Cloud Based Requirements Management Tools Should Be Selected on the Basis of Project Requirements

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Abstract— Requirements engineering plays an important role in coordinating with various stakeholders / customer expectations and ensures developers build applications that meets virtually all stakeholder / customer requirements. Appropriate requirements management tool results in a better solution for the organizations' defined problem. Handling several thousands of requirements needs a Requirements management tool, so handling is a daunting task. This paper discusses the web-based requirements management tool that can easily trace requirements, online tender management, bug and defect, use cases and related information throughout the project's planning and development process. It has the centralized database; the solution can be updated from solitary consign. It can be easily used with any software development processes including, Waterfall, Spiral and Agile.

This paper considers six leading Web based Requirements Management tools; IRIS Business Architect, ACCOMPA, JAMA Contour, Gatherspace, AgileSpecs, Blueprint, ReQtest, Orcanos and CASE Spec. It discusses their features including collaboration, History, Tracking, and Comments for Requirements, Status Reporting, Traceability, and Centralized database, Import /Export Data, Summary Reports and User Defined Attributes. Besides this, the paper also focuses on Project management attributes; regaining project control, reduce project risks, and decrease failure costs.

I. INTRODUCTION

Requirements Management is the process of managing needs or requirements of any product. For delivering the best quality product successfully, the requirements should be in its best place or requirements should be analyzed accurately as per the product [1, 2]. Quality of the product directly depends on the requirements. The software or application developed with proper requirements satisfy the users more successfully and delivery with minimum issues [3, 4, 5]. The industry has emphasized on the requirement management system for handling requirements more effectively and are documented, analyzed, traced, agreed upon, monitored, versioned and prioritized. Requirement management system helps th e users to manage the system in proper manner [6, 7, 17]. As it is known that in the market, there are a large number of requirement tools available and organizations are investing a lot on such tools to manage their requirements.

- Aligned Element is very flexible and customized tool. Regularly using this tool for documentation will minimized the time used for the work and its give valuable results in minimal amount of time. Basically it helps in developing, maintaining and tracking the designs and requirements from the old files [8].

- Broadband caliber handles diversity of requirements as a repository in central and is secure too. From development to testing, to manage nearly complete life cycle of the product this tool is a complete solution. Requirement changes can be very easily handled from this tool [9].
- aNimble is a open source requirement management tool and is designed to support all the phases of Software Development Life Cycle for software development.[10].
- ReqView helps in making structured documents out of requirements organization [11].
- CodeBeamer ALM is an all rounder requirement management tool that supports the user to re-use, share, manage and import requirements [12].
- Cognition corporations Cockpit is almost a complete product lifecycle management tool. Some of its features are instant traceability, reporting, and analysis [13].
- Cradle is a multi-user and facilitates multi-project utility which can link seamlessly with corporate PDM/EDM systems [14].

This paper considers six leading Web based Requirements Management tools; IRIS Business Architect, ACCOMPA, JAMA Contour, Gatherspace, AgileSpecs, Blueprint,

ReQtest, Orcanos and CASE Spec. It discusses their features including collaboration, History, Tracking, and Comments for Requirements, Status Reporting, Traceability, and Centralized database, Import /Export Data, Summary Reports and User Defined Attributes. Web based requirement management tools gives the edge to the organizations in terms of increased in business value, reduced the budget issues and no need for installing web based RMT on each and every system etc [15]. There are many web based requirement tools available in the market. Besides this, the paper also focuses on regaining project control, reduce project risks, and decrease failure costs [16, 31, 32]

II. RELATED WORK NEED OF REQUIREMENT MANAGEMENTS TOOLS

1) In this section, the author describes the previous research works in the form of title, problem statement, objectives, not repeat the information discussed in The project stakeholders can be mind-readers who can immediately understood every feature, specification and assumption of the project [31].
2) If budgets are low, deadlines are short and complexity is creeping, the requirement documentation appears to be first deliverable to go and the last deliverable to be contemplated.
3) Each project will benefit from a well-versed business analyst technical knowledge of domain.
4) All clients are expected to express their desires with 100 % accuracy, and
5) Every (mammoth) requirements specifications will be an absolute pleasure to read.

Depending on the project approach and priorities the requirements management tools that are required will be different. Likewise, depending on the methodology, the approach to specifications itself can also differ, for specifications such as "product requirements," "user stories," or simply "features," some teams use another term. Tools can either be used for basic requirements or complex requirements.

a) BASIC REQUIREMENTS TOOLS
You can simply use a spreadsheet or a word-document template to fill in your requirements documentation for quite a simple requirements management planning. Excel or Google Sheets and a word document are your first common requirement tools, and they work just fine for certain instances [33].

b) COMPLEX REQUIREMENTS TOOLS
In more detailed preparation of requirements management, the method may be a complete software framework for managing the associations among requirements, assessing any changing impact, coordinating approvals, etc. Introduction [2].

III. WEB BASED REQUIREMENT MANAGEMENT TOOLS

A. IRIS Business Architect
IRIS business Architect is a powerful management tool and it follows all the standards to give precise results. This tool dynamically, effectively and continuously handles requirement changes. This tool follows all the standards and hence gives a precise results [18]. IRIS have combined package which correlates IT with business operations. This tool provides security, documentation, and have a good speed along with performance. It is also user-friendly. Their trial version is available in the market and it also supports Cloud, SaaS, Mac, Windows, and web.

Who are the users of the Software?
The target market is made of Software Architects, Application Architects, Enterprise Architects, IT Architects, Data Architects &Business Architects, Business Analysts and Transformation Specialists.

B. ACCOMPA
Accompa is a cloud based requirements management software and easy to use with affordable price [19]. This is a WEB based Requirements Management tool highly customized with high performance and modeled with cloud and SaaS.
- Accompa is hailed as one of the best cloud based requirements management tool.
- Accompa requirements management software is easy to use as well as very easy to implement.

C. JAMA
Jama tool is the best requirement management software for the projects using waterfall model while software development life cycle. When the total requirement is gathered at the beginning or the requirements are repeated then this tools is the best. Jama is simple, natural, and fast it also gives very accurate reports of the requirements. Jama requirements management tool is user-friendly. Trial version is available in the market and it supports windows for installation. Jama requirements management software can be easily deployed in cloud, SaaS and web [20].

- Jama is developed by Jama Contour Software.
- JAMA is a powerful web application for managing requirements, planning and traceability of a project for the development and introduction of the products [21].

D. Gatherspace
This is a web based requirements management tool based on-demand whenever required just login and starts it for the solution of the project. Gatherspace software is also includes business system analysis and RUP implementation and it is more found valuable with project managers [22].This requirement management tool allows product team to beautifully collaborate and share requirements.

Gatherspace requirement management tool is used by technical and non-technical users to manage, organize and share requirements.

E. AgileSpecs:

AgileSpecs is a web-based requirements management tool which can be trusted by entrepreneurs. It can be use by freelancers for every size of organizations (small or large) and projects [23]. It is a complete communication center, decision support system, issue tracking together, alignment, solution for organizing, planning, collaborate, transparency and delivering high quality agile projects. Agile Specs is innovative tool for sustainable agile software development and agile project management.

F. Blueprint:

Blueprint is a web based requirements management tool and have been chosen for used by almost 100 fortune organizations. Companies using Blueprint software for requirement management improves software quality and accelerates project delivery on time within budget. Blueprint software works well with all methodologies, including waterfall and agile software development model. This tool used to manage models, requirements, and documentation for the cloud and SaaS. It can be installed on Mac and Windows [24].

G. CASE Spec

CASE Spec is the ultimate tool for specifying products using trace graph or special specification editor. This least

expensive tool provides a combined framework for specification and traceability. Full graphical and tabular traceability is provided with drill-down to lower levels [25]. This tool in detail provides a unique and user-friendly specification and traceability that includes Trace Graphs, Multi-level Trace Grids and Impact Graph. It also manages trace relationships and views. Easily customized with attributes, collaborate with centralized repository and readily use it with predefined templates.

H. ReQtest

ReQtest provides the opportunity to monitor the scope, efficiency, and success of IT projects through requirements & test management as well as bug tracking capabilities. Fully cloud based requirement management tool with full traceability. Effectively prioritize and plan requirements. Integrated modules to plan and execute test, capture, track and manage bugs effortlessly. Agile board items links to requirements, bugs & test cases quickly [35, 36].

I. Orcanos

Orcanos Requirements management tool as part of Orcanos' integrated ALM and QMS platform is an affordable one-stop cloud solution, for tracking and managing requirements and testing. Orcanos ALM offers processes for Requirements & Test Management, traceability, requirement verification, FMEA Risk Management, Document Management and Quality Control, in one repository [37, 38, 39].
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Table I.   REQUIREMENTS MANAGEMENT FEATURES

	Deployment	Training	Support	Free Version	Free Trial	Vendor	Price
IRIS Business Architect	Cloud, SaaS, Web Installed – Mac, Windows	Documentation Webinars Live Online In Person	Online Business Hours 24/7 (Live Rep)	Yes	Yes	Benchmark Consulting www.benchmarkconsulting.com Founded 2015 United States	$3,495.00/one-time/user
Gatherspace	Cloud, SaaS, Web [34]	Live Online In Person	Online Business Hours	No	Yes	Gatherspace.com www.gatherspace.com Founded 2006 United States	$15.00/month/user
Accompa	Cloud, SaaS, Web [34]	Documentation Webinars	Online Business Hours 24/7 (Live Rep)	No	Yes	Accompa www.accompa.com	$199.00/month
agileSpecs	Cloud, SaaS, Web	Documentation Webinars	Online	Yes	Yes	Rodalo agilespecs.com/ Founded 2014 Germany	$39.00/month
CASE Spec	Cloud, SaaS, Web	Documentation Webinars Live Online	Online Business Hours	No	Yes	Goda Software www.casespec.net Founded 2000 United States	$178.00/month
ReQtest	Cloud, SaaS, Web	Documentation Webinars Live Online	Available online	No	Yes	ReQtest AB developed by founders Ulf Eriksson in 2001 since 2001 www.reqtest.com	$45.00/month
Blueprint	Cloud, SaaS, Web Installed – Mac, Windows	Documentation Webinars Live Online In Person	Online Business Hours	No	No	Blueprint Software Systems www.blueprintsys.com Founded 2004 Canada	$19.00/month/user
Jama	Cloud, SaaS,Web	Documentation	Online	No	Yes	Deloitte Xeausoft MOUSoft AA Projekts	$25.00/month/user

Orcanos	Cloud, SaaS,Web Installed – Windows, Android Native	Documentation Webinars Live Online In Person	Online Business Hours	Yes	Yes	Orcanos Founded in 2004 www.orcanos.com	$69.00/month

Table II. REQUIREMENTS MANAGEMENT FEATURES

Features Checklist	IRIS Business Architect	Gatherspace	Accompa	Agile Specs	CASE Spec	Blueprint	Jama	ReQtest	Orcanos
Collaboration	Y	Y	Y	Y	Y	Y	Y	Y	Y
Comments for Requirements	Y	Y	-	Y	Y	Y	Y	Y	Y
History Tracking	Y	-	Y	Y	Y	Y	-	Y	Y
Prioritization	Y	Y	-	-	Y	Y	-	Y	Y
Status Reporting	Y	Y	Y	Y	Y	Y	Y	Y	Y
Summary Reports	Y	-	Y	Y	Y	Y	Y	Y	Y
To-Do List	Y	Y	Y	Y	Y	Y	Y	Y	Y
Traceability	Y	Y	-	Y	Y	Y	-	Y	Y
User Defined Attributes	Y	-	Y	-	Y	Y	-	Y	Y
Good Customization	-	-	-	Y	-	-	-	-	-

IV. TOOL EVALUATION

The survey of the tools was performed on the basis of the materials available on the venders web pages and the others sources available on the internet. The evaluation results based on the materials which has been collected from different sources and venders web sites. Evaluation results provide a normative base though they are not very accurate. There are numerous web based requirement management tools available in the market, but it is not possible to evaluate all the tools, within the limited resource, and time. While evaluation web based tools, it demands too much time and resource, which is not suitable and practically possible to cover all [26]. Some evaluation reports are also available on the internet that partially assists this work. The evaluations results can never be absolute precise [28]. However the evaluating work is like, the evaluator is giving the opinions.

Even it is known that choosing wrong requirements management tools can lead financial burdens to the organizations [2, 4]. Therefore the tools should be chosen as per the requirements of the projects, experts team should contribute to final selection of requirements management tools [27, 29, 30]. Users or organizations should choose the latest versions of the RMTs as some of the latest versions of the respective tools provide some additional features and fixes some draw backs of the previous versions.

Table III. REQUIREMENTS MANAGEMENT FEATURES

Features Checklist	IRIS Business Architect	Gatherspace	Accompa	agileSpecs	CASE Spec	Blueprint	Jama	ReQtest	Orcanos
Budget Management	Y	Y	N	-	N	Y	N	N	Y
Issue Management	Y	Y	N	Y	N	-	-	Y	Y
IT Project Management	Y	Y	N	Y	-	Y	-	Y	Y
Milestone Tracking	Y	-	Y	Y	-	-	N	Y	Y
Percent-Complete Tracking	Y	Y	Y	-	-	-	-	-	Y
Portfolio Management	Y	-	-	-	Y	Y	-	-	Y
Project Planning	Y	Y	N	Y	-	-	N	Y	Y
Requirements Management	Y	Y	-	Y	-	-	N	Y	Y
Resource Management	Y	-	N	-	N	Y	N	Y	Y
Status Tracking	Y	Y	Y	Y	-	-	-	N	Y
Task Management	Y	-	N	Y	N	Y	N	N	Y
Time & Expense Tracking	Y	Y	Y	N	-	-	N	-	Y

V. CONCLUSION

The market has a numerous number of Requirements Management tools to manage requirement of the project and handle it pertinently. With significant strength and functionalities each and every tool is unique in supporting and handling the activities of requirement management effectively. The tools are commercial and available in market but they are not always available free of cost. One of the best things of these types of RM tools is that most of them provide free trials. But to use the tools properly and more effectively for a long term one has to purchase it. Web based requirement management tools are useful as they provide services to their customers or stakeholders online.

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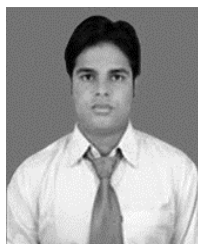
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