intercax

Integrated MBSE and Graph Analysis for System and Program Assessment

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- President
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About Intercax





- Georgia Tech spin-off 2008
- Atlanta, US (HQ) and Pune, India
- **Focus**: Software for MBE/MBSE
 - Syndeia MBSE (SysML) + PLM/CAD/CAE/Data/Simulations
 - SysML parametric solvers
 - aero, auto, defense, others

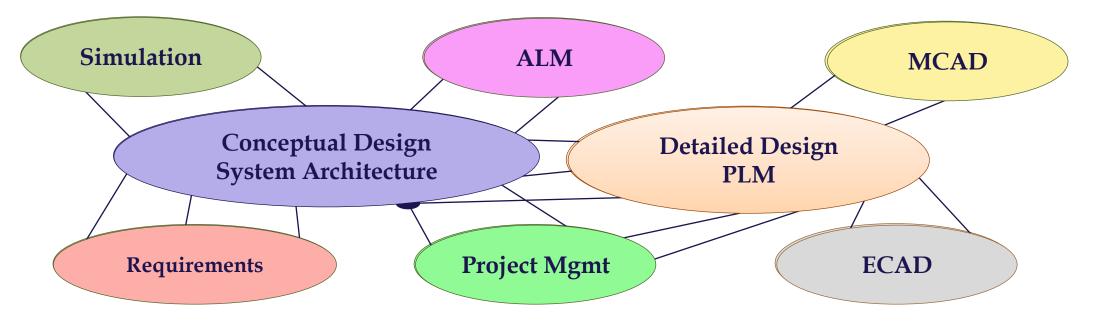


Apply MBSE to a DoD 5000 acquisition model to address three questions;

- how can a model determine that I have a good solution,
- how can a model determine program acquisition progress, and
- how do I know I have a good model?

Integrated Model-Based Systems Engineering (iMBSE)

- The goal of Integrated MBSE is to create a single, unified model <u>extending over all</u> <u>the tools and data repositories involved in developing a system.</u>
- Solution: create, maintain and analyze a network of connections between model elements in different tools
- Needs: Accessible, secure, dynamic, multi-branched, scalable, vendor-agnostic

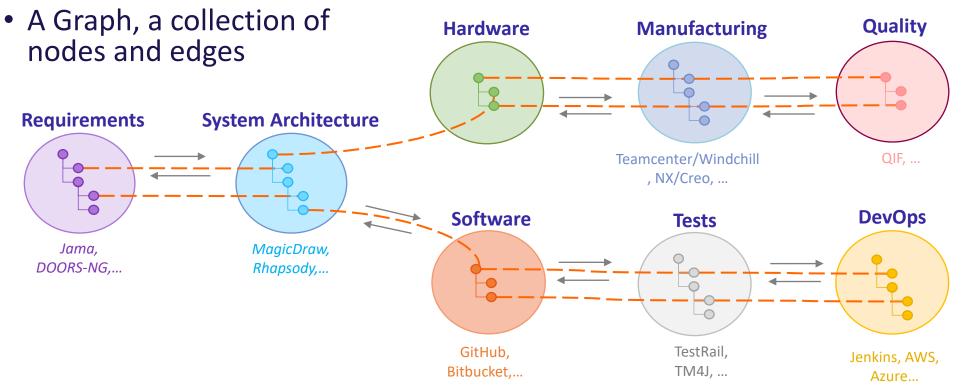


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Digital Thread

- A complete specification of a system or mission, comprised of all the domain models, connected and navigable in a useful fashion.
- Work product for integrated Model-Based Mission/Systems Engineering, similar to software code for software engineers



Potential Benefits of the Digital Thread

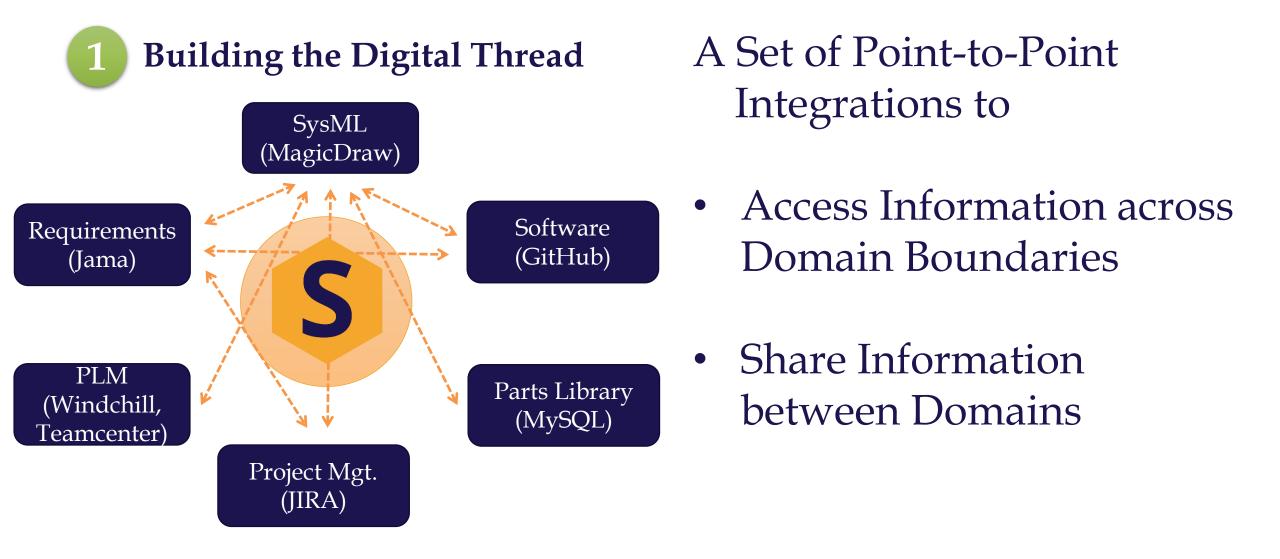
- Sharing and access for distributed models/data across org boundaries
 - Helping all team members find the information they need to do their job
- Configuration management of the total system model
 - Composing baselines, e.g. candidate system configurations, for verification and documentation
- Impact analysis across multiple models
 - Determining scope of upstream changes on downstream elements
- Tracking project schedule, cost, and risk
 - Project dashboards updated at frequent intervals
- Report generation on demand
 - Generate reports for PDRs and CDRs, Technical Data Package (TDPs)
- Intellectual property and data security
 - Access control and authorization separate for each participating org



Apply MBSE to a DoD 5000 acquisition model to address three questions;

- how can a model determine that I have a good solution,
- how can a model determine program acquisition progress, and
- how do I know I have a good model?
- Is the Digital Thread consistent?
- Is the Digital Thread complete?
- Is the Digital Thread up-to-date?

Digital Thread in action using Syndeia

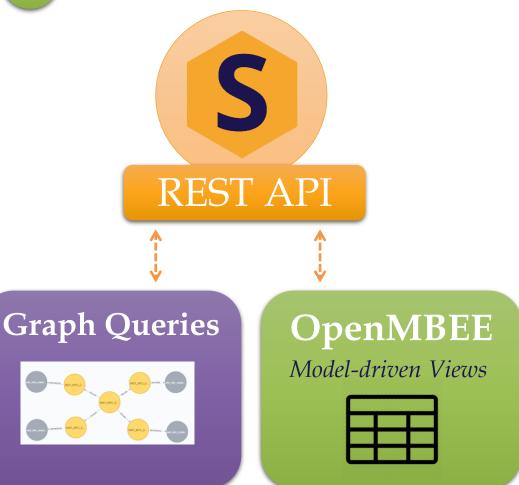


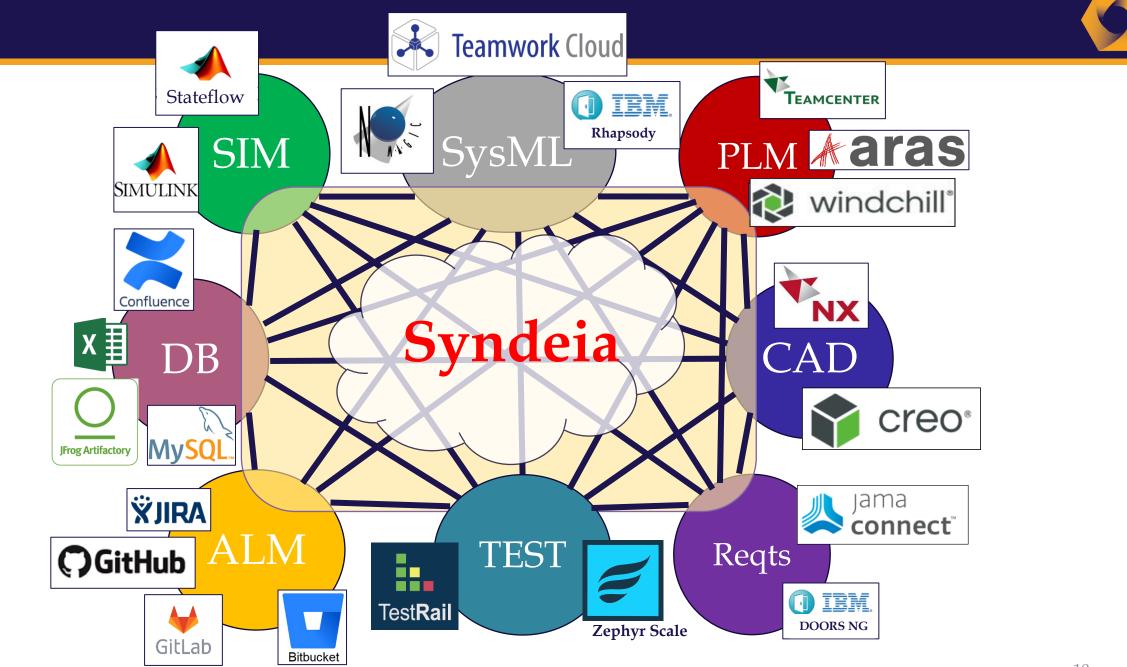
Digital Thread in action using Syndeia

A Set of Microservices to

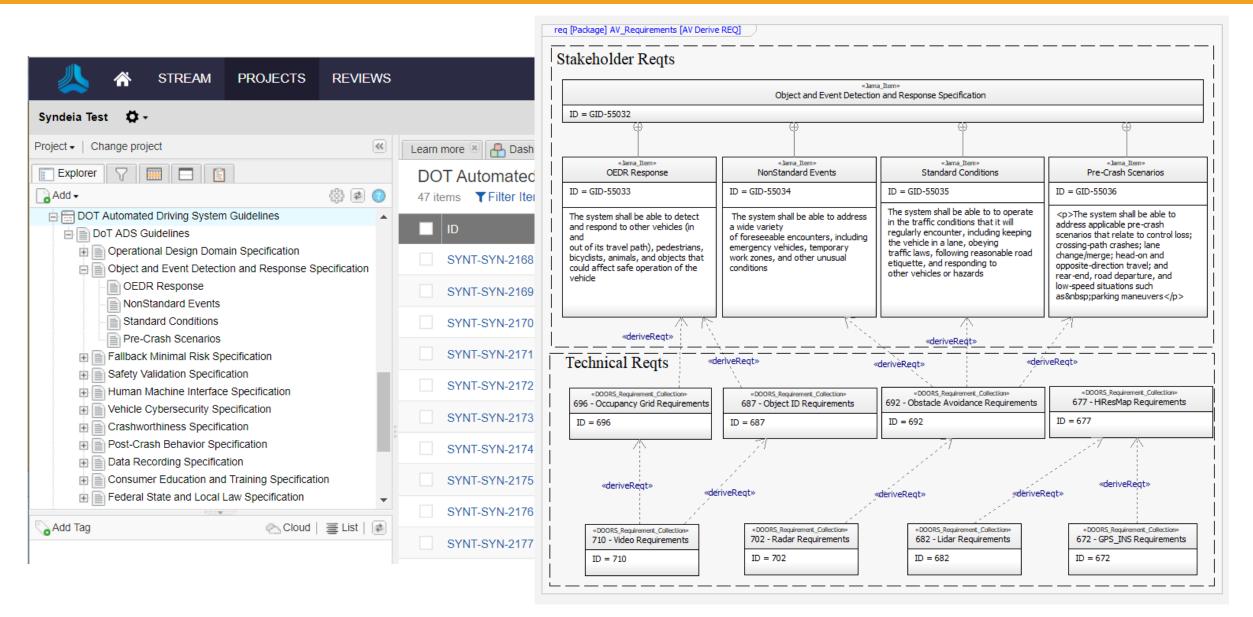
- Manage Traceability
- Perform Impact Analysis
- Monitor Project Progress
- Facilitate Design Review
- Document Technical
 - Deliverables







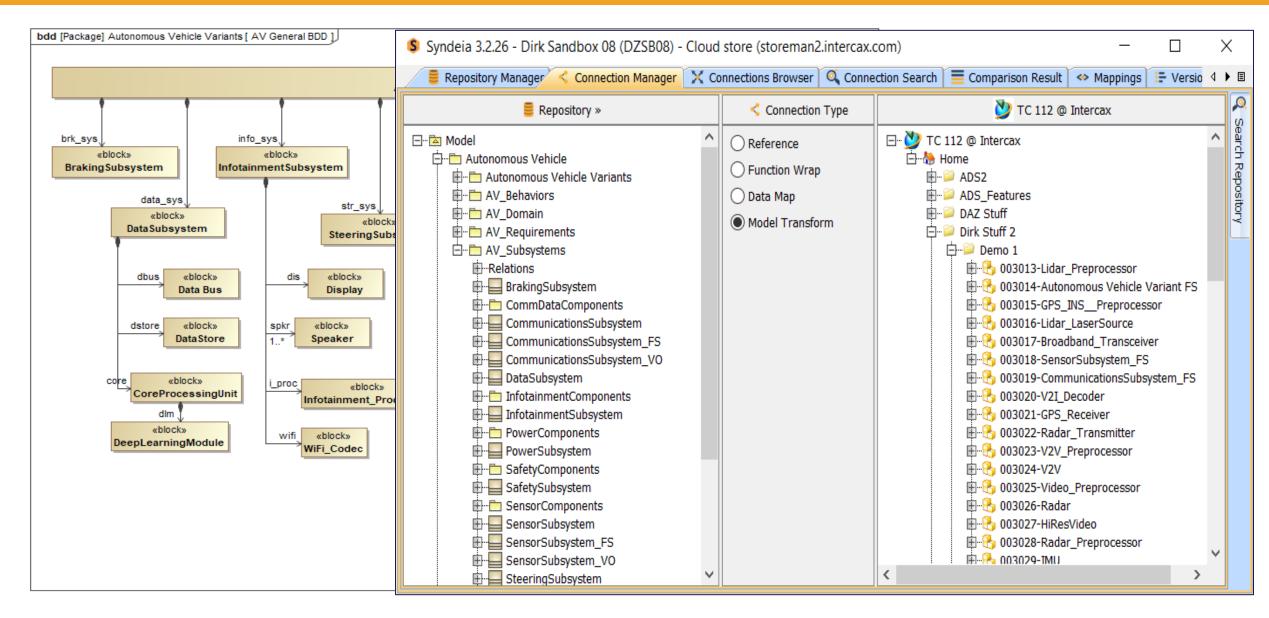




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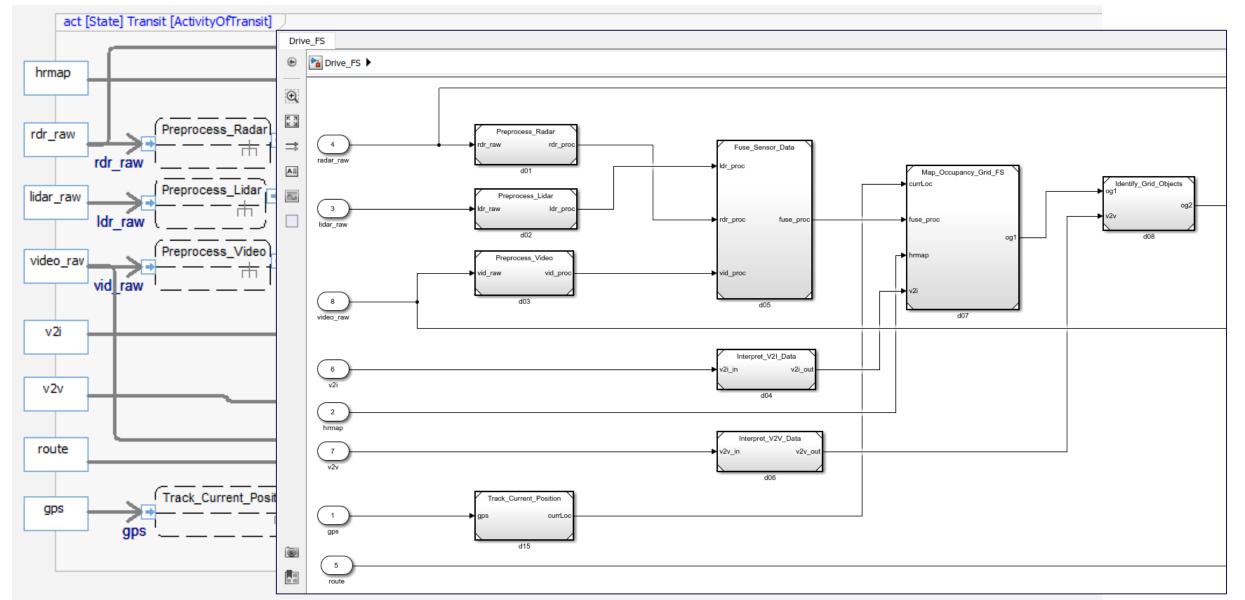
PLM BoM – SysML Model Transform





Autonomous Vehicle Functions

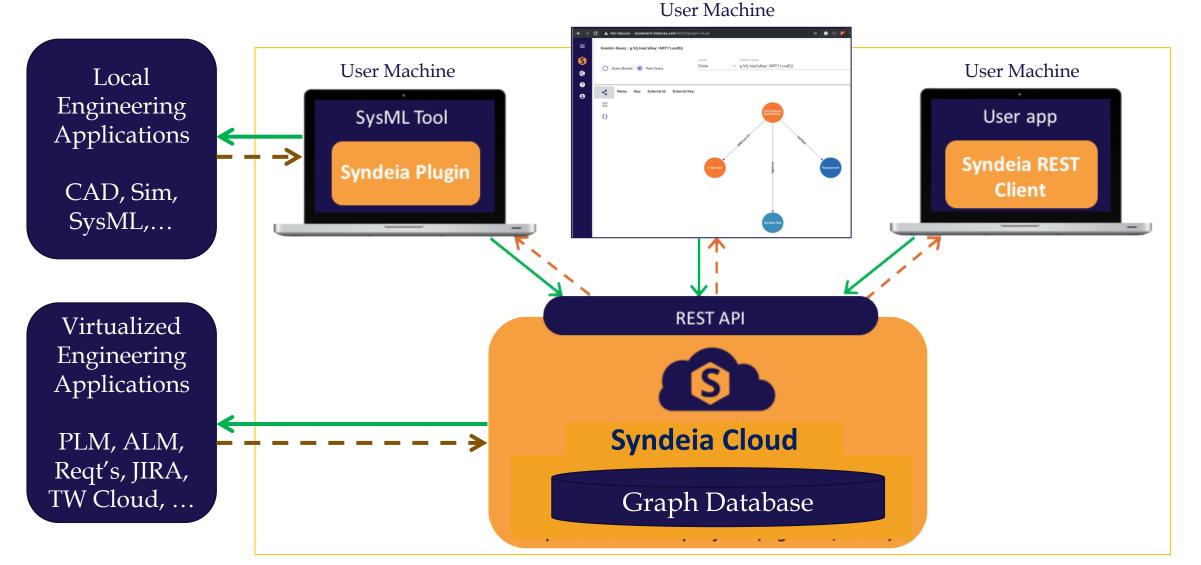




Syndeia Architecture Roadmap – 3.4

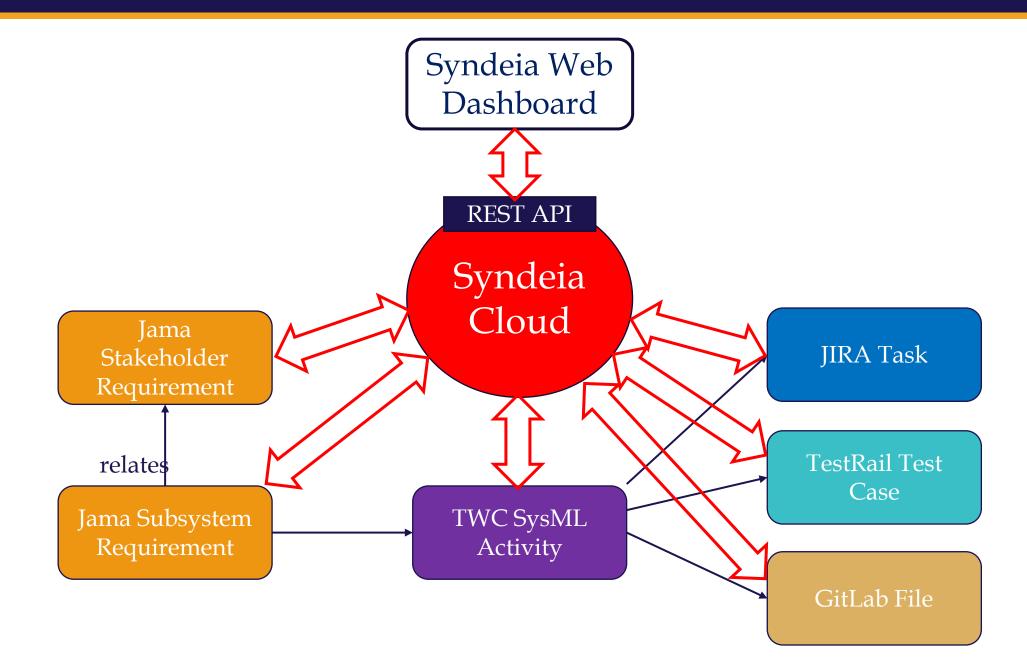


Syndeia Web Browser



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Syndeia Web Dashboard – Viewing Repository Contents

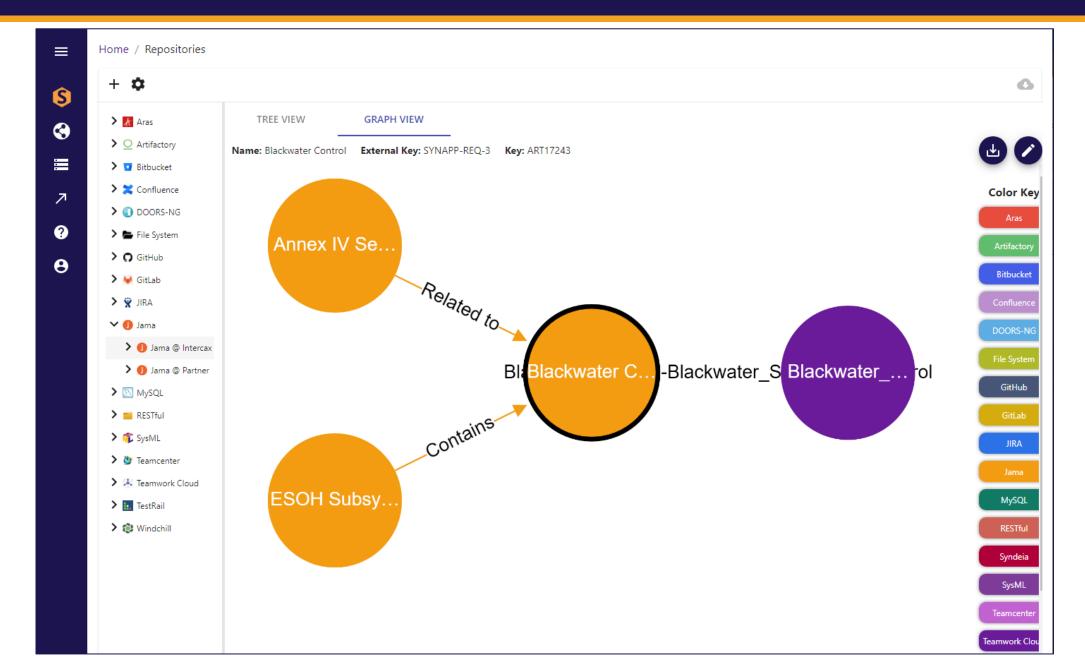
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> 😢 Windchill	Cooling Water Control	
	Fresh Water Control	

Syndeia Web Dashboard – Searching Repository Contents

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Digital Thread Explorer



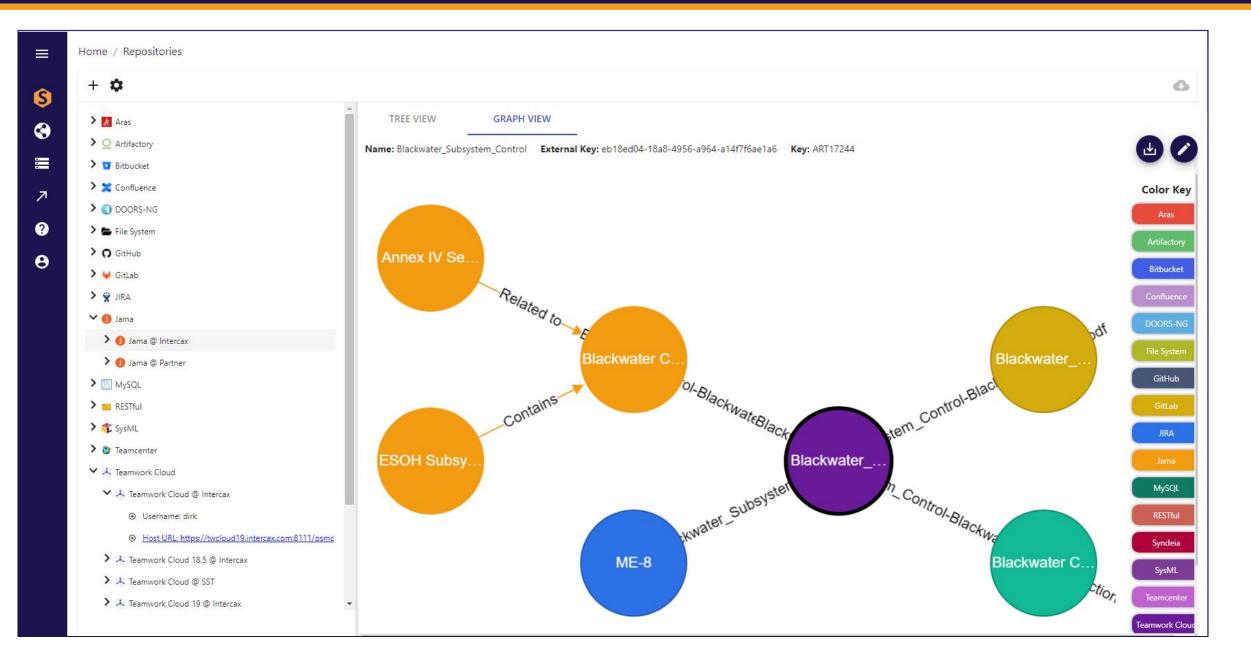


Jama Repository



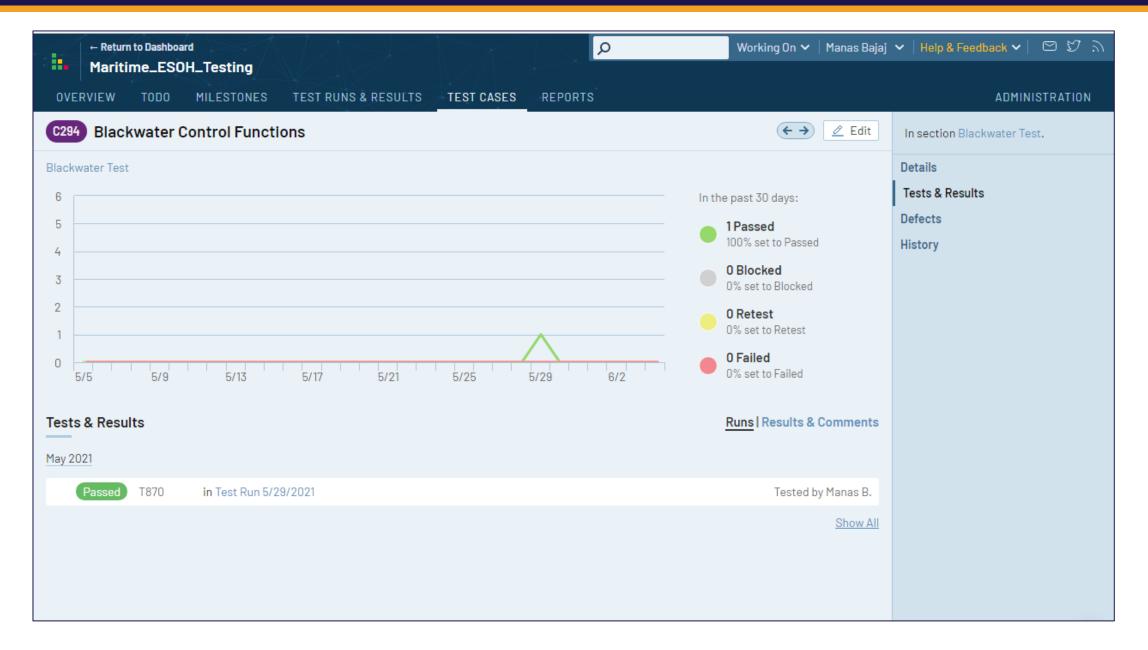
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Digital Thread Explorer - expanded

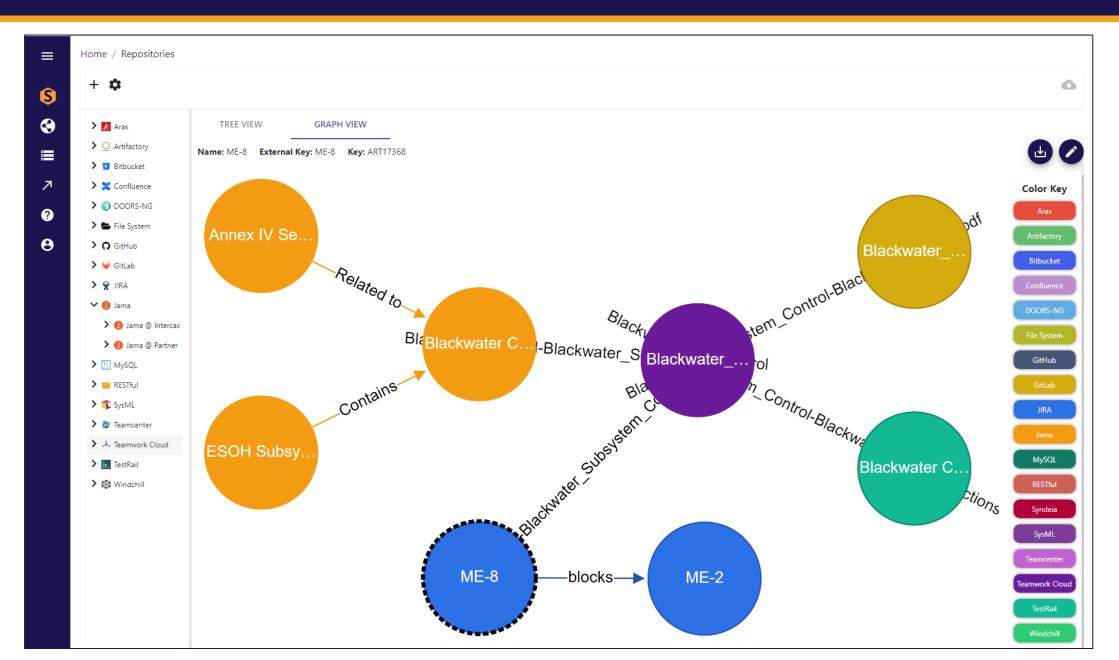


TestRail





Digital Thread Explorer – expanded again

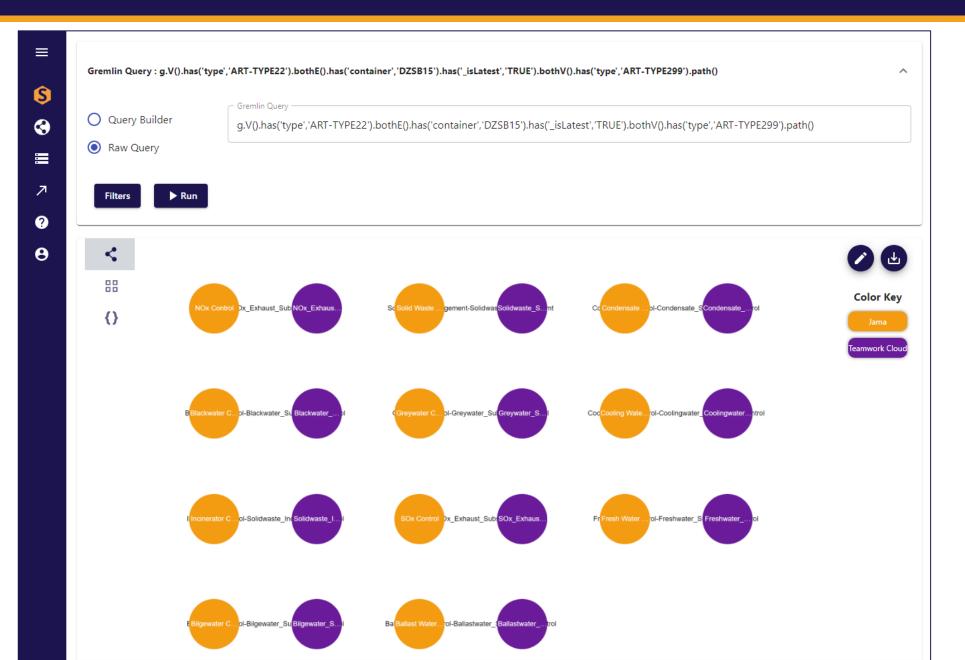


JIRA Repository

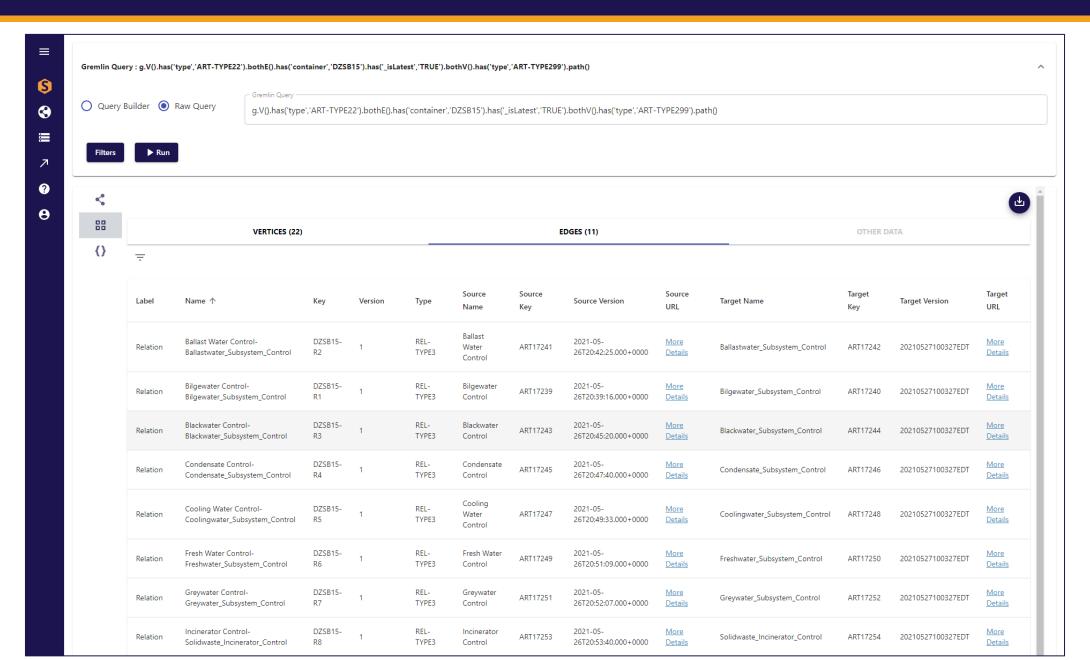


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 Roadmap Backlog Board 	 <i>Q</i> Attach <i>A</i>tda a child issue <i>Q</i> Link issue <i>v</i> <i>Description</i> This task tracks Blackwater Subsystem Development 	Assignee Labels	Dirk Zwemer
 Code Project pages Zephyr Scale 	Linked issues + blocks	Sprint Story point estimate	None
Add item	ME-2 Waste Water Treatment Subsystem Development 🔶 😰 TO DO 🗸	Reporter Created 8 days ago Updated 6 days ago	Dirk Zwemer Configure
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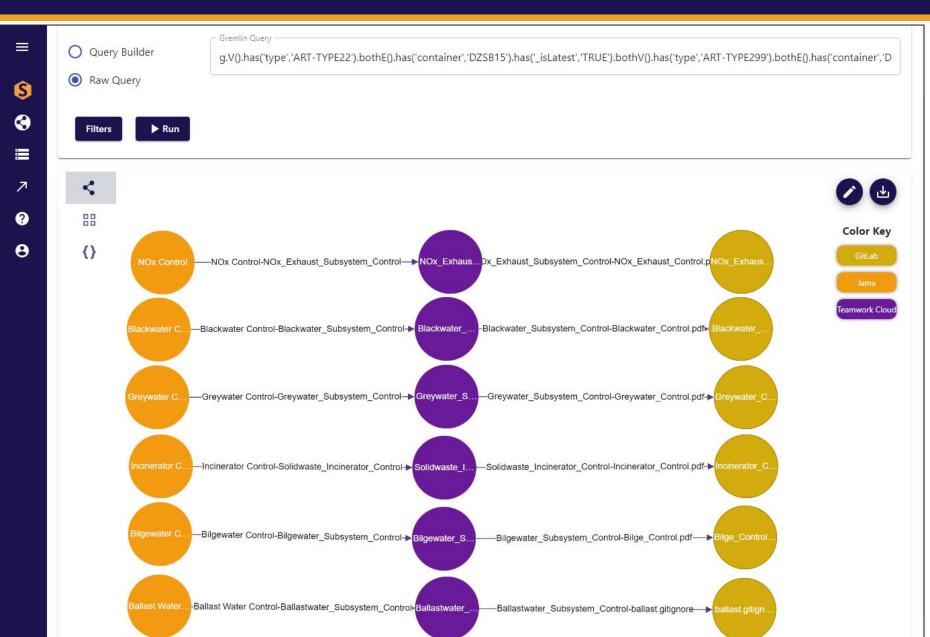
Gremlin Query – Jama req't – TWC activity



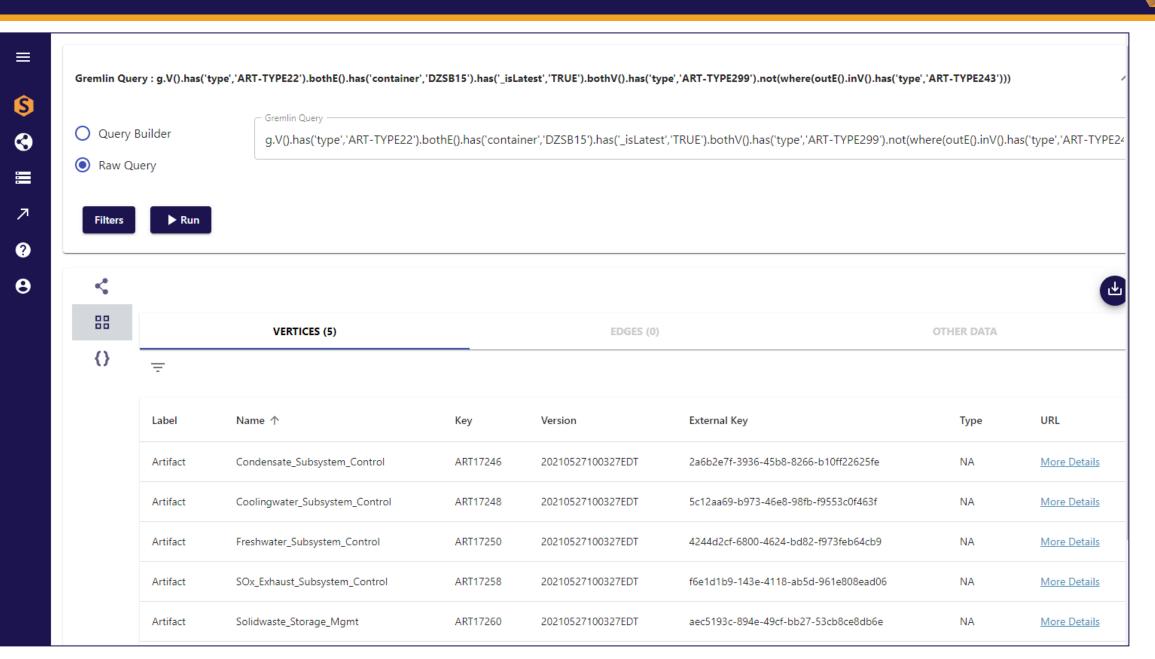
Gremlin Query – Jama req't – TWC activity



Gremlin Query – Jama req't – TWC activity – GitLab code file



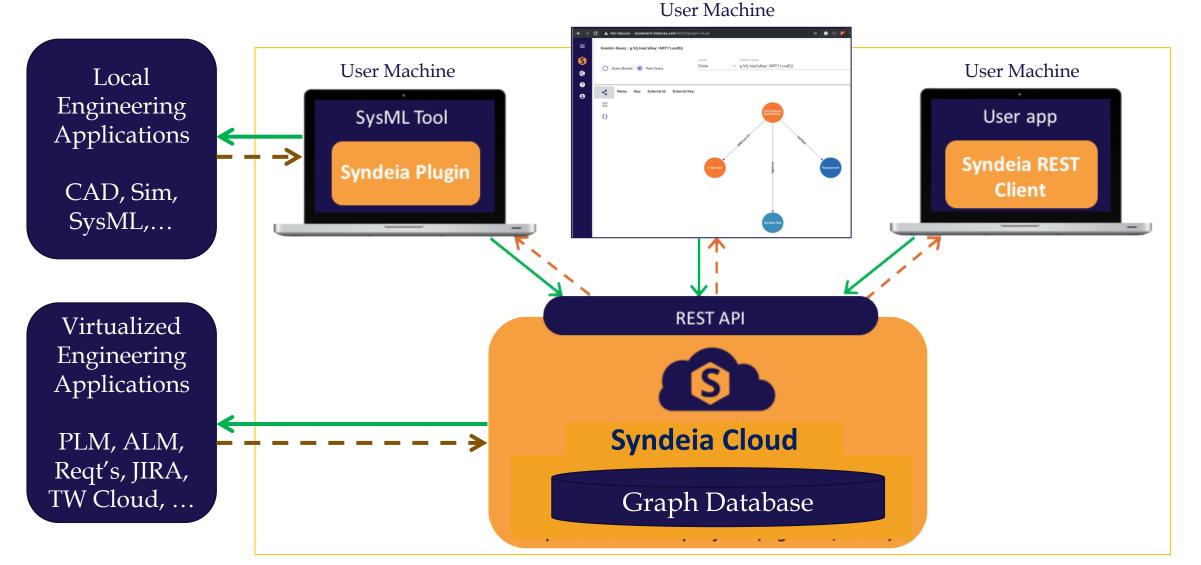
Gremlin Query – Jama req't – TWC activity **+** GitLab code file



Syndeia Architecture Roadmap – 3.4



Syndeia Web Browser



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Syndeia Cloud REST API (Swagger / OpenAPI specification)



Endpoints for accessing external repositories

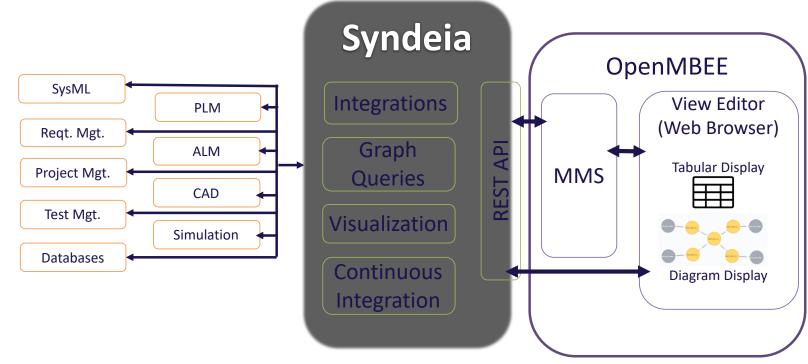
(e.g. JIRA) -- subset shown here

Endpoints for core domain concepts in Syndeia (subset shown here)

Artifact Manage artifacts	Find out more: http://www.intercax.com/syndeia/docs	External Repository - JIRA Manage JIRA repository Find out more: http://www.intercax.com/isyndeia/docs 🗸
GET /artifacts Get all artifacts		GET /external/jira/repositories Got Syndeia-Cloud JIRA repositories
POST /artifacts Create a new artifact	â	GET /external/jira/repositories/{key} Get Syndela-Cloud JIRA repository by key
GET /artifacts/{key} Get an artifact given the artifact key	â	POST /external/jira/repositories/external/id Get Syndala-Cloud JIRA repository by external id
PUT /artifacts/{key} Update artifact given the artifact key	â	GET /external/jira/{repoKey}/containers Gatal JRA containers
DELETE /artifacts/{key} Delete an artifact given the artifact key	â	GET /external/jira/{repoKey}/containers/{key} Get JIRA containers by external key
GET /artifacts/{key}/versions Get all versions of an artifact given the artifact key	a	POST /external/jira/containers/external/id Get a jira container given the container external id
GE1 /artifacts/{key}/versions/{version} Get an artifact given the artifact key and version	a	GET /external/jira/{repoKey}/artifacts GetJRA andacts
POST /artifacts/external/id Get an artifact given the artifact external id	a	GET /external/jira/{repoKey}/artifacts/{extKey} Get JIRA antifact by external key
Relation Manage relations	Find out more: http://www.intercax.com/syndeia/docs	POST /external/jira/artifacts/external/id Get an artifact given the artifact external id
GEI /relations Get all relations	â	GET /external/jira/{repoKey}/relations Get JIRA relations
POST /relations Create a new relation	â	GET /external/tm4j/{repoKey}/artifacts GetTM44J antifacts
GET /relations/{key} Get a relation given the relation key		GET /external/tm4j/{repoKey}/artifacts/{key} Get TM4J artifact by external key
PUT /relations/{key} Update relation given the relation key	a	POST /external/tm4j/artifacts/external/id Get an artifact given the artifact external id
DELETE /relations/{key} Delete a relation given the relation key	â	GET /external/tm4j/{repoKey}/relations GetTM4J relations
GET /relations/{key}/versions Get all versions of a relation given the relation key		POST /external/jira/{repoKey}/containers/search Search JIRA containers
GEI /relations/{key}/versions/{version} Get a relation given the relation key and version	â	POST /external/jira/{repoKey}/artifacts/search Search JIRA antifacts
POST /relations/external/id Get a relation given the relation external id		POST /external/tm4j/{repoKey}/artifacts/search

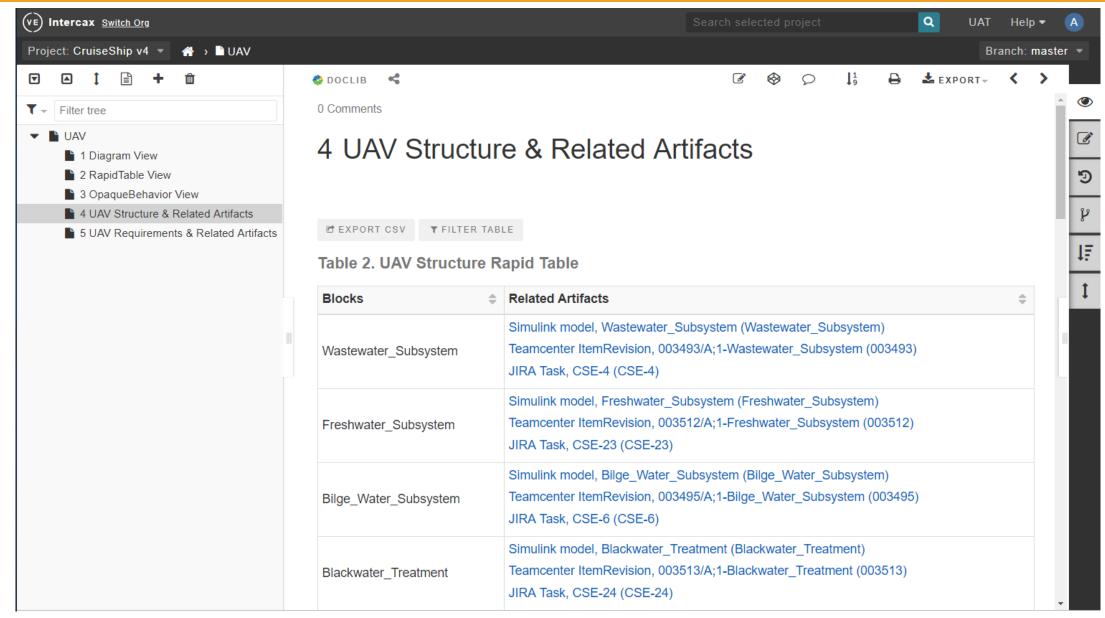
Syndeia and OpenMBEE

- OpenMBEE : Open source Model-Based Engineering Environment (MBEE)
 - Driven by the user community (NASA JPL, Lockheed Martin, Boeing)
 - Pragmatic collection of open source and commercial tools
 - http://www.openmbee.org/
- Syndeia as a conduit for OpenMBEE to enterprise/commercial tools and repositories

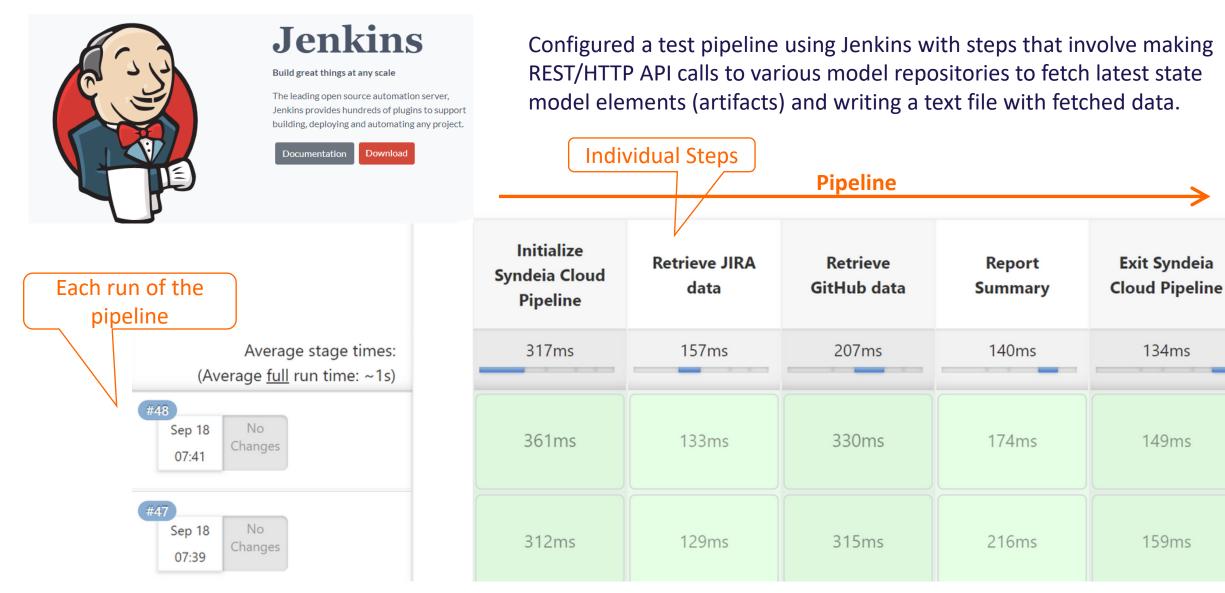


Syndeia and OpenMBEE









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- Syndeia creates and manages a network of point-to-point operations connections between model elements in different tools
 - reference connection for access and traceability
 - model transform connection for share, compare and update
- Syndeia supports analysis, visualization and documentation of the connections as a Digital Thread
- Syndeia is hybrid client/server architecture, transitioning to a server-based enterprise application



- Check out our website for product info and video demonstrations at <u>www.intercax.com/syndeia</u>
- Read our on-line user guide and tutorials at https://intercax.atlassian.net/wiki/spaces/SYN33/overview
- Schedule a web demo with Intercax contact us at info@intercax.com
- Request an evaluation license set up an account and submit your request at www.intercax.com/help



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