University of Texas at Austin, Advanced Research in Software Engineering Center (UT ARiSE)

IV&V Review Services for the State of Texas OAG CSD TXCSES 2.0 (T2) Program

Semi-Annual Review Report (SRR) Volume I - Findings

Version: 2.0 Final
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This report includes an assessment of the T2 program at a single point in time based upon defined standards and industry best practices. It is not meant to represent an overall evaluation of the program, but rather serves as a "snapshot" of the program's adherence and utilization of these knowledge sources as of July 7, 2014. Each subsequent Semi-Annual Report will build on prior reports.

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VERSION HISTORY

Version #	Written, Changed By	Revision Date	Approved By	Approval Date	Reason
1.0 – DRAFT	UT ARiSE IV&V team members: Herb Krasner, Don Shafer, Bob Futrell, Dewayne Perry, Linda Shafer, Sarfraz Khurshid, Susan Tennison, Bill Young	August 1, 2014	J. Hicks		Semi-annual Report – Initial Draft Version to OCSE (and copy to OAG Contract Manager)
2.0	UT ARiSE IV&V team leader: Herb Krasner	August 18, 2014	J. Hicks		Version updated to incorporate OCSE comments provided on Aug. 18, 2014. (and ready for dissemination to OAG CSD)
2.0 Final	UT ARiSE IV&V team leader: Herb Krasner	September 12, 2014	J. Hicks		Version updated to incorporate OAG CSD comments on findings provided on Sept. 9, 2014.

1. EXECUTIVE SUMMARY

This semi-annual review report represents the seventh semi-annual review in our series, starting in July 2011. IV&V involvement in the T2 Initiative started after the program was two years into its system renewal stage (2009).

For this review, the UT ARiSE IV&V team gathered information from a variety of sources related to the management, engineering and support aspects of the T2 Program and its key sub-projects. We attempted to gain a current snapshot of the program and its major challenges relative to the scope of our IV&V task (*i.e., ensuring that they are building the right system, and that they are building that system the right way).*

The table below shows the lifecycle status of the total set of all IV&V findings, from our initial review in July 2011 through our most recent semi-annual review. This shows the current balance of open and closed findings, and shows that IV&V's findings are being systematically addressed and resolved by T2.

Table 1.1 - IV&V Findings Progress Scorecard for July 2014

Finding Category	Finding Count	Comments
NEW	5	5 high
OPEN	12	5 urgent, 7 high
CLOSED (this period)	7	4 urgent, 3 high
CLOSED (all prior periods)	57	
TOTAL	81	

We also continue to track factual data to indicate how big and dynamic the T2 initiative and emerging T2 system are. Such a massive program is a challenge to carry out. The table below shows the program size indicators for this review in comparison to the last 3 reviews.

Table 1.2 – Indicators of Program Size and Dynamics

Indicator	SRR July 2014	SRR January 2014	SRR July 2013	SRR January 2013
Staff size	The T2 organization has been split into two organization charts (CSD and DDI) to better align with a shift in responsibilities. The headcounts reflect this. There are 331 staff positions counted on the organization charts; 15 positions are TBD. DDI added 68 IDC positions, expecting to ramp up to 104 or more. RFD employs seven positions for QA. Many staff members are in multiple positions.	344 staff positions were counted on the T2 organization charts. 273 of these are filled (DDI = 89, CSD = 175, other contractors = 9). This includes full-time and part-time staff. There are 71 positions TBD (DDI = 10, CSD = 61) This includes incremental resource needs, vacancies, and planning for Release 2.0 (FIN). CIL has 90 positions including 3 TBDs.	372 staff positions were counted on the organization charts. This represents a 20% overall growth from the previous period (primary due to DDI ramp up and RFD on boarding). Those 372 positions are filled by 193 unique names, with many serving in 3-5 positions. There are 18 positions TBD.	301 staff members were counted on the organization charts. (e.g. 71 on CIL). This represents a 10% overall reduction in headcount (primarily reflecting departure of CAV, etc.).
Staff hours consumed	The current T2 work plan was baselined twice so far in 2014 (3/31/2014 and 5/29/2014), and shows 1,605,513 hours in the current work plan. 824,900 hours (51%) of the baseline have been	The current T2 work plan was baselined twice in 2013 (January and August), and shows 1,406,553 hours in the current work plan (including FIN). 679,265 hours (48%) of the baseline have been expended	The new T2 schedule baselined 01/25/13 (combining Phase 1 and Phase 2 into Release1, with high level FIN work estimates) has 1,211,170 hours in the baseline work plan. 571,925 hours (47%)	Due to the "Rescheduling Effort" that combined Phase 1 and Phase 2 into Release1, 1,220,793 hours are now in the new work plan (which includes FIN hours this time). 459,423 hours (38%) of that have

Indicator	SRR July 2014	SRR January 2014	SRR July 2013	SRR January 2013
	expended through 7/18/2014 (consuming 56% of the current plan timeline to the currently projected end-of-project on 5/31/2018).	through 1/10/2014 (consuming 44% of the current plan timeline to end-of-project on 3/30/2018). CIL has consumed 245,592 hours.	of the baseline have been expended through 7/12/2013 (consuming 42% of the current plan timeline to end-of-project on 3/30/2018). CIL has consumed 197,175 hours.	been expended (consuming 43% of the current plan timeline). CIL shows 77,257 hours consumed.
Planned tasks	5182 line items are being tracked in CSD's T2 Initiative Clarity work plan, with 5464 Release1 and 114 FIN line items being tracked separately in the DDI's WBS's maintained in MS Project, tying into the CSD Clarity work plan at key milestones. The sum of detail from both WBS's represented all the planned work in the Initiative today.	4229 line items are being tracked in CSD's T2 Initiative Clarity work plan, with 4667 line items being tracked separately in the DDI's WBS maintained in MS Project, tying into the CSD Clarity work plan at key milestones. The sum of detail from both WBS's represented all the planned work in the Initiative today. The CSD plan includes all Initiative level tasks/ deliverables, all the Release 1 projects & iteration work, Capture, Case File Conversion, VCF, EBO and FIN. The Release 1 plan on the DDI side only reflects the Release 1 projects and iteration work which excludes Initiative level tasks/deliverables, Capture, Case File Conversion, VCF, EBO and FIN.	4042 line items are being tracked in CSD's T2 Initiative Clarity work plan, with 4438 line items being tracked separately in the DDI's WBS maintained in MS Project, tying into the CSD Clarity work plan at key milestones. The sum of detail from both WBS's represented all the planned work in the Initiative today. The DDI WBS does include the Iteration 1 & 2 efforts for Release1, but does not yet include the IDC as a development resource.	3984 line item tasks are being tracked in the CSD T2 Initiative Clarity work plan. There are 4206 tasks being tracked in the DDI Release 1 work plan. There has been a shift of detail from the Clarity plan to the DDI's plan in MS Project. These are synchronized weekly.
System requirements and size/scope	There are currently 17,728 total entries in ReqPro. 5,698 of those are inactive. 12,030 requirements represent Release 1.0 (R1) functionality to be validated. In the past few months, requirements volatility has been flaring up within the projects (e.g. CIL, Tech Arch), but has now settled down. Requirements have become more stable as a result. From design it is estimated that there will be 2701 components built in R1.	There are currently 21,080 total entries in ReqPro. 5,786 of those are inactive. 11,428 active requirements represent Release 1 functionality to be validated. Requirements volatility has been averaging about 8.26% per month with considerable variation across the projects.	There are currently 23,442 total entries in ReqPro. 8174 of those are inactive. 13,939 active requirements represent Release 1 functionality to be validated. Requirements volatility has been averaging about 1.5% per month with considerable variation across the projects. No change was observed in the number of BPMs (103).	There are currently 21,775 total entries in ReqPro. Approximately 4,500 of those are inactive. The number of different types of requirements was reduced from 22 to 15. No change observed in the number of BPMs (103). The conceptual model that shows the relationships between the BPMs is still missing.
Development Process Size	Version 14_04 is the current Playbook released in June of 2014. Further changes are scheduled for another release within the next few months. The SEP, VP and PSP will likely see the most significant changes as the DDI team moves forward with their own methodology (ADM).	Version 7.07 is the current Playbook released on 7 January 2014. Further changes are scheduled for another release within the next 6 months. 57 sections were changed causing changes to be done within the ClearQuest Tool Set. Many other technical processes are performed outside of the Playbook.	Version 7.06 is the current Playbook. Several parts (plans) are going through incremental improvements. (E.g. SEP, VP, PSP). Other important processes are being performed outside of the scope of the Playbook.	Version 7.03 of the Playbook is current. Several parts (plans) are going through incremental improvements. The SEP is being overhauled using DDI's ADM material.
COTS Tools Included	The official list now shows 191 COTS tools to be included in the program, however we discovered several more during this review. This list will continue to dynamically change and there needs to be a single point of control.	Within the T2 controlled documents, technical architecture has a listing of 132 COTS tools used in the project. Another spreadsheet of 201 COTS tools is used at the program management level and for the environmental build out teams. It has not been	Over 201 COTS tools are currently identified across all platforms and environments. It is not clear how many of those will actually be used.	Over 130 COTS tools are currently identified to be in the system solution suite. An exact count was not available this review.

Indicator	SRR July 2014	SRR January 2014	SRR July 2013	SRR January 2013
		determined which one of these individual lists or a combined list is correct, accurate or true.		

In the fall of 2012, the T2 Steering Committee approved a new deployment approach to implement the Phase 1 projects with Phase 2 (EER) creating Release 1.0. The key benefit cited was to minimize the risk associated with the integration between the new T2 system and the legacy T1 system. Release 1.0 is now targeted for deployment in July 2016.

The detailed work plan for Release 1.0 is still in flux and we were presented with a new baseline schedule, which was already out of date, and a yet another baseline schedule is being developed to accommodate an additional 50,000 – 80,000 hours of unscheduled work to be done by DDI. IV&V anticipates that there will be significant challenges in meeting the Release 1.0 go-live schedule. Nonetheless, IV&V observed that the key development projects are making forward progress.

We were also presented with a significantly revised organization chart. This chart segregates the program into 2 major pieces to facilitate the shifting of more development responsibilities onto the DDI vendor. DDI has more than doubled its offshore IDC workforce to build the components of the R1 system.

The current status of the T2 Initiative is reflected in their June 30, 2014 management status report. It stated the following:

1. Prior to development, DDI re-estimated the effort to complete the project based on the results of the design activities. They identified an increase of 56,000 hours for project-related work and 25,000 hours of Integration work to complete Release 1. As a result the work plan is being updated and a revised baseline will follow in September 2014. Schedule and effort variance reporting will therefore resume in October, 2014. There is no cost increase as a result of the increase in hours and the Release 1 go-live date remains July 2016. *If those additional hours are on the critical path, it is not clear to IV&V how the R1 go-live date will be affected.*
2. The Quality Indicators for FIN, CIL . Therefore, the T2 Initiative Quality Indicator remained red.
3. There are no severe risks. The number of open significant risks increased from 4 in May 2014 to 8 in June 2014. There are no critical issues. The number of open high issues decreased from 13 in May 2014 to 10 in June 2014.
4. All Requirements Volatility indicators were "Green". There was a major flare-up in the Tech Arch project in May. The Business Services Council continues to scrutinize modifications to requirements to ensure a stable baseline now that development has started.
5. CIL and ECM successfully transitioned from Design to Development. Development work is being performed at the State Office and the DDI India Development Center (IDC).
6. Next steps in the program include:
    - Re-baselining the workplan by September 2014. R1 design work is already tracking late.
    - As the Architecture team completes their work, the Application team continues to review the work products for any impacts to designs.
    - Continue final build outs and verification for Pre-development and Development environments. This is planned to be completed in August 2014.
    - Continue with Technical Design and formally complete designs via acceptance of the Solution Specifications by October 2014.
    - Continue CIL and ECM Development.
    - Continue to write System Test scripts.

IV&V also observed weaknesses that are currently plaguing the Initiative. In summary, these are:

1. The scarcity of knowledgeable resources in certain key technical areas.
2. The lack of widespread understanding of the solution system architecture under development. Some of this is due to architecture terminology problems. This has improved significantly with the creation of the war room and the availability of the architectural blueprint diagrams for posting on the wall.
3. DDI's IDC Team has doubled in size since our last review, and may have the usual off-shoring risks when full-scale implementation starts. Communication and OAG project understanding issues are mitigated by sending the DDI lead designer to India for 6 months to run that team. There are ongoing issues with the availability of the virtual desktop development environments used by the IDC but managed and controlled not by the server managers at DCS but by OAG CSD IT personnel in the Oltorf building.
4. There are several significant CR's pending in the BSC that may push the R1 schedule out, if all are approved. There is no explicit prioritization scheme in place to help decide what to remove in order to put in new CR's.
5. The Playbook's SEP, VP and PSP will need more refreshing as the program moves into ADM guided system development.
6. CSD Staff are concerned that there is not enough time being allocated for system, performance and UA testing.
7. BPA roles, responsibilities, and training are not yet focused on new Business Process Management (BPM) tools, e.g. IBM Portal8.

Ongoing concerns from previous reviews include:

1. Some design reviews/validations were taking way too long (e.g. 9 mo.!). This has improved significantly since our last review, and the 5-5-5 rule has more recently been routinely successful.
2. Complex system architecture definitions contain multiple COTS tools' suites; e.g. Websphere, MQ Series, Tivoli; to be somehow integrated, in the context of the evolving system architecture.

4. Environment readiness, maintenance, ownership and roles and responsibilities are still in doubt.
5. Release 1.0 will now be "a big bang" integration.
6. CSD staff are over allocated, playing multiple roles, with significant knowledge gap issues.
7. There is a missing T2 maintenance process to be defined.
8. CSD's ability to acquire and retain needed technical expertise is problematic.

As well as following up on all of the previous IV&V findings, the following focal points are intended for the next Semi-Annual IV&V Onsite Review scheduled for January 5-16, 2015:

1. Planning and roles/responsibilities definition within IT for the "go live" and IDC work products delivery in June 2015.
2. Quality of the work products sampled from the IDC.
3. Adequacy of preparation and planning for system level, performance, regression and UA testing
4. T1-T2 conversion project progress
5. IDC interface, process and performance
6. FIN requirements definition and design progress
7. Technical architecture evangelism
8. Environments stability and availability (especially beyond dev)
9. Potential Release 1 capabilities de-scoping and schedule slippage
10. Security mechanisms
11. The ending of the dedicated T2 DCS team in August 2015 (with 100+ servers to build out and manage)
12. The status of upgrading all Windows 7 workstations and COTS code to supporting Java 8 to have been released in March 2014
13. The design and development of interface requirements between T1 and T2 during the year between Release 1 implementation and Release 2 implementation

The remainder of Volume I of this report provides the details of our findings and recommendations for this semi-annual reporting period, and is organized as follows:

- Section 2 contains a summary of the background, scope and objectives for this review.
- Section 3 shows the application our IV&V Review Methodology.
- Section 4 contains the analysis criteria used and the mapping to the predefined checklist activity areas.

- Section 5 presents the findings, ordered as new findings discovered, previous open findings and findings closed for this SRR.
- Section 6 shows the summary and relative prioritization of our findings.
- Section 7 shares our tentative emphasis areas for the next semi-annual review, when we intend to follow-up on progress against the findings presented here and also focus our attention on other program specific areas.
- Attachment 1 provides CSD management's response to our current findings

Volume II of this report contains all the appendices. It contains supporting information used or created in the course of this review. The specific Appendices are:

A. Findings And Recommendations Prioritization Criteria
B. Definitions And Acronyms Used
C. Detailed Lists Of Interviews Held, And Meetings Observed
D. IV&V Evaluation Checklists
E. Previously Closed Findings
F. Findings Elaborations

2. SCOPE AND OBJECTIVES

There are two primary audiences for this report. First, the Federal Office of Child Support Enforcement (OCSE) who is a champion for truly independent V&V assessments performed on state-level Child Support Enforcement systems. The second target audience of this report consists of those executives, managers and technical staff members responsible for the management, definition, development, deployment, maintenance and evolution of the T2 system within the OAG CSD organization.

The information contained in this report is aimed at those who must make decisions about the future directions that the T2 Program will take with regard to ultimately deploying a T2 system that both meets the needs of its users, and is well engineered.

2.1 T1 Background

The State of Texas relies heavily on automation to successfully deliver child support services on more than 1.4 million active cases, but the number of cases is growing rapidly thus putting serious pressure on the agency to be able to do more with less.

2.2 T2 Rationale

While the current system has proven to be successful for more than 15 years, it is built on 20 year-old technology that lacks the flexibility and adaptability that will enable CSD to meet increasing customer service demands, manage growing and changing caseloads, improve automation of processes, and attract and retain a changing workforce.

The T2 Initiative started in 2007 when CSD began an effort to evaluate inefficiencies in their current processes and technologies, develop recommendations for improvements, and determine CSD's readiness to implement the recommendations. In 2008, the CAV delivered a multi-year roadmap (T2 Roadmap) of projects that support CSD's vision to incrementally renew the existing child support system using newer technologies. CSD refers to this initiative as "T2." The initiative encompasses the framework and strategy to move the agency, its staff, and its stakeholders out of their reliance on aging, inflexible systems and technology into a much more modern, agile, efficient and customer centered environment, which ties the business and IT practitioners together more effectively.

Looking Forward
The benefits of T2 are expected to be significant. This initiative will position Texas to satisfy ever more demanding customer service expectations, handle increasing caseloads, and compete effectively for incentive funding in the face of ongoing reductions in Federal matching funds. The CSD will ultimately be a much more effective organization, able to do more with less, make better decisions with more reliable information, and ultimately deliver better results for the children of Texas. The following is the vision for the future environment:

- Enable a mobile work force.
- Enhance self-service capability.

- Allow for incremental renewal.
- Leverage existing tools.
- Minimize custom development.
- Flexible and adaptable architecture.
- Open architecture.
- Enterprise security.
- Usability.
- Reduce batch processing.

For more information on the T2 vision and roadmap, please see the latest version of the T2 PMP.

2.3 T2 Program Overview

The TXCSES 2.0 Initiative lays out a multi-year strategy for incremental renewal of the TXCSES system using new technologies. The strategy allows CSD to enhance the system over time while assessing and realizing benefits at each stage of implementation. This incremental approach allows CSD to better manage project costs over a multi-year timeline, control risks, and manage change within the organization and technical environment.

The following system releases comprise the TXCSES 2.0 Delivery Strategy:

- Enterprise Content Management
  - Release 0.01 – Capture System (implemented May 2011)
  - Release 0.02 – Virtual Case File (VCF) Version 1 – Pilot
- TXCSES 2.0 Release 1.0
  - Case Initiation and Locate Renewal (CIL)
  - VCF Version 2, T1/T2 Integration, RODEO (E-Forms), Enterprise Reporting System,
  - Establishment and Enforcement Renewal (EER)
- TXCSES 2.0 Release 2.0
  - Financial Renewal (FIN)
  - Retirement of TXCSES mainframe system (T1)

The interested reader may see the latest version of the TXCSES 2.0 Initiative Project Management Plan, Section 1, for a detailed description of the development projects and the release strategy.

2.4 Review Objectives

The overall objective of our IV&V Reviews are to provide periodic, independent analysis of the technical and managerial activities within T2 in order to identify, inform and educate T2 management, stakeholders and other interested parties, as well as the OCSE, of any areas of weakness and/or risk to T2.

Also it is intended to propose and recommend solutions for remediation and/or mitigation of said weaknesses or risks in order to provide the following key benefits:

- Identify high risk areas early
- Provide State and Federal stakeholders with an objective analysis to deal with system development issues
- Provide management with improved visibility into the progress and quality of the development effort
- Ultimately reduce errors and improve quality in delivered products

For this semi-annual report we believe that we have accomplished these objectives. We also followed up on the assessment and findings of our previous reports. Specifically, we examined and determined progress for their findings.

Given that most of the Release 1.0 projects above are moving through the design stage of their development lifecycle, we focused our attention on their overall lifecycle processes, and primarily the system engineering stages (requirements definition, specification, architecture, design, construction) as well as planning for the later stages (implementation, testing, deployment, operation and maintenance, etc.). CIL is moving into software development and so we focused on the middle of the lifecycle for it.

3. METHODOLOGY

The UT ARiSE IV&V review team collectively has over 250 years of experience in IT/software systems engineering, management, support and service disciplines. Each member contributed their unique expertise and experience to cover all of the review areas. Shown in the table below is a brief overview of the team members, their title(s) and primary areas of responsibility.

Table 3-1 IV&V Team Members

Name	Title (s)	Review Team Role	Areas of responsibility for this review
Herb Krasner	Director of UT ARiSE Outreach Services, Senior Lecturer in Software Engineering	IV&V Project Manager, Review Team Leader	Overall Report Synthesis, Requirements Management, Process Management, Quality Management
Dewayne Perry	Professor/Chair of Software Engineering, Director of UT ARiSE	Senior reviewer	Technical Solution (Architecture), Process Management
Sarfraz Khurshid	Associate Professor, Director of Software Testing V&V Laboratory	Associate reviewer	Technical Solution (COTS), System and Acceptance Testing, Development Testing
Bob Futrell	Project Management Practice Leader, Cooper Consulting	SME reviewer	Program and Project Management
Susan Tennison	IT Consultant, E W Consulting, Inc.	Junior reviewer	External Dependencies, Human Resources, Operational Environment
Don Shafer	Corporate Director and Chief Technology Officer, Athens Group	SME reviewer, Backup review team leader	Technical Solution, External Dependencies, Data analysis, BPM Technology
Linda Shafer	Certified Software Development Professional, Certified Software Quality Engineer, Senior Member, IEEE Computer Society	SME reviewer	Human Resources, Project Management, Quality Management
Bill Young	Research Scientist, U. of Texas at Austin	SME reviewer	System Security, System modeling and verification, Technical development approaches.

The following section contains a brief narrative description of the process used in the performance of our IV&V reviews. Our full IV&V review methodology is described in our IV&V Project Management Plan (delivered separately). For this review we collected and analyzed data from the following sources:

1. *Interviews* – oral interaction with those performing the work within the organizational unit. Interviews were held with various groups or individuals, such as project leaders, managers, SE practitioners and support staff. Combinations of formal and informal interviews were held, using interview scripts or exploratory questions developed to elicit the information needed. A presentation or demonstration also served as an interview if interaction between the review team and presenter ensued.
2. *Meetings* – observational notes of T2 team meetings that were held for various purposes. The IV&V team had the opportunity to sit in and assess how effective the meetings were, relative to their stated purpose. This involved observing meeting protocol as well as outcomes.
3. *Documents* – review of written information relative to the implementation of one or more artifacts, products, or processes. These documents included organizational/project plans, policies, procedures, implementation-level artifacts, instruments (e.g., questionnaires), and presentation materials. Documents were available in

hardcopy or softcopy or accessible via hyperlinks in their Web-based environment.

4. *Metrics* – analysis of measurement data provided in either electronic or manual form. In many cases, data gathering is enabled by the use of automated collection tools.
5. *Survey data* – in some cases a pre-onsite project survey is used to collect basic information about each project. These results are then used to guide the project leader round of interviews. The surveys are stated as confidential, so as to protect the identity of the individuals. Other surveys may be done when appropriate.
6. *Field trips* – direct observation of the activities, processes, systems, infrastructure and repositories at CSD Field Offices, Call Centers, Court dockets and related user activities.

Using multiple data-gathering mechanisms we improved the depth of understanding and enabled corroboration of the data and findings. The "focused assessment" paradigm is to:

1. Understand what objective information was available, and how it contributed toward gauging the success/failure/risks of the unit within the review scope.
2. Continually consolidate the data to determine progress toward sufficient coverage of review model areas.
3. Focus review resources by targeting those areas for which further assessment was needed to collect additional data or verify the set of objective information.
4. Avoid unnecessary or duplicated effort that did not contribute additional information toward achievement of sufficient coverage or toward obtaining significantly greater confidence in the review results. For example, keeping interviews efficient by asking further questions only about areas for which sufficient data had not been obtained.

As the review process progressed, the review team aggregated and synthesized additional objective information, and used this information to draw inferences about the overall performance of the T2 Program. Wherever there were shortcomings in the review team's understanding of T2's performance, new data-collection strategies were determined to probe for and obtain more information. For example, in cases where the objective information was missing, unclear, or insufficient, other documents were requested. Generating focused questions for follow-on interviews added specificity and better understanding. By maintaining a current inventory of the status of the review objective information and prioritizing areas where additional information was still needed, these focused assessment approaches were continuously and iteratively applied to narrow identified gaps and converge on sufficient coverage for proceeding with the findings and recommendations.

The following specific data sources were used in our IV&V analysis process during this review.

Table 3-2 IV&V Data Sources

Type	Number	Comment
Interviews	Over 200 people/roles interviewed	See Appendix C, Volume II
Meetings observed	Many team meetings observed	See Appendix C, Volume II
Documents Reviewed	Many documents were viewed electronically	Found on the T2 shared drive, or delivered in electronic form to the team
Metrics Data	Clarity, ClearCase, ClearQuest, ReqPro, etc.	See various findings descriptions with the data embedded
Field Trips	None this review period	

For more details please see the tables in the appendices listing all interviews conducted, meetings observed, documentation reviews performed, artifacts analyzed, etc.

4. CHECKLIST AREAS AND REVIEW WORKSHEETS

Presented in this section are the worksheets used in the performance of this IV&V review. These worksheets present a high level view of our focus and findings by activity area, and have been completed, scored, commented, etc. as applicable.

Weighting and Scoring the Activity Areas Reviewed

The tables below identify attributes for the reviewed activities in terms of their relevance for this particular review and a general indicator of their strength of practice. Activity area relevance is an outcome of our review-planning phase, whereas the strength indicator is an aggregate review finding. Both of these attributes can be measured on a Likert scale with the following meanings.

Table 4.1 - Relevance and Strength Indicators Definition

Indicator	Relevance meaning	Strength meaning
0	*Minimal*	*None*
1	*Little*	*Weak*
2	*Some*	*Somewhat weak*
3	*Moderate*	*Average*
4	*High*	*Strong*
5	*Critical*	*Superior*
NR	*Not relevant*	*Not rated*

For this Semi-annual review the following activity areas have been assigned the identified relevance indicators. Their notional strength indicators as determined in summary over all previous reviews are also shown below.

Table 4.2 –Checklist Activity Areas, Relevance and Strength Indicators

Activity Area	Relevance	Strength
Program & Project Management Activities (Including vendor management)	**5**	**5**
Quality Management Activities	**5**	**5**
Human Resources	**5**	**3**
Process Management and Maturity	**5**	**4**
Systems Engineering	**5**	**4**
Requirements Management Activities	**5**	**4**
Development Environment Activities	**5**	**3**
Software Development Activities	**4**	**3**
System & Acceptance Testing Activities	**3**	**2**
Data Management Activities	**3**	**3**
Training Activities	**3**	**4**
Operating Environment Activities (Including external dependencies)	**3**	**2**
Operations Oversight Activities	**2**	**NR**

The relationship of our Findings Areas to the Checklist Activity Areas indicating the negative findings tag identifiers is shown in the table below. See Appendix D, Volume II for the detailed IV&V activity area checklists used for this review.

Table 4.3 – Findings Areas and Checklist Tags

Findings Area	Primary Activity Area Tags
Program/Project Management	PM-3, 4, 7, 8, 10, 25, 26, 27, 30, 31, 32
Requirements	RM-2, RM 10-18, OE-4
Quality Management	QA-1, 6, 9, 10, 11, 13; OO-3; MA-1, PM 35, 36
Process Management	DE-4, DE-6, PM-10
Systems Engineering	SE-1 through SE-9
Technical Solution	OE-8, 10; SD-1; DM-1, 3
External Dependencies	OE-1; DE-1, 3
Human Resources	HR 1-8

RM-Requirements Management, OE-Operating Environment, DE-Development Environment, PM-Project Management, QA-Quality Assurance, MA-Measurement and Analysis, SE – Systems Engineering, SD-Software Development, DM-Data Management, HR-Human Resources

5. FINDINGS

5.1 Findings Introduction

During each semi-annual review IV&V identifies areas of concern that need to be brought to the attention of OAG, CSD and the Federal Office of Child Support Enforcement (*OCSE*). These concerns reflect exceptions from related standards and/or generally accepted best practices. When such concerns arise, they result in an IV&V finding. In addition to the description of the finding, suggested recommendations are included for how the concern might be addressed. Progress against previously open findings is reported, as well as, new findings that were identified during this semi-annual reporting period.

For each finding the following information is provided:

- **Finding Number**: The dark blue banner across the top of the table contains a unique identifier for the finding in the form FxxL-###, where xx represents the 2-digit year, L represents either an A or a B standing for the first or second semi-annual review of that year, and the ### is an appropriate sequence number. These numerals are assigned sequentially as new findings are created. This identifier is used to track and report progress on the finding through closure. This is followed by the finding short name for tracking purposes.
- **Finding Short Description**: An unlabeled, un-shaded, section follows the banner. It includes a general description of the essence of the finding. The finding details are included in the *Findings Description* section described below.
- **Period Opened**: The *period opened* is represented by the month and year of the IV&V Semi-annual Report (*SR*) where the finding was first created and reported.
- **Period Closed**: This section will contain NEW in the report in which the finding was first identified. In subsequent reports it will contain OPEN until it has been closed. At that time it will include the month and year of the IV&V report where the finding was closed. Findings may be closed in either a SR or SR update.
- **Degree of Impact**: See ***Appendix A*** of Volume II.
- **Probability of Impact**: See ***Appendix A*** of Volume II.
- **Time Criticality**: See ***Appendix A*** of Volume II.
- **OCSE Priority**: See ***Appendix A*** of Volume II.
- **Progress Indicator**: This section identifies the IV&V assessment of progress toward the closure of the finding. The progress indicator for each finding will either be NEW, NO PROGRESS OBSERVED, PROGRESS OBSERVED, or CLOSED. The guide for interpretation of the progress indicators is as follows:
  - NEW: The finding is being identified for the first time in this report.
  - PROGRESS OBSERVED: Significant[1] progress was observed during this reporting period toward the closure of this finding and the finding might reasonably be expected to be closed according to the guidelines in *Appendix A*.
  - NO PROGRESS OBSERVED: Though there may have been some amount of progress in this reporting period, significant progress was not observed toward the closure of the finding according to the expectations for closure identified in *Appendix A, Volume II*.
  - CLOSED: The finding was closed in this report. If the finding was closed due to being overcome by events, an (*OBE*) will be appended to the progress indicator.
- **Related IV&V Tasks**: This section will include one or more identifiers for activity areas from the checklists in Appendix D. It was during the assessment of these activity areas that the finding was generated. While there may have been several activities that relate to the finding, only the most relevant are included in this section. Links to related findings are also found here.
- **Finding Description**: This section contains a detailed description of the original observations that led to the creation of the finding. The conclusions documented in this section were based upon the assessment of the

[1] In this context "*significant*" means that, based upon any progress noted, URGENT or HIGH priority findings may be reasonably expected to be closed in the next reporting period. For findings with lesser priorities the expectation is that they might be reasonably closed within two reporting periods. See *Appendix A, Volume II* for more details.

program/project based upon industry standards and best practices at the time the finding was created. Additional observations as discovered are found in the Status Update section.

- **Risk**: This section includes one or more statements of the risk to the project associated with this finding.
- **Recommendations**: This section includes a general recommendation from IV&V for how the finding should be addressed, and additional recommendations as needed to help the program make progress toward remediation of the finding.
- **Relevant Standards, Best Practices, and Related Resources**: This section includes a list of:
  - Standards that are relevant to the concerns identified in this finding. In addition to the name of the standard, the each entry may include pointers to specific sections within the standard that apply to things identified in the *Finding Description* section.
  - Not all best practices have been formally standardized, but they are nonetheless accepted as generally accepted approaches. Where no specific standard can be identified, the best practice will be described in brief. If available, pointers to resources related to the best practice will be identified.
  - There may be references to other related resources, such as the project documents and artifacts reviewed in identifying the findings.
- **Status Update**: This section is included for findings that were identified in a previous report. This section includes a detailed chronological status of the program's progress related to the concerns identified by the findings.

As directed by OCSE, the findings presented are intended to be "exception based" and will therefore be interpreted as weaknesses relative to standards and best practices.

The findings are organized into the following sections:

- New findings observed during this review period,
- Status updates to previously open findings,
- Findings that were closed during this review period.

5.2 NEW FINDINGS.

This section presents new findings that were identified during this semi-annual review period. They are presented in alphanumeric order by assigned *Finding Number*.

F14B-001 Lack of Requirements Prioritization			
The lack of explicit priorities defined for the body of T2 requirements will make tradeoff decisions more difficult when push comes to shove.			
Period Opened	July 2014	**Period Closed**	NEW
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OSCE Priority**	HIGH
Progress Indicator	NEW		
Related IV&V Tasks	RM-12		

Finding Description

With over 12,000 active requirements in ReqPro representing Release 1.0 (R1), all are described as MEDIUM priority. It is widely assumed that these requirements completely cover all related T1 functionality, which has never been verified (at least not in EER). It is also widely assumed that the current set of active requirements are "doable" by the release date of July 1, 2016 "as is". And yet there are already many "in-flight" change requests (CRs) that are in limbo pending the analysis of what will have to be deferred in order to squeeze in the new requests. Although these 22 CR's have been prioritized in relative order of urgency, the BSC are starting to ask key questions about these: For example

1. Is the change the result of a required Policy Change, Legislature Change or Federal Certification Requirement?
2. Is the change a requirement or a "nice to have"?
3. Can the change be deferred to a future release?
4. What is the effect on the release if we don't do it until later?
5. How do we handle an "emergency CR"? (which popped up while we were onsite)

The question they are not yet asking is "what do I take out in order to squeeze this CR in?". Over the next year some tough decisions must be made about what R1 functionality will have to be deferred in order to squeeze in new and forgotten requirements. However, there is no objective basis in place for making those decisions, and IV&V is concerned that these decisions will be made on an ad hoc basis.

Requirements prioritization is used in IT management for determining which candidate requirements of a system/product should be included in a certain release. Requirements are also prioritized to minimize risk during development so that the most important or high-risk requirements are implemented first. Several methods for assessing a prioritization of IT requirements exist. It ensures that the project focuses on the most important elements first, and that everyone understands and agrees regarding what the project's most important elements are. Good prioritization of requirements will also ensure that managers, engineers, programmers and analysts develop a project's most critical elements in sync with the business needs.

Establishing each chunk of functionality's relative importance also lets you sequence construction to provide the greatest product value at the lowest cost. Requirements prioritization enables an organization to ensure that requirements are ranked and implemented in a systematic approach.

Many projects do not have the dedicated staff to implement all features at once; and many long-term projects experience shifts in priority as business needs change. In virtually all projects, time and resources will dictate that only a certain number of requirements can be addressed at any given time. Therefore, it behooves the organization to ensure that the requirements addressed at any specific juncture are the ones they believe to be the most important.

Business Considerations in Requirements Prioritization

When it comes to the process of assigning a requirement's priority, any requirement may be prioritized at any point in its lifecycle. But regardless of when it is done, before a requirement can be prioritized, an analyst must consider what is most important from a business standpoint. There are a number of possible business considerations , including value, cost, risk, difficulty of implementation, likelihood of success, stakeholder agreement and urgency, each of which is described in more detail below. Often, a combination of these methods is used when considering the business need; rarely is one alone used in a vacuum.

- **Value** – This approach focuses on the business benefit of any given requirement; the requirements that will return the greatest business or economic value are given the highest priority. This focus on value helps to ensure "quick wins" for the organization.
- **Cost** – With an eye toward funding, this approach may be implemented a number of ways—implementing the least expensive requirements first or first implementing requirements with the greatest ROI (return on investment).
- **Risk** – This approach prioritizes the riskiest requirements first, with the logic that should they fail, the project can be abandoned with a minimum of investment. This approach often makes sense when a controversial or untested initiative is planned.
- **Difficulty of Implementation** – The inverse of the risk approach, a focus on difficulty of implementation places the highest priority on the requirements that are the easiest to implement—the safest bets. The benefit of this approach is that it allows a project to get some project benefits deployed quickly, enabling customers and other stakeholders to become familiar with the project and give critical feedback before the organization moves forward to deploy more difficult aspects of the project.
- **Likelihood of Success** – Similar to difficulty of implementation, this method is frequently employed when a project is divisive and needs to shore up stakeholder support. It places highest priority on requirements with a high probability of success.
- **Regulatory Compliance** – With this approach, the requirements that are needed to meet legal and/or regulatory requirements are given highest priority. If an organization has a high priority (e.g. for legal reasons) to incorporate certain regulations such as federal certification compliance, requirements that force accordance with that would be given highest priority.
- **Relationship to Other Requirements** – Requirements often intermingle in complex relationships of interdependence. With this approach, requirements that support other high-priority requirements are also given high priority.
- **Stakeholder Agreement** – With this approach, stakeholders must come to a consensus on which requirements are most important, and then those are given highest priority. Within most organizations, stakeholder agreement is likely to be at least a partial factor no matter what other prioritization methods are employed.
- **Urgency** –This approach prioritizes requirements based on time sensitivity. An example of this approach would be if an organization wanted to unveil something at a trade show or to stakeholders on a certain date. The requirements that would make up the public-facing pieces would have to be implemented quickly, and those would be given highest priority based on the urgency of the looming deadlines.

The above business considerations will factor in when one employs a prioritization method to logically rank requirements' priority.

This finding will stay in place until the R1 requirements are logically prioritized into criticality subsets. It is likely the role of the Chief Customer Advocate with help from the BSC to perform these prioritizations when needed.

Risks

As a result of the lack of explicit prioritization it will more difficult to make tradeoff decisions on what will or will not be considered to be in scope for a particular release (R1).

Recommendations

Prioritization Designations

A project may use any prioritization designations that make the most sense to the stakeholders, or that the parent organization has already established as a convention. As with most methods and formats in requirements, it is a good idea for an organization to adopt one or more standard conventions for designating requirements if none have been chosen. This will ensure that managers, programmers, engineers, and analysts

are able to get in the habit of understanding requirements prioritization at a glance. In addition to some of the specific designations that go along with the methods described above, a few designation ideas that have been suggested include:

- High, medium, low
- Essential, conditional, optional, deferred
- Numerical or scale ratings
- Federal requirements, State requirements, T1 functional requirements, additional "must haves", additional "nice-to-haves", etc.

These designations may be headers for sections so that all requirements under one section would have that designation. Or, requirements may be placed in some other order that follows an organization's conventions, and the designation may be placed next to each requirement. Either method will assist managers, engineers and developers in knowing which pieces of the system deserve the highest priority and therefore the most of their attention.

Relevant Standards, Best Practices, and Related Resources

1. First Things First: Prioritizing Requirements" by Karl E. Wiegers. Software Development, September 1999. http://www.processimpact.com/articles/prioritizing.html

F14B-002 Overly complex business rules in EER

Many of the business rules dealing with legal processes in EER are more complex than industry standards would dictate.

Period Opened	July 2014	**Period Closed**	NEW
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OSCE Priority**	HIGH
Progress Indicator	NEW		
Related IV&V Tasks	SE-1		

Finding Description

In order to be adaptive and agile, processes require little constraint otherwise they become just as hard and fast as their older cousins built on ageing technology solutions. Not only this, but the effort and expense required to maintain and update complex rules outweighs the benefits of the agility touted. Business rules aren't mean to be hard and fast. These complex rules aren't meant to constrict decision making, process efficiency and/or set a workforce to automatic.

The EER project has a set of very complex business rules. There is at least one such example of a rule that is 4 pages long, with many logical AND or OR conditions all coupled together. Implementing these rules "as is" in a BPM solution will be difficult, especially to integrate, test and evolve. A simple yet useful industry standard is that each rule should be no more than 1 page long and should operate as a relatively independent unit of business logic. Standard software complexity metrics can be applied for more detailed analysis.

Risks
The primary risks to the initiative are that: ➢ Cost increases in implementation, testing, deployment and evolution ➢ Schedule delays ➢ Quality concerns
Recommendations
Some effort should be undertaken now to refactor these complex rules to see if they can be simplified.
Relevant Standards, Best Practices, and Related Resources
1. http://pic.dhe.ibm.com/infocenter/dmndhelp/v7r5mx/index.jsp?topic=%2Fcom.ibm.wbpm.wid.bpel.doc%2Fbusrules%2Ftopics%2Ftrefact.html

F14B-004 Methods for sampling of IDC-developed components for review have not been determined			
The strategy and procedures for sampling IDC-developed components for review have not been developed. Random sampling will not provide the necessary coverage.			
Period Opened	July 2014	**Period Closed**	NEW
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OSCE Priority**	HIGH
Progress Indicator	NEW		
Related IV&V Tasks	F13B-007, SD-18		
Finding Description			
Quality, being of utmost importance in T2, will be, in part, assured by stringent review of designated components delivered by IDC. It is assumed by IV&V that the volume of components delivered by IDC will be too numerous for exhaustive review (2701 components currently estimated for R1). There are plans to perform strategic sampling of critical components in addition to random sampling, but the identification of which elements are strategic/critical/risky has yet to be determined.			
Risks			
Artifacts containing defects could find their way into production.			
Recommendations			
Choosing the most relevant IDC-delivered components to be reviewed by CSD is a crucial aspect of T2 quality assurance. While it is known that a sampling of components should be based on risk, criticality and complexity, those terms have not been quantified. For example, complexity should be measured by an industry standard (such as cyclomatic complexity) and applied consistently to all code modules. Business priority along with a threshold of complexity, set by CSD, will allow the identification of modules becoming candidates for CSD review. Tracing to the T2 Initiative Risks and Issues documentation should identify potentially "risky" components.			

Relevant Standards, Best Practices, and Related Resources
1. http://en.wikipedia.org/wiki/Sampling_(statistics) 2. *Sampling Techniques, 3rd Edition* [Paperback], William G. Cochran, Wiley Publishing, 2007

F14B-005 System Performance Concerns			
System performance is a major component to ensuring project success and there are not currently any plans for ensuring that these objectives will be met.			
Period Opened	July 2014	**Period Closed**	NEW
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OSCE Priority**	HIGH
Progress Indicator	NEW		
Related IV&V Tasks	SE-1		

Finding Description

"Performance" typically refers to the response time or throughput as seen by the users. Responsiveness limits the amount of work processed, so it determines a system's effectiveness and the productivity of its users. Many users subconsciously base their perception of computer service more on system responsiveness than on functionality. Negative perceptions, based on poor responsiveness of new systems, seldom change after correction of performance problems.

The performance balance weighs resource requirements (workload and software) against computing capacity. A system will fail to meet performance objectives when resource requirements exceed computer capacity. All decisions made during the development of the system should take into account the performance requirements of the system. If developers implement software solutions before knowing about performance objectives, there can be performance problems inherent in code.

Isn't hardware fast enough and cheap enough to resolve performance problems? Surprisingly, the use of state-of-the-art hardware and software technology dramatically *increases* the risk of performance failures. This seems counter-intuitive — one would expect increased performance — but the newness of the products combined with the developers inexperience with the new environment leads to problems. This is particularly true for distributed systems, because the myriad of inter-related performance factors and the complexity of the design choices make intuitive performance design decisions difficult if not impossible. For instance, OAG bought the software before determining the interfaces needed for effective execution of the different COTS packages. Some of these interfaces have been tried in the Iteration X effort, but performance testing was not a part of Iteration X. However, the effect of the different packages on

performance will not really be known until the system testing phase.

As we held meetings with staff across the T2 project, we heard concerns about the performance expectations from most of the project areas:

- Concerns about long-term performance of the system.
- Concerns about the impact of additional offices being opened across the state on the performance of the T2 system.
- Concerns about the Service Level Agreements (SLA's) and whether they will be sufficient to reflect acceptable performance levels.
- Concerns about the performance of the development environment with the addition of the IDC.
- Concerns that currently there are decisions about coding, development and implementation being made without parameters for maintaining performance levels.
- Concerns about the complexity of rules in EER that will tax the performance of the overall system

DDI has stated that there will be a performance test and a person is being hired for this task. After 2-3 months of development, this person will begin testing performance. DDI has done some performance testing in the BPM space earlier and they have made changes in their approach based on the results of that testing. They have not done testing in the Portlet space and no performance objectives were tested during Iteration X testing. Performance testing will be included in the test plans being developed. The Systems Testing phase will include performance testing.

One lesson learned from VCF is to never skip performance testing. This lesson needs to be reflected in all plans for future steps in the development of the T2 system. There should be an R1 performance testing plan that elaborates the performance test goals in the R1 Master Test Approach.

Risks

The primary risks to the initiative are that:

1. Cost increases if additional resources are needed to provide the performance needed for optimal use by the workers in the field.
2. Reputation decreases when performance is not providing the workers in the field the response time they need.
3. Morale decreases when the system does not perform and staff cannot accomplish their work in a timely way.

Recommendations

Suggested recommendations for T2:

1. Conduct initial performance tests to establish a baseline and to provide data for revising test plans.
2. Establish precise, quantitative performance objectives and ensure these are included in the development and testing phases.
3. Identify critical use cases that will test out the performance objectives and ensure the scenarios developed test out all facets of the performance objectives.
4. Develop performance metrics and track the metrics to ensure that expectations are being met. Examples of computer performance metrics include availability, response time, channel capacity, latency, completion time, service time, bandwidth, throughput, relative efficiency, scalability, performance per watt, compression ratio, and instruction path length.
5. Perform an Architecture Assessment to ensure that the software architecture will support the performance objectives.
6. Include in the implementation plan processes to ensure that the implemented performance models are not impacted by future changes to the software.

Relevant Standards, Best Practices, and Related Resources

1. Connie Smith and Lloyd T. Williams, Performance Solutions: A Practical Guide to Creating Responsive, Scalable Software, (Addison-Wesley Professional), September 2001.

5.3 PREVIOUS OPEN FINDINGS

This section contains those findings that were reported in a previous semi-annual review report and are not yet closed. For each finding the current status has been updated to reflect the most recent progress and activity related to addressing that finding. This information is found at the bottom of each finding. New recommendations are made as warranted if the situation changes. These previous findings are presented in reverse chronological order by year, and within that year by descending alphanumeric order, with the more recent items first. Dark green is used to indicate the section of each finding that contains new information for this review period.

Open Findings 2014

F14A-001 Negative effects of continuing schedule delays			
Schedule delays in minor and major milestones in the master work plan are jeopardizing the ability of CSD to deliver the project on time (e.g. CIL Iteration 1 and Release 1.0).			
Period Opened	January 2014	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OSCE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks			

Finding Description

We have now observed several attempts to create a realistic baseline schedule to deliver Release 1.0, all of which have failed to accurately estimate and predict when that will occur. The Master schedule was baselined in January, and again in August 2013. From the November 2013 Monthly Status Report:

Nov 2013 T2 Project Status MILESTONE VARIANCE RPT:		Completed Milestones				Slipped Milestones			
TOTAL Underway: 44		24	100%	Average Variance (days)		34	100%	Average Variance (days)	
On Schedule: 12 (27%)	# On Time or Early:	3	12.5%	-30.3	~1 month early	0	0.0%	0	On Time
Tracking Late: 32 (73%)	# Late:	21	87.5%	95.5	~3 months late	34	100.0%	160.6	~5 months late

A common theme is that as soon as a baseline schedule is determined, work plan task level slippage starts to occur.

From a scheduling standpoint, the goal of every project is to be delivered on time and within

budget, with desired functionality and an acceptable quality level. In an ideal world, projects follow early starts and early finishes, float is not consumed, deadlines are met, the developer group never asks for time extensions, and the owner never assesses possible damages. Unfortunately events occur that potentially affect the planned completion of work, requiring a need to systematically evaluate the impending impact of these events on the project schedule. In many cases, this is due to poor planning and/or poorly managed risk and uncertainty. In this case, the unfolding technical scope of the development program is becoming known through in-work discoveries and gap identification; and new technology risks are constantly being identified. The complexity and fluidity of the T2 architecture definition is a current case in point. Additionally, Technical Architecture and Environments Build Out are critical path items causing delays, along with a large number (60) of open design reviews.

Although IV&V considers CSD enterprise architecture to be out of our scope, we recognize those areas where a lack of definition or knowledge is directly affecting the potential for success of developing the T2 system.

Risks

The primary risks to the initiative are that the longer the program takes to deliver a working system, the more:

- Cost increases
- Reputation decreases
- Turnover occurs leading to knowledge and skill gaps
- Morale decreases
- Actual needs and expectations of the customer may change

Recommendations

Employ a different strategy that allows for well-focused, incremental achievements in functionality delivery. For example, one option would be to choose a firm (non-movable) date for Release 1.0, and negotiate the priorities of the functional scope to be implemented in order to achieve that date. This would clearly necessitate the potential for a series: Release 2.0, 3.0, 4.0, etc. After Release 1.0, yearly releases are generally recommended. This would also allow the compartmentalization of the implementation technologies into functional groupings. Putting a stake in the ground for delivering something as Release 1.0 on the agreed to date allows management to see the critical path issues that would cause the date to slip and make decisions in a rapid fashion to either solve the problem or take that functionality out of Release 1.0.

Another option, and a strong recommendation, would be to turn the large diverse development team into a smaller high performance team, and set them up as a separate undisturbed entity to operate in a more independent manner with a well-focused delivery objective. Such a team would be dominated by DDI technical staff with certain key CSD technical staff as integral working partners. That would allow for the seeding of the future CSD T2 maintenance team. This team would have to be given the decision making autonomy to rapidly decide detailed design, tool configuration and coding decisions without the overhead of prolonged reviews that are merely delaying the project and not adding value.

A third option is to turn over the Release 1.0 development completely to the DDI vendor with CSD personnel available for support wherever and however needed. This would include continuing to enhance the Playbook with ADM best practices so that DDI could operate at optimum effectiveness, as well as, turning over the technical architecture to DDI to refactor and

prove out. A further benefit would be eliminating the need to continue attempting to hire skilled people out of the Austin workforce and concentrate on bringing the existing staff up to speed and ready to accept the T2 system from DDI.

Relevant Standards, Best Practices, and Related Resources

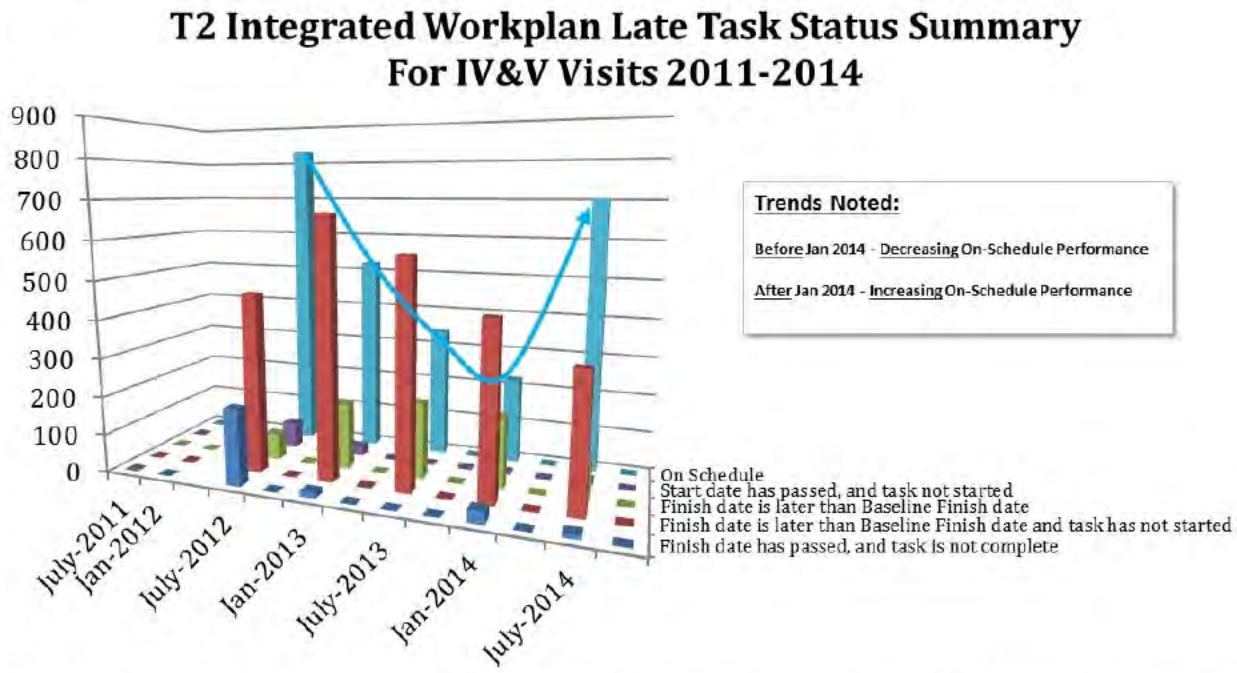
1. Enterprise Architecture Assessment Guide v2.2 © Copyright, Institute For Enterprise Architecture Developments, 2006 – http://www.enterprise-architecture.info/Images/Architecture%20Score%20Card/Enterprise%20Architecture%20Assessment%20Guide%20v2.2.pdf

Status Update

Effective July 2014.

Significant progress towards stabilizing the continuing schedule uncertainty was noted during this IV&V visit. There has been noticeable and focused staff attention on stabilizing the workplans towards a sustainable baseline. And T2 management has mostly implemented the recommendations above to mitigate the negative effects of continuing schedule delays (reflected in related finding F12A-003 - Creeping Schedule Slippage).

A review of T2 Initiative workplan baselines and Late Task reports across all seven IV&V visits since July 2011 shows a marked improvement in "On Schedule" performance, especially recently:



Apparently from inception, the T2 Initiative had suffered from a flawed and unstable workplan, plagued with unreliable work estimates for some areas (these were the subject of IV&V finding F12A-002 - Questionable Work Plan Effort Estimation Accuracy). Indeed, the workplan in use during our first visit in July 2011 had not been baselined, and was therefore not being measured properly. Since then, a robust metrics program has been established, organizational changes were implemented, and a new cultural attitude towards schedule achievement has evolved. The "Alternate Plan" agreement between CSD and the DDI has put the Release 1 development under DDI control, and they have begun accelerating the pace of work.

Reviewing the T2 Initiative's published major project completion dates in the Texas Legislative Budget Board's annual Quality Assurance Team (QAT) reports1 since 2010, IV&V finds only slight project-level impacts reflected in the externally reported scheduled end dates, but they have been trending upwards recently.

1 SOURCE: http://qat.state.tx.us/pubs.htm

Management states that the major milestones and project completion dates in the current baseline workplan (5/29/2014) will hold after the DDI has incorporated their recently identified increase of 56,000 hours for project related work and 25,000 hours of Integration work to complete Release 1. These increases are to appear in a workplan being updated for a planned rebaseline in September 2014.

From the monthly T2 Initiative Status Report for June 30, 2014:

> "The negative schedule variance was incorrectly reported as .03% in May 2014. The schedule variance was 3%. The variance decreased in June to negative 4%. Prior to development, DDI re-estimated the effort to complete the project based on the results of the design activities. They identified an increase of 56,000 hours for project related work and 25,000 hours of Integration work to complete Release 1. As a result the work plan is being updated and a rebaseline will follow in September 2014. Following the methodology of the GAO Assessment Guide a rebaseline is warranted. There is no cost increase as a result of the increase in hours and the Release 1 go-live date remains at July 2016. Reference the Schedule Management section for additional detail."

IV&V is concerned that as the launch dates for Release 1 and 2 approach, the workplan schedules for testing and quality control will become compressed to hold the release dates (a common pressure on large projects like T2). Planning now for this anticipated crunch is highly advised. IV&V saw some evidence of this from the QA plans where performance testing was pulled in earlier in the test plan, to overlap with UAT.

IV&V would like to continue monitoring this finding for at least one more visit, to verify that the planned workplan additions for the September 2014 baseline do not adversely affect the recent positive trends that have improved workplan stability and project performance. To close this finding, IV&V needs to see:

1. The new rebaselined DDI workplan expected in September 2014, containing the extra hours identified by DDI for integration,
2. a stable T2 Initiative baselined workplan covering the complete scope, with less frequent rebaselines (and associated external budget increases), and
3. at least 6 months of only slight variances to milestone and task completion dates (green, as defined by the T2 Initiative Summary Dashboard Metrics Legend).

We will look for these during our next visit in January 2015.

F14A-003 One Consistent List of COTS Tools for T2 does not exist			
We discovered two different official lists of COTS tools in the solution set that do not agree in content. These differences add to the communication and planning difficulties in the project.			
Period Opened	January 2014	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	MEDIUM	**OSCE Priority**	HIGH

Progress Indicator	PROGRESS OBSERVED
Related IV&V Tasks	

Finding Description

Within the T2 controlled documents, technical architecture has a listing of 132 COTS tools used in the project. Another spreadsheet of 201 COTS tools is used at the program management level and for the environmental build out teams. It has not been determined which one of these individual or combined lists is correct, accurate or true.

There are only 47 common COTS tools listed that are common between the Reference Architecture T2 COTS tools list and the longer, 201 tools list produced by T2 project management. There are only 3 common COTS tools listed that are common between the Reference Architecture T1 COTS tools list and the longer, 201 tools list produced by T2 project management.

The confusion caused by the differing lists inhibits communication and planning across the project and between CSD and DDI.

Risk

The following risks are immediately apparent:

1. Failure to plan for and provide adequate tool support moving forward with T2
2. Failure to adequately define the tool requirements for the multiple clustered and standalone server environments
3. Failure to manage the correct patches for multiple tools
4. Failure to provide adequate training for analysts, developers and maintainers of T2
5. Failure to identify contractual support parameters and tool provider SLAs
6. Failure to identify non-approved open source software that is bundled in delivered tools or IDC developed applications

Recommendations

Determine a common list of COTS tools across all the T2 and T1 environments and communicate that list to all stakeholders. Identify the degree of likelihood that each tool will be in the solution set and for how long if temporary. Also identify which environments and platforms that each tool will be in (e.g. development, execution, operational, etc.).

Relevant Standards, Best Practices, and Related Resources

1. DeMarco, T. and T. Lister, *Peopleware*, 2nd Edition, Dorset House Publishing, 1999
2. Reifer, D. (Ed.), *Software Management*, 7th Edition, Wiley Interscience, 2006

Status Update

Effective July 2014.

A single list of 191 COTS tools has been presented. This number is being consistently used within CSD. Unfortunately it is not complete. The single list, along with the DDI Rationalization Analysis of 22 May 2014, do not match. These example COTS tools are "rationalized", or on the architecture but are not part of the list:

1. HP LoadRunner
2. ComputeGrid – used for handling batch jobs but Iteration X showed it lacking

3. Spring Batch – alternative to ComputeGrid, recommended by DDI, approved by Tech Arch
4. WebSeal – on the architecture diagrams
5. Chrome – alternative, supported Web browser

Understanding that the list of tools will be changing over time, here are the recommendations to address this finding:

1. Define the maintenance process for this list, ownership and update cycle.
2. Using the "Ref Arch Software List v1.xlsx" define a process for updating and rationalizing on a regular basis, perhaps every three months at the least.
3. Add a column that identifies the end of life, if known for each tool. There is a column that identified "temporary". A more quantitative measure is needed to be able to look ahead for replacements and other end of life impacts.

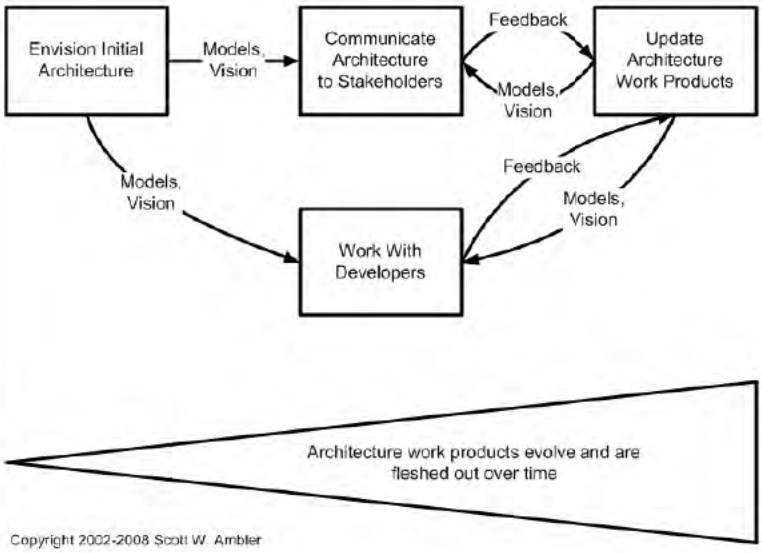
Open Findings 2013

F13B-003 Lack of Shared System Models			
There is no top level shared model of the system architecture or enterprise data model			
Period Opened	July 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OSCE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	F13B-001, F13B-002; SD-1, SE-4, SE-5		
Finding Description			
Current architectural and data models are appearing in various silos representing the different elements being currently designed. The understanding of the architecture and data models is thus individualized in these different silos. There is no overall high-level model of the architecture or data that is shared across the entire project. The different models emerging in CIL and EER evidence this.			
Risk			
The short-term risk is designing in local inconsistencies with the other silo designs and developments. The long-term risk is significant integration problems because of these inconsistencies. Further, instead of the architecture driving the development, development is driving the architecture.			
Recommendations			
Create the top-level models for the system architecture and enterprise database.			

Additional recommendation January 2014

Figure 1 depicts an architecture strategy where the Enterprise Architects (EAs) interact with the application teams that they support. The EAs may often take on the role of architecture owner on the application teams (or chief architecture owner on large teams).

Figure 1. Architecture Model Driven Development



First you'll do some up front architecture envisioning to get you going in the right direction and then you'll need to evolve the architecture over time as your project progresses. Although it's convenient to believe that a disciplined delivery team will always be in agreement as to the architecture of the solution, the reality is that many designers/developers are smart, strong-willed people and teams of such don't always come to agreement. Someone needs to lead/facilitate the team with regards to the evolution of the architecture. That position/role needs to be firmly established.

Relevant Standards, Best Practices, and Related Resources

1. http://www.softwarearchitectures.com/
2. *ISO 15288*
3. *ISO 12207*
4. ISO/IEC/IEEE 42010
5. The Mythical Man Month, Essays on Software Engineering, Anniversary Edition by Frederick P. Brooks, Jr., Published by Addison Wesley 1995, ISBN 0-201-83595-9
6. Guide to the Software Engineering Body of Knowledge, Version 3.0, SWEBOK®, IEEE Computer Society, 2014, ISBN-10: 0-7695-5166-1

Status Update

Effective January 2014.

Although there is currently no shared vision of a T2 system architecture, we recognize that some kind of architecture will eventually emerge. There is still no conceptual view of it.

DDI architecture terminology is non-standard and has obfuscated what parts of the architecture they do have. DDI defines several types of architecture related to modeling T2. They are: Functional Architecture, Application Architecture, Execution Architecture, Operation Architecture, Development Architecture and Infrastructure Architecture. All of these fit as components into their higher-level Architecture Reference Model. However, what they call functional architecture is a domain model, not architecture at all. At the heart of what was originally intended for architecture, only the application architecture, execution architecture and operation architecture are most relevant. The development architecture is what is supposed to be used to build and evolve the system. The infrastructure architecture is the base hardware and software platform – which was already established.

While IV&V detected hints that they are going in a useful architectural direction (e.g., the use of the terms wrappers and facades) it is not clear that they are providing any appropriate level of abstraction to protect them from the coming problems of version update, COTS substitution, or the addition of open source components. Although the main components and subcomponents are identified in some of these aspects, some are not yet fully defined or proven. Also encouraging is the fact that the architectural interconnections that IV&V was looking for were discovered within what the DDI calls High-level Design (HLD). It is also the case that the key data warehouse component is a logical data model for R1 that is now defined and currently in review.

There is still the lack of a shared system model available to all project members that would most likely appear on the wall of a T2 program war room if one existed.

Effective July 2014.

There is now a Service Oriented Architectural (SOA) Model – the Architecture Logical Blueprint – that provides a basic box and arrows view of the service architecture. The SOA provides a level of abstraction by decoupling the contracts from specific COTS products as technology scales and evolves. These SOA contracts provide the entire system view. The closest thing to a war room is room 260.

What is missing are the connections to the BPM applications architectures – that is, this is just the bottom half of what is basically a two tier architecture.

T2 has undertaken the following actions per an identified risk item:

- End-to-end documentation of the architecture is underway.
- The DDI vendor will be updating the architecture blueprints to ensure they reflect all of the capabilities in the architecture prior to CSD acceptance of those deliverables.
- Work has begun that will enable DDI to address the Operations Architecture, Development Architecture and T2 Infrastructure, to provide a full and complete technology perspective of the T2 system and its integrating components, both at run time , as well as during development.

F13B-004 Technical Design Delays
There are design delays due to lack of architecture definition and resource constraints.

Period Opened	July 2013	Period Closed	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	MEDIUM	**OSCE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	SD-1, SE-1		

Finding Description

In CIL, Functional Design is almost complete, but the Technical Design start is being delayed at least three months for their first Iteration. This is primarily due to the lateness of the work going on with prototyping in Tech Arch, getting the desktops configured and rolled out, and resource constraints for timely design validation reviews. In spite of better coordination among the project teams there is an ongoing struggle to get any actual guidance or answers or solutions on the issues. Product integration decisions seem harder to make than expected. Previous design assumptions and temporary decisions have led to additional problems. A number of critical system component designs have been delayed into Tech Design, which may lead to an unstable start to that phase.

As of June the current timeframes for completing Design Validations in CIL is shown in the table below. Although there has been some improvement recently, perhaps CSD's sampling strategy is in need of revisiting.

Design Stage	Total artifacts	In progress	Completed	Avg. days for CSD review for completed items
High-level	22	6	16	98
Functional	47	26	21	116
Technical	TBD	TBD	TBD	TBD

Risk

The primary risk is further delays in the development process, as well as, having to unmake previous design decisions and suffer the rework associated with that.

Recommendations

More focus and attention should be paid to getting the system architectures prototyped, defined and stabilized, which will better enable all of the subsequent design stages. For design artifact review and validation, a revised sampling strategy may be more efficient, with some consideration given to the idea of no CSD validation review at the technical design level.

Relevant Standards, Best Practices, and Related Resources

1. *Rapid Development*, S. McConnell, Microsoft Press, 1996, ISBN 1-55615-900-5

Status Update

Effective January 2014.

Technical architecture tasks are still causing delays in the program schedule.

Effective July 2014.

This is an identified risk at the program level. There was considerable requirements volatility in the technical architecture area prior to our review. Batch and QualityStage are the two primary problem COTS products causing delays. 5:5:5 review times have improved the Tech Arch response. They further intend to update the RSA model (no brown boxes) and assess that against the new Baseline.

F13B-007 OAG CSD Resources in Austin Are Strained			
Resources at Austin OAG CSD are strained, with many roles vacant or To Be Determined, for both current and future tasks. Some staff members are providing assistance to other projects while continuing to work on their original assignments, potentially leading to "burn out".			
Period Opened	July 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OSCE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	F13B-008		
Finding Description			
Staffing is inadequate in the following areas (shown as a TBD or Vacant on the organization charts): ➢ Forms Administration ➢ Communications ➢ Object Oriented Java Designers ➢ Chief Technical Architect ➢ Architecture Review Board ➢ Risk Management ➢ EER Project Manager ➢ EER Designer ➢ CIL/EER BPA ➢ CIL Programmer III/IV ➢ VCF ➢ RODEO ➢ Data Quality ➢ Environment manager ➢ SAS Data Warehouse Architect			

- SAS Administrators
- DB2 Administrator 1
- DB2 Administrator 2
- SAS Report Analyst

The drain on resources results in CSD staff stretched to cover all knowledge areas. Staff are being moved between projects and suffering the strain. New staff members may put the project at a disadvantage due to lack of child support experience. Key Staff roles must be filled, either by new hires, transfer of existing resources, or IDC (through Release 2 Development).

The training schedule below, showing TBD's, also is an indicator of staffing needs.

Training Schedule						
M & T Area	**T2 Role**	**Project**	**OAG Counterparts**	**DDI Counterparts**	**Number Staff TBD – OAG, DDI**	**Start**
Application Arch	Information Arch		TBD		1, 0	
Application Arch	T2-T1 Integra Arch		TBD		1, 0	Q3 FY 12
Application Arch	ERS Architect		TBD		1, 0	
Release 1 Design	R1 Designer	EER	TBD	TBD	1, 1	Q3 FY 13
Release 1 Develop	Java Developer	CIL		TBD	0, 7	Q4 FY 13
Release 1 Develop	Java Developer	EER	TBD	TBD	4, 4	
Release 1 Develop	Portal User Interface Developer	All	TBD	TBD	1, 1	
Release 1 Develop	WID Integr Dev	All	TBD	TBD	1, 1	
Release 1 Develop	Batch Developer	All	TBD	TBD	2, 2	
Release 1 Develop	ECM Developer	ECM	TBD	TBD	1, 1	
Release 1 Develop	ERS Developer	ERS	TBD	TBD	2, 2	
Release 1 Develop	Forms Developer	Forms	TBD	TBD	1, 1	
Build and Deploy	Build &Deploy Anyl	All	TBD	TBD	2, 2	
Database	Database Admin	All	TBD	TBD	2, 2	
System Admin	Adobe/Forms	Forms		TBD	0, 1	Q4 FY 12
Release II Design	R2 Designer	FIN	TBD	TBD	1, 1	
Release II Develop	Java Developer	FIN	TBD	TBD	6, 6	Q3 FY 13
				Total OAG, DDI	25, 31	
				Total	56	

T2 Release 1 Projects Dashboard as of 6/26/13 shows, on the Program Dashboard, that Effort is trending negative (6% variance, with DDI responsible for 29% and CSD responsible for 72%).

T2 Initiative Management Metrics shows "yellow" (some oversight required; project may be at risk in this area) for CIL, ERS, (the Lead Designer will be working Transformation and only able to support ERS part time), and Technical Architecture. For Schedule variance, RODEO experienced DDI turnover and CSD's need for a designer. The Tech Arch schedule was impacted by turnover in staff.

One of the Top 10 Risks shows "Limited CSD resources to fill critical skills." Manpower concerns include CIL, RODEO, EER and ERS. These projects "may not be able to accomplish everything planned for June and July since the manpower increases may not be achievable."

The Risk and Issue Weekly Email (6/7/2013) includes this risk with implications for Resources: "… concerns were raised about Phase 1 projects with cross-system impacts, such as RODEO and

ERS, which were ahead of design for EER and VCF Release 1 and additional requirements may require earlier designs to be reworked…. There has been no follow-up with PM's on establishing a mechanism to expose cross-project design dependencies and ensure shared functions/capabilities are reused in the system."

Risks

Insufficient staff could result in inferior products and/or a slipped schedule.

Recommendations

The T2 Initiative Status Report 05-31-2013 contains Risk Descriptions (Significant), pertaining to Resources. We agree with the risks and with the Response Plans developed to mitigate the risks. We recommend that the Response Plan be executed as stated.

- The Risk: CSD has limited existing resources with the skills to develop and implement solutions using new technologies. The Risk response plan: utilize vendor resources to augment CSD staff; rely on the vendor to coach and mentor CSD staff into new roles and perform knowledge transfer; plan to identify future skill needs, assess current capabilities, develop sourcing strategies to train and transition staff, acquire staff with needed skills, and outsource job duties
- The Risk: If key CSD positions are not filled, then staff may not learn the new systems and be able to support the system when turned over. The Risk response plan: identify key positions needed where skills do not exist in the agency.
- The Risk: If the vendor does not provide the technical skills and staffing levels required, the project will not be successfully completed and in a timely way. The Risk response plan: continue to escalate to DDI and CSD management.

In addition, we refer to the F13A-001 Finding on Reviews, with regard to resources. If adequate resources were provided, and reviews were sampled from the entire artifact pool, the design review process would likely not take so long and potentially impact the schedule.

CSD appears to have a handle on risks of resource demands and on recommendations to reduce the gravity of the issue. During the next visit, IV&V will assess the severity of the Resource-related risks and compare the actual progress to that recommended by CSD.

Relevant Standards, Best Practices, and Related Resources

1. DeMarco, T. and T. Lister, *Peopleware*, 2nd Edition, Dorset House Publishing, 1999
2. Reifer, D. (Ed.), *Software Management*, 7th Edition, Wiley Interscience, 2006

Status Update

Effective January 2014.

Lack of qualified staff continues to hamper CSD, and DDI is affected as well. Based the organization chart dated 12/17/2013, the following shows numbers of named staff committed to T2:

	Filled Positions	To Be Determined (TBD) Positions
DDI	89	10
CSD	175 (full-time and part-time)	65 (includes FIN)

CSD	9 (contract staff outside of DDI)	

The organization chart shows that many people are spread across multiple projects. There are a few knowledgeable people who can effectively serve on cross-team efforts and they are stretched thin. There has been a redistribution of staff among the T2 projects, which is causing shortages of resources. For instance, CIL had 3 designers and that has now been reduced to.5 staff and their BPA's have been reduced from 6 to 4. Overall, there seems to be a shortage of resources for reviewing deliverables.

Given that Austin, Texas has become a technology hub, qualified job candidates in the metropolitan area are in high demand. State agencies generally do not have the financial resources to compete with industry, even though FTE slots are available. Experienced candidates have a "buyer's market." The manager of the CSD application architecture development reports that recent candidates have preferred telecommuting, requested more pay, and leave after a short time to pursue better offers. These issues affect finding and attracting contract staff as well as full and part-time CSD staff.

DDI conducted a gap analysis that shows the project lacking a lead Enterprise Architect/Lead Infrastructure Architect. The analysis stated that a lack of a formal and accountable lead for Enterprise Architecture and Infrastructure Architecture is needed to own and drive decisions that are upheld by the program. The analysis also showed that the project does not have a Lead Operations Architect to be the person who owns, drives and delivers the operational environment, tools, and process enabled to effectively support and maintain the new T2 solution.

Effective July 2014.
The T2 program continues to lack personnel in key positions. Difficulty in filling the positions is due, in part, to the competitive climate in the central Texas area, and a lack of expertise in T1/T2 needs.

Open positions include:

- Build and deploy resource
- Release manager
- ECM designer/developer
- Websphere designer
- CIL developer
- ERS BPA
- FIN designer developer
-
- Playbook analyst
- Test analyst
- SAS administrator
- Operations Architect
- Communications resource

An added difficulty is that knowledge of the projects, ECM, ERS, FIN, will take time for a new hire to assimilate.

Developed artifacts from DDI's Indian Development Center (IDC) are expected to be voluminous, causing a spike in the need for CSD reviewers. Sampling of the components will be based on complexity, criticality and risk, and although difficult to quantify, could result in a very large number of artifacts. Until the sampling algorithm is defined, the estimation of time needed for review is unknown, but could be extensive. In addition, the quality level of the components, while expected to be high, is currently unknown. For example, if 50% of the code units are found to be defective, more sampling, and more reviewers to inspect the samples, will be required.

The most serious aspect of resourcing is preparing for T2 sustainability. While there will be a one year "warranty" period with DDI after Release 1 and another after Release 2, the number of maintainers with specialized skills is estimated to be large. The expectation is that teams of people, rather than individuals, will be needed for maintenance of the complex T2 system.

T2 is taking the following actions as part of an identified risk

1. CSD is monitoring resource constraints through their risk management plan.
2. Under the revised plan and new organization chart, DDI will exercise more autonomy, CSD staffing needs will decrease, thus resulting in fewer vacant roles.
3. CSD will assign a key point person to help DDI manage environment changes with Data Center Services (DCS).

F13B-008 Offshoring Approach Has Documented Risks			
The decision to incorporate 50 – 65 DDI offshore coders and unit testers poses risks that are well documented in multiple case studies.			
Period Opened	July 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	MEDIUM	**OSCE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	F13B-007		

Finding Description

Fifty to sixty-five offshore developers at the India Design Center (IDC) will begin work on T2 when designs are completed and ready to be shipped, and IDC equipment is in place. The schedule for onboarding IDC staff will be complete in August. The primary responsibility of the Java/Object-Oriented developers will be to code and unit test from specified designs. IDC will not be involved with Iteration 1 or Iteration 2, but will be a part of the Release 1 team (go live goal of October, 2015).

Although the offshoring will be accomplished through the DDI vendor, who has had previous

experience with global software engineering, inherent risks will be present.

To reduce risk, some DDI T2 staff will move between Austin and Pune, for purposes of knowledge transfer. For example, the DDI Project Leader will spend three weeks in Pune before kickoff and IDC team members will visit CSD for several weeks at a time.
Risk is also reduced because "offshoring" with IDC has been included in DDI's staffing on previous projects – IDC has experience in working with DDI on child support systems.
In addition, the Accenture Development Methodology (ADM) will be used by IDC.

Offshore development has matured and is adopted widely today. But the user experiences of products developed offshore are complex and challenging to design and often less than desirable because offshore and user experience cultures are at odds. Although some risks have been reduced by DDI, there are many that remain. The common challenges and concerns for offshore development may be found in Appendix F.20, Volume II.

IV&V would like to see the following information from the IDC at our next review. These should be readily available from a CMMI Level 5 organization as claimed.

1. IDC Java coding standards
2. IDC UML style guidelines
3. IDC testing process guidelines
4. IDC performance data from past development projects - specifically IDC level defect removal effectiveness data for the past couple of years

Risks

Risks of offshoring include:

1. Project delivery failures. Schedule and budget risks are amplified due to the intrinsic difficulties of managing a global development team.
2. Lack of quality. There is a risk of a "ping pong" approach of work products being thrown back and forth due to poor quality. Repeated rework and increasing mistrust is a result of the cycle.
3. Instability with overly high change rate. Missing or insufficient designs may be accepted by the global team whose job it is to develop to the specifications received.
4. Staff turnover. There are abundant job opportunities in the Indian economy. IDC developers may be tempted to leave the project for better positions and greater pay.
5. Insufficient competencies. Although IDC is purported to be a CMM Level 5 organization, there may still be less visibility into global projects resource planning and skills availability.
6. Wage and cost inflation. Wage inflation is a major offshoring risk. Salaries in India increased by 14% per annum between 2004 and 2007.
7. Poor supplier services. A common risk with outsourced suppliers is concerned with meeting expectations in terms of quality and delivery schedule.
8. Distance and culture clashes. While DDI has employed offshoring on multiple previous projects, there remains the impact of work split. There is overhead for planning and managing people and dealing with cultural barriers. Risks range from time zone issues to incompatible technology infrastructures.
9. Environment Availability. There will be an impact on CSD's ability to upgrade the environments because IDC will push usage to 24-hour availability, which will impact their timing of upgrades.

Recommendations

Risk mitigation techniques for offshoring would include:

1. Project delivery failures. Both local and offshore project and team managers must be educated in uncertainty management and communication, in addition to the standard estimation, planning, dependency management, and project monitoring. *... experience shows that projects fail not because of unknowns but because of not willing to know or* communicate *known facts.* [4]

2. Periodic Root Cause Analysis should be performed on completed tasks, followed by Pareto analysis to define focused actions for the most critical and repeating issues.
3. Insufficient quality. An incoming work product should be accepted only if it has the right quality level. Because not every work product can be inspected, a system of random sampling for consistency and quality can be instituted. In addition, large or complex work products may be singled out, as well as those meeting other criteria determined by project personnel.
4. Instability with overly high change rate. Offshoring demands extremely reliable designs and change requests. More communication is needed with an offshore team than co-located teams. Specifications and documents must be carefully reviewed because engineers on the other side trust what is written.
5. Staff turnover. DDI must have an engineering strategy that includes career paths for employees. Because attrition is a fact of life, managers must plan in advance with schedule buffers, as well as loyalty bonuses and other incentives. Attrition and its impact should be measured in order to control and limit turnover.
6. Insufficient competencies. Assure global competence management and resource planning and a skills management on the level of detailed technical skills necessary for the project. Manage competency needs in parallel to technical and project road mapping. Even huge amounts of effort in training does not always reflect skills that match the specific project needs.
7. Wage and cost inflation. Carefully plan cash flow, taking into consideration expected wage increases.
8. Poor supplier services. The risk of insufficient supplier services may be mitigated by evaluating internal processes. It is easy to get trapped into situations that look economically favorable but later bring extra cost due to weak processes and insufficient delivery quality. IDC is in a good position by having the DDI ADM methodology in place, yet the responsibility falls to DDI to ensure that it is indeed followed.
9. Distance and culture clashes. Risks are mitigated with collaboration and communication across disciplines, cultures, time, distance, and organizations. Periodic workshops between clients, and suppliers and networking between various teams, are effective mitigation strategies. The importance cannot be overstated – for example even change management tools are inefficient without collaboration on content and knowledge.
10. Environment Availability. Plan for 24x7 availability for the environments associated with coding, building and testing the custom software and COTS packages needed. This would include the environments for development, unit test, and system test.

The next IV&V review will concentrate on the above-mentioned issues surrounding the extension of the DDI vendor to Indian counterparts located in Pune. The major risks, communication and quality, will be carefully assessed for status.

Relevant Standards, Best Practices, and Related Resources

1. "Offshore Development Culture and User Experience", Iyengar, Jhumkee, Principal Consultant, User In Design, Pune, India. http://www.userindesign.com/Images/Papers/Offshore%20Development%20Culture%20and%20UX.pd
2. Ebert, Christof, Murthy, Bvs Kristna, Jha, Namo Narayan, "Managing Risks in Global Software Engineering: Principles and Practices," *International Conference on Global Software Engineering*, 2008, pp. 131-140.
3. Matloff, Norman, "Offshoring: What Can Go Wrong?," *IT Pro*, July/August, Volume 7, Issue 4, 2005. pp 37 – 45.
4. Cusick, James and Prasad, Alpana, "A Practical Management and Engineering Approach to Offshore Collaboration," *IEEE Software*, September/October, Volume 23, Issue 5, 2006. pp. 20-29.
5. Sharma, Sharad and Seshagiri, Girish, "Making Global Software Development Work and GSD: Not a Business Necessity, but a March of Folly," *IEEE Software*, September/October, Volume 23, Issue 5, 2006. pp. 62-65.
6. Persson, John Stouby and Mathiassen, Lars, "A Process for Managing Risks in Distributed Teams," *IEEE Software*, January/February 2010. pp 20 – 29.
7. *http://www.surgeforward.com/white-papers/Offshoring-Software-Development-R*
8. Aberdeen Group, *www.aberdeen.com*, July, 2013.

Status Update

Effective January 2014.

Due to continued delays in work order approvals and the redefinition of Iterations 1 and 2 into

Iteration X, DDI offshoring of code development to the IDC has not progressed. This finding will remain open until some positive movement is observed.

Effective July 2014.

The number of developers estimated to be dedicated to T2 at the IDC has increased to 125. The work orders have been approved and Iteration X completed successfully. But, until unit tested and quality sampled code is delivered and positively evaluated, this finding will remain open. Recommendations to address this finding are:

1. Defined and successfully implemented sampling process for representative work product samples from the IDC.
2. Sampled work products of an acceptable quality level.
3. Definition of acceptable Service Level Agreement from CSD to the IDC in support of the virtual desktops.
4. Reduction of downtime to the SLA levels for the virtual desktops maintained by CSD.

This relationship is working well so far. IDC has allowed DDI to implement some of the recommendations for mitigating the offshoring risks. Examples include:

1. Communication – Two times daily status calls at the beginning and end of shift for India
2. IDC meetings are held with onshore development leads. A weekly 'all hands' meeting is held on Tuesday mornings with all development staff and then the onshore Initiative Manager has a weekly call with the offshore Initiative Manager to discuss broader topics/concerns. IDC produces their own weekly status report that is incorporated into the overall DDI vendor weekly status.
3. Progress Reporting – IDC has currently completed 3 portlets and 7 batch jobs. 95% of development has completed on time and within budgeted estimates.
4. Quality – IDC code has been peer reviewed by onshore staff and 100% of components have 'passed' the peer review. Unit test scripts are currently being created in collaboration with the onshore team as Iteration X moves into the testing phases.

F13B-009 BPM Technology is a Significant Change for BPAs			
The proposed Portal 8 implementation for the BPM tools to be used by the CSD BPAs will require a tool focused redefinition of their roles and responsibilities with appropriate methodology and tool training.			
Period Opened	July 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OSCE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	TR-1		
Finding Description			
In expanding the number of COTS tools from 131 to 201 since the January 2013 IV&V review, a decision has apparently been made to front end the Business Process Management tools in T2			

with IBM BPM Version 8.0 as part of Portal 8.0. This decision will fundamentally change the role of Business Process Analyst to BPMAs. Here is the recommended Analyst Job Description from IBM:

> **Job Role Description -** This *intermediate level* certification is intended for BPM analysts who discover, define and analyze complex processes within a functional area. These BPM analysts lead and facilitate the process discovery phase of IBM BPM projects, and communicate business needs for process-oriented solutions. BPM analysts are expected to:
>
> 1. Perform process inventory and prioritization following the IBM BPM methodology.
> 2. Execute the Process Discovery phases, address the goals and create the deliverables following the IBM BPM methodology.
> 3. Discover, define, analyze, improve, and model a process in Blueworks Live.
> 4. Identify the business case, requirements and key opportunities.
> 5. Define the business level of Key Performance Indicators (KPIs) and Service Level Agreements (SLAs).
> 6. Understand the functionalities and capabilities of IBM Business Process Manager V8.0 for delivering executable BPM processes.
> 7. Design future state processes for IBM Business Process Manager V8.0 with Blueworks Live
> 8. Understand the IBM playback methodology and be familiar with change management approaches.
>
> These BPM analysts are generally self-sufficient and able to perform most of the tasks involved in the role with limited assistance from peers, product documentation and vendor support services.
> Use of this very complex and powerful tool set require prerequisite knowledge of:
>
> 1. Software Development Lifecycle (SDLC) and using Agile methodology,
> 2. Business process analysis techniques, including discovery and improvement,
> 3. Modeling techniques of automated tools,
> 4. Eclipse development environment,
> 5. UML model representation, and
> 6. Validation of business process models.

Today the CSD BPAs do not have the foundational knowledge to begin learning the BPM tool suite. In the commercial world today, job descriptions for a comparable business process analyst /Business Process Specialist - cite the following skills/qualifications and competences needed:

Skills

- Lead internal BPM enablement sessions
- Lead and mentor the efforts and resources driving process understanding, process definition, solutioning and requirements definition
- Partner with the business and development resources to improve business processes, gather / understand requirements
- Assist with use case development for unit / system/user acceptance testing
- Summarize and develop playback documentation
- Familiar with BPMN documentation standards
- Proficient in BPMN process modeling (ideally IBM Blueworks Live experience)

Qualifications

- Bachelors or Masters degree in computer science or other related disciplines
- Experience in software development using BPM tools

Competences

- Understands business value… Can speak professionally with LOB
- Entrepreneurial… Sees opportunity in problems
- Familiar with iterative (agile) delivery methodology

- Experience with Lean / Six Sigma
- Focused on business value and return-on-investment (ROI)
- Create transparency with metrics, simulation, and process optimization
- Positive attitude
- Working to deadlines

CSD must address this gap between the expectations of what the tool suite and BPM methodology will provide and the skills, aptitudes, experiences and competencies of the current set of BPAs.

Risk

The lack of foundational training in the prerequisite knowledge to use the IBM BPM tool suite will extend the learning of the basic tool suite, cause failures in the representational process models and extend the T2 schedule.

Recommendations

Begin the redefinition of the BPAs roles and responsibilities in 2013. Put together a training plan for all BPAs to acquire and use the prerequisite knowledge. Begin putting key BPAs on the path to certification under the IBM process in 2014.

Relevant Standards, Best Practices, and Related Resources

1. IBM Business Process Manager Version 8.0 Production Topologies, Draft Document for Review, April, 2013, SG24-8135-00, http://www.ibm.com/redbooks
2. Scaling BPM Adoption: From Project to Program with IBM Business Process Manager, March 2012, http://www.ibm.com/redbooks

Status Update

Effective January 2014.

Portal 8 is still waiting on the work order wording to the DDI contractor. It has been more than six months since this work order was started. This continued delay in decision-making can only further hamper T2 progress and directly lead to implementation failure of the BPM application stack.

IBM training has been contracted for and began the week of 13 January 2014. During the July 2014 IV&V review, this training will be evaluated and the status of this finding updated.

Effective July 2014.

The Rationalization effort DDI performed was submitted to CSD on 6/30/2014 and is under review. That effort included recommendations for which applications and which versions within BPM the Initiative will utilize (PD, BAM, etc). To avoid the waste of sending BPAs to the wrong tool training, the Transition Management team delayed sending the Business Process Analysts to BPM training until this Rationalization effort was complete and instead focused on sending the BPAs to necessary UML and WODM training. The timing was good for this because the BPAs started using WODM right away, so this training was "just in time."

After the BPM Rationalization recommendations are approved by CSD (including the ARB) the Transition Management team will shift focus back to BPM training for BPAs. So far:

1. CSD has arranged for BPM training for BPAs.
2. CSD is developing a new M&T Plan.

During the January 2015 IV&V review, this training will be evaluated and the status of this finding updated.

F13A-004 Environment Issues Concern CSD and DDI			
Problems encountered when using the hardware and software platforms are being categorized as general "Environment" issues. Successful resolution cannot be achieved until everyone is using the same terminology referring to a standard environment development process.			
Period Opened	January 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OSCE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	OE 1, 3		

Finding Description

An "Environment" is a distinct set of physical and logical configurations of hardware and software that comprise a unique platform that a solution system can be deployed to. This applies to whether the system is a custom-designed system or one using packaged software or a combination. T2 considers these to be foundational technical platforms that contain all the common elements needed for use by development.

Seven technology environments (platforms) have been defined to support the T2 system elements as they move through the development lifecycle. These environments are named:

1. Pre-Development (pre-dev)
2. Development (dev - they are setting up 3 partitions to support concurrent development)
3. System Test (they will be setting up 3 partitions to support concurrent system testing)
4. User Acceptance Test (they will be setting up 2 partitions to support concurrent UAT)
5. Training
6. Staging
7. Production

These environments are needed by the various development projects at different times with VCF leading the deployment, and CIL in design.

There should be a process for defining requirements for the environments, defining the architecture of the environments, assessing the environments, and defining responsibilities for developing and maintaining the environments.

As we met with T2 staff, it became apparent that there is neither a consistent or comprehensive definition of what the environments should encompass. The definition of each appears to be quite fluid.

The T2 Environment Build-Out team regards the "environments" as the basic loading of the servers to meet the needs for different part of the development process – pre-development, development, system testing, user acceptance testing, production and training. This build-out process is where the system code is loaded onto the servers, the software packages needed for each server are loaded, some basic testing is done to ensure that everything basically can be turned on, and then the "environment" is "stood up." The environment is then "turned over" to the DDI team needing it. DDI's role in the "standing up" process is not well defined, and therefore likely to be misinterpreted.

Next, the DDI team will begin to load other software and hardware to the T2 system to make it function as planned. They check out the software in depth to ensure it is operating correctly. During this process, there can be many problems discovered with the environment; for example, that:

- one or more of the software components needs to be reconfigured, "patched" or upgraded;
- two software components are incompatible and there will have to be software created to enable them to communicate.

There can be many issues discovered at this point, but they are not necessarily the fault of the initial effort to stand up the environment. There can also be flaws discovered about the initial effort to stand up the environment that need to be corrected or redone.

As testing progresses, there can be other technical issues with software interfaces. These issues are currently being referred to as "environment" problems by DDI and CSD staff. There can be a myriad of issues that could be regarded as "environment" problems during the development of a complicated, interdependent system like T2.

T2 does not have an overall architecture plan. Without an overall technical architecture, it is difficult to ensure that each of the basic environments fits seamlessly into the global T2 picture. It also causes conflict between different staff as they have different visions of the architecture plan for their part of the system and how that will interface with the specified environments.

The Environment Build-Out process is reported to be occurring on time. According to the following status report provided by CSD, the environments are continuing to be "stood up" as needed.

Server Count as of 01/16/13

Environment	Status	Sum Of Counts
Development	Completed	31
Pre-Development	Completed	26
Production	Completed	34
Staging	Completed	8
System Test	Completed	24
Training	Completed	10
UAT	Completed	43
TOTAL COMPLETED		176
Development	Pending	2

Pre-Development	Pending	5
Production	Pending	57
Staging	Pending	11
System Test	Pending	1
Training	Pending	15
UAT	Pending	36
TOTAL PENDING		127
GRAND TOTAL		303

This process includes the basic loading of systems software and the initially specified software. It also includes initial testing to ensure that all the software is accessible. However, then the environment is turned over to DDI and they do their testing on the usability of the environment. There are issues that are being encountered where the current, necessary software has not been loaded or the software needs patches or there are connectivity issues.

Risk

If the right software is not in the right place at the right time, T2 will be unable to meet its goals. This system is very complicated and there is a high need for standardization, procedures and a unified direction to the final goal.

Recommendations

There are several recommendations that will decrease the risk and increase the potential of success:

1) Improve communications. When different staff is using the same word in different ways, it impedes progress. Determine which platform and which part of the "environment" is having a problem and allow the staff designated for that part of the process to address the problem.
2) Use a standard problem reporting process. There is an in-house REMEDY system used by the Help Desk staff to collect reported problems, triage them and assign them to the staff responsible for resolving that type of problem. Ensure that both CSD staff and DDI staff use this existing process to report environment problems.
3) Create an in-house team to receive problems from the Help Desk to do the initial triage if the problem is bigger than something that the Help Desk can handle. Log these problems into REMEDY and use a cross-functional team to work across organizational lines to determine the problem and to expedite resolution. This would involve working with CSD staff, DDI staff and DCS staff as needed to resolve the problem.
4) Develop standard procedures for upgrading and updating the already-established server environments. Processes will ensure that all tasks are done in a timely manner and no requests are lost. (This is addressed in another Finding, but it has impact on this problem also.)
5) Create the Overall Technical Architecture for use by all project teams. This will assure that all teams are developing systems in the same direction for successful implementation.

Relevant Standards, Best Practices, and Related Resources

The State of Texas and OAG/CSD in particular is an important user of IBM hardware and software. One of the most extensive sources of managing support environments is IBM. CSD can easily access the best practices for their environments by contacting IBM for seminars, lunch and learns, and simple references to the extensive Redbook library IBM has developed.

Status Update

Effective July 2013

CSD has implemented the process for all staff to use the REMEDY system for tracking all requests for environments – new environments to be stood up, changes to existing environments and upgrades to existing hardware or software. This system is be used by the DDI staff and CSD staff to make requests and establish completion dates. The tracking of work requests is dependent on the Data Center Services (DCS) staff and their processes. The DCS has implemented a change management system, which has time deadlines that sometimes impact the speed staff want changes. The working relationship with the DCS is improving and the work requests are being completed in a timely manner.

For facilitating work requests and to enhance the installation of effective environments, it is recommended that the DDI vendor name a counterpart to the CSD person accepting work requests. This would allow for all DDI requests to go through that person to enhance communication and increase coordination.

CSD has extended the contract for the dedicated team at the DCS until August 2014. This is a team dedicated to T2 development environments and allow for more timely creation, correction and upkeep on the development and testing environments. By extending the contract, OAG is assured of adequate staff for handling CSD issues for the development phase.

To update the progress, the following chart shows the server status as:

Server Count as of 07/19/13

Environment	Status	Sum Of Counts
Development	Completed	31
Pre-Development	Completed	26
Production	Completed	50
Staging	Completed	8
System Test	Completed	24
Training	Completed	10
UAT	Completed	73
TOTAL COMPLETED		222
Development	Pending	2
Pre-Development	Pending	5
Production	Pending	41
Staging	Pending	11
System Test	Pending	1
Training	Pending	15
UAT	Pending	6
TOTAL PENDING		81
GRAND TOTAL		303

Effective January 2014

Current build-out totals as of December 31, 2013, are as follows:

Environment	O/S	Status	Counts

Development	AIX	Completed	21
Development	WIN	Completed	10
Pre-Development	AIX	Completed	16
Pre-Development	WIN	Completed	15
Production	AIX	Completed	12
Production	WIN	Completed	35
Staging	AIX	Completed	3
Staging	WIN	Completed	5
System Test	AIX	Completed	17
System Test	WIN	Completed	8
Training	AIX	Completed	5
Training	WIN	Completed	5
UAT	AIX	Completed	56
UAT	WIN	Completed	28
TOTAL COMPLETED			**236**
Development	AIX	Pending	1
Production	AIX	Pending	46
Production	WIN	Pending	7
Staging	AIX	Pending	9
Staging	WIN	Pending	2
Training	AIX	Pending	12
Training	WIN	Pending	2
TOTAL PENDING			**79**
TOTAL SERVERS			**315**

EBO has come to a "crawl". Staff are depending on the task orders currently being negotiated to provide new direction. Per the pending task orders, DDI will take the lead in determining the specifications for the build-outs. They will develop the integrated plan which will include the specifications and schedule for all necessary components. We will keep this finding open to observe whether this took place and determine its effectiveness.

The production, staging and training environments are waiting until closer to the time they will actually be needed because once the environments are built, CSD begins incurring support fees.

The tasks to stand up the remaining environments may be impacted by the possible loss of the dedicated team at DCS which has only been funded through 8/31/2014. There may be a need for their services after that time.

Effective July, 2014.

Current build-out totals as of June 30, 2014, are as follows:

Environment	O/S	Status	Counts
Development	AIX	Completed	21
Development	WIN	Completed	10

Pre-Development	AIX	Completed	16
Pre-Development	WIN	Completed	15
Production	AIX	Completed	12
Production	WIN	Completed	35
Staging	AIX	Completed	3
Staging	WIN	Completed	5
System Test	AIX	Completed	17
System Test	WIN	Completed	8
Training	AIX	Completed	5
Training	WIN	Completed	5
UAT	AIX	Completed	56
UAT	WIN	Completed	28
TOTAL COMPLETED			**236**
Development	AIX	Pending	1
Production	AIX	Pending	46
Production	WIN	Pending	7
Staging	AIX	Pending	9
Staging	WIN	Pending	2
Training	AIX	Pending	12
Training	WIN	Pending	2
TOTAL PENDING			**79**
TOTAL SERVERS			**315**

The task orders have been executed after causing some time delays. DDI has begun to provide an integrated plan for the environments. They are providing specifications for future build-outs. They are providing installation guides and writing each document specific to T2. They are evaluating the DEV environment to determine if it will support the required development. Next, they will develop the same documents for the UAT environment. CSD plans to analyze the documents to determine if there is a gap between the current environment and the planned one specified in the document.

CSD has extended the contract for the dedicated team at the DCS until August 2015. This is a team dedicated to T2 environments and allows for more timely creation, correction and upkeep on the environments. By extending the contract, OAG is assured of adequate staff for handling CSD issues for system testing and going into performance testing.

Responsibilities have shifted within T2 with the creation of a new Phase 1 task order:

1. DDI will take the lead in providing specifications and an integrated plan for the build-outs.
2. DDI will take lead role in coordinating the build-out activities.

This finding will remain open until the IV&V team analyzes the complete set of capacity plans, documentation and hardware migration plans for all environments.

Open Findings 2012

F12A-002 - Questionable Work Plan Effort Estimation Accuracy			
The T2 Initiative work plan in Clarity contains variances indicating inaccurate work effort estimations.			
Period Opened	JAN 2012	**Period Closed**	OPEN
Degree of Impact	MEDIUM	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OSCE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	PM 25, 26, 28		

Finding Description

The table below shows the top few lines in the T2 Clarity work plan as of 1/12/2012. The total number of hours planned for Phases 1 and 2 of the initiative are **281,184.65** hours, and **37,529.84** hours have been consumed to date (1/12/12). There are 3,050 tasks in the T2 work plan, and 1,553 in the related DDI work plan (which is not in Clarity and therefore could not be analyzed in depth).

Table - Clarity Workplan Extract

Task	Status	% Complete	% Schedule Variance (Finish Variance)	% Effort Variance	SPI(t) (Finish Variance)	SPI(t) (Duration)	PT Planned Duration	AT Actual Duration	Schedule Variance Days (Finish Variance)	Effort Variance Hours	Baseline Usage	Actual Usage	Estimate to Complete	Total Usage
TXCSES 2.0	Started	36.8%	0.0%	-14.4%	1.00	0.93	2663	2870	0.00	-82,516.85	572,821.01	240,963.40	414,374.46	655,337.86
Initiative Activities	Started	63.3%	Milestone	-29.3%	0.00	0.00	1	1312	-1118.00	-22,343.83	76,159.15	62,333.10	36,169.88	98,502.98
Initiative Tasks	Started	63.2%	0.0%	-30.1%	1.00	1.00	1134	1134	0.00	-21,623.25	71,855.15	59,108.35	34,370.05	93,478.40

Based on our detailed analysis of the Clarity work plan dataset extract, the T2 Initiative contains variances to date indicating that inaccurate work effort estimations were made and loaded into the master plan.

Specifically, the current T2 Work plan Variance Analysis shows variances of from -93.5% to +27.1%, after the Initiative has moved through 18.2% (1.3 years) of the Clarity timeline since the start date of 9/7/2010. A later Excel dataset extraction from the Delivery (Quality) Assurance manager (SV EV and Perc Complete 1 18 2012.xls.xml) also showed a -14.4% variance (655,337.86 EAC vs. 572,821.01 Baseline hours).

Some estimation inaccuracy may come from DDI-CSD mismatched assumptions, which get rolled up into Clarity milestones. Based on the DDI architecture model, their work plan

contains the following items, which illustrate the mismatched assumptions:

1. The State of California system they last worked on was not a BPM SOA system, so CSD's must be customized.
2. The DDI methodology is not the Deloitte-based Playbook, but is the Accenture Delivery Method (ADM), which came from Method1.
3. There are 4300 hours currently in their plan, with 1553 specific tasks.
4. Their MS Project schedule and CSD's T2 Clarity schedule are synched weekly (with some overlapping entries).
5. They have added an additional requirements validation step to their work plan.
6. Not currently in their plan is Production support and sysadmin.
7. The DDI assumes that stable environments will be provided by the T2I team.
8. DDI believes that the CSD environments area was under-scoped in the current CSD work plan.

It is also possible that the variances are caused by inaccurate time tracking and reporting against the estimates. In either case, the root cause is not yet known.

As best as could be determined by the IV&V team based on the detailed analysis of the 01/12/2012 Clarity work plan dataset, the T2 Initiative Work Breakdown Structure is loaded with approximately 26% (168,098 of 653,100) of the total hours for the Initiative (less the Phase 3 FIN project effort) over the full timeline. At 01/12/2012, with 18.2% of the timeline used, approximately 36% of the actual hours reported were for project management (PM) related activities. Industry averages for PM activities usually run about 3-5% over a SELC.

Some of this loading and usage is understandable given the many layers of management in place, and the dual positions at each level for knowledge transfer. But this may also be contributing to the perception of management over control.

Further evidence of questionable accuracy of the schedules is that the Clarity database has zero hours loaded for the Initiative Phase 3 FIN project.

Other than the T2 Infrastructure project's environment build-out hours, total hours for the T2 Initiative apparently do not contain the FIN development project hours for Phase 3, misrepresenting the total hours and cost for the Initiative. If these hours are under a different label somewhere else that is held for rolling wave planning, then they are mislabeled and/or misplaced (a search for FIN and Phase 3 in the full Clarity dataset returned only the T2I buildouts).

One reason is that the Delivery Management Plan (DMP) lacks sufficient detail to support work effort estimation, as seen in the DMP excerpt below, which states that:

- The project metrics methods, maintenance and communications processes to be used in a project should include a rationale for choices of estimation methods, collection of work effort estimate history, and comparison to actuals to allow the project to refine their estimation accuracy as the project progresses, and provide a sound basis for new estimates. It is insufficient to address these during project closure in lessons learned reports.

Risk

1. Inaccurate work estimation and reporting can lead to missed milestones, schedule, slippage, and scheduling coordination problems such as unleveled team idle time, and serious cost issues from time and cost under/overruns. Incremental schedule slippage is a sign of issue management problems on a project, often the result of poor processes.

2. The lack of guidelines in general can lead to unnecessary variance of process amongst projects.
3. The lack of guidelines for metrics methods and maintenance processes, and communication about them within the project management plans can lead to project work estimates that are over or underestimated, with failure to refine estimates over the life of the project.
4. The lack of guidelines for an early termination or restart process can lead to run-on projects, costing extra time and resources.
5. Excessive project cost and personnel issues relating to perceived over control can result from too much project management activity.

Recommendations

1) The process for producing work estimates, and the validity of work estimates in the current work plan should be reviewed and validated.
2) At least two different estimation methods should be used, and compared for reasonableness, for each major activity estimate. Possible methods could include:
   a) **Expert estimation**: quantification based on judgmental processes (analogy, expert judgment, Delphi, etc.)
   b) **Formal estimation model**: quantification based on mechanical processes, such as the use of an algorithmic formula derived from historical data (Function Point Analysis, Use Case Analysis, Software Size Unit, Story points, COCOMO, SLIM, etc.).
   c) **Combination-based estimation**: quantification based on a judgmental or mechanical combination of estimates from different sources
3) It is also recommended, if possible, for the persons or group who will execute the work to make at least one of the effort estimates for it. The work effort estimation process should include methods for collection of work effort estimate history, for comparison to actuals during project execution to allow the project to refine their estimation accuracy as the project progresses.
   Estimates should include a confidence factor for the estimate, to aid in determining the amount of risk contained in it.
4) Update the DMP to include guidelines for Project Management Plans to include:
   - Standardized project metrics methods to be used on a project, and the maintenance and communications processes to be used for them during the project. Include directions for a Project Management Plan about choosing a rationale for estimation methods choices, and tie them to SELC phases and gates. Implementation of the revised DMP should cause a re-evaluation of project plans with respect to estimation processes for accuracy, and a probable recalculation of work effort estimates.
   - A prescribed process for terminating a project before it is scheduled to complete, and a process for restarting a project where required. The process should include criteria for termination, and for restarting a project.
5) Evaluate the Work Breakdown Structure (WBS) in Clarity to validate that the hours observed are accurate; and then streamline the WBS to provide only enough structure and control to effectively manage the projects, without over control.
6) The use of appropriate and well defined SELC's and the institution of a well-built metrics program can improve information about what is occurring on the projects, facilitate mid-course corrections in a timely manner, and allow the individual project teams the freedom to perform within their scope, producing better results at lower overall cost.
7) Explicitly load the Clarity work plan with the Phase 3 FIN project hours as a reserve block to

be detailed in the WBS later.

At our upcoming July review IV&V will meet with CSD's QA manager to determine why our Clarity analysis results differed from theirs. It may be that the Clarity extract provided was flawed or that our category of "project management activities" is different than their category of "hours expended by project management personnel". In any case, for this review IV&V is willing to accept CSD's result of 36% for project management hours consumed to date.

Relevant Standards, Best Practices, and Related Resources

1. McConnell, Steve, *Software Estimation: Demystifying the Black Art.* Redmond, Wa.: Microsoft Press, 352 pages, 2006. ISBN: 0735605351. http://www.stevemcconnell.com/Estimation-17.pdf
2. Boehm, Barry, *Software Engineering Economics*, 1981, Prentice-Hall
3. PMI, *Guide to the Project Management Body of Knowledge*, 4th Ed., 2008
4. Jack R. Meredith and Samuel J. Mantel, Jr., *Project Management: A Managerial Approach*, John Wiley & Sons, ISBN-10: 0470533021

Status Update

Effective July 20, 2012

At the last IV&V review, Clarity extracts had to be manipulated and loaded into Microsoft Excel for analysis. It was determined that IV&V's schedule work plan calculations differed from CSD's due to lack of direct access to the Clarity tools, such that incomplete data was obtain in the January review. It did serve to highlight some of the issues with the Clarity plan data however.

For this review, IV&V was granted direct tool access to Clarity, ClearCase, ClearQuest, and RequisitePro. There are 2,875 tasks in the T2 work plan. The table below shows the top few lines of the T2 Clarity work plan variance analysis worksheet (SV EV and Perc Complete 07_20_2012.xlsx) as of 7/20/2012. The total number of hours baselined for Phases 1 and 2 of the initiative are now 618,501.78 hours, with 326,787.60 hours consumed to date (52.8%). With current Estimates-to-Complete, the total forecasted hours at completion are 699,106.04 (13.0% over baseline).

Task	% Complete Effort	% Complete Duration	% Schedule Variance (Finish Variance)	% Effort Variance	SPI(t) (Finish Variance)	SPI(t) (Duration)	PT (Baseline Duration)	AT (Current Duration)	Schedule Variance Days (Finish Variance)	Effort Variance Hours	Baseline Effort (Baseline Usage)	Actual Effort To-Date (Actual Usage)	Estimate to Complete	Effort at Completion (Total Usage)
TXCSES 2.0	46.7%	31.1%	0.0%	-13.0%	1.00	1.00	2839	2839	0.00	-80,604.26	618,501.78	326,787.60	372,318.44	699,106.04
Initiative Activities	84.2%	51.7%	Milestone	-34.4%	0.00	0.00	1	1312	-1118.00	-24,150.16	70,127.75	79,418.80	14,859.11	94,277.91
Initiative Tasks	84.3%	94.9%	36.5%	-36.4%	1.59	1.59	1134	714	420.00	-24,008.11	66,015.65	75,928.05	14,095.71	90,023.76

This report shows that the Initiative is 31.1% through the timeline (with no schedule variance from the first February 2012 baseline), and has consumed 46.7% of the total hours so far (a variance of -13.0%). The projected total hours at completion are now 699,106.04, a 6.7% increase since our last review six months ago, which was the first time a detailed hours analysis was performed.

Increasing hours estimates are a sign of inaccurate estimations. If risk contingency for the

unknowns ahead are embedded in the total work hour estimates for tasks in the work plan schedule, then either the hours or the risk contingencies were underestimated. This leads to movement of estimated completion dates (schedule slippage), which spawns frequent re-planning, and overall increased project costs.

The need for 5,408 extra DDI hours (which included a 26.4% embedded risk buffer) to cover schedule delays due to the need for further CIL requirements clarification is an example of such impacts. It added an additional $747,768.32 to the Initiative's costs on March 14, 2012.

Effective January 2013

Since our last review, CSD has performed a significant re-ordering of the work in the Clarity work plan, to create a new Work Breakdown Structure (WBS). The new WBS combines the remaining work of Phase 1 and 2 together into a single Release1. At 1/17/2013, the new WBS contained 3984 line items – an increase of 932 line items in a year. The WBS summary for the last three IV&V reviews is shown below:

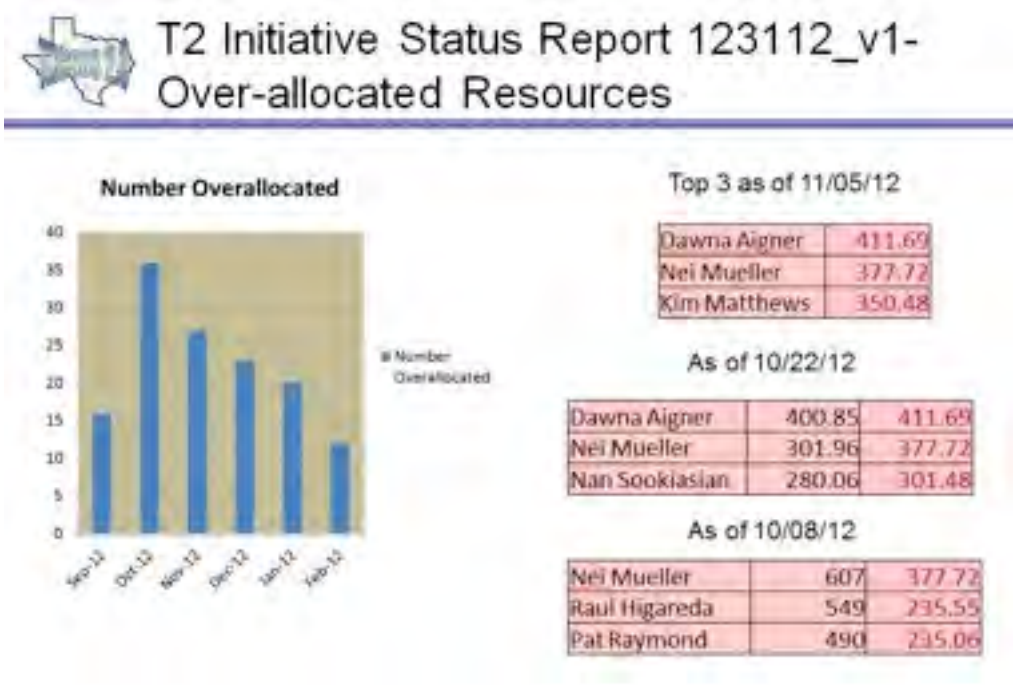
	Counts		
Type	**Jan 2013**	**Jul 2012**	**Jan 2012**
Phase	1	1	1
Activity	9	10	10
WBSLevel3	61	68	83
WBSLevel4	156	160	154
WBSLevel5	292	270	118
WBSLevel6	241	84	47
WBSLevel7	69	70	41
WBSLevel8	5	9	3
Task	2485	2661	1960
Milestone	665	651	635
WBS Line Items	**3984**	**3984**	**3052**

In addition, the new Initiative Tracking and Reporting Manager appointed just prior to our last review has performed manpower analyses to refine the assignments of CSD staff to tasks across projects, and to tune the work estimates reflected in the Clarity work plan. The new WBS more closely aligns to the Accenture's Delivery Method (ADM), which is the basis for the estimates in the SDLC phases of the project.

The new WBS work plan includes a breakdown of tasks and hours for the **Finance** project (Phase 3 in prior work plans) which had been omitted from the detail work plans up to this revision. Therefore, the work plan now reflects the total hours effort for all projects in the T2 Initiative, which has increased from the 608,108.47 hours baselined February 2012 to 1,220,793 hours (under approval review as the new baseline).

The net result of these WBS and staffing changes over the last few months is that the work plan has been improved, has more accurate estimates, and better reflects the actual state of the work to do and to date. This however, is revealing that many tasks are currently understaffed, leading to continued schedule slippage (as reflected in the 12/31/2012 Management

Dashboard excerpt sample above). The below sample from the Project Manager's Status Meeting illustrates the metric:



Underestimating work leads to understaffing. A side effect of understaffing is overworking the existing staff, which may lead to burnout and/or turnover.

Effective July 2013

Progress on this finding has been noted. Since our last review, CSD has re-estimated some work in a bottom-up fashion, using more than one method for much of it, and baselined it in the Clarity work plan, with the new Work Breakdown Structure (WBS) combining the remaining work of Phase 1 and 2 together into a single Release1 that was created late in 2012. The DDI has also added Iteration 1 and 2 due in October/November 2013 into their WBS. CSD and DDI learned from the work done thus far and revised the baseline projects to help ensure that realistic timelines were estimated. CSD still needs to work with DDI to document their better estimation methods in the Playbook for future project work estimation efforts.

At 7/12/2013, the new baselined CSD WBS contained 4042 line items (tasks, summaries, and milestones) maintained in Clarity, and referenced 4438 line items being tracked in the DDI WBS maintained in MS Project. The WBS summary for the last four IV&V reviews is shown below:

Clarity Workplan Line Item Counts

Type	Jul 2013	Jan 2013	Jul 2012	Jan 2012
Phase	1	1	1	1
Activity	9	9	10	10
WBSLevel3	35	61	68	83

WBSLevel4	89	156	160	154
WBSLevel5	186	292	270	118
WBSLevel6	223	241	84	47
WBSLevel7	215	69	70	41
WBSLevel8	146	5	9	3
WBSLevel9	5	0	0	0
Task	2444	2485	2661	1960
Milestone	689	665	651	635
Total WBS Line Items	**4042**	**3984**	**3984**	**3052**

The above table illustrates that the level of detail tracked in CSD's Clarity work plan has been increasing, reflecting a progressively deeper elaboration of the project work to be done. A finer work breakdown leads toward increasing accuracy. Management asserts that that they have confidence in the improved work estimations based on their review of the previous WBS elements over the past year, and the addition of design and development work tasks that have been washed through the DDI's ADM Estimator tool (based on several past Child Support Systems implementations), with adjustments for special Texas considerations, T2 Initiative requirements, and the CSD project team environment. IV&V was pleased to see much progress on this finding and noticeably more accurate effort estimates in the WBS. And the new metrics tracking and project management dashboard is reflecting a crisper measurement of progress on tasks against these estimates. That, however, is showing slippage due primarily to the violated assumptions of full and timely skill staffing, and a streamlined review process able to achieve the 5-5-5 target.

Despite the progress on estimation accuracy, there did not appear to be any kind of quantitative confidence factor added to the estimates, to be reflected in the risk management tracking and the new metrics program. A verbal confidence factor in the range of 10%-50% was elicited from the CIL team for R1 completion by Oct 2015. Only the CSD Customer Advocate and the DDI Design Lead were more optimistic with confidence factors of from 85% - 100% IF (and only if) all assumptions were met and everyone did their job right. But the dashboard metrics tracking for the past five months shows that these assumptions underlying the baselined estimates in the current schedule have already been violated.

Also, no evidence was found that a process for a project to be terminated or suspended before its natural completion, with a process to restart it once suspended, had been added to the DMP per recommendations.

Overall, IV&V was pleased to see much progress on this finding and noticeably more accurate effort estimates in the new WBS and baselined project schedule, reflected in the new metrics tracking and dashboard reporting, but recommends that it remain open until the quantitative confidence factor and termination/suspension/restart process be addressed.

Effective January 2014

IV&V accepts that the process and templates documented for project termination or suspension within the T2 Initiative, as described in the Playbook's Delivery Management Plan

(DMP), are sufficient.

Estimation Accuracy is a measure of how accurate estimates of work and time made long ago are proving to be. Estimation accuracy increases with information over time. Identification of consistent estimation error sources can lead to improved re-estimation, a component of forecasting and continuous improvement. One piece of evidence of estimation inaccuracy is variance from planned effort, especially increasing hours to complete. This can be measured by tracking overall Estimate-To-Complete (ETC) changes.

At this review, CSD reports:
Weekly reports track schedule and effort variances by task and roll-ups. The variances are reported weekly and analyzed for reporting monthly. The PMs and Development Leads are prompted to consider whether effort variances will persist on similar tasks. Effort growth is also monitored to identify when estimates to complete are growing.

The November **Planned vs. Actual** worksheets show an **8.2% variance** in ETC Growth:

Project	Resource Act	Resource ETC	Resource EAC	Resource BL	EAC-BL	**Percent Variance**
ERS	24,441.85	37,823.95	62,265.80	61,710.20	555.60	0.9%
CIL	122,910.16	96,498.25	219,408.41	207,947.24	11,461.17	5.5%
EER	102,455.76	73,026.75	175,482.51	173,026.01	2,456.50	1.4%
T2I	37,241.80	6,530.75	43,772.55	41,848.55	1,924.00	4.6%
RL1-ARCH	67,708.46	14,387.00	82,095.46	68,002.13	14,093.33	20.7%
RDO	31,028.85	17,951.50	48,980.35	48,012.35	968.00	2.0%
ECM	107,600.06	14,572.00	122,172.06	116,474.51	5,697.55	4.9%
RL1	7,064.50	200,297.75	207,362.25	150,851.00	56,511.25	37.5%
INIT	128.136.20	54.348.97	182.485.17	171.424.12	11.061.05	6.5%
DQA	5,712.45	1,772.60	7,485.05	7,395.25	89.80	1.2%
FIN	1,861.75	223,298.75	225,160.50	222,668.00	2,492.50	1.1%
CFC	8,590.60	0.00	8,590.60	8,589.10	1.50	0.0%
TOTAL	655,399.44	746,033.27	1,401,432.71	1,295,351.21	**106,081.50**	**8.2%**

BL = Baseline

The data shows that most of the variation is in the CSD tasks, with Release1 being the big outlier:

Project	**Resource Act**	**Resource ETC**	**Resource EAC**	**Resource BL**	**EAC-BL**	**Percent Variance**
DDI						
ERS	10,497.55	26,552.00	37,049.55	36,263.05	786.50	2.2%
CIL	61,885.72	75,622.75	137,508.47	125,832.25	11,676.22	9.3%
EER	14,279.50	46,554.00	60,833.50	61,413.75	(580.25)	-0.9%
T2I	0.00	0.00	0.00	0.00	0.00	
RL1-ARCH	52,830.46	11,493.00	64,323.46	53,944.88	10,378.58	19.2%
RDO	6,280.00	10,422.75	16,702.75	15,872.75	830.00	5.2%
ECM	47,059.39	8,425.00	55,484.39	46,730.54	8,753.85	18.7%
RL1	5,005.50	110,219.50	115,225.00	116,077.00	(852.00)	-0.7%
INIT	29.713.30	6.406.90	36.120.20	26.611.00	9.509.20	35.7%

DQA	0.00	0.00	0.00	0.00	0.00	
FIN	0.00	150,206.00	150,206.00	150,206.00	0.00	0.0%
CFC	0.00	0.00	0.00	0.00	0.00	
TOTAL	228,508.42	450,120.90	678,629.32	639,255.97	39,373.35	**6.2%**

CSD						
ERS	13,944.30	11,271.95	25,216.25	25,447.15	(230.90)	-0.9%
CIL	61,024.44	20,875.50	81,899.94	82,114.99	(215.05)	-0.3%
EER	88,176.26	26,472.75	114,649.01	111,612.26	3,036.75	2.7%
T2I	37,241.80	6,530.75	43,772.55	41,848.55	1,924.00	4.6%
RL1-ARCH	14,878.00	2,894.00	17,772.00	14,057.25	3,714.75	26.4%
RDO	24,748.85	7,528.75	32,277.60	32,139.60	138.00	0.4%
ECM	60,540.67	6,147.00	66,687.67	69,743.97	(3,056.30)	-4.4%
RL1	2,059.00	90,078.25	92,137.25	34,774.00	57,363.25	165.0%
INIT	98,422.90	47,942.07	146,364.97	144,813.12	1,551.85	1.1%
DQA	5,712.45	1,772.60	7,485.05	7,395.25	89.80	1.2%
FIN	1,861.75	73,092.75	74,954.50	72,462.00	2,492.50	3.4%
CFC	8,590.60	0.00	8,590.60	8,589.10	1.50	0.0%
TOTAL	426,891.02	295,912.37	722,803.39	656,095.24	66,708.15	**10.2%**

IV&V believes that individual task estimation accuracy of work in the WBS by both CSD and DDI has improved in the T2 work plans over the course of our observation. Project lessons learned to date (e.g. Capture and Virtual Case File implementations), along with recent re-estimation events (e.g. to include work at the India Development Center), as well as the use of tools such as the ADM Estimator, have led to more accurate estimated work hours in the work plan WBS items. Yet further accuracy can still be achieved.

The largest component of the estimate variations in the work plans so far has not been individual task estimates, but rather whole blocks of work that were not included in the previous WBS's at all (e.g. Scope changes resulting in new DDI Task Orders; having to standardize the HLD and FD processes; adding user reviews to the development process; etc.).Additionally, extended decision timeframes on key work items tend to inflate ongoing work effort-to-complete estimates. A more stable planning environment after recent key management changes, coupled with expanding detailed knowledge by each participant of the work to be done, more efficient and better understood development processes, and carefully estimated risk impacts for future blocks of work in the WBS, should produce increasingly accurate revised weekly work estimates for the WBS work plans. Despite many slippages in work plan tasks to date, T2 Initiative management has not changed the Release dates for the T2 Implementation Strategy very much yet. The original public dates for the T2 Initiative, as aligned with the state's fiscal years, show SFY 2012-2016 as the timeframe for complete system renewal. But pressure is building on the T2 Initiative's ability to meet that timeframe within project constraints.

IV&V will continue to monitor this finding until work plan volatility subsides, and monitored slippage appears to be under control, with only minor variances, as measured by the stoplight

legends for the management reports.

Effective July 2014.

IV&V has seen significant improvement on this finding since it was made in January 2012 on our 2nd visit. Recommendations 1-7 cited above have been addressed to varying degrees since then, and the estimates in the Initiative's current workplans are far more reliable than they were when we first arrived. CSD accumulated project experience, and DDI's use of the ADM Estimator based on prior child support system implementations that includes their recent experience with the California system, have helped a great deal. This has resulted in the major milestone Estimates-to-Complete (ETC) becoming less volatile during the past year.

The T2 Initiative continues to hold a 12/31/2017 externally published completion date, with an estimated expenditure of $243.1M, which is 12.5% over the current $216M budget, and 20% over the original 2010 $202.7M budget.

	ECM	ERS	EER	FIN	RODEO	T2I	T2 Initiative
2013-OAGT2							
ORIGINAL BUDGET	$51.3	$6.2	$54.5	$40.2	$6.3	$48.8	**$216.0**
CURRENT BUDGET	$35.2	$12.0	$65.0	$48.2	$10.0	$66.3	**$243.1**
EXPENDITURES TO DATE	$28.5	$6.4	$37.8	$15.7	$6.2	$43.0	**$142.4**
PERCENTAGE COMPLETE	88%	21%	29%	1%	36%	45%	
ORIGINAL START	9/1/08	9/1/08	1/1/10	12/1/13	8/1/09	9/1/08	**9/1/2008**
STOP	12/31/11	8/31/12	8/31/15	**12/31/17**	10/31/12	12/31/11	**12/31/2017**
ORIGINAL TIMELINE (YEARS)	3.33	4.00	5.67	4.08	3.25	3.33	**9.34**
CURRENT START	9/1/08	9/1/08	9/1/09	2/1/13	1/1/09	9/1/08	**9/1/2008**
STOP	11/30/15	11/30/15	11/30/15	**12/31/17**	11/30/15	11/30/15	**12/31/2017**
CURRENT TIMELINE (YEARS)	7.25	7.25	6.25	4.92	6.92	7.25	**9.34**

[1]SOURCE: http://qat.state.tx.us/pubs.htm

From the Texas Legislative Budget Board's annual Quality Assurance Team (QAT) report1 as of the end of the Texas state year 2013, the project had consumed $142.4M (61% of the current budget). From the 6/30/2014 monthly SPI and CPI reports, the Initiative has consumed 824,900 hours of work, which is 51% of the currently estimated 1,605,513 hours planned, with a Schedule Performance Index (SPI) of .96, and a Cost Performance Index of .97 (a "1.00" indicates "on plan").

So, T2 Initiative variances persist. And the DDI's estimates for the design and development work were apparently under-scoped, as they are preparing a revised workplan for Release 1 (expected in September 2014) to absorb an increase of up to 81,000 estimated hours for extra project work and integration of T2 with T1 after Release 1, to meet the Release 1 launch date in

July 2016.

From the monthly T2 Initiative Status Report for June 30, 2014:

> "The negative schedule variance was incorrectly reported as .03% in May 2014. The schedule variance was 3%. The variance decreased in June to negative 4%. Prior to development, DDI re-estimated the effort to complete the project based on the results of the design activities. They identified an increase of 56,000 hours for project related work and 25,000 hours of Integration work to complete Release 1. As a result the work plan is being updated and a rebaseline will follow in September 2014. Following the methodology of the GAO Assessment Guide a rebaseline is warranted. There is no cost increase as a result of the increase in hours and the Release 1 go-live date remains at July 2016. Reference the Schedule Management section for additional detail."

The June status reports showed some positive metrics variance to estimates, but a *sustainable trend* and only *small variances* to estimates *over 6-12 months* are desired.

To close this finding, IV&V needs to see:

1. The new rebaselined DDI workplan expected in September 2014, containing the extra hours identified by DDI for integration,
2. a stable T2 Initiative baselined workplan covering the complete scope, with less frequent rebaselines, and
3. at least 6 months of only slight variances to milestone and task completion dates (green, as defined by the T2 Initiative Summary Dashboard Metrics Legend).

We will look for these during our next visit in January 2015.

F12A-003 - Creeping Schedule Slippage			
The T2 Initiative timeline appears to be suffering incremental schedule slippage.			
Period Opened	JAN 2012	**Period Closed**	OPEN
Degree of Impact	MEDIUM	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OSCE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	PM 2, 4, 7		
Finding Description			
"According to the Division's milestone reports, from March 2009 to January 2011, 184 milestones were, on average, 35 calendar days late. Division management asserts that intermediate delays will not affect the overall project completion date." [2] Difficult to recognize without fully baselined schedules, it appears that incremental slippage is			

occurring (or beginning to occur) in the T2 Initiative work plan.

Only dates in the Clarity work plans from July 2011 and Jan 2012 were compared (total hours were not supplied in July 2011), and neither work plan was fully baselined, but 5 of the 10 major WBS categories being tracked in the work plan showed a change in end dates in a range from 105 to 307 days (3.5 to 10.2 months) when the Initiative is only about 16 months into the total 90 month Initiative work plan.

Table - Clarity Workplan date variance analysis

T2 Workplan Date Variance Analysis			January 2012 Clarity Workplan Data			July 2011 Clarity Workplan Data			
Name	Status		Start	Finish	Duration (days)	Start	Finish	Duration (days)	Diff (%)
Initiative Activities	Started	Current:	9/7/2010	4/29/2014	1330	9/7/2010	10/31/2013	1150	-180
		Baseline:	3/21/2011	3/21/2011					
		Variance:	0	-123	-0.3%	na	na	na	na
Data Quality Analysis (DQA)	Started	Current:	9/7/2010	4/1/2015	1667	9/7/2010	5/29/2014	1360	-307
		Baseline:	9/7/2010	4/1/2015					
		Variance:	0	0	0.0%	na	na	na	na
Case Initiation & Locate (CIL)	Started	Current:	9/7/2010	11/21/2014	1536	9/7/2010	4/16/2014	1317	-219
		Baseline:	9/7/2010	4/14/2015					
		Variance:	0	102	0.2%	na	na	na	na
Enterprise Reporting System (ERS)	Started	Current:	9/7/2010	9/4/2014	1458	9/7/2010	4/17/2014	1318	-140
		Baseline:	9/7/2010	9/4/2014					
		Variance:	0	0	0.0%	na	na	na	na
Identity Access Management (IAM)	Started	Current:	9/7/2010	9/4/2014	1458	9/7/2010	5/22/2014	1353	-105
		Baseline:	9/7/2010	9/4/2014					
		Variance:	0	0	0.0%	na	na	na	na

For the CIL project (a current Initiative focus), the July 2011 work plan finish date of 4/16/2014 moved to 11/21/2014 in the January 2012 work plan. The Virtual Case File (VCF) pilot was going to start in January 2012 (at the July 2011 review), and then it was moved to July 2012 (at the January 2012 review). Discussions during this review with T2 management and the CSD and DDI project teams indicated that it might not be ready to start until August 2012.

Other observations include:

- The phase 1 schedule has slipped by 8 months to a year since the last IV&V team visit; primarily due to revisiting requirements analysis and business process flows instead of designing.
- The T2 Initiative master schedule is still floating (not baselined).
- Some of the overlapping items in the DDI schedule are still also in MS Project instead of Clarity.
- Schedule slippage issues being discussed in the project teams.
- Phase 1 is beginning to spill over into phase 2, which will probably spill over into phase 3.

Risk

Incremental schedule slippage is a sign of issue management problems on a project, often the result of poor/incorrect processes. Schedule slippage usually leads to cost overruns, and/or poor quality work products.

Recommendations

Determine the underlying causes of the schedule slippages and correct the root problems, metricize the project processes, baseline the work plans, monitor a project slip chart, and manage the risks and issues closely.

Relevant Standards, Best Practices, and Related Resources

1. Gerald Weinberg, *Quality Software Management*, Vol. 2, Dorsett House, 1993, ISBN 0932633242
2. An Audit Report on The Development of the Texas Child Support Enforcement System 2.0 at the Office of the Attorney General, SAO Report No. 11-035, July 2011

Status Update

Effective July 20, 2012

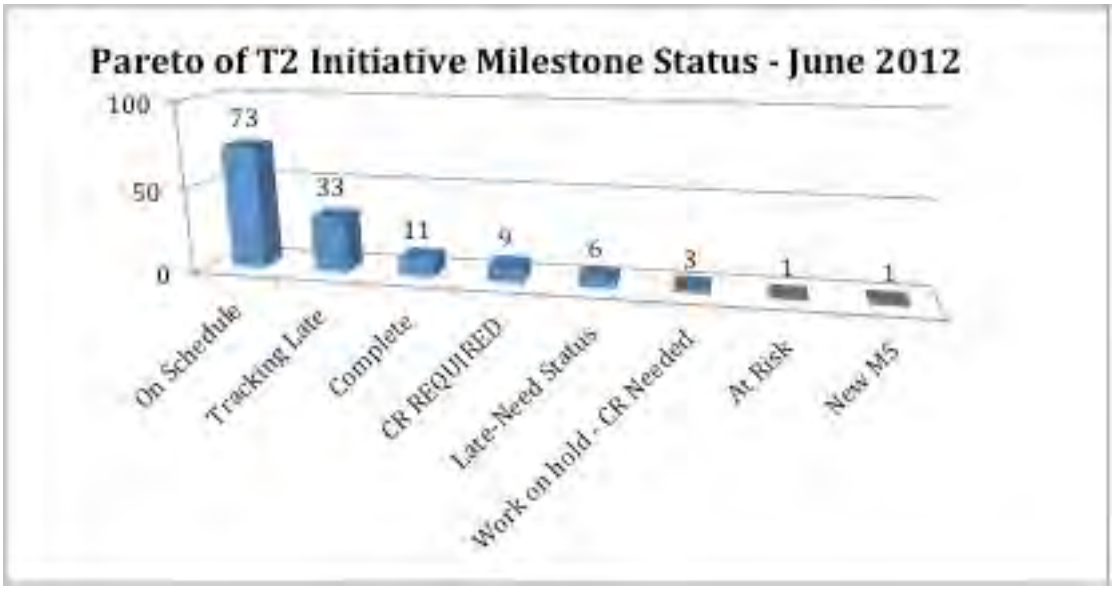
The IV&V Team observed continued schedule slippage. The following is from the Initiative Summary section of the monthly T2 Initiative Status Report of 6/30/2012: Schedule rating "red" due to the slippage in the VCF Pilot schedule, current delays in completing requirements clarifications for CIL, and delays in completion of Phase 1 tech design approach artifacts.

The following is from the Schedule Management section of the same report:

> VCF Pilot design is tracking two weeks late. Current impact assessment shows a 1-week impact to go-live for start of Pilot rollout. DDI will reassess impact once design phase tasks are 100% complete.

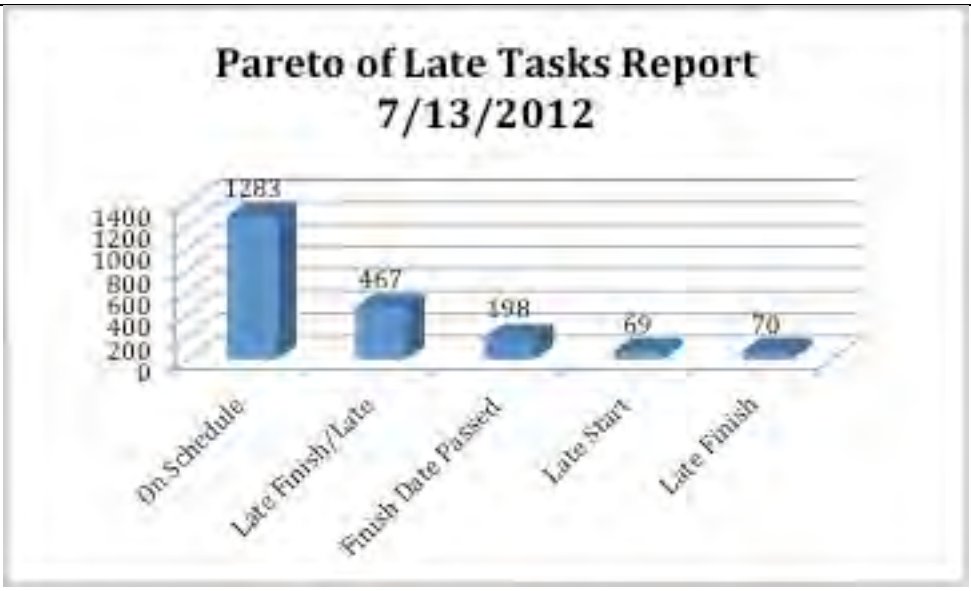
As reporting in April, the CIL requirements clarification milestones are tracking late. Mitigation strategies, including adding more resources to requirements clarification tasks, were employed in April to minimize slippage. CSD and DDI project managers estimate a two-month impact to overall schedule, or approximately a -6% variance. Additional mitigation strategies are being employed in downstream phases to try and preserve the June 2014 implementation date. Will monitor effectiveness of mitigations and reassess schedule variance as the project progresses through detailed design.

From the same report, of 137 milestones reported on*, 52 (38%) are either Late, At Risk, or a CR is Needed.



* Milestones completed during the current fiscal year are included in the report. Milestones completed in the prior fiscal year(s) will roll-off the monthly report, but are maintained in the work plan for the life of the project.

The T2 Late Tasks report from Clarity for 7/13/2012 contained a total of 2087 tasks, of which 804 (41%) were other than "On Schedule".



The sum of these indicators only 2 months after a re-baselined work plan schedule confirms the IV&V team's observation that the T2 Initiative is still suffering continued schedule slippage.

Effective January 2013

At this review, the newly revised WBS and work plans that were aligned with the Accenture Delivery Method (used for work estimation) were awaiting CSD baseline approval, so no reliable variances of schedule slippage could be obtained yet. However, IV&V believes that the revised approved work plan as a baseline will prove to be a better measure of the state of the initiative going forward.

As an informal metric, each group that IV&V met with during this review was asked the same question: "What is your *confidence* that the Release1 date of October 20, 2015 in the new work plan can be achieved?"

Most staff seemed relieved that the pressure of the building bow wave of schedule slips for Phase 1 over the past two years has been relaxed and the deadline pressure moved out for a couple more years. Their confidence of achieving this new deadline, however, was not as high as might be expected with a fresh new work plan. Instead, low to medium confidence was expressed. Confidence varied by organizational level and scope. For example, the lower in the organization, the lower the confidence about the entire organization's ability to achieve the Release1 date. If scope was narrowed to what they could control (e.g. CIL Designs or Go-Live), then confidence rose. This is normal for large projects and organizations like T2.

The informal metric results were reflected in the T2 Initiative's Late Task Report:

From the 1/18/2013 Late Tasks Report:

Late Start Baseline	Late Start Current Plan	Late Finish Baseline	Late Finish Current Plan	Late Starts > 20 days to baseline	Finishes > 20 days to baseline
820	54	936	15	771	872

Tasks Started	263
Not started	1144
On Schedule	523
Late Finish/Late Start	671
Late Start	25
Late Finish	173
Finish Date Passed	15

Key	
15	Finish date has passed, and task is not complete
67	Finish date is later than Baseline Finish date and task has not started
1	
17	Finish date is later than Baseline Finish date
3	
25	Start date has passed, and task not started

IV&V expects to review the new baselined Clarity work plan at the next review, to see if the Late Task Report shows marked improvements, and will review the collected trend and variance schedule data from the approved baselined schedule, and ask the interviewed staff same confidence question again then.

Effective July 2013

For the July 2013 review, the 7/12/2013 late tasks report shows 1118 active tasks from the new WBS and work plan that was baselined 1/25/2013, with the following breakdown:

0	0%	Finish date has passed, and task is not complete
577	52%	Finish date is later than Baseline Finish date and task has not started
198	18%	Finish date is later than Baseline Finish date
0	0%	Start date has passed, and task not started
343	31%	On Schedule

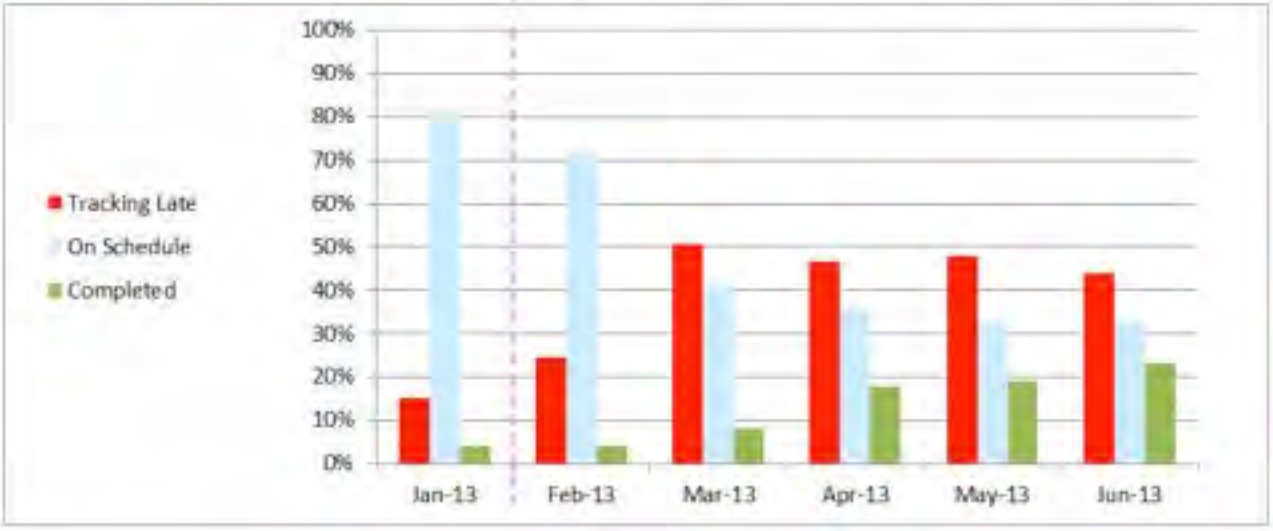
This is slightly better than the 1/18/2013 report, but still indicating significant slippage. The data for the last six months, as reported on the T2 Initiative Monthly status reports is summarized below into a slip chart:

Dashboard Metrics Legend	
G	No intervention required. Project going as planned in this area. A positive variance or a negative variance less than or equal to 5%; risk and/or issue rating of Low.
Y	Some oversight required. Project may be at risk in this area. A negative variance greater than 5% and less than or equal to 10%; risk rating of Moderate or Controllable, and/or an issue rating of High or Medium.

R	Intervention required. Project is at risk in this area. A negative variance greater than 10%; risk rating of Severe or Significant, and/or an issue rating of Critical.

T2 Status Report	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13
Dashboard Metrics						
Schedule	Y	G	G	Y	R	R
Effort			G	G	G	G
Quality	R	R	Y	Y	Y	Y
Risks	R	R	R	R	R	R
Issues	R	R	R	Y	Y	Y

Milestone Tracking	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13
Tracking Late	15%	25%	51%	47%	48%	44%
On Schedule	81%	71%	41%	36%	33%	33%
Completed	4%	4%	8%	18%	19%	23%



After baselining the new WBS work plan on 1/25/2013, the January report showed mostly On Schedule tasks. However, project tasks began to slip rather dramatically in the next month, and then leveled off for the next four months. The T2 Initiative Monthly Status Reports explanations indicate that the slippages were mostly due to resource shortages (at both CSD and DDI), and extended review times for the High-level Designs (HLDs). These causes persisted through our review this period, although the impacts seem to be held steady-to-slightly-slipping as of July 2013.

For the whole project, a top-level summary of the T2 Initiative from the T2_INT_Week Ending_071213.rmp file is shown below:

	1/25/2013 Baseline	7/12/2013 Current and Actual	Variance (neg = over baseline)

Name	Start	Finish	Duration (Workdays)	Duration (Years)	Effort (Hours)	Start	Finish	Duration (Workdays)	Duration (Years)	Usage To Date	Remainder to Complete	Total Estimate at Completion	Hours	Percent
TXCSES 2.0	**2/10/2010**	**3/30/2018**	**1,996**	**7.7**	**1,211,170**	**2/10/2010**	**3/30/2018**	**2,123**	**8.2**	**571,925**	**702,471**	**1,274,396**	**(63,226)**	**-5.22%**
Initiative Activities	9/7/2010	3/30/2018	1,848	7.1	171,443	9/7/2010	3/30/2018	1,974	7.6	114,683	70,606	185,289	(13,846)	-8.08%
Case Initiation & Locate (CIL) RL1-ARCH T2I RL1	9/7/2010	1/31/2016	1,283	4.9	395,427	9/7/2010	1/31/2016	1,409	5.4	197,175	231,351	428,526	(33,099)	-8.37%
Enterprise Content Management (ECM)	2/10/2010	12/30/2015	1,536	5.9	125,065	2/10/2010	12/30/2015	1,536	5.9	109,648	22,460	132,108	(7,044)	-5.63%
RODEO (RDO)	9/7/2010	12/30/2015	1,387	5.3	47,805	9/7/2010	12/30/2015	1,387	5.3	26,336	20,855	47,190	615	1.29%
Enterprise Reporting System (ERS)	9/7/2010	12/2/2013	773	3.0	52,533	9/7/2010	12/30/2015	1,387	5.3	19,100	35,978	55,078	(2,545)	-4.84%
Data Quality Analysis (DQA)	9/7/2010	12/30/2015	1,387	5.3	7,395	9/7/2010	12/30/2015	1,387	5.3	5,421	1,841	7,262	133	1.80%
Establishment & Enforcement (EER)	9/7/2010	12/30/2015	1,387	5.3	171,642	9/7/2010	12/30/2015	1,387	5.3	89,570	86,933	176,503	(4,861)	-2.83%
Financial Renewal (FIN)	10/8/2012	12/29/2017	1,349	5.2	222,668	10/8/2012	12/29/2017	1,365	5.3	926	224,283	225,209	(2,541)	-1.14%

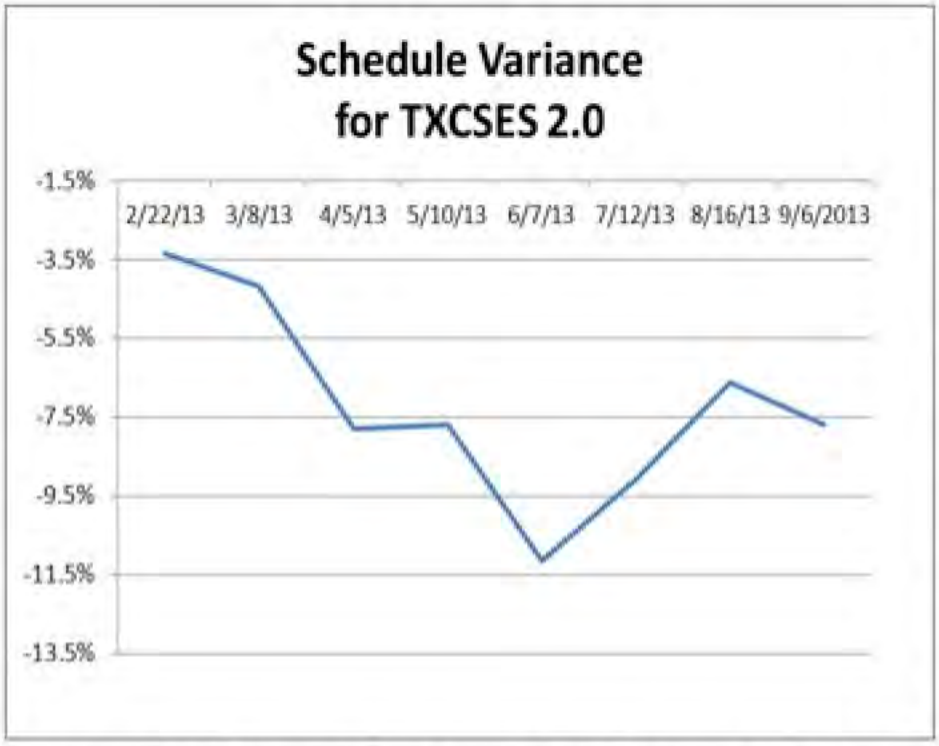
A negative variance in hours means that the overall estimate to complete is growing, which is putting pressure on the overall project end date, now at 3/30/2018. Indeed, a verbal poll of the team's confidence to achieve the Release1 date at the end of October 2015 seemed to corroborate the numbers trends above.

Management explains that the causes are understood, and that actions are being negotiated and implemented to correct the causes, and allow the planned target dates to be achieved. The new management dashboard provides warning that project managers to react and correct a problem before it is too late and the task has missed its expected completion date.

IV&V will check the metrics again in our next review to see if the 1/25/2013 Baseline schedule still holds, and the schedule slippage trends have been brought under control.

Effective January 2014

The last prepared and available **Monthly Management Metrics** report (October 2013) showed that schedule variance for the T2 Initiative was improving during our last visit in July 2013 (consistent with management's assertion that the schedule slippage issues were understood and undergoing actions to correct), but got worse after our visit due to a number of factors (e.g. Requirements were not finalized pending decisions from Management on potential scope items; Standardizing the HLD and FD process was not planned. Reviews took longer than planned. User reviews were not in the baseline plan; etc.):



Project	Schedule Variance 09/06/13
TXCSES 2.0	-7.7%
CIL	[illegible]
ARCH	-7.9%
EBO	[illegible]
ECM	-6.8%
RDO	-4.8%
ERS	[illegible]
IAM	[illegible]
EER	-4.4%
FIN	[illegible]

Figure 1: Schedule Variance Trends and Schedule Variance by Project

In fact, the downward trend (so clearly evident due to the advanced metrics in place) led to abandonment of preparation of the Monthly Management report for November and December with its attendant effort for investigations into root causes, due to awaiting CSD approval on key task orders for the DDI, continuing CSD resource shortages, and a major turnover in key T2 Initiative management positions late in 2013.

The current CSD Clarity work plan is tracking 4229 WBS line items, with 4667 line items being tracked separately in the DDI's WBS maintained in MS Project, tying into the CSD Clarity work plan at key milestones. The consolidated T2 Initiative work plan shows 1,406,553 hours to complete the Initiative (including FIN). 679,265 hours (48%) of the baseline have been expended through 1/10/2014 (consuming 44% of the current plan timeline to end-of-project on 3/30/2018). CIL has consumed 245,592 hours (36% of the total).

A Milestone Report Analysis prepared from the November 2013 T2 Initiative Status Report is shown below:

Milestone Variance*

* Milestones in this report are tracking to the baseline established 01/25/13. If a current date is more than two weeks past baseline, status is "tracking late". Tasks completed in Fiscal Year 2012 were removed from this report.

Unique ID	Milestone Name	Baseline	Current	Actual	Status
Deliverables					
5621	T2-ARCH-Milestone: Presentation Arch SAS Deliverables Complete	5/23/2013		11/22/2013	Complete
5646	T2-ARCH-Milestone: Integration & Service Arch SAS Deliverables Complete	6/18/2013	3/10/2014		Tracking Late
5657	T2-ARCH-Milestone: Batch Arch SAS Deliverables Complete	3/8/2013	12/13/2014		Tracking Late
5331	T2-ARCH-Milestone: T1 Integration Arch SAS Deliverables Complete	2/15/2013		6/28/2013	Complete

Completed Milestones Analysis

Finish (Days)
183
133

Tracking Late Milestone Analysis

Slippage (Days)
265
645

1508	RL1-Milestone: Solution Specification Part 2 Approved by Delivery Assurance Team	2/4/2013		4/8/2013	Complete	63		
1520	RL1-Milestone: Solution Specification Part 3 Approved by Delivery Assurance Team	2/5/2014	6/4/2014		Tracking Late			119
1356	RL1-Milestone: Data Conversion Design Approved by Delivery Assurance Team	7/3/2014	7/9/2014		On Schedule			6
1888	RL1-Milestone: Release 1 Master Test Plan Approved by Delivery Assurance Team	3/27/2015	5/15/2015		Tracking Late			49
3776	VCF-Milestone: Pilot Release Plan Complete/Approved by Delivery Assurance Team	6/18/2012		4/5/2013	Complete	291		
1662	VCF-Milestone: Release 1 Integration/Version 2 Solution Specification 1 v1.0 Approved	3/4/2014	3/5/2014		On Schedule			
1801	RDO-Milestone: Release 1 Solution Specification Approved by Delivery Assurance Team	7/31/2013		8/14/2013	Complete	14		
410	ERS-Milestone: Solution Specification Approved by	2/28/2014	3/13/2014		On Schedule			
7316	EER-Milestone: Solution Specification v1.0 Approved by Delivery Assurance	3/12/2014	5/27/2014		Tracking Late			76
DQA Milestones								
2341	DQA-Milestone: Manual Data Clean-Up Complete	10/22/2015	2/1/2016		Tracking Late			102
CIL Milestones								
6755	CIL-Milestone: Requirements Analysis Complete	2/8/2013		04/12/13	Complete			
6756	CIL-Milestone: High-level Design Complete	5/28/2013	1/24/2014		Tracking Late			241
5696	CIL-Milestone: Functional Design complete	7/31/2013	1/31/2014		Tracking Late			184
7004	CIL-Milestone: Design Complete	1/31/2014	8/14/2014		Tracking Late			195
110	CIL-Milestone: Development Complete	7/31/2014	12/11/2014		Tracking Late			133
7456	CIL-Milestone: Iteration 1 CIL Work Complete	6/28/2013	2/12/2014		Tracking Late			229
7457	CIL-Milestone: Iteration 2 CIL Work Complete	9/26/2013	5/1/2014		Tracking Late			217
T2-ARCH Milestones								
6923	T2-ARCH-Complete Documentation for Portal Reference Application	2/8/2013		4/5/2013	Complete	56		
4112	T2-ARCH-Milestone: Presentation Architecture Capabilities Design Complete	6/20/2013		11/22/2013	Complete	155		
4200	T2-ARCH-Milestone: Integration and Service Architecture Capabilities Complete	7/9/2013	4/10/2014		Tracking Late			275
4853	T2-ARCH-Data Access Design & Prototype Complete	3/27/2013		5/31/2013	Complete	65		
4861	T2-ARCH-Exception Handling Framework Design Complete	5/7/2013	1/6/2014		Tracking Late			244
4202	T2-ARCH-Milestone: Batch Architecture Capabilities Development	4/5/2013	12/13/2013		Tracking Late			252
6847	T2-ARCH-End to End Reference Application for T1 Integration Complete	5/13/2013		7/8/2013	Complete	56		
T2I Milestones								
3387	T2I-VCF Pilot/Version 1 Environment Build-Outs Complete	2/5/2013		4/26/2013	Complete	80		
4637	T2I Milestone: Release 1 Pre-Dev Environment Build-Out Complete	4/29/2013		5/31/2013	Complete	32		
3450	T2I-Milestone: Release 1 Environment Build-Outs Complete	12/2/2013	9/1/2015		Tracking Late			638
Release 1 Milestones								
82	RL1-Milestone: Design Completed/Approved	7/2/2014	8/14/2014		Tracking Late			43
130	RL1-Milestone: Release 1 System Testing Complete	3/31/2015	4/17/2015		Tracking Late			17
146	RL1-Milestone: Release 1 Acceptance Testing Complete	7/31/2015	7/31/2015		On Schedule			
160	RL1-Milestone: Release 1 Solution Training Complete/Verified	10/23/2015	10/23/2015		On Schedule			
167	RL1-Milestone: Release 1 Incremental Renewal Deployed-Go-Live	10/22/2015	2/12/2016		Tracking Late			113

ERS Milestones								
5974	ERS-Milestone: Requirements Analysis Complete	4/19/2013		9/5/2013	Complete	139		
7187	ERS-Milestone: High-level Design Complete	9/3/2013		11/19/2013	Complete	77		
7185	ERS-Milestone: Functional Design Complete	2/7/2014	3/10/2014		Tracking Late		31	
6155	ERS-Milestone: Design Complete	7/2/2014	8/4/2014		Tracking Late		33	
1741	ERS-Milestone: Development Complete	11/24/2014	2/6/2015		Tracking Late		74	
RDO Milestones								
5888	RDO-Milestone: Requirements Refinement Complete	2/28/2013		2/15/2013	Complete	-13		
7355	RDO-Milestone: Fragments, Docs, Forms & PAKs Analysis & Mapping Complete	2/28/2014	2/28/2014		On Schedule			
7439	RDO-Milestone: Release 1 High-level Design Complete	5/3/2013		7/31/2013	Complete	89		
7440	RDO-Milestone: Functional Design Complete	7/26/2013		7/31/2013	Complete	5		
5890	RDO-Milestone: Design Complete	10/11/2013		10/3/2013	Complete	-8		
1805	RDO-Milestone: Development Complete	7/8/2014	9/25/2014		Tracking Late		79	
VCF Milestones								
2169	VCF-Milestone: Pilot System Testing Complete	11/2/2012		3/8/2013	Complete	126		
3548	VCF-Milestone: Pilot Acceptance Testing Complete	12/7/2012		4/4/2013	Complete	118		
2181	VCF-Milestone: Pilot Solution Verified	12/7/2012		4/8/2013	Complete	122		
2208	VCF-Milestone: Pilot Solution Deployed	1/11/2013		4/5/2013	Complete	84		
2204	VCF-Milestone: Pilot Training Complete/Verified	10/18/2013		8/9/2013	Complete	-70		
7431	VCF-Milestone: Release 1 Integration Requirements Finalized	4/26/2013		8/9/2013	Complete	105		
7433	VCF-Milestone: Release 1 High-level Design Complete	7/26/2013	12/13/2013		Tracking Late		140	
7434	VCF-Milestone: Release 1 Integration Functional Design Complete	11/26/2013	2/28/2014		Tracking Late		94	
7241	VCF-Milestone: Release 1 Design Complete	4/16/2014	4/17/2014		On Schedule			
1702	VCF-Milestone: Release 1 Integration Development Complete	7/18/2014	7/21/2014		On Schedule			
EER Milestones								
7484	EER-Milestone: Knowledge Transfer and Requirements Consolidation Complete	3/10/2013		3/22/2013	Complete	12		
7476	EER-Milestone: Release 1 High-level Design Complete	7/24/2013	1/24/2014		Tracking Late		184	
7477	EER-Milestone: Release 1 Functional Design Complete	12/11/2013	2/18/2014		Tracking Late		69	
7296	EER-Milestone: Release 1 Design Complete	3/7/2014	5/21/2014		Tracking Late		75	
7297	EER-Milestone: Release 1 Development Complete	7/18/2014	10/17/2014		Tracking Late		91	

Nov 2013 T2 Project Status MILESTONE VARIANCE RPT:		Completed				Slipped			
On Schedule: 12 (27%)	Total:	24	100%	Average Variance (days)		34	100%	Average Variance (days)	
Tracking Late: 32 (73%)	# On Time or Early:	3	12.5%	-30.3	~1 month early	0	0.0%		
TOTAL: 44 Underway	# Late:	21	87.5%	95.5	~3 months late	34	100 0%	160.6	~5 months late

The analysis highlights that the T2 Initiative has fallen behind on 32 of 44 tracked milestones (73%) with an average slippage of ~5 months each on a schedule baselined 1 year ago. Of 24 milestones completed, 21 (87%) finished an average of 3 months late. 3 milestones (13%) completed an average of 1 month early.

A summary of the schedule variance issues explanations from the November 2013 T2 Initiative Status Report is shown below:

"The project negative schedule variance increased from negative 13% in October to negative 16% in November. A new go-live date will be provided with the Integrated Master Plan for Release 1 in mid-January. Delivery of an

updated work plan from DDI slipped from end-November to mid-January. The work plan will addresses issues with Tech Arch and Infrastructure that are impeding progress.

Following is some specific detail regarding the schedule:

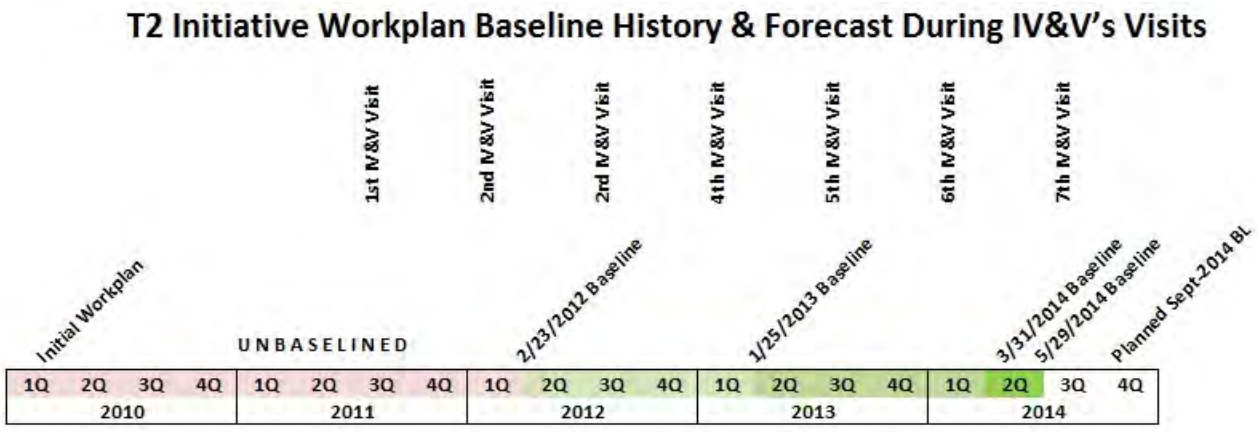
- Most development work will not begin until the gaps identified in the updated work plan are addressed. The work plan will include the effort to get the environment and build and deploy processes ready to support development.
- Tech Arch tasks have slipped and those slips are impacting downstream work. Contributors to the slips include resource constraints, environment challenges, and more customization than expected. In addition, the team is encountering issues with IBM tools that require Problem Management Requests (PMRs) which are sometimes difficult to resolve
- Scope decisions are impacting the completion of CIL Functional Design. Initiative Management is working through the outstanding Change Requests.
- The date for completion of Iteration 1 continues to slip. In October the reported completion was 01/28/14, but Iteration 1 is now predicted to complete 02/12/14. The Iteration work is identifying changes to artifact content. The slips in Iteration 1 impact CIL Technical Design.
- EER is focused on Functional Design. It was baselined to complete 12/10/13, but is now planned to complete 02/18/14. The work started late due to delays in completion of High-level Design.
- Test scripting may be delayed until decisions are finalized on outstanding Change Requests."

The new Integrated Master Plan for Release 1 mentioned in the November report above was not available to IV&V during our January onsite visit as forecast. However, we learned through interviews that some work tasks are not being executed pending management actions, so schedule slippage will likely continue to occur, adding to overall project costs. Therefore, IV&V will continue to monitor this finding until work plan volatility subsides, and monitored slippage appears to be under control, with only minor variances.

Effective July 2014.

T2 began operating under new approach in April 2014. This plan was to be reevaluated in July. They have concluded that a new baseline plan is needed.

The Initiative workplan baseline history during IV&V's visits has been:



Recently, the monthly T2 Initiative Status reports are showing positive trends:

T2 Status Report	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
		Baseline ->			Baseline ->	

Dashboard Metrics

Schedule	R	R	G	G	G	G
Effort	Y	Y	G	G	G	G
Quality	R	R	R	R	R	R
Risks	R	R	R	R	R	R
Issues	R	R	R	R	Y	Y

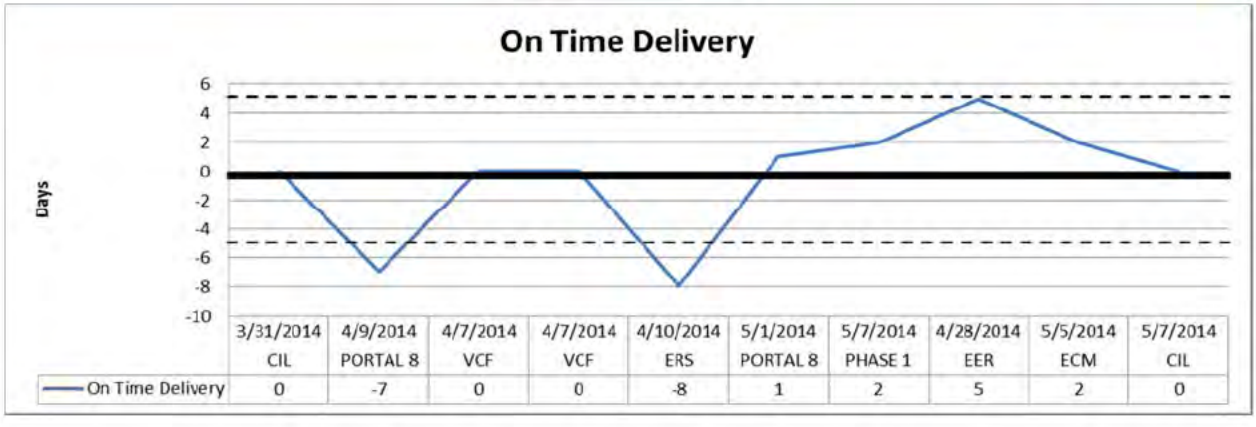
Weekly Issue Priority and Risk Exposure Dashboard by Project 05/09/14

- ISSUE PRIORITY. Low.
- ISSUE PRIORITY. High or Medium.
- ISSUE PRIORITY. Critical.

Total # of Currently Open Issues / Project	Project	Low	Medium	High	Critical
0	CFC				
3	CIL		1	2	
0	ECM				
1	ERS		1		
0	EST/ENF				
1	Infrastructure	1			
0	RODEO				
5	Security	2		2	1
12	T2 Initiative		3	7	2
0	FIN				
2	VCF		1	1	
24	All Issues	3	6	12	3

- RISK EXPOSURE. Low or Controllable.
- RISK EXPOSURE. Moderate.
- RISK EXPOSURE. Severe or Significant

Total # of Currently Open Risks / Project	Project	Low	Controllable	Moderate	Significant	Severe
0	CFC					
1	CIL		1			
0	ECM					
4	ERS		1	3		
1	EST/ENF			1		
4	Infrastructure			4		
2	RODEO			2		
1	Security				1	
16	T2 Initiative		3	10	3	
1	FIN			1		
1	VCF				1	
31	All Risks		5	21	5	



For this review, IV&V looked at the T2 Milestone variance from the **T2 Initiative Status Report** of 6/30/2014, based on the 5/29/2014 workplan. An analysis shows a continued net

slippage of on-going milestones:

T2 Milestone Variance

From T2 INITIATIVE STATUS REPORT 06302014 V1.0.DOCX

ID	R1 Milestones	Baseline Date	Revised Date	Actual Date	Status	Completion Variance (in days)	Revision Variance (in days)
	Major Milestones						
1	Iteration X Development Completed	3/31/2014		3/31/2014	Complete	0	
2	Phase 1 - Development Key Dependencies Completed	5/30/2014		6/30/2014	Complete	31	
3	Phase 1-Integrated Technical Architecture Completed	9/26/2014	10/6/2014		On Schedule		10
4	Design Completed	10/30/2014			Tracking Late		
5	Development Completed	5/28/2015			On Schedule		
6	System Testing Started	2/3/2015			On Schedule		
7	System Testing Completed	2/1/2016			On Schedule		
8	User Acceptance Testing Started	1/4/2016			On Schedule		
9	User Acceptance Testing Completed	4/22/2016			On Schedule		
10	Phase 2 - Technical Architecture Scope Complete	7/1/2016			On Schedule		
11	Performance Testing Started	1/4/2016			On Schedule		
12	Performance Testing Completed	4/29/2016			On Schedule		
13	Solution Training Started	3/24/2016			On Schedule		
14	Solution Training Completed	6/30/2016			On Schedule		
15	Implement (Go-Live)	Jul-16			On Schedule		
	CIL Milestones						
16	CIL Design Completed	9/8/2014			On Schedule		
17	CIL Development Completed	5/26/2015	6/1/2015		On Schedule		6
	EER Milestones						
18	EER Design Completed	10/30/2014	10/20/2014		On Schedule		-10
19	EER Development Completed	5/26/2015			On Schedule		
	Technical Architecture Milestones						
20	Integration & Service Architecture Complete	6/27/2014	7/3/2014		On Schedule		6
21	Exception Handling Framework Design Complete	6/30/2014	7/31/2014		Tracking Late		31
22	Batch Architecture Design Complete	6/30/2014	7/21/2014		Tracking Late		21
	ERS Milestones						
23	ERS Design Complete	7/7/2014	7/22/2014		Tracking Late		15
24	ERS Development Complete	5/12/2015			On Schedule		
	VCF Milestones						
27	VCF Design Complete	5/12/2014			On Schedule		
28	VCF Development Complete	4/24/2015	1/14/2015		On Schedule		-100

Testing Milestones					
29	System Test Plan Development	6/2/2015			On Schedule
30	Cycle 1 System Test Scenarios Executed	7/21/2015			On Schedule
31	Cycle 2 System Test Scenarios Executed	11/3/2015			On Schedule
32	Cycle 3 System Test Scenarios Executed	1/19/2016			On Schedule
ID	**R2 Milestones**	**Baseline Date**	**Revised Date**	**Actual Date**	
1	Procure Requirements Services	8/31/2013		10/23/2013	Complete
2	Release 2 Requirements Project Initiation	12/31/2013		12/5/2013	Complete
3	Requirements Started	3/18/2014		3/18/2014	Complete
4	Requirements Completed	11/19/2014			On Schedule
5	Design Started	8/4/2014			On Schedule
6	Design Completed	5/29/2015			On Schedule
7	Development Started	6/1/2015			On Schedule
8	Development Completed	3/31/2016			On Schedule
9	Implement (Go-Live)	Jul-17			On Schedule

53

-26

0

Summarizing the above indicates that slippage is still occurring for these milestones, causing a 2-3 month impact to the overall T2 Initiative workplan schedule:

Total Milestones	**41**	**100%**
On Schedule	31	76%
Tracking Late	5	12%
Complete	5	12%
Net Completion Variance	58	days
Revised Baselines	19	46%
Net Baseline Variance	89	days

In the monthly T2 Initiative Status Report for June 30, 2014, management asserts:

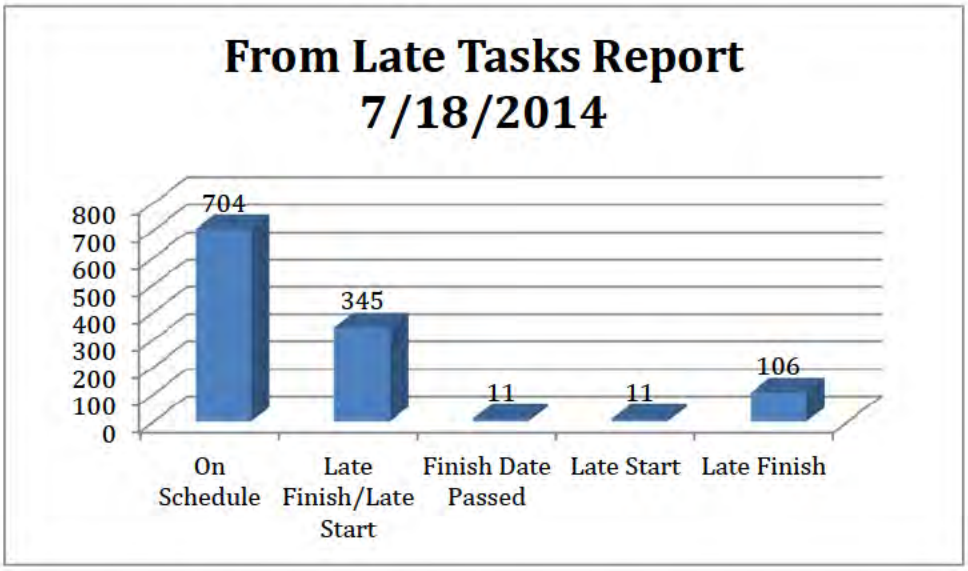
> "The negative schedule variance was incorrectly reported as .03% in May 2014. The schedule variance was 3%. The variance decreased in June to negative 4%. Prior to development, DDI re-estimated the effort to complete the project based on the results of the design activities. They identified an increase of 56,000 hours for project related work and 25,000 hours of Integration work to complete Release 1. As a result the work plan is being updated and a rebaseline will follow in September 2014. Following the methodology of the GAO Assessment Guide a rebaseline is warranted. There is no cost increase as a result of the increase in hours and the Release 1 go-live date remains at July 2016. Reference the Schedule Management section for additional detail."

IV&V also inspected the available **T2 Initiative Late Tasks** report for the week ending 7/18/2014 on **1,177 task items** being tracked in the 5/29/2014 baselined workplan, with the following summary:

July-2014

11	1%	Finish date has passed, and task is not complete
345	29%	Finish date is later than Baseline Finish date and task has not started
106	9%	Finish date is later than Baseline Finish date
11	1%	Start date has passed, and task not started
704	60%	On Schedule

This is still not ideal, but is a marked improvement over previous visits, compared to the Pareto chart from July 2012 (in the July 2012 Update above):



Comparing the above results to previous tracking, we see a noticeable improvement in the **On Schedule** performance situation:

T2 Integrated Workplan Late Task Status Summary For IV&V Visits 2011-2014	No baseline established July-2011	Jan-2012	1st Baseline 2/23/2012 July-2012		Rebaselined 1/25/2013 Jan-2013		July-2013		Rebaselined 3/31/2014, with Ph2 Task order work added 5/29/2014 Jan-2014		July-2014	
Finish date has passed, and task is not complete	n/a	n/a	198	12%	15	1%	0	0%	32	4%	11	1%
Finish date is later than Baseline Finish date & task has not started	n/a	n/a	467	29%	671	48%	577	52%	444	50%	345	29%
Finish date is later than Baseline Finish date	n/a	n/a	70	4%	173	12%	198	18%	184	21%	106	9%
Start date has passed, and task has not started	n/a	n/a	69	4%	25	2%	0	0%	5	1%	11	1%
On Schedule	n/a	n/a	828	51%	523	37%	343	31%	225	25%	704	60%

Continuing our informal metric, each group that IV&V met with during this review was asked the same question: "What is your *confidence* that the Release1 date of July 2016 in the current workplan can be achieved?" This time, the groups' consensus confidence was generally around 95-100%, BUT, with the big caveat that some scope may have to be reduced to achieve the release date. Holding scope where it is today seemed to drive the confidence factor down to about 55-60%. This represents a cultural shift to prioritizing schedule over scope from previous IV&V visits.

For the most part, these slipping tasks were started long ago, under a different workplan, so the

net variance is most likely a legacy from prior activities. For 2014, management has sharpened their focus on risk and issue resolution, and adopted an "Alternate Plan" for working with the DDI. The DDI also states that they are preparing a revised workplan (expected in September 2014) to absorb increased estimated hours for extra project work and integration of T2 with T1 after Release 1, to meet the Release 1 launch date in July 2016, so continued improvement is expected.

The T2 Project Control Manager's team says that they must suspend their production of the variance metrics for management reporting until the DDI's workplan has been rebaselined.

To close this finding, IV&V needs to see:

1. The new rebaselined DDI workplan expected in September 2014, containing the extra hours identified by DDI for integration,
2. a stable T2 Initiative baselined workplan covering the complete scope, with less frequent rebaselines, and
3. at least 6 months of only slight variances to milestone and task completion dates (green, as defined by the T2 Initiative Summary Dashboard Metrics Legend).

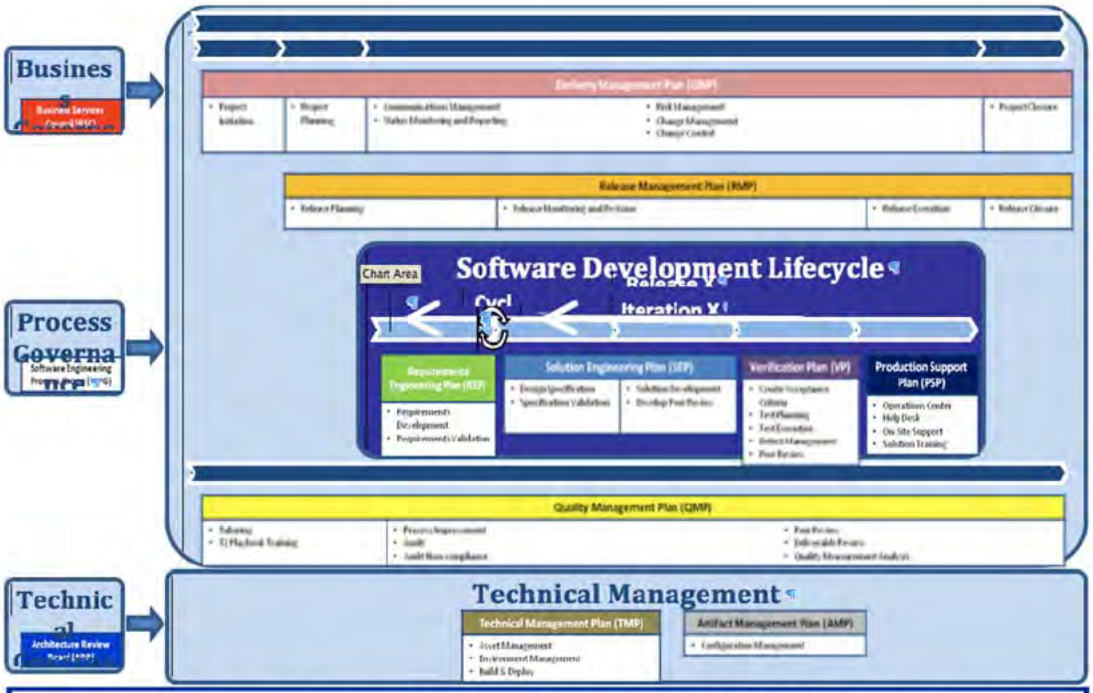
We will look for these during our next visit in January 2015.

F12A-010 The Playbook Is Missing A Comprehensive Systems Engineering Process Model			
The Playbook engineering processes are fundamentally flawed and incomplete, and do not cover all the activities needed by T2.			
Period Opened	Jan. 2012	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	IMMEDIATE
Probability of Impact	HIGH	**OSCE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	PM 10; QA 10, 12		

Finding Description

T2 Playbook V5.0 content is organized into four methods and nine plans. The following figure provides a brief overview of the T2 Playbook methods and their processes. The four methods in the T2 Playbook establish the operating model for project execution – Delivery Management, Quality Management, the Software Development Life Cycle, and Technical Management. Each method contains various processes that should align to their respective plans and governance bodies.

Figure - Playbook Methods Overview



The Playbook Software Development Lifecycle (SDLC) process model is seen in blue in the figure above. In critically analyzing the SDLC, IV&V discovered that major systems engineering process areas are completely missing from it; for example: maintenance, user evaluation and conceptual systems analysis/design. The SDLC also does not provide processes to facilitate COTS integration and does not include prototyping, simulations or experiments. These missing processes are too important to be considered as exceptions. Additionally the engineering process areas of the SDLC are particularly weak (e.g. REP, SEP, VP, "X" cycles) as already discovered for the REP.

The SDLC is inappropriate and ill-fitting since the T2 Program is producing major **integrated systems**, not just software. In the broader definition, "systems" also contain hardware, databases, maintenance, user guides and other elements that surround the system development. Therefore, the current **SDLC** does not have all the components necessary to cover the breadth of the implementation that CSD is undertaking.

In order to accommodate all of the missing elements that CSD requires, the Playbook **Software** Development Life-Cycle should be replaced with an appropriate **System** Engineering Life Cycle Model (**SELC**). A new SELC could contain a re-engineered SDLC as one alternative software development process (another SDLC would be COTS-driven, see the related findings, F11-016 and F11-023).

Risk

To a large extent, the quality of the process used to development the T2 system will determine the quality of the end product produced. Having the wrong system development process model in the Playbook will almost guarantee failure.

With such a large investment in creating a defined process model, IV&V would like to see the maximum benefit gained through increased process efficiency and effectiveness, leading to building the right T2 system. Our finding reflects that desire.

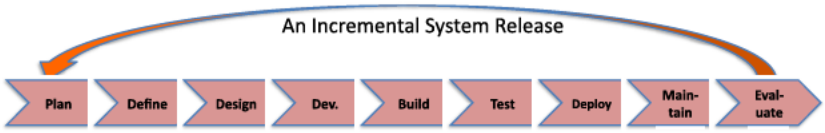
Recommendations

Fix the major deficiency of the Playbook by replacing it with a more suitable and complete systems engineering lifecycle process model.

We recommend that CSD consider a more effective and complete System Engineering Lifecycle Model (SELC) to replace the Playbook SDLC. Adopting this new model will allow CSD to fix all of the current and projected deficiencies in the SDLC, and install a more appropriate methodology for IT systems engineering. For example, this would fix all of the vaguely defined iterations and cycles from the SDLC model that are currently consuming so much time and effort in the program. This new SELC would also allow the initiative to better manage and control the changes that will occur during the course of this many-year initiative.

The figure below provides the basic concept of what activities are performed in the course of one iteration through the SELC model which produces a working partial system, subsystem or complete system version. A specific project could contain a further breakdown (iterations) within specific project releases (e.g. CIL as a series of phased releases). The SELC could also be used for concurrent engineering when the links between project instances of the model are made explicit.

Figure - New SELC Iterative Development Model



The current "*requirements clarification*" activities can easily be incorporated into this model by bucketing subsets of the requirements (BPMs and use cases) into scheduled iterative releases.

Given the complexity of T2, it may not be possible to sequentially first define the entire problem, design the entire solution, build the system and then test it at the end. An iterative approach allows an increasing understanding of the problem through successive refinements, and to incrementally grow an effective solution system over multiple iterations. A possible road map shows an iterative development approach to the whole T2 system as:

1. Assessment phase
   - High-level architectural design
   - System scope and planning
2. 1st Development Iteration
   - Application framework development
   - Initial object model defined
   - Initial rule set defined
   - Rule flow created
   - Basic deployment to development environment
   - Initial governance plan created
3. 2nd Development Iteration
   - Live database connection established
   - Framework refined
   - New rules added
   - Rule flow updated
4. 3rd Development Iteration
   - Integration points refined

- Object model refined
- Additional rules added
- Rule flow updated
- User training

Depending on a specific development project's needs, there could be additional iterations before the project is considered to be essentially complete. Also, the iterative approach could be adapted to accommodate several alternative implementation strategies, for example, using technology migration tools to get useful functionality quickly while pursuing the full system development in parallel.

The following six core practices, which have been proven to work effectively together, are typically used in conjunction with the iterative model across the flow of activities shown above. These practices are:

1. Business Process Modeling (BPM) with SOA Approach
2. Rigorously Managing the Requirements
3. Systematically Controlling Changes
4. Using Component Architectures
5. Modeling the System Visually (UML)
6. Verifying Quality

This new SELC and somewhat different practices would suggest that T2 will need to form a comprehensive *SELC PIA* working group to implement the new model recommended here.

IV&V hopes that CSD understands that the SELC suggested is NOT a software engineering lifecycle model, but is an IT system engineering lifecycle model. We believe that patching the current SDLC *in situ* will not be sufficient for the needs of successfully delivering the T2 system. This potential difference in viewpoint can be discussed at the next review period.

Relevant Standards, Best Practices, and Related Resources

1. Bill Curtis, et al, "On Building Software Process Models Under the Lamppost," Proceedings of the Ninth International Conference on Software Engineering, Monterey, CA, IEEE Computer Society, 30 March - 2 April 1987, pp. 96-103.
2. IEEE Std 1074-2006, IEEE Standard for Developing Software Life Cycle Processes
3. IEEE Std 1220-2005 (ISO/IEC 26702), IEEE Standard for the Application and Management of the Systems Engineering Process
4. IEEE/EIA 12207- 2008, Systems and Software Engineering - Software Life Cycle Processes
5. IEEE/EIA 12207.1- 1996, Industry Implementation of International Standard ISO/IEC 12207:1995, Standard for Information Technology-- Software Life Cycle Processes--Life Cycle Data
6. ISO/IEC TR 15271:1998, Information technology-- Guide for ISO/IEC 12207 (Software Life Cycle Processes)
7. ISO/IEC 15288:2008, Systems Engineering-- System Life Cycle Processes

Status Update

Effective July 20, 2012

A new candidate for the systems engineering lifecycle model to replace the SDLC in the Playbook has emerged from the considerable experiences of the DDI vendor. IV&V has reviewed the DDI ADM and has found it to be a worthy candidate for T2's system engineering needs. It is recommended therefore, that a **high-level** version of ADM be considered for adoption. Another monolithic, dead weight process model is not needed, but instead a lighter weight process that can hook into T2's management processes, and which will make effective

use of the Rational tool suit for development management and support. It is further recommended that the Playbook be modified so as to delete the SDLC from it; replacing those sections with the appropriate hooks and handles into the ADM methodology. Given that CSD management wishes to fully empower the DDI to successfully deliver the T2 system, adopting ADM would remove a significant hurdle. The 2 most relevant ADM methods are shown in the figure below.

Figure – Accenture Delivery Methods Appropriate for T2

In order that the Playbook SDLC be replaced by a more effective and mature process, IV&V **strongly recommends** that the ADM if adopted be certified as a *CMMI-Development, Level 3 capable process*. IV&V will develop a set of criteria to rate the ADM methods against for that purpose. Alternatively, if DDI can demonstrate that their methods have already been certified at CMMI-Dev, Level 3, then that will mostly satisfy IV&V.

Effective January 2013

It was recommended by IV&V that the SDLC from the Playbook be replaced with a new SELC, and that the DDI vendor's ADM methodology be given strong consideration for that purpose.The Process transition workgroup, Design Artifact Refresh project has the goal to address the known deficiencies and streamline the current System Development Lifecycle Processes in use by the T2 Project, starting with design. Design Phase Recommendations include:

- Align Design Phases with industry best practices (High-level, Functional, and Technical levels of design) to increase comprehension, quality, and decision-making
- Propose refresh of 22 design artifacts to ensure design process efficiency, to address gaps, and to introduce more specific artifacts
- Determine that considerations would be needed for Architecture and COTS
- Artifacts proposed are driven from the best practices for custom application design as seen in the principles of the ADM methodology, keeping in mind the existing Playbook artifacts and the needs of the T2 Initiative such as Batch and Portal
- Based on Steering Committee and SEPG approvals, a project was chartered to further elaborate the artifact templates, standards and guidelines, checklists, and needed tool configuration changes

The results of this workgroup project will likely completely overhaul the Playbook SEP and perhaps parts other plans (QMP, AMP) as needed. IV&V will monitor progress and accomplishments at our next review.

Effective July 2013

The design artifact refresh project continues to streamline and fix deficiencies in the current

systems development lifecycle processes of the T2 program. This will essentially overhaul the Playbook SEP with more appropriate systems engineering practices from the ADM. The 22 design artifacts were "refreshed" to align with best design practice at 3 levels of system design models (high-level, functional and technical).A number of templates and guidelines have been produced and distributed. The project continues with the next steps of: completing and rolling out technical design artifacts, evaluating the effectiveness of artifacts deployed and changed as necessary, and planning for incorporating those artifacts in the Playbook during the fall of 2013.With the SEP overhauled, the VP and PSP would be next in line for a similar "refreshing". Additionally, the PSP needs to be expanded into an MP (Maintenance Process Model).

An IT CCB has been proposed to minimize service downtime by ensuring that changes to the tools are recorded, evaluated, authorized, prioritized, planned, tested, implemented, documented and reviewed in a controlled and consistent manner. Remedy and CQ will be used for this purpose. IV&V views this as an important part of the missing maintenance process for T2.

Another ongoing concern is requirements traceability for testing. The issues identified are how to test across functional silos, and how to use the automated tools. The current workaround is to use expanded spreadsheets until the IBM Rational tools (RQM) can be upgraded.

Effective January 2014

The Playbook is slowly and painfully being updated to replace the systems engineering methodology with a more proven approach known well by DDI. In the meantime, most projects are using ADM concepts and frameworks to fill in the gap. This will continue to be an issue until the REP, SEP, VP, PSP are replaced by a proven methodological approach.

Effective July 2014.

CSD has done the following since our last review:

- The SEP was recently updated to match the current process, post Artifact Refresh. They are now up to version 14_04. However, the SEP still needs to be re-written to reflect the ADM process that is currently being used in development.
- Iteration X proved out most of the artifacts and provided a clean and accurate set of standards and guidelines.
- CSD will follow the revised process for T2 Playbook REP. The newer process being used by FIN is included as an appendix, and may cause their development process to be different from what is currently in the Playbook.
- Test team has proposed an approach for system test that is based on designs. The T2 Playbook VP will be updated as this process begins to be enacted.

The T2 maintenance process in the PSP has yet to be verified.

This finding will continue to remain open as long as significant changes are being made to the Playbook technical systems engineering process areas and activities.

Open Findings 2011

F11-028 Ill-defined Interface between T1 and T2			
The interface between T1 and T2 is ill-defined.			
Period Opened	July 2011	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OSCE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	QE 7, 14		

Finding Description

Due to the 3-phase approach of introducing T2 capabilities, clearly T1 and T2 will need to co-exist for many years. We did not see a defined plan for incrementally integration existing T1 capabilities within the emerging T2 system over time. Clearly the T2 architecture must smoothly accommodate this evolving integration.

Risk

The risks exposed by poor architecture include software that is unstable, is unable to support existing or future business requirements, or is difficult to deploy or manage in a production environment.

Recommendations

Additional recommendation (Jan. 2012) - Create a separate **T1/T2 integration plan** and conversion project to help scope out the integration requirements, architecture and interfaces over the program phases

Relevant Standards, Best Practices, and Related Resources

Status Update

Effective January 13, 2012.

No progress was seen to manage this considerable risk.

Effective July 20, 2012

Preliminary effort was noticed on the part of DDI Architecture/Design team in the form of proof-of-concept demos, but a well-defined plan for incremental integration between T1 and T2 remains missing and a significant risk continues to exist. This risk is so severe that IV&V considers it to be a risk of potential program failure if not addressed.

Effective January 2013

With the conflation of Phases 1 and 2 into Release 1, the impacts of the change in T1/T2 integration were listed as the following:

1. T1 Integration (data synch). High positive impact. Reduces complexity of T1 integration and overall phase 1 & 2 development efforts.
    a. The mechanism of ensuring that appropriate data synchronization occurs among T2 Case Initiation, Locate and Case Management functions and TXCSES and that all appropriate business events are triggered from T2 into TXCSES is highly complex.
    b. Identification of the appropriate triggers is difficult and there is a high probability that some business event or necessary trigger is not identified. This could result in inappropriate legal actions being taken, clients being unduly penalized – perhaps even incarcerated and payments made in error or delayed.
    c. Only requiring T1 integration to trigger financial transactions are much simplified and much more easily identifiable. Existing T1 processes (for example, adjustment transactions) can be used to trigger many of the events that need to occur. This is a much simpler and proven process that can be leveraged in a majority of cases.
    d. Work effort for Phase 1 & 2 is significantly reduced if the phases are combined. Combining phases reduces the overall implementation effort for Phases 1 & 2 by 15%. The following project activities are impacted:
        i. Reduction of T1 integration design, develop and testing efforts
        ii. Reduction of testing efforts by combining Phase 1 & 2 System and User Acceptance Testing
        iii. Conversion efforts are reduced – particularly execution of testing and mock runs of conversions
    e. Simplified production operations after initial Go-Live (fewer synchronization discrepancies to address).
2. T1 Projects that have been deferred (promises to state/fed entities). Medium negative impact.
    a. State: HHSC backward conversion of our referrals. We worked with HHSC to get agreement to continue this process until June 2014. Any additional date change would need to be coordinated with them. HHSC pulled the requirements from the 2012 build as we were delayed and unable to design the new requirements in time. They are currently attempting to prioritize the project for a later release.
    b. We will need to consider restarting some of the T1 projects previously deferred due to CIL implementation. We will also have an impact to resources assigned to those projects and the issue of those same resources being needed on T2.

And graphically shown here with the check marks as positive and the x marks as negative impacts:

Neither before nor during this IV&V review were in depth analyses performed of this list of positive and negative impacts. At the July 2013 IV&V review, the team will focus on the analysis done and results of Release 1 on the critical T1/T2 integration efforts.

Effective July 2013

T1 Integration is still a significant risk on the 30 June 2013 T2 Initiative Status Report: *The phased approach for T2 requires integration between the T1 and T2 databases. If the Technical Solution does not account for inherent risks, there will be an impact to the end users.*

The risk mitigation planned includes:

a) DDI creates the T2 logical data model during the functional design phase using the T1 database model as the primary input. Minimizing data model discrepancies when possible – stream lining conversion and T1 - T2 Specification Integration logic.

b) The data dictionary will be developed during functional design in conjunction with the T2 logical data model.

c) DDI owns the database architecture as well as the logical and physical data model. The application design team creates the logical data model during the functional design phase and is reviewed and approved by various stakeholders. Database Analysts create the physical database model and databases during the technical design and development phase - including defining database topologies to support abstraction, caching, and performance needs.

d) A new design artifact, the "T1 Integration Design Specification" was introduced into the Software Development Life Cycle. Integration points will first be identified during the new High-level Design phase. Specific data mappings will then be elaborated and validated by CSD during the Functional Design phase. This will address scenarios where T2 sends information to T1.

The current status is: *Infrastructure Support Architecture team is creating an inventory of batch components and assisting DDI with defining all of the T1 screens and portal services that exist in T1 production. This information will be provided to the staff that will be writing the T1 specifications.*

Although inventories are being produced and supplemental T1 specifications categorized and clarified, a critical component is tracking late:

T2-ARCH-End to End Reference Application for T1 Integration

With the identification of the T1/T2 Integration as a separate project at the end of this review period, the IV&V team is hopeful that there will be significant progress and artifacts to review in January 2014.

Effective January 2014

Keying off of the identification of T1/T2 Integration as a separate project at the end of July 2013, Integration and Conversion has been designated as a separate organization to address both aspects of the T1/T2 data and process integration.

A top down analysis has been completed to identify the obvious files that are needed by T1 after the T2 Release 1 (pre-FIN). The analysis of more than 1,000,000 lines of Natural programming language code resulted in more than 6400 data paths identified for possible analysis. Of those, 3300 data paths were identified for further analysis. This top down approach greatly reduced the amount of code review work in the bottom up analysis.

The bottom up analysis is currently in progress. 800 of the 3300 data paths have been analyzed in a create, read, update and delete (CRUD) fashion. This decomposed to approximately 20 minutes per data path. With the remaining analysis, completion should be within 2 to 3 months with 2 to 3 FTEs. After these are completed, business analysts must review to ensure that no T2 requirements were missed.

Along with the data paths, approximately 400 T1 screens and various other application components will be absorbed into Release 1. This will necessitate high-level design changes to CIL and EER as they accommodate the T1 conversions into T2.

Work has begun on this critical integration project but progress cannot be assured until the next review cycle.

Effective July 2014.

Since our last review the following occurred on T2:

1) The T1 Natural code analysis work was complete in March 2014.
2) The assessment of T1 programs and screens that will be retired with Release 1 were also completed in March 2014.
3) The identification of integration needs for the T1 ancillary applications was complete in April 2014.
4) The team has started conversion design for CIL.
5) The results of the conversion design work will be leveraged when designing the T2/T1 integration modules.

At the end of design, DDI re-estimated 50,000 to 80,000 additional hours needed to complete R1. Of those hours 30,000 were due to uncertainty in T1 and T2 integration. In order to address this finding, the following is needed by the IV&V team:

1. A baselined project plan accounting for the re-estimated hours.
2. A specific project approach to T1 and T2 integration that resolves the unknown issues and addresses the 30,000 hours.
3. A risk analysis of the integration approaches for T1 and T2 accommodating the inherent risk in Release 1 and Release 2.

5.4 CLOSED FINDINGS FOR THIS REVIEW

The following findings were closed during this review period.

F14A-002 Questionable Success of Iteration "X"			
Iteration "X" as currently envisioned may not provide sufficient data to precisely plan for the development of Release 1.0 (R1) or even the successful completion of CIL.			
Period Opened	January 2014	**Period Closed**	July 2014
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	MEDIUM	**OSCE Priority**	HIGH
Progress Indicator	CLOSED		
Related IV&V Tasks	ST-1, SE-1		

Finding Description

Iteration "X" addresses the following subset of the approximately 15,300 active requirements in T2 Release 1.0 as planned over the next 3 months:

Iteration "X" intends to provide a proof of concept and potentially deliverable code for 24 listed requirements of CIL. This will try to prove out the strategies for building and deploying analysis and design in Austin with code from the India Development Center for:

1. Portlets,
2. Batch Streams,
3. Business Processes,
4. Forms, and
5. T1/T2 integration via: T1 Service Integration (passing IDs); pulling financial information (payments, arrears balances, pending adjustments, etc.…) from T1 to display on T2 Case Dashboard.

These are all important concepts to illustrate.

Iterations 1 and 2 were planned, initiated and then slipped their schedule. Iteration 2 was then dropped. Finally when there was little chance for the timely completion of Iteration1, they were both combined and redefined as Iteration "X" with a few additional items added.

Based on the team's previous inability to complete iterations 1 & 2 and the constant schedule slips the IV&V team has observed, there is a high probability that Iteration "X" will have no meaningful results by the end of March and will be redefined again within the next 6 months.

Risk

Iteration "X" will be redefined, re-scoped and/or canceled and there will be no return on the effort expended.

Recommendations

Do more and better-planned iterations, faster.

Relevant Standards, Best Practices, and Related Resources

1. *Rapid Development*, S. McConnell, Microsoft Press, 1996, ISBN 1-55615-900-5
2. Rapid Prototyping: Lessons Learned, V. Scott Gordon and James M. Bieman, IEEE Software, 12(1):85{95, January 1995.
3. R. Budde. Prototyping: an Approach to Evolutionary System Development. Springer-Verlag, 1992.
4. J. Connel, et al, *Structured Rapid Prototyping*: an Evolutionary Approach to Software Development. Yourdon Press, 1989.

Status Update

Effective July, 2014.

Iteration X was completed according to its planned schedule. CIL Iteration X artifacts were submitted for CSD review at the end of March. The CIL team completed Iteration 2 and Iteration 3 development on 4/1/14, and demonstrated Iteration 1, 2, and 3 functionality to the Steering Committee in April. In April and May artifact documentation and standards and guidelines were updated based on the lessons learned.

The following items of Iteration X were discussed with the prototyping team in detail:

Iteration X Deep Dive Item	Discussion
(L6) IX was done in the Dev Environment. What did you find as the differences between working in Pre-Dev versus Dev? Do you know what the differences will be when you get to Prod?	Dev is where the system will be run. Done in Portal 7 not Portal 8. Have different stacks and apps in the environment.
(L7) What were the "functional points" covered in IX? How do those map to R1 function points?	Functional points are well covered in the sheet "ITX Implementation Details" column B.
(L8) Show us how the validation framework works.	Programming Model

Walk us through the service layers and the architecture levels.	Programming model and application blueprints provides what the system is doing for any specific transaction.
(L15) "Queue Publishing and consumers will be deferred to IT2." What else was learned for deferral? Why was/were they deferred?	This was completed, but all the red items were deferred and descoped. Quality Stage tool was not implemented. Problematic and needs to be addressed.
At what point did you learn that ComputeGrid was inadequate? How much time did it take to integrate Spring into the stack? What else should be replaced?	Learned that ComputeGrid was insufficient and moving to Spring Batch. Important learning. Line 85

What testing was done on IX? Did you use any of the inherent Java tools for testing or coverage?	Only final test not run was the last static analysis tool definition.
(L34-36) Show the prototyping for Asynch Exception Handling.	MQ Series okay
(L45) Show the issues with Quality Stage.	Working with IBM to get a solution to continue leveraging Quality Stage - requires lots of custom code and out of the box doesn't solve business needs. Shortage of skills within IBM for support.
Show the links into DB2.	Case intake and management - look on T2 website
Show the interface to T1	Data Stage job to link to T1

NOTE: (L#) refer to the lines on worksheet "ITX Implementation Details".

After multiple demonstrations and a deep dive into the tools used in Iteration X and the lessons learned, this is recommended for closure.

F13B-001 Lack of System Architecture Driven Approach			
The initiative is lacking an effective top-down, system architecture-driven approach			
Period Opened	July 2013	**Period Closed**	July 2014
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OSCE Priority**	URGENT
Progress Indicator	CLOSED		

Related IV&V Tasks	F13B-002, F13B-003; SD-1, SE-4, SE-5

Finding Description

In contrast to the ideal of a high degree of conceptual integrity (see Appendix F.19), we observed that the T2 System architecture is currently being debated from two perspectives. One form is evolving from the specification of an Architecture Reference Model, which exists mostly as pictures (e.g. blueprints) and documents. A second form is evolving from a bottom-up exploration within application silos and technology clusters within the development projects. We found that the complexity of current levels of system architecture(s) definition are difficult to comprehend since they currently exist as nine silos of architecture environment styles without explicit linkages between them or identified common sub-elements.

Many paper specifications have been created, which are quite complex, and lack the assurance that the assumed integration will materialize. We also see the unstable allocation of system requirements to system architecture elements (for both application and quality requirements), for example, knowing which applications will use a particular component. Many design items are being deferred.

For example, the T2 Logical data model produced years ago is also reforming bottom up in silos, and making it more difficult to create an enterprise level data architecture that covers all T2 information requirements.

Because of these problems it appears that the current system architecture team is not effective in enabling the development projects of Release 1. The development projects are therefore making architectural decisions in isolation based on assumptions about the architecture from their perspective. There is a high risk that those decisions may be found to be incorrect in the future.

Risk

The conceptual integrity of the T2 system is weak, resulting in poor communications, confusion, and design decision uncertainties. It is difficult to make solid application design decisions when the system architecture is not fully understood or believed. Although some local application design decisions may proceed with valid assumptions, there is a larger, overall system integration risk that could materialize in the future.

Recommendations

In order to create a model for the entire project to follow, we make the following recommendations:

1. Create an enhanced systems architecture team that understands and communicates the big picture. The team will create the mapping of the emerging system designs emanating from the Release 1 projects. The enhanced architecture team should give regular presentations to all development staff, to increase understanding and allow for design issues to be discussed.
2. Build a higher-level conceptual model ("mall map") that ties the nine style silos together showing common components across the domains.
3. Build system integration prototypes for each of the nine domains, to make sure that the components will work together for some basic test scenarios in collaboration with the Release 1 development projects.

Relevant Standards, Best Practices, and Related Resources

1. *http://www.softwarearchitectures.com/*
2. *ISO 15288*

3. *ISO 12207*
4. ISO/IEC/IEEE 42010
5. The Mythical Man Month, Essays on Software Engineering, Anniversary Edition by Frederick P. Brooks, Jr., Published by Addison Wesley 1995, ISBN 0-201-83595-9
6. Recommended Best Industrial Practice for Software Architecture Evaluation, Technical Report, CMU/SEI-96-TR-025, ESC-TR-96-025, January 1997, available at http://www.sei.cmu.edu
7. ATAM: Method for Architecture Evaluation, Rick Kazman, Mark Klein and Paul Clements, August 2000, TECHNICAL REPORT, CMU/SEI-2000-TR-004, ESC-TR-2000-004
8. Guide to the Software Engineering Body of Knowledge, Version 3.0, SWEBOK®, IEEE Computer Society, 2014, ISBN-10: 0-7695-5166-1

Status Update

Effective January 2014.

Although there is currently no shared vision of anything approaching a T2 system architecture, we recognize that there will eventually be some kind of architecture. There is still no conceptual view of it in any useful sense.

DDI architecture terminology is non-standard and has obfuscated what parts of the architecture they do have. DDI defines several types of architecture related to modeling T2. They are: Functional Architecture, Application Architecture, Execution Architecture, Operation Architecture, Development Architecture and Infrastructure Architecture. All of these fit as components into their higher-level Architecture Reference Model. However, what they call functional architecture is a domain model, not architecture at all. At the heart of what was originally intended for architecture, only the application architecture, execution architecture and operation architecture are relevant. The development architecture is what is supposed to be used to build and evolve the system. The infrastructure architecture is the base hardware and software platform – which was already established.

While IV&V detected hints that they are going in a useful architectural direction (e.g., the use of the terms wrappers and facades) it is not clear that they are providing any appropriate level of abstraction to protect them from the coming problems of version update, COTS substitution, or the addition of open source components. Although the main components and subcomponents are identified in some of these aspects, some are not yet fully defined or proven. Also encouraging is the fact that the architectural interconnections that IV&V was looking for were discovered within what the DDI calls High-level Design (HLD).

It is also the case that the key data warehouse component is a logical data model for R1 that is now defined and currently in review.

There have been some gains in reconciling the assumed top-down system architecture vs. the bottom-up proof of concepts from the projects. However, the individual projects are still operating mostly in technology silos, and it is hoped that an integrated system emerges from this approach. IV&V will continue to monitor this important area.

Effective July 2014.

There is an architecture whose design is evolving organically, primarily driven by implementation considerations. Instead of providing a top-down, stable structure with which

to implement the applications it will be an evolving structure changed to meet the application needs as they are implemented. There is potential risk resulting from conflicting needs of the different applications. There is further downstream risk as the system evolves during testing and version updates and COTS changes.

Due to the existence of a published system architecture, this finding is closed.

F13B-002 Architecture Visualizations Inadequate			
The current system architecture visualizations are inadequate.			
Period Opened	July 2013	**Period Closed**	July 2014
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OSCE Priority**	URGENT
Progress Indicator	CLOSED		
Related IV&V Tasks	F13B-001, F13B-003; SD-1, SE-4, SE-5		

Finding Description

The most basic, useful architectural description is that of boxes and arrows – easy to consolidate into a top-level view that is easy to understand. Its weakness is that the arrows have only minimal semantics and are variously interpretable. The current visualization of the architecture is an abstract hierarchical component structure of boxes and arrows. What is missing is the representation of how these components are related to each other (other than being a component of a larger component). While one part of architecture is there (i.e., the element list and some structure of it), the interactions among those elements are completely missing. This latter aspect is even more important than the former.

Risk

The short-term risk is lack of good design that contributes to maintaining conceptual integrity. The long-term risks are misunderstandings of the architecture that lead to significant integration problems.

Recommendations

Using the current box description, add the interactions among the different components in the architecture. Doing this in a layered format will help work towards a shared high-level model of the architecture.

Relevant Standards, Best Practices, and Related Resources

1. *http://www.softwarearchitectures.com/*
2. *ISO 15288*
3. *ISO 12207*

4. ISO/IEC/IEEE 42010
5. The Mythical Man Month, Essays on Software Engineering, Anniversary Edition by Frederick P. Brooks, Jr., Published by Addison Wesley 1995, ISBN 0-201-83595-9
6. Guide to the Software Engineering Body of Knowledge, Version 3.0, SWEBOK®, IEEE Computer Society, 2014, ISBN-10: 0-7695-5166-1

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While IV&V detected hints that they are going in a useful architectural direction (e.g., the use of the terms wrappers and facades) it is not clear that they are providing any appropriate level of abstraction to protect them from the coming problems of version update, COTS substitution, or the addition of open source components. Although the main components and subcomponents are identified in some of these aspects, some are not yet fully defined or proven. Also encouraging is the fact that the architectural interconnections that IV&V was looking for were discovered within what the DDI calls High-level Design (HLD).

It is also the case that the key data warehouse component is a logical data model for R1 that is now defined and currently in review.

Still missing from the visualization are the interconnections in the functional architecture, and the layers below that. It is suspected that this information is buried in HLD documents and has not been brought out into a high-level diagram.

Effective July 2014.

There are now complex architecture visualization diagrams used to visualize an extremely complex architecture. There are blueprints and wiring diagrams on the wall of the T2 war room. There is potential risk resulting from the complexity of both the architecture and visualizations in creating the applications. There is further downstream risk as the system evolves and new features are added during the maintenance and enhancement stage coupled with version updates and COTS component changes. Due to the existence of the architectural blueprints this finding is closed.

F13A-001 Review Method Is Non-Standard And Less Than Fully Effective			
The current review process is cumbersome, resulting in long delays in artifact deliveries. There is a lack of understanding of the process and poor quality of artifact content.			
Period Opened	January 2013	**Period Closed**	July 2014
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OSCE Priority**	HIGH
Progress Indicator	CLOSED		
Related IV&V Tasks	F11-005; F11-009		

Finding Description

Reviews represent one important form of internal verification and validation or QA activities. Just as with IV&V, they confirm that the right artifact is being built and the artifact is being built right. Selecting the right set of artifacts to formally review is an important project/QA planning activity. The primary purpose of a review is to discover "defects" in the artifact under review. A defect is an error, flaw, mistake, failure, or fault in a design, program or system that produces an incorrect or unexpected result, or causes it to behave in unintended ways. Rooting out defects prior to finding them during testing has an ROI of 5:1.

Reviews as currently conducted at CSD do not follow industry standard best practices and therefore, are not achieving the benefits desired. Flaws observed include:

- Reviewers are frequently unprepared for the review. Some reviewers are not experienced in, or knowledgeable of, the review process.
- Some review sessions are being used for Knowledge Transfer (KT). Reviews are not intended for this purpose, and there are other avenues within T2 that are structured to specifically address KT. Teaching the process of reviews or explaining the content and environment of an artifact during the review session only prolongs the session and wastes the time of knowledgeable reviewers, thereby extending the schedule. Mentoring, a contractual agreement, is not taking place, which could lead to a decrease in maintainability.
- Some reviewers are not familiar with the tools and models in use (e.g., Object Models, class diagrams, state transition diagrams, logical data models, user experience diagrams, etc.).
- Some artifacts are not being pre-reviewed. That is, artifacts have not undergone a thorough "desk check", nor an internal review before being submitted to the formal review session.
- In some cases, the author of the artifact under review was not even present in the review session to answer questions and provide clarifications. This has led to an overblown list of comments and problems to be worked on after the review session.

Other observations of the review process are:

- The "5-5-5" rule for the Review process is insufficient. That is: five days to review and submit Comments; five days to review the findings and, perhaps, suggest solutions; five days to resolve the defects and non-defects found. 5-5-5 results in the process becoming too lengthy. In addition, the rule is not being followed – for example, one Design document has been in review for eight months.

- While Phase Containment Effectiveness and Root Cause Analysis are understood by those who work with Review metrics, use of these management tools are in their infancy.
- "Severity" has been replaced with "Priority" for Testing, which is acceptable as long as reviewers understand that defect severity is no longer the norm.

There are positive movements toward improvement of the review process, including:

- The formation of a committee, consisting of CSD and DDI representatives, to study the current Review Process and make recommendations for improvement. One of their tasks is to determine how to shorten the time of the process, from first submission to final validation.
- Capturing of comments, (Defects and Non-Defects), during Review meetings is made easy by ClearQuest formatting, such as pull-down menus.

Risk

Risks of non-existent or inefficient reviews are both monetary and non-monetary. Monetarily, defects found after product deployment can cost up to 100 times as much to fix as defects discovered in earlier phases of the lifecycle. The factors causing this phenomenon include cumulative analysis, design and coding rework, plus a magnified ripple effect throughout a completed system.

Nonmonetary benefits of reviews include:

- Becoming accustomed to reviewing an appropriate "chunk" of work, developers begin to think in terms of modularity and draw upon their knowledge of low coupling and high cohesion.
- Consistency across teams and products is increased.
- Reviewers are rewarded for finding errors, as it becomes a "safe" environment.

An effective review process can increase product quality by:

- Finding problems while they are still relatively easy and inexpensive to correct, and confirming parts of products that have no problems.
- Finding problems as near to their point of origin as possible.
- Inspecting the output of a phase to see if it satisfies the output requirements or exit criteria.
- Preventing future problems from occurring by publishing solutions to frequently discovered problems.
- Giving management reliable milestones and estimates.
- Helping with project discipline and providing objective, measurable feedback.
- Spreading good organizational procedures and practices, and achieving more uniform technical work.[4]

An ineffective review process will negate all of the aforementioned monetary and nonmonetary benefits and result in losses in budget, quality, functionality and schedule.

Recommendations

We recommend that CSD continue to support the working committee dedicated to study Review issues and recommend enhancements. The committee membership includes teams from CSD as well as DDI, which should result in successful outcomes if conclusions are reached, approved and transferred to managers, authors and reviewers. During the July, 2013 session the IV & V team will assess the progress of the Review improvement activity.

Suggestions to consider include fixing these common problems with reviews:

- Participants don't understand the review process;
- Reviewers critique the producer, not the product;
- Reviews are not planned;
- Review meetings drift into problem-solving;
- Reviewers are not prepared;

- The wrong people participate;
- Reviewers focus on style, not substance.[5]

All of these problems apply to T2, and each has a known remedy.

We also recommend that T2 sample reviews by predetermined criteria. It is infeasible to review every artifact, but reasonable to review a few from each category. Critical artifacts or those of exceptional complexity should remain in the review pool.

Relevant Standards, Best Practices, and Related Resources

1. Accenture Development Methodology, Quality Management Guidelines.
2. Capability Maturity Model Integration (CMMI-SW v3.1)
3. IEEE Std 1028-2008, IEEE Standard for Software Reviews and Audits
4. Weigers, Karl, "Seven Deadly Sins of Software Reviews," *Software Development*, March, 1997.

Status Update

Effective July 2013

Reviews continue to take longer than expected and necessary.. The "5-5-5" rule appears to be working in some situations but not in others. Turnaround time has improved, yet some artifacts have been in review for several months. In one case, a sampling of twenty-two design artifacts, tracked for timeliness, showed that none met the turnaround goal.

Reasons for not hitting review timing goals include: lack of resources; underemployment of lessons learned; involvement of field users; too many reviewers per artifact; too many artifacts under full review; and lack of technical architecture capabilities for high-level designs.

Lessons learned from CIL reviews are not being applied to EER. Attempts to involve CIL personnel to EER for Knowledge Transfer has been only partially successful. The reasons are being investigated.

Not every artifact needs to be reviewed. EER will soon experience a plethora of design artifacts, not all of which can be reviewed with the existing resource and time constraints. A system of sampling and/or spot checking should be initiated. Complex designs, or those with potential risk are candidates for review, but others can be quickly reviewed for standards and guidelines, or not reviewed at all. Over 500 design artifacts are expected to be delivered for Release 1; clearly, not all can be reviewed in depth.

Reviewers should be chosen selectively, as not everyone can review everything. Some artifacts may be adequately reviewed by designers alone; BPA's may not need to review Logical Data Models, for example.

Reviews should not be used as opportunities for training.

At the next visit, IV&V will look for a return on investment (ROI) for reviews. If too many artifacts are under review, too many reviewers are involved, or reviews are used for knowledge transfer, a decrease in ROI is to be expected.

Effective January 2014

The "5-5-5" goal remains just that – a goal of having 5 days to review and submit comments; 5 days to review the findings and suggest solutions; 5 days to resolve the defects and non-defects

round. From the CIL and EER Design Status files, we observed the following:

Project Team	Dates	Number of reviews taking over 15 days	Number of reviews taking over 50 days
CIL	12/25/10 - 11/25/13	56	26
EER	12/15/10 - 12/19/13	54	32

Factors contributing to the extended review period include:

- No spot-checking or sampling
- Lack of knowledge transfer
- A culture of questioning all decisions – even at the level of each line of code
- Proposed solutions are frequently questioned, even when they are adequate, with time spent exploring other possible dispositions
- Mid-stream changes to artifacts
- Lack of resources to do the reviews
- Lack of understanding of the process
- Lack of preparation for the reviews.

These factors result in repeated reviews and "analysis paralysis." An improvement to this dilemma would include making decisions while at the same time acknowledging that information may be imperfect. Decisions cannot be reached if every path or scenario is re-analyzed.

Lack of preparation seems to be the most serious issue. Sometimes, the artifact under review is not sent out the requisite two – five days before the session, the reviewers have not prepared, or the artifact is too large for a reasonable length of a session and needs to be segmented into pieces. In addition, the correct resources must be assigned and follow-up to close out issues must be addressed. Often, several artifacts to be reviewed are sent at once instead of spacing them out at reasonable pace, which results in a back log.

RFD has additional staff ready for code review. They are waiting to find out when Iteration X will have code to review. The current schedule shows March. Their goal is to review 100% of code for Technical Architecture Iteration X, which, while worthy, is virtually impossible. RFD and CSD should determine the portions to review based on artifact size, complexity and/or criticality.

A strong recommendation is that the most recent Validation Process (Version 0.23 in January, 2014) be the subject of training for all involved in the T2 project, even those who have been through previous training.

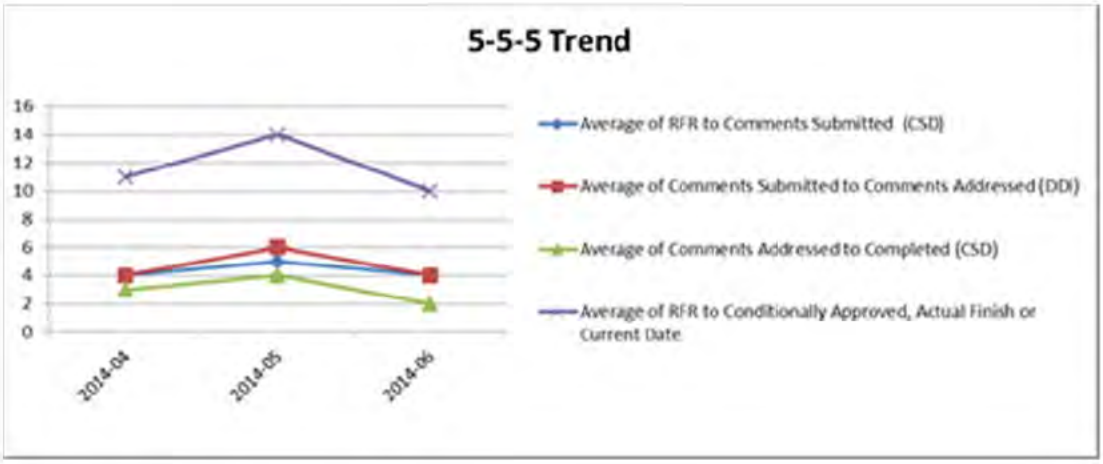
Effective July 2014.

The original finding, opened in January 2013, stated*: The current review process is cumbersome, resulting in long delays in artifact deliveries. There is a lack of understanding of the process and poor quality of artifact content.*

Improvements in the review process, understanding of it, and the level of quality of artifacts, have been noted since the previous IV&V assessment.

The Playbook contains high level flows for Peer Reviews and for Validation processes. It is regularly updated by the SEPG. In addition to the Playbook, more comprehensive and detailed processes have been developed via CSD and DDI teamwork. These processes have been published and taught to both DDI and CSD functional leads. Formal training was revised and improved following the first prototype training activities and now assimilate DDI's Alternate Plan. The most recent training activities took place in the April-May, 2014 timeframe.

The "5-5-5 rule" is applied across the project, for all categories of artifacts (five days to comment; five days to address; five days to validate). The quality of validation has improved and is shown in management dashboards, including those presented to the Steering Committee. The average time to obtain condition approval, per artifacts by phase, has been reduced from 20 days to nine days. As they are quickly approaching the target performance, this finding is now closed.



F12B-003 Non-Functional Requirements Need Attention			
The non-functional system characteristics are not receiving the same level of attention in design as are the functional (feature) requirements.			
Period Opened	July 2012	**Period Closed**	July 2014
Degree of Impact	HIGH	**Time Criticality**	IMMEDIATE
Probability of Impact	HIGH	**OSCE Priority**	URGENT
Progress Indicator	CLOSED		
Related IV&V Tasks	F12A-006		

Finding Description

In the previous finding F12A-006, we pointed out that issues surrounding the various meanings of Quality pose significant risks for the T2 project. Different interpretations of terms cause miscommunication, which can result in duplicate work, rework, or necessary work that is completely missed.

In system requirements engineering, a *non-functional requirement* is a requirement that specifies criteria that can be used to judge the overall operation of a system, rather than specific behaviors. These are contrasted with functional requirements that define specific behavior or functions. Other terms for non-functional requirements are "constraints", "quality attributes", "quality goals", "quality of service requirements" and "non-behavioral requirements". Informally these are sometimes called the "ilities", from attributes like reliability, testability, maintainability, availability, stability and portability. They come in 2 flavors: Execution qualities, such as security and usability, which are observable at run time; and Evolution qualities, such as maintainability, extensibility and scalability, which are embodied in the static structure of the software system.

In any case, they must be defined as requirements in order to be achieved. Once defined as requirements someone on each project team must be the champion for ensuring that they are designed into the system, and QA must ensure that happens.

It was not clear to us, where the non-functional requirements were defined and stored within ReqPro. The supplemental specifications included a few. The plan for implementing non-functional requirements should be detailed in the system architecture approach.

Risk

If non-functional requirements are not addressed in design, the resulting T2 system will have undesirable characteristics when delivered.

Recommendations

Include non-functional requirements in every design review as a checklist of system characteristics to be achieved. Therefore we recommend that a quality model of non-functional requirements be defined, and that a set of non-functional requirements be written and then be managed by a designated "ilities" champion on each project. For example, the ISO 9126 model contains recommended terms that could be defined, used and incorporated into a non-functional system requirements model:

Relevant Standards, Best Practices, and Related Resources

1. ISO 9126-1:2001, Software engineering -- Product quality -- Part 1: Quality model
2. ISO/IEC 25000:2005(E), Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE
3. Capability Maturity Model Integration for Software Engineering (CMMI)," CMU/SEI-2002-TR-028, ESC-TR-2002, Software Engineering Institute, Carnegie Mellon University, 2002. http://www.sei.cmu.edu/library/abstracts/reports/02tr028.cfm
4. *IEEE Standard for Software Reviews and Audits,* IEEE Standard 1028.
5. *IEEE Standard Glossary of Software Engineering Terminology,* IEEE Standard 610.
6. *IEEE/EIA Standard for Information Technology – Software Life Cycle Processes*, IEEE Standard 12207.
7. *Guide to the Software Engineering Body of Knowledge (SWEBOK),* eds. Abran, Alain, Moore, James W., Bourque, Pierre, Dupuis, Robert, IEEE Computer Society, 2004, Chapter 11, "Software Quality." ISBN: 0-7695-2330-7.
8. *ISO9001;2000, Quality Management Systems – Requirements*, ISO, 2000.
9. Pressman, Roger, *Software Engineering: A Practitioner's Approach,* McGraw-Hill, 7th ed., 2009. ISBN-10: 0073375977, ISBN-13: 978-0073375977.

Status Update

Effective January 2013

The requirements workgroup of the process transition team has identified the set of future actions to be performed. They are to:

- Remove functional requirements from supplemental specs and assign them to the appropriate project team. Presumably any that are leftover would be true non-functional requirements. They will then engage the Tech Arch team in a review of the remainder.
- Clarify or add non-functional requirements as required. Examples include: User counts by profile, Print routing and Password Guidelines.
- Develop a non-functional requirements checklist for each project for use during design reviews.

IV&V will check next review to see to what extent these actions were carried out.

Effective July 2013

The non functional requirements were contained within the T2 Supplemental Specifications list, which required further attention in 2 ways:

1. The entries that currently exist needed to be dispositioned as either: Implemented, Rewritten and Implemented, or Inactivated. This was because the supplemental specs had become a parking lot for requirements rejected by specific development projects.
2. Areas of truly non-functional requirements that have not been clearly defined needed to be addressed. This included requirements for: Disaster Recovery, Availability, User Counts, Performance and Other (TBD)

The initial set of supplemental specs were categorized as Design Constraints, Global Rules, or

Style Guides. The starter set that had the following distribution.

Count of Current Tag	Author Project									
Type	0	CIL	Conversion	ECM	EER	ERS	EST/ ENF	RODEO	Tech Arch	Grand Total
DSGNCN	1	300	2	37	10	31		1	10	510
GLBRUL	3	69		13	4	8	25	44	4	191
STYLGD		120		12		9	3	1		181
Grand Total	4	489	2	62	14	48	28	46	14	882

As a result 314 of these 882 were inactivated, largely due to duplication. To facilitate implementation, a number of functional requirements were moved out of supplemental specs – and more appropriately categorized as features to be addressed by the development projects. These were allocated as shown below.

Implement/Inactivate	Implement

Count of Implement/ Inactivate	Team							
Class	CIL	ECM	EER	ERS	FIN	Forms	Tech Arch	Grand Total
Design Constraint		2					16	18
Feature	44	21	1		31	14	100	263
Global Rule	19	4		3	6	1	129	174
Standard	2	4				1	87	113
Grand Total	65	31	1	3	37	16	332	568

In addition, two clarifying documents have since been created. One document for Service levels that addresses uptime, DR timeframes, performance, etc. and a second, which clarifies the security-based behaviors, expected to be standardized across applications. Once these 2 documents are approved they will become part of the non-functional requirements as well. IV&V will examine these at our next review.

The following next steps are currently being done:

1. Update ReqPro per the above analysis.
2. Implementation: Each entry will have some form of action required to address its implementation. A draft of those is shown below:
   - Feature: Traced to a design component
   - Common Feature: Traced to a design component, and a design review checklist
   - Standard: Traced to a design review checklist
   - Constraint: Optionally traced to test cycle.
   - Style Guide: (if we keep it in ReqPro) traced to style guide deliverable.

Effective January 2014

Although the scrubbing of the supplemental specifications has helped to separate out actual functional requirements and to isolate the non functional requirements, the latter only exists in a draft document as of this review.

Effective July 2014.

The effort to delineate and define the non-functional requirements in documented guidelines

and standards has been completed. This finding is therefore closed.

F11-029 COTS Risks Are High			
With all those new COTS tools misbehaving, interacting, interfacing and changing in various ways, the risk to successfully synthesizing a T2 solution system from them is high, and must be proactively managed.			
Period Opened	July 2011	**Period Closed**	July 2014
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OSCE Priority**	URGENT
Progress Indicator	CLOSED		
Related IV&V Tasks	ST 11, 12, 13		

Finding Description

Successfully accepting many COTS products into the T2 environments requires a different view of risk, process, staff roles and tools. The following table presents the number of COTS tools for each identified area of the T2 program. A complete list of the COTS tools may be found in IRR Appendix F.

Table – COTS tool counts

T2 Area	# COTS tools
SDLC tools	21
SDLC/runtime	5
T2 runtime	24
ECM	27
E-forms	13
Enterprise Reporting	32
Total	131

There are currently 131 different COTS tools currently identified in the T2 Solution, and the list is still growing.

More focused attention needs to be given to the managed assimilation of the COTS tools. As far as managing the changes in the COTS products, one of the purposes of the pre-development environment is to allow staff to test new features, upgrades, patches, prototype new design approaches and frameworks and test configuration changes. They state that this environment is not intended to be used by any of the SDLC phases. IV&V does not understand that statement. IV&V found little indication of a plan for who will do this work with the pre-dev environment and when they will do it. Since COTS product evaluation is a process that is missing from the Playbook, we have attempted to sketch that out for CSD consideration below.

We did not see a timeline for COTS selection, acquisition, integration and deployment. We will be asking for this next time.

Risk

The risk to successfully integrating a T2 system goes up as more COTS tools are added.

Recommendations

Choosing to make use of COTS components, an organization must immediately deal with the problem of assessing or evaluating these products. While pertinent to any selection of a COTS product, such evaluation must be systematic when the product will be a component in a complex, heterogeneous system and when the constraints native to the product and its vendor must be harmonized with the constraints of the system that incorporates it. COTS Evaluation involves the work that needs to be done using the pre-deployment environments prior to installing COTS components in the deployment environment.

One common understanding of *evaluation* makes it roughly synonymous with *acceptance testing*. Another common (though quite different) understanding of *evaluation* is that it refers to assessing software through such mechanisms as benchmark tests. COTS evaluation in our view is as a *decision aid*, a notion that is somewhat different from evaluation as acceptance testing.

The COTS analyst is the person (or persons) who designs and executes the various activities that constitute a COTS product evaluation. This should be a defined role. How the relevant BPOs and BPAs are involved in COTS vendor demos and selection decisions should also be defined.

Additional recommendation (Jan. 2012) - The COTS Evaluation process will provide a basis for systematic evaluation with a three-fold objective:

1. To perform independent evaluation – in the traditional sense, e.g., to check appropriateness, feasibility, and limitations – of the selected COTS tools,
2. To perform independent evaluation of the sub-systems of T2 as they are developed using integration and adaptation of different COTS tools to provide the desired functionality, and
3. Use the COTS Evaluation process to perform due diligence assessments of the COTS tool suite in the VCF Pilot, CIL, and the other Phase I development projects.

Since this COTS evaluation process will be ongoing for many years, it is advised that this process be defined and put into the Playbook.

Relevant Standards, Best Practices, and Related Resources

1. Lawrence Chung, Xavier Franch and Neil Maiden. 2nd International Workshop on Models and Processes for the Evaluation of off-the-shelf Components (MPEC'05). *27th International Conference on Software Engineering (ICSE)*. 2005.
2. Eric Dubois and Xavier Franch. International Workshop on Models and Processes for the Evaluation of COTS Components (MPEC'04). *26th International Conference on Software Engineering (ICSE)*. 2004
3. Santiago Comella-Dorda, John Dean, Grace Lewis, Edwin Morris, Patricia Oberndorf, and Erin Harper. A Process for COTS Software Product Evaluation. *Technical report CMU/SEI-2003-TR-017*. July 2004.
4. Steve McConnell, *Rapid Development*, Microsoft Press, 1996, ISBN 1-55615-900-5
5. Paul Clements, et al, Constructing *Superior Software*, Software Quality Institute Series, Macmillan Technical Publishing, 2000, ISBN 1-57870-147-3

Status Update

Effective January 13, 2012

The functionality of the T2 system will be delivered by software. Commercial Off-the-Shelf (COTS) software is becoming an ever-increasing part of the solution system. A common perception held by many people is that since a vendor developed the software, much of the quality responsibility is carried by the software vendor. However, people are learning the hard way that as they buy and deploy COTS-based systems, these activities are not necessarily reduced, but shifted to other types of activities not seen on custom developed systems.

We still do not see a timeline for COTS selection, acquisition, integration and deployment. We will be asking for this next time. We do, however, see in the developing T2 architecture a recognition of these issues and movement in the direction of considering the importance of these issues.

Effective July 20, 2012
The pre-development environment is getting close to being set up, although the DDI continue not to be pleased by the quality of how the tools are configured and the distinction between tool configuration (EBO's job) and tool customization (DDI's job) remains unclear. Nonetheless, it seems the DDI are willing now to work with the pre-development environment as made available to them. This step is of fundamental importance for any COTS-based development to succeed. However, the COTS risks – both short-term in the context of implementing T2 as well as long-term in terms of maintaining T2 – remain high. Two particular risks that became apparent in this review are: (1) no well-documented process for testing a COTS-based system – this is a particularly significant risk in the context of implementing the T2 system correctly; and (2) no well-documented process for how to decide whether to integrate a new version of a (COTS) tool into the system, specifically how should CSD and DDI make such a decision amicably – this is a particularly significant risk in the context of maintaining T2, specifically without the availability of a sand-box environment.

Additional recommendation (Jul. 2012) – Define the steps in testing a system composed of COTS components. The Verification plan in Playbook makes no mention of how to address the complexity of COTS-based systems. For example what is the analog of "unit" (for unit testing) in such a system? Is it one COTS tool along with its customization? If so, what is the analog of a code peer review (as required by T2 Playbook Section 4.7.3, which states "For each development task, a mandatory unit test and peer review of the code precedes any review by the lead developer or delivery of the code into the configuration management system")? The customization of a COTS tool does not necessarily consist of writing code only, rather it can include actions performed by the developer through a GUI-based front-end. For peer review, are these actions documented, e.g., as a list of actions with appropriate data values on the GUI, and reviewed? Such issues must be clarified. Otherwise the resulting system will likely be brittle with low reliability.

Additional recommendation (Jul. 2012) – There is an urgent need for building a sand-box environment, which not only allows performing the basic tasks of integrating the chosen COTS tools in different ways and evaluating how different customizations/configurations might fit the client needs better, but more importantly also allows trying out the effects of upgrading a subset of tools while the other tools maintain the older versions. Not having such a sand-box environment will force such upgrades to be performed on a deployed system and in the context of a COTS-based system an upgrade that did not complete as expected could have severe

consequences on the overall functionality and quality of the system.

Effective January 2013
COTS risks remain high, especially with the set of tools changing. The need to define testing activities specific to COTS provisioning and integration remains. At present, testing is largely based on first putting together the tools that form a system and then doing combined system/UAT testing as well as performance testing. The lack of a coherent architecture exacerbates the issues with testing systematically and thoroughly.

Effective July 2013
COTS risks continue to remain high. With the continually increasing number of COTS tools, which now exceeds 200, the risk becomes even more significant. In addition, with the recent decision of offshore development at the India Development Center, the importance of defining testing activities specific to COTS provisioning and integration has also become more important. Further, the continued lack of a coherent, overall system architecture continues to exacerbate the issues with testing systematically and thoroughly.

Effective January 2014
COTS risks remain high. The need for defining testing activities specific to COTS provisioning and integration continues to remain important and largely unfulfilled -- for instance, the unit testing conducted so far on CIL did not follow any well-defined testing methodology and also did not include any test cases that ran the underlying COTS tools. Further, the continual lack of a conceptual view of the overall system architecture continues to exacerbate the issues with testing systematically and thoroughly. With the additional confusion of 2 different official lists of COTS tools in the solution, we now believe that the number is somewhere between 132 and 200 but are not at all sure (see related Finding F14A-003).

Effective July 2014.

The most current official list from CSD shows 191 COTS tools in the solution suite, 63 of which are considered to be core products. The results of Iteration X showed how the BPM toolsuite could be integrated and used to drive T2 functionality. With the development of a consistent architecture view and ongoing tools training, the risk in the large number of COTS tools is decreasing. There will always be risk in a project of this size and complexity, however, CSD and DDI have effectively addressed this risk. Although there are many more COTS tools to be integrated into the system, the team is widely aware of the risks involved and will undertake necessary experimentation as needed. Therefore this finding is closed.

6. FINDINGS AND PRIORITIZATION SUMMARY

The following tables are color coded to provide a representation of the CSD progress made on each finding. There are five colors on the charts:

Table 6-0 Findings Progress Color Codes

Finding #	Finding Description
F##-###	Red means little or no effective work has been done, no progress observed
F##-###	Yellow means that a plan has been defined and work is being done to remedy the finding, some progress was observed
F##-###	Light blue means that this finding is almost closed and is being considered for closure at the next review
F##-###	Green means the finding has been remedied and was closed
F##-###	White means a new finding for which progress has not yet been examined

The following table presents a summary of all the new IV&V findings that were identified since the last IV&V review. The meaning of the priority grades in this table is found in Volume II, Appendix A.

Table 6-1 July 2014 New Findings Summary

Finding #	Finding Descriptor	OSCE Priority
F14B-001	Lack Of Requirements Prioritization	HIGH
F14B-002	Overly Complex Business Rules In EER	HIGH
F14B-004	Methods For Sampling Of IDC-Developed Components For Review Have Not Been Determined	HIGH
F14B-005	System Performance Concerns	HIGH

The following table presents a summary of all the IV&V findings that were identified in all previous reports, along with their priority, open and closed dates, number of days open, priority and their progress color indicators. They are presented in chronological sequence from oldest to newest findings.

Table 6-2 IV&V Findings Summary

Number	Title	Opened	Closed	Days Open	Degree Impact	Time Criticality	Probability Impact	OSCE Priority
OCSE-1	Project Charter Out of Date	Sep-2010	Jan-2012	487	Medium	Immediate	Medium	Medium
OCSE-2	Project Documentation Not Under Version Control	Sep-2010	Jul-2011	303	Medium	Short Term	High	high
OCSE-3	PMP and Playbook Not based on Industry Standards	Sep-2010	Jan-2012	487	High	Short Term	High	urgent

Number	Title	Opened	Closed	Days Open	Degree Impact	Time Criticality	Probability Impact	OSCE Priority
OCSE-4	Field Office Staff Not Properly Involved	Sep-2010	Jan-2012	487	High	Short Term	Medium	high
OCSE-5	Risks and Issues Not Tracked at Program Level	Sep-2010	Jul-2011	303	Medium	Short Term	Medium	Medium
F11-001	Project communication and team-building deficiencies exist	Jul-2011	Jan-2013	550	High	Long Term	High	high
F11-002	Program Organizational Structure Deficiencies	Jul-2011	Jan-2013	550	High	Long Term	High	high
F11-003	Forms Management Solution Divergence	Jul-2011	Jan-2013	550	High	Short Term	Medium	high
F11-004	Management Over control	Jul-2011	Jul-2013	731	High	Short Term	Medium	high
F11-005	Inadequate Management Metrics	Jul-2011	Jul-2013	731	Medium	Short Term	High	high
F11-006	Risk Buffers not visible or understood	Jul-2011	Jan-2014	915	High	Long Term	Medium	Medium
F11-007	Requirements Volatility	Jul-2011	Oct-2012	458	High	Immediate	High	urgent
F11-008	Flawed REP	Jul-2011	Jul-2013	731	High	Immediate	High	urgent
F11-009	Lack of Quality Focus.	Jul-2011	Sep-2013	793	High	Short Term	High	urgent
F11-010	QMP deficiencies.	Jul-2011	Oct-2012	458	Medium	Short Term	High	high
F11-011	Metrics program deficiencies	Jul-2011	Oct-2012	458	High	Short Term	Medium	high
F11-012	Lack of quality criteria in decision making	Jul-2011	Oct-2012	458	High	Long Term	High	high
F11-013	T2 Master Schedule is Not Real	Jul-2011	Jul-2013	731	High	Long Term	High	high
F11-014	Playbook has deficiencies.	Jul-2011	Jul-2013	731	High	Immediate	High	urgent
F11-015	The Playbook feels too heavy	Jul-2011	Oct-2012	458	High	Immediate	Medium	high
F11-016	Playbook is too waterfall-like.	Jul-2011	Jul-2013	731	High	Immediate	Medium	high
F11-017	The Playbook is of dubious quality	Jul-2011	Oct-2012	458	High	Immediate	Medium	high
F11-018	Playbook is different from previous experiences	Jul-2011	Oct-2012	458	High	Immediate	Medium	high
F11-019	Playbook and toolset not mutually supportive	Jul-2011	Jul-2013	731	High	Immediate	Medium	high
F11-020	Playbook as Dogma	Jul-2011	Jul-2012	366	High	Immediate	High	urgent
F11-021	No Application Domain Architecture.	Jul-2011	Jan-2014	915	High	Short Term	High	urgent
F11-022	No API for COTS	Jul-2011	Jan-2014	915	High	Short Term	High	urgent
F11-023	No Differentiation between COTS and custom.	Jul-2011	Jan-2014	915	High	Short Term	High	urgent
F11-024	Lack of Reference Architectures Focused on COTS	Jul-2011	Jan-2014	915	High	Short Term	High	urgent
F11-025	No Separation of Development and Application Architectures	Jul-2011	Jan-2014	915	High	Short Term	High	urgent
F11-026	Architectures are Simplistic.	Jul-2011	Jan-2012	184	High	Short Term	High	urgent
F11-027	Different Architectures Currently Being Touted	Jul-2011	Jan-2012	184	High	Short Term	High	urgent
F11-028	Ill-defined Interface between T1 and T2	Jul-2011		1124	High	Short Term	High	urgent

Number	Title	Opened	Closed	Days Open	Degree Impact	Time Criticality	Probability Impact	OSCE Priority
F11-029	COTS risks are high	Jul-2011	Jul-2014	1096	High	Short Term	High	urgent
F11-030	DDI deliverable acceptance issues.	Jul-2011	Jan-2012	184	High	Short Term	High	urgent
F11-032	No DDI technical quality performance monitoring process.	Jul-2011	Jan-2012	184	High	Short Term	Medium	high
F11-033	DCS Dependency Problem	Jul-2011	May-2013	670	High	Short Term	Medium	High
F11-034	DCS Ticket Processing Delays	Jul-2011	May-2013	670	High	Short Term	Medium	high
F11-036	Change in TfT (DCS) Vendor(s)	Jul-2011	Jul-2012	366	High	Immediate	High	urgent
F11-037	Human Resource Development Deficiencies	Jul-2011	Oct-2012	458	High	Short Term	High	urgent
F12A-001	No T2 Program Scope Management Plan	Jan-2012	Jan-2013	366	High	Short Term	High	Urgent
F12A-002	Questionable Work Plan Effort Estimation Accuracy	Jan-2012		940	Medium	Short Term	High	high
F12A-003	Creeping Schedule Slippage	Jan-2012		940	Medium	Short Term	High	high
F12A-004	Lack Of Rigor In Using Factual Data For Management Purposes	Jan-2012	Jul-2013	547	High	Short Term	High	urgent
F12A-005	Difficulties In Transitioning From Requirements To Design	Jan-2012	Jul-2013	547	High	Immediate	High	urgent
F12A-006	Lack of Clear Definition of the Meaning of Quality for the T2 System	Jan-2012	Jan-2013	366	High	Short Term	High	urgent
F12A-007	Lack Of QA Performance Review On The CIL Project	Jan-2012	Oct-2012	274	High	Short Term	High	urgent
F12A-008	Lack Of QA Performance Review On The VCF Project	Jan-2012	Oct-2012	274	High	Short Term	High	urgent
F12A-009	Lack of a defined technical quality plan (from DDI).	Jan-2012	Jul-2012	182	High	Short Term	Medium	high
F12A-010	The Playbook is missing a comprehensive systems engineering process model	Jan-2012		940	High	Immediate	High	urgent
F12A-011	Support environments may not be ready when needed	Jan-2012	Jan-2013	366	High	Short Term	High	urgent
F12A-012	Support environments assumptions not correct	Jan-2012	Jan-2013	366	High	Short Term	High	high
F12A-013	Support environments are currently flawed and unstable, and it's not clear who is responsible for that.	Jan-2012	Jan-2013	366	Medium	Short Term	Medium	high
F12A-014	Knowledge Transfer Difficulties Are Occurring	Jan-2012	Oct-2012	274	High	Long Term	High	high
F12A-015	Knowledge Losses Due To Retirement (And Turnover) are occurring	Jan-2012	Oct-2012	274	High	Long Term	High	high
F12B-001	Initiative Management Transition Focus is Too Short Term	Jul-2012	Jul-2013	365	High	Long Term	High	high
F12B-002	Project Management Dashboard Missing Scope, Quality and Resources	Jul-2012	Jan-2014	549	High	Short Term	High	urgent
F12B-	Non-functional requirements need	Jul-2012	Jul-2014	730	High	Immediate	High	urgent

Number	Title	Opened	Closed	Days Open	Degree Impact	Time Criticality	Probability Impact	OSCE Priority
003	attention							
F12B-004	Phase 2 Requirements Are Problematic	Jul-2012	Jul-2013	365	High	Short Term	High	high
F13A-001	Review Method is non-standard and less than fully effective	Jan-2013	Jul-2014	546	High	Long Term	High	high
F13A-004	Environment Issues Concern CSD and DDI	Jan-2013		574	High	Long Term	High	high
F13B-001	Lack of System Architecture Driven Approach	Jul-2013	Jul-2014	365	High	Short Term	High	urgent
F13B-002	Architecture Visualizations Inadequate	Jul-2013	Jul-2014	365	High	Short Term	High	urgent
F13B-003	Lack of Shared System Models	Jul-2013		393	High	Short Term	High	urgent
F13B-004	System Design Delays	Jul-2013		393	High	Short Term	Medium	high
F13B-005	Questionable Lessons Learned from Iterations 1 and 2	Jul-2013	Jan-2014	184	High	Short Term	Medium	high
F13B-006	EER Out of Synchronization	Jul-2013	Jan-2014	184	High	Short Term	Medium	high
F13B-007	OAG CSD Resources in Austin Are Strained	Jul-2013		393	High	Long Term	High	high
F13B-008	Offshoring Approach Has Documented Risks.	Jul-2013		393	High	Short Term	Medium	high
F13B-009	BPM Technology is a Significant Change for BPAs	Jul-2013		393	High	Short Term	High	urgent
F14A-001	Negative Effects of Continuing Schedule Delays	Jan-2014		209	High	Short Term	High	urgent
F14A-002	Questionable Success of Iteration "X"	Jan-2014	Jul-2014	181	High	Short Term	High	urgent
F14A-003	One Consistent List of COTS Tools for T2 Does Not Exist	Jan-2014		209	High	Short Term	Medium	high

Notes:

1. Finding F11-031, *DDI Contracting Issues*, was administratively closed due to being out of scope. It was never reported to OAG
2. Finding F11-035, *TfT Staffing Issues*, was merged into F11-033

The table below shows the lifecycle status of all IV&V findings starting from our initial review in July 2011 through our most recent semi-annual review. This shows the current balance of open and closed findings, and shows that IV&V's findings are being systematically addressed and resolved by T2.

Table 6-3 Findings Progress Scorecard

Finding Category	Finding Count	Comments
NEW	5	5 high
OPEN	12	5 urgent, 7 high
CLOSED (this period)	7	
CLOSED (all prior periods)	57	
TOTAL	81	

Chart 6-1 below shows, for each finding, the number of days that each was/is open.

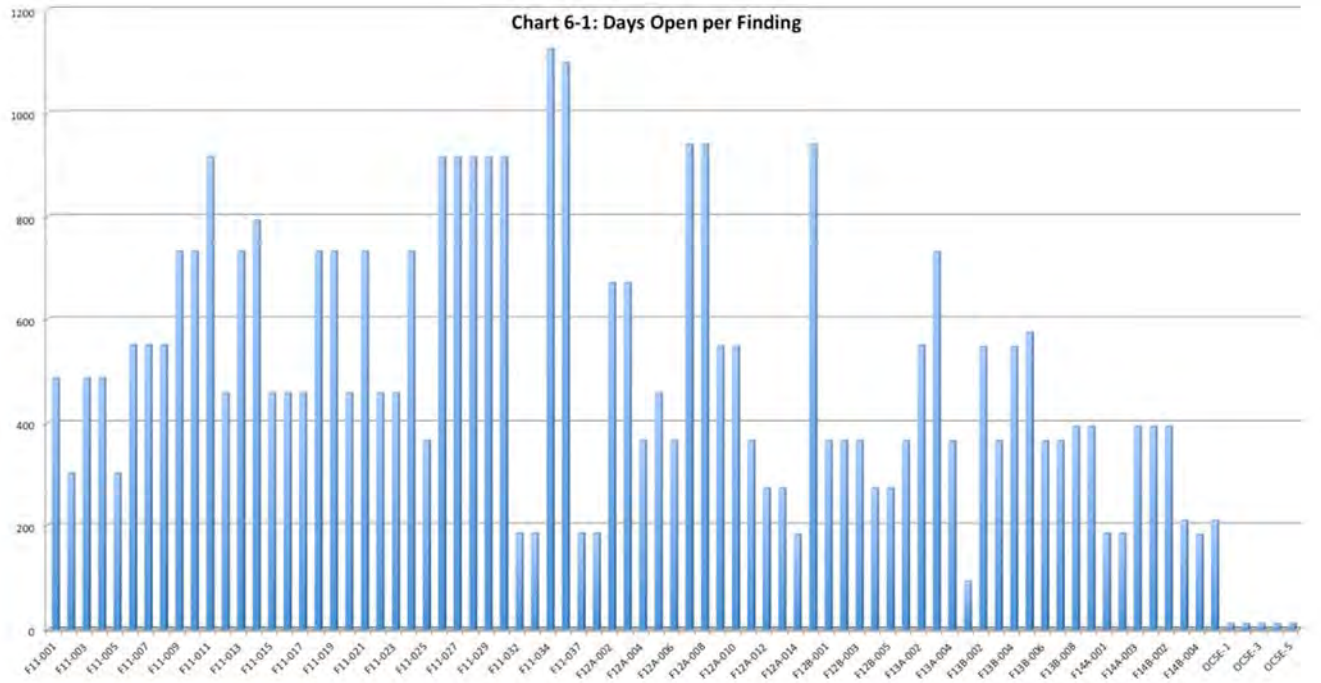
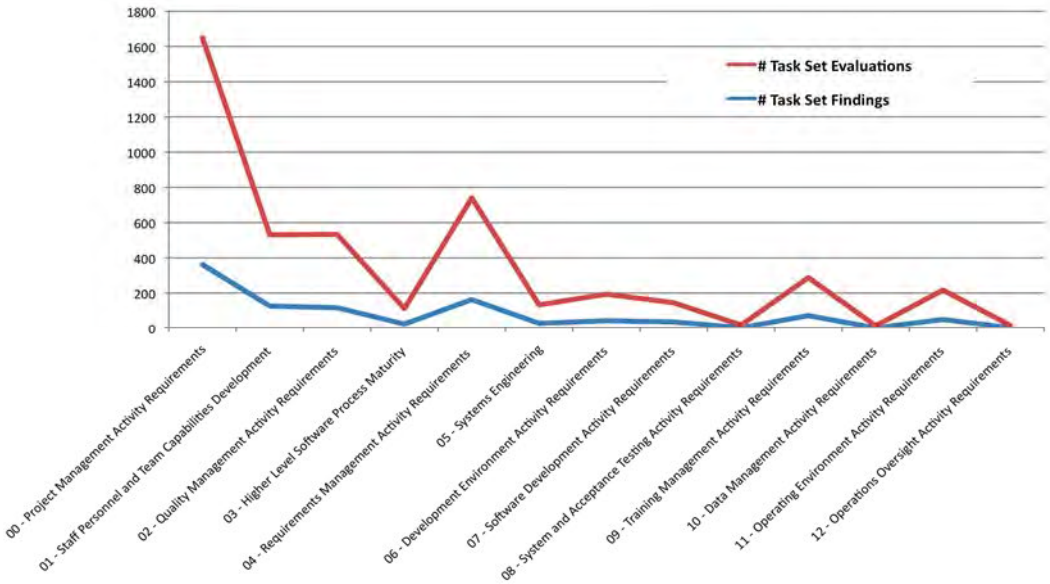


Chart 6-2 below shows how our IV&V review evaluations and findings have covered the necessary categories and activity areas associated with our review scope. The intensity of our evaluations and findings shifts to the right as the T2 program moves down its production lifecycle. In our early reviews, we dealt mainly with management, quality and process issues. Now we are dealing primarily with engineering issues, and will be moving into the test, training, deployment, maintenance and support areas over the next 2 years as the program moves toward the R1 "go-live" date.



7. NEXT STEPS

This section presents a brief overview of what IV&V activities and focal points are intended for review during the next Semi-Annual IV&V Onsite Review scheduled for January 5-17, 2015. As well as following up on all of the previous open IV&V findings, and investigating new issues, the following areas will receive attention on the next review.

IV&V will seek more information about open issues stemming from prior reviews.

1. Change Request valuation and prioritization process.
2. The effect that ADM has had on the REP, SEP, VP and PSP and the incorporation of other existing processes into the development methodology.
3. Looking for evidence of incremental schedule slips.
4.
5. The level of COTS configuration, customization and integration risk, and how that is addressed.
6. Release 1.0 design issues and test planning synchronization.
7. The results of R1 and IDC development and the lessons learned
8. The potential impact of BSC level change requests that are pending approval

In addition the following new areas of the initiative will be explored:

1.
2. Prioritization of "in-flight" CRs, scope management, delta of CRs plus future requests; R1 scope reductions
    a. Developed F14B-001 - Lack of Requirements Prioritization
3. System Performance Concerns
    a. Develop new finding focusing on the concern for performance testing
4. Conversion Sync with T1, Integration risk, all teams do not recognize Java conventions, rules, common screen conventions
    a. Update to F11-028 Ill-defined Interface between T1 and T2
5. Testing squeezed out in schedule slips
6. Planning for Operations Change management after "go live". Can CSD absorb and maintain the T2 system? CSD needs to plan for skills, T1 & T2 roles and responsibilities.
7. Lack of Visibility into Code Development
    a. Included in update F13B-008 Offshoring Approach Has Documented Risks
8. EER Rule Complexity. Hard to scrub requirements because all T1 functionality assumed required
    a. Developed F14B-002 - Overly complex business rules in EER

The appendices to this report may be found in VOLUME II, consisting of:

A. Determination of Priorities for IV&V Findings
B. Acronyms, Abbreviations and Terms
C. Interview Sessions Held And T2 Meetings Observed
D. IV&V Evaluation Checklists
E. Previously closed findings
F. Findings elaborations

ATTACHMENT 1 – CSD MANAGEMENT RESPONSE TO FINDINGS

CSD Management Response to New Findings and Recommendations

F14B-001 Lack of Requirements Prioritization			
The lack of explicit priorities defined for the body of T2 requirements will make tradeoff decisions more difficult when push comes to shove.			
Period Opened	JULY 2014	**Period Closed**	NEW
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OCSE Priority**	URGENT
Progress Indicator	NEW		
Related IV&V Tasks			

CSD Response to New Finding:

The Child Support Division (CSD) is formalizing a process to prioritize requirements that are created from this point going forward. For existing requirements CSD will convene a design team and business owners to identify functions to defer as needed. CSD has done this once already, and believe this can be done again if necessary. CSD is also in the process of defining a prioritization scheme for "product backlog", the list of deferred change requests and/or deferred requirements. CSD will share an update on the progress of these items during the January 2015 IV&V review.

F14B-002 Overly complex business rules in EER			
Many of the business rules dealing with legal processes in EER are more complex than industry standards would dictate.			
Period Opened	JULY 2014	**Period Closed**	NEW
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OCSE Priority**	HIGH
Progress Indicator	NEW		
Related IV&V Tasks	SE-1		

CSD Response to New Finding:

CSD agrees that the EER business rules are more complex than what other states are currently designing. The CSD caseload is growing at more than 6,100 net cases each month. Without an increase in the division's FTE cap since 2004, CSD has added more than 555,506 new cases in the last ten years. Therefore, CSD needs to automate more manual tasks than other states who have more FTEs than Texas to perform the daily tasks. This aspect is necessary to ensure that the growing case load is properly monitored/worked in the future. The Establishment and Enforcement Renewal (EER) business rules, specifically in legal assessment are complex. These rules determine if the Attorney General will file administrative or judicial legal actions and the complexity is necessary to ensure CSD does so accurately. The legal actions being assessed have the capability of requesting someone be held in contempt of court leading to possible jail time. It could also lead to garnishing wages, intercepting tax refunds, or placing liens on assets and property. Without assessing the case and checking each of the attributes of the case, CSD may do so improperly. CSD wrote requirements in EER to ensure the utmost accuracy of our legal actions prior to initiating them. These rules are currently being designed and translated into Design Rules. CSD needs to ensure the details are not lost and re-factoring the requirements is not an option as it would cause further delays to the entire project as well as increasing the possibility of missing requirements.

F14B-004 Methods for sampling of IDC-developed components for review have not been determined			
The strategy and procedures for sampling IDC-developed components for review have not been developed. Random sampling will not provide the necessary coverage.			
Period Opened	JULY 2014	**Period Closed**	NEW
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OCSE Priority**	HIGH
Progress Indicator	NEW		
Related IV&V Tasks	F13B-007, SD-18		

CSD Response to New Finding:

CSD will verify that sampled artifacts meet requirements and design specifications, as well as standard and guideline checklists. CSD will also verify there are no missing development artifacts based on requirements/design specifications.

CSD will sample every "type" of artifact across all Release 1 functional areas. CSD will focus sampling efforts on elements which are critical, complex, or high risk to the business. CSD will cover architecture, security, conversion/integration and commercial off-the-shelf (COTS) tool components in the sampling strategies.

CSD will sample artifacts from every developer, from both onshore and offshore India Development Center (IDC). CSD will review developer unit test plans and results, and in some cases run independent tests.

CSD will formally validate business rules and sample all business process models.

The Quality Assurance (QA) team will independently sample development artifacts, limiting overlap with CSD sampling efforts. The quality management sampling strategy is located on the T2 website. The QA team will:

- Use the DDI vendor's development inventory to determine the number of expected artifacts by

functional area, i.e. Case Initiation and Locate Renewal (CIL), Establishment and Enforcement Renewal (EER), etc. and by type, such as screen and portlet, batch, etc.

- Use tools to determine artifact complexity. Complexity factors will be used to focus sampling efforts.
- Review sampling thresholds and adjust as needed.

CSD and the QA team will monitor the severity of comments, T2 issues and risks, and lessons learned to adjust sampling strategies. If additional sampling or resources are needed, contingencies will be developed.

Sampling results, coverage, and other metrics will be gathered, monitored, reported and tracked.

CSD has started sampling with the delivery of the ItX and refactor components. CSD sampling plans will align to the DDI development plan. In order to limit knowledge of which areas will be sampled, the specific plans will not be published. CSD and the QA team will be glad to share sampling strategies, plans, and results with ARiSE when they return in January 2015.

F14B-005 System Performance Concerns			
System performance is a major component to ensuring project success and there are not currently any plans for ensuring that these objectives will be met.			
Period Opened	JULY 2014	**Period Closed**	NEW
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OCSE Priority**	HIGH
Progress Indicator	NEW		
Related IV&V Tasks	SE-1		

CSD Response to New Finding:

The project team agrees with ARiSE's performance test finding. Performance objectives were defined in Change Request (CR) #35315 which is approved for implementation. The DDI vendor is on-boarding a member of their performance engineering team who specializes in end-to-end performance. The engineer will be available by IV&V's next review. The team is still elaborating the detailed performance objectives.

The project team will be developing a performance test approach in order to meet system performance objectives. This approach will determine how T2 will establish a baseline for performance system standards. The project team will also take into account capacity planning based on known volumes. The team will define service level objectives, and plan for a performance test that will run in a highly-available, distributed, and scaled (production-like) environment. In addition the team will identify pieces of key functionality that may impact performance. An example of this is the use of Quality Stage-Member Matching. Another example is the retrieval of document images from the

repository.

In addition, adjustments continue to be made to the architecture to address performance concerns such as the retirement of a poor performing Enterprise Service Bus (ESB) in favor of hardware accelerated ESB. This ensures that guidelines will be enforced to concentrate business logic to the Java tier that will be able to support a higher load.
The project team is also involved in capacity planning efforts in order to understand and document today's volumes, estimate volumes for the future, understand transaction and interaction volumes for T2 and work with vendors to determine the appropriate infrastructure necessary to support such capacity.

Initial tests have been performed in the environments available to the project. These tests identified and allowed for the revision of the architecture. For example, service composition tests in Java versus in the ESB identified the need to perform service composition logic in the services tier. Further testing on the ESB resulted in the retirement of the previous ESB technology (WESB) and replaced with current technology (DataPower). This type of performance identification continues as an ongoing discipline on the T2 project.

The project team will plan as part of the performance test approach how to best handle continued changes to the T2 system. In addition, the project team will provide input to the monitoring plan, based on performance test results. This will ensure long term performance of the system is not impacted.

Planned Activity Completion Dates:
Performance Test Approach: November 2014
Capacity Plan: October 2014
Monitoring Plan: May 2015

CSD Management Update Response to Previous Findings and Recommendations

F14A-001 Negative effects of continuing schedule delays			
Schedule delays in minor and major milestones in the master work plan are jeopardizing the ability of CSD to deliver the project on time (e.g. CIL Iteration 1 and Release 1.0).			
Period Opened	JANUARY 2014	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OCSE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks			

CSD Response to July 2014 Finding Update:

As evidenced by the "Indicators of Program Size and Dynamics", the T2 Initiative is a large and complex program and developing a realistic schedule remains challenging. CSD is pleased that ARiSE noticed the significant progress towards stabilizing the schedule uncertainty. CIL Iteration 1 was combined with Iteration 2 and 3 and was referred to as Iteration X. Iteration X functionality was delivered on schedule (3/31/14). The documentation updates as a result of the lessons learned in Iteration X slipped due to competing priorities. However, those updates are complete and there was no downstream impact to major milestones.

As noted, CSD and the DDI vendor are working under the "Alternate Plan" to put development under the DDI vendor's control in a similar fashion to the third option in ARiSE's recommendations. CSD has also implemented ARiSE's first option to establish a "firm (non-movable) date for Release 1.0". Initiative Management, which includes CSD and the DDI vendor, are holding firm to a Release 1 date of July 2016.

CSD is still on track to meet the first item necessary to close this finding: rebaselining in September of 2014. The rebaseline will cover the complete scope of the project. The performance to baseline will then be monitored via status reports, status meetings, and a robust metrics program, all of which focus on achieving schedule.

F14A-003 One Consistent List of COTS Tools for T2 does not exist			
We discovered two different official lists of COTS tools in the solution set that does not agree in content. These differences add to the communication and planning difficulties in the project.			
Period Opened	JANUARY 2014	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM

Probability of Impact	MEDIUM	**OCSE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks			

CSD Response to July 2014 Finding Update:

Maintenance processes are now being developed to enforce an accurate and consistent COTS tool list. In addition, further information will be added to the COTS tool list which will help CSD plan for and provide adequate tool support moving forward with T2. Some of the changes and processes that are currently being evaluated include, but are not limited to:

- Major COTS upgrades or new COTS tools will continue to be submitted to the Architecture Review Board (ARB) for review and approval. If approved, the COTS upgrade or new COTS tool will be added to the master COTS tool list. However, as designed, there are two gaps in this COTS tool list process:
  1) the ARB may not be aware of when the upgrade or the new tool is actually implemented, and
  2) the ARB does not process minor COTS upgrades.

- To address the above gaps, the Change Control Board (CCB) process will be modified. These process changes are planned for November 2014. Currently, all changes must be approved by the CCB. These changes include both major and minor COTS changes. In addition, the CCB tracks when these changes are actually implemented. The only CCB process change needed would be for the CCB to provide COTS updates to the COTS tool list owner. To help ensure that the COTS tool list has been updated, CSD will develop a process to verify that the work has been completed. This process is targeted for November 2014.
- To further address this finding, fields may be added to the COTS list: STATE (e.g. pending, approved, implemented), EOS (end of support) and EXTENDED SUPPORT.

- The master COTS tool list will be version controlled.

F13B-003 Lack of Shared System Models			
There is no top level shared model of the system architecture or enterprise data model.			
Period Opened	JULY 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OCSE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	F13B-001, F13B-002; SD-1, SE-4, SE-5		

CSD Response to July 2014 Finding Update:

CSD partially agrees with this finding. The scope of the end-to-end architecture blueprints

is the execution architecture. It has two views, a logical view which shows the products and how they interact, and a more technical view which shows the patterns of abstraction that are contained in that part of the solution across the multiple tiers.

The blueprints define a four tier architecture. The consumer tier consists of the WebSeal login page, the T2 portlets, and Legacy T1 portlets that the user interacts with, the business processes implemented in BPM, and the scheduled batch jobs. The integration tier consists of components like DataPower, International Business Machines Corporation (IBM) Websphere MQ, and ExtremeScale. The services tier consists of Adobe forms, content management in Documentum, business rules in IBM Operational Decision Maker (ODM), entity match in QualityStage and custom java services. The data access tier consists of the data access objects (implemented with the Java Persistence API (JPA) framework) that read and update the DB2 database.

CSD is unclear with what connections are missing to the BPM application architecture. As discussed during the last review, the DDI vendor reviewed diagrams that depict the BPM application connections with ARiSE and this was part of the architecture blueprint that was also reviewed with ARISE. Through those reviews, it was understood that the finding was covered. Further, Rationale Software Architect (RSA) design diagrams exist that depict the application itself and how the various components – BPM, batch, services, portals, etc – connect and interact with each other to accomplish the T2 system.

In order to provide continuity from the architecture team to the application development team, the DDI vendor tech arch lead will be moving into the application development area and will be overseeing the development of the COTS implementation of DataPower, Websphere MQ, QualityStage, BPM and ODM.

F13B-004 Technical Design Delays			
There are design delays due to lack of architecture definition and resource constraints.			
Period Opened	JULY 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	MEDIUM	**OCSE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV&V Tasks	SD-1, SE-1		

CSD Response to July 2014 Finding Update:

CSD continues to track the completion of the execution architecture closely and to manage this as an issue with regular status meetings. Iteration X, developed in the Spring of 2014, proved out many of the base technical capabilities. Now that the top level of the execution architecture definition (the design approaches) has been completed or conditionally accepted, CIL has been able to revise their high-level designs (HLD) to incorporate the remaining execution architecture capability definitions (no more brown boxes) and those HLDs are going through re-validation which will complete September 2014.

Batch architecture design approaches are conditionally approved. The batch architecture designs and how-to guides are delayed because the DDI vendor batch team has been developing prototypes to allow the IDC team to start batch development. Batch execution architecture design documentation, and how-to guides are scheduled to complete October 2014. At that point, CSD can peer review them.

The requirements volatility cited during this review occurred in the month of May 2014, and reflected the introduction of the Interface Manager requirements which had been underway for many months. Those were defined in conjunction with the DDI vendor and were anticipated in the schedule.

Use of the QualityStage product to design the Member Match process (BPM 41) is also being tracked closely by the initiative. The Member Match process determines whether incoming members are new member records or an update to an existing member in the T2 System. CSD has brought IBM pre-sales and IBM lab resources in over the last two months to work directly with the DDI vendor in answering questions and providing recommendations. In addition, CSD Initiative Management has requested that the DDI vendor bring in a skilled QualityStage resource(s) to design and develop the solution to ensure it meets best practices and avoid any concerns of schedule delay.

F13B-007 OAG CSD Resources in Austin Are Strained			
Resources at Austin OAG CSD are strained, with many roles vacant or To Be Determined, for current and future tasks. Some staff members are providing assistance to other projects while continuing to work on their original assignments, potentially leading to "burn out".			
Period Opened	JULY 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OCSE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		

Related IV& V Tasks	F13B-008

CSD Response to July 2014 Finding Update:

While CSD continues to recruit personnel for key positions, good progress has been made in filling the gaps. The reorganization to dedicate staff full time to the T2 project improved the ability to focus on T2 tasks.

Key roles have been filled with internal and external resources that include:

- ERS Business Process Analyst (BPA)
- RDO Business Process Analyst (BPA)
- Business Partner Planning

There are eight positions posted and CSD is actively interviewing. Some of the vacancies have less urgency to fill right away due to our location in the Systems Development Life Cycle (SDLC). For the remainder, CSD will hire contract resources in the interim to fill the gaps.

The project has moved into development and CSD will review the components using a sampling strategy. As ARiSE noted, the sampling algorithm and the quality of the components will drive the amount of effort required to review. The QA team will have an approach for measuring quality this month for reporting in October 2014. The DDI vendor will have completed all components for the first BPM by October 2014. As a result, CSD will have a better understanding in October 2014 of the staffing levels required to review the components.

CSD is developing an organization chart to reflect the anticipated structure once T2 goes to production and CSD is expected to maintain the system. This will emphasize the need for specialized skills and provide the ground work for identifying and filling the operational gaps. The goal is to have these key roles filled during the DDI vendor warranty period when mentoring and transition will take place.

With regards to the actions T2 is taking to address the risk:

1. The CSD resource risk is addressed in Risk 45015. It is a "significant" level risk and the Initiative Director reports on the progress against the risk to the Steering Committee.
2. The T2 project has successfully transitioned to the revised plan and new organization chart that allows the DDI vendor more autonomy and, therefore, reduces CSD staffing needs.
3. CSD has assigned an experienced employee who came from Data Center Services (DCS) as key point person to help the DDI vendor manage environment changes with DCS.
4. CSD will create an Occupational and Human Resource Plan (OHRP) which will focus on staff skills inventory, knowledge sharing, and staff development. The plan will be completed by October 31, 2014.

F13B-008 Offshoring Approach Has Documented Risks
The decision to incorporate 50 – 65 DDI offshore coders and unit testers poses risks that are well documented in multiple case studies.

Period Opened	JULY 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	MEDIUM	**OCSE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV& V Tasks	F13B-007		

CSD Response to July 2014 Finding Update:

CSD presented a PowerPoint, "IDC offshoring approach", to ARiSE during their visit. The material in the presentation is still accurate and the approach is, as ARiSE points out, working well so far. The meetings and status reporting continues. The DDI vendor's application development lead leaves in September 2014 to move to India and work on-site to ensure the vision for the Texas CSD System is understood. The DDI vendor's application development lead has been with the project since the DDI vendor team on-boarded and has the experience and knowledge to be effective.

The IDC is developing components and progress is tracked via weekly status reporting and component Level charts. As of August 14, 2014, 53 of the planned 66 components are ready for the DDI vendor's onshore peer review.

Sampling is conducted by CSD designers and developers as well as the CSD QA team. They have worked together to develop a strategy for sampling that takes into consideration risk, criticality, and complexity. The approach also focuses on assigning the most knowledgeable resources for specific functional or technical areas.

The "IDC Support Plan" document was produced and agreed to by CSD and the DDI vendor to address Service Level Agreements (SLA). CSD is meeting or exceeding the times defined in these agreements. In order to squeeze all of the performance possible from the Virtual Desktop Infrastructure (VDI), CSD had Dell, the hardware manufacturer spend a week on site in July 2014 running diagnostics and fine tuning the VDI environment. Stability has immensely improved. IBM, the software vendor also spent a week on site in July 2014 configuring the tool sets and fine tuning the development environments. The results have been spectacular with response times at the lower end, or exceeding, industry standards and performance that exceeds the standalone desktop machines.

Downtime has been greatly minimized and procedures are in place to immediately react to any issues. With the increase in stability there have been very few instances of downtime. Notification to the technical support teams is within seconds and restoration is within minutes.

The number of IDC developers has peaked and will remain at this level for 10 months. The performance is on an infrastructure running at capacity and therefore it is indicative of a fully utilized environment.

F13B-009 BPM Technology is a Significant Change for BPAs			
The proposed Portal 8 implementation for the BPM tools to be used by the CSD BPAs will require a tool focused redefinition of their roles and responsibilities with the appropriate methodology and tool training.			
Period Opened	JULY 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OCSE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV& V Tasks	TR-1		

CSD Response to July 2014 Finding Update:

The Transition Management team revised the Mentoring and Transition (M/T) plan and it was approved by stakeholders. The plan emphasizes BPA development, specific to BPM. In August 2014, CSD agreed to the DDI vendor's recommendation to use IBM Business Process Management version 8.0.1 and the BPA training paths will be updated accordingly. The BPA mentor will continue to work with the T2 Knowledge Management Program Coordinator (both are CSD staff) to enroll the BPAs in the appropriate BPM courses.

F13A-004 Environment Issues Concern CSD and DDI (Accenture)			
Problems encountered when using the hardware and software platforms are being categorized as general "Environment" issues. Successful resolution cannot be achieved until everyone is using the same terminology referring to a standard environment development process.			
Period Opened	JANUARY 2013	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	LONG TERM
Probability of Impact	HIGH	**OCSE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV& V Tasks	OE 1, 3		

CSD Response to January 2014 Finding Update:

The DDI vendor is defining composition and the build-out schedule for all T2 environments. Within the integrated plan as observed by ARiSE, the DDI vendor has identified the date for delivery of the capacity plan, environment configuration, and specification documentation.

Target date for completion is October 2014.

F12A-002 - Questionable Work plan Effort Estimation Accuracy			
The T2 Initiative work plan in Clarity contains variances indicating inaccurate work effort estimations.			
Period Opened	JAN 2012	**Period Closed**	OPEN
Degree of Impact	MEDIUM	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OCSE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV& V Tasks	PM 25, 26, 28		

CSD Response to July 2014 Finding:

CSD is pleased that ARiSE noticed the significant improvement in the estimate accuracy. At the end of design, the DDI vendor re-estimated the effort for the rest of the project using their Accenture Delivery Methods (ADM) estimator that is based on prior child support system implementations. The result was an increase in estimated hours, but the DDI vendor is able to add resources and T2 will still go-live with Release 1 in July of 2016 and Release 2 in July of 2017. There is no additional cost to CSD for the increase in effort.

The actions required to close this finding are identical to those required to close F14A-001. CSD is still on track to meet the first item necessary to close this finding: rebaselining in September of 2014. The rebaseline will cover the complete scope of the project. The performance to baseline will then be monitored via status reports, status meetings, and a robust metrics program all of which focus on achieving schedule.

F12A-003 - Creeping Schedule Slippage			
The T2 Initiative timeline appears to be suffering incremental schedule slippage.			
Period Opened	JAN 2012	**Period Closed**	OPEN
Degree of Impact	MEDIUM	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OCSE Priority**	HIGH
Progress Indicator	PROGRESS OBSERVED		
Related IV& V Tasks	PM 2, 4, 7		

CSD Response to July 2014 Finding Update:

There is a focus on meeting schedule at every level of the initiative as a result of new Initiative Management staff and the 'Alternate Approach'. ARiSE is correct that management has sharpened their focus on risk and issue resolution. When there is a concern for meeting schedule on a task that could impact a major milestone, it is documented as a risk and the mitigation efforts proceed. The team continues to add and improve metrics to help monitor the schedule and predict potential problems. One example is the on-time-delivery chart added to the Management Metrics Report. Metrics specific to the development effort are being added. There is a renewed emphasis on monitoring 'actual' versus 'planned' staffing levels as a result of the increase in hours to finish the work.

ARiSE commented that "the T2 Project Control Manager's team says that they must suspend their production of the variance metrics for management reporting until the DDI vendor's work plan has been rebaselined." Note that the initiative level schedule and cost performance variances reported in the Monthly Initiative Report will become meaningless as the schedule morphs, but other metrics continue to provide insight into schedule status. On-time-deliveries, design schedule variance, and the new development metrics are examples. The Management Metrics Report will still be produced each month.

The actions required to close this finding are identical to those required to close F14A-001. CSD is still on track to meet the first item necessary to close this finding: rebaselining in September of 2014. The rebaseline will cover the complete scope of the project. The performance to baseline will then be monitored via status reports, status meetings, and a robust metrics program all of which focus on achieving schedule.

F12A-010 The Playbook is missing a comprehensive systems engineering process model			
The Playbook engineering processes are fundamentally flawed and incomplete, and do not cover the activities needed by T2.			
Period Opened	JAN 2012	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	IMMEDIATE
Probability of Impact	HIGH	**OCSE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV& V Tasks	PM 10; QA 10, 12		

CSD Response to July 2014 Finding Update:

CSD agrees that progress is still being made. CSD disagrees with the statement that the Solution Engineering Plan (SEP) does not reflect the development process being used by the project. The SEP changes that have been made were based on the artifact refresh project which was where the ADM concepts were implemented into the process. For design, it is complete. For build, there are still some refinements to be made based on use

of Parasoft and how Americans with Disabilities Act (ADA) testing will be performed on all pieces including COTS tools, as well as updating standards and guidelines. This will all happen as the teams start executing the build on all component parts.

The tailoring approach being used by the Financial Renewal (FIN) project for the Requirements Engineering Plan (REP) is different in that it includes less requirement types. However, in accepting the new approach the project demonstrated how the requirements can still be consumed more easily by the SEP. The different templates are included in the REP along with all of the templates being used for both releases. Those being used by FIN are labeled. Once the process has been proven, it will be determined how to incorporate it across the board.

A tailoring approach will be created to cover the proposed (and approved) approach for system test from designs. Again, once proven, it will be incorporated into the Verification Plan (VP) if warranted.

The T2 maintenance process in the Production Support Plan (PSP) has been demonstrated to some extent through the Virtual Case File (VCF) implementation and maintenance. However, CSD will be updating it based on the Phase 1 and Phase 2 task order work and continued Release 1 planning.

F11-028 Ill-defined Interface between T1 and T2			
Ill-defined Interface between T1 and T2			
Period Opened	JULY 2011	**Period Closed**	OPEN
Degree of Impact	HIGH	**Time Criticality**	SHORT TERM
Probability of Impact	HIGH	**OCSE Priority**	URGENT
Progress Indicator	PROGRESS OBSERVED		
Related IV& V Tasks	QE 7, 14		

CSD Response to July 2014 Finding Update:

CSD continues to make good progress on the T1/T2 integration tasks. In addition to the items noted by ARiSE, CSD completed a high-level analysis of the T1/T2 integration work based on the initial assumptions of synching EER and CIL data back to T1 in order to continue reporting for reports containing case and/or legal data along with financial data. This also assumed that all data needed for the Employer Web Portal (not to be renewed until Release 2) would be synched back to T1. During this analysis, it was determined that CSD could reduce the effort to 18,000 hours if CSD reduced the synch effort to only the data needed by financial. CSD is still re-estimating the impact to the ERS project and how the Employer Web Portal will be worked to access data on both T1 and T2. The integration tasks in the work plan are being detailed at this time and will be included in the re-baseline planned for September 2014. This new approach to synching data only where necessary

reduces the risk to data due to synch errors and timing.