OpenLEGO demonstration

A link between AGILE and OpenMDAO

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OpenLEGO demonstration

A link between AGILE and OpenMDAO

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Simon Binder (Airbus)

Session: Link CMDOWS to OpenMDAO
13th of October 2017, 10:00-10:30h

First European OpenMDAO Workshop
12-13 October 2017, Toulouse, France

Contents

- The big picture
- Demo time!
- Recap
- Questions

AGILE

TU Delft

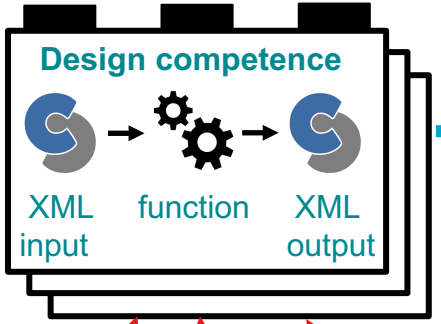
The big picture

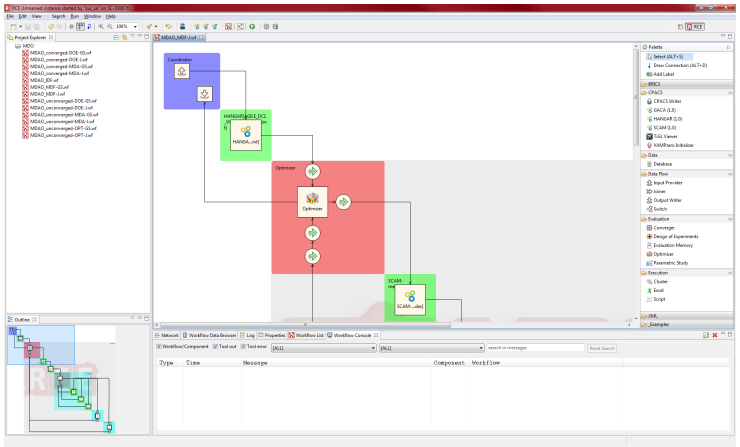
Pool of Simulation Tools ⇄ ***Integration and Optimization environments***

The big picture

Pool of Simulation Tools ⇄ ***Integration and Optimization environments***

The big picture





Structural analysis

Aero solver

Mission analysis

Pool of Simulation Tools ⇄ ***Integration and Optimization environments***

AGILE

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The big picture

Instead of making **running** optimizations cheap and easy,

we want to:

make **setting up** collaborative optimizations cheap and easy.

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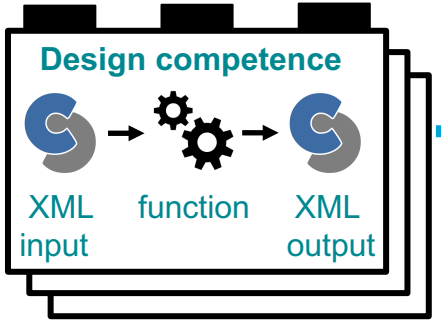
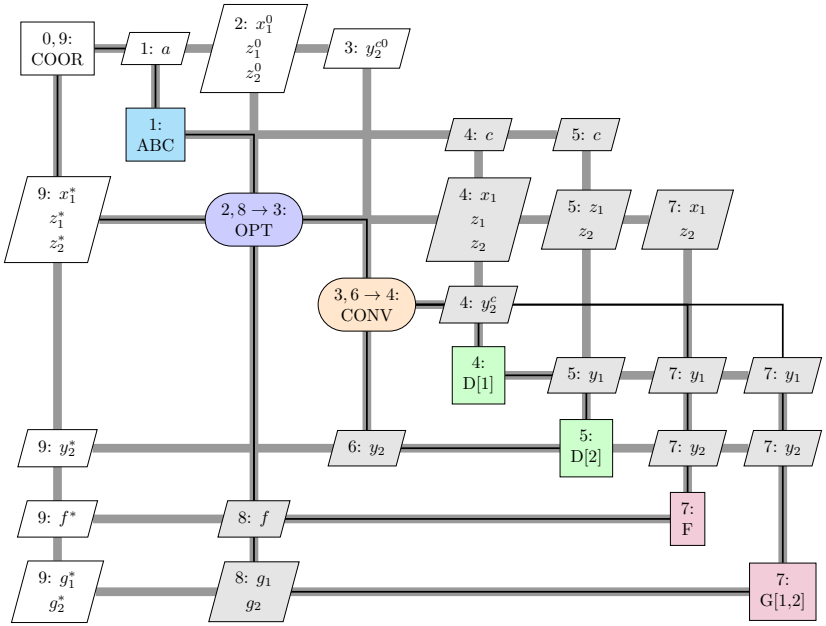
The big picture



KADMOS

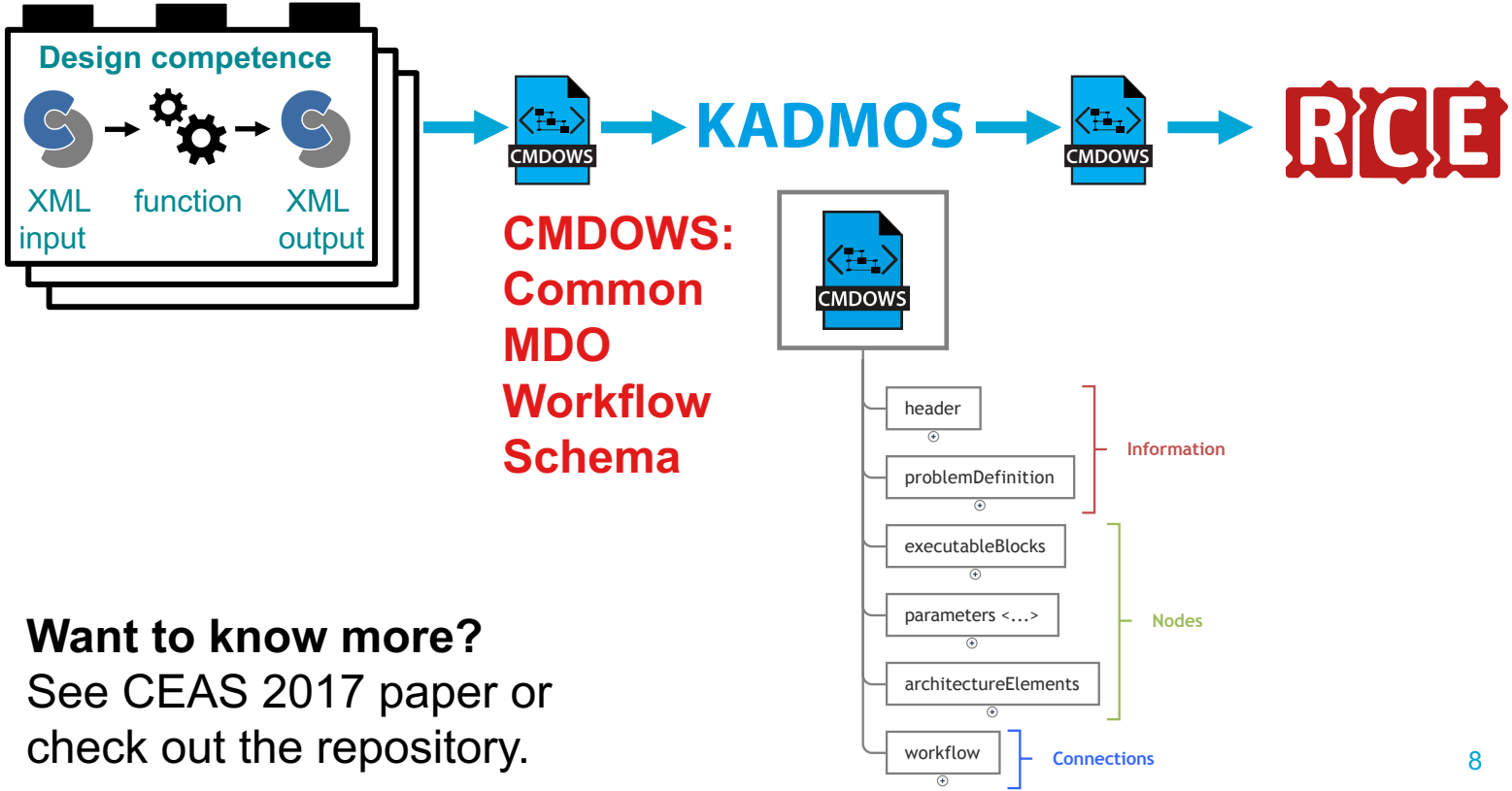
RCE



AGILE

TU Delft

The big picture



Want to know more?
See CEAS 2017 paper or check out the repository.

The big picture

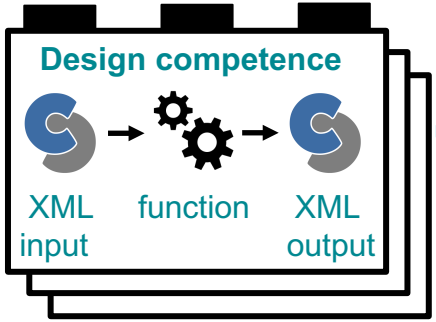
The big picture

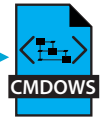
The big picture

AGILE

TU Delft

The big picture





KADMOS

Design for real
Optimus®

RCE

openMDAO

=

Made by Daniël de Vries

OpenLEGO

(Open-source Link between AGILE and OpenMDAO)

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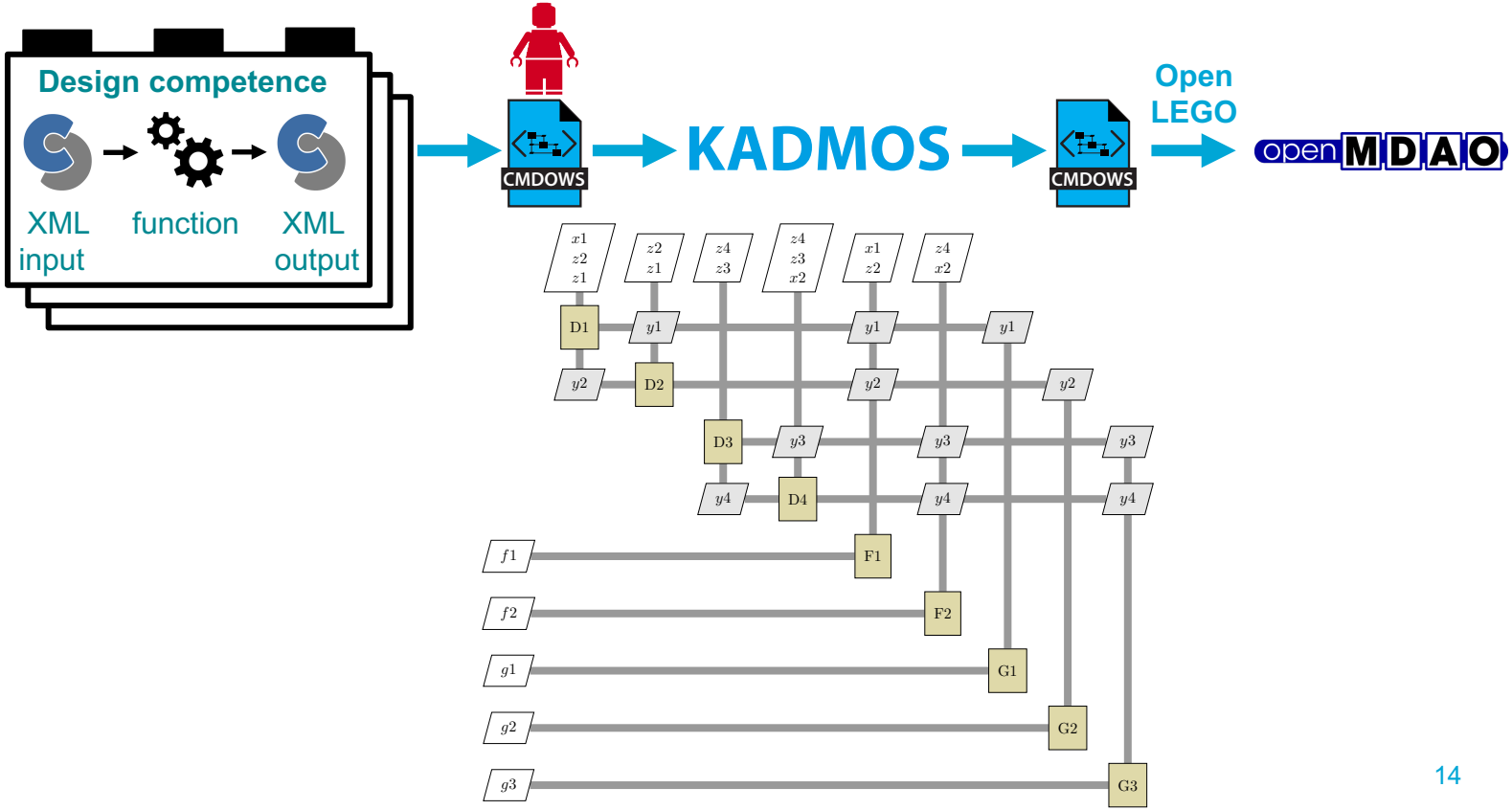
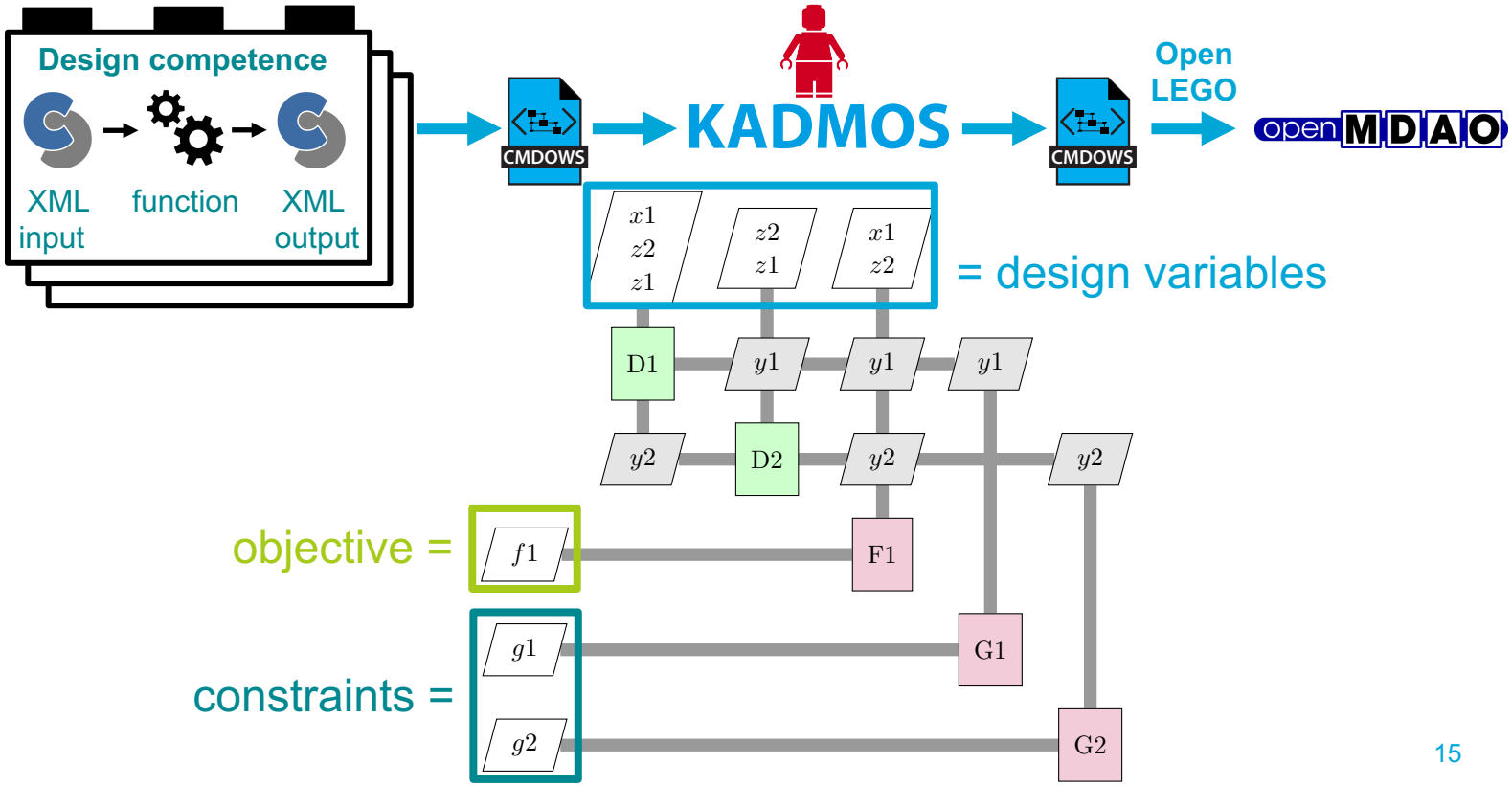
Demo time!

- sellar_OpenMDAO_workshop
  - __init__.py
  - D1.py
  - D2.py
  - D3.py
  - D4.py
  - F1.py
  - F2.py
  - G1.py
  - G2.py
  - G3.py
  - sellar.xsd

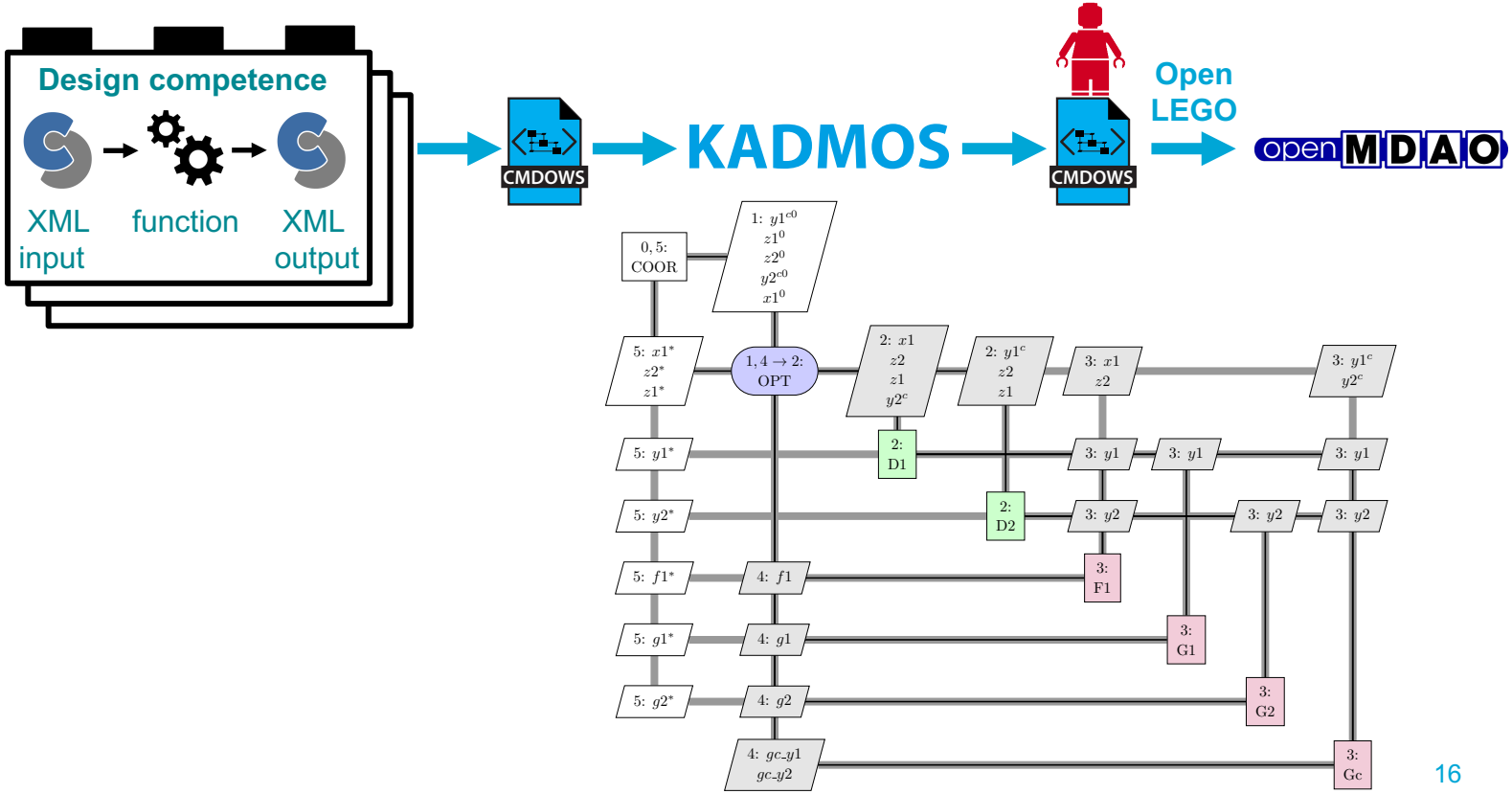
Demo time!


Design competence
XML input
function
XML output
CMDOWS
KADMOS
CMDOWS
Open LEGO
openMDAO
x1 z2 z1
z2 z1
z4 z3
z4 z3 x2
x1 z2
z4 x2
D1
y1
y1
y1
y2
D2
y2
y2
D3
y3
y3
y3
y4
D4
y4
y4
f1
F1
f2
F2
g1
G1
g2
G2
g3
G3

Demo time!


Design competence
XML input
function
XML output
CMDOWS
KADMOS
CMDOWS
Open LEGO
openMDAO
x1 z2 z1
z2 z1
x1 z2
= design variables
D1
y1
y1
y1
y2
D2
y2
y2
objective =
f1
F1
constraints =
g1
G1
g2
G2

Demo time!



AGILE

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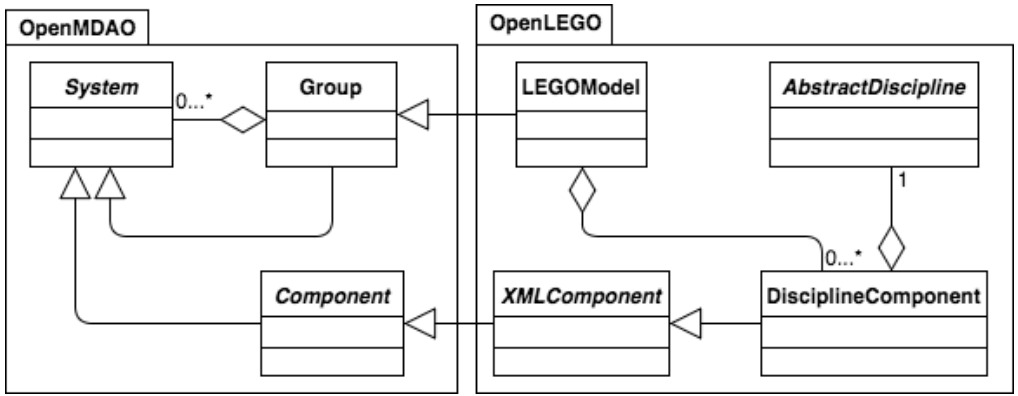
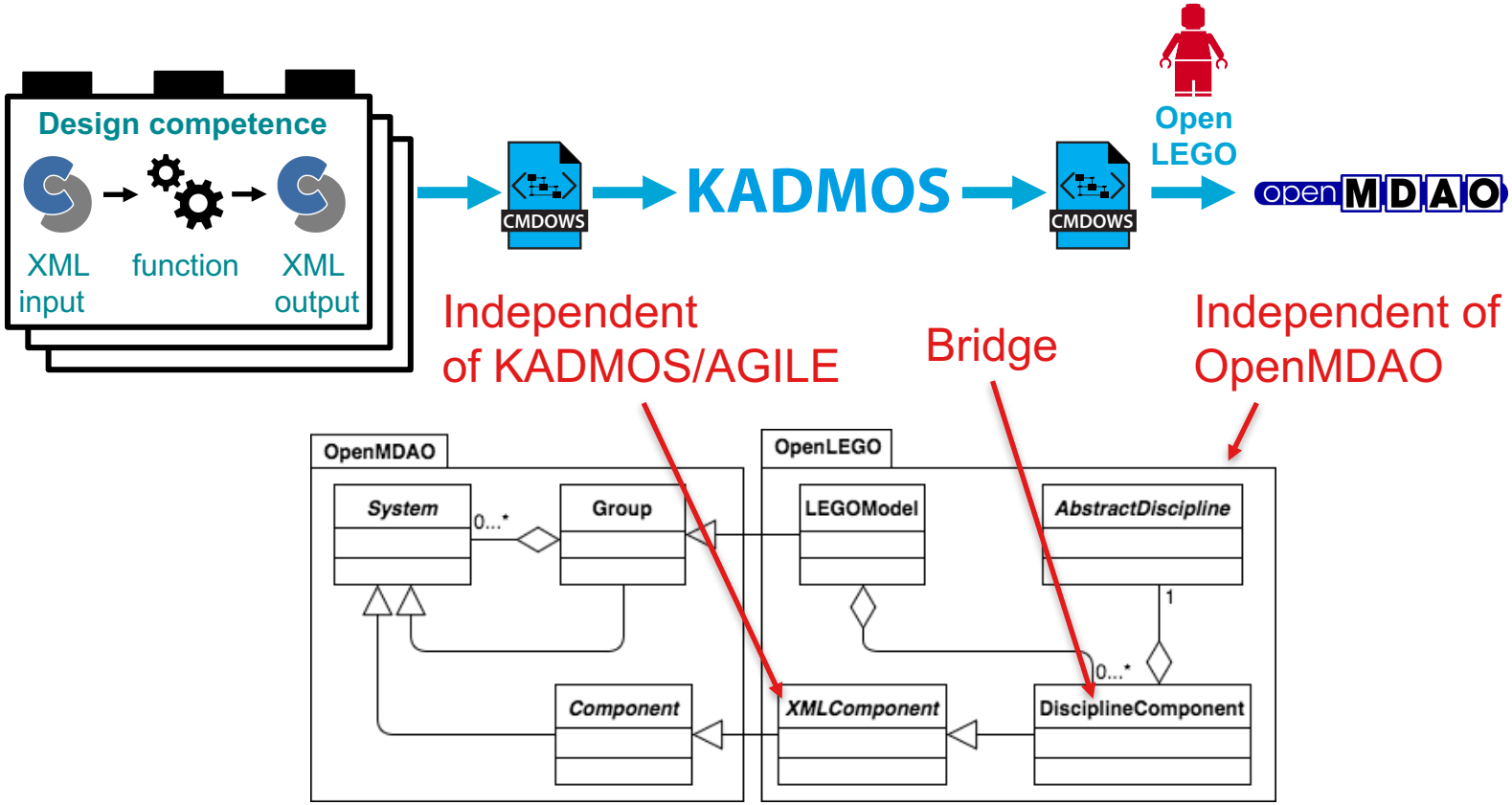
Demo time!

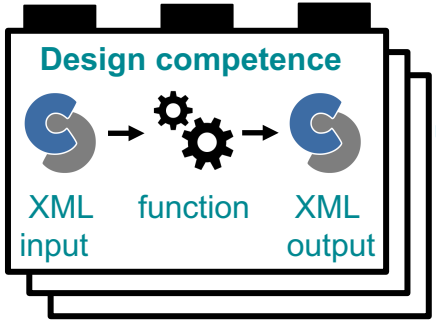

Design competence
XML input
function
XML output
CMDOWS
KADMOS
CMDOWS
Open LEGO
openMDAO

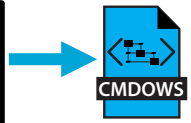

OpenMDAO
System
0...*
Group
Component
OpenLEGO
LEGOModel
AbstractDiscipline
1
0...*
XMLComponent
DisciplineComponent

Demo time!


Design competence
XML input
function
XML output
CMDOWS
KADMOS
CMDOWS
Open LEGO
openMDAO
Independent of KADMOS/AGILE
Bridge
Independent of OpenMDAO
OpenMDAO
System
0...*
Group
Component
OpenLEGO
LEGOModel
AbstractDiscipline
1
0...*
XMLComponent
DisciplineComponent

Demo time!

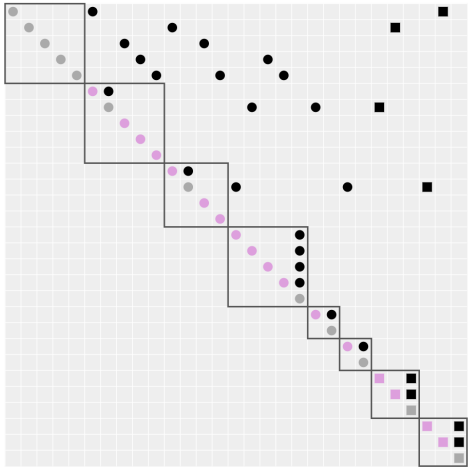




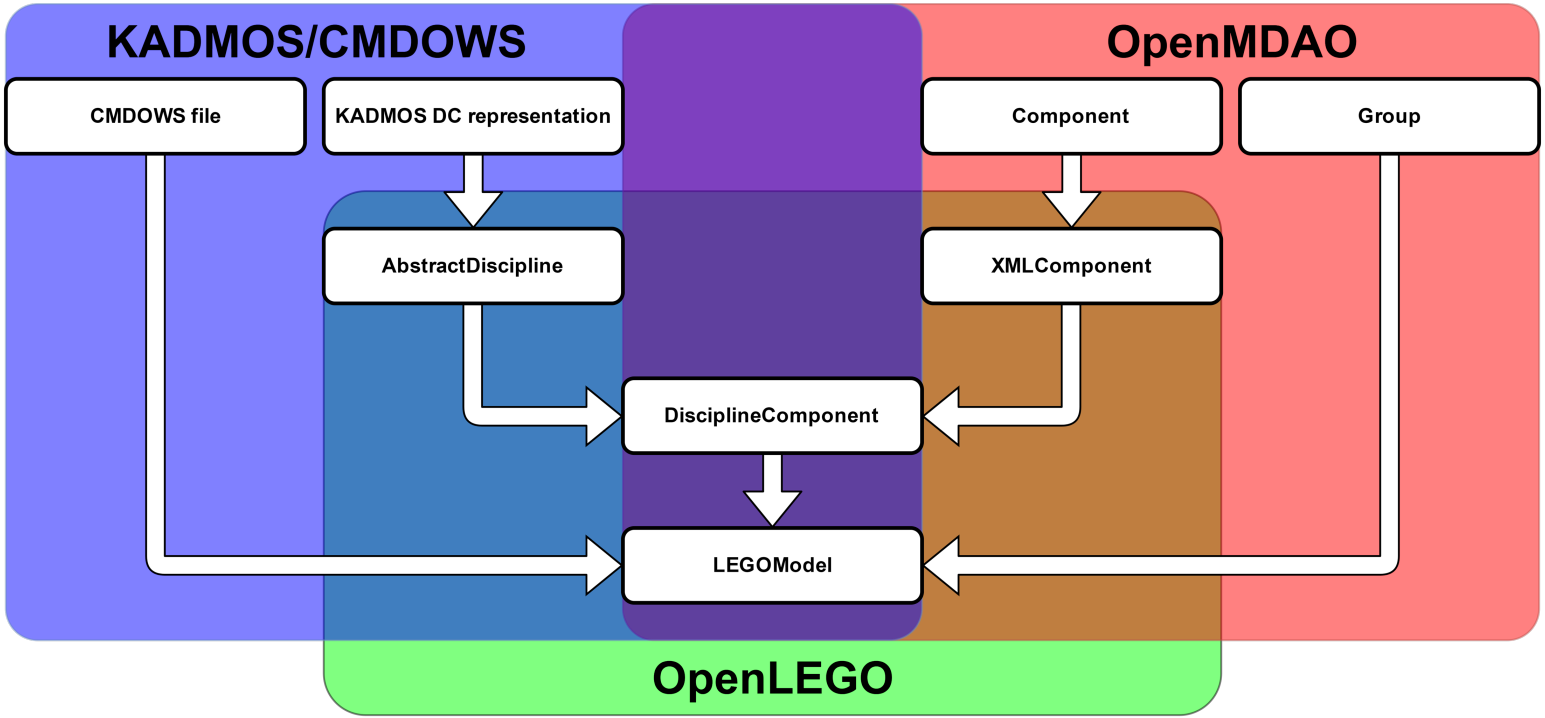
KADMOS

Open LEGO

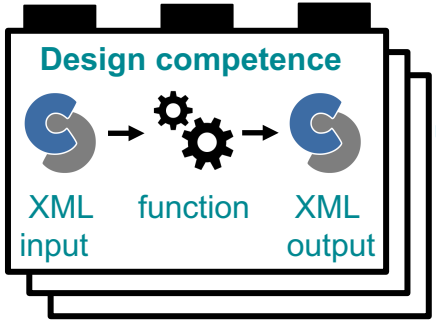
OpenMDAO Partition Tree and N^2 diagram.



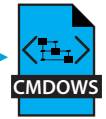
Demo time!


KADMOS/CMDOWS
OpenMDAO
CMDOWS file
KADMOS DC representation
Component
Group
AbstractDiscipline
XMLComponent
DisciplineComponent
LEGOModel
OpenLEGO

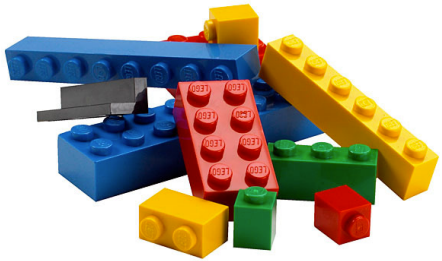
Recap

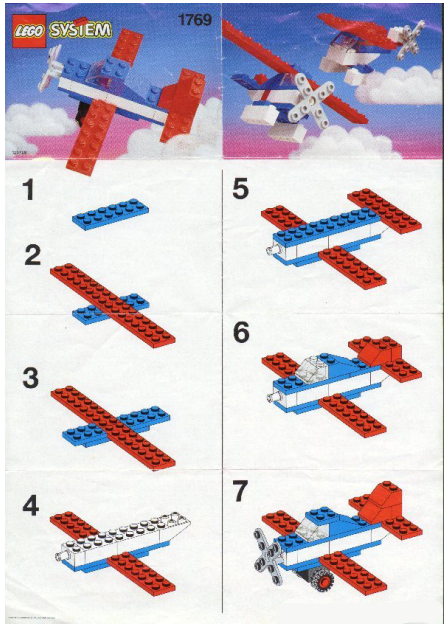


KADMOS



Open LEGO





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Recap

Benefits:

- High level of reconfigurability and agility
- Scalable in different directions
- CMDOWS modularizes the problem formulation process
- CMDOWS parsers could be an OpenMDAO plug-in

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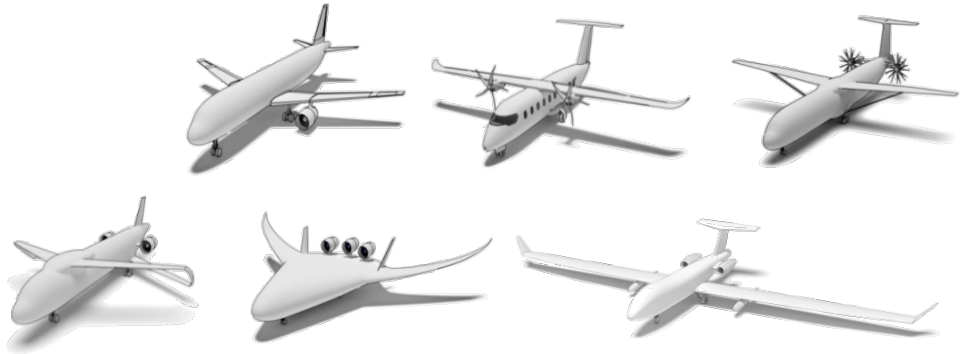
Recap

AGILE Configurations



Questions?

Open-source softwares:

- OpenLEGO: https://github.com/daniel-de-vries/OpenLEGO
- CMDOWS: http://cmdows-repo.agile-project.eu/
- KADMOS: https://bitbucket.org/imcovangent/kadmos
- OpenMDAO: https://github.com/OpenMDAO

Acknowledgements

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Back-up slide: OpenMDAO 1.7.3