

Review of COAA AMS Project Documentation

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1 Document Revision History

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2 References

| Ref | Document Title | Filename/URL | Revision/Date |
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| 1 | Requirements Management Using IBM® Rational® RequisitePro® | http://www.informit.com/articles/article.aspx?p=1152528&seqNum=4 | 30/06/2008 |
| 2 | Technical Assignment on the audit activity management system (AAMS) of the Chamber of Accounts of the Republic of Azerbaijan | AFİS Texniki Tapşırıq 1.0_ENG_fin.docx | v1.0 – 19/11/2018 |
| 3 | Detailed Technical Assignment related to the audit activity management system (AAMS) of the Chamber of Accounts of the Republic of Azerbaijan | AFIS - Detalli texniki tapsiriq_eng.pptx | Undated and not versioned |
| 4 | Structural information (general) | AAMS analysis_ENG.DOCX | Undated and not versioned |
| 5 | Analytical report forms | Analytical report forms _ENG.XLSX | Undated and not versioned |
| 6 | The Standard for Organizational Project Management (2018) | https://www.pmi.org/pmbok-guide-standards/foundational/organizational-project-management | Published 2018 ISBN 978-1-62825-200-2 |

3 Executive Summary

The Chamber of Accounts of the Azerbaijan Republic (COAA) has embarked on a software development project to build a bespoke Audit Management System (AMS), the design, implementation, and support of which will be handled by their chosen third-party commercial software development contractor.

Following a detailed review of the project documentation provided by COAA, this report concludes that whilst the project documentation contains certain deficiencies, the details of which are described in the following sections of this report, these deficiencies are not out of character with typical technical project documentation produced by organisations in Azerbaijan, based on the typical level of organisational maturity in the management of software development projects in Azerbaijan. The various project and document control related risks described in the conclusion of this report could be entirely mitigated by COAA and their contractor adopting an accepted practice approach to the planning and management of the project.

The nature of the internal COAA AMS project is as an outsourced turnkey project. A third-party contractor will be responsible for designing, developing and maintaining all aspects of the bespoke AMS solution, which on completion and acceptance will be turned over to COAA, and all IPR in the system will reside with COAA.

Another area of supplemental activity that could potentially be considered, and that has previously been discussed at a high level within the WB TA team, is ensuring that the AMS meets specific standards for the audit of WB funded projects. However, it may be the case that the existing Azerbaijan legislation on public sector body financial audit, which as stated in the COAA documents has been prepared according to INTOSAI standards, already meets the WB standards for public sector audit.

4 Abbreviations and Acronyms

| Abbreviation/Acronym | Definition |
|----------------------|--|
| AMS | Audit Management System |
| BI | Business Intelligence |
| COAA | Chamber of Accounts of the Azerbaijan Republic |
| DWH | Data Warehouse |
| QA | Quality Assurance |
| TA | Technical Assistance |
| TOR | Terms of Reference |
| UAT | User Acceptance Testing |
| WB | World Bank |
| WBG | World Bank Group |
| WBS | Work Breakdown Structure |

5 Introduction

This report provides analysis and expert opinion regarding the suitability and completeness of documentation provided by COAA describing the requirements for an AMS that will be used by a software development contractor to build a bespoke software AMS solution for COAA.

The documents provided by COAA comprise the following materials:

- **Technical Assignment^[2]:**
 - Overview of the COAA organisation and current situation
 - System context description
 - High-level overview of the expected system operation
 - Functional system requirements
 - Non-functional system requirements
 - IT infrastructure requirements
 - Release, deployment and launch objectives, and IT infrastructure pre-requisites
 - Appendices containing supporting information and sample data (seemingly incomplete)
- **Detailed Technical Assignment^{[3],[4]}:**
 - Wire-frame user interface layouts
 - Some populated sample data
- **Analytics and Report Forms^[5]:**
 - Wire-frame report layouts

The materials provided by COAA contain several deficiencies in the way that the documents have been prepared and the level of detail provided in them:

- a. The documents have no proper document control mechanism, so information regarding the document change history, past document status, reasons for revisions, approval record, and references to external documents is not visible to the reader.
- b. The documents are deficient in their structure – there is no consistent header and footer and document titles are either missing or seem to be rather uninformative as to the real purpose of the documents/document sections in question.
- c. Table of contents are either not present or are manually generated and may become inconsistent with document headings over time.
- d. The documents appear to be incomplete, but without a change history it is not possible to determine if that is because they are still in a draft state.
- e. Information is duplicated between some of the documents and it is not obvious why or which document should be considered the primary source of the information.
- f. The requirements capture system used in the documents does not meet with accepted practice for the documentation of technical requirements. This can lead to serious problems during the design, development and testing of the technical solution.
- g. No detailed acceptance test strategy and test plan has been defined (accepted practice is to define the acceptance test strategy as part of the requirements definition and project planning process and to make it contractually binding on the vendor).

- h. The level of detail in the documents is inadequate to ensure a proper understanding of what is to be achieved by technical teams and how acceptance of the final solution would be defined and verified. As a result, there will need to be very close and continuous interaction between the software development team and members of COAA staff in the various functional areas to ensure that questions and clarifications can be obtained, and the development process is not delayed. This could be a significant unplanned time burden on COAA staff.

Further sections of this report will cover a detailed appraisal of each section of the COAA material and conclude with an overall risk analysis of the project.

6 Review of AMS Requirements Capture Materials

The single most important aspect of any technology project is a complete and detailed requirements capture process according to accepted practice of requirements capture. It does not matter what development methodology is being used (Waterfall, Agile or Hybrid), there is no shortcut to properly understanding and defining the problem space for which a solution must be developed.

Any shortcuts taken at this stage will inevitably lead to issues during the later stages of project execution, potentially causing time and cost overruns, and in the worst case a failure of the project to deliver its intended business value.

The requirements capture approach that has been used is deficient in several areas from accepted practice of the capture and documentation of requirements. A requirements specification document that follows accepted practice^[1] should meet the following criteria:

1. **Traceable:** Individual requirements should be uniquely numbered and be unambiguously identifiable so that there is an ability to trace back to the origin of development and move forward to the documents produced from the requirements specification document for each individual requirement.
2. **Unambiguous:** The requirements specification should contain enough detail to ensure that there is only one interpretation of each requirement and hence what the software will be used for, and that it is communicated in a common language.
3. **Correct:** A method of requirements capture and analysis, and peer review should be used that ensures that requirements have been stated correctly and that the software will meet the identified requirements.
4. **Complete:** There is a representation for all requirements for functionality, performance, security, availability, aesthetic and other design constraints, attributes, and external interfaces.
5. **Consistent:** The information in the requirements specification must correspond with other project and related external documentation, including project plans, test plans, and software architecture and design documentation.
6. **Ranked for importance and/or stability:** Since all requirements are not of equal weight, a method to appropriately rank requirements should be used in the requirements specification document.
7. **Verifiable:** The requirements specification must use measurable elements and defined terminology to avoid ambiguity and to ensure that it is possible to demonstrate that each requirement has been met.
8. **Modifiable:** A well-defined organizational structure of the requirements specification document that avoids redundancies, enables easy adaptation, ensures proper version control, tracking of changes and approvals.

The following sub-sections describe comments and observations following a detailed review of the relevant sections of the COAA requirements documentation

6.1 Analysis of current situation and expectations for the new system

There is no description in this section of the current situation and existing business processes currently being used at COAA. It explains the legislative changes that have prompted the need to develop an AMS, and the COAA expectations of such a system. Standard accepted practice would entail a detailed description and analysis of existing (manual) business processes and workflow, and identification of opportunities to optimise and streamline those existing business processes.

6.2 Requirements for AAMS functionality

The requirements defined in this section have various deficiencies in their preparation such that they do not meet the items described in the accepted criteria for good requirements listed in section 6.

- There is no numbering system used to identify unique requirements, so requirements cannot be referenced between different project documents and there is no way to trace delivery of requirements.
- The language used to describe many requirements is vague and non-specific, leaving much to interpretation of the contractor. This can lead to significant misunderstandings and surprises when the system is delivered for acceptance testing.
- There is no evidence of peer review or approval path in the documentation provided, but it is not possible to conclude absolutely whether it has been performed or not.
- Many requirements areas in the document contain such little detail as to be incomplete, are only partially provided, or are missing entirely.
- Given the lack of traceability, it is highly likely that requirement references will be repeated in an inconsistent fashion within different project documents.
- Requirements are not ranked or prioritised so the contractor has no guidance on the relative importance of different pieces of functionality (and so will be unable to produce an optimised development plan).
- Many of the requirements are written in such a way that it will be difficult or impossible to test them. This is largely due to the use of very general language in the requirement descriptions and lack of detail regarding expected outputs and behaviours in both normal and exception scenarios, or indeed in many cases the complete omission of this information.
- The requirements document has no proper document control mechanism, so information regarding the document change history, past document status, reasons for revisions, approval record, and references to external document is not visible to the reader. This combined with the lack of requirements traceability will make it very difficult to manage modifications to requirements throughout the project and to easily understand the impact of those modifications.

6.3 Requirements for technical solutions

The requirements defined in this section have various deficiencies in their preparation such that they do not meet items 1, 6, 7, 8 in the accepted criteria for good requirements listed in section 6.

- This section contains a reasonably thorough description and enough detail of the requirements for the technical infrastructure to support the AMS software, AMS users, and COAA IT staff (AMS systems administrators).
- The requirements regarding reliability and availability are deficient as they do not quantitatively specify the required system availability, and the required maximum system recovery time in the event of an unplanned system outage.
- The requirements regarding performance and scalability are deficient as they do not quantitatively specify the required system performance and scalability based on number of concurrent system users, number of concurrent audits being performed, number of concurrent requests for analytic reports etc.
- The requirements regarding system quality are again too general to be of much use. Acceptable quality should be defined quantitatively in terms of the quantity, type and severity of system impacting faults detected during the UAT phase of the project, and the acceptable percentage of total tests that have passed.
- Requirements for data retention and data archiving/DWH appear to be missing.
- Requirements for provision of a BI capability appear to be missing

6.4 Information security and copyright requirements

The requirements defined in this section have various deficiencies in their preparation such that they do not meet items 1, 3, 6, 7, 8 in the accepted criteria for good requirements listed in section 6.

- The requirements for information security are described in general terms and whilst the thrust of the requirements is reasonable, the use of precise quantitative language would be advisable.
- Many of the requirements are untestable based on the current general language used.

6.5 Requirements for system trial, deployment and on subsequent service

The information contained in this section would normally reside in a separate document called a “User Acceptance Test Plan”.

- The complete set of tests that form the UAT Plan, that will be performed to determine if the system is of acceptable quality, should be defined in this section. Each test should be uniquely numbered and should refer to the requirement(s) that will be satisfied when the test has been passed, to provide backward traceability.
- For each test the test setup criteria, the exact method of test execution, the expected results and outputs of the test should be described.
- For each test there should be a record of the test result (pass/fail) and supporting notes.

6.6 Future development of the system and integration opportunities with other information systems

The requirements defined in this section have various deficiencies in their preparation such that they do not meet items 1, 2, 3, 4, 6, 7, 8 in the accepted criteria for good requirements listed in section 6.

- The information provided is extremely general in nature and cannot be used to determine exactly what third party integration functionality is required by, and deemed important to, COAA.
- Details are left to the software development contractor to decide upon and so there is a strong possibility that a very simplistic approach will be used (to save time/cost from the contractor’s project schedule) and which will not provide enough flexibility for future integration without significant further software development to the core architecture of the AMS solution.
- Due to the extremely general nature of the requirements, there is no way to define quantitative pass/fail criteria so it is questionable how this requirement could be evaluated during testing.

6.7 Interface requirements

The requirements defined in this section have various deficiencies in their preparation such that they do not meet items 1, 2, 3, 4, 6, 7, 8 in the accepted criteria for good requirements listed in section 6.

- This section should describe the required detailed workflow of every system screen that reflects the desired business process that is being automated.
- The expected order of data entry, expected notifications and messages, and expected data validation requirements should be indicated on the wire-frame screen designs^{[3],[4]} and supporting text, but this information is largely missing or described in an imprecise and general way.
- System screen designs (graphic designs not wire frame) with sample data should be provided to guide the contractor as to the general aesthetic design approach that is expected.
- Due to the extremely general nature of the requirements, there is no way to define quantitative pass/fail criteria so it is questionable how this requirement could be evaluated during testing.

6.8 Appendices 1-6

The requirements defined in this section have various deficiencies in their preparation such that they do not meet items 1, 3, 4, 6, 7, 8 in the accepted criteria for good requirements listed in section 6.

The information in these sections appears to be incomplete or missing in most cases. Sample data should be provided for all screen layouts^{[3],[4]} and all analytic reports^[5].

7 Review of AMS Project Planning Materials

Accepted practice^[6] project planning materials typically consist of the following elements:

- **Project Charter Document** which typically provides the following kinds of information:
 - A statement of objectives and constraints of the project
 - Detailed project goals/benefits
 - High level project budget
 - Roles and responsibilities within the project team
 - Description of the project scope (main in-scope and out-of-scope elements)
 - Initial risk assessment of the project
 - Identify the main project stakeholders
 - Define the level of authority of the Project Manager
- **Detailed Project Plan** which is a planning and control document for managing schedule and tasks:
 - Resource Sheet, describing project resources, their availability and their cost
 - WBS showing the detailed breakdown of tasks, task dates, resource allocation, task dependencies
 - PERT Chart for project critical path, early/late start, and slack analysis
 - Gantt Chart showing the project schedule, work order and task dependencies and critical path(s)
- **Risk Plan** which is a planning and a control document for managing project risk:
 - Description of the process for ongoing identification and review of project risks
 - Register of risks, probabilities and mitigation options and actions taken throughout the project
- **QA Plan** which is used for managing the quality of deliverables and of the whole solution:
 - Description of QA process to be used on the project
 - Identification of types of QA testing and test environment that will be used on the project
 - Definition of the QA technical environment and tools to be used on the project

The project planning materials provided by COAA consist of a high-level WBS with task start and end dates, organisation level rather than individual resource assignments, and the percentage of work completed on each task. None of the other materials associated with accepted project management practice as listed above have been provided.

Conclusions of the review of the COAA project plan WBS:

- There are no obvious tasks associated with the development of an integration API for third-party developed software modules and associated technical documentation.
- There appear to be inconsistencies with duration estimates (the testing time allocated to tasks is not consistent with the task time. The complexity and duration of testing is usually a function of the complexity and duration of the associated task).
- There are no specific tasks defining the production and peer review of technical documents (e.g. architecture documents, design documents, data models, entity relationship descriptions, object models, API descriptions, unit and integration test plans).

AMS may be delivered with missing technical documentation assets that would make it difficult and expensive for COAA to change to a different software contractor or to maintain and enhance the AMS within their own technical team, if that became desirable in the future. It is also unlikely that this first release of the AMS software will provide a system for simple integration of third party developed software systems/modules.

8 Conclusion

As has been noted in the previous sections of this report, there are various deficiencies in the project documentation provided by COAA that suggests that the project will not be run in an optimal way and several project control related risks may be realised that can have an impact on the successful delivery of the project according to planned timescale and cost, the quality of the delivered solution, and whether the solution will deliver the intended business value.

The deficiencies that have been identified are not out of character with typical technical project documentation produced within Azerbaijan based on the current level of maturity of management of software development projects, and the COAA project documentation represents some of the higher quality work in this area that has been produced within the country.

Risks that may be realised during the project execution as a result of the deficiencies discovered, and which would have been mitigated if the project documentation and planning had been developed to accepted practices, are as follows:

- The project may over-run the planned time and cost schedule, due to lack of detail and incompleteness of the documentation which may cause defects in the software that require significant unplanned rework time. The apparent lack of an accepted practice project management approach may mean that project risks and issues are not properly identified and addressed.
- The project may fail to deliver the intended business value because the lack of detail and incompleteness of the documentation causes the contractor to avoid or over-simplify the development certain more complex features.
- It may be difficult to define acceptance criteria that can be agreed between the contractor and COAA for the project, due to lack of detail and incompleteness of the documentation, and a requirements capture approach that does not meet accepted standards.
- The quality of the developed software may be below an acceptable standard due to a requirements capture approach that does not meet accepted standards, and the lack of obvious QA planning activities.
- Relevant technical documentation for the AMS may not be developed, making it difficult and expensive to change technical contractor in the future, or to integrate third party solutions to the AMS, if desirable.

This review, and the conclusions drawn from it, have been performed on English Language translations of original documents provided by COAA that were written in Azerbaijani Language. It is possible that undetected errors or inaccuracies in the translation of the concepts described in the original texts have resulted in errors in some of the observations made and conclusions drawn in this report.