

# Joint Effort: Vault and Fusion Lifecycle as the new dream couple

**Christian Gessner**

Technical Evangelist | coolOrange

# About the speaker

## Christian Gessner

Christian Gessner is a co-founder and Technical Evangelist at coolOrange. In this role, he helps customers and resellers to use the right technology and tools to successfully design, implement and customize Autodesk data management solutions.

He has over 15 years of experience in software development with a focus on Autodesk data management products and Microsoft development technologies.

Prior to coolOrange, Christian was member of the data management software engineering team at Autodesk.

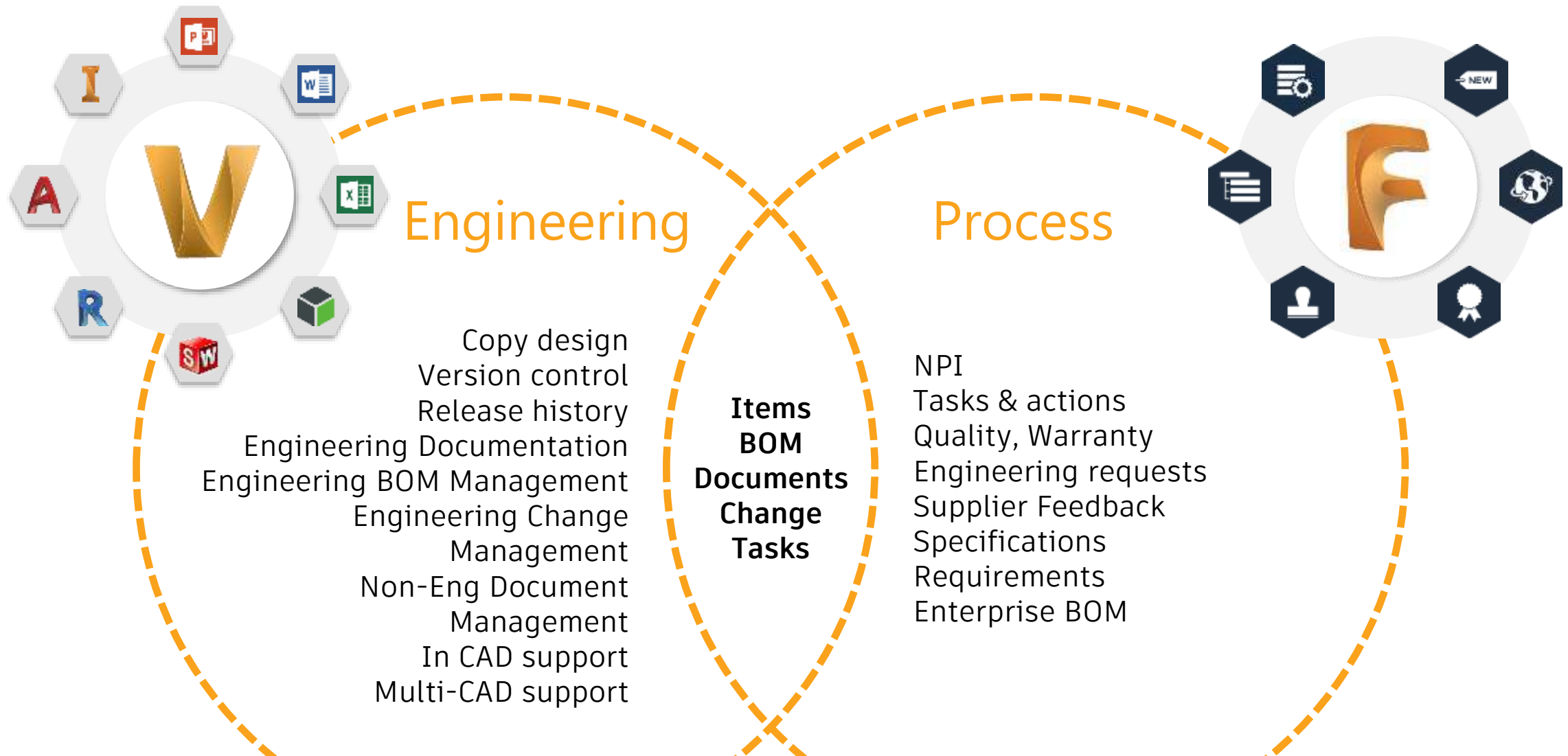


[www.coolOrange.com](http://www.coolOrange.com)

# Agenda

- Introduction
- Out-of-the-box capabilities of powerFLC
- Architecture and the different components used by powerFLC
- Custom workflows to transfer data between Vault and Fusion Lifecycle
- Real-world use cases and benefits for customers
- Additional resources

# Vault + Fusion Lifecycle



# History of powerFLC



2014

## Idea was born

coolOrange plays with the idea to connect Vault and PLM360 based on PowerShell cmdlets



2018

## Prototype

In collaboration with Autodesk, coolOrange investigates in the topic again and starts developing a Vault-to-Fusion Lifecycle-Connector

2019

## Release of vaultFLC

coolOrange releases vaultFLC, a configurable connector with predefined workflows



2020

## Release of powerFLC

coolOrange releases powerFLC, a configurable and customizable connector with unlimited workflows



# vaultFLC vs. powerFLC

## vaultFLC

### Hardcoded workflows

BOM workflow only supports Inventor files

### Configurable but not customizable

### Four built-in workflows

File centric BOM publishing

Change Order synchronization (file based)

Folder synchronization (NPI)

File (drawing) publishing

### Limited to built-in workflows

### Standalone Product

## powerFLC

### Script-based workflows

Any objects in Vault supported

### Configurable and customizable

### One built-in workflow

Item centric BOM publishing

### Extendable with any workflow

Folder synchronization (NPI)

File centric BOM publishing

File (drawing) publishing

Change Order synchronization (ECO based)

Many others...

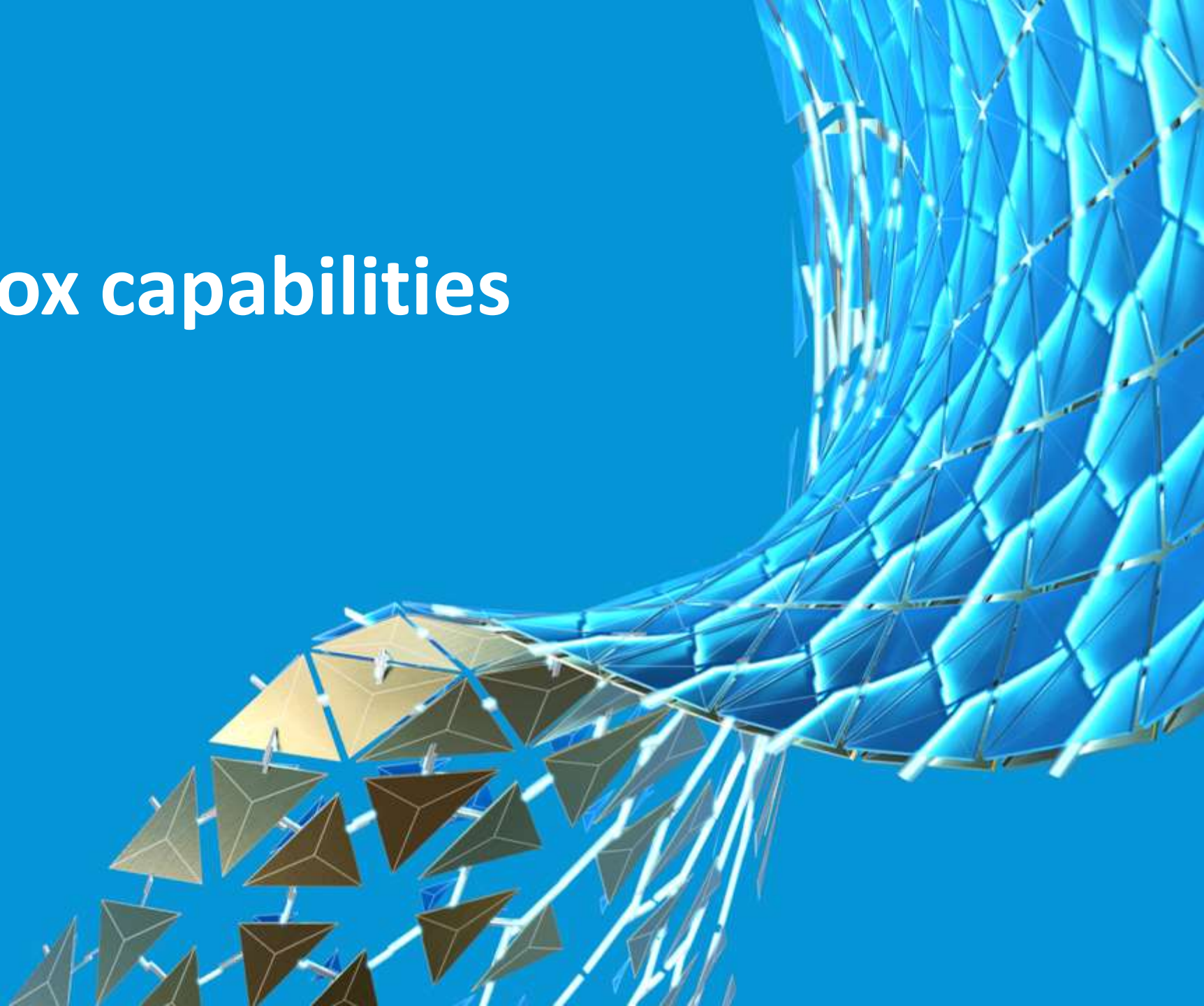
### Bundled with powerJobs Processor

powerJobs Processor license included





**powerFLC**  
**out-of-the-box capabilities**



# powerFLC – what's in the box?

## powerFLC Processor

- A full powerJobs Processor  
(with all jobs and possibilities)
- Cmdlets (*/kə'mɑ:nd'let/*) for reading, searching, creating, updating and uploading FLC items, attachments and BOMs
- Based on Autodesk Forge and the FLC V3 API
- Configuration Manager to change workflow behaviors and define property/field mappings
- Vault Item and BOM publishing workflow  
(created in collaboration with Autodesk)

**Additional Workflow templates / samples available**





# Items and BOM workflow – Key Features

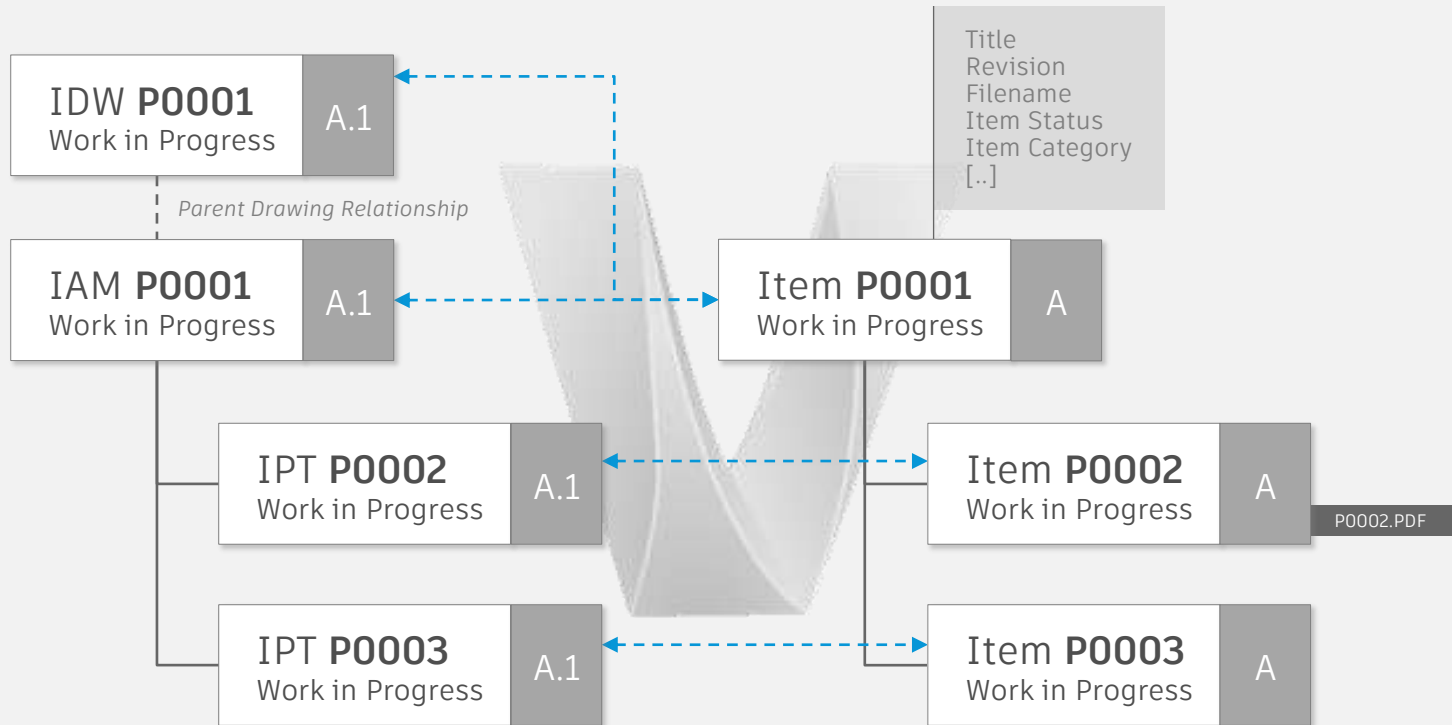
- **Vault Item centric**
  - Vault Item BOM is derived from CAD Data (Inventor, ACADM, ACADE, SWx) or built based on manually created items
  - Triggered on Vault item release (or any other lifecycle state transition)
- **Publish Vault Item metadata to FLC**
  - Item metadata
  - Primary linked file metadata
  - Vault thin- and thick client links
- **Publish engineering BOMs to FLC**
  - Merged BOM rows (Inventor “Part Number Row Merge Settings”)
  - Rows manually added in Fusion Lifecycle
  - Raw materials
  - Virtual Components
  - Cutting list (Part List Details)
- **Upload Vault Item attachments and associated files attachments**
- **Fusion Lifecycle App (workspace) available**

# Items and BOM workflow – Process

Check in  
Inventor  
Assembly  
with Drawing

Assign /  
Update  
Item

Attach  
additional  
file to  
Item



# Items and BOM workflow – Process

Check in  
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Assign /  
Update  
Item

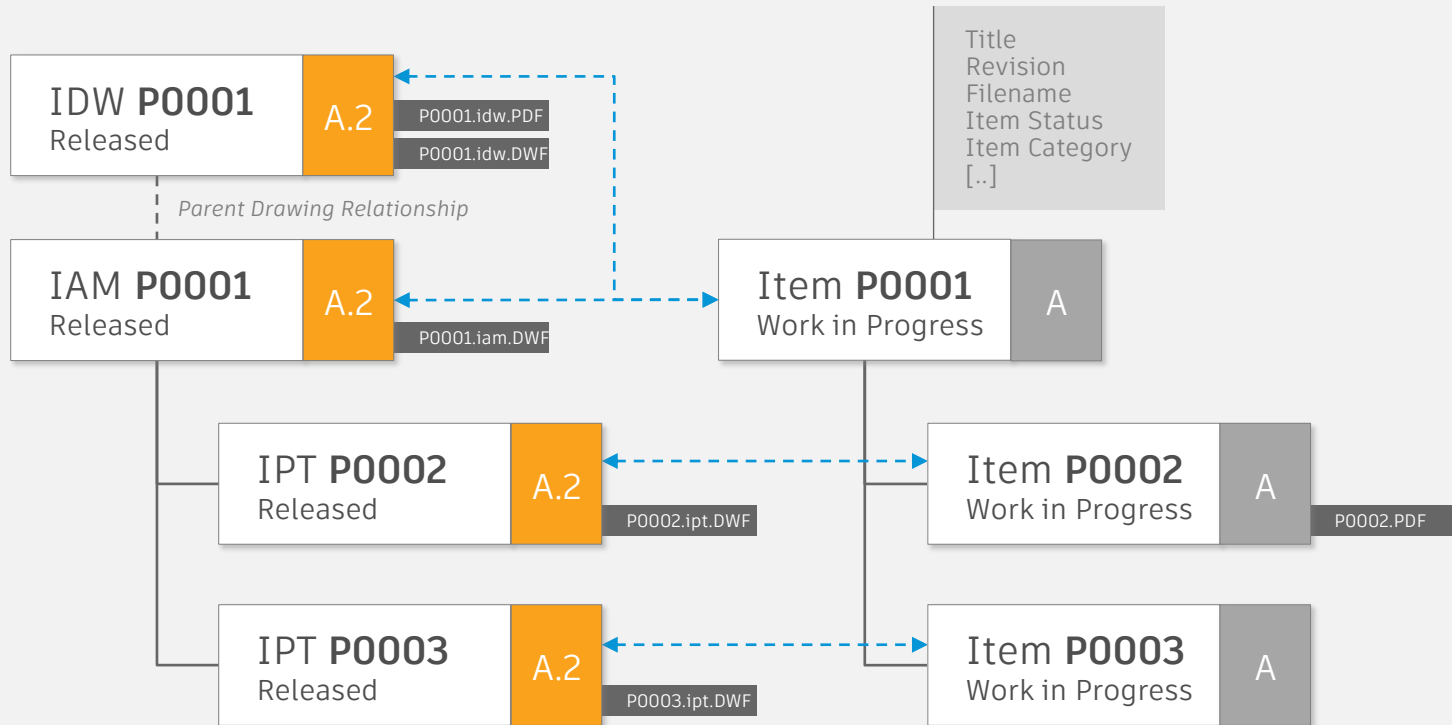
Attach  
additional  
file to  
Item

Check in update  
from Inventor  
and set file state  
to "Released"

Create  
DWF  
& PDF

Assign /  
Update  
Item

Change Item Status  
that invokes the  
integration



# powerFLC - Items and BOM workflow

Check in  
Inventor  
Assembly  
with Drawing

Assign /  
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Attach  
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file to  
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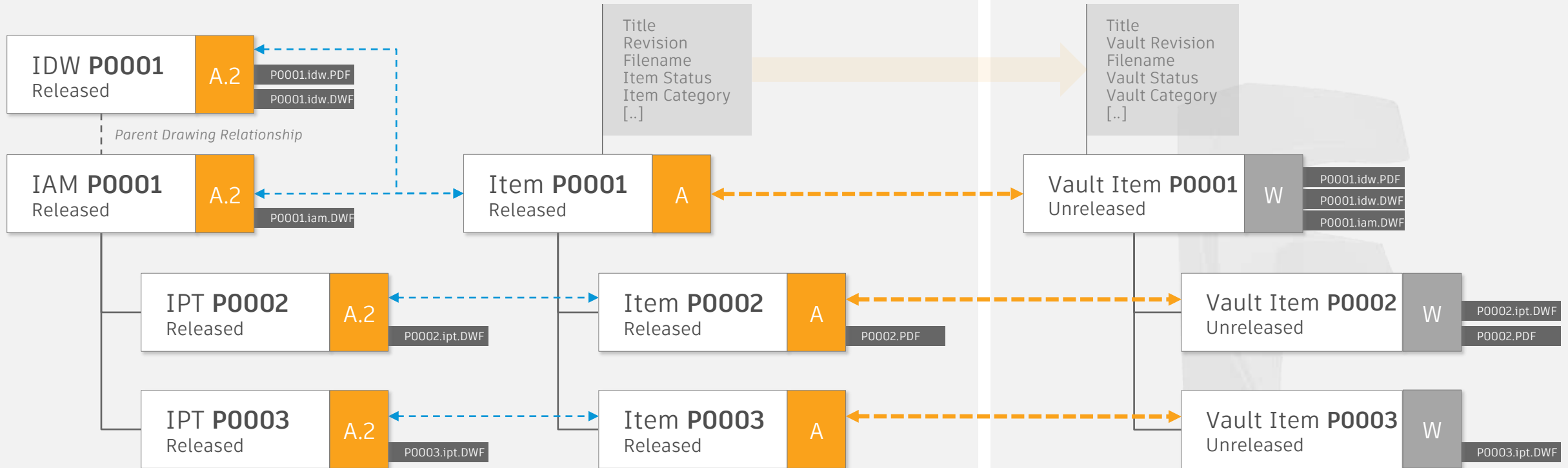
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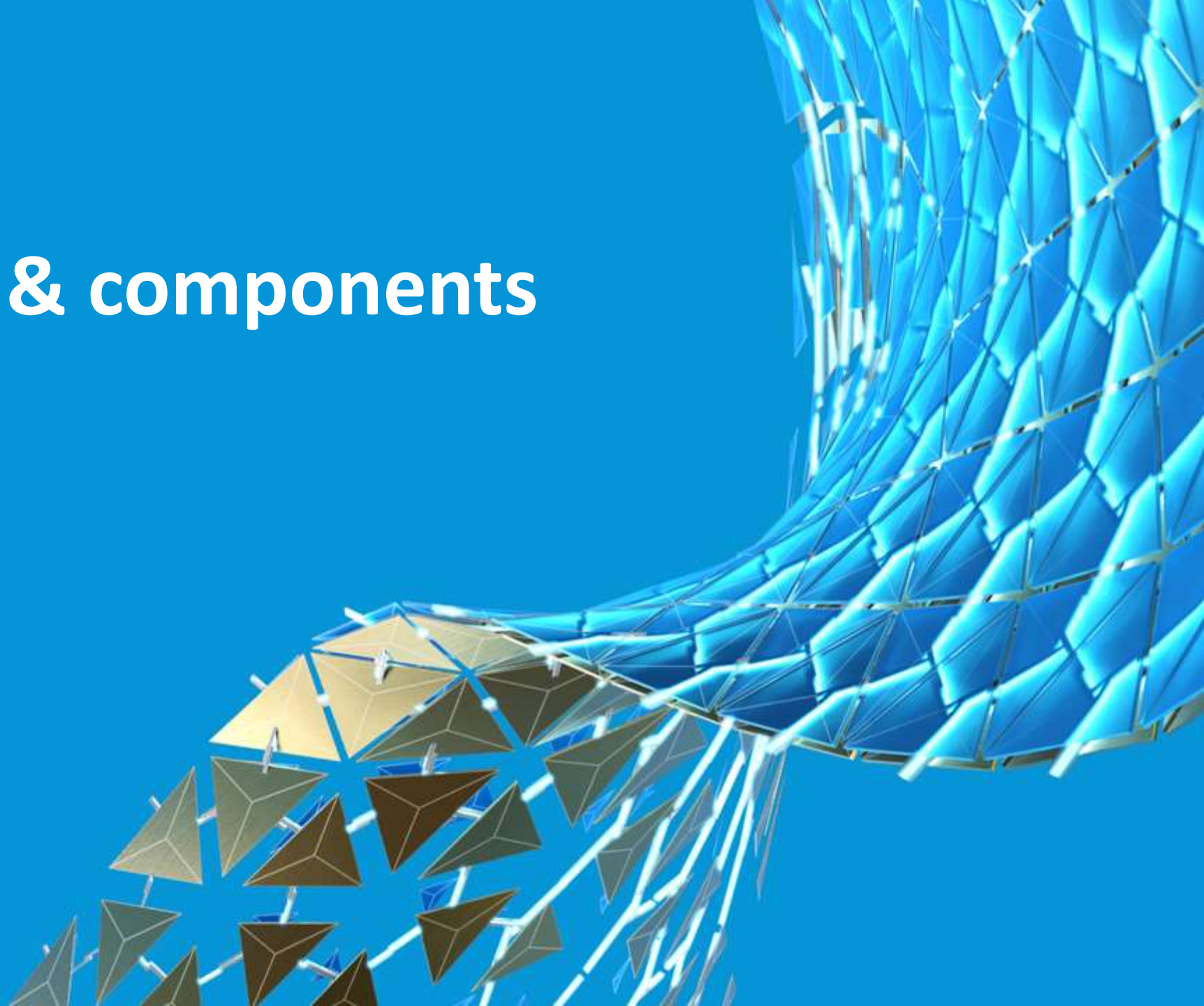
Change Item Status  
that invokes the  
integration

powerFLC creates / updates  
Vault Items, maps defined  
properties & uploads files



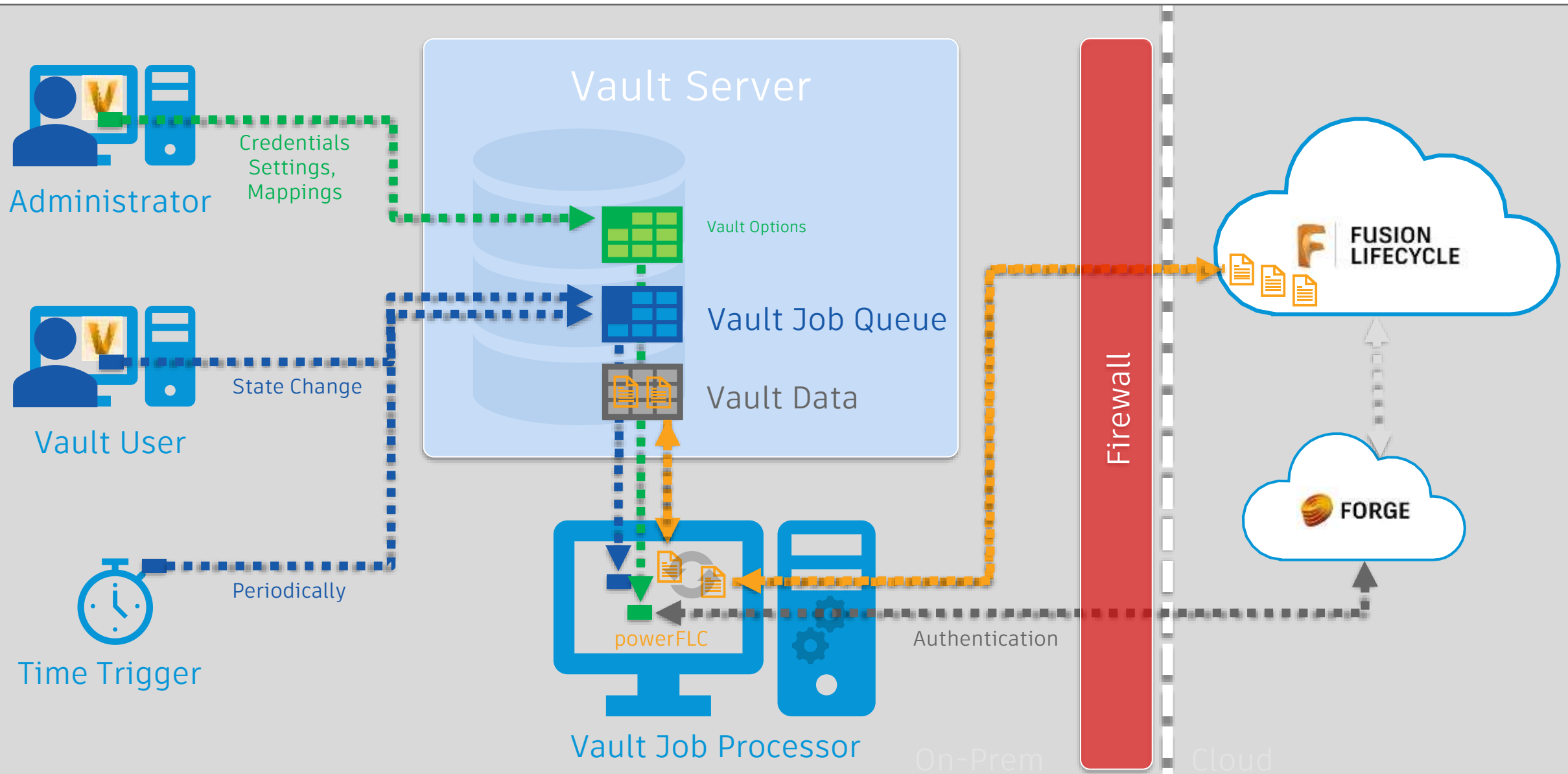
# powerFLC

## architecture & components

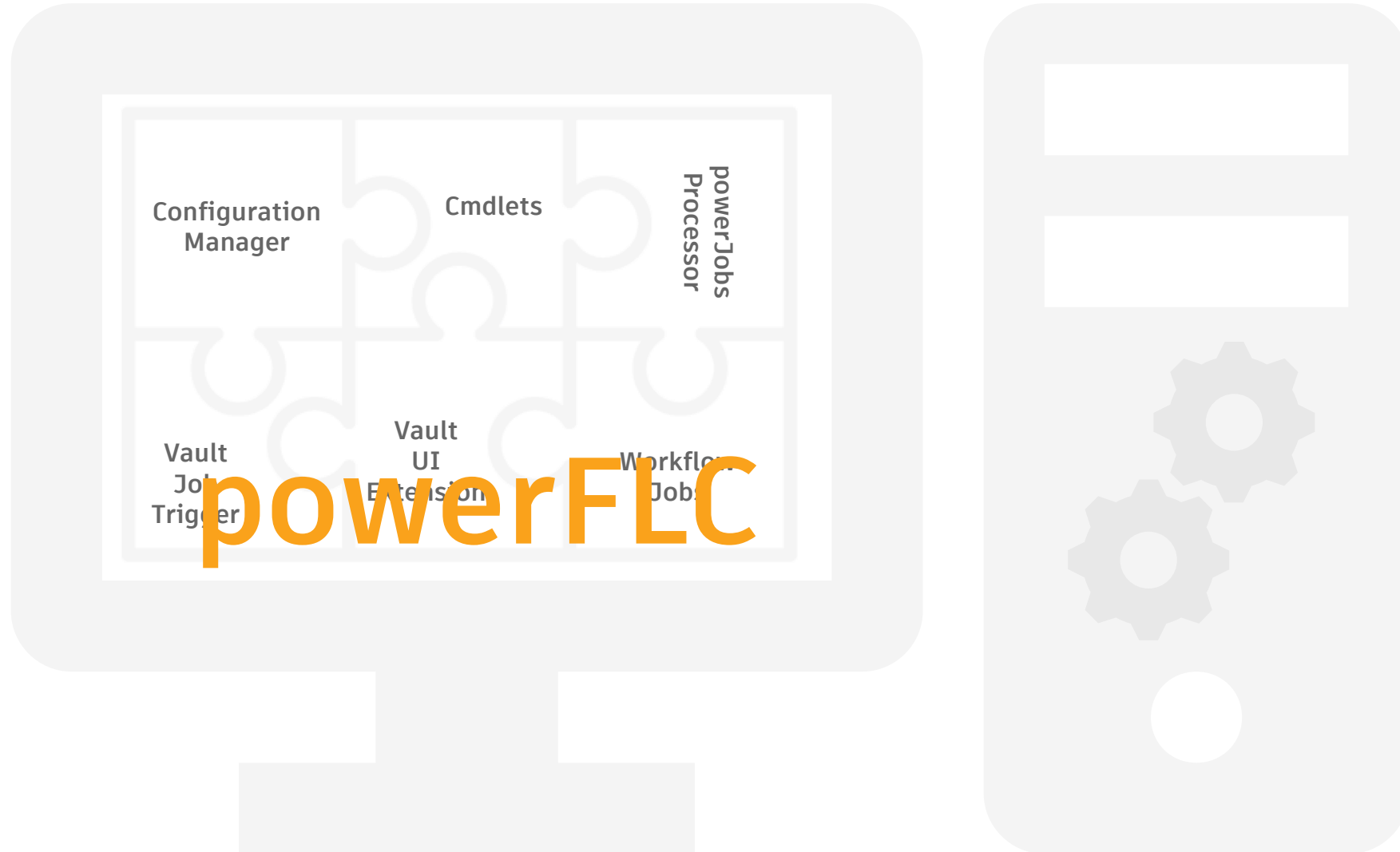




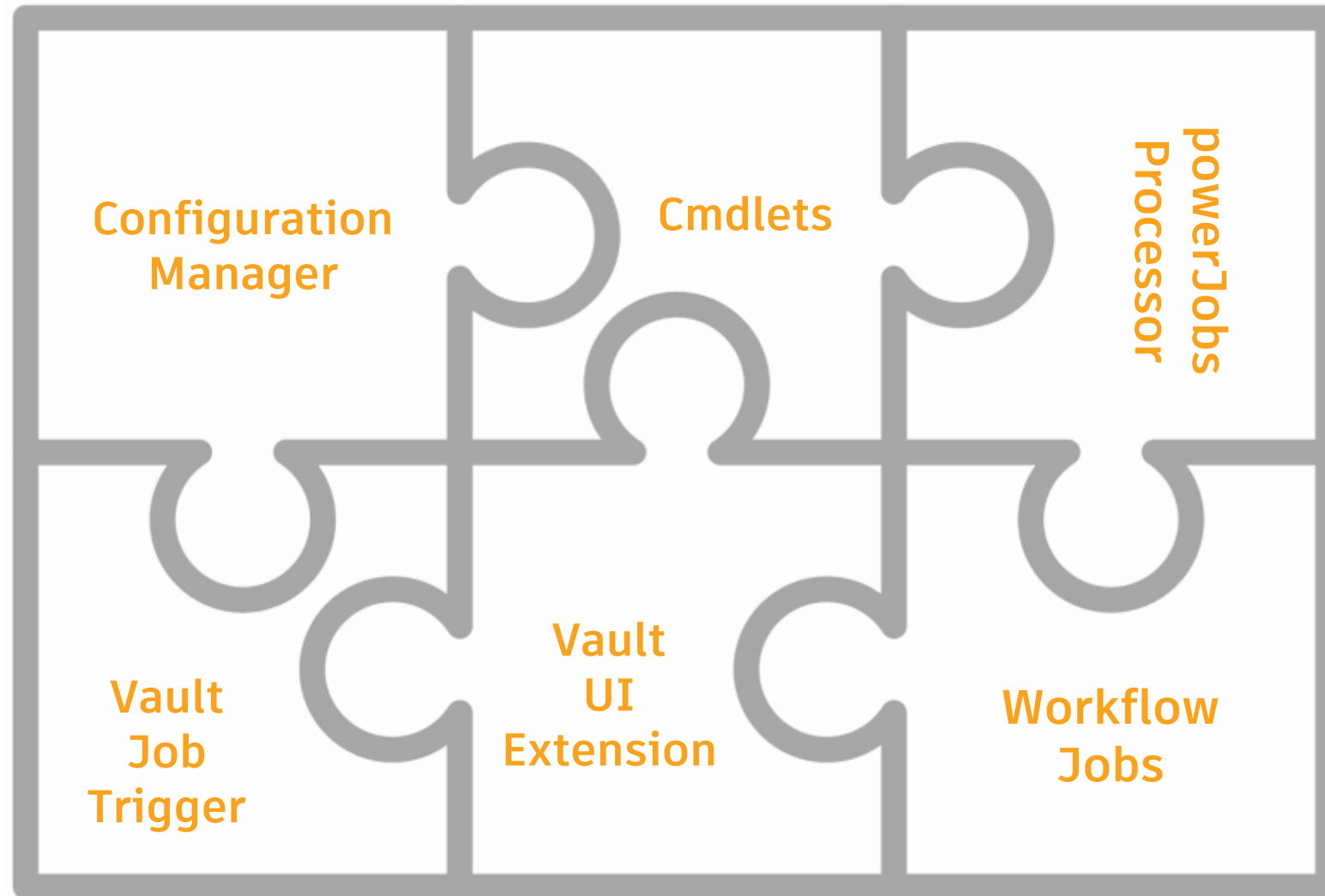
# powerFLC – Workflow Architecture



# powerFLC – Components

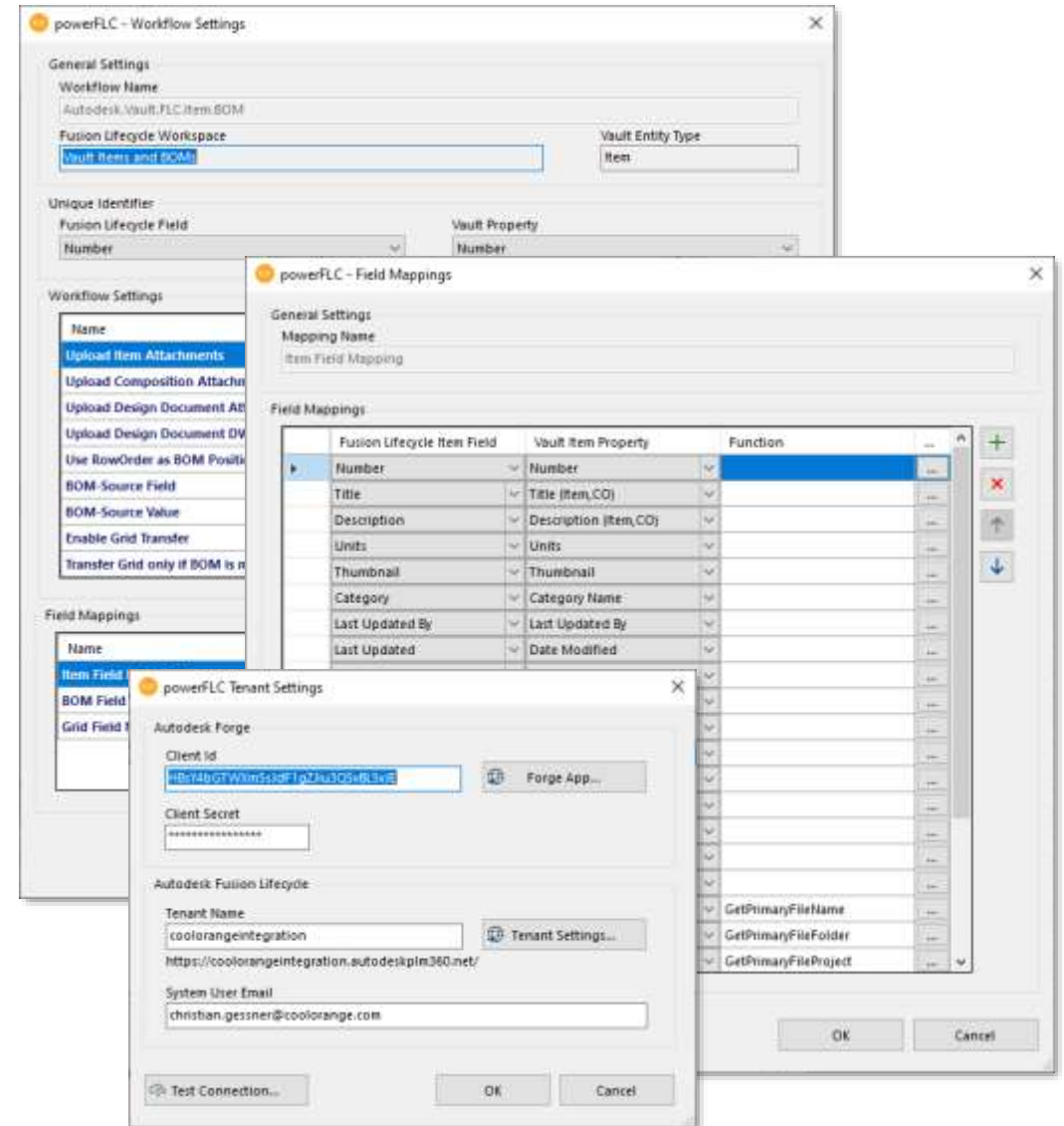


# powerFLC – Components



# powerFLC – Configuration Manager

- Graphical UI in Vault (Tools Menu)
- Tenant Configuration (Forge 2-legged Auth)
- Workflow Settings
  - Various settings for each workflow
- Field Mappings
  - Multiple mappings supported
  - Fusion Lifecycle field to Vault property mapping
  - Fusion Lifecycle field to Function mapping
- Import / Export workflow settings/mappings (JSON)
- Same UI for all workflows
- Configuration stored in Vault Options
- Configuration used by workflows (scripts)



# powerFLC – Cmdlets

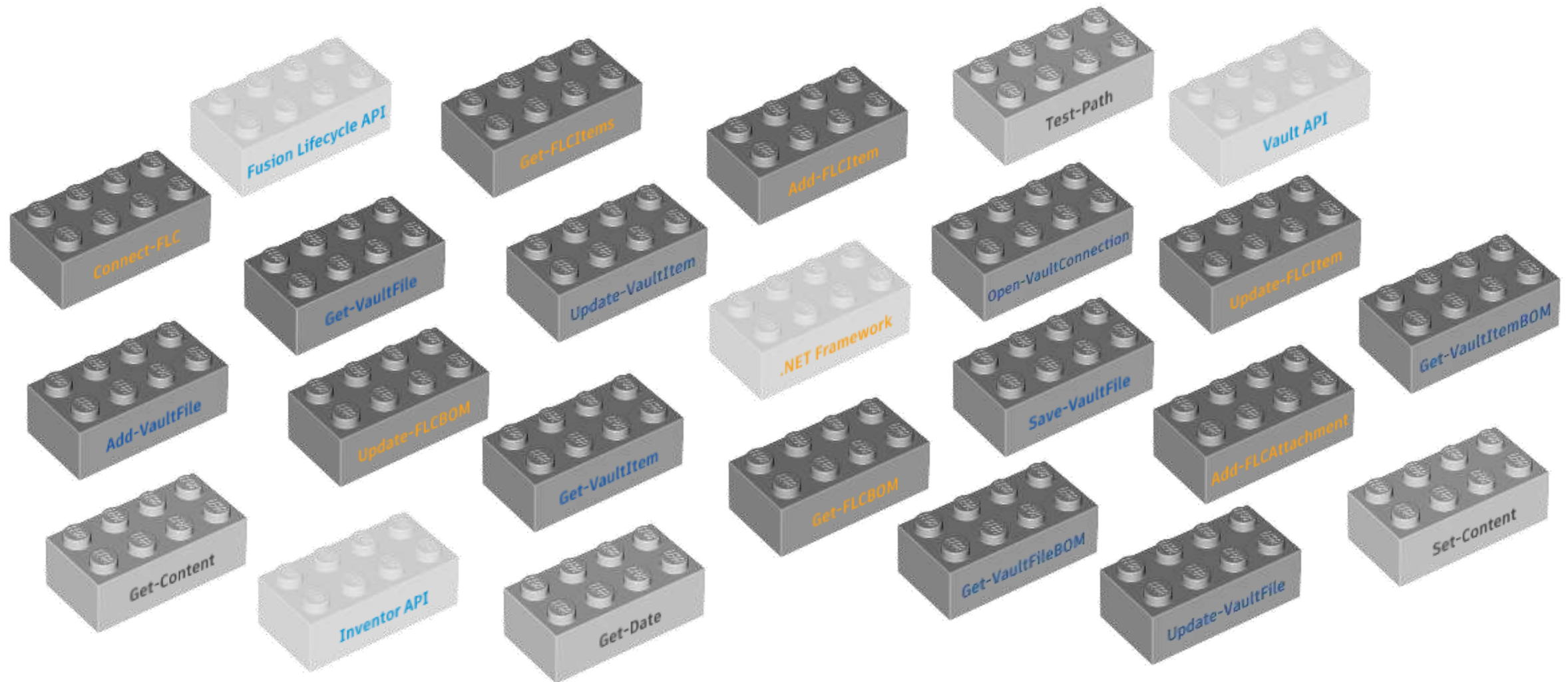




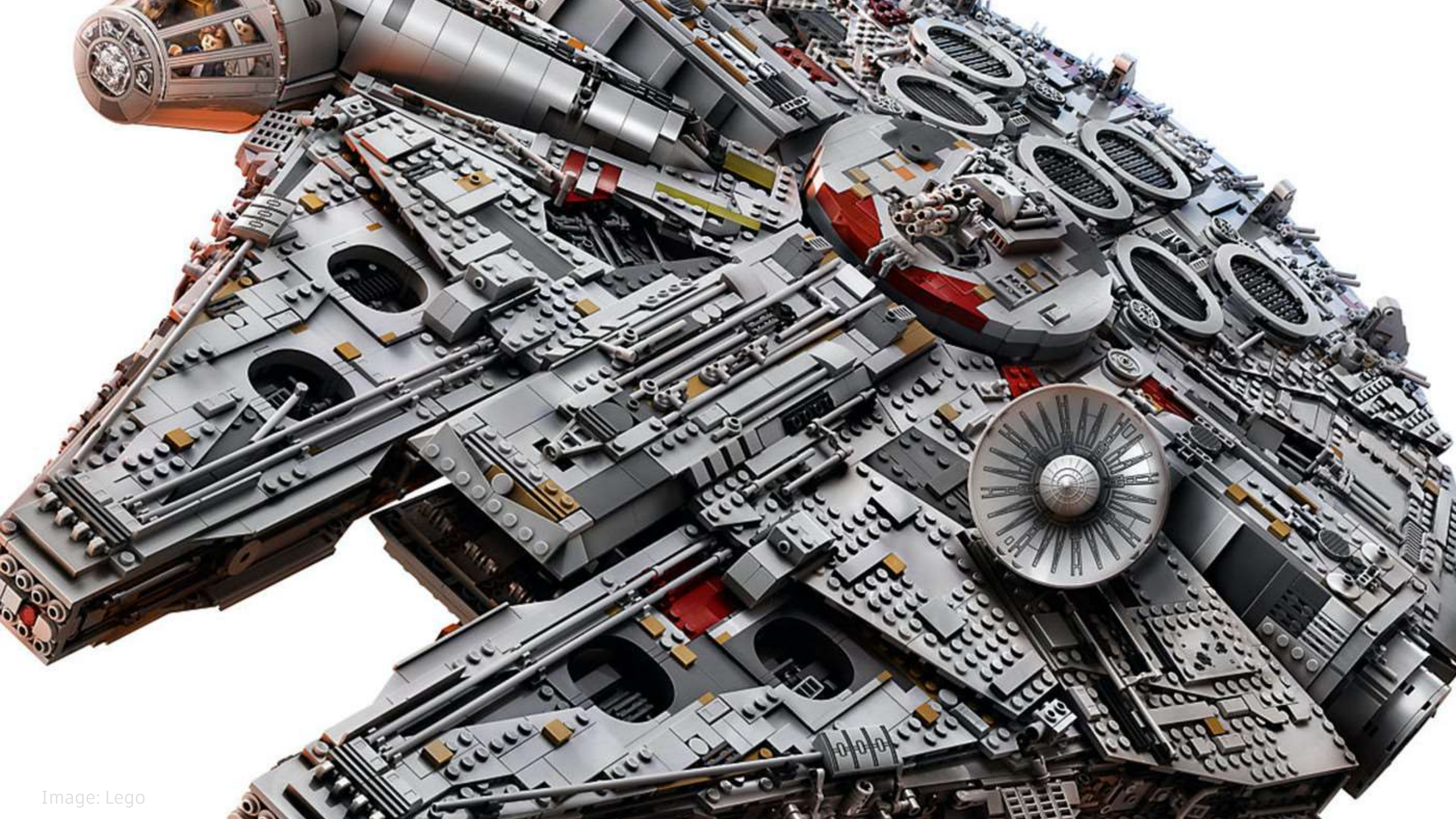
# powerFLC – Cmdlets



# Cmdlet = Building Block









# powerFLC + powerJobs Cmdlets

- Cmdlets hide the complexity of APIs
- Cmdlets are API version independent
  - Eliminates migration efforts
- 3<sup>rd</sup> party Cmdlets available
  - File operations
  - SQL connections
  - and many more...
- No advanced programming skills needed
  - PowerShell syntax is well documented
  - Administrators are used to PowerShell
  - Thousands of books, courses and examples available
- APIs can be accessed directly if needed



## powerFLC

Add-FLCAttachment
Add-FLCItem
Connect-FLC
Get-FLCBOM
Get-FLCItems
Update-FLCBOM
Update-FLCItem



## powerJobs

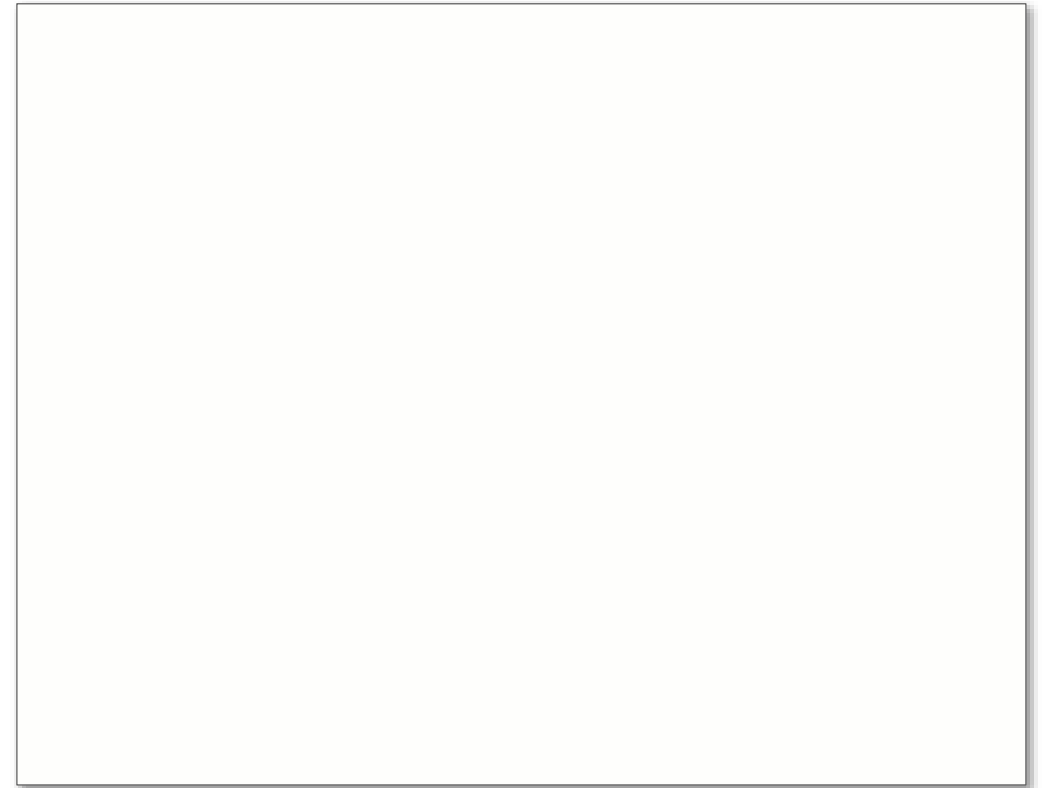
Close-Document
Export-Document
Open-Document
Open-VaultConnection
Add-VaultFile
Add-VaultJob
Get-VaultFile
Get-VaultFileAssociations
Get-VaultFileBom
Get-VaultFiles
Get-VaultItem
Get-VaultItemAssociations
Get-VaultItemBom
Save-VaultFile
Show-Inspector
Update-VaultFile
Update-VaultItem

# powerJobs Processor



powerJobs

- **Vault Job Processor Extension**
- **Enables Job Processor to execute scripts**
- **Customizable scripts for**
  - Automated Publishing
  - Automated Printing and Plotting
  - Email notifications
  - Files upload to Network drives, SharePoint, OneDrive...
- **PowerShell Commands to**
  - Create neutral formats (e.g. PDF, DXF, STEP, STL...)
  - Communicate with Vault
  - Communicate with Inventor
  - Communicate with AutoCAD / DWGTrueView
- **“Time Triggered Jobs” functionality**
  - Submits Jobs in a configurable interval
- **powerJobs Processor License included in powerFLC**





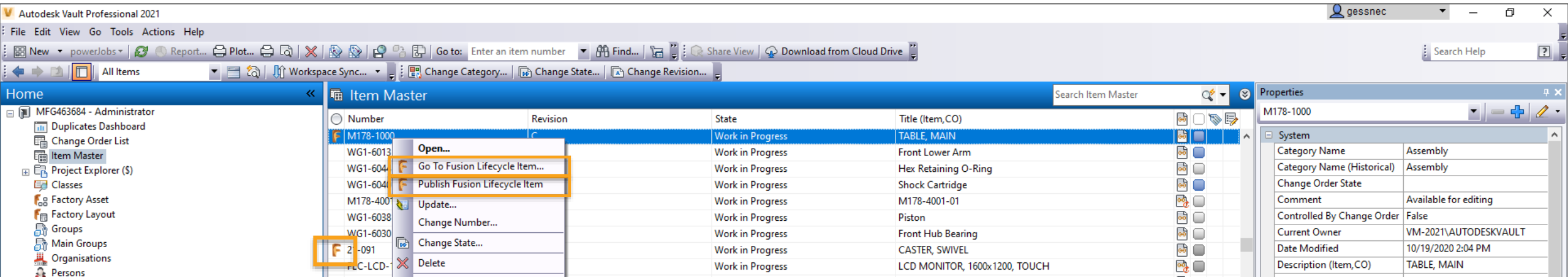
# Vault Job Trigger

- **Vault's built-in "Custom Job Types" functionality**
  - Triggers jobs on entity lifecycle state change
- **coolOrange powerJobs Processor "Time Triggered Jobs" functionality**
  - Triggers jobs in configurable intervals
- **coolOrange powerEvents**
  - Triggers jobs on any Vault actions
    - Check-in, Check-out, Change State, Delete...
    - Customizable (Scripting)
    - Not included in powerFLC – can be purchased separately



# Vault UI Extension

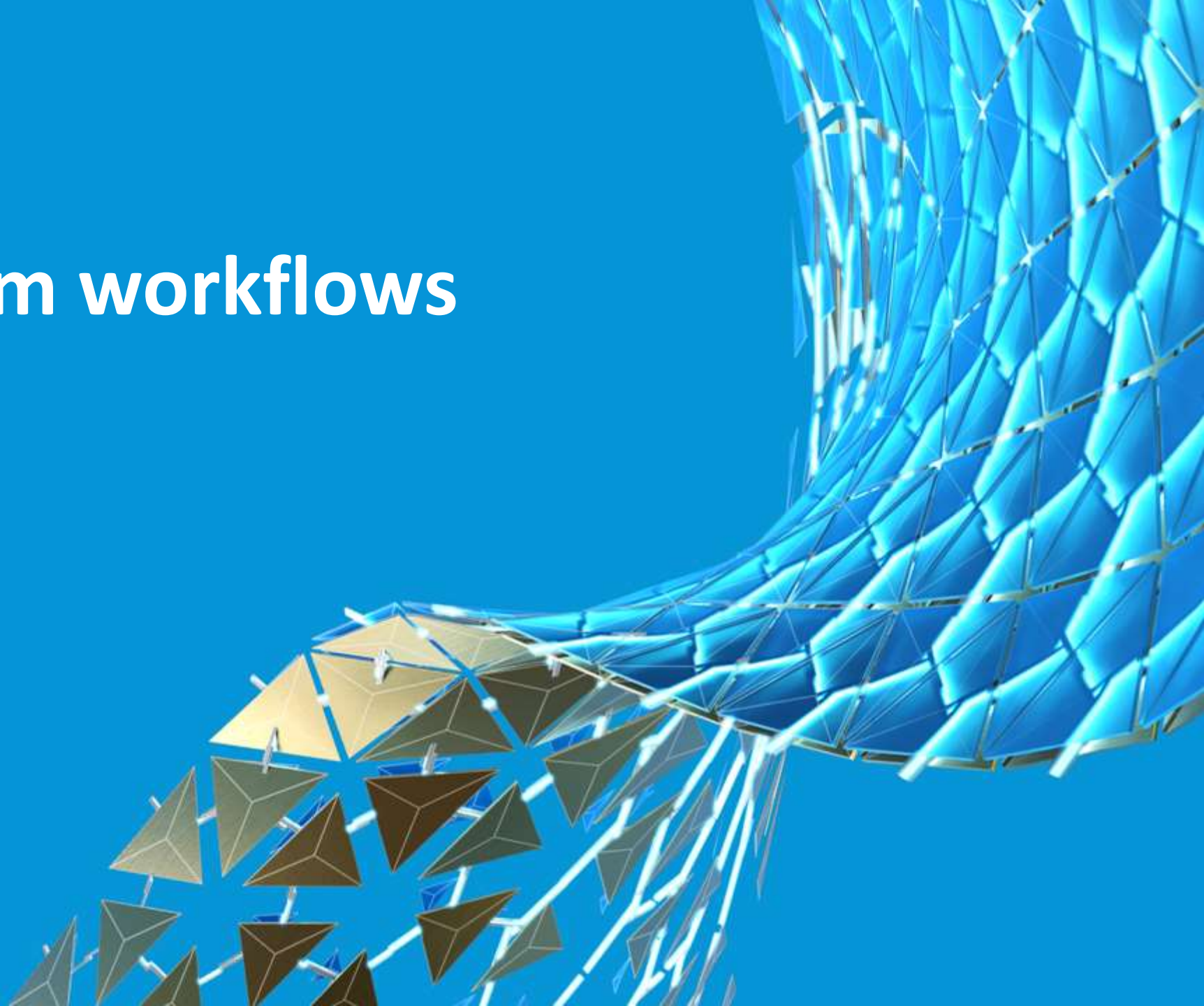
- Navigate to Fusion Lifecycle item
- Manually trigger jobs
- Check if Item exists in Fusion Lifecycle
- Sample Vault UI Extension available:
  - <https://github.com/coolOrangeLabs/powerflc-explorer-extension>
  - Sample code written in C#
  - Installer available
- Alternative
  - Vault Data Standard



# powerFLC – Components Overview

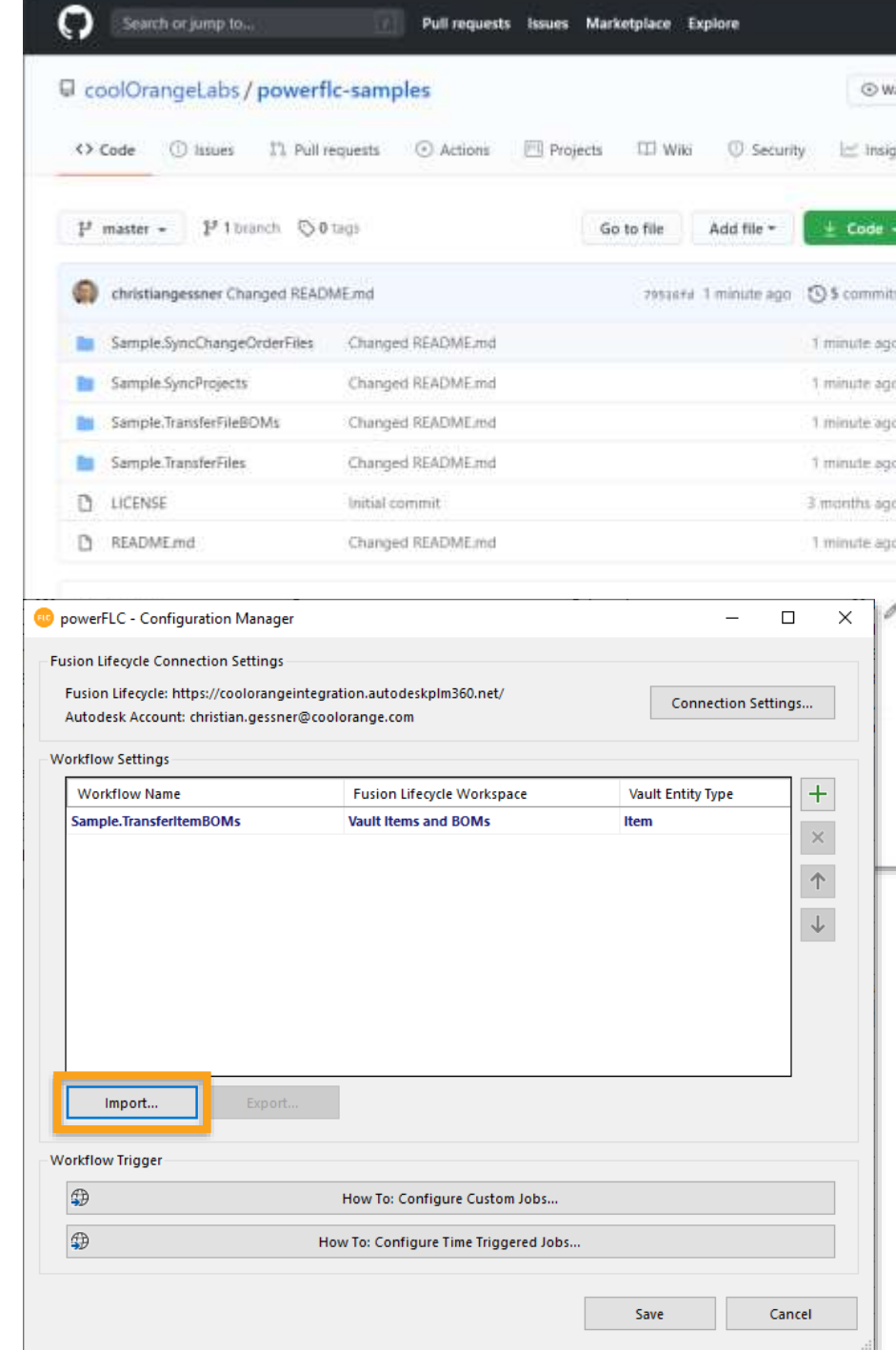
powerFLC	powerJobs Processor	Vault Job Processor	Vault UI
Configuration Manager	Cmdlets to interact with Vault	Hosts powerJobs	Sample Extension
			or
Cmdlets to interact with Fusion Lifecycle	Time Triggered Jobs	Custom Job Types	Vault Data Standard
Workflow (Job) Scripts	Job Scripts		
Installed on the Job Processor machine	Installed on the Job Processor machine		Installed on all client machines

**powerFLC**  
**create custom workflows**



# Import existing workflows

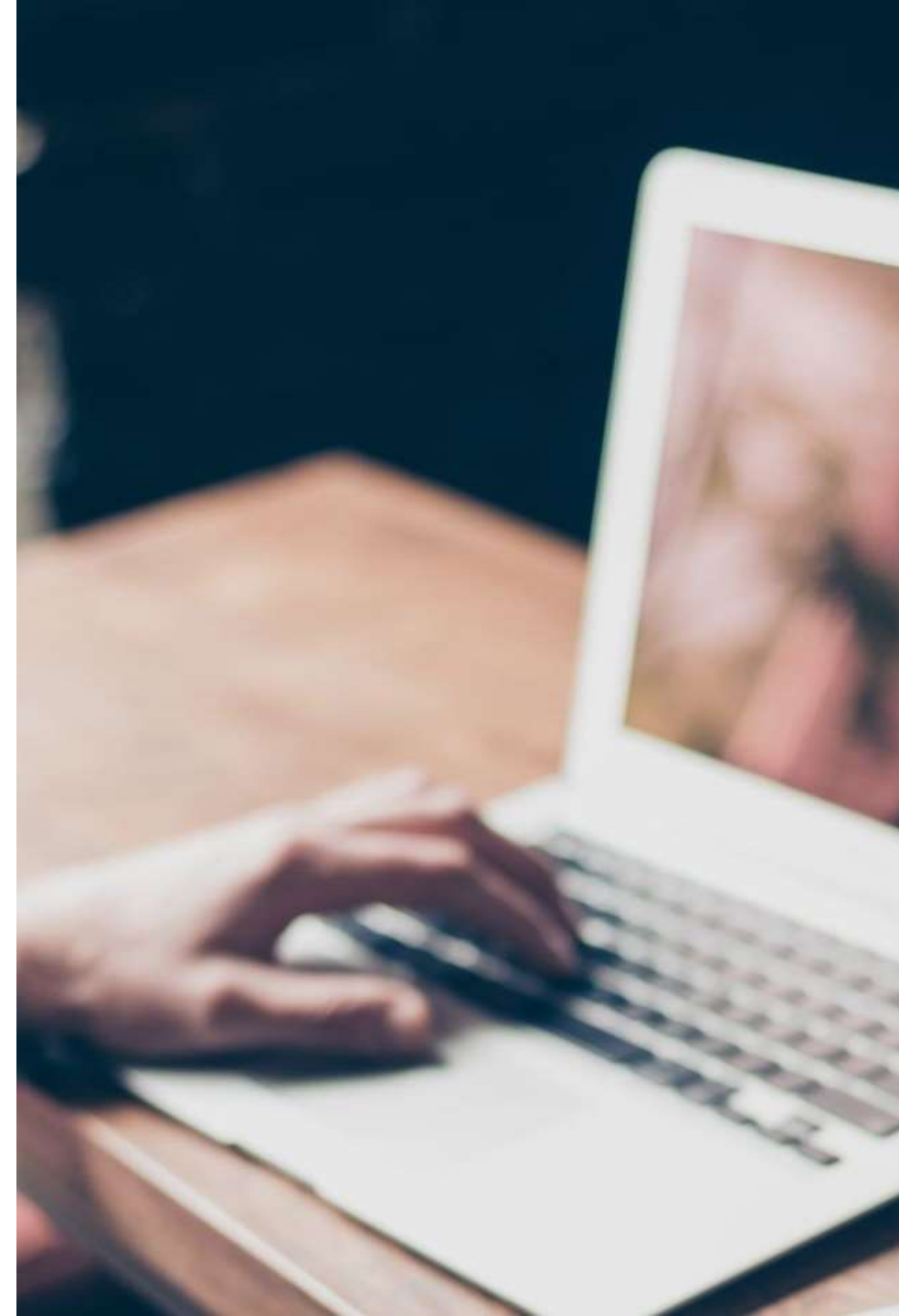
- **Job script**
  - Download files
    - *C:\ProgramData\coolOrange\powerJobs\Jobs*
    - *C:\ProgramData\coolOrange\powerJobs\Modules*
- **Import**
- **Restart powerJobs Processor**
  - Automatically registers the new job
- **Job Trigger**
  - Job Type == Name of the PS1 file without file extension
  - Time based (triggers continuously) or
  - Vault's Custom Job Types (triggers on state change)





# Create new workflows

- **Job script**
  - Create new PS1 (PowerShell script) file
  - *C:\ProgramData\coolOrange\powerJobs\Jobs*
- **Restart powerJobs Processor**
  - Automatically registers the new job
- **Job Trigger**
  - Job Type == Name of the PS1 file without file extension
  - Time based (triggers continuously) or
  - Vault's Custom Job Types (triggers on state change)
- **Configuration Manager optional**



```

Import-Module powerFLC
Import-Module powerJobs

Write-Host "Starting job 'Publish Word file to FLC' for file '$($file._Name)' ..."

if ($file._Extension -ne "docx" -or $file._CategoryName -ne "Office") {
    Write-Host "Files with extension $($file._Extension) are not supported"
    return
}

$connected = Connect-FLC -Tenant $tenant.Name -ClientId $tenant.ClientId -ClientSecret $tenant.ClientSecret -UserId $tenant.SystemUserEmail
if (-not $connected) {
    throw "Connection to Fusion Lifecycle failed!"
}

$workspace = $flcConnection.Workspaces.Find("Documents")

$flcItem = (Get-FLCItems -Workspace $workspace.Name -Filter ('ITEM_DETAILS:DOC_NUMBER="{0}"' -f $file._Name))[0]
if (-not $flcItem) {
    Write-Host "Adding document..."
    $flcItem = Add-FLCItem -Workspace $workspace.Name -Properties @{
        "Doc Number" = $file._Name
        "Title" = $file._Title
        "Image" = $file._Thumbnail.Image
    }
} else {
    Write-Host "Updating document..."
    $flcItem = Update-FLCItem -Workspace $workspace.Name -ItemId $flcItem.Id -Properties @{
        "Title" = $file._Title
        "Image" = $file._Thumbnail.Image
    }
}

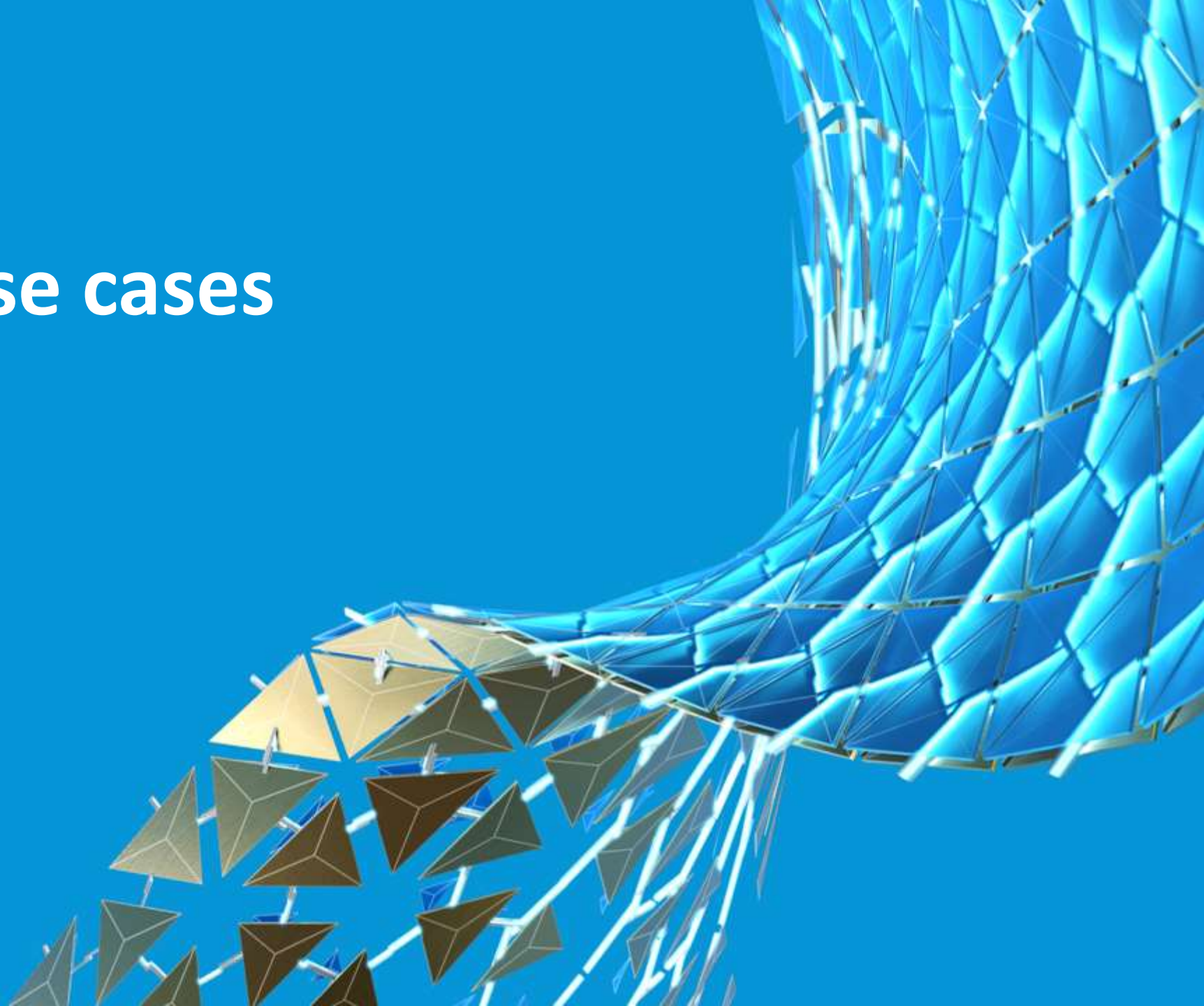
Write-Host "Uploading file..."
$downloadedFiles = Save-VaultFile -File $file._FullPath -DownloadDirectory "C:\TEMP"
Add-FLCAttachment -Workspace $workspace.Name -ItemId $flcItem.Id -Path $downloadedFiles[0].LocalPath

Write-Host "Finished job 'Publish Word file to FLC'"

```

# powerFLC

## real world use cases



# Use Case: Engineering Data Transfer

## Challenge

Manually create and update Items in Fusion Lifecycle to have engineering data available in Fusion Lifecycle

Manually create and update Engineering BOMs in Fusion Lifecycle

Manually download viewable files and drawings from Vault and upload them to FLC

## Solution

Automatically create / update Items in Fusion Lifecycle based on Vault data

Automatically create / update Engineering BOMs in Fusion Lifecycle

Automatically upload viewable files and drawings from Vault to Fusion Lifecycle

## Benefits

Departments other than engineering can access up-to-date Engineering data

Viewable files and documentation available to all stakeholders



# Use Case: Change Management

## Challenge

Manually create ECO in Vault to track design tasks and changes

Manually add find related Items in Vault and add them as records to the ECOs

Manually update CO/CR in Fusion Lifecycle when an ECO is closed in Vault

## Solution

Automatically transfer FLC CO/CR as an ECO to Vault

Automatically assign Records to the Vault ECO based on Affected Items in FLC

Automatically update CO/CR in Fusion Lifecycle when an ECO is closed in Vault

## Benefits

Vault ECO functionality is seamlessly integrated into the Fusion Lifecycle Change Process and ECO are available in Vault once they are ready for engineering

# Use Case: New Product Development / Introduction

## Challenge

Manually setup a project in Vault to kick-off the engineering

Manually check-in technical specs and requirements to Vault to be available for engineers

## Solution

Automatically create Projects and Project Structure in Vault based on Fusion Lifecycle projects

Automatically transfer Project content from FLC to Vault

## Benefits

Projects and project related templates and files are automatically available in Vault when the engineering work starts

# Workflow Examples

## Design Review Process Release Process

Transfer files or items to Fusion Lifecycle to be reviewed and approved by non-Vault users.

Once approved in Fusion Lifecycle, the Vault entity automatically transitions to a new state

## Supplier Collaboration

Transfer multiple Vault files as ZIP package to a Fusion Lifecycle workspace to share engineering data with suppliers

## Revision Management

Transfer documentation files of released file revisions from Vault to Fusion Lifecycle to be able to manufacture spare parts from historical revisions

## Task Synchronization

Transfer Fusion Lifecycle Tasks to Vault (as Custom Objects) and automatically link the Tasks to engineers in Vault to automatically distribute work instructions and related information

powerFLC  
additional resources





# Documentation and Support

- **powerFLC Documentation**  
<https://www.coolorange.com/wiki/doku.php?id=powerflc>
- **powerJobs Processor Documentation**  
[https://www.coolorange.com/wiki/doku.php?id=powerjobs\\_processor](https://www.coolorange.com/wiki/doku.php?id=powerjobs_processor)
- **powerFLC Solution Portal**  
<https://support.coolorange.com/support/solutions/22000107360>
- **powerJobs Processor Solution Portal**  
<https://support.coolorange.com/support/solutions/22000097987>
- **coolOrange Helpdesk**  
<https://support.coolorange.com/support/home>
- **Feature Request Forum**  
<https://support.coolorange.com/support/discussions/forums/22000188644>



# GitHub Repository

Presentation

Handout

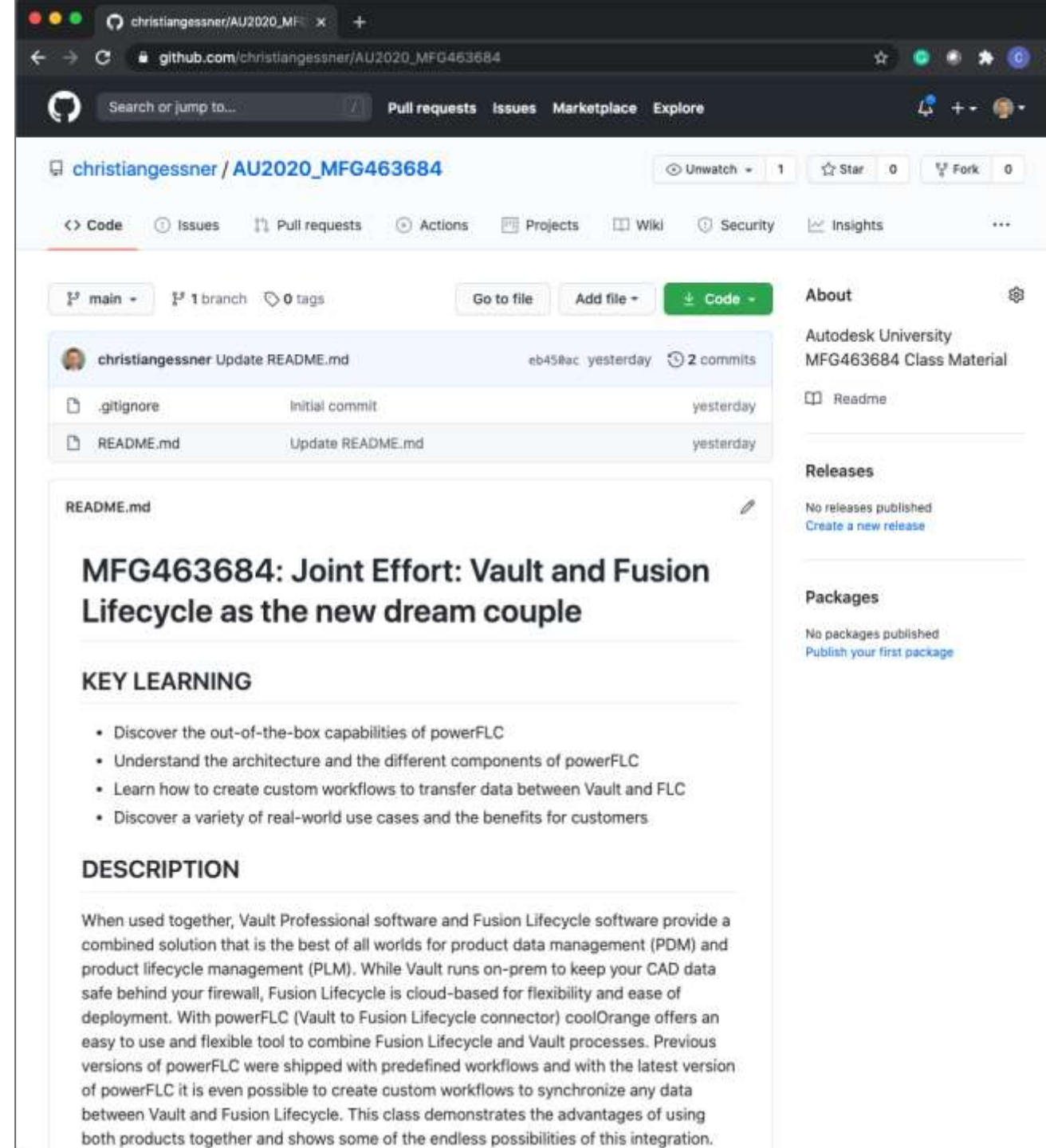
Detailed Technical Information

Installation Guide

Sample Scripts



[https://github.com/christiangessner/AU2020\\_MFG463684](https://github.com/christiangessner/AU2020_MFG463684)



# Conclusion

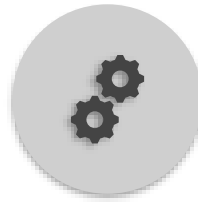
powerFLC is the coolest way to connect Vault and Fusion Lifecycle



READY  
TO USE



SUPER  
FAST  
IMPLEMENTATION



SIMPLE  
CONFIGURATION



HIGHLY  
CUSTOMIZABLE



LOW  
MAINTENANCE



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