

Let's talk Machine – The Digital Transformation of Systems Engineering

Let's talk machine! The Digital Transformation of Systems Engineering

Tim.Weilkiens@oose.de

linkedin.com/in/timweilkiens

INCOSE Symposium 2023

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ooose.

**Consultancy and training company
for Systems and Software Engineering
Headquarter in Hamburg, Germany**

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Who am I? Tim.Weilkiens@oose.de

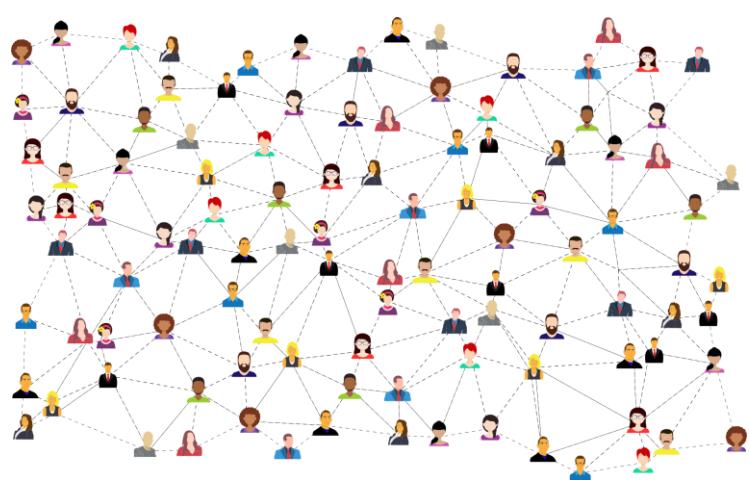
Executive Board Member oose
MBSE Consultant & Trainer
Co-Developer of SysML 1 & 2
Co-Chair of SysML v2 FTF
Book author
Author of SYSMOD & VAMOS
Lecturer of MBSE master courses
Owner of publishing company MBSE4U
Founder X4Planet



UML2 Zertifizierung
Basiswissen Geschäftsprozessmanagement
Model-Based System Architecture
SYSML 2 The Systems Modeling Toolbox
Variant Modeling with SysML
Systems Engineering with SysML/UML
Geschäftsprozessmodellierung mit der UML
Systems Engineering mit SysML/UML
UML2 DAYCAMP EXAMS
OCB Certification Guide
The New Engineering Game

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Systems Engineering is a lot about Communication

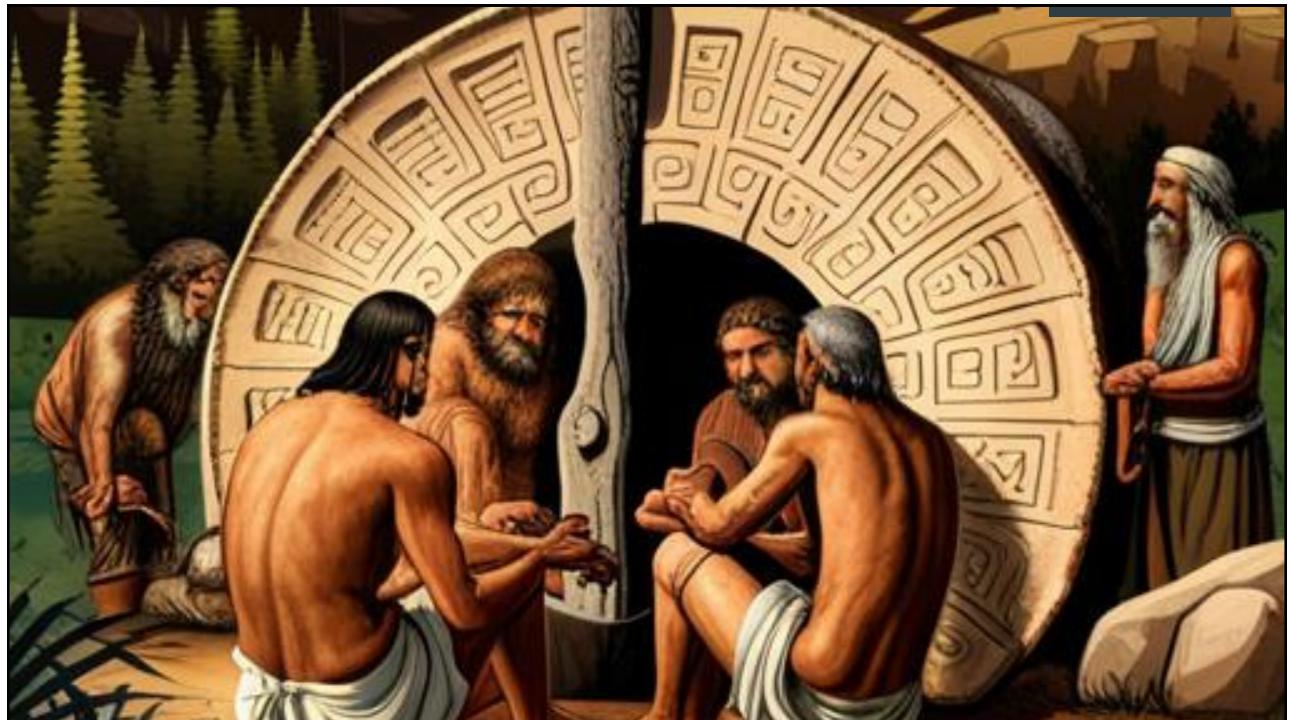


Communication between team member, suppliers, stakeholders, and so forth.

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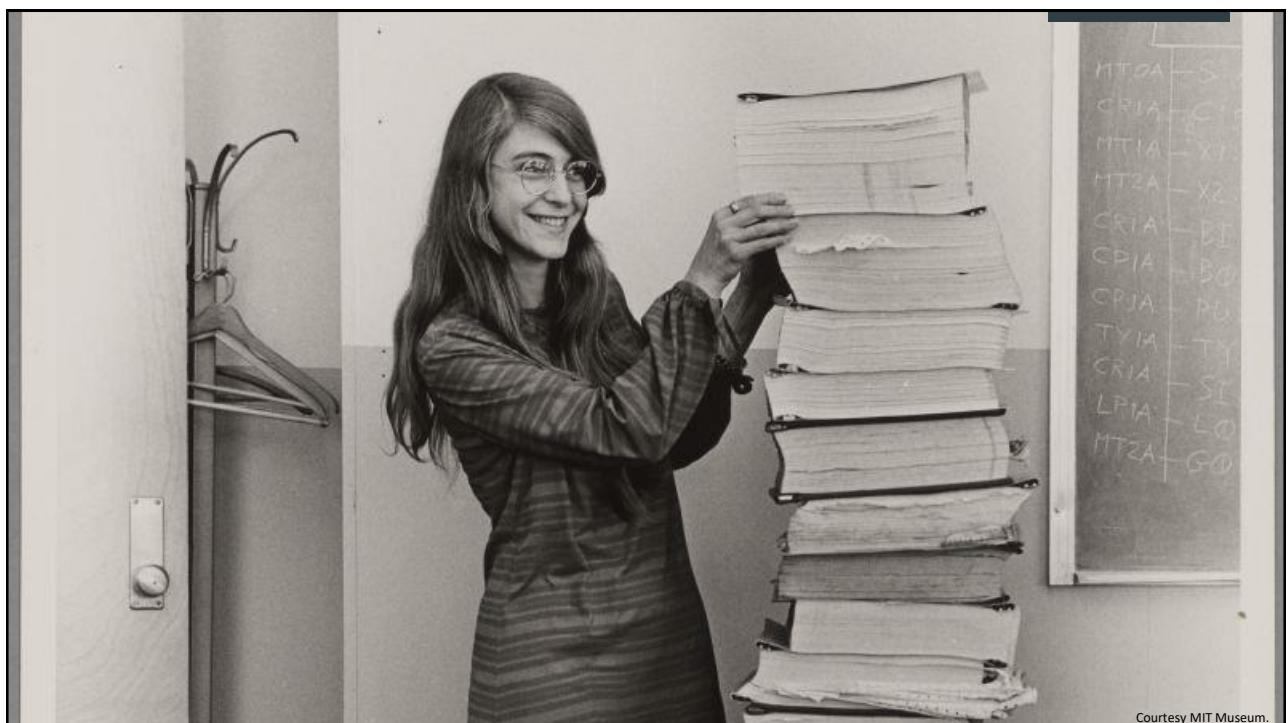


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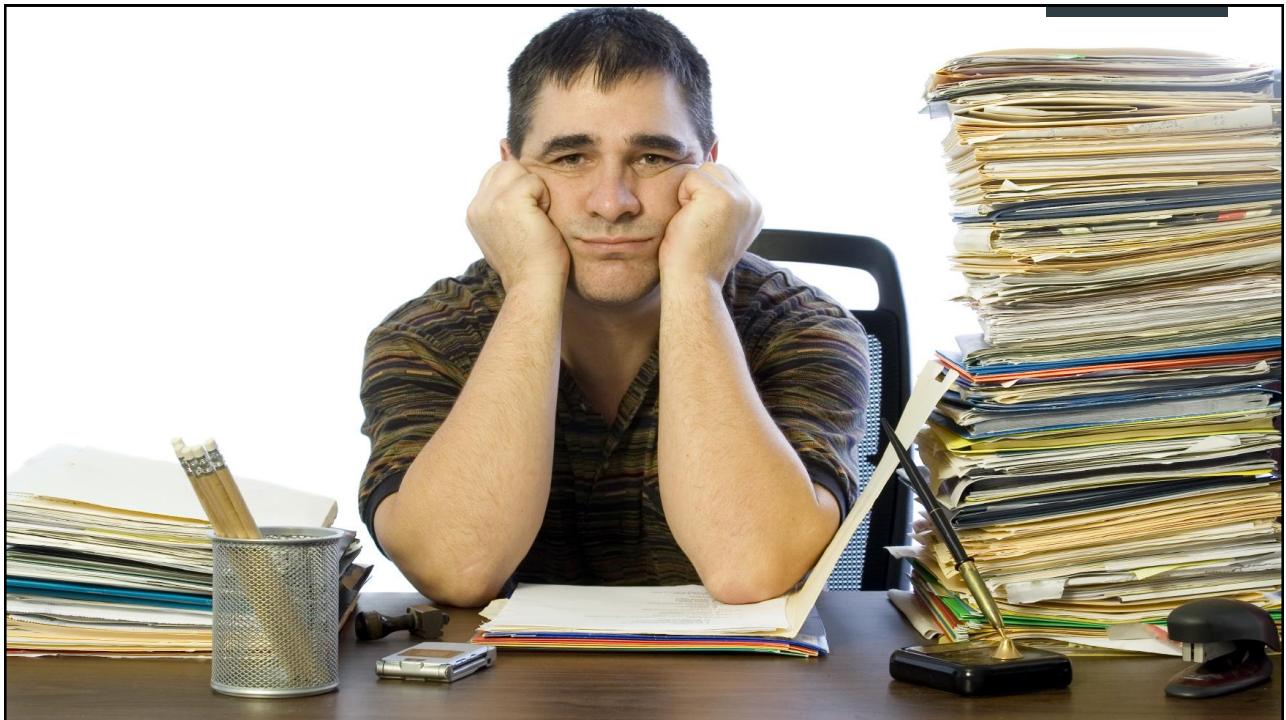
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Courtesy MIT Museum.

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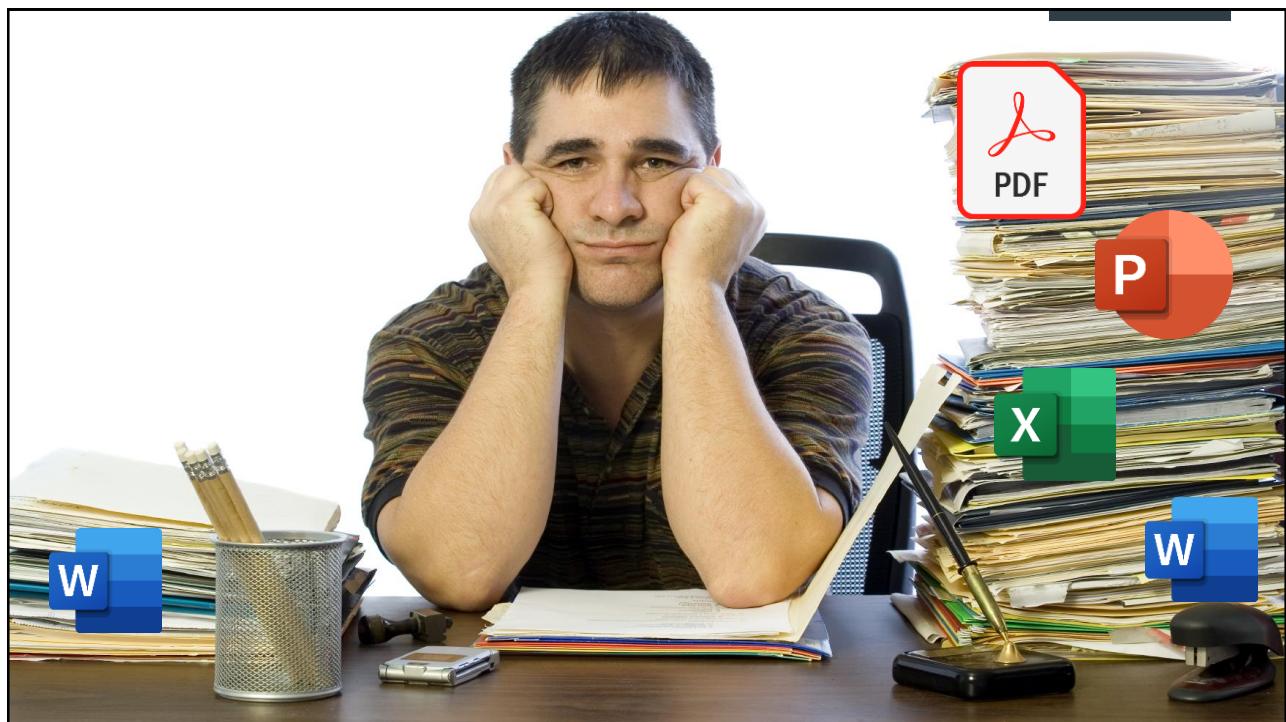


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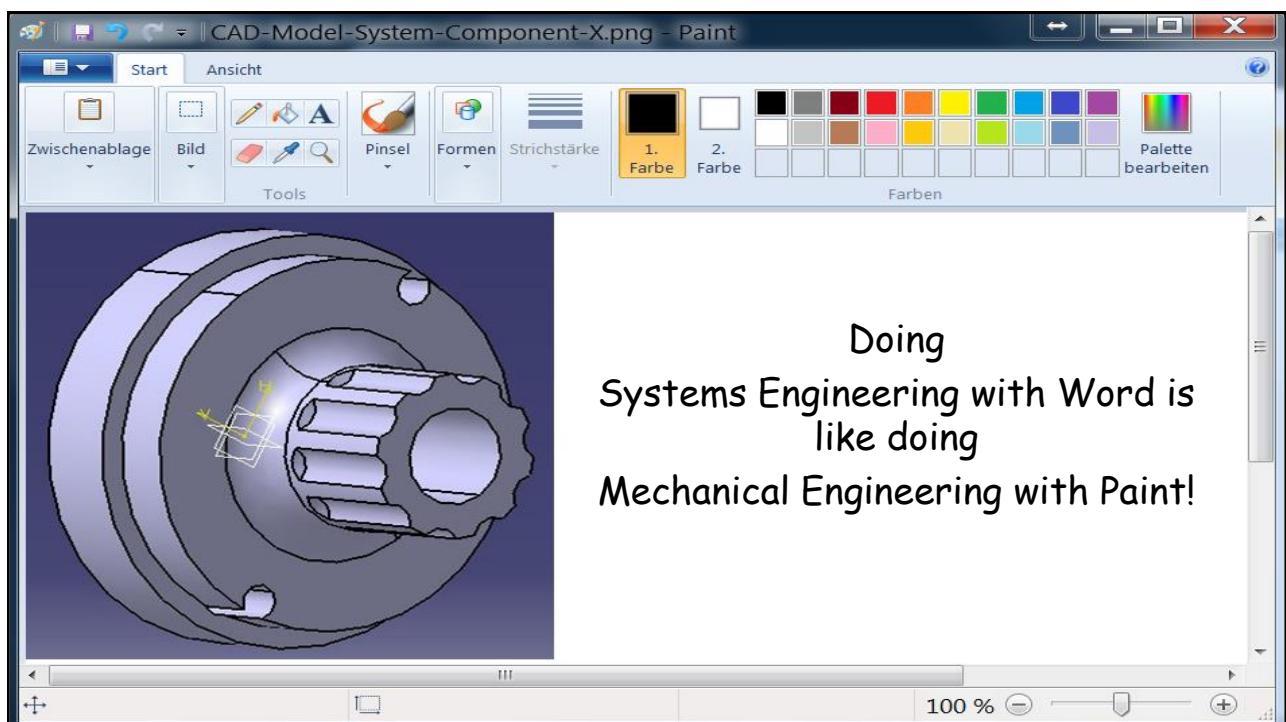


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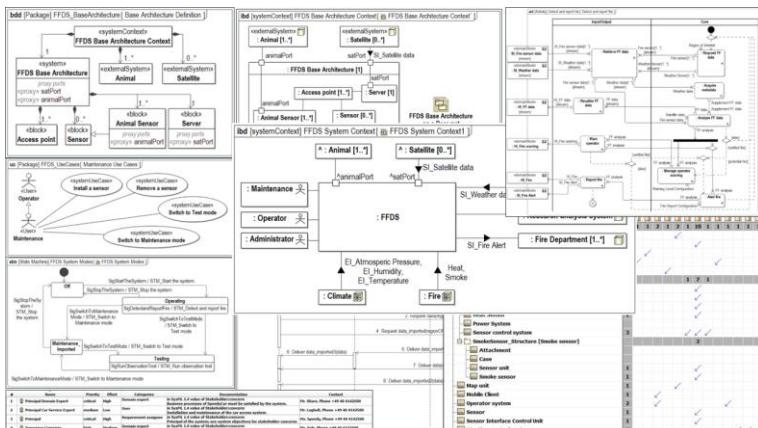
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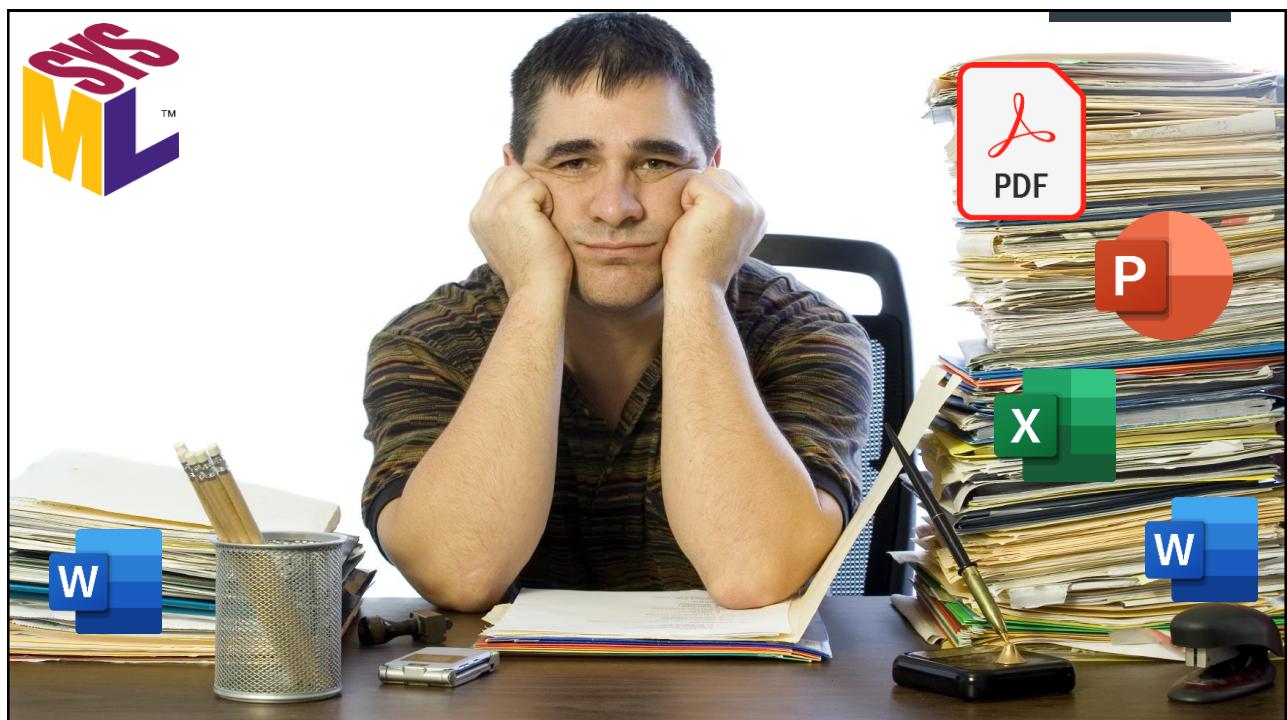
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From DBSE to MBSE – Now it gets much better(?)



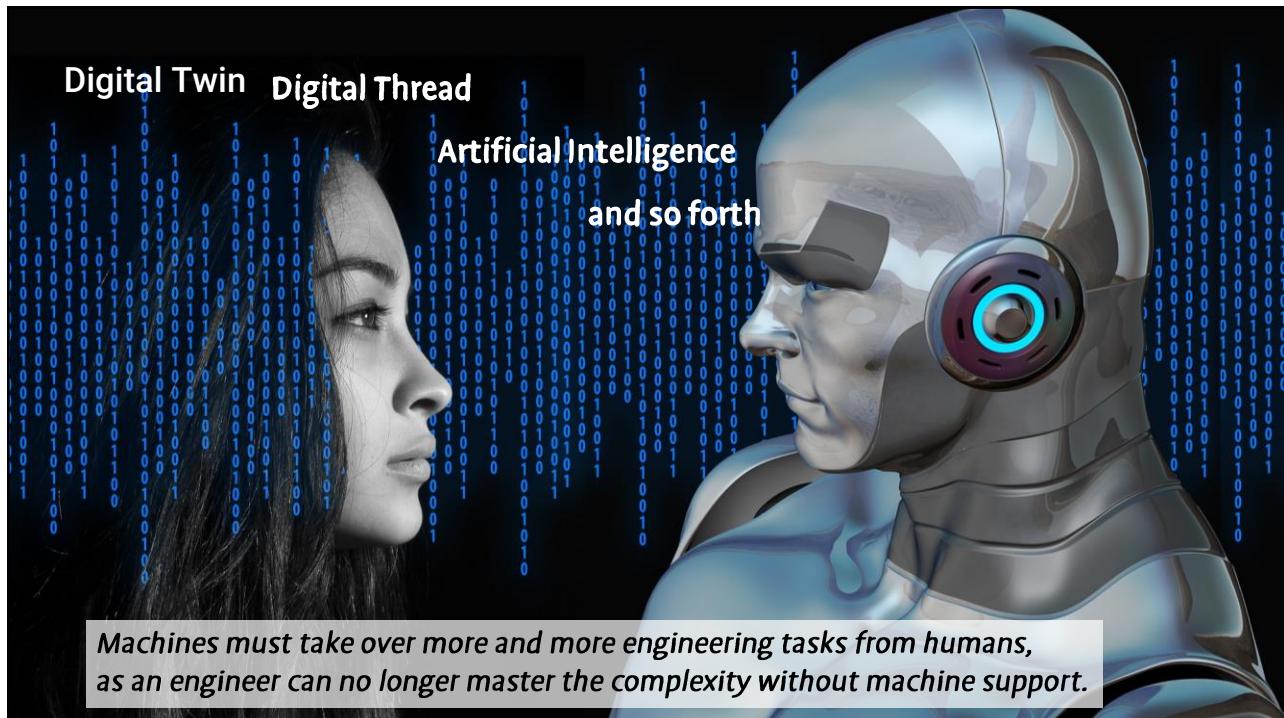
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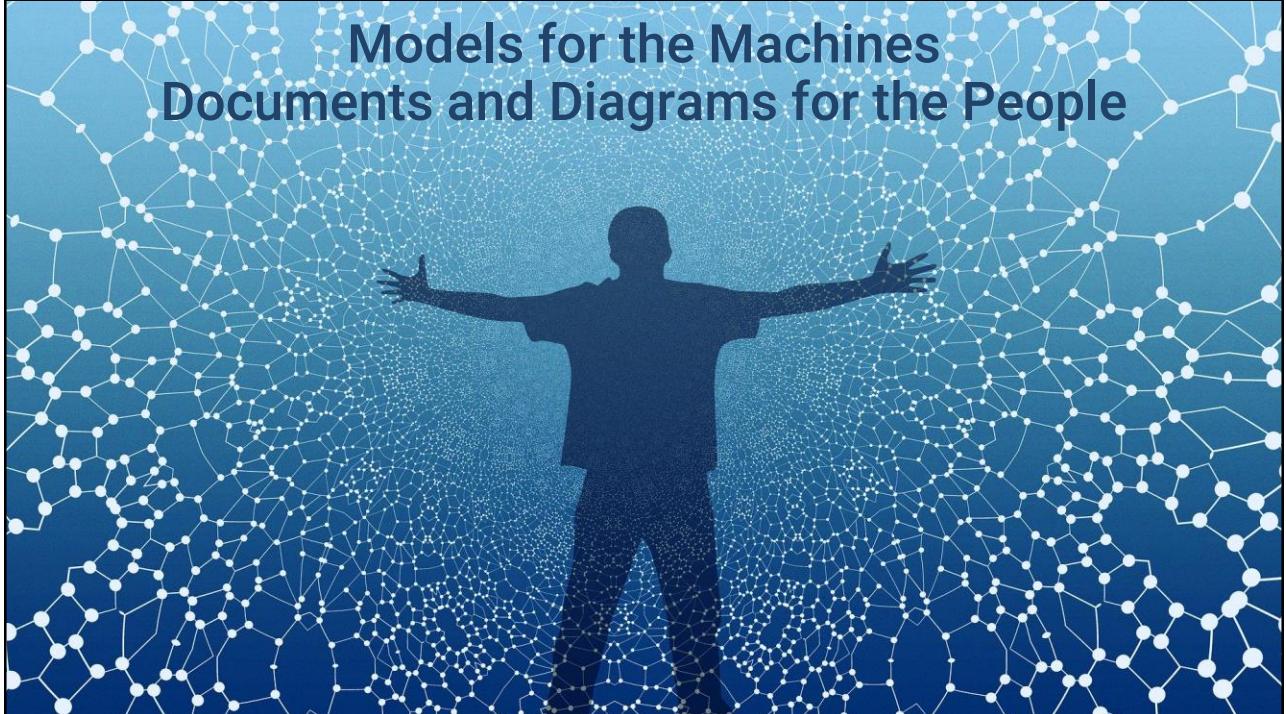


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Models for the Machines
Documents and Diagrams for the People



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Without a context this is just a number

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Office tools
provide context
for Humans

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Subsystem	Part	CBE Mass (kg)
SYS1	P1	42,00
SYS1	P2	1,20
SYS1	P3	7,30
Total SYS1		50,50



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For a Machine
42 is a value in the
2nd row, 3rd column

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Subsystem	Part	CBE Mass (kg)
SYS1	P1	42,00
SYS1	P2	1,20
SYS1	P3	7,30
Total SYS1		50,50



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42 in a SysML model

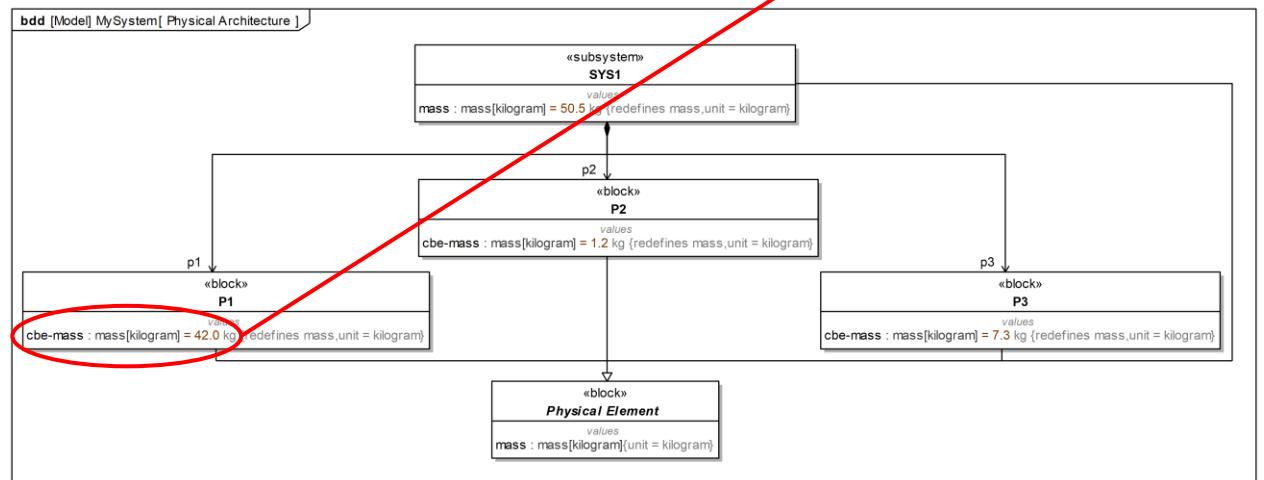
#	Name	CBE Mass [Kg]
1	P1	42.0
2	P2	1.2
3	P3	7.3
4	SYS1	50.5



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One Model repository
Many Views

#	Name	CBE Mass [Kg]
1	P1	42.0
2	P2	1.2
3	P3	7.3
4	SYS1	50.5



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Machine readable Semantics

#	Name	CBE Mass [Kg]
1	P1	42.0
2	P2	1.2
3	P3	7.3
4	SYS1	50.5

«block»
P1
values

cbe-mass : mass[kilogram] = 42.0 kg {redefines mass,unit = kilogram}



- Value property cbe-mass
- Owner block P1
- Value type mass[kilogram]
- Unit kilogram
- Quantity kind mass
- ...

SysML makes common systems engineering concepts accessible for machines.

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The Model makes the Difference



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#	Name	CBE Mass [Kg]
1	P1	42.0
2	P2	1.2
3	P3	7.3
4	SYS1	50.5

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The Model makes the Difference



No Model?

Model



Subsystem	Part	CBE Mass (kg)
SYS1	P1	42,00
SYS1	P2	1,20
SYS1	P3	7,30
Total SYS1		50,50

#	Name	CBE Mass [Kg]
1	P1	42.0
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4	SYS1	50.5

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DEFINITION

An MBSE Model is a model that represents information about systems and their environments and is based on a modeling language that covers concepts of the systems engineering domain.

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The Kind of Model is Crucial

„Worksheet Modeling Language“

Machines get information about cells, data formats, etc.



Systems Modeling Language

Machines get information about systems engineering concepts



Subsystem	Part	CBE Mass (kg)
SYS1	P1	42,00
SYS1	P2	1,20
SYS1	P3	7,30
Total SYS1		50,50

#	Name	CBE Mass [Kg]
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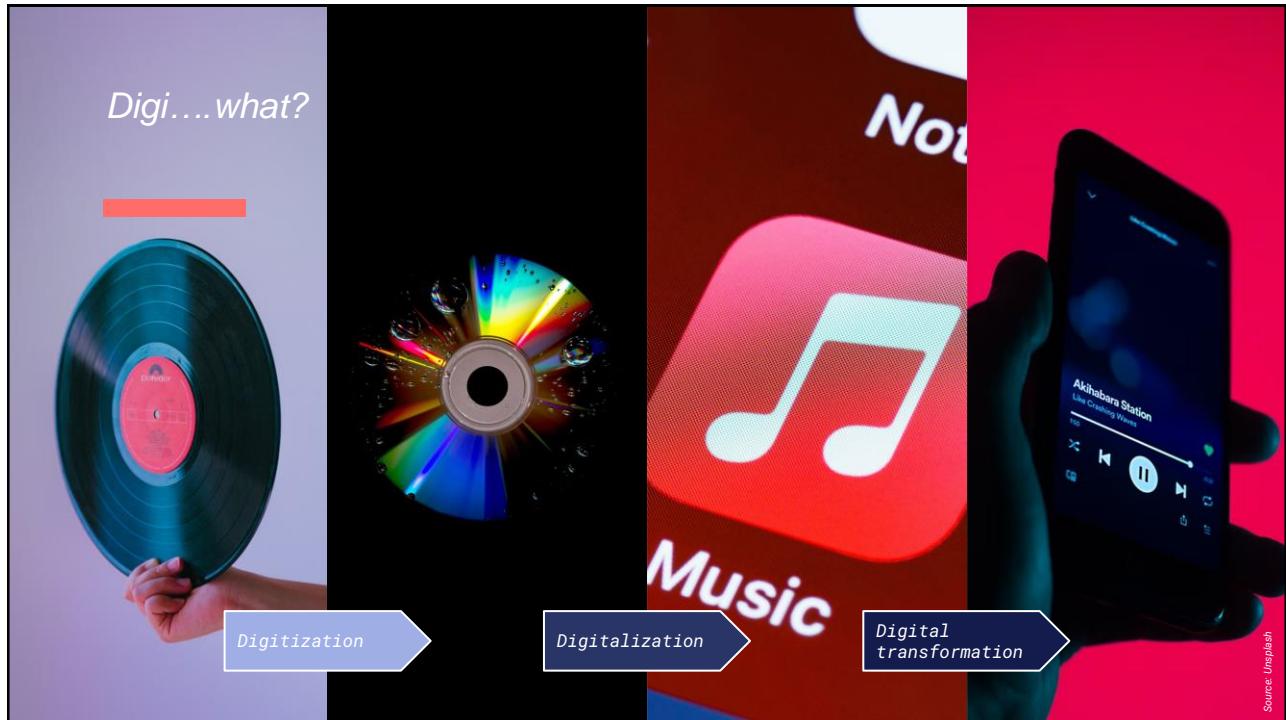
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Models turn data into information

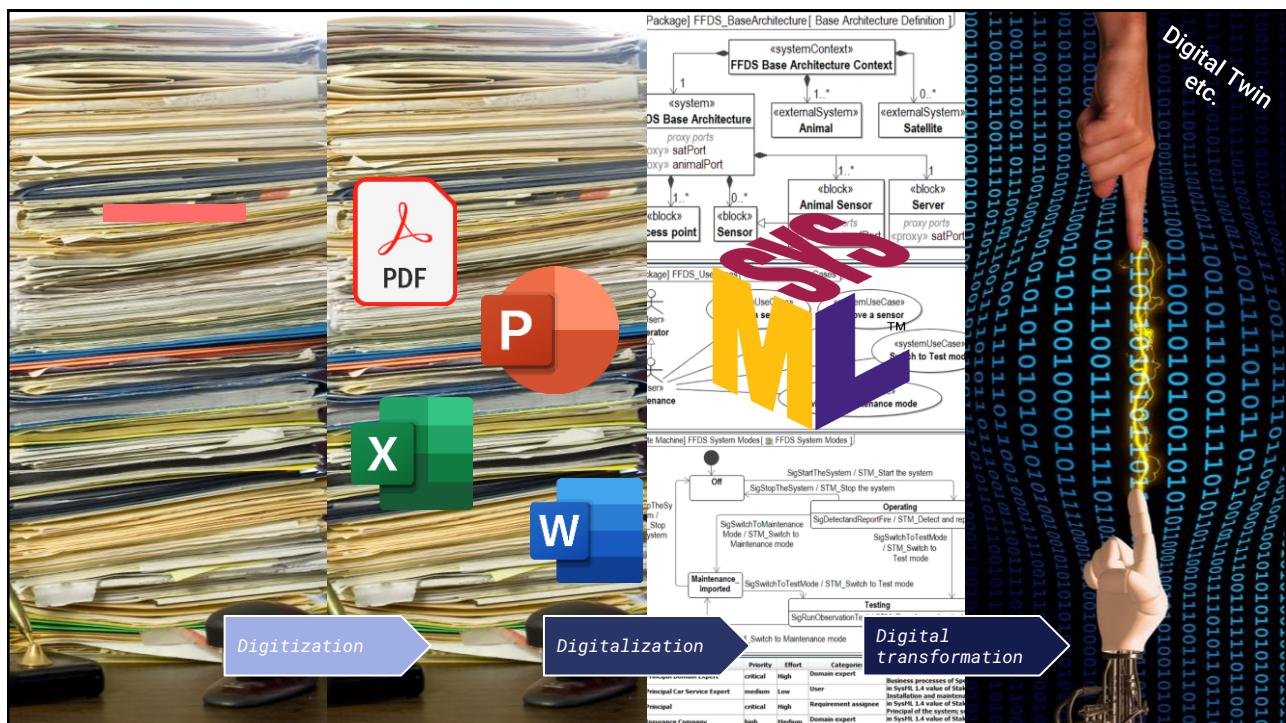


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Modeling is not Drawing

„A picture is worth a thousand words...

(Andreas Willert)

...and a model is worth a thousand pictures.”

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