MFG500112

Cloud Data Management with Upchain

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Autodesk

Learning Objectives

- Familiarize the student with Upchain's intuitive interface and overall philosophy
- Introduce Upchain's Bill of Materials (BOM) management concepts and workflows:
  - BOM creation and manipulation paradigms (top-down or bottom-up)
  - BOM actions
  - Item Types & Part Numbering
  - BOM Compare
  - Visualization
- Introduce Upchain's CAD Integration capabilities
  - CAD Connector Plugin
  - Checkout/Modification/Checkin
  - Object status indicators (concurrent engineering)
  - Local caching
- Introduce Upchain's Business Process / Workflow / Change Management
  - Change Request
  - Workflow Editor
- Introduce Upchain's Document Management functionality
  - Creating a document
  - Checkout/Modification/Checkin
  - Microsoft Office Plugin
- Additional Resources

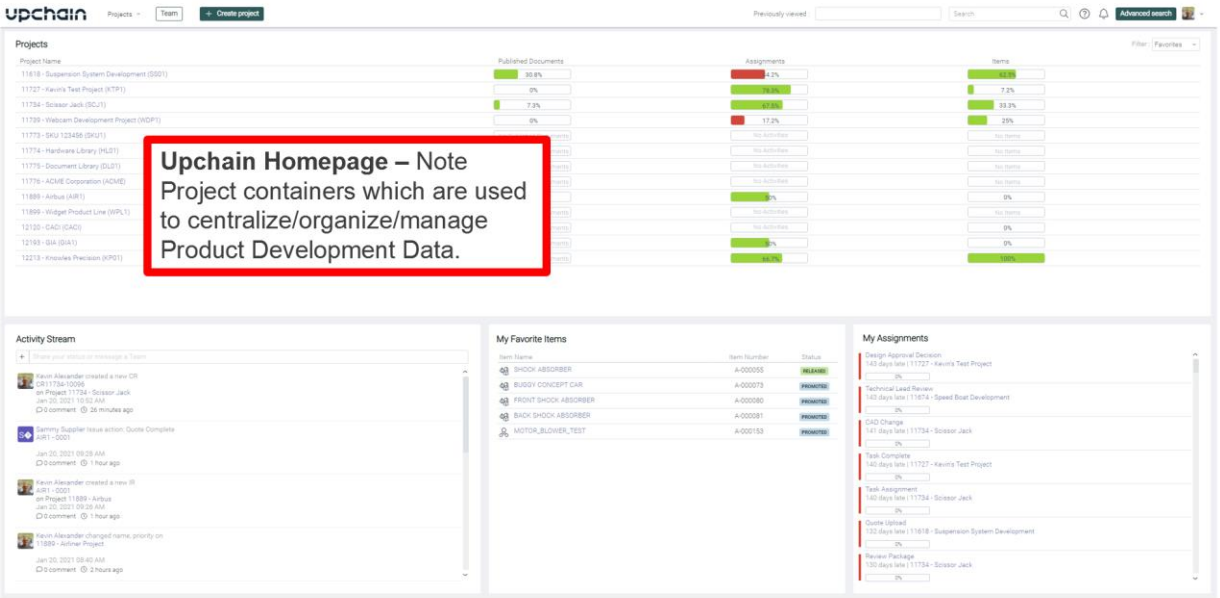
Description

Upchain is the world's first CAD-centric, multi-tenant SaaS, instant-on PDM/PLM system. Fusing an intuitive interface with powerful CAD, BOM, and project/change/document management capabilities, Upchain is ideal for today's complex product development ecosystems. Designed first and foremost with collaboration in mind, Upchain also empowers the extended value chain.

Speaker

Kevin graduated from the University of Louisville in 1997 with a Mechanical Engineering degree. He has spent his entire career applying technology to Product Development challenges! As an Implementation Specialist and Upchain Subject Matter Expert at Autodesk, Kevin enjoys helping customers employ Upchain's revolutionary PDM/PLM capabilities to make their businesses more efficient.

Interface and overall philosophy



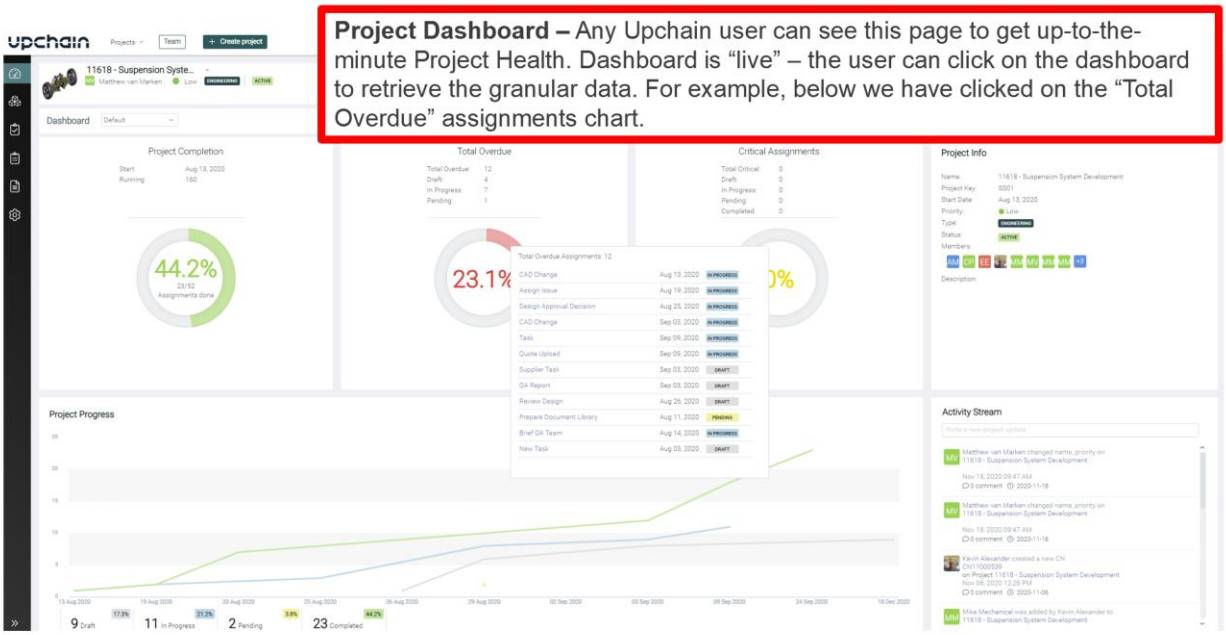
Projects are the central organizing principle within Upchain. The easiest way to think about a Project is that it is simply a “container” for housing Product Development content. Inside the Project container we can access/control things such as:

- Project Dashboard
- BOM
- Project Management (Gantt chart)
- Business Processes / Workflow
- Documents
- Project Settings (including access control and Project Team)

Upchain provides great flexibility in terms of structuring content – Projects can represent product lines, individual SKU’s, part and document libraries, customers, contracts, and more. Also, Projects may be created for the sole purpose of sharing content with suppliers, vendors, contract manufacturers, etc. Sharing content is as simple as copying the object of interest and pasting into the BOM’s or Projects where you want to reuse the information.

Additionally, Project templates can be created which facilitate the reuse of information such as: Teams, Documents, BOM’s, Business Processes, and Gantt charts (project plans).

Interface and overall philosophy (continued)



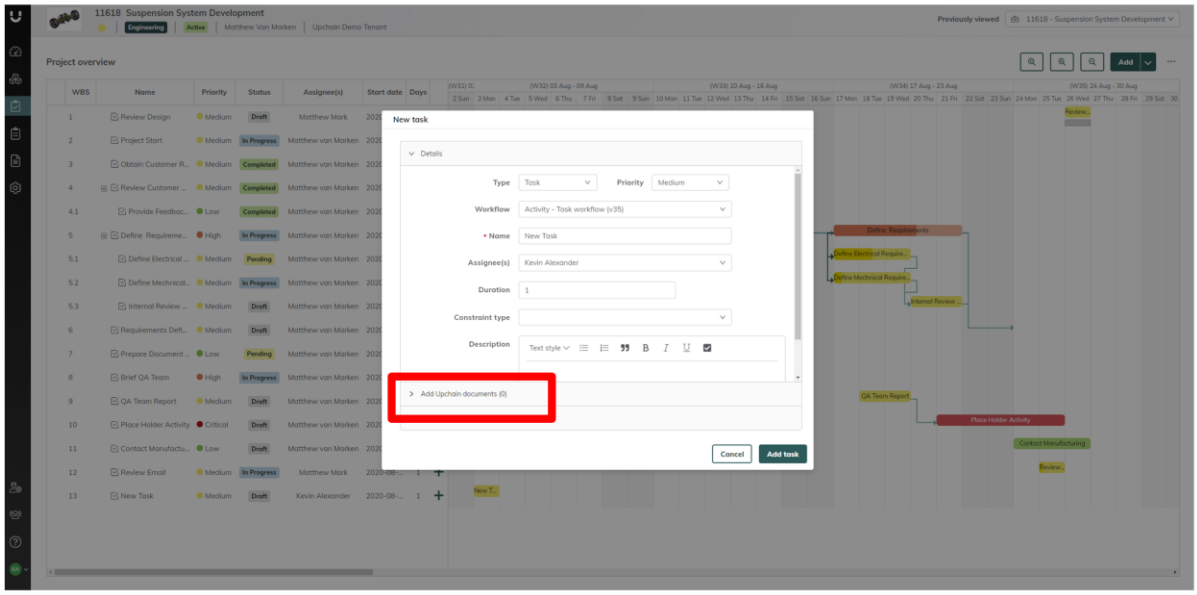
The Project Dashboard is used to provide insight and visibility into Project health. Several dashboard "views" are provided:

- Default (shown above) – high level view of % of completed Project tasks, % of overdue Project tasks, % of critical Project assignments which have been completed, and Project Progress chart
- Design – granular view of the user's recently created Project objects, locked objects, and assignments
- Project Management – granular view of BOM Items (with cost rollup) and assignments

In addition to the Project Dashboard shown above, Upchain has a myriad of dashboards and reports which can be used to glean Product Development information. Several out of the box reports are provided, but additional reports can be created. Additionally, Upchain's Open REST Services API can be used to extract information from the system.

Interface and overall philosophy (continued)

Project Management – Upchain supports common project management functionality including project planning (shown below-left of screen) and Gantt chart (shown below-right of screen). Project Tasks (form shown below-center) can be linked to **Documents** and/or **Items** – this ensures Product Development deliverables are "connected" to the Project Plan itself.



Upchain is first and foremost a PLM software, however it does have Project Management capabilities. Project plans may consists of 3 different types of Project Management activities:

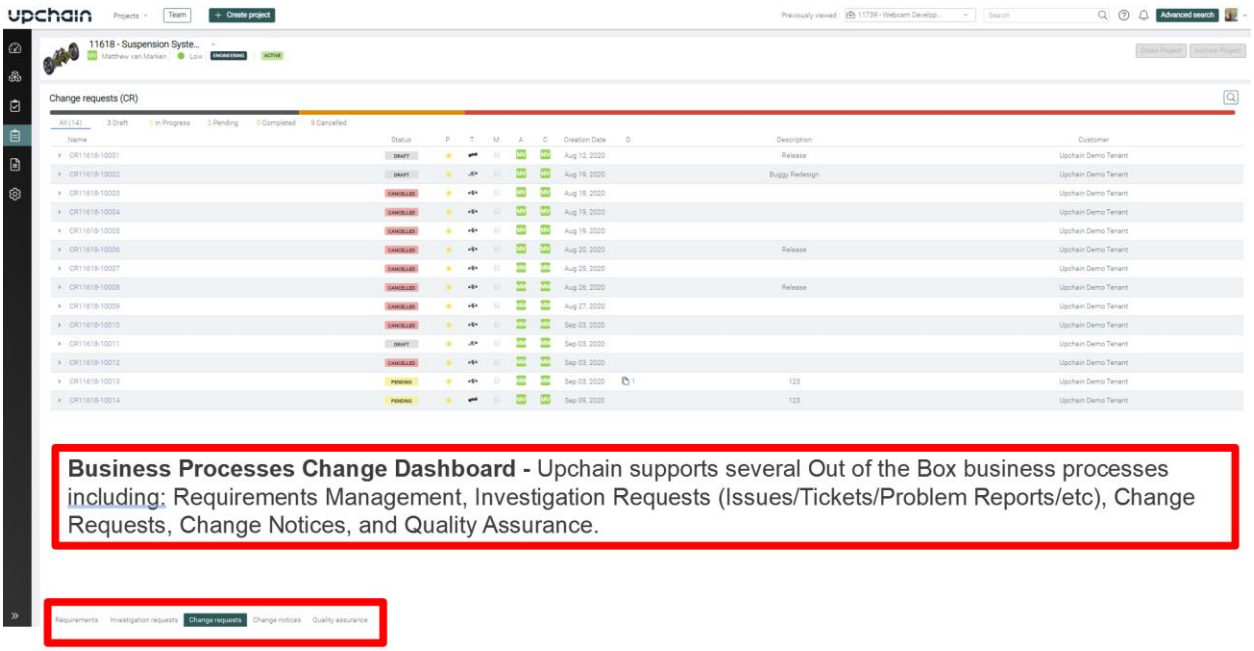
- Milestone – marks a key point in the plan, use milestones to determine if the project is on schedule
- Stage gate - key decision points in the project, use stage gates when continuation of project depends upon approval
- Task - most basic and flexible unit of work, this is the only activity that can have an individual workflow associated to it

Additionally, Project tasks can have Documents and/or Items associated to them. This facilitates the "connection" of Project planning/execution activities with actual Project deliverables.

Dependencies and predecessor relationships may be created between Project activities by simply dragging and dropping the endpoints of activities in the Gantt chart.

Upchain also supports "critical path" and "slack" functionality. The critical path represents all the activities that, if delayed, affect the completion time of the entire project. Activities that are not on the critical path can be delayed without delaying the project. Slack represents the amount by which activities can be delayed before becoming part of the critical path.

Interface and overall philosophy (continued)

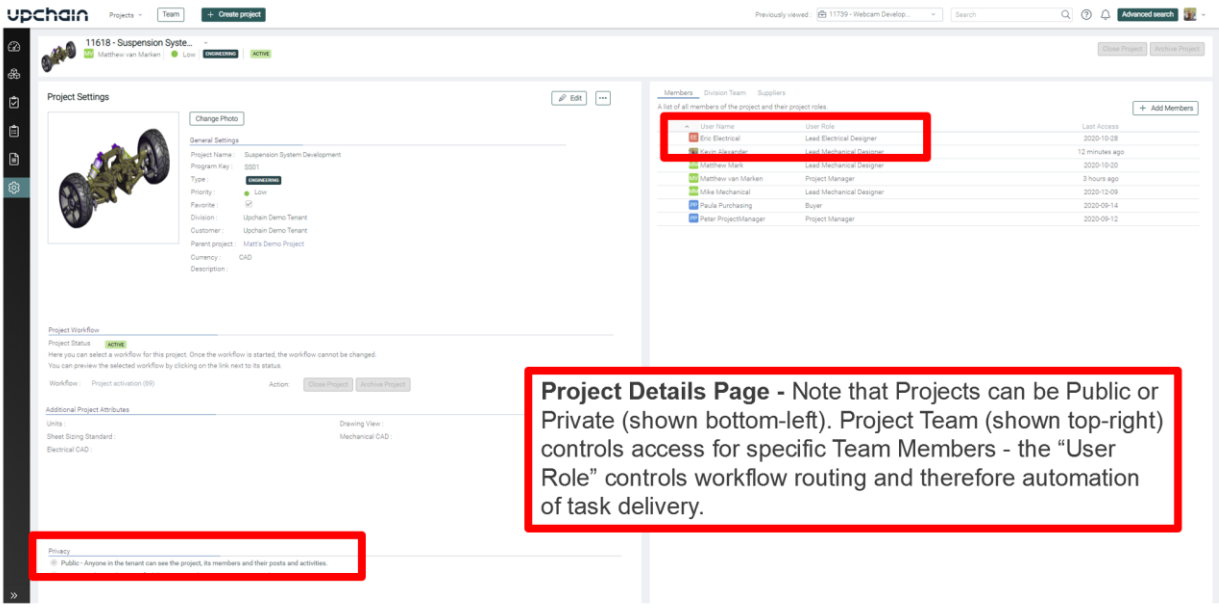


The Business Process Dashboard provides a central portal for creating, managing, and reporting on the various business processes which Upchain supports out of the box including:

- Requirements Management - keep track of your requirements, assign them to specific people, attach documents to them, link them to items, link them to other requirements, and create child tasks and requirements
- Investigation Requests - used to initiate the change process and promote discussion within the organization or with partners
- Change Requests - used to describe a suggested enhancement or problem with a product and defines a set of affected items to be released - a change request can also be used to obsolete an item
- Change Notices - used to initiate the procurement of items contained in the CN - it is used to notify other departments and/or systems connected to Upchain (such as an ERP system) that design changes have occurred, items have been released, and are now ready for procurement
- Quality Assurance - keep track of your QA processes, assign them to specific people, attach documents to them, link them to items, link them to other QA processes, and create child tasks and QA processes

Note that the dashboard is Project-specific. The business objects which appear on the dashboard reside in the Project container being accessed.

Interface and overall philosophy (continued)



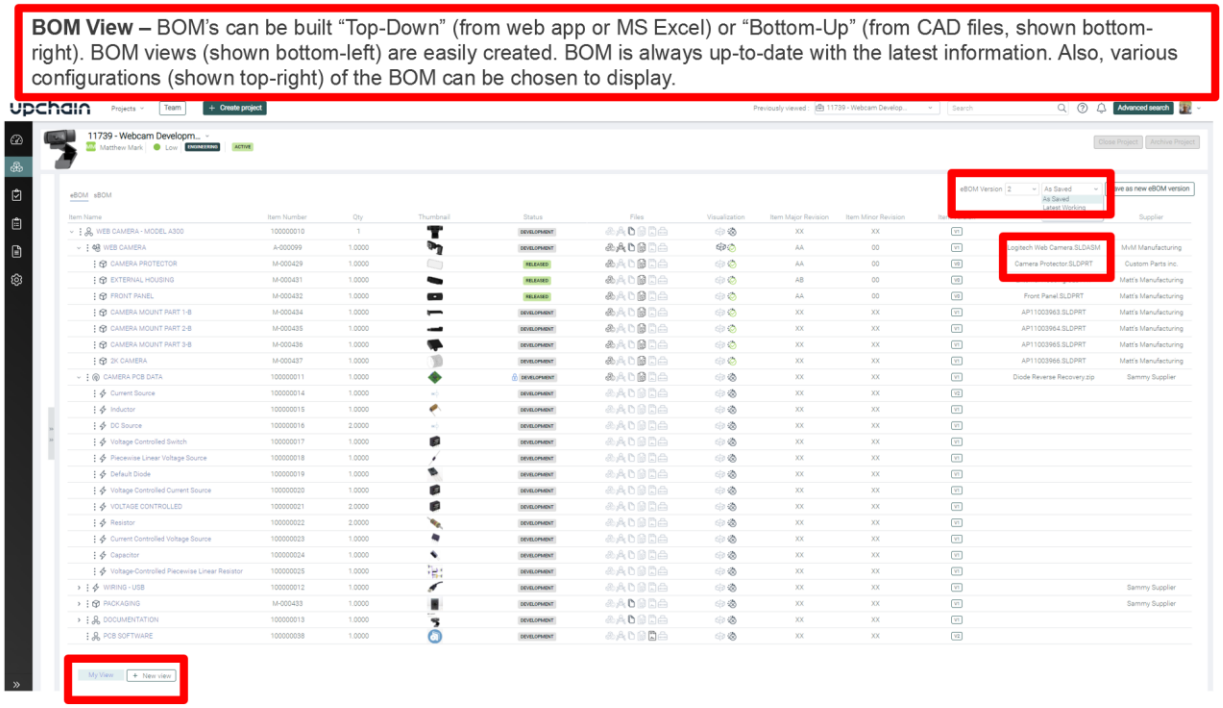
The Project Settings page provides an area to modify Project details such as:

- Project metadata (photo, name, priority, hierarchy, description)
- Project workflow
- Additional Project Attributes (enabled by a tenant property)
- Privacy setting
- Project Team

Note that Projects can be Public or Private. Anyone your company has provided an Upchain login to will be able to access Public Projects. Public Projects are great for things like hardware libraries, document libraries, etc. Private Projects can only be accessed by the people who have specifically been added to the Project Team. Members are added by simply clicking the "Add Members" button at top right.

Note that Project Members have roles, these roles drive the workflow engine within Upchain. Workflows typically call generic user roles such as Mechanical Engineer, Electrical Engineer, etc. The user-to-role mapping connects these generic workflow role assignments to "real" Project team members.

BOM Management



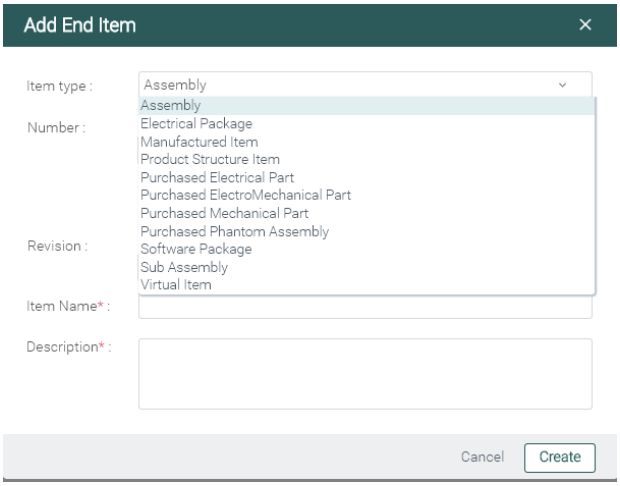
Upchain has extensive BOM Management capabilities. BOM's can be constructed in a "Top-Down" or "Bottom-Up" fashion. When using Top-Down design, the BOM is built using the web browser itself (shown above) or Microsoft Excel, then CAD data may be added later. When using Bottom-Up design, BOM structure is driven directly from a CAD system.

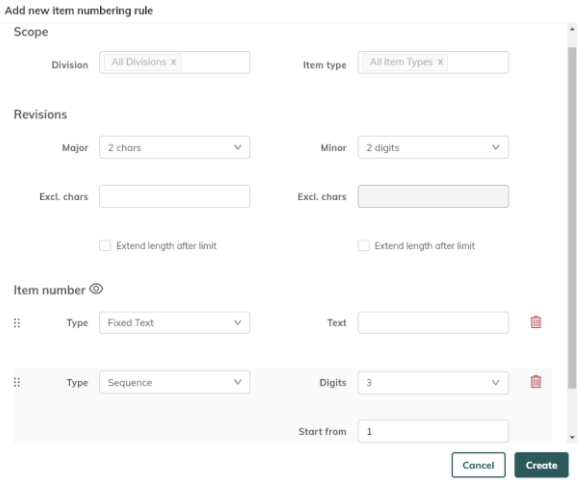
The BOM table display is extremely configurable. Columns can be dragged-n-dropped, resized, etc. Upchain provides an extensive list of managed attributes out of the box, but it's a simple matter to add additional attributes into the system. Also, these attributes can be "mapped" to the CAD data.

Many standard BOM functions are supported including:

- Copy – copies a specific BOM Item to the system clipboard
- Paste – pastes the clipboard Item into a new BOM or Project
- Move – moves the BOM Item
- Remove – removes the BOM Item from the BOM itself
- Substitute Item – substitutes the Item for another

BOM Management (continued)



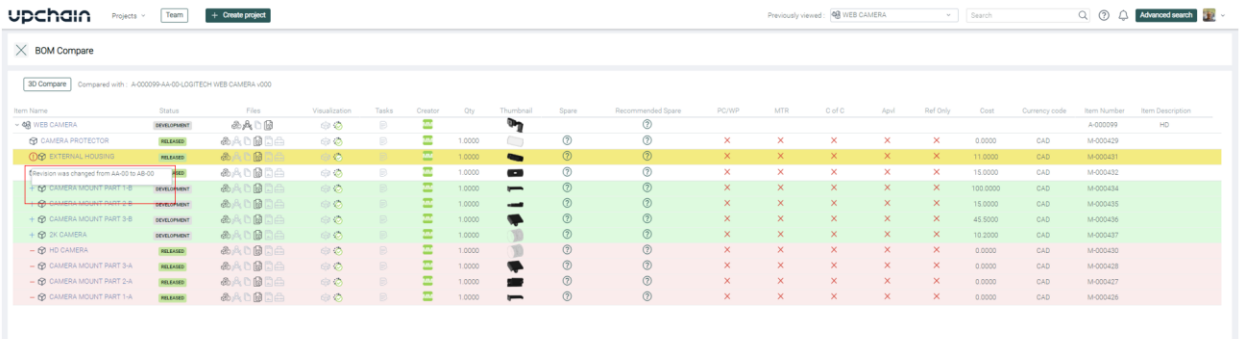


Upchain comes with an extensive list of out of the box Item Types including:

- Assembly - structure of parts and sub-assemblies
- Electrical Package - top-level item in an electrical assembly
- Manufactured Item - parts manufactured within your company or defined supply chain, typically made specifically for use within your assembly and cannot be purchased “as-is” from anywhere else
- Product Structure Item - has additional kitting and sBOM functions
- Purchased Electrical Part - electrical components purchased outside your organization
- Purchased ElectroMechanical Part - components that contain both mechanical and electrical qualities purchased outside your organization
- Purchased Mechanical Part - mechanical parts purchased from outside organization
- Purchased Phantom Assembly - used to indicate that you have a reference assembly (i.e. not associated to a BOM Item) in your CAD BOM (cBOM)
- Software Package - represents a software package that usually accompanies certain mechanical Items
- Sub Assembly - used to represent lower levels in an assembly or as a placeholder for other items which don’t belong to a specific assembly
- Virtual Item – used for legacy purposes only

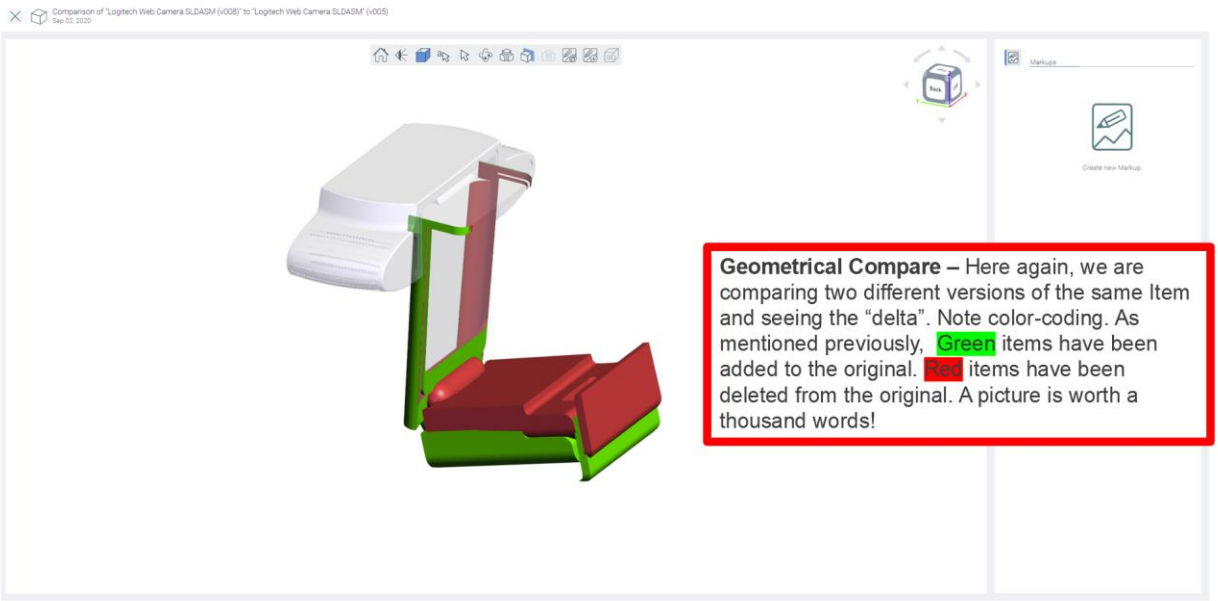
However, the out of the box list shown above is very easily configured to reflect your company’s specific Item Types. Additionally, each Item Type has its own Item Numbering rule which is also easily configured to reflect your company’s desired part numbering policies. Note that the numbering rule is also where we define Major Revision (form/fit/function) and Minor Revision (cosmetic/administrative) policies. Revisions can be alpha or numeric and single or double character/digit.

BOM Management (continued)



BOM Compare – Here we are comparing 2 different versions of the same Item and seeing the "delta". Note color-coding. Green items have been added to the original. Red items have been deleted from the original. Yellow indicates a metadata/attribute change – hovering over the red exclamation mark on a yellow Item will show the user what the metadata change was. This report is extremely useful for change impact analysis and communication of release candidate information.

Upchain's BOM Compare tool provides a color-coded BOM comparison. Items in Green with a "+" sign have been added to the original design. Items in Red with a "-" sign have been deleted from the original design. Items in Yellow have had a metadata change – hovering over the red exclamation mark provides a message indicating exactly what the metadata change was.



Geometrical Compare – Here again, we are comparing two different versions of the same Item and seeing the "delta". Note color-coding. As mentioned previously, Green items have been added to the original. Red items have been deleted from the original. A picture is worth a thousand words!

In addition to the BOM Compare tool, Upchain provides a "3D Compare" which provides a color-coded geometrical comparison. Green surfaces have been added to the original design whereas Red surfaces have been deleted from the original design.

BOM Management (continued)

Visualization Application – Visualization files are created automatically as users check in their CAD data. Therefore, high quality visualization of 3D models and 2D drawings is always "just a click away." No CAD software is required to be able to use the Visualization application – the extended enterprise (Suppliers/Vendors/Contract Manufacturers, Purchasing, Quality, Manufacturing, etc) can easily review/interrogate/measure/markup the CAD data. Product Structure (shown top-left) shows part numbers/revisions/etc. Visualization Toolbar (shown top-center) has a multitude of useful commands including sectioning, assembly explosion, measurement, markup, and more. Secondary Toolbar (shown top-right) allows quick navigation to the 2D drawing, efficient creation of Investigation Requests, and Download of native content.

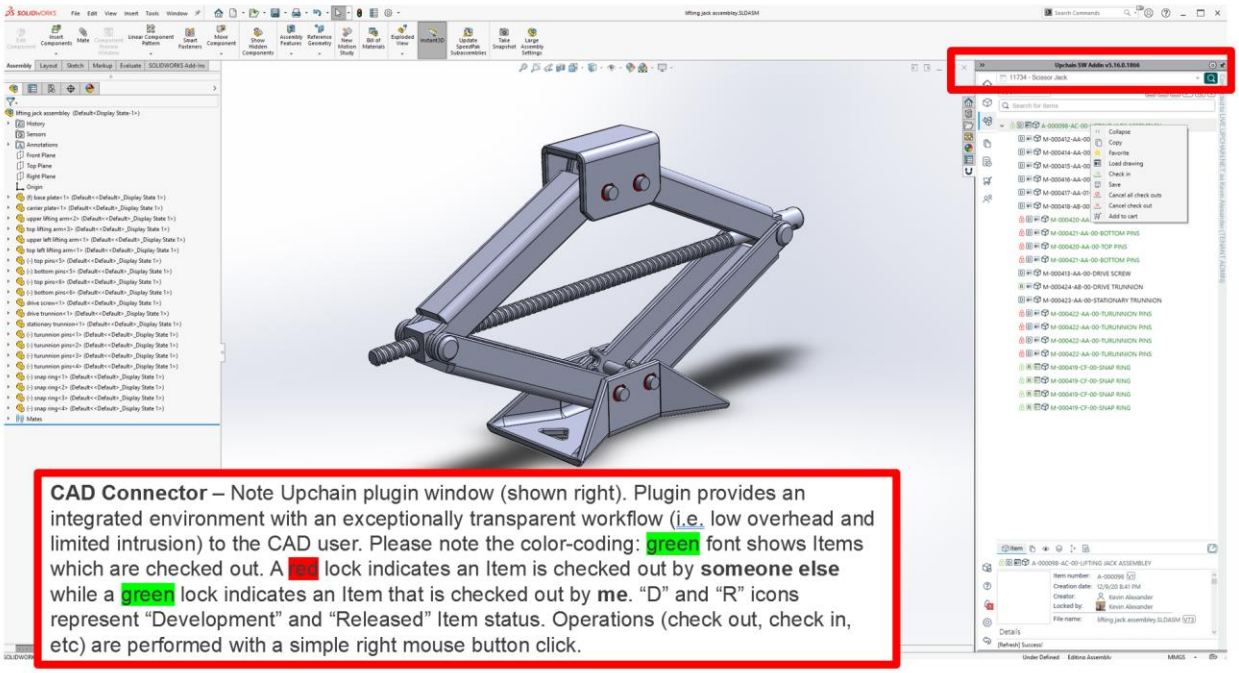
Visualization is integral to the Upchain experience. After a user checks in CAD data, Upchain automatically creates visualization files. These files are very lightweight – ideal for the extended enterprise. Using just a web browser, all constituents have real-time access to perfectly accurate representations of the 3D models and 2D drawings.

Additionally, tools are provided for interrogating the CAD data including:

- Cutting planes (sectioning)
- Assembly explosion
- Measurement
- Markup
- Saved Views (Top, Bottom, Left, etc)
- Rendering Views (Shaded, Hidden Line, etc)
- And much more!

In addition to the capabilities listed above, Investigation Requests (IR's) can be created directly from the visualization environment. This facilitates collaboration with the extended enterprise. IR's can be used to instigate workflows for raising tickets, problem reports, and even RFQ's.

CAD Integration



The Upchain CAD Connector is a hub for all of Upchain's dedicated CAD plugins: Solidworks, Catia, NX, Inventor, AutoCAD and PTC Creo. Use this application to manage and launch the plugins for your preferred CAD systems. Once launched, you'll use the plugin to capture, manage and share CAD data throughout Upchain — all without leaving your CAD environment.

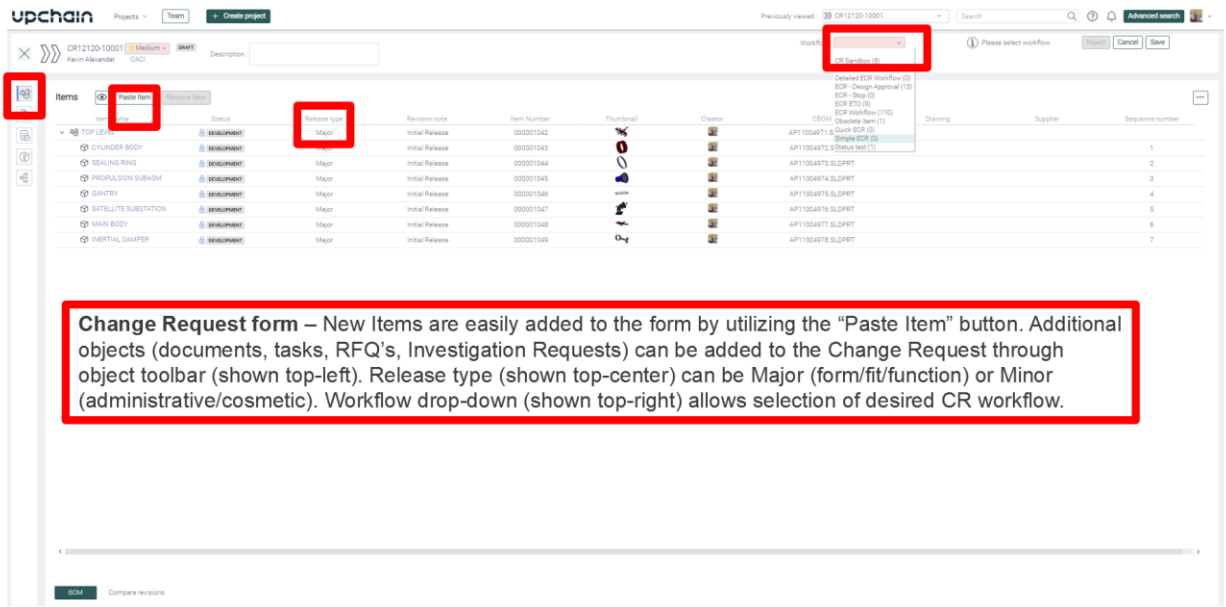
The CAD Connector also includes a Generic Plugin, which enables you to import and work with different CAD files without the need for native CAD applications.

The CAD Connector facilitates concurrent engineering by providing current status for each object in the CAD BOM (cBOM). Green items are checked out. A red lock icon indicates an object is checked out by a colleague (hovering over the red lock indicates exactly who). A green lock indicates an object that is checked out by myself.

Development and Released lifeycle status is clearly indicated by the "D" and "R" icons, respectively. A simply right mouse button click provides common operations such as Check In, Check Out, etc.

A fundamental component of Upchain's CAD integration architecture is "local caching". As a user works with CAD data, Upchain will cache the information locally on the user's hard drive. In other words, the more the user works with Upchain, the fast it gets! This caching mechanism ensures that users get terrific performance even when working with very large assemblies. Upchain keeps the cache up-to-date by checking time stamp information each time a user accesses the cache.

Business Process / Workflow / Change Management



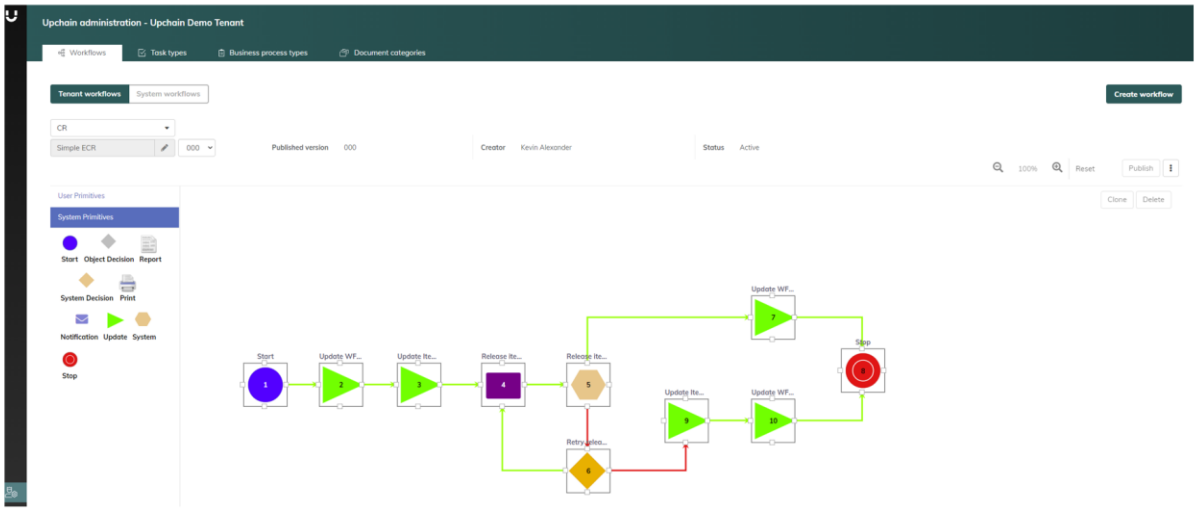
As mentioned previously, Upchain has a full complement of out of the box business processes including:

- Requirements Management
- Investigation Requests
- Change Requests
- Change Notices
- Quality Assurance

Out of the box workflows are provided for all business processes – a Change Request is shown in the image above. Note that new Items can be added to the Change Request by simply pasting. Additional objects like documents and Investigation Requests can be added to the CR by utilizing the toolbar at far left. The Release Type allows the user to select Major or Minor. Selecting Major will cause the CR to automatically increment the Major Revision of a listed Item (if not already released) if the CR gets approved. Selecting Minor will cause the CR to automatically increment the Minor Revision of a listed Item (if not already released) if the CR gets approved.

The drop-down at top right allows the user to specify the CR workflow they want to utilize. Customers can configure as many of their own workflows as desired in order to map Upchain's workflow to their own business processes.

Business Process / Workflow / Change Management (continued)



Workflow GUI (Graphical User Interface) – Out of the Box (OOTB), Upchain comes with several default workflows (business processes) including: Investigation Request, Project, Change Notice, Change Request, Task, Document, Quality Assurance, and Requirements Management. While the Out of the Box workflows often work perfectly well for our customers, it's not uncommon for a customer to tweak workflow(s) slightly to better suit business requirements. The existing OOTB workflows can be used as a starting point (template), or new workflows can be created entirely from scratch. User primitives are provided for assigning decisions and tasks to specific users and/or user roles. System primitives are provided for automation of various decisions, notifications, updates, and more.

As mentioned previously, out of the box workflows are provided for all business processes. Shown above is Upchain's Graphical Workflow Editor (GWE). From here, administrators can duplicate existing out of the box system workflows to build their own tenant workflows. Alternatively, administrators can "start from scratch" to build their company-specific tenant workflows.

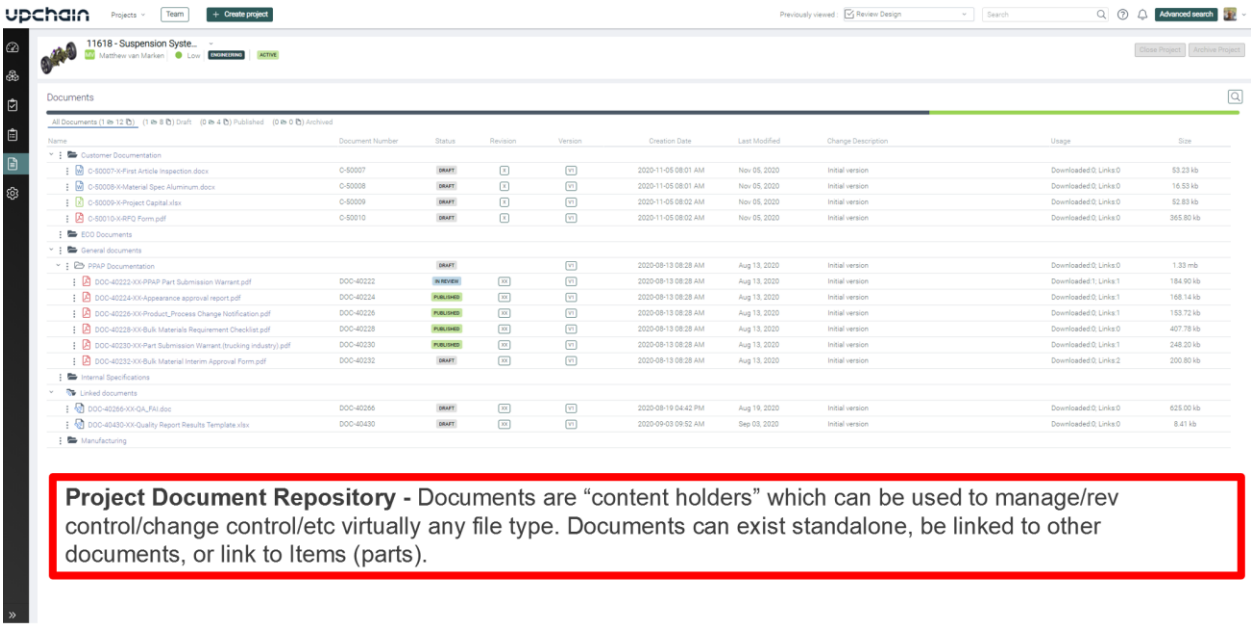
A full complement of "user" and "system" workflow primtives are provided. Examples of user primitives are:

- Decision - used to bring user interaction into the workflow to decide where the workflow goes next
- Task - used to create a task that a user must complete

Examples of system primitives are:

- System Decision - used to automatically enforce your business rules
- Notification - used to send a notification to a specified user.
- Update - used to update the status of the business object and/or the items contained inside the business object
- System - used to automate various system-related functions

Document Management



Each Project has a Document Repository where Document objects are stored. Documents are simply content holders which can be used to manage virtually any file type. Note that documents have Number, Name, Revision, etc. Additionally, they can be put through Document workflows.

Often, Documents are used to build relationships. Documents can be related to one another (doc-to-doc) or related to Items (doc-to-Item).

Document Categories can easily be created (by Administrators), each Category can have its own Document numbering and revisioning scheme if desired.

Creating a new Document object is as simple as drag-and-drop. Editing Documents is also very simple – just Check Out and download the Document locally, Edit, and Check In!

For Microsoft Office Documents, Upchain has a dedicated plugin which facilitates view, search, and editing directly within the familiar Office environment. Additionally, dynamic product images can be inserted into MS Office artifacts – these images can be updated automatically if the models they reference are updated (users receive a warning message asking to update).

Additional Resources

Upchain Platform Video (this is a compilation of videos 1-7 below)

01 Upchain Interface Tour

02 Upchain BOM Management and Visualization

03 Upchain CAD Integration

04 Upchain Document Management

05 Upchain Business Process and Change

06 Upchain Supplier Portal

07 Upchain Administration

Upchain Open REST Services API