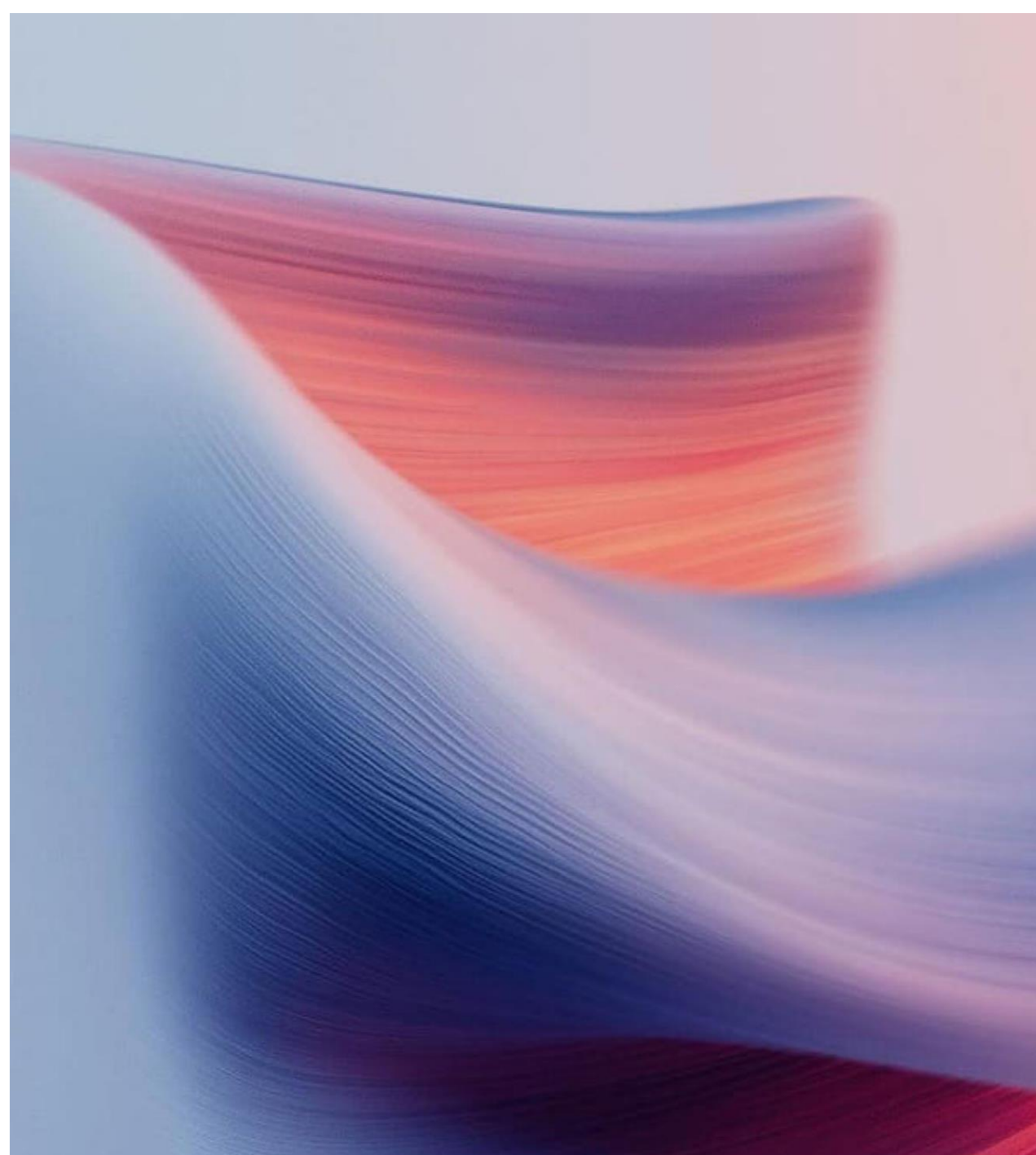




MBSE by efs

# Systems Engineering **at it's best**

MBSE by efs offers a comprehensive approach to PMT development, training, and appropriate operationalization.





#### The problem

Traditional systems engineering still offers a lot of potential in terms of efficiency, communication, traceability and dealing with complexity management, in terms of collaboration and adaptability.

#### Our solution

Our Model-Based Systems Engineering (MBSE) approach provides a unified modeling environment, enhances traceability, fosters collaboration, and enables agile responses to change, streamlining system development and improving outcomes.

## THE CHALLENGES

# Five challenges shaping the future of systems engineering

### Efficiency

To ensure efficient workflows in the future, it is crucial to mitigate delays, rework, and increased coordination requirements in development through a model-based approach.

### Traceability

A high degree of traceability is necessary to ensure consistency, analyze cause and effect and comply with the obligation to provide evidence.

### Managing Complexity

To be able to master the increasing complexity, it is necessary to expand evaluated methods and to take the step towards model-based development.

### Collaboration

Through a model-based approach and sensibly chosen tool chains, collaborative work is strengthened and leaves room for innovation.

### Adaptation to Change

The model-based approach makes it possible to react quickly to changes and their effects. This gives you the best possible chances of surviving in a fast-paced environment.



OUR MBSE JOURNEY

# For almost a decade we deliver MBSE services

Decision to  
implement SE /  
MBSE within  
the Volkswagen  
Group through  
a dedicated  
program

2016

2017

Strategic  
decision to  
establish a  
dedicated team  
focused on  
model-based  
system  
architecture  
development

Development of  
an MBSE  
method "FAME"  
commissioned  
by VW Group  
by 2023

Continuous  
operationalization  
of methods and  
modeling in  
productive  
projects at VW /  
Audi / CARIAD /  
Porsche to date

2018

2019

Establishment  
of an internal  
MBSE training  
program

2020

Establishment  
of the internal  
MBSE training  
program for the  
Volkswagen  
Group to date

2021

Additional  
productive  
projects within  
the Volkswagen  
Group to date

2022

Certified  
employees with  
SE-Certified  
Systems Engineer  
(GfSE) Level C  
and Level B

2023

Projects outside  
automotive sector  
to leverage our  
experiences from  
various industries  
for the benefit of  
our clients

2024

Partnership  
with TECHNIA  
as a central  
training  
platform

2025



# Process Methods Tools Development



MBSE by efs

# PMT Development

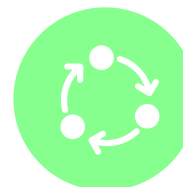
Processes, Methods, and Tools

We have years of experience developing PMT solutions for automotive clients, from needs to implementation.



## ONTOLOGY

Analysis of existing information objects to capture the problem space



## PROCESS

Deriving processes from ontologies and documentation as a process model



## METHOD

Development and optimization of methods following predefined processes



## TOOL IMPLEMENTATION

Tool customization, development of scripts and plugins, creation of reports, creation of metrics and tool integration



# Trainings

MBSE by efs

# Trainings

Our trainings provide value through modular design and through high practical components.

## CUSTOMER CENTRICITY

- Several training formats and contents
- Trainings designed for your audience by your needs
- Trainings off-the-shelf
  - i.e. Cameo 9-day training cycle
  - i.e. Cameo 6-day intensive

## MODULAR DESIGN

- Modules can be sequenced as needed, to match trainees' availability and prior knowledge
- The staggered timing of the modules allows participants to deepen their learned knowledge in everyday situations and reflect on their experiences with trainer

## PRACTICAL COMPONENT

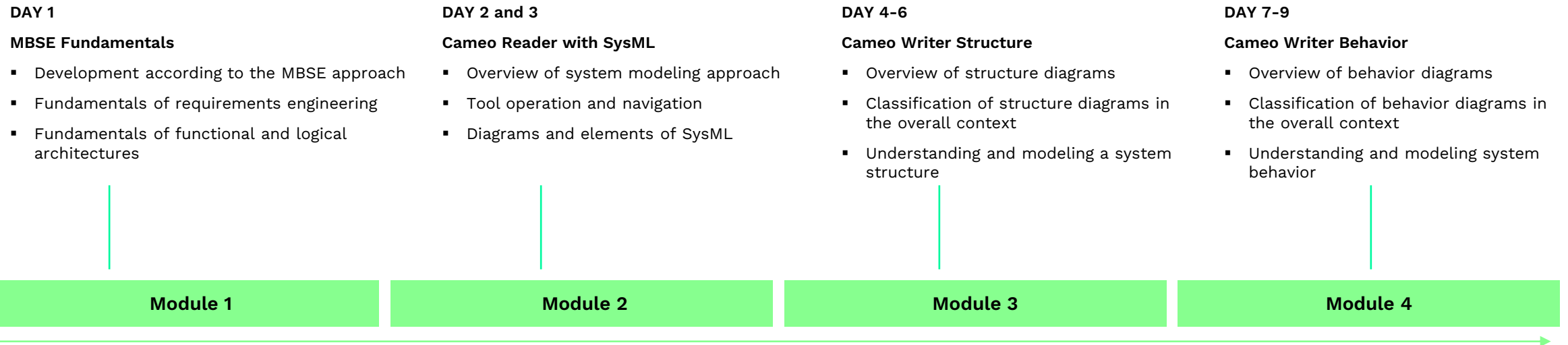
- Participants increasingly engage with the relevant tools (i.e. Cameo Systems Modeler)
- Different stages of user actions (from basics of using these tools to creation of own models with guidance, while also working independently)



MBSE by efs

# Training Overview (Example)

Our 9-day training cycle contains 4 modules and enables you to succeed in MBSE.





MBSE by efs

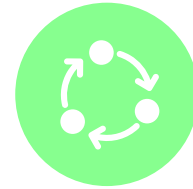
# Our Training Standard

Goal is to learn how to create models, this requires knowledge of methods, tool operation, and the language used.



## METHOD

Throughout all training components, methods and steps necessary for model creation are explained in a modular approach.



## TOOL

Participants are systematically introduced to the operation of the tooling through practical components.



## LANGUAGE

The language elements of SysML, along with their extensions through the chosen tool, are taught and then practiced



# Operationalization



MBSE by efs

# Operationalization

An implementation concept is necessary to establish PMT in a company. We focus on the following aspects:

## SUPPORT

- First Level Support
- Q&A sessions / FAQ
- Manuals / How To 's

## COACHING

- Accompanying of first application
- Consultation

## SERVICES

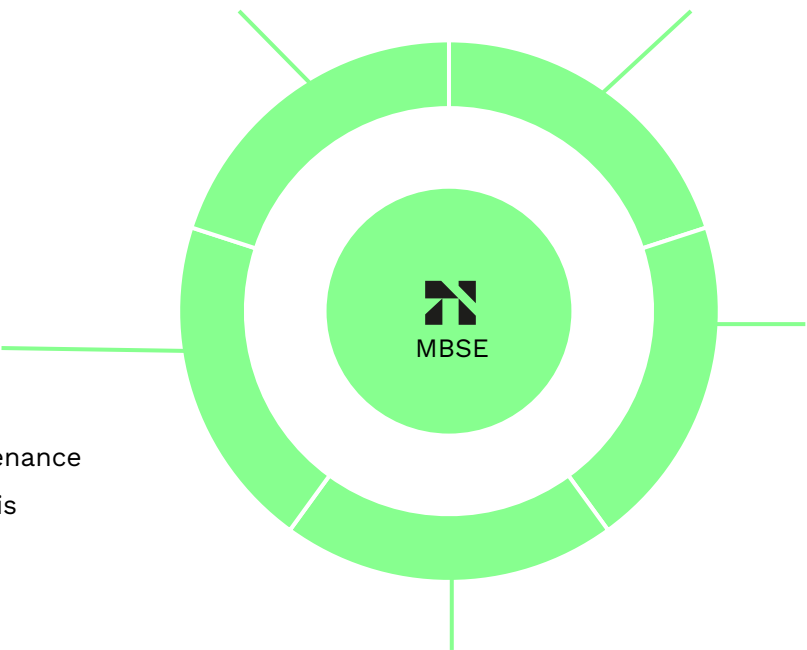
- Modelling
- Model maintenance
- Model analysis

## TRAINING

- Trainings off-the-shelf (see above)
- Customized trainings

## TAILORING

- Documentation of tailored processes and methods
- Toolautomation according to tailored methods





# Our References

## AUTOMOTIVE

# Reference: Volkswagen Group

Development of process and method for developing an architecture.

## Project

Methods and tools for function and software development

## 5

Years of project duration from 2018-2023

## Delivery

- Product architecture (including a custom light weight architecture framework)
- Process model
- Method documentation (with tool agnostic and tool specific documentation)
- Tool customizations (project templates, custom diagrams, validation rules and suites, automations)
- Trainings
- Deployment (coaching, administration, support)

## AUTOMOTIVE

# Reference: Volkswagen Group

Development of process and method for developing an architecture.

## Project

Typical operationalization project

## 3+

Years of project duration from 2020-today

## Delivery

- Tailoring of architecture process
- Adapting methods
- Development of scripts for automation
- Modelling of content
- Coaching
- Generating a PoC
- Business consulting
- Technical consulting

**AUTOMOTIVE****Reference: Volkswagen Group**

Development of process and method  
for developing an architecture.

**Project**

Audi Landjet

**4+**

Years of project duration  
from 2022-today

**Delivery**

- Modelling of content
- Modelling in several system levels
- Structuring several system
- Providing additional value to explicit models due to overview and broad vision



## AUTOMOTIVE

# Reference: Volkswagen Group

Development of process and method for developing an architecture.

## Project

SysML modeling of customer experience aspects in Cameo Systems Modeler

## 2+

Years of project duration from 2023-today

## Delivery

- Extending PMT by "sales language"
- Consulting
- Tool adaptations
- Modelling



## AUTOMOTIVE

# Reference: Volkswagen Group

Development of process and method for developing an architecture.

## Project

SysArch in CAMEO for steering

## 2

Years of project duration from 2023-today

## Delivery

- PMT: adapting methods to Cameo
- creating tooling for automated transfer from Enterprise Architect to Cameo Systems Modeler
- Creating tool interfaces to existing tools
- Consulting
- Tool adaptations
- Modelling

**AUTOMOTIVE****Reference: Volkswagen Group**

Development and execution of various trainings and coaching formats for several entities within VW Group.

**Project**

Trainings – 9-day training cycle

**5**

Years of project duration  
from 2020-today

**Delivery**

- Training modules
  - MBSE basics
  - Cameo Reader with SysML
  - Cameo Writer
- Defining training concepts
- Elaborate content for trainings (including training models)
- Execute trainings



**AUTOMOTIVE and other industries**

## Reference: **TECHNIA and other partners**

Development and execution of various trainings and coaching formats for several clients.

### Project

Trainings

**2**

Years of project duration  
from 2023-today

### Delivery

- Training modules with TECHNIA
  - CATIA Magic Cyber Systems Engineer Beginner and Expert
- Defining training concepts
- Elaborate content for trainings (including training models)
- Execute trainings



# Why TechHub by efs?

MBSE by efs

# Six reasons why we are your trustworthy partner for MBSE

## Customer centricity

Maxime: customer enthusiasm. Everything we do is focused on meeting the needs of our customers.

## Experience

High competence and experience through multiple projects and various industries.

## Broad vision

Holistic method development (questioning processes, creating methods, and enabling tools)

## Foresight

Challenging development process regarding re-usability of artifacts in later development steps. Building bridges between architecture and IVV

## Approach

Independent consulting, training and implementation from a single source in the context of MBSE development.

## Higher faster further

Through an approach coordinated with the customer, we reduce costs, increase the quality of the products and become faster



MBSE by efs

# Examples for “Higher faster further”

## Building Know How

We support your employees to build up missing know-how and deepen existing knowledge.

## Transparency and Clarity

We increase the transparency in your development and ensure clarity in the individual development steps.

## Getting into the Flow

We take care of process gaps, missing methods and preventable tool breaks to get in the flow with you.

## Time Savings

We look for time wasters. Automation and plug-ins as well as effective use of models and information are effective ways to save time.

## Speaking the same language

We enable your team to speak in models. Less emails, less PowerPoint, less meetings, less ambiguous communication.

## Workforce

We offer you a team that takes care of your needs. Strengthen your team with additional manpower and womanpower by efs.



Questions?  
**Contact me**



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