



# ACADIA platform WhatsOpt Prototype

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retour sur innovation

# OpenMDAO choice and history

- Back in 2012 : Overall aircraft design as a use case for surrogate models.

- 2012 : OpenMDAO 0.4.0

- Python
- Open source
- Target Domain : MDO



- 2014 : OpenMDAO 0.12.0

- Multi-fidelity surrogates management contribution



# OpenMDAO choice and history

- 2015: OpenMDAO/MAUD 1.0
  - OpenMDAO reboot
    - No more automatic MDO architecture
    - No more GUI
  - Focused on performance, smaller API, simpler



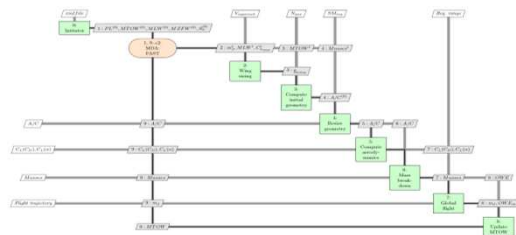
- What did you expect? It's research! It's open-source!

- 2017: OpenMDAO 2.0
  - OpenMDAO reloaded
  - Ok we get it! 😊



# ACADIA requirements

- Overall Vehicle Design:
  - Collaborative activity: information sharing, data definition, visualization
  - Capitalization: MDAO traceability, reusability, maintainability

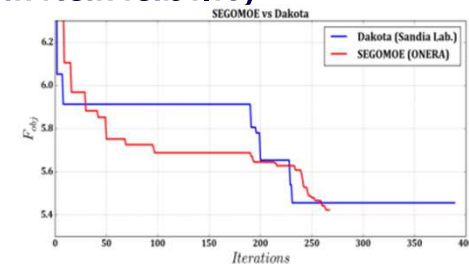


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<aerodynamics>  
<weight>  
<DOC>  
</aircraft>
```

Design processes

- Models
- Data

Web Application  
**WhatsOpt**



Methods Libraries :  
Surrogate / Optimizers

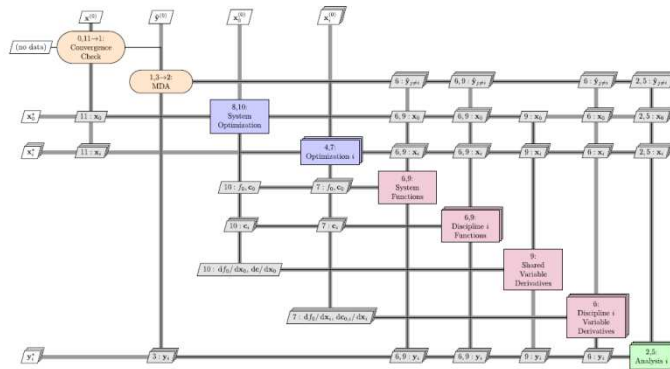
open **MDAO**

Surrogate Modeling Toolbox

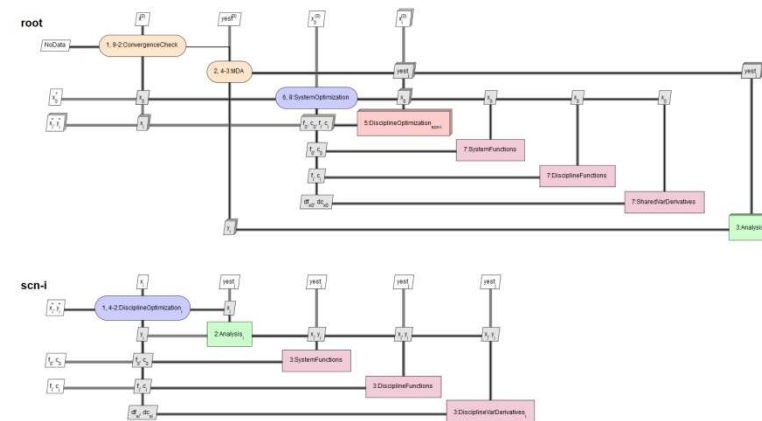


<https://github.com/SMTorg/smt>

# Process View: XD SM and XD SMjs



A. B. Lambe, J. R. R. A. Martins, *Extensions to the Design Structure Matrix for the Description of Multidisciplinary Design, Analysis, and Optimization Processes*. Structural and Multidisciplinary Optimization. 2012 ;46(2):273-284.



XD SMjs : XD SM generator written in javascript

<https://github.com/OneraHub/XD SMjs>



A. Gazaix et al., *Towards the Industrialization of New MDO Methodologies and Tools for Aircraft Design*, 18th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, AIAA AVIATION Forum, (AIAA 2017-3149)

B. Aigner, I. van Gent et al., *Graph-based algorithms and data-driven documents for formulation and visualization of large MDO systems*, CEAS 2017



# WhatsOpt : Web application to manage MDAO

## First Use Cases

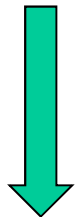
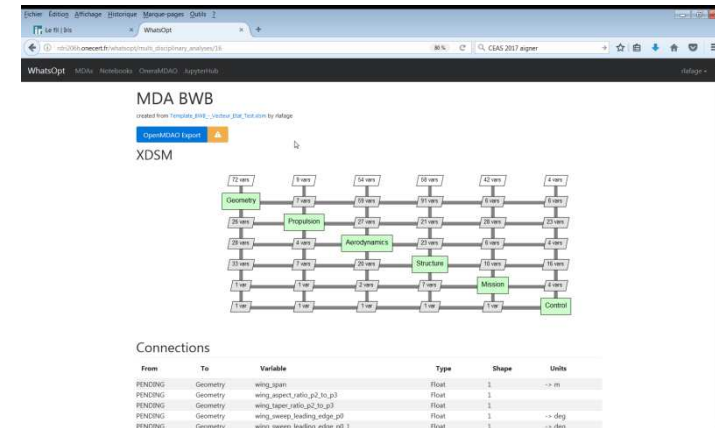
### Excel Tool

The screenshot shows an Excel spreadsheet titled 'PRF CICAIV'. It contains a table with columns for 'Discipline', 'Variable', 'Type', 'Shape', 'Units', and 'Comments'. The table lists various variables and their associated disciplines, such as 'wing\_sweep\_angle', 'wing\_sweep\_angle\_p0', and 'wing\_sweep\_angle\_p1'.

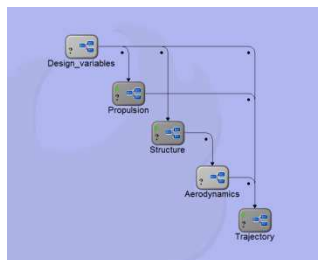
Import



### WhatsOpt



- Variables table
- Dataflow (disciplines connections)
- MC code generation



Export

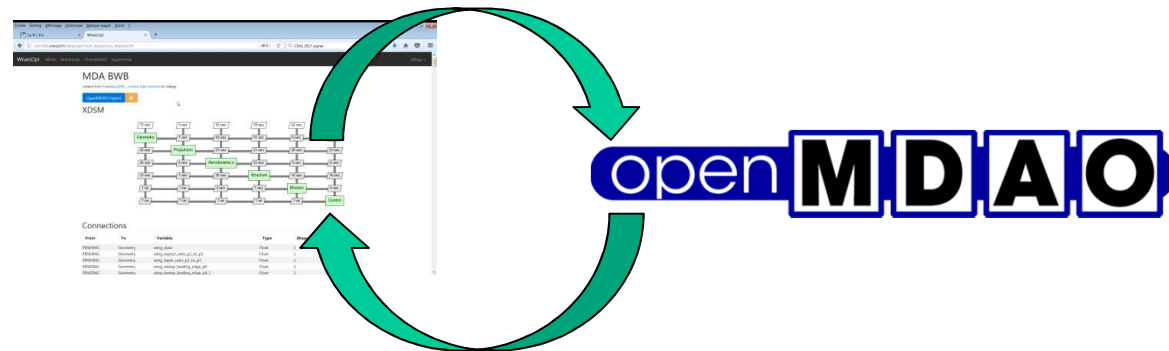
openMDAO



**Showtime!**

# Conclusion & Perspectives

- WhatsOpt: Web application to manage MDAO processes
  - Work in progress...
  - MDA Edition, Workflow management
  - Round trip between definition and execution



- Manage optimization results (traceability, visualization)
- Collaboration...



Thank you for your attention  
Questions?