for CACASA to officially become the contracting and oversight agency for the selected pesticide IT system. The effect of the proposal solicitation process in facilitating this transition in governance could turn out to be just as pivotal as its role in selecting the future 58 county IT solution.

The general governance recommendation is for CACASA, within its existing leadership and committee structure (described in the next subsection), to assume control of contract administration, funding, and program oversight for all contracted pesticide IT products and services. As set forth in the current MOU, coordination with DPR to obtain DPR's consent on allocation and accountability of funds will still be necessary because of the various state laws delegating to DPR the authority to distribute pesticide mill assessments to the counties. The next two subsections contain details about the CACASA organization and recommended governance task assignments within the organization.



3.B CACASA Organizational Structure

The CACASA leadership structure consists of a 15 member Board of Directors, ten of whom are elected from the five area groups (with staggered two year terms), plus five officers: President, Vice President for Agriculture, Vice President for Weights and Measures, Executive Secretary, and Past President. The Board is empowered to make most decisions on behalf of the membership, except when the entire membership is present at one of the regularly held association conferences.

There are at least 15 standing committees (8 to 16 members each) and a variable number of special assignment committees whose function is to develop and investigate action items within specific subject areas and report findings back to the Board and general membership. The committees with the closest ties to pesticide IT are the standing Information Management Policy and Analysis Committee (IMPAC), the special assignment IT Consultant Committee, and the Residual Mill Assessment Fund sub-committee to the Pesticide Regulatory Affairs Committee.

CACASA has no staff level positions *per se* to carry out advisory, administrative, or communications functions. These duties are assigned to members on the Board of Directors. In the past, however, CACASA has contracted Executive Director services to perform some of these duties. There are discussions and plans to reinstate the services of an Executive Director, and the pesticide IT governance task recommendations in the following subsection are closely linked to the outcome of those plans.

3.C Governance Tasks and Assignments

Near term and ongoing governance tasks can be broken down as follows:

A) Near Term Vendor Selection Tasks:

- A1) Develop and participate in proposal solicitation process
- A2) Recommend one vendor's proposal to implement 58 county solution
- A3) Approve three to five year budget for pesticide IT implementation/support
- A4) Negotiate and sign contract with selected vendor
- A5) Develop and oversee system deployment plan

B) Ongoing Governance and Oversight Tasks:

- B1) Negotiate and sign contract for pesticide IT oversight (or incorporate this function within the Executive Director contract)
- B2) Monitor pesticide IT vendor performance , including implementing a county feedback mechanism to monitor the quality and timeliness of the vendor's services
- B3) Manage fund disbursements for pesticide IT services and oversight contracts
- B4) Enforce contract provisions or take other actions as needed to resolve issues or problems as they arise
- B5) Negotiate and sign pesticide IT services and oversight contract modifications and renewals
- B6) Coordinate with DPR regarding changes to pesticide regulations, reporting standards, or technology/data issues.



Responsibilities for these tasks will be allocated to various entities as outlined below:

CACASA President and Board of Directors

The President's primary role is to sign contracts and preside over the discussion of any issues that come before the Board (or the full CACASA membership functioning as the Board) and require the Board as "final arbiter" to execute contracts and render decisions. This means that the President and Board have direct and necessary involvement with tasks A3, A4, B1, B4, and B5 – but they can choose to involve themselves more directly in any of the tasks listed. All Board actions will be informed by the appropriate Committees (and possibly the Executive Director) reporting to them.

Executive Director

Since Executive Director services are currently "on hiatus", it is somewhat speculative to assign specific roles at this time. At a minimum, it would be appropriate for the Executive Director to serve as a communications link between the various committees with roles described below and the Board of Directors, and between the pesticide IT oversight contractor and relevant committees. That role would constitute a relatively modest level of involvement with all ongoing tasks (B1 through B5).

A more expanded role is also possible by incorporating pesticide IT oversight contractor duties (task B2) directly into Executive Director services. This arrangement would provide tighter integration of contracted staff services, could potentially promote tighter integration among relevant committees, and would require a redefinition (expansion) of the Executive Director duties currently envisioned. In practical terms, adding IT oversight to Executive Director services would eliminate the need for a separate contract with an oversight vendor (task B1), which would also expand the Executive Director role in tasks B2, B4, and B5.

IMPAC and IT Consultant Sub-committee

The IT Consultant Sub-committee has been the most intimately involved in the IT recommendation process to date, and should continue serving as the committee in charge of near term selection tasks A1 and A2. This sub-committee should also provide an advisory role to the Pesticide Regulatory Affairs Committee (or Residual Mill Assessment Sub-committee) and Board of Directors in tasks A3 and A4. Once the selected vendor is under contract, IMPAC (Information Management and Policy Analysis Committee) may either take charge of ongoing pesticide IT deployment (task A5) and oversight (tasks B1 and B2) as a standing committee or create a new sub-committee for this purpose. Either way, the pesticide IT oversight consultant (or Executive Director) will report to the committee in charge and the committee will report to the Board of Directors on tasks B4 and B5.



Pesticide Regulatory Affairs Committee and Residual Mill Assessment Sub-committee

Budget and fund disbursement duties are included in tasks A3 and B3. Whether these duties are assumed by the standing Pesticide Regulatory Affairs Committee or a sub-committee is a practical matter for the committee members to determine. Either way, the committee in charge will get input from IMPAC (or a sub-committee thereof) and possibly the Executive Director, and will report budget information and financial events to the Board of Directors.

Pesticide Regulatory Affairs is also responsible for coordination with DPR on regulatory or reporting changes. To the extent these changes affect technology and data (Task B6), there will need to be further coordination with IMPAC.

Pesticide IT Advisory and Oversight Consultant

This is an optional contracted service to provide technical input and management services for near term tasks A1, A2, and A5 as well as ongoing contract oversight services in task B2. For near term tasks, the consultant will report to the Pesticide IT Consultant sub-committee, and after that will report to IMPAC (or a designated sub-committee) for ongoing oversight activities. Consultant participation in near term system/vendor selection tasks was fully outlined in Section 2.B.

The ongoing oversight function will be performed under a separate contract to be awarded around the same time as the selected pesticide IT vendor contract is executed. The purpose for contracted oversight is to have independent, technically proficient, and focused monitoring of the 58 county pesticide IT solution as it is developed, deployed, and supported. The selected solution vendor will report directly to the overseer with regular progress reports to ensure that the project stays on track, on schedule, and that problems are identified and resolved with alacrity. In this sense, the oversight contractor essentially functions as CACASA's project manager for pesticide IT.

As noted in the Executive Director description above, the ongoing oversight role could be integrated directly into Executive Director services. If that happens, it might be advantageous to expand the portfolio of oversight consulting to encompass other CACASA IT initiatives beyond pesticide IT – with an eye toward better technological integration of compatible IT initiatives.



4. Funding Considerations

4.A Funding Sources

A description of all near and long term pesticide IT funding sources should be included in the pesticide IT RFP. This is especially important if the recommendation to invite proposals from non-incumbent vendors is followed, because outside vendors will want assurance that the project has stable and sustainable funding. This can be done without necessarily revealing a specific budgeted amount for the services requested.

DPR has identified sources (but no amounts) of one time funds they could make available for items like initial system implementation (deployment) and oversight. At some point prior to proposal evaluation it will be necessary to identify the actual amounts available in order to determine which proposals are workable and which are not.

Another source of one time funds that must be accounted for is the unspent money already allocated to incumbent vendors from the residual mill fund. This amount will continue to decline over time no matter what happens, because it will need to be used to support existing systems until they are replaced. It is recommended that when the selection process is complete, a negotiation should be conducted with the vendor(s) of existing systems that will be replaced, in order to agree on a fixed amount they will be paid to support their systems up until the anticipated date of replacement. Any allocated money remaining beyond that needed for pre-replacement support can be spent on deploying the new system.

4.B Future Budget Planning

The overall budget for pesticide IT can be broken down into these chronologically ordered components:

- a) Consulting assistance and other expenses for the proposal solicitation process (*geographIT* will soon prepare a cost estimate for these services).
- b) Software design and development activities for the 58 county pesticide IT solution.
- c) Oversight of the pesticide IT solution contract and deployment in all counties.
- d) Short term costs to support existing systems in counties until replacement is ready.
- e) System deployment costs; including hardware purchases, licenses for any third party software packages, installation, initial training, and system documentation.
- f) Costs to migrate data from existing systems into the selected vendor's system.
- g) Assistance to counties without complete or up to date crop boundary GIS layers.
- h) Ongoing system maintenance with technical and user support.
- i) Future upgrades and potential expanded functionality.

Based on the amounts available from the funding sources described in Section 4.A, a realistic and sustainable budget should be prepared that encompasses all of these components. This budget should be finalized prior to the deadline for proposal submission, as its first intended use is to filter responses to the RFP. With any luck, the winning proposal will come in well under the available budget, which will allow the excess to be held as a contingency reserve, accumulated to pay for future enhancements, or spent elsewhere.



5. Evaluation of Existing Pesticide IT Systems

This section contains narratives on various system criteria describing workable expectations (goals/standards) for what a 58 county solution should include. There are also narrative critiques evaluating how well the incumbent systems, AgGIS and RMMS, meet the criteria expectations and how they may need to improve. Incumbent system evaluations are generally based on the systems as they are currently deployed as production systems installed within counties. Enhancements for which development is underway were formally evaluated only if vendors granted access to or demonstrated in-progress features and functions. Some informal comments are included on planned features, functions, and strategies whose status is less well defined.

These evaluation criteria were selected during Phase I of the project based on discussions with a large variety of stakeholders and hearing about their problems and successes with pesticide IT software.

Evaluations were based on information gathered from stakeholder contacts during Phase I, and especially from extensive interviews and interactive phone and web sessions with Rich Miller, President of Streamline Business Solutions, Inc. (developers of RMMS), and with Patrick Way, President of Patrick Way Consulting, Inc. (developers of AgGIS). These interactions included web conferencing sessions (GoToMeeting) between Jesse Stauffer of *geographIT* and Rich Miller or his brother James Miller, and between Jesse and both Pat Way and Steve Anderson of Yuba County.

The sessions on RMMS were sufficient to show Jesse a majority of the functionality supported by RMMS Desktop, RMMSWeb, RMMSWeb Administrator, and discussions on the operating characteristics of the PURLData interface. In addition to web conferencing sessions, Streamline made available a VPN connection to their network effectively allowing Jesse the opportunity to sample the RMMS suite of applications on his own. This method of remote connectivity was then replaced with a Windows Server terminal services remote application connection which allowed Jesse the ability to sample the alpha version of RMMSGeo and the new Reporting Services framework, both of which are works in progress.

The sessions on AgGIS were similar to hands-on training on the use of AgGIS. Steve Anderson contributed to the discussion by showing how the AgGIS application is used in production. One session included the help of Mike Quinn of Merced County to demonstrate the use of Permit6, Permit6 online interactive, and to discuss the operating characteristics of CEDTS. Pat Way provided Jesse with a laptop that was preconfigured with a working version of AgGIS version 3.0 and Permit6.



5.A System Functionality Criteria

This subsection evaluates criteria related to features/functions/components that directly influence user productivity.

5.A.1 Integrated GIS

Statement of Expectations:

Integrated GIS means that the application includes a geospatial field crop boundary layer where the individual polygon features are the sites referenced in agricultural restricted materials permits. Site polygons must be coded with the corresponding site identifiers used on the permits. The mapping and permit form interfaces are integrated so that users can search and browse permit data either spatially (by selecting and querying features on a map) or by querying and browsing attributes in permit tables. In addition to site polygons, the mapping interface will support the display and query of a broad range of other spatial data layers, such as: aerial imagery, roads, parcels, surface water features, cultural features (e.g. buildings), wildlife habitats, sensitive environmental or cultural features, etc. Only the site polygon layer is mandatory, but the application must support the display of additional layers that are available and relevant to users of the application.

The mapping interface will include, at a minimum, the following tools:

- Select and highlight site polygon feature(s) and associated permit record(s).
- Select permit record(s) and highlight associated site polygon feature(s).
- Select feature(s) from any data layer and display corresponding attributes.
- Editing tools to create, delete, and modify the coordinates (vertices) of site polygon features.
- Editing tools to modify selected site polygon attributes.
- Measurement tool that interactively computes distance between points entered by the user.
- Turn available mapping layers on and off and modify the symbols (colors and patterns) used to depict features in each displayed layer.
- Standard map navigation tools for zooming in and out and panning around the display.

The mapping interface will be simple and intuitive so that users require little or no specialized GIS training to use it.

The application should also have a geospatial processing platform that supports more advanced spatial analysis functionality needed to automatically analyze spatial relationships to adjacent and nearby agricultural commodities or sensitive features that could trigger specific pesticide use conditions. Analytical functions should ideally include automated buffering and overlays, and must at a minimum include interactive (manual) buffer display tools that aid assessments of critical spatial relationships performed by manual inspection.



If geospatial information is formatted to reside within a spatial database specific to the permitting program (as opposed to an external geospatial repository), data translation tools must be provided to import and export site polygon and other supporting data layers from/to formats supported by external enterprise GIS repositories maintained by counties. Ideally, though, the mapping toolset will have the ability to directly access and consume external mapping services and geospatial datasets in native formats without the need for translation.

The application will include tools to automatically format and label site maps as predefined map layout templates that are then printed along with the rest of the permit.

Evaluation of AgGIS

AgGIS has a mapping interface that supports a geospatial field crop boundary layer where the individual polygon features are the sites referenced in agricultural restricted materials permits. AgGIS users consider this functionality to be critical and use it extensively. Site polygons displayed within the mapping interface are labeled with the site identifiers used on the permit, and also include labels for the acreage and commodity grown on the site.

The interaction between the mapping and tabular permit data interfaces is primarily unidirectional, where a permit record is selected first, and its associated site polygons are automatically selected and highlighted on the map display. Bi-directional interaction is preferred, where one would also be able to select a site polygon and display the associated permit record(s). Also, feature attribute editing is not available within the mapping interface – it can only be done through the tabular permit interface.

A symbol editor is available to change the display characteristics of features, such as line color, line thickness, label text, and polygon fill color. However, the symbol editor interface is not intuitive, nor does it include descriptive labels for controls which would assist novice users. Learning how to change map symbols with this tool is an exercise in trial and error. Once symbology is set, however, it can be saved within the user's profile and automatically applied the next time that user opens the application.

The AgGIS mapping interface is designed to support the display and query of any spatial data layers loaded into the internal AgGIS spatial database. During testing, however, the setup that was used would only display attributes of the field polygons layer and none of the other displayable layers. The application also supports manual creation of buffer zones, but the tool for this is not intuitive and requires thorough knowledge of the underlying database schema and somewhat complicated command syntax to correctly format a buffer command. This places an unnecessary burden on the user, likely leading to the tool being underutilized. Besides manual buffer generation, there are currently no other distance or area measurement tools.



AgGIS does not currently include any automated spatial analysis tools that could, for example, trigger specific pesticide use conditions based on spatial relationships to adjacent and nearby agricultural commodities or sensitive features.

AgGIS requires that all geospatial information be formatted to reside within the PostgreSQL database. This means spatial data layers contained in external GIS repositories in different formats cannot be displayed or queried within AgGIS without first making a reformatted copy using the AgGIS data translation import and export tools. The only advantage of this is increased map redraw performance when all data are stored locally on a fast server, but that must be weighed against potentially having to frequently import externally maintained data to keep layers stored in AgGIS reasonably well synchronized with the source layers. AgGIS also has a custom image display manager to enhance performance of aerial imagery displays.

There is a tool to automatically format and label site maps suitable for printing, which is separate from the tool for printing the rest of the permit. Map formatting options are limited, and ideally users should have greater control over the appearance of printed maps.

Evaluation of RMMS

RMMS has no integrated GIS or mapping interface at present. However, a limited evaluation of the in-development version of the RMMSGeo application (planned to be released with RMMS v.5) was performed based on a live demonstration that was given to *geographIT* by SBS (Streamline Business Solutions) staff.

The alpha version of RMMSGeo is a standalone web browser application that is not yet integrated with the RMMS desktop application, though they do share the same underlying database. SBS plans to seamlessly integrate the two into a desktop/browser application, while also retaining the option for users to run RMMSGeo by itself in a web browser.

RMMSGeo supports basic map display and navigation functions, field boundary feature editing capability, attribute queries of all displayable layers, and displays of sensitive areas and sites with buffer zones in order to visualize situations requiring spatially determined permit conditions. The mapping tools, including those that generate buffer zones, are packaged into a third party GIS software engine (ThinkGeo for Web applications) that requires a per-server one time licensing fee.

ThinkGeo's toolset is capable of supporting external sources of GIS information including shape files, web mapping services, Oracle Spatial, SQL Server 2008 native GIS data types, and others – meaning that it's possible to connect with other spatial databases and web services and display their data layers in RMMSGeo without making copies or translating data to a specific format.



The standalone version of RMMSGeo includes a tabular display of permit attributes, which is separate from the permit information forms included in the RMMSWin desktop application. Interactions between the tabular and mapping interfaces within RMMSGeo are bi-directional, so users can either select crop boundary polygons and automatically retrieve an associated permit record, or users can select a permit from the tabular list and highlight the associated crop boundaries on the map. Whether this bi-directionality can be maintained when RMMSGeo is integrated with RMMSWin remains to be seen.

The mapping interface allows users to modify the symbols (colors and patterns) used to depict features in each layer. However, the variety of symbols and characteristics that can be modified appears somewhat limited, and there was no provision to store symbol changes in a user's profile for use in subsequent sessions.

RMMSGeo does not include automated spatial analysis tools that could be used to trigger specific pesticide use conditions based on spatial relationships to adjacent and nearby agricultural commodities or sensitive features.

No demonstration was provided on any function to automatically format and label site maps to be printed along with the rest of the permit.

5.A.2 User Interface for Permits

Statement of Expectations:

The permit interface consists primarily of user input forms to create, query, view, and edit the tabular components of restricted materials permits, which are: contact information, crops, permitting conditions, site locations, commodities and pesticides.

The interface must balance rich functionality and access to all permit components with visual simplicity that avoids clutter and confusion. This can be achieved through visual workflow queues (e.g. icons, tabs, expanding/contracting forms, wizards, popup messages, context sensitive help) that can be used, if desired by the user, to step through a standardized workflow sequence, but the interface must also allow users to quickly access specific permit forms directly without a predetermined sequence.

Forms used to display and edit permit data should be consistent in appearance and should make liberal use of embedded functionality such as: "type-ahead" style searches in text input fields, ability to sort columnar data in ascending or descending order, and drop down lists to show several lines of data or choices at one time. Shortcuts should be employed as much as possible to automatically fill in default values, to copy selected entries from one place to another, and to store complicated information (such as permit conditions and prior site/commodity/pesticide combinations) and make it available for re-use elsewhere. All user actions should be reversible to make it easy to recover from mistakes.



Interfaces should use color coding and other symbology appropriately to convey information such as selected records, required fields, fields that have been modified, or fields that cannot be modified. The interface should provide usable feedback to inform users when an error has occurred (and how to recover from the error) and to tell the user to stand by while a long process is running.

All status messages, labels, and other user interface controls, should use full words and sentences (as opposed to abbreviations and codes) to avoid ambiguity and wording should be placed in consistent locations on the screen. The interface will present the available options in a clear and concise manner; leaving no room for ambiguity.

The integration between mapping and tabular interfaces should promote seamless transitions between the two. Because different users may work in different ways, the interface needs to be flexible enough to support various approaches.

Evaluation of AgGIS

The AgGIS interface is generally clean and uncluttered, making it easy to find and display permit components. These components (permit holder, contacts, locations, pesticides, and conditions) are depicted in “mini-forms” within a single screen. To add or edit component information, the user expands the mini-form to reveal a larger windows form with all information related to that permit component. On the left side of the screen there is a hierarchical “tree view” of the selected permit which depicts one-to-many relationships between the permit and all of the sites associated with it.

The only implied workflow for creating and entering information for a new permit is the left-to-right, top-to-bottom sequencing of permit components. There are no wizards, tabs, or labels to guide the permit creation and editing process.

Several of the windows forms that lookup information use what appear to be raw database field names as labels and column identifiers. These kinds of labels are often cryptic and difficult to read, and may confuse less experienced users. Concise labels in plain English are always preferred.

Following are some additional examples of omissions and inconsistencies found in the AgGIS interface:

- When required fields are left blank only a cryptic error message is returned rather than one that gives clear feedback on what error occurred and how to fix it.
- Labels on controls are often vague, abbreviated, or reflect specific database field names.
- A few controls (such as the PUR Web Access section in the lower-right corner of the screen) are currently not functional and should therefore be eliminated until the functionality is present.
- Search functions are not consistent from one column or input field to the next. All searchable fields should have bi-directional sorting and type-ahead search



capability to eliminate the need to scroll through long lists of tabular data. For example, the “Growers Locator” form is not sortable, though it does allow the user to type in characters and have the list reduced to only those entries that contain what was typed. This is different from the commodity input field for a site location which uses a “starts with” type-ahead style search. It is okay to employ text string searches that employ “contains” and “starts with” functionality, but unless users are provided with a way to pick the method for themselves, they have no way of knowing which method is being used where.

- Some field entries that have a limited number of choices, such as units of a commodity, do not have a drop down box to help users make an acceptable choice.
- The application should allow canceling (without saving) out of actions like adding new crops, and have buttons clearly labeled “Done” to let the user confirm that a step involving multiple record entries has been completed and the work can be saved.
- The Growers Locator screen does not allow the user to see all of the field values that run off of the right side of the form.

Evaluation of RMMS

The RMMS permit interface consists primarily of a series of tabbed forms that access the components of restricted materials permits, which are: contact information, crops, permitting conditions, site locations, commodities and pesticides.

The interface is rich in functionality, but not necessarily easy to use due to the proliferation of individual controls which give the interface a cluttered appearance. The workflow sequence for entering new permits or editing existing ones is implied only by the ordering of tabs at the top of the permit entry screen. Dividing permit components over several tabbed menus precludes the ability to see information from more than one component at a time.

Most of the lists containing tabular data have column headings that are sortable, but only in the ascending order. However, the ability to sort on columns is not consistent throughout all of the forms in the application. Each tabular list of data supports the ability to perform type-ahead style searches in text input fields.

The interface has an “Undo” function but it is not always clear what is being undone when the function is used. Undo appears to work differently in different contexts.

When an input error occurs, such as failure to enter all required fields in a new record, the feedback comes in the form of cryptically worded pop-up messages. This text is uninformative to the user as it does not explain the source of the error or the actions to take to resolve the issue. Except for these error pop-ups, most of the status messages, labels, and other user interface controls are understandable because they employ full words, phrases or intelligible abbreviations.



Color coding is used extensively to convey information such as selected records, records that are in a certain “state”, required fields, fields that have been modified, or fields that cannot be modified. There is no key or documentation explaining what the colors mean, so users must rely on training and repeated use to understand the visual cues.

5.A.3 User Interface for Pesticide Use Reporting

Statement of Expectations:

Ideally, the PUR data entry forms should mimic the layout of corresponding paper forms. The same kinds of productivity and quality control tools used in the permit user interface should be included in the PUR interface. These include drop down choice lists, type-ahead searches, and understandable status and error messages. Fields must be clearly labeled and links to informative help screens must be provided. These help screens should include an explanation of the processing sequence that occurs after records are submitted for validation.

During PUR data entry there must be error detection that provides instant feedback so that data entry personnel can make corrections right away. At a minimum, error detection will occur at the moment a completed record is submitted, but detecting errors within individual fields as they are filled in is preferred. Automated error detection should include the same validation tests used by DPR in order to catch and repair PUR errors before data are transmitted to DPR. The error condition feedback to the user must be clear and unambiguous so that the required correction is immediately understood.

Evaluation of AgGIS

AgGIS does not have its own use reporting interface. Instead, AgGIS users must use the separate Permit6 application for this purpose. The Permit6 interface is extremely utilitarian in appearance and does not resemble the typical interface found in most windows desktop applications today. Controls are laid out somewhat haphazardly and often do not provide adequate feedback or cues on how to use them properly. For example, the PurReport interface has two date range fields that do not indicate the expected format of dates. If the wrong date format is entered then the date field will turn red but give you no indication of the expected format.

The Permit6 Production Ag Use Report screen uses what appear to be raw database field names as labels and column identifiers. More intelligible labels would improve the experience for users who are not familiar with raw database field names.

Invalid entries may prompt error messages containing source code specific information that means very little to most users. That kind of information should be hidden from the end user and possibly stored in a known location that the vendor would be able to use for debugging purposes.



The Permit6 PUR data entry form does perform automated error detection, but once the recorded is added it cannot be immediately retrieved within the data entry interface for editing. Instead, records with errors must be edited after they have been filtered by a batch error detection process.

Data entry screen controls makes liberal use of keystroke shortcuts (arrow and tab keys), which mimics the navigation methods in the old RMPP application. Not all users are accustomed to this, so it would be helpful to also allow standard windows point and click navigation along with text on the menu explaining the keystroke shortcuts.

Evaluation of RMMS

The RMMS use reporting interface looks and feels very similar to the permitting interface. There is liberal use of drop down boxes, field value lookup screens, and validation in the form of restricted text box input controls (e.g. not allowing alpha characters where numeric is expected). The interface also makes use of color coding controls to indicate fields that are editable and fields that are read only. Fields are labeled adequately, but links to informative help screens are not provided.

The PUR data entry screen provides some instant feedback when detecting errors within individual fields as they are filled in. Feedback comes in the form of pop-up windows with intelligible error messages, though messages may also include technical details that are of little use to the average user. This type of information should not be displayed unless the user is able to act on the information.

RMMS provides the same validation tests used by DPR in order to catch and repair PUR errors before data are transmitted to DPR.

5.A.4 Web Interface for PUR/NOI submission and Permit Browsing

Statement of Expectations:

Ideally, the PUR and NOI data entry forms on the web should mimic the layout of their corresponding paper forms. Fields must be clearly labeled and links to informative help screens must be provided. These help screens should include an explanation of the processing sequence that occurs after records are submitted for validation. The same kinds of productivity and quality control tools used in desktop PUR and permit interfaces should be included in the web form interface. These include drop down choice lists, type-ahead searches, and understandable status and error messages.

Error detection and repair protocols will be similar to those employed in the desktop PUR interface, because the vast majority of rejects are caused by human error or system technicalities and not by actionable regulatory transgressions. However, the public website interface must not invite fraudulent data entry by alerting pesticide applicators of potential violations after they have already applied the pesticide, as they might decide to



change the data in order to avoid the violation. In practice, this means that pesticide applicators entering PUR on the web will have their submissions checked according to the same validation rules exposed to Ag Department staff using desktop PUR entry, but web users will only be notified about and allowed to correct rejects that contain mistakes and not those that contain potential violations.

The web site will also provide site navigation information and a clear site structure so that users can easily determine what functions are available and access them quickly.

Evaluation of AgGIS

Much like in the Permit6 application, the interactive PUR web site is plain in its appearance and it lacks features such as drop down lists to ensuring that only correct values can be entered. Controls are laid out somewhat haphazardly, some form fields are not clearly labeled, and help screens are not provided.

There is error checking and validation behind the scenes on the server side to ensure that the user entries are consistent with information on the permit.

Evaluation of RMMS

The “home page” of the RMMSWeb application offers a useful introduction to the web site with links to pages containing additional information. The various pages of the web site are accessed through tabs at the top of each web page. The tabbed pages give the user the ability to view account activity, permit information, and data entry forms for PUR, Monthly Summary PUR, and NOI.

The RMMSWeb is clean and professional looking, with less interface control clutter than the RMMSWin desktop interface. The web data entry screen for PUR is very similar to its desktop counterpart, in that it includes most of the same lookup tools for identifying commodities, commodity codes, and pesticides.

Error detection provides feedback so that users can make certain corrections right away. However, some errors result in the record being placed “in mitigation” which requires Ag Department staff to investigate and edit later on.

5.A.5 License and Registration Database Interface

Statement of Expectations:

A combination of data structure, interface forms, and tools that allow users to search, edit, and browse their county’s registered contact database in order to perform all required registration management functions. These functions include:

- Creating and modifying the names and addresses of individuals and firms who are registered and/or licensed
- Tracking registration status
- Preparing hardcopy registration forms



- Accounting for registered equipment
- Tracking and scheduling inspection activities
- Synchronizing county databases with DPR master database

Evaluation of AgGIS

AgGIS has a comprehensive licensee (contacts) database that even includes the ability to enter registered pest control business and operator equipment. There are no tools or interfaces, however, to use any of this information to prepare registration forms or to track inspection activities. There also are no tools to synchronize with DPR's master contacts database, and it is unclear whether this is even performed manually in AgGIS counties.

Evaluation of RMMS

The RMMS licensee database is sufficient for permit preparation and PUR data entry, but is lacking in some areas that would be needed for a registration management tool, such as registered pest control equipment inventories. There are no tools or interfaces for preparing registration forms or tracking inspection activities. There is a centralized server tool for downloading the DPR master contacts list and synchronizing county databases to it, but it is only run manually on an as-needed basis.

5.A.6 Temporal Database Structure

Statement of Expectations:

Consists of a combination of data structure, query and reporting tools that allows users to retrieve all historical configurations of all permits. This facility supports both the examination of all changes in a permit through time and reconstructing the configuration of permits at a particular moment in time. The application will expose the temporal aspects of the database through a single, intuitive interface where a time criterion can be queried without requiring unduly complicated navigation or application restarts. Permit edits are automatically time stamped so that additional user intervention is not required to maintain the historical record.

Evaluation of AgGIS

AgGIS is designed to track the temporal status of all permits. Users see the most current permit by default, and can also see a list of previous dates when a permit was modified and reissued. When one of these previous dates is selected, the application will display the state of all attributes on the permit at that time.

During evaluation testing, there seemed to be some synchronization or refresh issues in that the list of previous dates would sometimes refer to a different permit than the one selected and displayed in the forms containing all permit attribute components. It is not known whether this was something peculiar to the software installation or if there was a refresh control of which the test operator was unaware.



Evaluation of RMMS

The RMMS database is not inherently temporal. This is made evident by the need to first choose a permit year when starting up the desktop application. In effect, the RMMS database is comprised of separate databases containing all permit and use report records for each calendar year. This is an artifact of RMPP and can pose a number of problems if data are entered mistakenly for the wrong year or when inspectors need to examine data from multiple years.

In addition, the permitting module does not appear to support the temporal tracking of changes made to permits within a single year. From the user's perspective, when permit modifications are made those changes overwrite the preexisting attributes of the permit. It is possible, though at this point uncertain, that the state of prior iterations of a permit modified mid-year may still reside in the SQL Server database. But even if they are, there is currently no mechanism to expose these prior states to the user.

5.A.7 Queries and Reports (Standard and User-defined)

Statement of Expectations:

The application must provide users with the ability to generate standard reports based on parameters (database queries and output formats) that are predefined within the system. Predefined parameters are reserved for reports that are run on a regular and frequent basis, or for complex highly formatted reports requiring specialized expertise to be structured properly.

The application should also provide the means for users to create their own simple queries and reports to be executed as needed (ad hoc). User defined queries and reports may be based on modifications to existing standard queries. An option to save and share any user-defined query should be available in the application.

The user interface of the reporting system must provide easily understood tools for querying and filtering on specific database fields employing commonly used logical and arithmetic operators. Ideally, the reporting tool should be readily accessible to non-technical users by creating correctly formatted SQL query expressions via an expression builder wizard, but also sophisticated enough to support IT professionals and 'power users' doing production reporting that requires advanced sorting and formatting options.

Evaluation of AgGIS

AgGIS and Permit6 both support standard reporting, and a limited number of predefined report parameters are available to be run by any user at the push of a button. Only people with intimate knowledge of the database schema and custom query command syntax are able to successfully structure a query and reporting command string. There is no ad hoc query interface with intuitive tools that would allow ordinary users to build their own queries.



Evaluation of RMMS

The RMMS application supports custom predefined reports that are stored as a descriptive name and can be selected and run from a standardized reporting interface. RMMS also has a built-in Crystal Reports module that allows knowledgeable users to select a predefined report type and provide required and optional parameters for filtering the results of the report. A tab driven wizard facilitates the process of providing input parameters by systematically stepping the user through the process. The user also has the option of directly accessing a tab containing specific report input parameters without having to go through the wizard.

Users may also create their own queries and reports in an ad hoc manner. The interface for ad hoc reporting lets users specify queries on a majority of fields in the underlying database, and is somewhat user-friendly in its use of a tab driven approach to define filtering and reporting parameters. The ad hoc query tool is most accessible to power users, though with some improvements such as better guidance and online help it could also benefit less technically inclined users. Ad hoc queries can be saved and shared with other users.

5.A.8 Rotational Cropping Compliance

Statement of Expectations:

There are five principal cropping systems that must be accommodated. These are, in order from least to most complex:

1. Monoculture of a perennial tree or vine commodity.
2. Monoculture field commodity – one planting per season.
3. Successive monoculture field commodity – multiple plantings of the same crop.
4. Successive rotational field commodities – multiple plantings of different crops.
5. Polyculture commodities – two or more crops interplanted in the same field at the same time. The two most common variations are annual crops interplanted with perennials, and the so-called “coastal” situation where mixtures of vegetables, herbs, and greens are grown together – usually with successive rotational plantings in one season.

California’s EIR (Environmental Impact Report) equivalency requirement specifies that whenever a restricted material is applied, the location, commodity treated, and surrounding conditions (including other commodities and sensitive features) are all known and tracked. At a minimum, therefore, the pesticide IT database must support one-to-many relationships between field sites and commodities present, and a temporal element to record commodities present at various times throughout the growing season.

For permit preparation efficiency and clarity, it is also desirable to incorporate processes and tools that avoid creating overly complicated permits where every possible site/commodity combination is recorded and printed explicitly in the permit. That level of detail is not required to create a valid permit, but the application database still needs to capture the information needed to satisfy EIR equivalency.



Combined AgGIS and RMMS Evaluation

The approaches of both AgGIS and RMMS to rotational cropping support were described in Section 5.K of the Phase I Needs Assessment report. Neither system vendor has yet undertaken the more rigorous investigation described above to develop a solution that is workable but more refined than the “workaround” techniques currently employed. Therefore, there are no further evaluation comments beyond the findings reported in Phase I.

5.A.9 Access and Interface Customization

Statement of Expectations:

The most basic application security is provided by a username/password combination that uniquely identifies each user and restricts access to authorized users only. Particularly in counties with large numbers of application users and users with specialized responsibilities, another layer of security and access convenience should be provided by assigning users to various groups that are given read/write access permissions to specific parts of the application and underlying database.

This security system must be managed by an interface that allows system administrators to assign and authorize login names, assign users to groups, and adjust permissions to specific program modules, interface tools, and to fields and tables in the underlying database. These security measures are primarily intended to prevent unauthorized (or untrained) users from mistakenly corrupting data, but they can also be used to tailor the appearance of the interface so that it more efficiently supports specific types of tasks by rearranging controls and/or eliminating controls that are not needed by a particular group for a particular task.

Evaluation of AgGIS

A username/password login is required to access the AgGIS desktop application. There is no administrative interface for managing user access to the system. Instead, system administrators must directly edit a database login table when adding, disabling, or modifying usernames and passwords. There is a capability to restrict access to selected database tables based on the login name, but it isn't known whether AgGIS installations use this capability extensively or at all. In any case, the desktop application itself would not appear any different to restricted users, it would just respond with errors or become non-responsive if users tried to edit tables to which write access has been denied.

To satisfy user demands in all counties, AgGIS would need both an administrative interface and the ability to assign application access permissions to users and groups and have those permissions expressed in an obvious way within the application, either by rendering invisible the modules and controls restricted users cannot access or “graying them out.”



Evaluation of RMMS

The RMMS desktop application requires a username/password combination to gain entry into the application. Each user is assigned to a group, and the system administrator assigns read/write access permissions to program modules and features within modules that are appropriate for each group of users.

Log-in identity management and group access permissions are managed with an administrative module interface. In concept, this capability satisfies the Statement of Expectations for this functional criterion, though it isn't known how many or to what extent counties with RMMS installations use these access controls.

5.B System Quality Criteria

This subsection evaluates criteria related to the engineering quality and performance of each system.

5.B.1 Engineering and Design Quality

Statement of Expectations:

Engineering quality in a software application affects performance, stability, and ease of management. Unlike a mechanical or physical system, software quality is difficult to assess by inspection, and flaws that are revealed through use of the product may be due to poor design or simply errors in execution. However, the software development and testing processes that are documented and followed are themselves revealing of the resulting product's quality. Therefore, it is expected that vendors will have clear and organized as-built design specifications, development processes and testing plans. Vendors are also expected to develop and apply consistent software coding standards, and be able to identify and follow performance and cost optimization strategies used to guide future development and management of their product.

Vendors should be able to explain the thought processes behind choosing particular development platforms, third party components, hardware specifications, and overall development approaches embodied in their product. A well engineered design process is typically reflected in a well engineered end product.

Combined Evaluation of AgGIS and RMMS

Any reasonable evaluation of system engineering has been hampered by *geographIT's* limited time to examine and test these applications and, more importantly, by the lack of documentation regarding designs, testing procedures, technical specifications, and standards described in the Statement of Expectations. It is not known whether this documentation is not well organized, has been intentionally withheld, or simply does not exist. Regardless, no engineering evaluation can be performed without it. That is why one of this project's key recommendations is to have the winning vendor first undertake an effort to develop technical specifications followed by a system design that addresses cost and performance optimization strategies and all of the quality assurance plans and procedures described above. Software quality should be built into an



application during design and continued through development and not tested in after the fact when development is considered complete.

5.B.2 Cohesiveness of System Components

Statement of Expectations:

Each of the vendor solutions is comprised of a suite of desktop, web and server applications that deliver the entire working set of functions. The expectation is that each of these components will exhibit high levels of cohesion in terms of architecture, technology, and end user experience - thus providing a consistent and harmonious solution. A common architecture standard promotes economies of scale by limiting the number of technology dependencies and by allowing the propagation of individual functions and modules to various application components without having to write the same thing in different ways to satisfy diverse architectures. From the end user's perspective, system learning and ease of use is improved when the entire family of software applications share a common look and feel.

Evaluation of AgGIS

The cohesiveness of AgGIS is undermined by its dependence on Permit6 for use reporting, web interfaces, and some database management functions. The "marriage" of these two applications is based on a common database, but that is where the commonality begins and ends. These applications do not share the same technology base in terms of programming language and structure of the application, and the user interfaces of the two are completely different from one another. While this marriage is intended to be temporary, until all essential Permit6 functionality is re-architected and absorbed within AgGIS, AgGIS cannot be considered a comprehensive application and the AgGIS/Permit6 combination cannot be considered cohesive.

Evaluation of RMMS

The RMMS suite of applications exhibits a high level of cohesiveness in terms of the underlying technology and architecture used by each component of the system. This is also reflected in the similarity of user interface designs between RMMS desktop and web applications. It may be a fairly stiff challenge to maintain this degree of cohesion with the addition of RMMSGeo, because it seeks to combine the RMMS desktop application with the ThinkGeo based web browser application.

5.B.3 Performance in Production Environment

Statement of Expectations:

Applications must exhibit stable and predictable performance so that users don't have to be concerned about whether the system might break down on any given day, nor should they have to worry about loss of data or wasting time trying to troubleshoot problems. All of these things are unnecessary distractions from the real work at hand, and



frustration builds quickly whenever there is any uncertainty surrounding the uptime of one's computer system and actual the loss of data when a system locks up.

System instability has the greatest impact on perceptions of system performance, but sluggishness or even occasional unresponsiveness when performing certain tasks can also annoy impatient users. Peak performance requires exploring every avenue to track down bugs and optimize resource intensive tasks.

Combined Evaluation of AgGIS and RMMS

Realistic evaluations of application performance require more rigorous testing and investigation than this project has allowed. Some interesting performance related information was included in Section 5.A of the Phase I Needs Assessment report. However, reports from system users (whether positive or negative) must be considered anecdotal and while they may raise questions worth investigating further, these reports can't be taken as a reliable measure of system performance.

5.B.4 Synchronization Between County and Web Servers and with DPR

Statement of Expectations:

Effective connectivity between distributed (county) and centralized (web) components in the pesticide IT system relies on the quality of communication and synchronization protocols. These protocols have a tremendous influence on database integrity, system performance, and the provision of redundant services necessary for fault tolerance and recovery. Therefore, the system must incorporate a communications infrastructure with methods and tools that efficiently perform day to day synchronization of distributed databases and that are designed to overcome and quickly recover from foreseeable breakdowns (e.g. equipment failure or temporary loss of network connectivity).

The system must also include tools and methods needed to synchronously connect with essential external data and systems, most specifically with the product label and professional license holder databases maintained by DPR. External sources of critical GIS data layers may fall into this category as well. Tools that communicate and/or synchronize with external systems should be developed in coordination with managers of those systems and should be automated as much as possible so that the processes are completely transparent to pesticide IT users.

Evaluation of AgGIS

All replication services are managed by Permit6 and CEDTS. While it is known that AgGIS servers in counties regularly synchronize with the central web server in Merced County, and that the CEDTS server in Merced transfers use report data to the counties, exactly how all of this is accomplished is unclear because no documentation of the process was examined.

Communication (it can't really be called synchronization) with the DPR product label database is currently a manual process performed on an as needed basis by users. The



usual trigger occurs when someone encounters a pesticide use report with a chemical that is not in that county's local database. There is a tool in Permit6 that establishes a connection to the DPR web page where the searchable product label database can be accessed. The user searches for the chemical (by name or number) and then manually enters the DPR data that is retrieved into the county's local database. This new entry is then replicated to the central CEDTS web server during the normal synchronization process. Obviously, this is not very efficient and a more automated and thorough synchronization tool has been developed and is currently being tested.

As noted previously in Section 5.A.5, there is also a need to create a tool that synchronizes license and registration entries in the contacts database with the master contacts list maintained by DPR.

Evaluation of RMMS

The RMMS system employs a web server that effectively acts as a conduit to the outside world for pulling information from DPR or receiving PUR data from the agricultural community. Replication processes run on an adjustable schedule from county servers to the RMMS Web server at a Southern California hosting facility. The replication process is custom built but may at some point be replaced with equivalent or superior capabilities built into Microsoft SQL Server.

RMMSWinWeb is the administrative interface (accessed from the RMMS desktop application) that is primarily used to manage replication as well as user log-in data for the RMMSWeb application. This interface has well documented capabilities including:

- Control over how information is shared between the RMMS web server, DPR and the county servers.
- Manage several modes of replication including manual start, periodic start and a scheduled start for automation.
- Schedule the frequency of synchronizations that occur with DPR.
- Review any potential errors that may have been reported and provide diagnostic routines for debugging purposes.
- During replication, allow the auto-generation of NOI reports and PUR exceptions to be automatically printed to a specified printer.
- Notifies users that replication may not be working properly and that the RMMS administrator should confirm that replication is set up properly and is turned on.
- Provides detailed and summary reports of all items contained within a batch after synchronization has occurred.

RMMS supports several methods of synchronizing data between county servers and DPR, including:

- Pesticide product label data are downloaded from DPR on a nightly basis and replicated from the RMMSWeb server to the county servers.



- PReData - Web Services based implementation with real-time data validation and replication of pesticide use reports. This functionality is equivalent to CEDTS.
- Manually download DPR's master contact list of licensed pest control professionals and replicate updates out to the counties.

5.B.5 Technical Support Delivery

Statement of Expectations:

The system vendor should provide a multi-tiered help desk resource to answer user's questions and to troubleshoot, resolve, and record problems with system components. Support should include both "active" and "passive" elements. "Active" elements allow users to communicate directly with support technicians via telephone (toll-free number), website, or e-mail. "Passive" elements include website postings of answers to Frequently Asked Questions (FAQ), and access to a searchable list of questions and problem reports submitted by other users along with solutions offered by the vendor.

The help desk should be managed with tracking software that records help requests with a unique ticket number. Tracking help requests as they are processed is an extremely effective way to find, analyze, and eliminate common software system problems. Associating help requests with specific customers over time helps pinpoint problems in which the customer's unique computing environment is the source of the problem or a contributing factor. Cases handled through the help desk can provide useful insight on ways the product's user help could be improved to reduce confusion, and can also provide relevant input to the on-line FAQ. The help desk will be prompt in investigating issues and concerns identified by the client without undue waiting periods in providing follow-up correspondence to the client.

Evaluation of AgGIS

Patrick Way Consulting (PWC) offers help to AgGIS users through phone, email, and online GoToMeeting support but does not offer a web site to record and track technical support issues. Until recently, there was no formal issue tracking system at all. Now there is a very simple customized issue tracking system that logs calls from users and tracks follow-up activities. It is not yet clear whether the information captured will be made available to users (so they can check for similar problems) or if it will remain as internal use only.

This is reactive support and AgGIS report high levels of satisfaction with the services received. In addition, more proactive support has been proposed in the form of regular outreach meetings between PWC staff members and counties. Those meetings would cover such items as training requirements, issues with the system, and opportunities for improvement.

Passive forms of technical support are not offered currently at all.



Evaluation of RMMS

Streamline Business Solutions (SBS) provides active help desk support in the form of email, phone, and online GoToMeeting sessions. A web based issue management system is integrated into the RMMS desktop application, but it does not appear to be widely used because users prefer calling the SBS help desk as a first, not last, resort. SBS literature speaks of using this tracking system to log issues coming forward in all modes, but the historical record of issues appears to have gaps due to incomplete logging.

Most of the planning in this area speaks about developing several tutorial videos that could be made available either through the RMMS desktop application or from the SBS corporate web site. Each tutorial would focus on a specific aspect or module of the RMMS application. In a more interactive vein, regular weekly training sessions (Training Tuesdays) in the form of webinars have been proposed. These training sessions would provide attendees with walkthroughs of the various functions supported by RMMS.

Streamline does not currently offer passive forms of technical support.

5.B.6 User and Administrative Documentation

Statement of Expectations:

User documentation must be provided to describe program features, and offer assistance in how to correctly use the interface controls. Documentation must be clear, concise, well organized, and have a searchable index. Documentation should be kept up to date as new application functionality is developed or existing functionality modified.

The desktop application should include a comprehensive user guide that functions as an overview describing system content and usage, especially in describing how to use the software to support the typical workflows the user is likely to encounter. This guide should be available in printed hardcopy form and also available in electronic format accessible from within the desktop application. In addition, context-sensitive help functions should be available in the application so that users can directly access documentation tied to the specific module, form, or interface control they are currently using. For example, documentation should be organized so that each discrete module has its own “help” button that opens the portion of the user guide devoted to that module.

Web applications must also provide links to HTML user guides that are contextually relevant to the specific application. Web help should also be provided in the form of “rollover tooltips” for controls whose functions are not obvious from their labels or appearance.

Administrative documentation should be geared toward an audience primarily consisting of network administrators and PC/server support technicians. This documentation outlines the overall architecture of the system including the technology dependencies and



system interfaces that the application uses. Detailed installation, configuration, and trouble shooting instructions must be supplied in order for local system administrators to install, maintain, and update the system without having to rely on assistance from the vendor to perform routine tasks.

Administrative documentation should describe routine database maintenance operations and guidelines for scheduled backup and disaster recovery. Lastly, the administrative documentation must include both optimum and minimum specifications for server and desktop hardware, network bandwidth, operating systems, and software licensing parameters needed to implement the system.

Combined Evaluation of AgGIS and RMMS

There is essentially no current or comprehensive documentation for system design, training, user support, or administrative support in *any* of the desktop and web applications from either vendor. This is a rather glaring omission that the user community strongly wants to remedy.

- Users need documentation to help them with problems, help them learn, and show them the full range of functionality in their application.
- CACASA and counties need documentation so that they know how to manage the systems they have purchased.
- Lack of documentation has interfered with the ability to evaluate the systems responsibly and make future plans.

5.C System Scalability Criteria

This section evaluates criteria related to scalability in the sense of being a viable statewide enterprise solution, viability over time, and potential to integrate new functionality.

5.C.1 Scaling Up to a Statewide Enterprise

Statement of Expectations:

A successful statewide enterprise software application system must be able to meet challenges in four major arenas:

1. System architecture must support interconnected database communication and synchronization demands between centralized elements (web servers) and distributed elements in all 58 counties.
2. System architecture must readily integrate with the unique network infrastructure and IT environment within each county.
3. System functionality must meet the full range of diverse needs and circumstances present in the entire collection of counties. Capabilities that are deemed essential by a small number of counties or even a single county must be accommodated.
4. Vendor provided technical support capacity must be scaled appropriately to provide acceptable levels of service.



Combined AgGIS and RMMS Evaluation

Neither of the existing systems is currently ready to be scaled up to become a statewide enterprise, primarily because each one lacks capabilities (both functionality and usability) that users of the other system consider to be essential. In a sense, they have organically evolved as “niche” systems with user bases willing to overlook various shortcomings because of the superiority to the RMPP system they replaced. Other considerations, such as cost and even personalities, have also played a role in the current distribution of AgGIS and RMMS among counties. Nevertheless, a perception is widely held that each county’s situation lends itself to one system’s set of strengths and shortcomings better than the other’s.

The findings of this project demonstrate that this is more rationalization than fact. The reality is that nearly all counties would benefit significantly from the collected strengths in the two systems, and very few counties would gladly suffer any of the existing shortcomings for very long. The goal, then, is to build an enterprise system that gathers up all the positives and leaves all the negatives behind.

5.C.2 Scaling Forward to Keep Pace with Technological Change

Statement of Expectations:

Certain qualities of computer application systems can make them more or less able to continually adapt in order to keep pace with technological change. The challenge is to avoid premature obsolescence by incorporating software components and software development platforms that are widely used and therefore dynamically evolving and not headed toward a technological dead end. Efficient system evolution requires leveraging technological advances made by others as opposed to undertaking perpetual cycles of intensive custom development on one’s own system.

Successful scaling through time depends on a system developer’s ability to select and deploy an appropriately dynamic technology platform at inception, and to stay abreast of technical developments as they occur.

Evaluation of AgGIS

AgGIS uses the PostgreSQL database, which is a modern Relational Database Management System (RDBMS). The Java programming language used in the AgGIS desktop application is considered a “high-level” modern language. As Open Source products both Java and PostgreSQL are free to use (no licensing fees), have broad user bases, and are under continual development by a large community of widely dispersed software engineers.

One benefit of an Open Source platform is that applications can freely take advantage of other developers’ work, which could be especially valuable here regarding GIS toolsets. One potential drawback to avoid is the temptation to develop generic tools from scratch that someone else has already created. It is great to have the ability to improve upon existing tools, but going overboard with over-engineered solutions leads to excessive development cycles and cost.



Another potential Open Source trap is that once an application is “exposed” to the community it is fair game for others to tinker with. The only real danger is if an unauthorized version of the pesticide IT application somehow gets installed as a production version in one or more counties. This must be avoided with a version management process overseen by the vendor that institutes version identification and control. Also, any county that insists on using an unauthorized custom version is on their own as far as technical support and might even face restrictions on database replication.

Evaluation of RMMS

RMMS desktop and web applications use SQL Server, a modern proprietary RDBMS licensed from Microsoft. The desktop programming environment uses the Visual DataFlex language (which also has a license fee), while web applications use the Active Server Pages (ASP) language – also a Microsoft product.

One concern about the future of the desktop application is its reliance on Visual DataFlex. This is still considered a modern programming language, but one that is less widely used and is likely to experience a continued decline in the number of developers familiar with the language. In other words, even if CACASA owns the software there could come a time when qualified DataFlex programmers other than the RMMS vendor are difficult to find.

On the plus side, SQL Server is a dynamic, continually improving product with a very large contingent of experienced administrators and developers.

5.C.3 Scaling Outward to Integrate with or Absorb New Functionality

Statement of Expectations:

Application users and developers alike should always be on the lookout for opportunities to integrate new data, new functionality, and new business practices into their systems. Whether a system is amenable to incorporating new functionality or communicating with related systems and applications depends on the openness of the system and if its data structures and software modules can be modified with relative ease.

Evaluation of AgGIS

The potential for AgGIS to absorb new functionality is difficult to assess. The database itself can be added to with relative ease and it is capable of supporting many different types of data. The most likely scenario is to have somewhat related applications utilize PostgreSQL in a separate database that could copy and synchronize with records in selected tables from the pesticide IT database; but these applications would have their own separate interfaces. Database level integration with other systems might also require additional security measures in order to ensure that pesticide IT data integrity is protected from actions occurring in external systems.



A major boost for both functional integration and for AgGIS enhancements could occur by fostering a group of “homegrown” developers within Ag Departments. An effort has recently begun along those lines to direct a handful of interested staff toward developer information resources and to teach them more about the inner workings of AgGIS.

Evaluation of RMMS

RMMS has good potential for database level integration with other applications because SQL Server is so widely used already and its database schemas can be modified with relative ease. The most likely scenario is to have somewhat related applications utilize SQL Server in a separate database that could copy and synchronize with records in selected tables from the pesticide IT database; but these applications would have their own separate interfaces. Database level integration with other systems might also require additional security measures in order to ensure that pesticide IT data integrity is protected from actions occurring in external systems.

The potential for homegrown developers is not that high (and no interest in this has been expressed to date) due to the current proprietary nature of RMMS software and fewer people familiar with or interested in learning Visual DataFlex.

6. Expectations of System Vendors

This section describes expectations placed on any vendor wanting to be awarded the contract to develop and support a 58 county pesticide IT solution. These are very brief summaries of the types of vendor evaluation criteria that would be used in proposal solicitation process. Since that is the process that has been recommended, it is not appropriate to actually evaluate the two incumbent vendors at this time.

6.A Organization and Personnel

Statement of Expectations:

Vendor must have sufficient personnel with an appropriate mix of software life-cycle system design, development, testing, implementation, and technical support skill sets to support a system deployed as a statewide enterprise solution. This considers both the quantity of personnel and the full range of technical, business, and communication skills needed to manage each of the software life-cycle phases while demonstrating the ability to undertake other projects that will keep the business and the enterprise it supports up and running. The quantity, skill, experience, and availability of assigned staff to be dedicated to this project in order to achieve a timely delivery according to an aggressive implementation schedule will be a key consideration of the firm’s ability to undertake this project.

6.B Breadth of Business Development

Statement of Expectations:

Vendor must be capable of expanding the business as needed to sustain the company once development income from pesticide IT applications begins to decline. This considers



prospects to secure clients for new projects and products that will retain the staff needed to continue supporting pesticide IT as well as prospects for new products that are synergistic with pesticide IT.

6.C Communications and Planning

Statement of Expectations:

Vendor must demonstrate the capability to effectively execute two-way communications (listening and informing) with users, business partners, and the entities overseeing their project budgets and project operations. Vendors must also be able to create and execute clear and workable product deployment and business plans in support of ongoing business development. Vendors must be capable of demonstrating strong project management skills including time management, risk management, and progress reporting during each phase of product development and deployment.

6.D Vision and Innovation

Statement of Expectations:

Vendor must have the forward-thinking capability to articulate a strategic vision (for both their business and their products) and then conceive and deliver products that are technologically advanced and consistent with the strategic vision.



Appendix – Description of System Requirements and Design Specifications

System Requirements Specification

The SRS document itself states in precise and explicit language those functions and capabilities a software system (i.e., a desktop application, a Web site, Tools and so on) must provide, as well as states any required constraints by which the system must abide. The SRS is often referred to as the "parent" document because all subsequent project management documents, such as design specifications, statements of work, software architecture specifications, testing and validation plans, and documentation plans, are related to it.

It's important to note that an SRS contains user and system functional and nonfunctional requirements only; it doesn't offer design suggestions, possible solutions to technology or business issues, or any other information other than what the development team understands the customer's system requirements to be.

A well-designed, well-written SRS accomplishes four major goals:

- It provides feedback to the customer. An SRS is the customer's assurance that the development organization understands the issues or problems to be solved and the software behavior necessary to address those problems. Therefore, the SRS should be written in an unambiguous manner that may also include charts, tables, data flow diagrams, decision tables, and so on.
- It decomposes the problem into component parts. The simple act of writing down software requirements in a well-designed format organizes information, places borders around the problem, solidifies ideas, and helps break down the problem into its component parts in an orderly fashion.
- It serves as an input to the design specification. As mentioned previously, the SRS serves as the parent document to subsequent documents, such as the software design specification and statement of work. Therefore, the SRS must contain sufficient detail in the functional system requirements so that a design solution can be devised. In turn, the SDS should cross reference each element of the design back to one or more items in the SRS to ensure all requirements have been addressed.
- It serves as a product validation check and also serves as the parent document for testing and validation strategies. The delivered system must be certified as meeting all of the user and system requirements during system acceptance testing.

System Design Specification

The System Design Specification (SDS) describes the detailed architectural design for the system and specifies all known components needed to deliver a complete system. The SDS will begin with a technical overview describing the environment in which the system will exist including:

- Data Requirements
- Configuration
- Third-party Tools
- Applications Used



- Interrelationships and dependencies among the various components
- How the solution is to be organized

The SDS will then include the architectural overview describing the system as a set of communicating entities that collaborate to perform a task. The Architectural design shows these entities, their relationships and the relationship to the actors in the system. This section will provide a high-level overview of how the functionality and responsibilities of the system were partitioned and then assigned to subsystems or components, with cross-references back to the equivalent requirements in the SRS document. The main purpose here is to gain a general understanding of how and why the system was decomposed, and how the individual parts work together to provide the desired functionality.

The system architecture will then be decomposed into detailed descriptions of the Security Requirements Hardware Requirements, and Software Requirements and will also document any global limitations or constraints that have a significant impact on the design of the system's software (and describe the associated impact).

After system architecture has been defined the SDS will document the design of each system feature including all the screens, data and reports needed to deliver all of the functional requirements. Included are screen descriptions, screen shots, data descriptions, database diagrams, data relationships, report descriptions and report formats. Design may include process flow diagrams describing the process steps attached with workflow arrows with decisions and/or validation performed in between.

Additional considerations that may be described in the SDS include:

- Data Conversion Modules
- Archive and Purge Modules
- Backup and Recovery Design
- Security Architecture
- System Interfaces
- Batch Jobs
- Performance and Response Time Considerations
- Platform Dependence and Installation Considerations
- Localization Considerations

