Syndeia 3.1 for MBSE
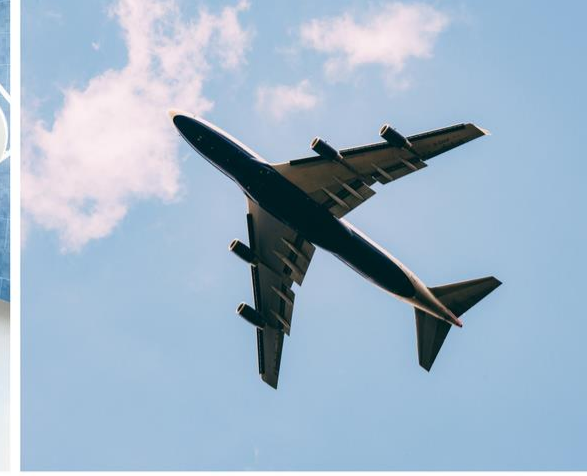
The Next Generation of Model-Based Systems Engineering

Dr. Dirk Zwemer

June 14, 2017

About Intercax

- Born: Georgia Tech spin-off 2008
- Location: Perimeter Center, Atlanta; Pune IT Park, Pune, India
- Focus: Software for MBSE
  - **Syndeia -** PLM/CAD/CAE/ALM Integration with SysML
  - SysML parametric solvers
- Training, consulting, custom apps
  - 3500+ students since 2008
- Customers
  - Gov: NASA, DoD, DoE
  - Commercial: aero, auto, transportation, consumer goods, energy, mfg., healthcare
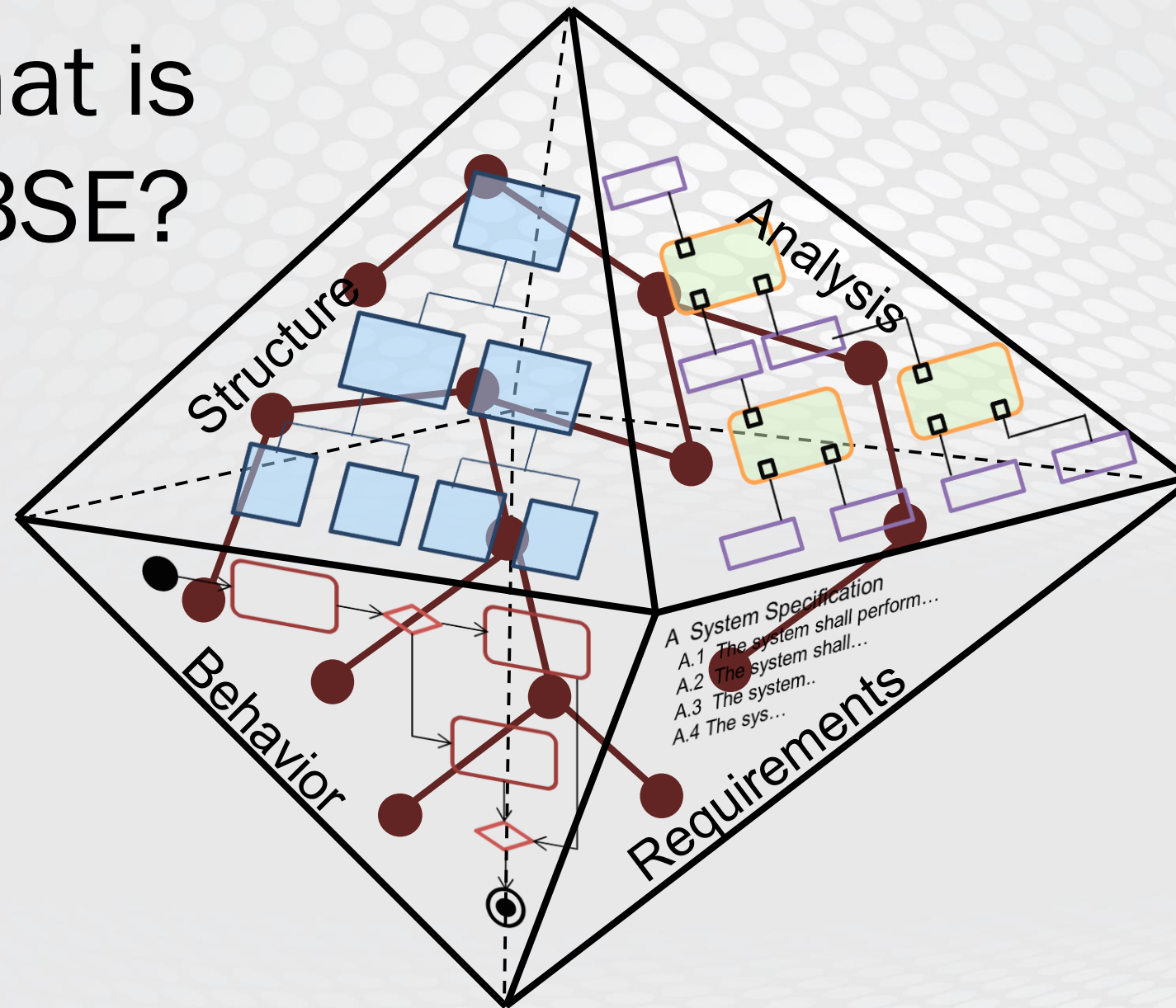
Agenda

- MBSE, MBE and Syndeia
- What does Syndeia do?
- New Features in Syndeia 3.1
  - Jama Software Interface
  - Stateflow Interface
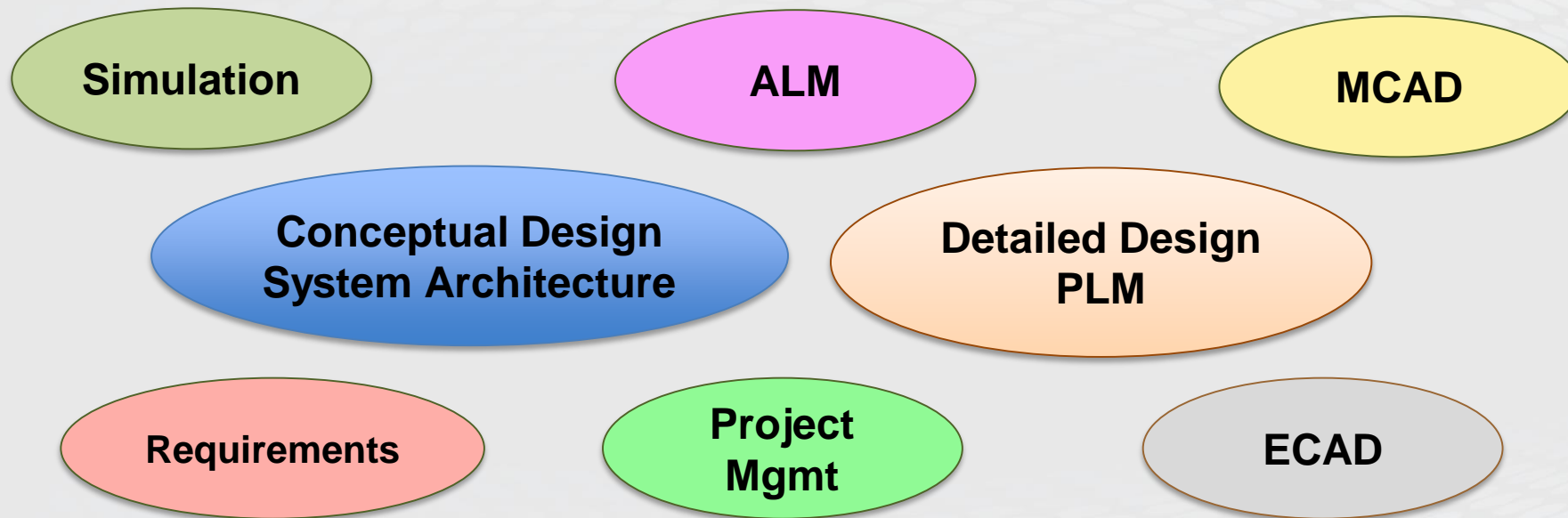 - Connection Database
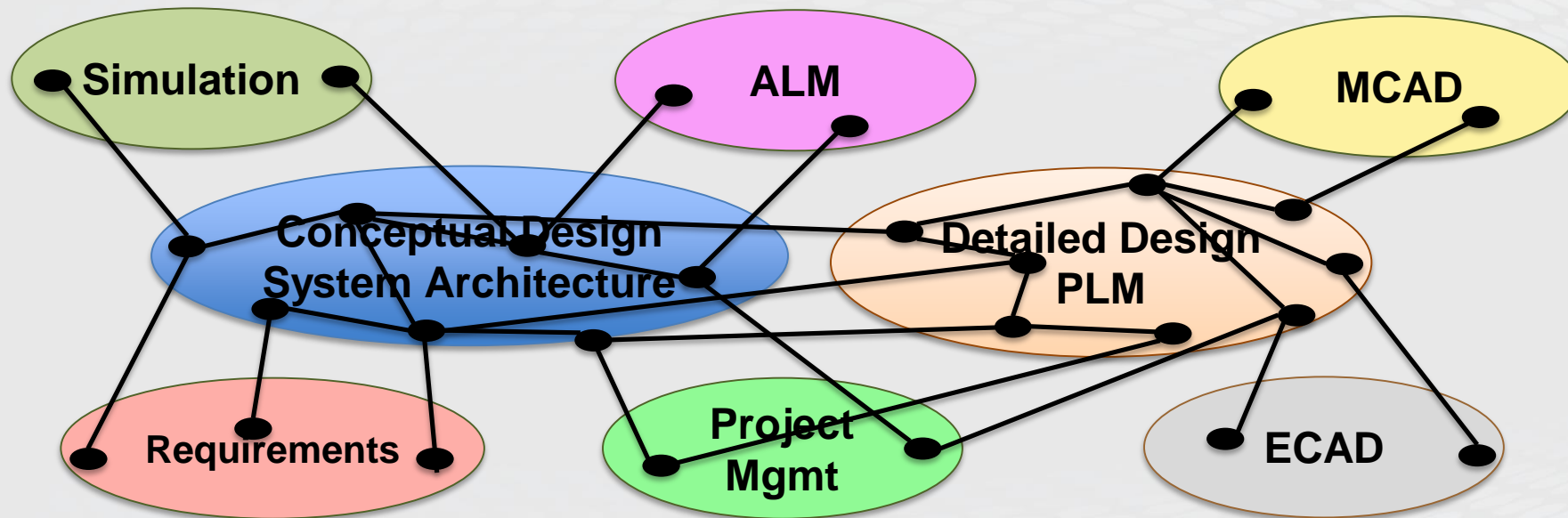- Future Directions

What is MBSE?

The Engineering Software Universe

- Our customers deal with a diverse, multi-vendor engineering toolset.
- Our customers create and store product/system data in a variety of tools, models and repositories: PLM, ALM, CAD, spreadsheets, databases, SysML models…

Simulation

ALM

MCAD

Conceptual Design
System Architecture

Detailed Design
PLM

Requirements

Project
Mgmt

ECAD

The Engineering Software Universe

- The challenge of MBSE is to create a single, unified model <u>extending over all the tools and data repositories</u>.

- This kind of model is called a Graph.
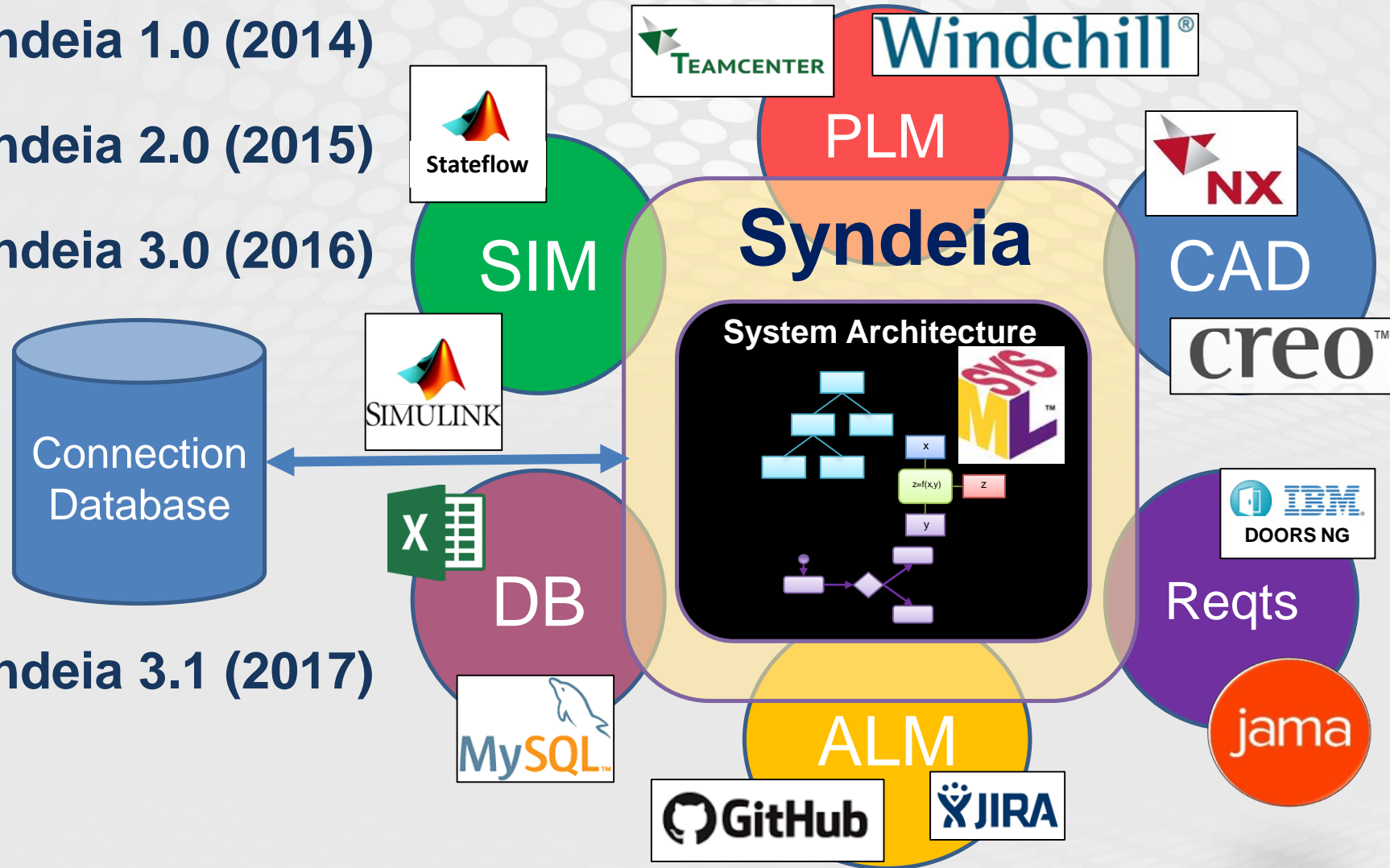
- Syndeia™ creates, manages and displays these Graphs.

Syndeia

Syndeia 1.0 (2014)

Syndeia 2.0 (2015)

Syndeia 3.0 (2016)

Syndeia 3.1 (2017)

Connection Database

Syndeia

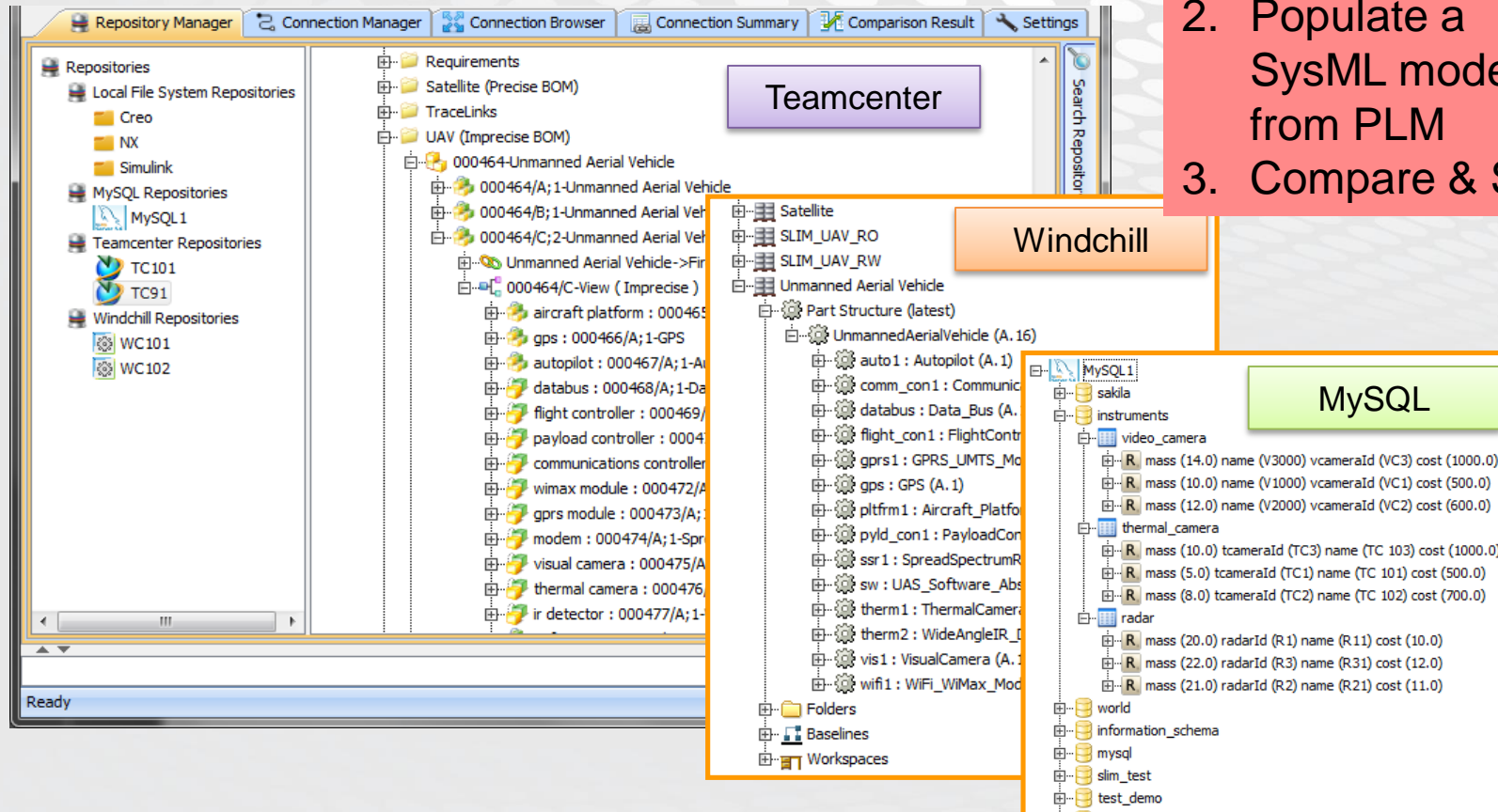System Architecture

SIM

PLM

CAD

DB

ALM

Reqts

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Connection to PLM Systems and Databases

1. Populate a PLM BoM from SysML
2. Populate a SysML model from PLM
3. Compare & Sync

Connection to 3D CAD models

1. Access a CAD model
2. Generate a CAD file from SysML
3. Generate a block from a CAD part or assembly
4. Compare & Sync

Drag-n-drop to generate & connect

Example model from PTC Creo 3.0

Race Car

Connection to Simulation
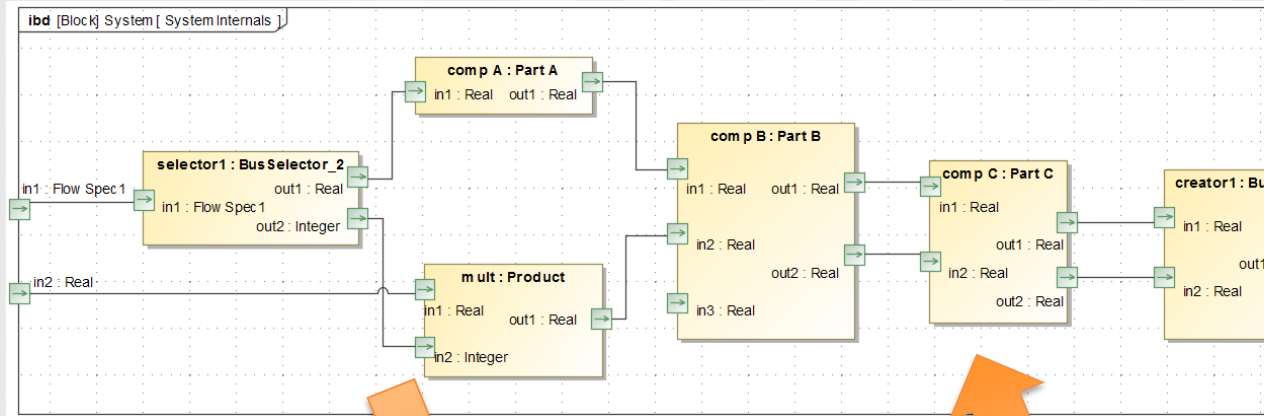
1. Populate a Simulink model from SysML IBD or Activity diagram
2. Populate a SysML model from Simulink
3. Compare & Sync
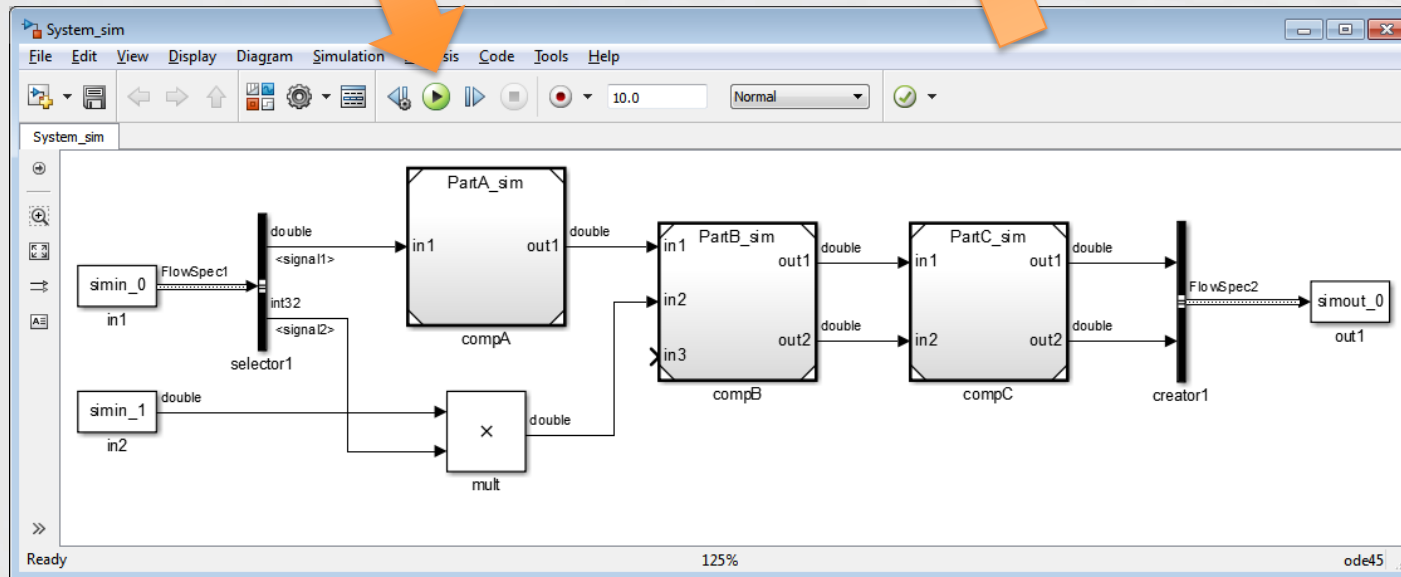
Jama   DOORS NG

Connection to Requirements

Jama side:

- ⊟ ⓙ Jama @ Partner
  - ⊟ Automobile
    - ⊞ Syndeia
    - ⊟ System
      - ⊞ Manufacturing
      - ⊞ Design
    - ⊟ Market Input
      - ⊟ Stakeholder Requirements
        - ⊞ Occupant Safety
        - ⊞ Riding Comfort
        - ⊞ Passenger & Baggage Load
        - ⊞ Emissions
        - ⊞ Production Cost
        - ⊟ Vehicle Performance
          - ⊞ Turning Radius
          - ⊞ Top Speed
          - ⊞ Braking Distance
          - ⊞ Max Acceleration
        - ⊞ Reliability
  - ⊞ IIBA BABOK
  - ⊞ Integrated System
  - ⊟ IS
    - ⊞ Ipad Defects
    - ⊟ System
      - ⊟ Software
        - ⊞ software Architecture
        - mobile power bank
        - mobile app
      - ⊟ Hardware
        - Temperature Sensor

DOORS side:

- ⊟ 🟦 DOORS @ Intercax
  - ⊞ Automated Meter Reader (Water)
  - ⊞ Unmanned Aerial Vehicle
  - ⊞ Fire Station
  - ⊟ Automobile
    - 1171 – Automobile Project–level Requirement Collection
    - ⊟ 1172 – Automobile Project Kick–off Requirement
      - ⊟ → Link From
        - 1171 – Automobile Project–level Requirement Collection
    - ⊞ 1173 – Automobile Project Schedule Requirement
    - 1871 – Automobile Project–level Module
    - ⊞ 2090 – D1
  - ⊞ 📁 Automobile Project–level Module artifacts
  - ⊟ 📁 Customer Specification
    - ⊟ 1144 – Automobile Customer Specification Module
      - ⊞ 1147 – Vehicle Performance
      - ⊞ 1146 – Passenger and Baggage Load
      - ⊞ 1159 – Fuel Economy
      - ⊟ 1152 – Riding Comfort
        - ⊞ 1153 – Space
        - ⊞ 1154 – Vibration
        - ⊞ 1155 – Noise
      - ⊞ 1156 – Occupant Safety
      - ⊞ 1157 – Reliability
      - ⊞ 1158 – Emissions
      - ⊞ 1160 – Production Cost
    - 1162 – Passenger Comfort–related Requirements
    - 1161 – Automobile Customer Req Collection
      - ⊞ 1152 – Riding Comfort
      - ⊞ 1147 – Vehicle Performance
      - ⊞ 1151 – Turning Radius
      - ⊞ 1153 – Space
      - ⊞ 1155 – Noise
      - ⊞ 1149 – Top Speed
      - ⊞ 1156 – Occupant Safety
      - ⊞ 1150 – Braking Distance

1. Populate SysML req'ts
2. Populate req'ts tool from SysML
3. Compare & Sync

Connection to software (ALM)

Repository Manager | Connection Manager | Connection Browser | Connection Summary | Comparison Result | Settings

GitHub Server

GitHub @ Intercax
- InterCAX
- User Public Repository
  - Demonstrations
    - Branches
      - develop
        - Commits
          - 105c40a0d9 Create Controls.py
          - 9226921ac8 Create Scenarios.py
          - 9243ead0b7 Delete python
          - 9fb692d6a0 Create python
          - 49bdca771c Create InclinationTest.java
          - 0626750bd2 Create ControlTest.java
          - 5a557ceab3 Create AngleTest.java
          - dfbbe4385f Create Inclination.java
          - 12518ad774 Create Angle.java
          - 37db5bb24a Create Control.java
          - 0f34833d4d Initial commit
        - Files
          - README.md
          - src
            - main
              - java
                - Angle.java
                - Control.java
                - Inclination.java
              - python
                - Controls.py
                - Scenarios.py
            - test
      - master
    - Tags
- Project-Alpha

Your organization repositories

Your public repositories

Git Branch

Git Commits (on the branch)

Git Files/Folders (on the branch)

Git Repositories

1. Access latest software file from SysML

Tags

DOORS @ Supplier A
GitHub
  GitHub @ Intercax
JIRA
  JIRA @ Intercax
Local File System
  Creo Models
  Simulink Models
MySQL
  MySQL @ Intercax
  Parts Lib @ Supplier A
RESTful
Teamcenter
  TC9 @ Intercax
  TC9 @ manas
Windchill
  WC @ Supplier B
  WC10.2 @ Intercax

Connection to Project Mgmt.

Repository Manager | Connection Manager | Connection Browser | Connection Summary |

Repositories
- DOORS
  - DOORS @ Intercax
  - DOORS @ Supplier A
- GitHub
  - GitHub @ Intercax
- JIRA
  - JIRA @ Intercax
- Local File System
  - Creo Models
  - Excel Models
  - NX Models
  - Simulink Models
- MySQL
  - MySQL @ Intercax
  - Parts Lib @ Supplier A
- RESTful
- Teamcenter
  - TC9 @ Intercax
  - TC9 @ manas
- Windchill

JIRA @ Intercax
- Projects
  - Big Bang (BIG)
  - HelloJIRA (HELLO)
  - Syndeia Demo Box (SDB)
    - SDB–128
      - Project: Syndeia Demo Box
      - Summary: Problem with the document
      - Type: Bug
      - Status: Open
      - Priority: Major
      - Updated: 2016–06–30T08:31:24
      - Assignee: manasbajaj
      - Reporter: manasbajaj
    - SDB–127
    - SDB–126
    - SDB–118
  - SysML Interface (SYSML)
  - Test–Basic–Desk (TESTBASIC)
  - Test–IT–Service–Desk (TESTITDESK)
- Issues

JIRA rep

JIRA Projects

Issue details

JIRA Issues (assigned to you for this project)

JIRA Issues (assigned to you for all projects)

1. Access a JIRA issue from SysML
2. Create a JIRA task structure from SysML
3. Compare & Sync

Visualize and trace connections

1. View all connections
2. View connections around specific element
3. Query a graph database by connection or element type.
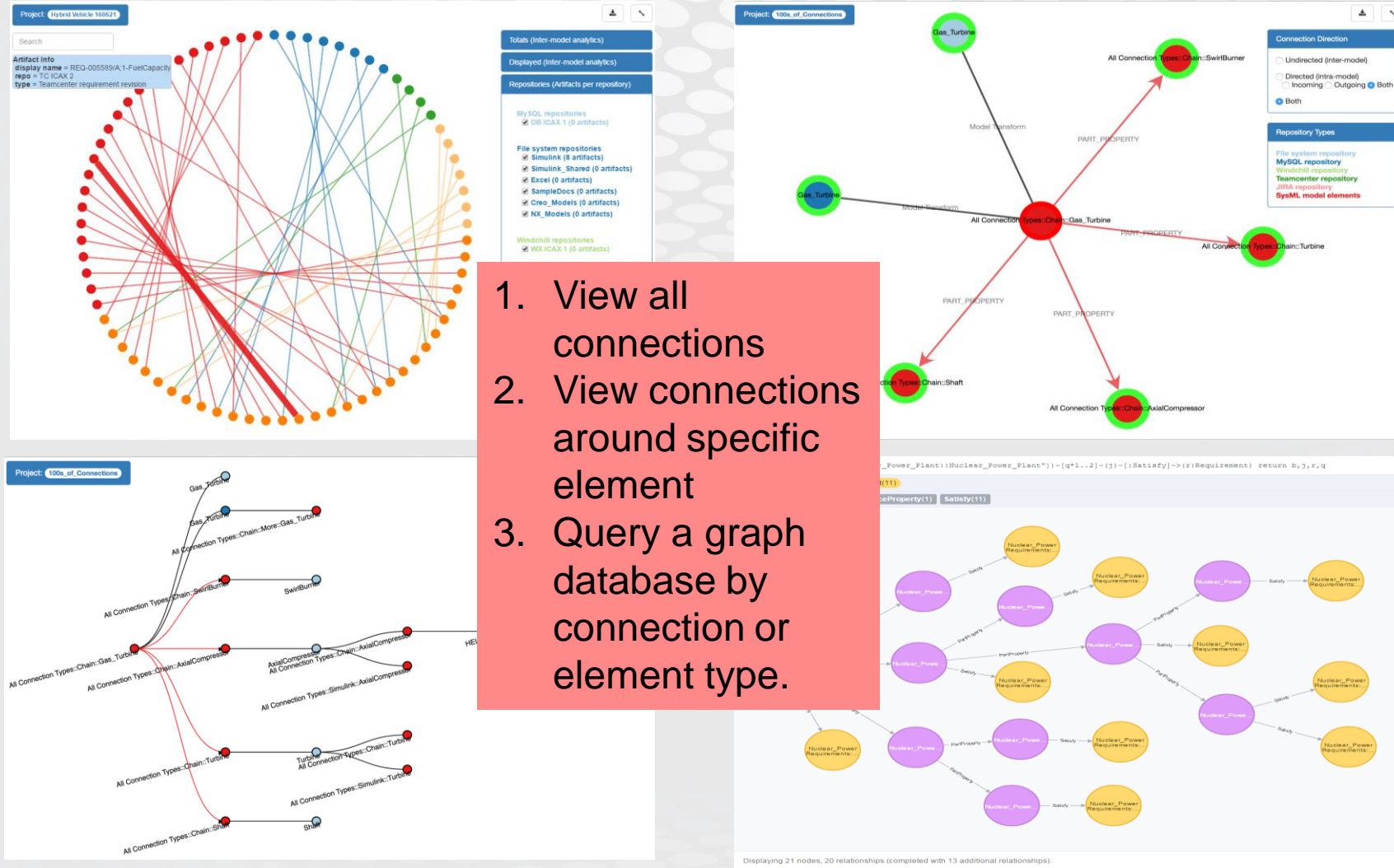
Syndeia leverages open standards, open frameworks, and open APIs

- OMG SysML (Systems Modeling Language)
- OSLC
- REST Web Services
- JSON
- JDBC
- ISO STEP 10303
- Apache projects (multiple)
- FMI
- … and others

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Other New Features

- Simulink Synchronization
- API-Based Interface to MATLAB
- Windchill Projects and Libraries
- New Search Capabilities

Syndeia Yesterday (3.0 release and earlier)
- Plug-in for MagicDraw, IBM Rational Rhapsody
- Accessible only from SysML tools
- Connections stored in SysML model
- Visualization and queries from connection database

Syndeia Today (3.1 release)
- Plug-in for MagicDraw, IBM Rational Rhapsody
- Accessible only from SysML tools
- Connections stored in Cassandra database/cluster
- Visualization and queries from connection database
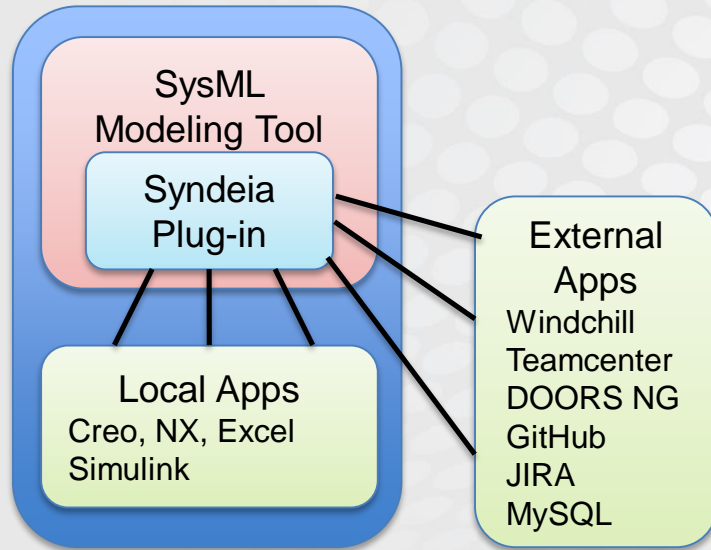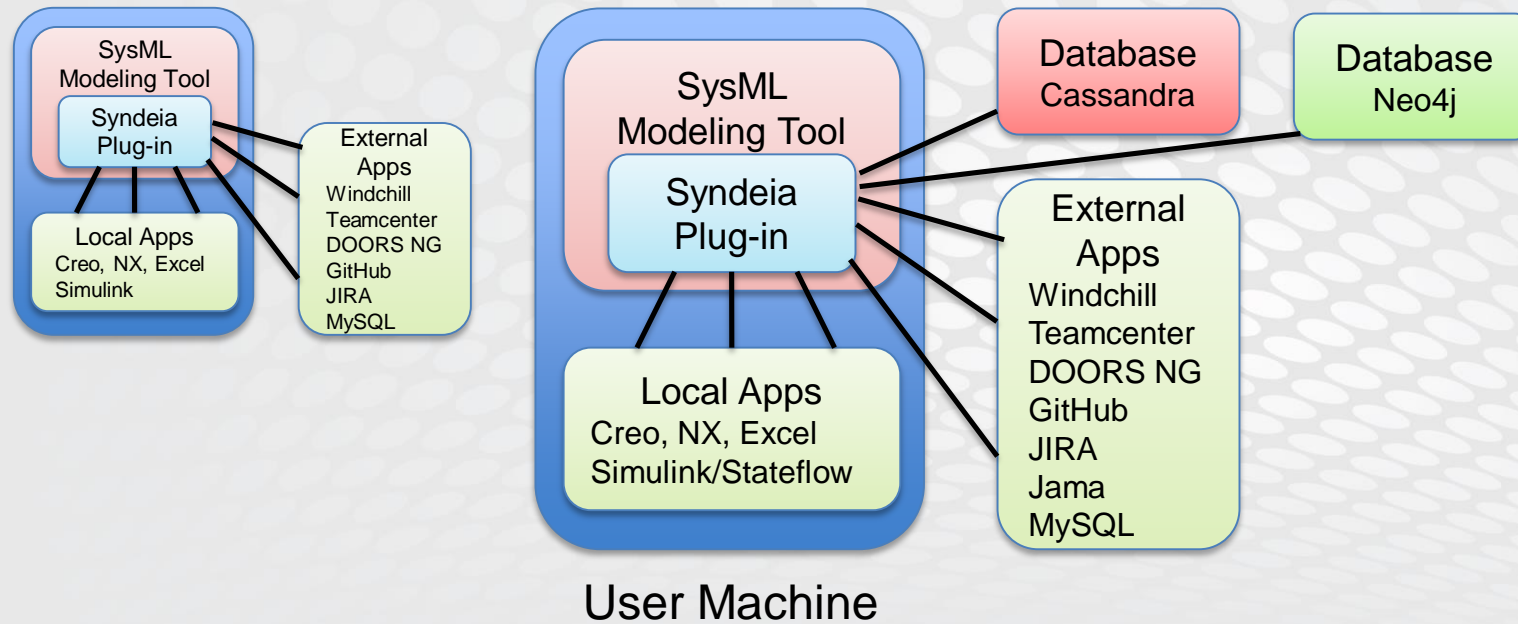
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Syndeia Roadmap

- **Today - Syndeia is a MBSE-centric tool**, deployed as a plugin for SysML Modeling tools (MagicDraw, Rhapsody,…)
  - Operates primarily from the SysML tool
- **Future - Syndeia is an enterprise MBE application**
  - REST web services with a backend graph database
  - Advanced query & visualization capabilities
  - Accessible from anywhere in the tool chain (SysML, PLM, ALM,…)
  - Incorporates parametric execution and analysis
  - API for extensible end user applications

SysML
Modeling Tool

Syndeia
Plug-in

External
Apps
Windchill
Teamcenter
DOORS
NG
GitHub
JIRA
MySQL

Local Apps
Creo, NX, Excel
Simulink

Database
Cassandra

SysML
Modeling Tool

Syndeia
Plug-in

External
Apps
Windchill
Teamcenter
DOORS NG
GitHub
JIRA
Jama
MySQL

Local Apps
Creo, NX, Excel
Simulink/Stateflow

User Machine

SysML Modeling
Tool

Syndeia
Stand-alone App

Local Apps
Creo, NX, Excel
Simulink/Stateflow
...

User Machine

Syndeia Server 3.2

Services
for
Visualiz-
ation

DB

External Apps
Windchill   Teamcenter
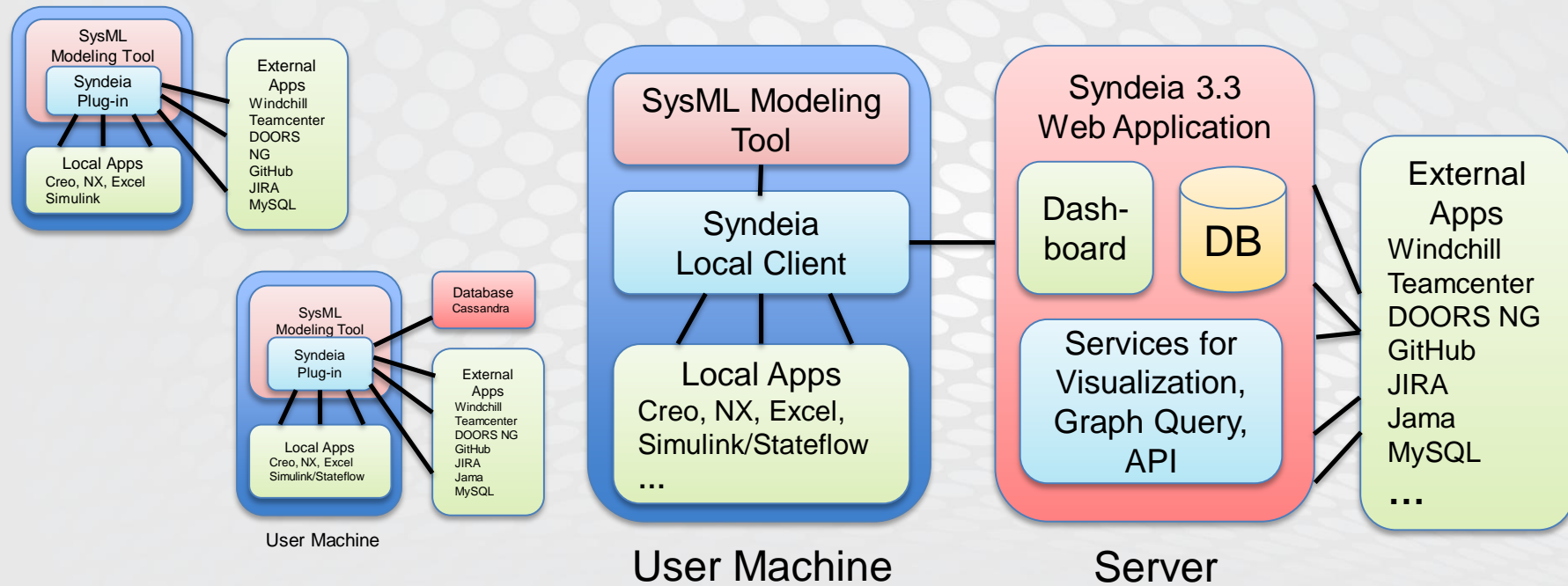DOORS NG   GitHub
JIRA   Jama   MySQL ...

Server

Syndeia 3.2 (Q4 2017)

- Stand-alone or plug-in client
- API for basic queries
- Customized mapping
- Create inter-model *reference connections* between any two repositories/tools

Syndeia 3.3 Enterprise Application (Q2 2018)
- Customized mapping between any tools
- Version Control and User Access Management
- Flexible Graph Queries and Visualizations
- Advanced API for customized applications
- Analysis and report generation

Why Syndeia?

- Works with your tools
- Supports many use cases
- Consistent interface
- A clear vision for MBE

Learn more about Syndeia

- Syndeia site: www.intercax.com/syndeia

- Demo Videos
  - Intro to Syndeia in 3 minutes - https://youtu.be/_RZ4lHDtdN8
  - Syndeia deep demos - http://intercax.com/products/syndeia/demos/

...and request an evaluation license

- Download and try Syndeia
  - Request 30-day or longer-term evaluations at:
    http://intercax.com/products/syndeia/download/

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