INCOSE MBSE Model Share Trade Study

# Introduction

MBSE working group team members collaborate and share models in the course of working group activities. This has been done by each group contacting the vendors directly installing local temporary licenses, and then identifying services needed to collaborate on the development of the models. This is a time consuming effort for every working group. Often times the results are time consuming and not very satisfying resulting in many team members not participating.

**Trade Study Goal**: Provide a collaborative modeling environment that facilitates initial setup of a modeling team, addition of new members, on-going collaboration among team members, and sharing results with the broader MBSE community.

The trade study identifies a set of environment requirements (criteria). Next, a set of evaluation tests are written to test each solution against the requirements. A set of potential solutions are then identified for each category of requirement. Each tool solution is researched. The promising solutions are installed and run against the evaluation tests to measure compliance with the requirements. The results of the evaluation are then carefully documented for review by the MBSE group.

# Requirements

R1.0 - Ability to manage licenses for MBSE tools.

R1.1 - Team Members can find and use licenses provided by tool vendors to install MBSE tools. (Team members are any INCOSE member. Team members are any person invited by an INCOSE member)

R1.2 - Team members have immediate access to install and use the MBSE tool.

R1.3 - Vendors can provide licenses for tools including version upgrades.

R1.4 - Vendors can monitor usage of licenses.

R1.5 - Vendors can not view or change the licenses of other tool vendors.

R2.0 - Ability to manage models.

R2.1 - Team Members can check-in and check-out models and related modeling artifacts (documentation, reports, ..). Check-out means that only one person can modify the model at a time.

R2.2 - Model versions are maintained with applicable metadata (e.g., version number, who changed, when changed, summary of change)

R2.3 - Team Members can categorize and then find models based upon the categorized information.

R3.0 - Ability to view and comment on the model in a web browser.

R4.0 - Ability to collaborate in real-time virtual meetings.

R3.1 - Team members can schedule meetings.

R3.2 - Team members have audio communications (e.g., voip or shared dial up number)

R3.3 - Team members can share a live view of the model. (Shared desktop)

# Evaluation Tests

## Evaluation Test for Managing Licenses

This evaluation test looks at how tools are managed and shared. The key usability question is how hard is it for a new member to install the tool and to get a valid license?

## Evaluation Test for Managing Models, Viewing or Commenting on Models

This evaluation test looks at the aspects of sharing and managing models across the MBSE teams. The key usability question is how hard is it for a new member to find a model, view the model, comment on the model, and modify the model?

**Case 1** (R2.1) - Create new model.

1. Create a simple test model, document, and html view.
2. Check-in or upload model, document, and html view.

**Case 2** (R2.1) - Modify and update the model. Check for edit conflict. Can 2 people edit the same file at the same time? How are conflicts prevented or resolved?

1. Person 1 - Check-out or download the model.
2. Person 1 - Modify the model.
3. Person 1 - Re-generate the document
4. Person 2 – Check-out or download the model. One acceptable solution is to block a person from checking out a locked file (model).
5. Person 2 – Modify the model. One acceptable solution is to block a person from editing or modifying the locked file after they have it local.
6. Person 1 - Check-in or upload the model and the document. Add a comment describing the change.
7. Person 2 – Check-out or download the model. This should work now.
8. Person 2 – Modify the model. This should work now.

**Case 3** (R2.2) (R3.0) - Collaborate - Comment on the model file in general. Comment on a specific version of a model.

1. View the stored model. View the comment on the current version of the model. Can the author change the comment? Can people that did not make the change modify the comment? Can I see who made the change? What other meta data can I use to describe the model? What can I view from a web browser? What browsers work (IE, Firefox, Chrome, Safari)
2. View old versions of the stored model. View the comment on the old version. Can the author change the comment? Can people that did not make the change modify the comment? Can I see who made the change? What other meta data can I use to describe the model? What can I view from a web browser? What browsers work (IE, Firefox, Chrome, Safari)

**Cast 4** - View and restore model versions.

1. View the stored model. Can I browse the content of the model from the web browser? If the modeling tool generates HTML? Can the solution store the HTML? Can I browse the HTML version of the model?
2. View and restore an old version of the model. View the version history. Can I see that the new version was restored? Can I see where the version was restored from?

**Case 5** (R2.3) - Find models - Able to describe (define, categorize and/or tag) and find models.

1. View the model. Are there any ways to define and categorize the model? Set some common attributes such as MBSE, Reuse, and Model or document.
2. Find the model. Using the attributes, search for and find the model. Can people that are on the MBSE team find the model? Can people that are not in INCOSE or on the MBSE team find the model? Can anyone on the internet find the model?

## Evaluation Test for Collaborating in Real-Time

This evaluation test looks at working on and reviewing a model in real-time as a team. The key usability question is how hard is it to for a meeting coordinator to setup an event to view and modify a model as a virtual team. Also, how hard is it for a meeting participant to participate in the event.

# Tools Considered

## Solutions for managing Licenses (R1.0)

## Solutions for Managing Models (R2.0, R3.0)

**Solution 1** INCOSE Alfresco (library.incose.org)

**Solution 2** - Use Google Site to store model documents. Roger Burkhart suggested looking at System Modeling and Simulation Working Group. The technology is SMSWG collaborative community. They use Google Sites.

**Solution 3** - Use Google code and Github to share models.

**Solution 4** - Files anywhere

**Solution 5** - Drop box [pack rat option for CM](David Lempia to check)

**Solution 6** - Google Drive

## Solutions for Collaborating on Models (R4.0)

# Results

## Results for Managing Licenses (R1.0)

## Results for Managing Models (R2.0, R3.0)

Executive summary

Alfresco is free through INCOSE. As of this time, it is limited to users that are part of the beta evaluation team. The solution is file based and complete. It does a better job of preventing model conflicts than drop box.

Drop box is free with a limitation of 30 days of version history. The paid version has unlimited version history.

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| --- | --- | --- | --- | --- | --- | --- |
| Req \ Sol | 1 - Alfresco | 2 – Google Site | 3 – Google Code / Github | 4 – Files Anywhere | 5 – Drop Box  | 6 – Google Drive |
| R2.1 Check-in / Checkout / Modify | Yes – Use the “Edit Offline” to lock and “Upload New Version” to unlock. | No | Maybe Uses file merge to resolve conflict |  | Yes – Conflicts result in 2 files. It takes time for the sync to find changes. |  |
| R2.2 Model Versions & Restore | Yes – Click on the revert in the history. |  |  |  | Yes – Free versions are limited to 2 GB and 30 days of history. |  |
| R2.3 Find and Categorize | Yes – Tags and categories. |  |  |  | Maybe – If all sharable models are in the drop box, I can use my local computer search. No categories or tags.  |  |
| R3.0 View in Web Browser | Yes – If the html files are converted to a single mht file. |  |  |  | Yes – Able to generate HTML and view it in the local file. |  |
| Usability | Models are managed as single files. These files can be edited offline reducing the risk of change conflicts. It is still possible to download the file and re-upload over other changes. |  |  |  | A folder on the users computer is kept synchronized with the cloud. Very simple to use and to maintain. |  |
| Cost | Free, Part of INCOSE | Free |  | Price is $12 per user per month | Price is $15 per user per month. 30% discount for non-profits$2587 for 30 users for 1 year. |  |

**Solution 1** INCOSE Alfresco (library.incose.org) Testing Notes:

1. **Test Location Notes:**

**INCOSE Example (Wiki view)** <https://new.incose.org/cmis/browser/Sites/mbse/DocumentLibrary>

**INCOSE Example (Alfresco view)**

<https://library.incose.org/page/site/mbse/documentlibrary#filter=path%7C%2F%2FShared%20Model%20Repository>

1. **Search Notes**:

Log into library.incose.org. Search for “shared model repository”. Open the shared model repository folder.

I can add multiple tags to help find files.

1. **Upload Notes:**

Find model file in library.incose.org. Drag your model file onto this folder. It will be uploaded. (You can also click the “Upload New Version” button.

1. **Download Notes**:

Find model file in library.incose.org. Click on the “Edit Offline” to download and lock the file. Open the modeling tool. Load the file from the download location. Save and re-upload when changes are done. Remove old local versions after upload is done.

1. **Edit Conflict Notes**:

Find model file in library.incose.org. Click on the “Edit Offline” to download and lock the file. I can see the message “This document is locked by … for offline editing.”

1. **Version Notes**:

I can see the version, comments, and the person that last uploaded the change.

1. **HTML Notes**:

Generate the model into an HTML output. This is a folder with a set of htm files and folders. Convert this hierarchy into a single file by opening the index.htm file in Internet Explorer. Click SaveAs and save as an mht file. Upload the mht file. This file can be directly opened in Internet Explorer from library.incose.org.

**Solution 5** - Drop box [pack rat option for CM](David Lempia to check)

1. **Test Location Notes**:

<https://www.dropbox.com/sh/4e87bw78lblfi41/ap4INV6YCd>

1. **Search Notes**:

Use the local computer search to find files. This means all libraries must by synched to the local computer.

1. **Upload Notes:**

Dropbox creates a local folder that is kept in synch with the cloud. Just save the files in the dropbox file on the local computer.

1. **Download Notes**:

There is no download required. File sync occurs in dropbox when connected to the internet. The files will be replicated from the cloud to the local computer.

1. **Edit Conflict Notes**:

Conflicts result in 2 copies of the same file in the folder. It up to the user to merge conflicts or to tell other users when they are editing a file.

1. **Version Notes**:

The free version keeps versions for 30 days. The paid for accounts keep versions for ever. This includes deleted versions of the files.

1. **HTML Notes**:

Just generate the html into the dropbox file. It will by synched to other computers after some time. Users just need to open the index.htm file.

## Results for Collaborating on Models (R4.0)