Seilevel Whitepaper

Seilevel's Evaluations of Requirements Management Tools: Summaries and Scores

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Executive Summary

Seilevel's requirements management tools research indicates that there is significant improvement over the last few years in the available tools on the market. In an effort to help the Business Analyst and Product Management community, this paper presents the results of Seilevel's full evaluation of the top 17 tools selected from the initial evaluation, including each tool's strengths and limitations. The research approach and results are structured in a way to help make other organizations' tool evaluations easier. This paper also includes a short introduction to the final trial phase, Phase 3, where tools will be used on actual Seilevel projects.

A note about rankings: All 17 of the tools evaluated are worthy solutions depending on your organization's needs, and we strongly encourage you to evaluate all of them using your own priorities. Seilevel's ranking is not meant to be an endorsement of any tool in preference to another, but rather reflects Seilevel's proposed priorities for tools criteria.

Introduction to Seilevel's Requirements Tools Evaluations

More organizations are adopting requirements tools as they look for support in managing requirements information, in traceability to ensure scope is controlled, and in modeling to visually represent requirements. When Seilevel decided to do its own requirements tool research in 2011, it was decided to make the results public so other organizations could benefit from this extensive research. In this whitepaper, the results of the Phase 2 evaluation are discussed, including detailed evaluation of all criteria on 17 tools.

Tools Selection for Phase 2

In the first paper of this three-part series on requirements management tools, Seilevel highlighted the value of requirements management tools and described the research approach and criteria used to evaluate these tools.[1] The first phase of the research included evaluating 61 potential requirements management tools against a set of 30 "first pass" criteria. The top 17 tools from that evaluation were selected for the second phase of research described in this paper. The tools selected include:

Tools
3SL Cradle®
Blueprint® Requirements Center 2010
eDevTECH inteGREAT™ Requirements Studio
HP Application Lifecycle Management
IBM Rational Composer
IBM® Rational® DOORS
Jama Software Contour
Kovair Application Lifecycle Management
Micro Focus® Caliber® RM/RDM
Microsoft® Team Foundation Server
MKS Integrity
Orcanos Qpack
Polarion® Requirements™
Siemens Teamcenter®
Sparx Systems Enterprise Architect
TechnoSolutions TopTeam Analyst
TraceCloud

Evaluation Scoring

Each tool was evaluated and scored against the full set of features, using the following scale:

Tool Score	Feature Support
3	Fully supported in the tool
2	Supported but minor workarounds required or detailed functionality missing
1	Only slightly supported with major workarounds required or very minimal functionality
0	No support

The original prioritization and weighting is on a scale of 1 - 3 ranging from low importance (nice to have) functionality to high importance (must have) functionality.

Priority	Description
3	High – "Must have" functionality
2	Medium – Desired functionality
1	Low – "Nice to have" functionality

After completing the evaluation for all 17 tools, the research team realized that there was not much weight given to the modeling features as compared to the weight given to the editing features. To illustrate this point, there may have been six features related to basic editing functionality, but only one related to creating models in the tool directly; modeling, however, is at least as substantial a feature set as editing. Effectively, it was determined that not all major feature sets were equally weighted in the full criteria list so summing the evaluation scores across all criteria would more heavily weight the editing features. To address this issue, a weighting was added to each criterion to better balance the major sets of features across the evaluation. In the example, if there were six criteria pertaining to a single edit feature and only one criterion that applied to a modeling feature, and if modeling and editing were deemed to be equivalent sizes of functionality, then the six edit criteria would have a weight of 1 while the one modeling criterion would have a weight of 6. To perform this weight-balancing activity, the features were

grouped into major categories (Requirements Architecture, Writing, Analysis, Modeling, Review & Collaboration, and Ease of Use). The categories were weighted first, followed by weighting the features within a given category evenly. The Weighted Score for each criterion was then calculated by multiplying an individual criterion's Priority, Weight, and the Tool Score for that criterion. Finally, each tool was given a Total Score, calculated as follows:

Weighted Score =
Criteria Priority x Criteria Weight x Tool Score for Criteria

Total Score =
Sum of Weighted Scores for all Criteria

How to Use the Criteria and Results

Seilevel's research criteria and evaluation results are intended to be used by the Business Analyst and Product Management community. The criteria can be used alone for a self-run evaluation, additional criteria can be added, or the criteria can be prioritized and the results used directly.

If there are tools not included in this study that a BA organization is interested in, the criteria list can be used to evaluate any other requirements management tool on the market. In this case, it is best to use a blank copy of the requirements evaluation spreadsheet or just add columns to the end of the downloaded results to score new tools.[2] It is necessary to work with the vendor(s) of the newly identified requirements management tool(s) in order to get trial licenses, or as a last resort, have the vendor demonstrate the functionality in order to score all of the criteria.

As organizations evaluate the results of the requirements management tool research against their own needs, additional criteria may be identified that should be evaluated. In these cases, rows can be added to the research results. Again, it is necessary to reach out to the vendors for a demo copy or help in demonstrating support for the newly added features. It is important to actually see the feature working in order to score it correctly, using the same scoring system described above so that the results stay consistent.

The results of Seilevel's research study can also be used as-is in the downloaded file; however, it is important to note that the "Total Score" is based on the priorities Seilevel put on each criteria. If an organization plans to use these results, it is critical that the priorities on the criteria are updated to reflect that organization's needs in a requirements management tool. This will adjust the "Total Score" accordingly. Further, while the total scores are certainly useful, the individual scores and comments for each criterion contain a more granular level of information that may be equally useful. If an organization has a few absolutely necessary criteria, some tools can be eliminated if they simply do not support those individual criteria.

Vendor Self-Evaluations

All vendors were also asked to complete the evaluation themselves, using the same scoring system. This step in the research provided information to the Seilevel evaluators to ensure that they did not miss-score any criteria, simply because they could not find the feature. The vendor self-evaluation results were compared to the Seilevel evaluator results to look for variances; if there were variances, the Seilevel evaluators followed up for further demonstration from the vendor before deciding on a final score for the criteria.

In working with the various requirements management tool vendors, Seilevel had mixed success. In some cases, it was challenging to get a trial copy or a demo from the vendor to see the supported functionality. For these tools where trials or demos were unobtainable, the Seilevel evaluators sought other access. This introduced a risk that those installations were customized or configured abnormally, such that the results may not be accurate.

The only two vendors that provided no trial copy, vendor demonstration, or self-evaluation were Microsoft® Team Foundation Server (TFS) and HP Application Lifecycle Management (ALM), and those evaluations were completed from working copies of the tools used on actual projects. Seilevel welcomes participation from these vendors in the future and will update the results should those vendors participate.

Tool Results

Overall Results

Before discussing the results for each tool, here is a summary of the Tool Scores based on Seilevel's prioritization of the criteria. Bear in mind, your organization's priorities will change score outcomes.

Vendor and Tool Name	Total Score
eDevTECH inteGREAT Requirements Studio	**5579**
Blueprint Requirements Center 2010	**5378**
TechnoSolutions TopTeam Analyst	**5314**
Micro Focus Caliber RM/RDM	**5171**
MKS Integrity	**5171**

Vendor and Tool Name	Total Score
3SL Cradle	5078
Siemens Teamcenter	5049
IBM Rational Composer	4990
Polarion Requirements	4841
Kovair Application Lifecycle Management	4737
IBM Rational DOORS	4718
Jama Software Contour	4596
Orcanos Qpack	4513
Sparx Systems Enterprise Architect	4382
HP Application Lifecycle Management	4147
TraceCloud	4082
Microsoft Team Foundation Server	3438

In addition, vendors are encouraged to provide feedback on their scores or to update Seilevel on new releases that impact the scores; therefore the actual scores may change over time. The latest scores can be found in the online results sheet (see Endnotes).[3]

In order to demonstrate how prioritization impacts the results and how important it is that each organization uses their own prioritization, an example is provided. In an organization where modeling and review features are not important, but all editing features are, all writing criteria can be set to a priority of 3 and all other priorities set to 1. The results are that all "Total Scores" change, as well as the ordering of those tools. In this scenario, the following tools would score as the top three:

Vendor and Tool Name	Total Score
eDevTECH inteGREAT Requirements Studio	3469
Micro Focus Caliber RM/RDM	3285
MKS Integrity	3285

Another interesting view of the data is to look at the top scoring tool by each category of criteria. This view of the scores really highlights how tools vary significantly in their strengths.

Requirements Architecture	Total Score
Kovair Application Lifecycle Management	550
IBM Rational Composer	546
MKS Integrity	544
Writing	
Micro Focus Caliber RM/RDM	1260
MKS Integrity	1224
Orcanos Qpack	1224
3SL Cradle	1224
Analysis	
eDevTECH inteGREAT Requirements Studio	1264
3SL Cradle	1244
Kovair Application Lifecycle Management	1228
Modeling	
eDevTECH inteGREAT Requirements Studio	1092
Blueprint Requirements Center 2010	1092
TechnoSolutions TopTeam Analyst	1079
Review & Collaboration	
MKS Integrity	870
eDevTECH inteGREAT Requirements Studio	855
Polarion Requirements	845
Ease of Use	
eDevTECH inteGREAT Requirements Studio	664
Siemens Teamcenter	650
TechnoSolutions TopTeam Analyst	646

Individual Tool Observations

For each of the tools evaluated in Phase 2, the following sections highlight the interesting points about the tools, including any strengths and limitations, as well as any noteworthy points not evaluated with the criteria.

3SL Cradle®

Cradle scored 5078 out of 5757 and ranked 6th out of 17 tools using Seilevel's priorities and weightings. The best attribute of this tool is how well rounded it is; almost every capability that the tool is evaluated against is available. Most tools have very distinct strengths, as they are focusing on a specific capability; Cradle is different in that instead of having one or two stand-out features, it provides a veritable cornucopia of functionality. The completeness of the solution makes the tool very attractive because there are very few functionality gaps. Given this, the tool is a great choice for an organization that has varying priorities across projects or for a team that needs a comprehensive requirements tool solution.

The most apparent drawback to this tool is the difficulty to navigate the user interface (UI); most actions were slow to complete for the researchers due to usability issues. Any given task might take more clicks than in other tools, having to search through menus and screens to find the functionality. This is a major issue if end users have to spend a significant amount of time working directly in the tool. However, once the users learn how to complete tasks in the tool, then the impact of the usability would decrease. This vendor makes a point of helping new customers become trained on the tool in the context of the customer's existing methodologies in order to accelerate adoption. Given this, Cradle is best suited to an environment where there is ample time to ramp on how to use the tool.

Blueprint® Requirements Center 2010

Requirements Center 2010 scored 5378 out of 5757 and ranked 2nd out of 17 tools using Seilevel's priorities and weightings. The tool had one of the best feature sets when it came to functionality to support requirements definition, especially with creating and using visual models. Most types of requirements models can be created directly in the tool and traced to one another. One of the greatest strengths of this tool is that actionable visual mockups can easily be created and combined with Use Case narrative steps to create simulations for how the new software will look and feel when users interact with it. In addition, these features are easily accessible so it is possible to use Requirements Center 2010 to display these simulations in meetings and make changes on the fly. The tool has rich traceability capabilities, including linking textual requirements to models and objects within those models. The UI is extremely modern and easy to navigate which really contributes to the high level of usability.

While there is a strong focus on requirements definition, there is less focus with respect to traditional requirements management features. For example, Requirements Center 2010 lacks a workflow engine to create customized workflows. For organizations that wish to achieve an automated paperless approval process, this might present challenges. While Requirements Center 2010 provides strong features for establishing, managing, and assessing requirements traceability, detecting traceability inconsistencies is a manual process rather than automated. Arguably the users should be closely reviewing these links manually in any case.

eDevTECH inteGREAT™ Requirements Studio

inteGREAT scored 5579 out of 5757 and ranked 1st out of 17 tools using Seilevel's priorities and weightings. Most criteria are met directly through an existing feature in the tool or using a simple workaround. The top strength in this tool is the support for modeling Process Flows directly in the tool in a Visio® function. Beyond just having extremely flexible modeling capabilities relative to most other requirement management tools, visual models can be linked to individual requirements at the level of an object within a model. For example, requirements can be mapped to process steps in a full Process Flow. Further, the tool allows easy configuration to adapt the tool to a variety of contexts, be it agile projects, vendor selections, or major software development efforts. The vendor has been very willing to take feedback on their features and either customize or consider suggestions for future releases. inteGREAT can be used in almost any scenario because it has rich, easy to use features around modeling and managing requirements.

inteGREAT, more than most requirements management tools, supports a visual requirements definition process out-of-the-box. However, one limitation to this modeling functionality is there are only a few models directly supported in the tool: Data Flow Diagrams, Decision Trees, Process Flows, System Context Diagrams, and Use Cases. The other limitation of note is that inteGREAT has few major ALM platforms it integrates to out-of-the-box. However, it has very strong support for integrating to Microsoft tools for design and development. This tool is a solid choice for organizations that use visual modeling techniques or are using Microsoft products to support the development lifecycle.

HP Application Lifecycle Management (ALM)

ALM scored 4147 out of 5757 and ranked 15th out of 17 tools using Seilevel's priorities and weightings. ALM is a testing tool first and foremost, so the requirements management features are built with testing in mind. The tool offers a comprehensive set of links between requirements and the various testing artifacts; it is easy to see what aspects of testing are affected by a change made to the requirements, and potential testability issues will be caught

early. Users can also perform an analysis of test coverage very easily, to determine whether any test cases are missing for the requirements. As ALM is a dominant tool in the testing market, users who are familiar with the tool from a testing perspective will have few problems learning the requirements module within the tool. ALM should be used on a project that either is already using the tool for testing, or where a strong testing tool is needed in addition to requirements support.

While many of ALM's strengths are due to the tool's strong testing focus, a key drawback of the application is also the result of the tool's focus on testing in that the feature set to support requirements is limited. In particular, there is no ability to create models. ALM has full support for textual requirements including rich text formatting, but it provides no functionality to create models, diagrams or mockups. This limitation requires users have additional tools available to create visual requirements, and those models will not be able to be traced at an object-level to the requirements directly. ALM also does not offer a solution to work offline.

IBM Rational Composer

Rational Composer scored 4990 out of 5757 and ranked 8th out of 17 tools using Seilevel's priorities and weightings. The greatest strength of this tool is the intuitive web-based UI that offers much functionality with the ease of access a browser offers. Most BAs would have little trouble picking up the tool and using it with no training. Even the more advanced features, such as Process Flow modeling, are easy to use and arguably the best in a web-based tool. The tool allows tracing requirements to an entire Process Flow and individual steps in a Process Flow. The standard advantages of a web-based tool also apply, including that there is no client that must be installed on a working machine. Rational Composer is built with the agile methodology in mind; support for artifacts such as user stories and burndown reports are standard.

The biggest limitation of this tool is that access to it will be limited by factors that can be outside of a user's control, such as internet access or scheduled maintenance. This is a tradeoff endemic to internet based tools, where ease of access from anywhere must be compared to the need for connectivity to access the application. This issue is more severe in this tool, since there is absolutely no offline support for the tool. This means that if the users are disconnected, they will not be able to use the tool at those times. This is slightly mitigated with import and export capabilities to merge changes to the requirements from Microsoft Word or Excel®. Further, most organizations use the tool on their intranet, where they have more control over environment access. The other drawback of Rational Composer is the inability to drag and drop requirements within the traceability hierarchy. The process to move requirements up or down the hierarchy is manual and is one of the most time consuming tasks in the tool. As Rational Composer was originally designed as a requirements definition tool to complement IBM's other products, DOORS and Requisite Pro, it is not unexpected to find a feature missing that is available in those applications.

IBM® Rational® DOORS

DOORS scored 4718 out of 5757 and ranked 11th out of 17 tools using Seilevel's priorities and weightings. This tool is one of the most well recognized requirements management tools, and with a large user base and extensive development improvements over time, it is expected that the tool will be extremely stable requiring little support and troubleshooting. DOORS has a wide breadth of customization features which extends down to the access and security controls; this functionality makes it easy to grant numerous users, including stakeholders, access to the system. The tool is a proverbial "heavy duty" tool as it has an extensive variety of traceability, querying and reporting features. Virtually any possible view of information can be set up in the tool, providing flexibility for many types of projects. These strong capabilities arguably make DOORS a standard requirements management tool for industries with significant regulatory demands (e.g. aerospace, defense, medical devices) given their need for regulatory documentation for governance. DOORS is ideal for large systems projects that may need a tool to handle a large volume of requirements created and shared among a large number of users.

While DOORS is an excellent all-around tool, there are some limitations, including the dated appearance of the UI; the tool would look out of place alongside current desktop software and could make for adoption issues with users. Some of the functionality is "buried," as users have to go through several menus to access the specific capability they were looking for. Similarly the tool is targeted at systems engineering projects, with an emphasis on features such as requirements traceability and versioning rather than requirements modeling, making it more cumbersome than other tools for visually creating requirements. This is important to keep in mind as the priorities of systems engineering projects do not always align with those of software projects.

Jama Software Contour

Contour scored 4596 out of 5757 and ranked 12th out of 17 tools using Seilevel's priorities and weightings. It is a web-based tool with a wide base of requirements management and definition features. The key value of Contour as compared to other well-rounded tools is that its UI is easy to use and most actions can be performed quickly for a web-based tool. Unlike most online-only tools, the performance while navigating within the tool is quite good. While Contour contains a majority of the features scored by Seilevel in this research, it is especially strong in its support for review and collaboration. The best scenario for getting value from Contour is to use it on projects focused on managing textual

requirements that require a web-based tool, where the tool's speed is an advantage.

While Contour has the advantage of speed, it lacks important requirements modeling features. Contour does not offer features to create models directly in the tool. Therefore, simulated Process Flows with screenshots and mockups are not supported. Further, elements within models, such as Process Flow steps, cannot be linked to textual requirements. However, these models can be created in other tools and uploaded or pasted into Contour such that the entire model can be linked to requirements. If there are other tools in the organization that support modeling, this limitation is less concerning.

Kovair Application Lifecycle Management

Kovair scored 4737 out of 5757 and ranked 10th out of 17 tools using Seilevel's priorities and weightings. The primary strength of Kovair is that it is a web-based application that offers a significant level of customizability. Customization for the data views and the workspace give each user the ability to set up the application as they desire—functionality that makes the tool more usable for a wide range of users. This tool has a variety of options for custom documents, emails and architecture and does not enforce a process to the extent many other tools do. Kovair also offers a significant level of customization for traceability; the policy engine allows a customized project model that can require traceability between different types of artifacts. In the other tools that were evaluated, only the client-based applications had this level of customization so Kovair stands out as being both web-based and adaptable.

There are a couple of drawbacks regarding Kovair, including the UI being dated in its appearance, potentially creating an adoption issue for users. While it is quite functional, there are tasks that will take several clicks to complete. Considering how customizable Kovair is, this might be an acceptable trade-off. Finally, Kovair is limited in modeling functionality, although other tools can be integrated to provide this functionality.

Micro Focus® Caliber RM/RDM

Caliber scored 5171 out of 5757 and ranked 4th (tied with MKS Integrity) out of 17 tools using Seilevel's priorities and weightings. The tool is a well balanced requirements management and requirements definition tool. Caliber can create a wide variety of reports to detail the progress being made towards completing requirements on a project, including the capability to heavily customize data views as desired. The tool works as well in agile methodologies as it does in waterfall methodologies. In addition, the application has very good capabilities for mockups, simulations and visual modeling. In Caliber, requirements can be linked to individual elements within a document, providing much more detailed traceability compared to tools that only support attaching documents.

The most notable limitation of Caliber is the lack of issue tracking directly within the tool itself; the tool must integrate with another application in order to provide that functionality. Caliber's UI is relatively dated relative to most tools—an issue that can lead to users having problems with the overall usability of the system and resisting adoption. Caliber also is weaker in situations where many requirements have to be entered or changed rapidly. Many tools utilize an editable grid view or similar functionality to achieve this, but Caliber does not provide that capability. However, using export and import functionality is a simple work-around to this weakness.

Microsoft® Team Foundation Server (TFS)

TFS scored 3438 out of 5757 and ranked 17th out of 17 tools using Seilevel's priorities and weightings. The tool is typically integrated into Visual Studio, allowing for a close integration between requirements and development code, providing developers a "one-stop shop" for all of their needs. Although the tool was not designed to be a pure requirements management tool, there are some resources online that help explain how to use TFS as a requirements management tool. As long as an organization does not require significant customization, TFS can be used for managing requirements information.[4] TFS contains the ability to directly trace requirements to code, allowing for an extra level of traceability not found in most other tools. Generally speaking, TFS is good for projects that focus heavily on custom code development and do not require robust requirements management capabilities, particularly organizations already using TFS.

Because TFS is primarily a development and source control tool, it is to be expected that the feature set for requirements is not as comprehensive as in other tools. While there are several drawbacks to using TFS as a requirements tool, the primary ones are the lack of rich text formatting and modeling capabilities. Requirements in the tool cannot have rich text formatting; the tool will remove formatting, even when copying and pasting from Microsoft Word. This can be difficult to work with, as even the simplest representations—including tables, text formatting and calculation symbols—cannot be put into the requirements. This forces users to look at external documents for any requirement metadata that cannot be described in simple text. Further, TFS has no support for visual models; it offers no capability to create a drawing, model, or diagram in the tool itself. This forces users to use external tools to create and store these graphical representations.

MKS Integrity

Integrity scored 5171 out of 5757 and ranked 4th (tied with Micro Focus Caliber) out of 17 tools using Seilevel's priorities and weightings. The tool's workflow capabilities are outstanding and among the best of the requirements tools that were evaluated. The tool would be an excellent choice for a large organization—requirements can be reused across countless projects with full traceability, so that changes made to a requirement in one project can be propagated as needed across related projects. Further, the vendor has created solution templates specific to many of different industries. MKS Integrity is marketed as a full ALM application, so the feature set for requirements is only a small part of what the tool has to offer. The tool also has a large degree of customization available, so process is not enforced as rigorously as other tools. This can be an advantage to organizations that already have a well-defined process in place, since the tool can be configured to support most preexisting processes. Requirements reuse and full ALM support make the tool a good choice for large engineering projects.

Since there are such a wide variety of customization options, a downside of MKS Integrity is it will take longer to set up. This may not be an issue when lots of customization is required, but in small organizations, this may be a problem, since time and tool support resources may be limited. In addition, MKS Integrity does have a rather dated UI, which may slow adoption of the tool based on user perceptions of usability and appearance. The tool has a limited set of modeling features; for example, it is not possible to link Process Flow steps to requirements or to create simulations by linking Process Flow steps to screenshots. These limitations may force users to use additional tools like Microsoft Visio.

Orcanos Qpack

Qpack scored 4513 out of 5757 and ranked 13th out of 17 tools using Seilevel's priorities and weightings. The tool has a broad array of functionality, supporting most of the functionality assessed in Seilevel's evaluation. Qpack offers significant out-of-the-box support for health care and related regulated industries, including proven requirements templates and a built-in risk management module. In addition, Qpack supports issue tracking and test management. The tool has very strong support for offline work on components of the requirements repository, synchronizing those when reconnected.

Qpack does have a significant drawback—it lacks important modeling capabilities. It does not contain functionality for creating visual models directly in the tool, so diagrams, models, and charts must be created in another tool. This means that there is no support for linking Process Flow steps to other requirements components, textual or visual. Qpack also does not support linking Process Flow steps to screenshots to simulate the flow of the software.

Polarion® Requirements™

Polarion scored 4841 out of 5757 and ranked 9th out of 17 tools using Seilevel's priorities and weightings. The tool has a web-based client; Polarion can be synchronized with Microsoft Office®, allowing requirements to be exported while online so that they can be worked on while offline, and then merged when online again. This close integration also assists in generating documents; it is very easy to make several changes in the tool or a Word document, synchronizing the two and before printing out a final version for sign-off. In addition, Polarion offers excellent workflow and review functionality to assist in the requirements approval process. There are different versions of the tool available to organizations, from a single requirements management module up to full application lifecycle management software.

The primary issue with Polarion is that it is cumbersome to navigate the UI to execute tasks, which is common in web-based tools. This can be mitigated with the aforementioned Microsoft Office integration, by working on requirements offline and synchronizing work when reconnected. This is a disadvantage when one is trying to edit requirements on the fly in a meeting—the nature of the UI navigation mandates the changes be done after the meeting.

Siemens Teamcenter®

Teamcenter scored 5049 out of 5757 and ranked 7th out of 17 tools using Seilevel's priorities and weightings. The tool has Microsoft Word built into the tool, giving the application unparalleled document generation capabilities. Further, document generation is extremely rapid so it is very easy to iterate several versions of a document in a meeting with stakeholders and create the final copy at that time. Another noteworthy set of features involve the project management capabilities within Teamcenter—Microsoft Project® files can be imported into Teamcenter, and project plan elements can be linked to individual requirements, providing an additional level of traceability that we found in no other tool. This capability is useful for end-to-end projects where the requirements are precursors to coding, testing, and deployment activities. Teamcenter provides strong support for systems engineering organizations that need rigorous requirements management and want downstream traceability into many types of systems development components. Further, it is ideal for projects where regulatory concerns and the volume of documents created demand a robust tool for document generation.

The tool's weaknesses are centered on visual requirements and traceability. Traceability features are notably lacking; examples of this include an inability to link groups of requirements, link notes to requirements and link a high-level visual model's sub-objects to a lower level visual

model. In addition, Teamcenter does not offer capability to create screen mockups. Since mockups are not supported, simulated Process Flows with mockups/screenshots cannot be created.

Sparx Systems Enterprise Architect

Enterprise Architect scored 4382 out of 5757 and ranked 14th out of 17 tools using Seilevel's priorities and weightings. Enterprise Architect's greatest strength is its ability to perform model-driven development, allowing models to be created for each phase of the software development lifecycle. These models can then be linked, and artifacts can then be created and managed. This functionality can be handy for smaller development teams where only a few people will be handling architecture, coding and testing. This tool is well suited for projects where teams need to create models, particularly design models where significant requirements management functionality is not needed.

Enterprise Architect has a number of limitations centered on requirements management, workflows, assignments, and requirements architecture. These drawbacks are not surprising, given that Enterprise Architect is not designed to be a requirements management tool. Doing tasks such as an import or export with Microsoft Word or Excel was time consuming and complicated. Performing actions such as reviewing traceability reports, reviewing requirements, and reviewing changes are cumbersome, so users have to spend more time on management activities or simply cannot do them within the tool. In addition, creating workflows or assigning work to different owners is unwieldy. This tool will be most successfully used if it is used in conjunction with an integrated formal requirements management tool, so that the model-driven features can be put to proper use without limiting the requirements management on the project.

TechnoSolutions TopTeam Analyst

TopTeam Analyst scored 5314 out of 5757 and ranked 3rd out of 17 tools using Seilevel's priorities and weightings. The greatest strength of the tool is its ability to handle almost any situation or scenario given its broad set of features. Even if its out-of-the-box functionality does not suffice, TechnoSolutions is very active in releasing new updates and features that may meet those needs going forward. Further, in the event that a requested feature is not on the product road map, the vendor indicates they are likely willing to create customized solutions that will achieve the desired functionality. In addition, the tool has a UI that will immediately be familiar to any user of Microsoft products. The simple UI helps users get up to speed when starting with TopTeam Analyst; the UI makes it fairly easy to find functionality without users taking a training class. TopTeam Analyst has strong modeling functionality, and is particularly strong for use case driven development, and the tool can create a visual model of a use case from a textual flow of events. TopTeam Analyst is well suited to a project that will heavily use models, particularly use cases, for the requirements definition.

While TopTeam Analyst has very strong modeling capabilities relative to most tools, there is a limitation in that not very many models can be created in the tool directly. Specifically, there is support for Process Flows, Use Cases, and Context Diagrams, but other models have to be created in another modeling tool and uploaded or pasted into TopTeam Analyst. The only other major issue with this tool is that the functionality to create models is more cumbersome than creating them in Visio. However, this will become less of an issue when users become familiar with the TopTeam Analyst UI for modeling.

TraceCloud

TraceCloud scored 4082 out of 5757 and ranked 16th out of 17 tools using Seilevel's priorities and weightings. The tool's biggest strength is the ease with which it can be configured, as this tool is one of the easiest to set up and get running. This simplicity can be invaluable for smaller organizations where there is limited availability of IT support staff or where end users are responsible for the set up and maintenance of the tool. In addition, TraceCloud is actively supported and updates are released frequently which is also valuable in organizations that are looking for new features and regular defect fixes. The tool is available only as a web-based application; combined with the easy set up and configuration, this makes TraceCloud the fastest tool to implement and deploy. The feature set is quite comprehensive; it is likely that most necessary basic requirements capabilities can be found in the tool. An ideal situation to use TraceCloud is on small projects within organizations that do not have a significant support team to help with maintenance. The combination of a comprehensive feature set and web-based access make the tool a good choice in smaller, more nimble environments.

While TraceCloud has a comprehensive set of requirements features, there are no capabilities for other activities such as design and coding. Further, TraceCloud does not support integrations with traditional design, development, and source control suites, without custom built integrations using the API. Beyond that, the UI is slow and most actions take several clicks to perform. The Bulk Editing and Traceability Matrix help mitigate this issue, particularly when having to perform the same action many times repeatedly.

Conclusions and Next Steps

Study Challenges

There were a few unexpected challenges in performing the Phase 2 evaluation. The first challenge: it was surprisingly difficult to get access to some of the tools for Phase 2. Some vendors did not have trial copies or online videos available to thoroughly evaluate their tool. In other cases, some tools only work in specific infrastructures (constraints on the operating system, server, or browsers) which made it time-consuming to get the trial copy running for evaluation. In both of these scenarios, it was necessary to resort to vendor demos in order to move the research study forward. Organizations performing their own evaluation should be prepared to invest significant time in the logistics of the evaluation, including setting up the appropriate infrastructures, working with the vendor sales teams to get access to trial copies, coordinating demos, and waiting for support from vendor technical teams when there are questions.

It was challenging at times to find features within the various tools. Sometimes it was a challenge to find functionality in the UI to verify how they worked. More frequently, this challenge was a result of the trial copies of the tools being "limited" versions, so a set of features would be missing completely. In these cases, the research team tried to use manuals and marketing materials, but they were not always reliable, so vendor support was necessary to accurately score the tool, which added logistical delays to the research.

Finally, the best challenge of all: all 17 of the tools evaluated are worthy solutions depending on an organization's needs, so it was difficult to narrow down the list of 17 for Phase 3. The research team decided to narrow those tools selected for Phase 3 based on Seilevel's project priorities.

Conclusions and Next Steps

This second whitepaper in Seilevel's requirements management tool series describes the detailed evaluations that Seilevel undertook for the top 17 tools selected during Phase 1. The third paper in the series will describe the results of Seilevel implementing the research team's top four tools from Phase 2 on real projects. This last phase of research will help determine if the tools, in evaluation through real-world trials, show results comparable to their evaluation against the Phase 2 criteria. Phase 3 will place additional emphasis on usability and ease of learning the tools. The tools that are expected to be evaluated in Phase 3 include:

Vendor and Tool Name
eDevTECH inteGREAT Requirements Studio
Blueprint Requirements Center 2010
Micro Focus Caliber RM/RDM
TechnoSolutions TopTeam Analyst

Author Biographies

Joy Beatty is Vice President of Blue Ocean Research and Development at Seilevel, a professional services company focused exclusively on helping clients change the way they create requirements in order to enhance business outcomes. A managing principal at Seilevel, Joy drives innovation and development for new methodologies that improve requirements elicitation and modeling, assisting clients as they build business analysis centers of excellence. To date, Joy has provided training to more than 600 business analysts via professional association seminars, industry conferences, and Seilevel classes. Joy also works on strategic projects as a Requirements Architect. Her expertise is informed by her experience working with numerous Fortune 1000 companies, including Dell, AMD, Spansion, FirstCare, eBay, Lands' End, and Raytheon. She writes about Seilevel methodologies and studies in whitepapers that can be found at http://www.seilevel.com/resources and blog posts that can be found at http://requirements.seilevel.com/blog/.

Remo Ferrari is a professional consultant in Requirements Engineering. He received a M.Sc. and a Ph.D. in Computer Science with a specialization in Software Engineering from the University of Western Ontario, Canada, and has been active in the research areas of Requirements Engineering and Software Architecture. In particular, his work has investigated these areas through an empirical viewpoint, examining such issues as the technical effects an architecture has on new requirements, and the impact of requirements training on conducting software architecting projects. He has published research in prestigious journals such as the Journal of Systems and Software, Information and Software Technology, and the Working IEEE/IFIP Conference on Software Architecture, and has presented at the 17th IEEE International Requirements Engineering Conference.

Balaji Vijayan is a Product Manager at Seilevel. A key team member at Seilevel, Balaji helps develop new methods for requirements elicitation and modeling, and provides training to other business analysts and product managers. He also works on strategic projects, creating requirements and managing software initiatives to obtain maximum return on investment. He has worked with numerous Fortune 1000 companies including AMD, Dell, ExxonMobil, Noble Energy, Shell, and XTO Energy. Most recently Balaji worked with a Texas health insurance company to implement software to meet federal and state regulatory requirements. He writes about Seilevel methodologies and studies in whitepapers that can be found at http://www.seilevel.com/resources and blog posts that can be found at http://requirements.seilevel.com/blog/.

Savithri Godugula is currently doing her M.Sc. degree in Computer Science with a specialization in Software Engineering from the University of Waterloo, Canada. Her Master's research is in Requirements Engineering and empirical software engineering. For her Master's level research, she will empirically explore current challenges encountered in industrial software development due to deficiencies in the Requirements Engineering knowledge possessed by software development teams. In addition to her academic experience, she has experience in the financial industry as an advisor.

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End Notes

[1] Seilevel's first whitepaper in the series, "How to Evaluate and Select a Requirements Management Tool, Part One" can be found here: http://www.seilevel.com/wp-content/uploads/RequirementsManagementToolWhitepaper_1.pdf

[2] Seilevel's full criteria used in the 2011 evaluation can be found at: http://www.seilevel.com/download.php?file=http%3A%2F%2Fwww.seilevel.com%2Fwp-content%2Fuploads%2FRequirements-Gathering-Management-Tool-Evaluation-Worksheet.xlsx

[3] Seilevel's full Phase 2 evaluation results can be found at: http://www.seilevel.com/download.php?file=http%3A%2F%2Fwww.seilevel.com%2Fwp-content%2Fuploads%2FSeilevel-RequirementsManagementToolEvalResults2.xls%0D%0A

[4] Resources to help use TFS as a requirements management tool can be found here: http://vstfs2010rm.codeplex.com/

About Seilevel

Seilevel is a professional services company focused exclusively on helping Fortune 1000 clients redefine the way they create software requirements in order to achieve their business objectives. We do that through workshops, training, and turnkey consulting projects. Seilevel's leadership team train, manage and mentor a highly-skilled group of Product Managers who use our proprietary methods to determine which features create the most value for your business, and then make sure those features, and only those features, get built. Seilevel's innovative approach ensures your large software projects have reduced defects, reduced costs, are brought in on time, and provide greater end-user adoption. Founded in 2000 and headquartered in Austin, 11 years of growth proves Seilevel provides real value to clients like Dell, AMD, Shell, Spansion, FirstCare, eBay, and Raytheon.

Seilevel
requirements defined

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