

oose.

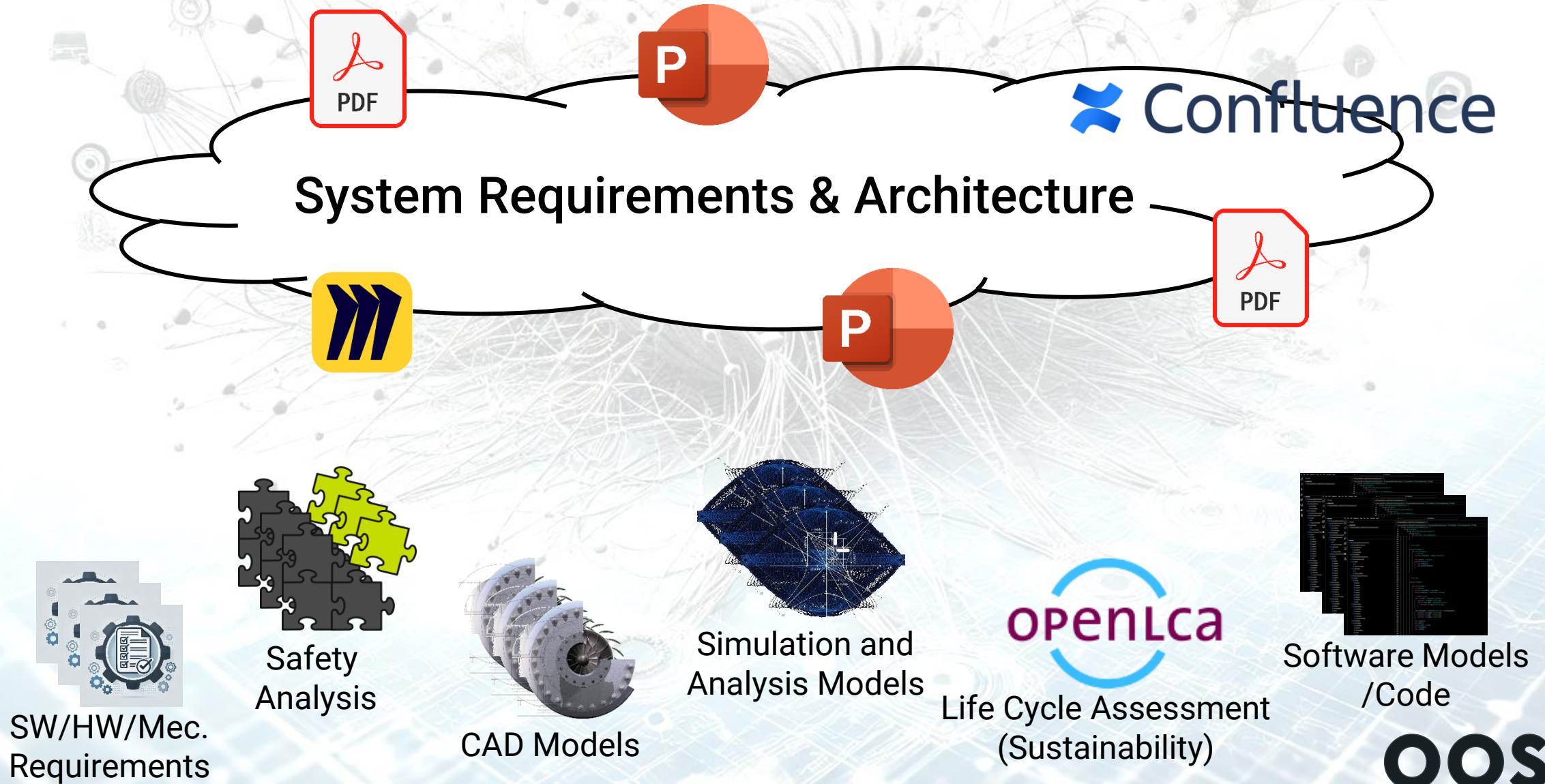
SysML
v2

Model Once, Reuse Many Times:

Unlocking the Power of MBSE with the SysML v2 Standard API
for Automated Life Cycle Assessment

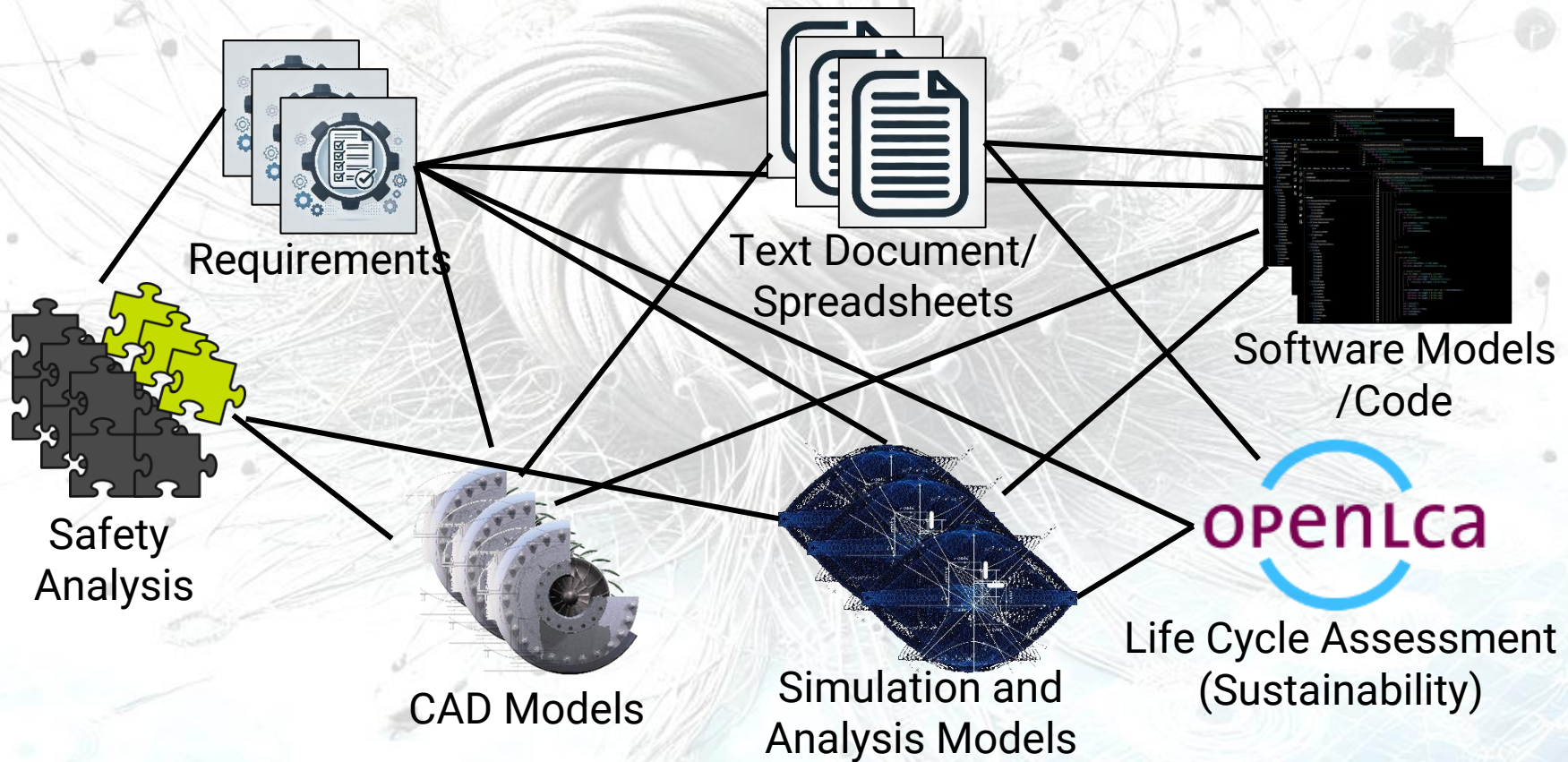
HOW ARE YOUR SYSTEM ENGINEERING ARTIFACTS DOING?

DIGITAL
THREAD



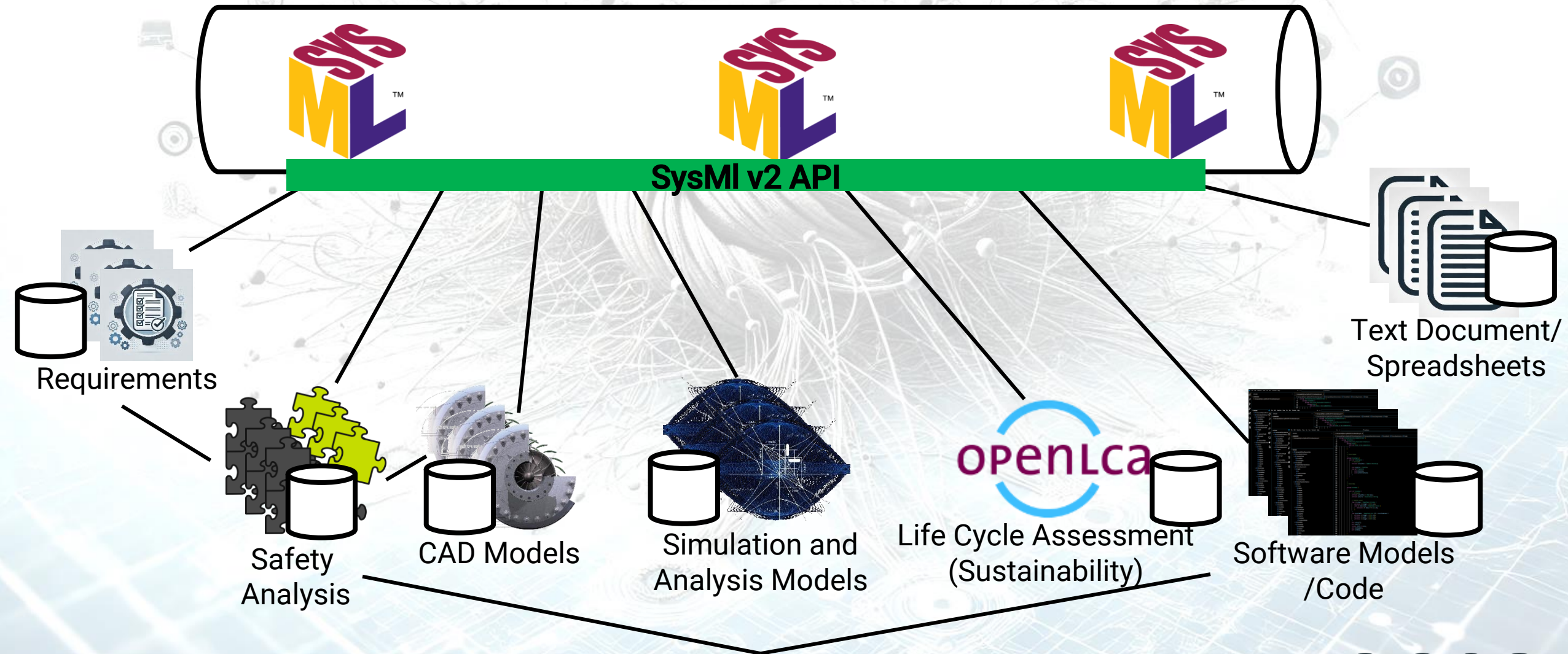
THE CHALLENGE OF THE DIGITAL THREAD

DIGITAL
THREAD



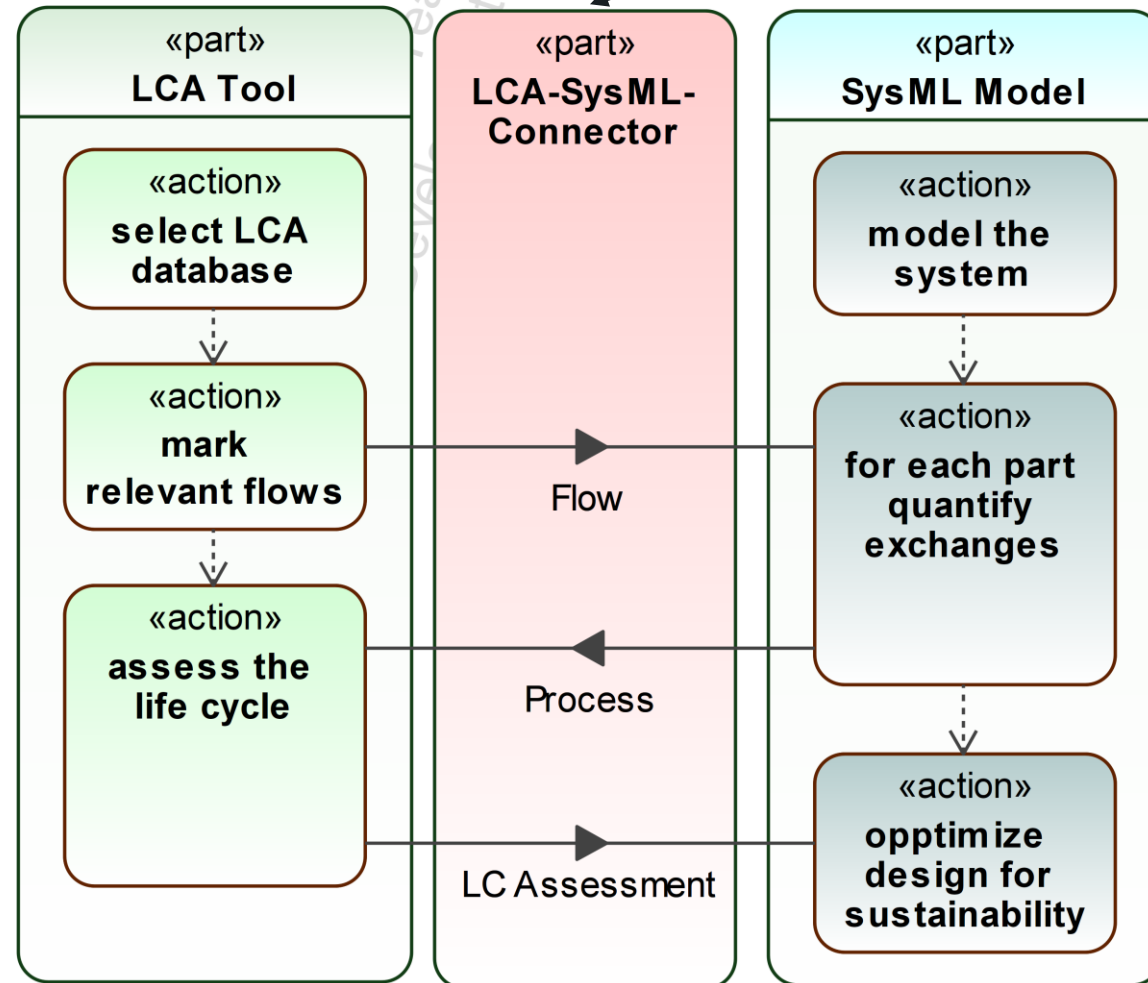
oose.

SYSTEM MODEL AS BACKBONE OF THE DIGITAL THREAD

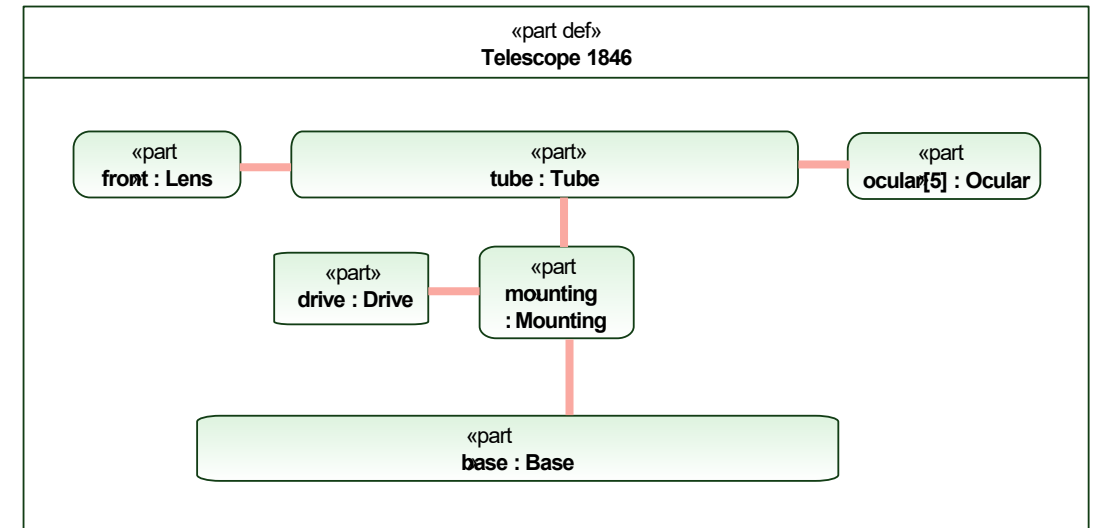
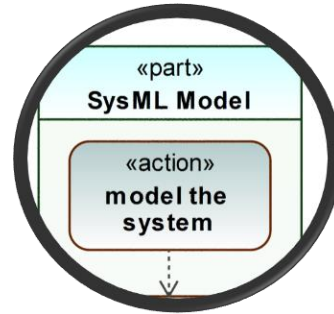


An Approach for Integrating SysML and LCA Tools

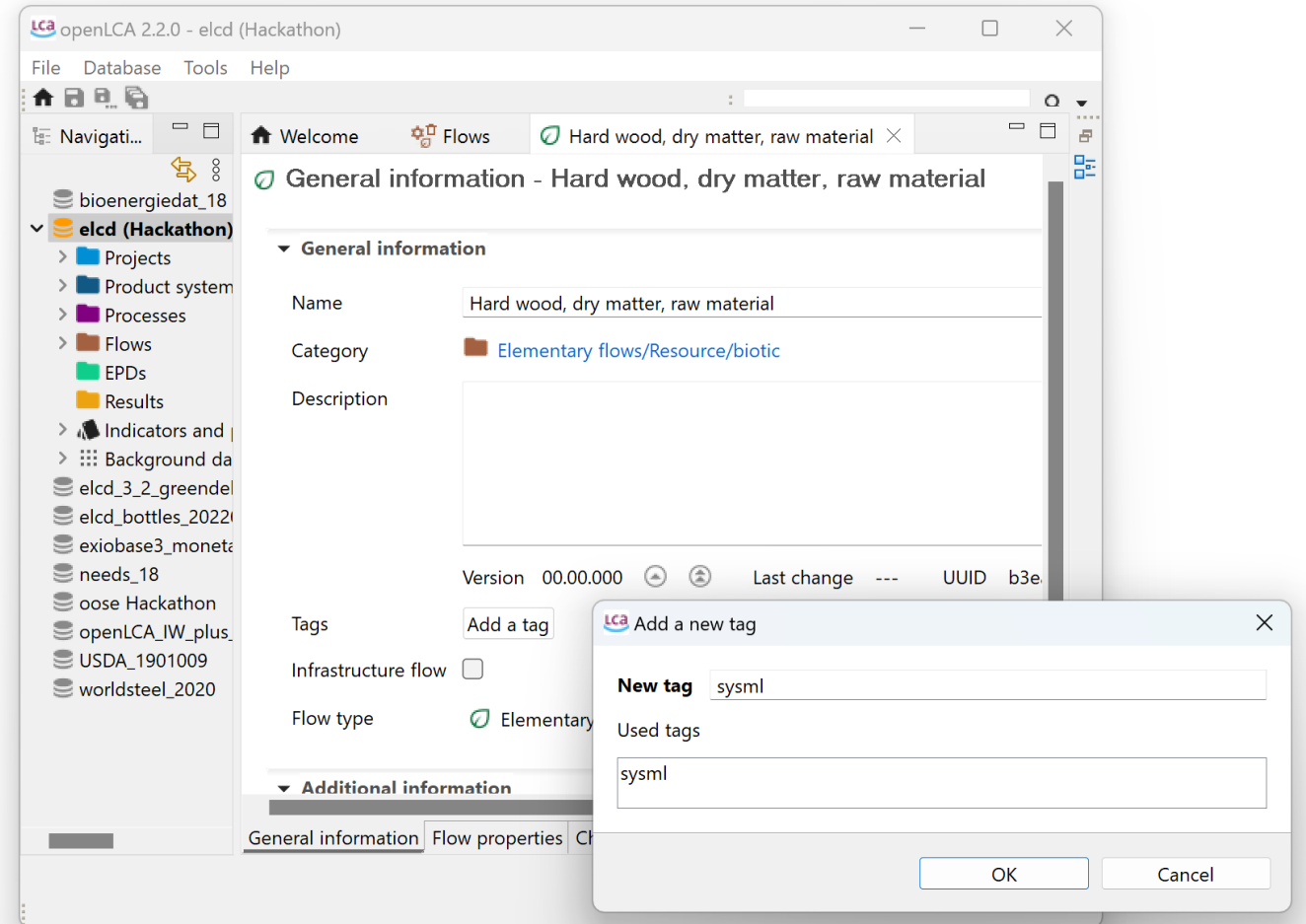
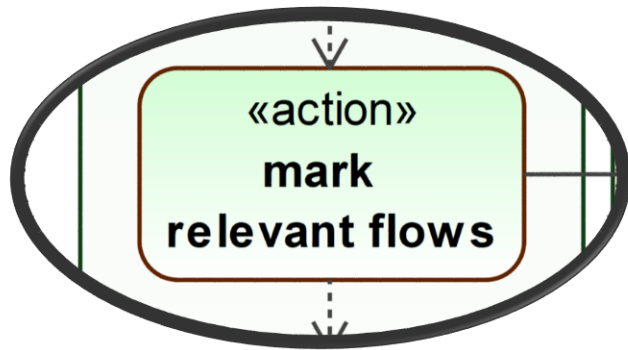
PYTHON SCRIPT THAT USES THE
SYSML EDITOR AND OPENLCA **API** TO
READ AND WRITE FROM/TO THE TOOLS



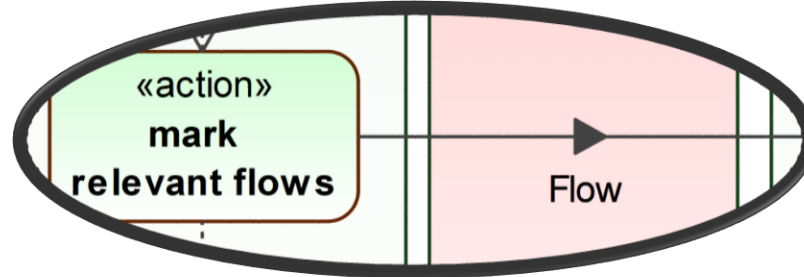
An Approach for Integrating SysML and LCA Tools



An Approach for Integrating SysML and LCA Tools



An Approach for Integrating SysML and LCA Tools



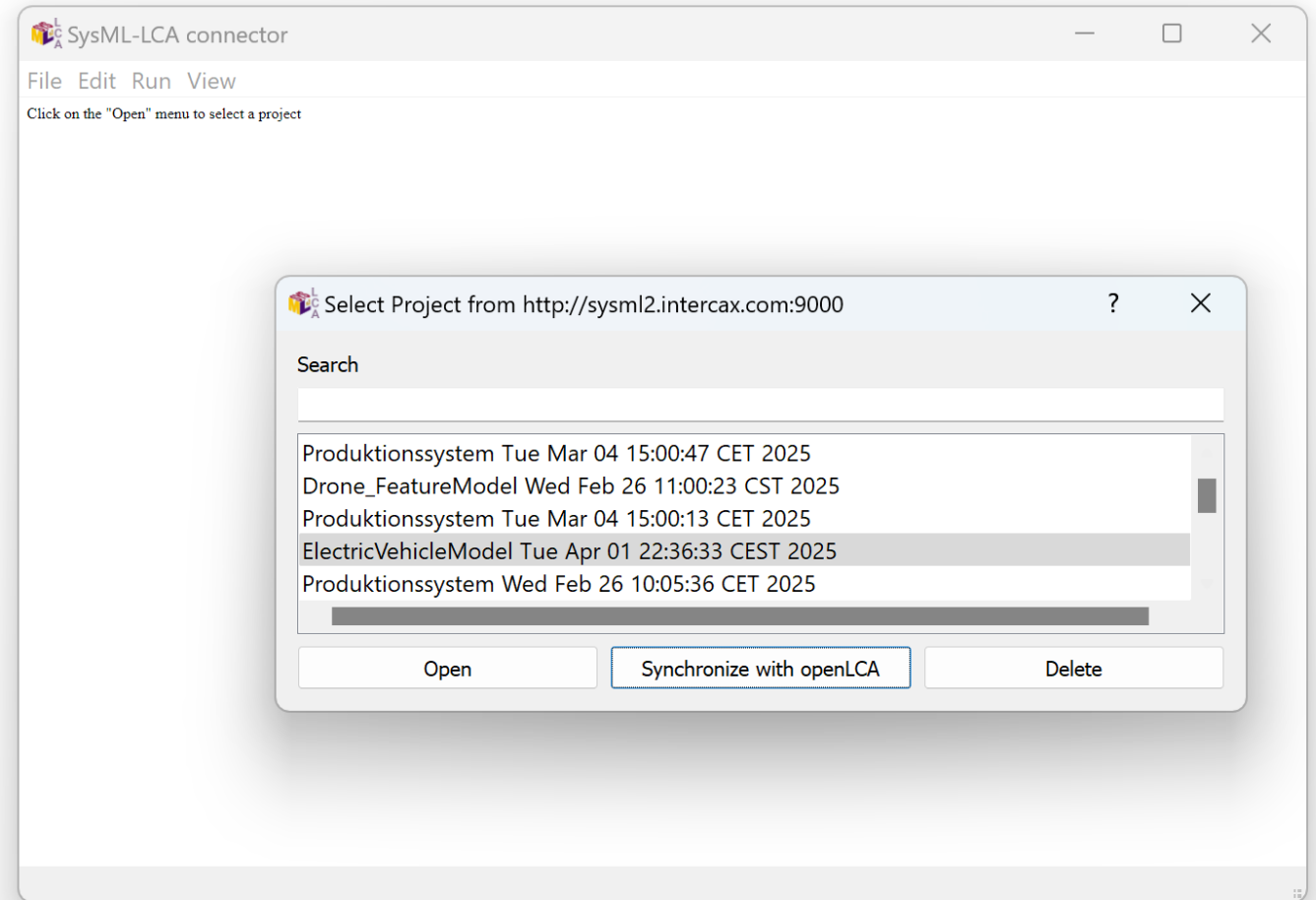
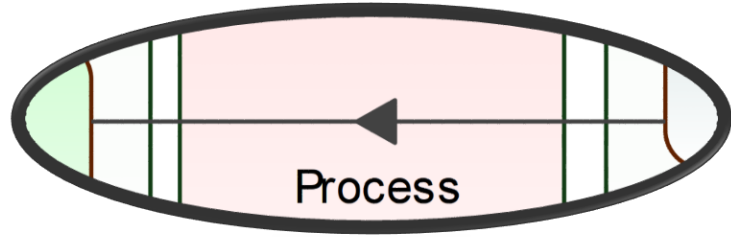
```
attribute 'Hard wood, dry matter, raw material' : MassValue {  
  @lcaflow { uuid = "b3eaaf76-0941-4d42-9edf-69c08c25cc00"; }  
}  
  
attribute electricity : 'Net calorific value' {  
  @lcaflow { uuid = "1ca6b4ff-e518-48f1-8012-82776ef15ef8"; }  
}  
  
attribute 'aluminium extrusion profile' : MassValue :> Quantities::scalarQuantities {  
  @lcaflow { uuid = "4f197be3-7b3b-11dd-ad8b-0800200c9a66"; }  
}  
  
attribute 'Glass (formed & finished)' : MassValue {  
  @lcaflow { uuid = "82b33e71-bfaa-49b4-9627-ee5963433f6e"; }  
}
```


An Approach for Integrating SysML and LCA Tools

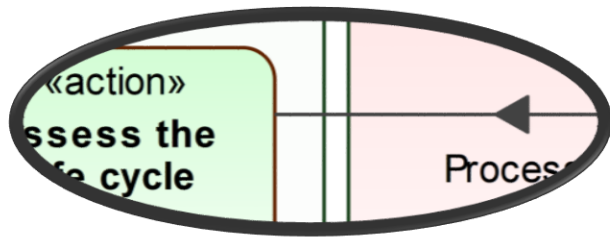


```
part def Lens {
    attribute focal length';
    #exchg attribute :> electricity = -0.01 [MJ];
    #exchg attribute :> 'Glass (formed & finished)' = -0.2 [kg];
}
part def Ocular {
    attribute magnification;
    #exchg attribute :> electricity = -0.01 [MJ];
    #exchg attribute :> 'aluminium extrusion profile' = -0.2 [kg];
    #exchg attribute :> 'Glass (formed & finished)' = -0.05 [kg];
}
part def Tube {
    attribute length;
    #exchg attribute :> electricity = -0.05 [MJ];
    #exchg attribute :> 'Hard wood, dry matter, raw material' = -20 [kg];
    #exchg attribute :> 'Hard wood, dry matter, raw material' = 1 [kg];
}
part def Mounting {
    attribute latitude;
    #exchg attribute :> electricity = -0.1 [MJ];
    #exchg attribute :> 'aluminium extrusion profile' = -10 [kg];
    #exchg attribute :> 'aluminium extrusion profile' = 1 [kg];
}
```

An Approach for Integrating SysML and LCA Tools



An Approach for Integrating SysML and LCA Tools



openLCA 2.2.0 - elcd (Hackathon)

File Database Tools Help

Navigation

- Materials production
- oose Hackathon Juli 24
- Systems
- Transport services
- produce Telescope 1846
- Flows
 - A Water Bottle
 - Deposited goods
 - Elementary flows
 - Emissions
 - Emissions to soil
 - End-of-life treatment
 - Energy carriers and techno
 - Materials production
 - oose Hackathon Juli 24
 - Production residues in life
 - Systems
 - Transport services
 - uncategorized
 - Wastes
 - Telescope 1846
- EPDs
- Results

Flows electricity produce Tele... »2

Inputs/Outputs - produce Telescope 1846

Inputs

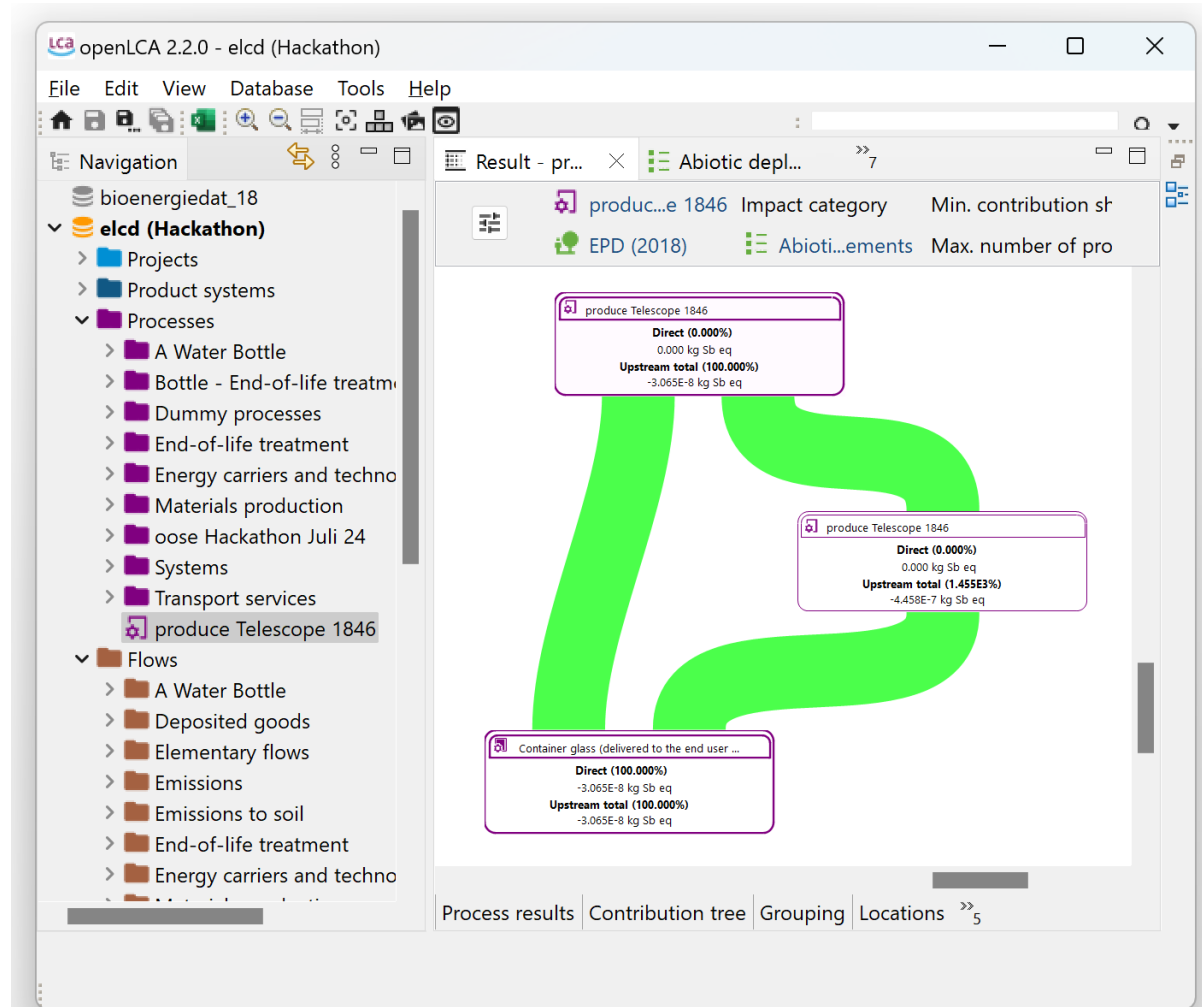
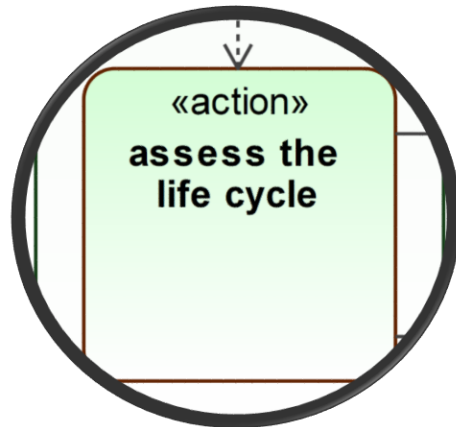
Flow	Amount	Unit
electricity	0.05000	MJ
electricity	0.01000	MJ
Glass (formed & finished)	0.20000	kg
Glass (formed & finished)	0.25000	kg
Hard wood, dry matter, raw ...	50.00000	kg
Hard wood, dry matter, raw ...	20.00000	kg

Outputs

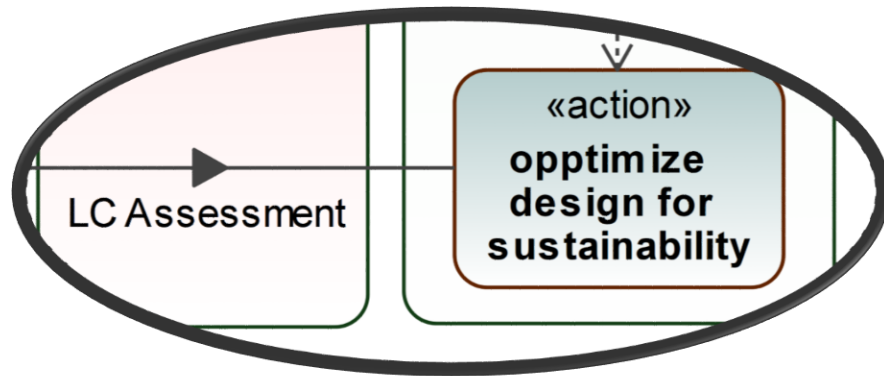
Flow	Amount	Unit	C...
Telescope 1846	1.00000	Item(s)	
aluminium extrusion profile	1.00000	kg	
aluminium extrusion profile	0.10000	kg	
Hard wood, dry matter, raw ...	5.00000	kg	
Hard wood, dry matter, raw ...	1.00000	kg	

General information Inputs/Outputs Documentation Parameters »3

An Approach for Integrating SysML and LCA Tools



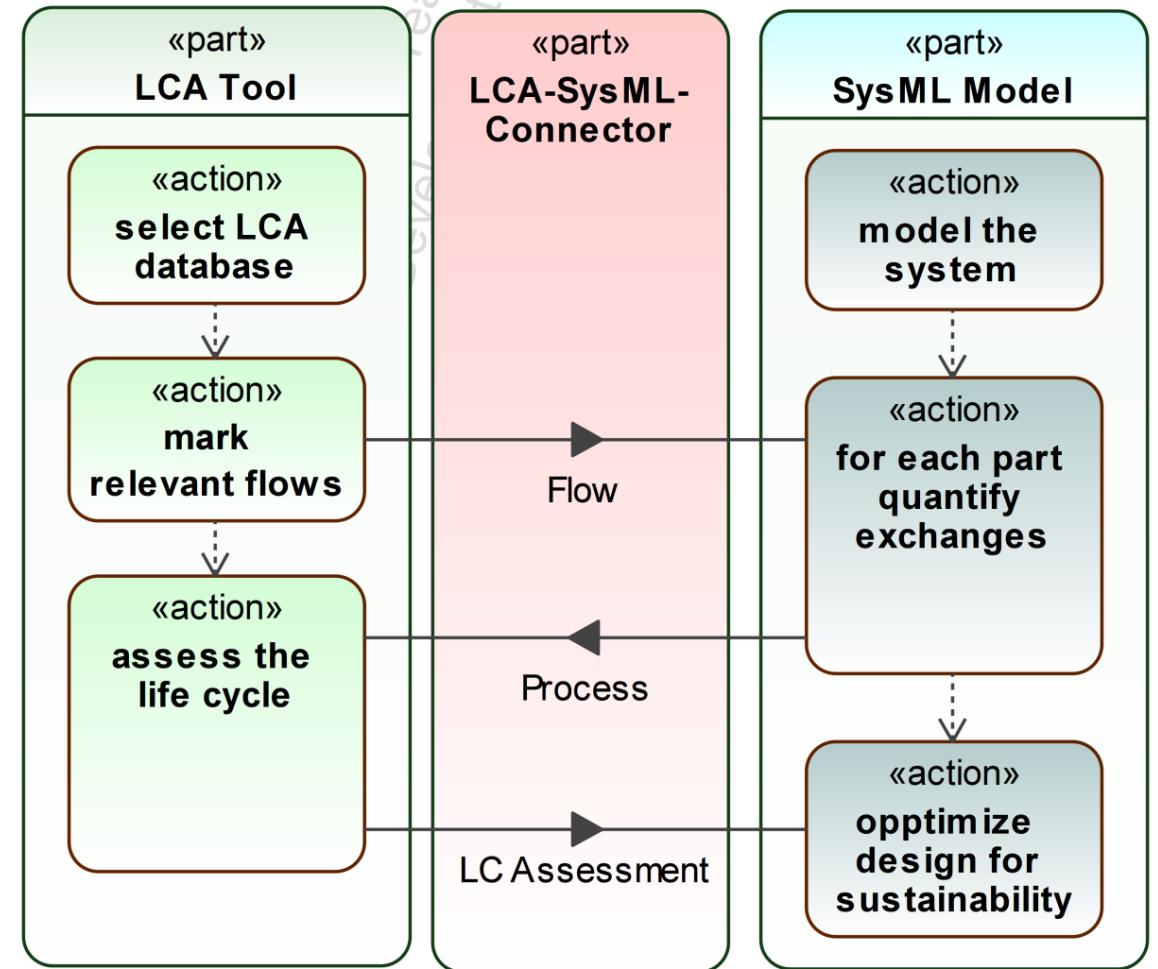
An Approach for Integrating SysML and LCA Tools



```
part def 'Telescope 1846' {  
    @lca;  
    #impact attribute 'CO2 equivalent' = 100 [kg];  
    part front : Lens;  
    part ocular : Ocular [5];  
    part tube : Tube;  
    part mounting : Mounting;  
    part drive : Drive;  
    part base : Base;  
    connect front to tube;  
    connect tube to ocular;  
    connect tube to mounting;  
    connect mounting to drive;  
    connect mounting to base;  
}
```

Benefits from the Approach

- *Save hours of manual data preparation.*
- *Get sustainability feedback early in design.*
- *Ensure tool interoperability across teams.*
- Scalability



With
oose.

**You never Model
Alone**

