



**Lucas
LINDNER**
Business &
Authorization Lead
HORYZN

DIVE DEEP INTO THE EFFICIENT
DEVELOPMENT OF FUTURE AIR-RESCUE
VEHICLES USING MODSIM

AGENDA

A brief look into HORYZN & Mission Pulse

Developments along the Years & Use-Case

Development of KOLIBRI

The Future of Air-Rescue-Vehicles

HORYZN's new ambitious project

3DEXPERIENCE Platform – MODSIM Approach

MODSIM Design Engineer

MODSIM Aerodynamics Engineer

Project Management & Governance

Summary





80 members



25 nationalities

Our History

2019 – 2020

Silencio Gamma



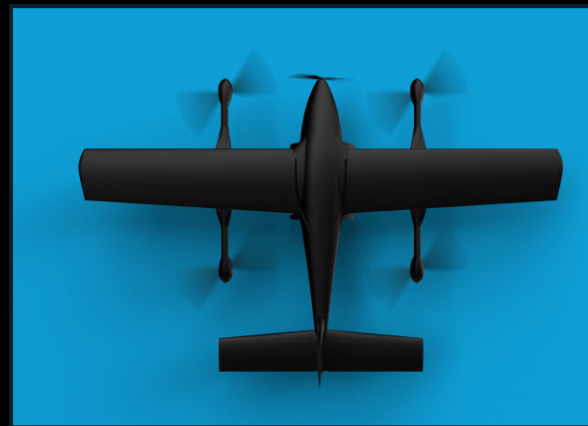
2021 – 2023

Frankenstein



2023 - 2024

Kolibri



Use Case Defibrillator Transport



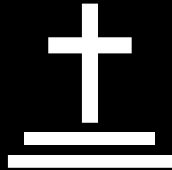
115.000

People suffer a cardiovascular arrest in Germany every year



9min

Needs an ambulance

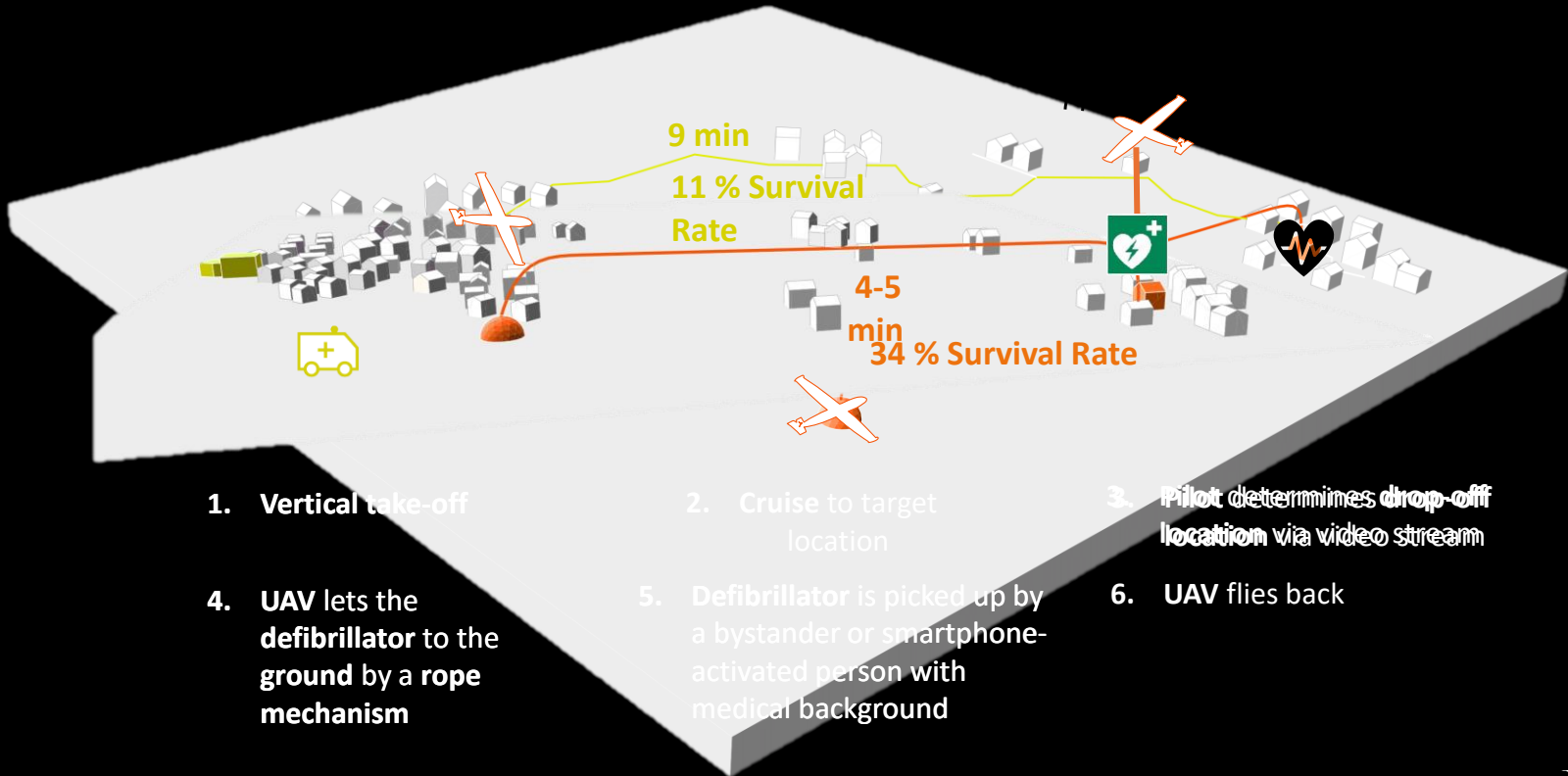


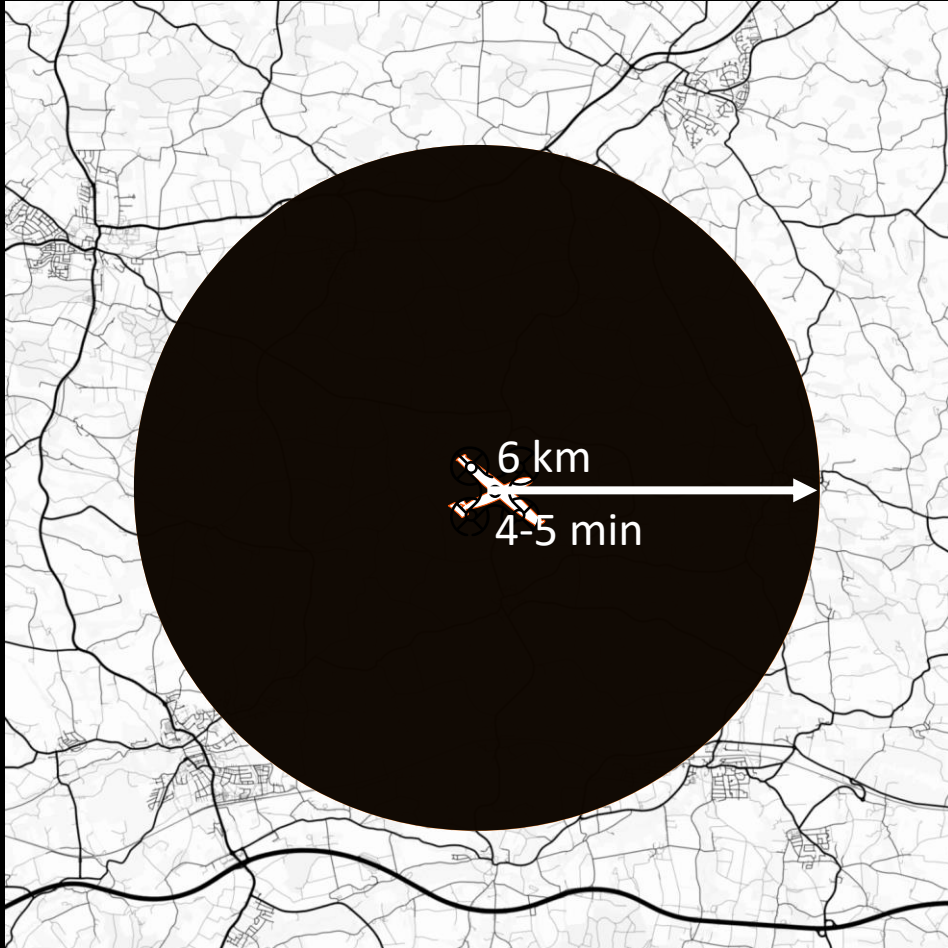
89%

Do not survive

The first eVTOL UAV defibrillator transport in Germany

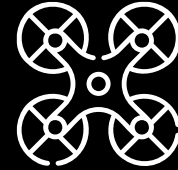
eVTOL UAV (electrical Vertical Take-Off and Landing Unmanned Aerial Vehicle)





Mission Pulse

eVTOL UAV to save lives



Low speed ca. 60 km/h



High range 6km
High speed ca. 125 km/h

3 m
WINGSPAN

KOLIBRI
DESIGN BASELINES



5
MOTORS



9

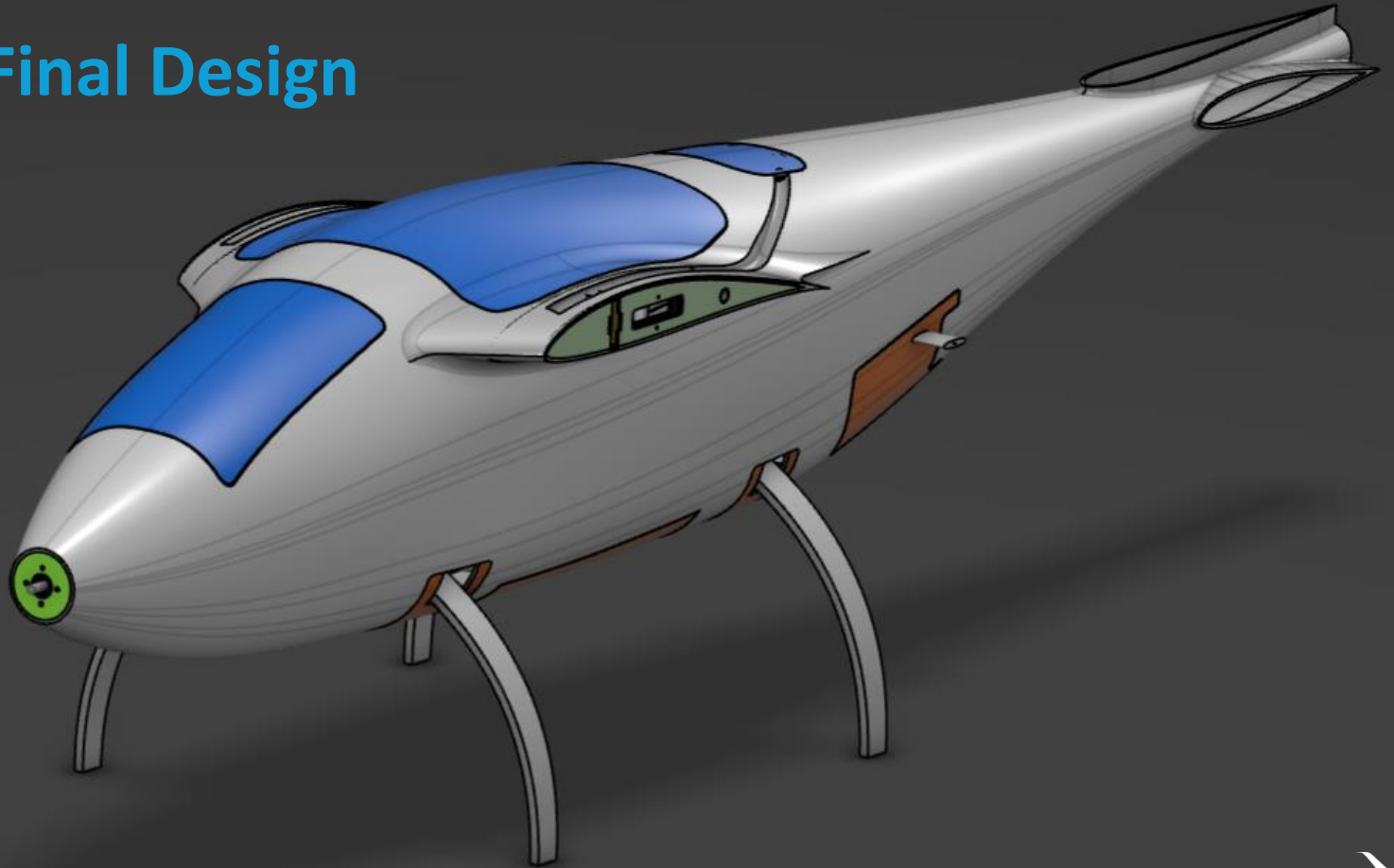
ASPECT
RATIO

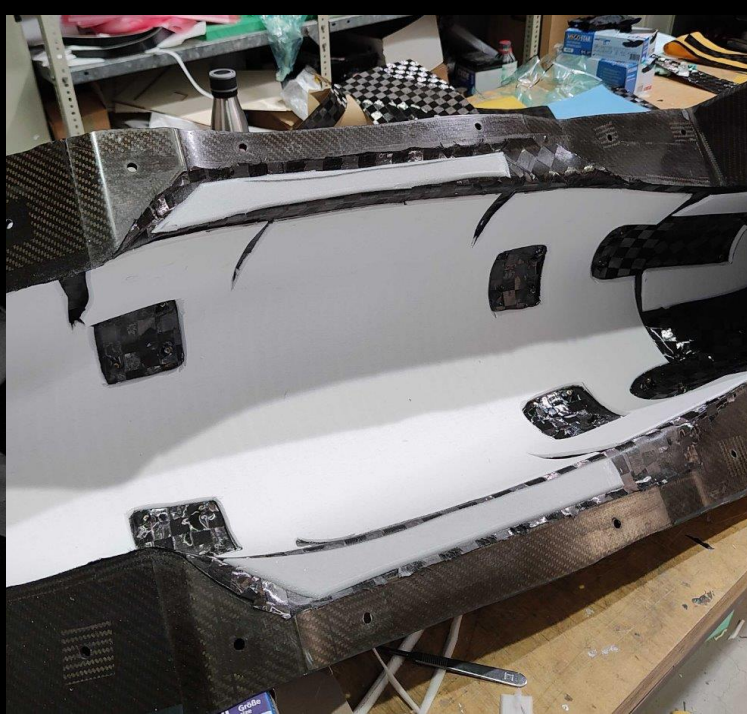
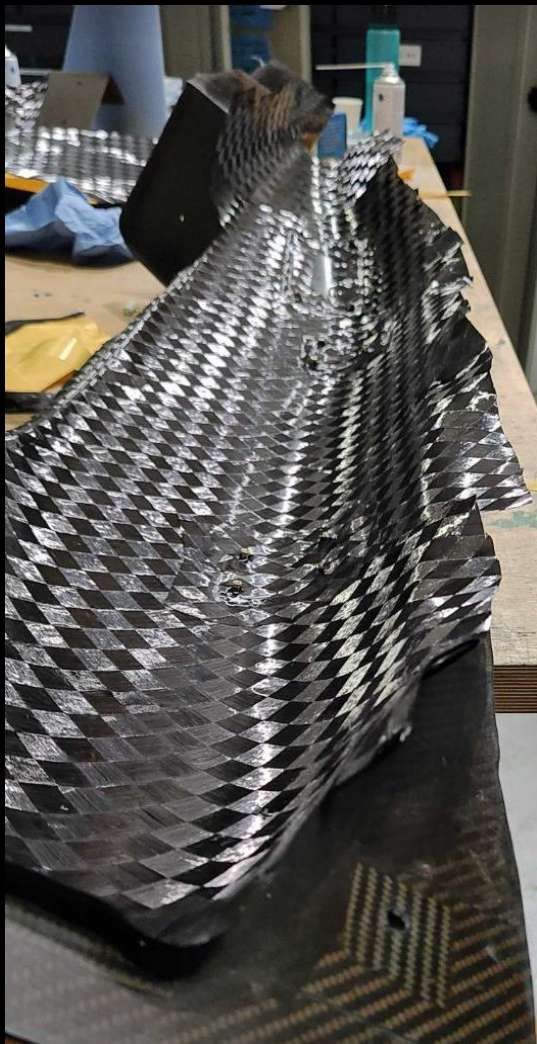
21 kg

MAX T/O WEIGHT



The Final Design

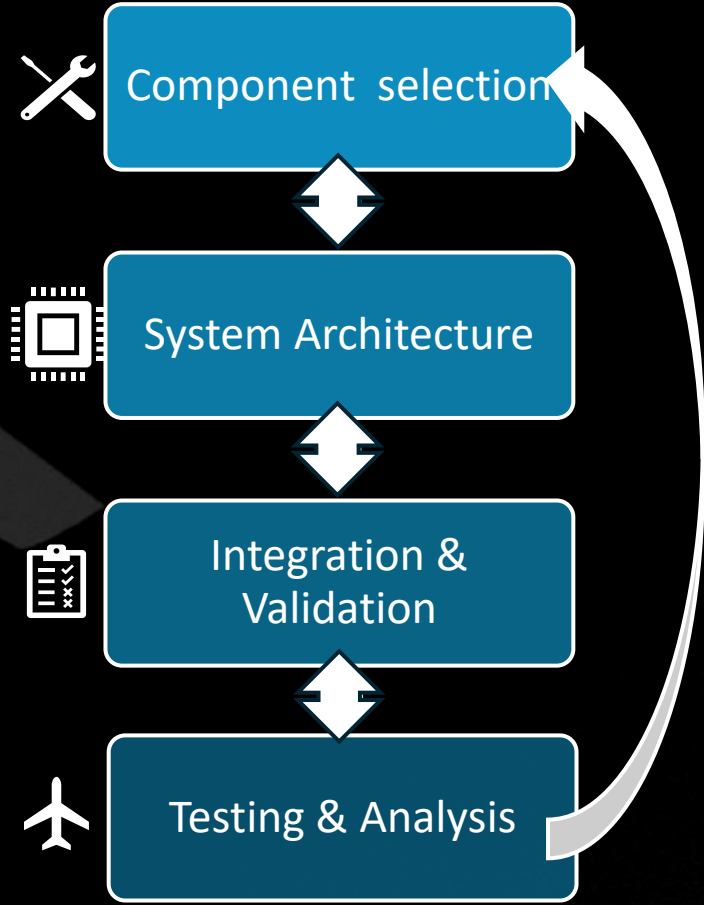




Assembly and Handover

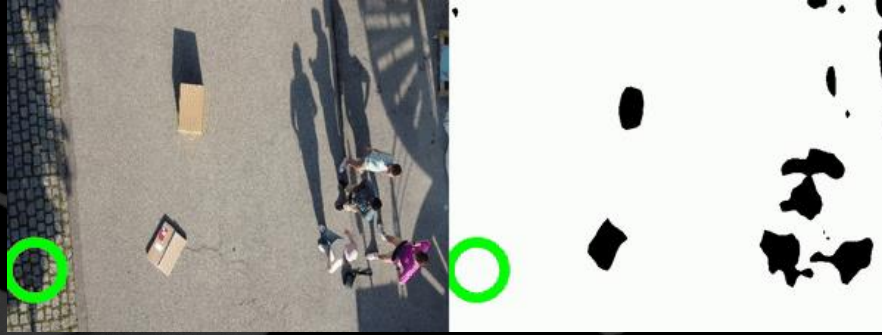


Flight Testing



Software - Autonomous Flight Features

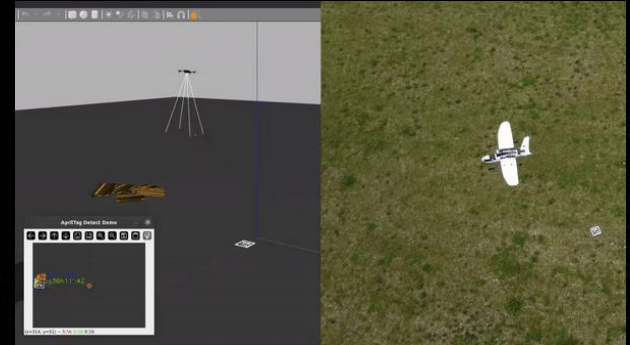
Safe delivery of medical supplies



Autonomous Navigation



Precision Landing



HORYZN is building an
Autonomous Emergency
Passenger Aircraft

GO AERO

PRIZE



35% Scale
Prototype

June 2025



Maiden Flight
& Qualification

December 2026



Final
Fly-Off

February 2027

Mission Pulse: Challenges and Learnings

Challenge 1:

Collaboration

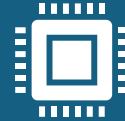


Management
Aviation & Flight-Testing
Software

...

Challenge 3:

Traceability



Various software packages
Changing teams
Different version

...

Challenge 2:

Complexity



System of systems
Mechanics/Electronics/...

Different design variants

...

Challenge 4:

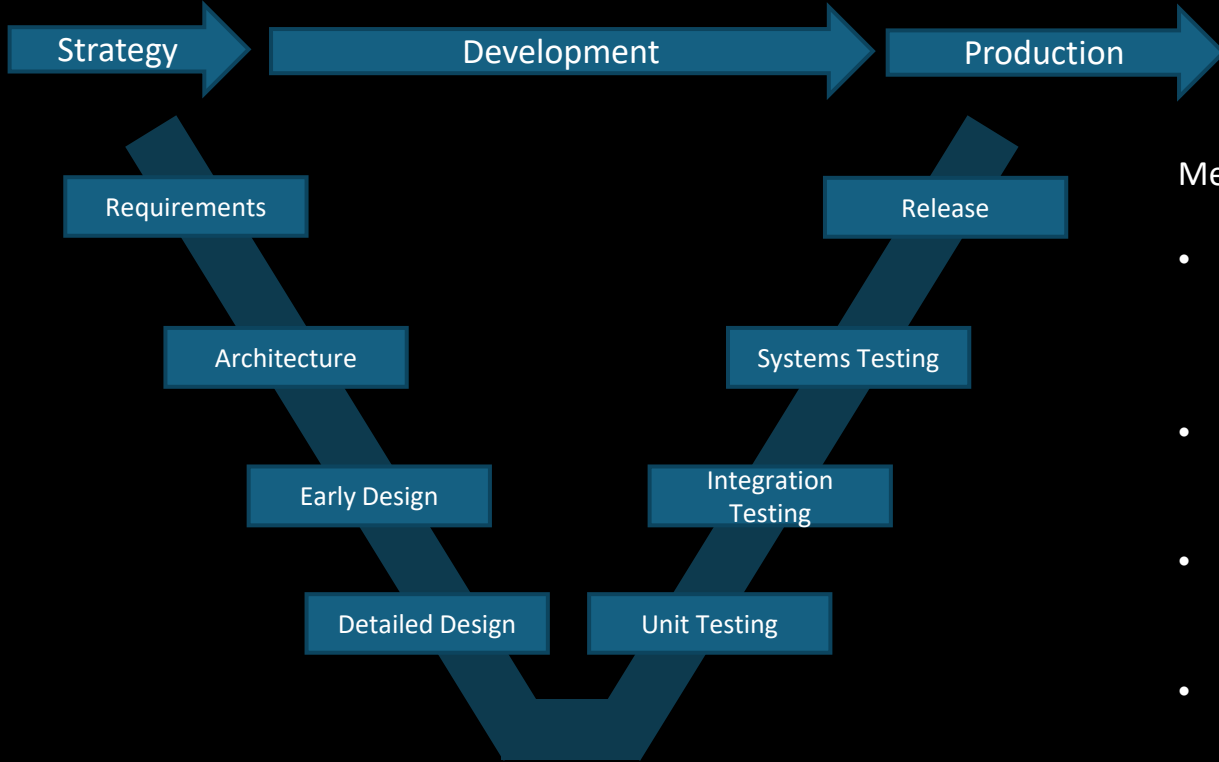
Certification



Data in different sources
Certification using simulation

...

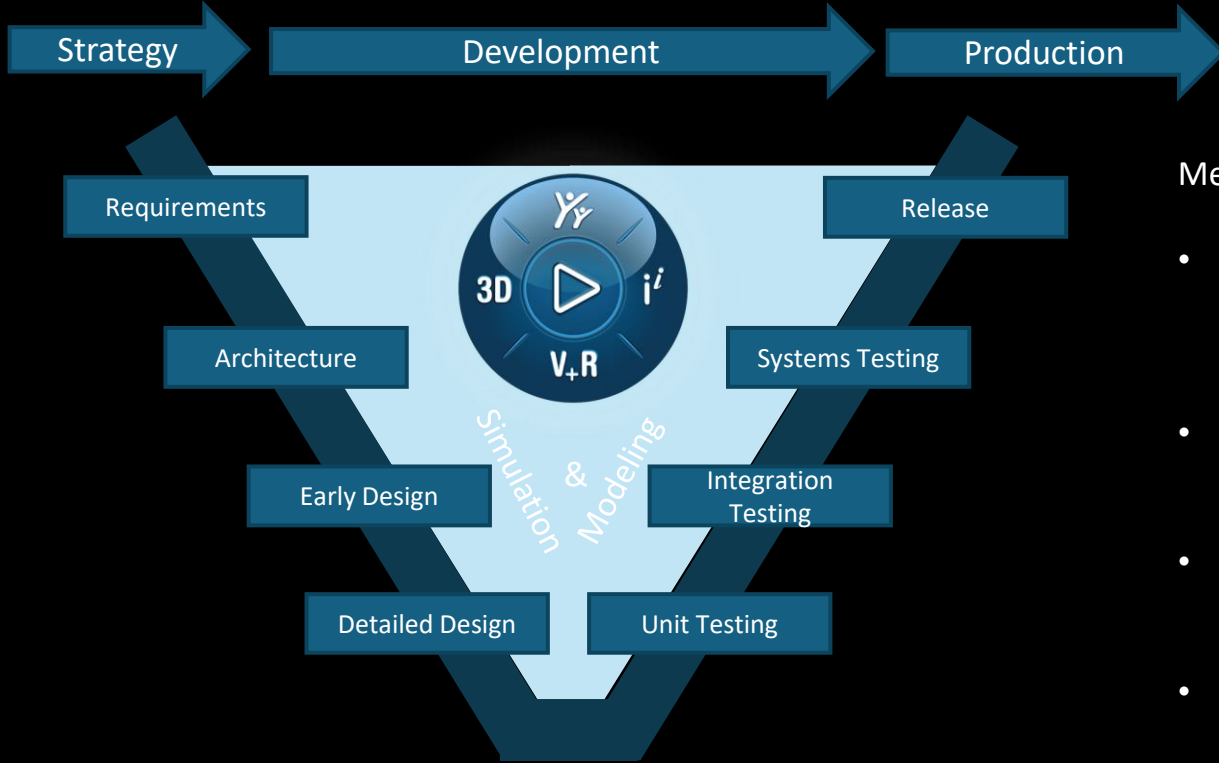
Product Development on the 3DEXPERIENCE Platform



Meet challenges by

- Business and development platform for seamless collaboration
- Clear user and task management
- Digital continuity and product lifecycle management
- Simulation to support the design and validation phase

Product Development on the 3DEXPERIENCE Platform



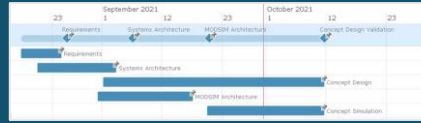
Meet challenges by

- Business and development platform for seamless collaboration
- Clear user and task management
- Digital continuity and product lifecycle management
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MODSIM: Connected Engineering



Project Management

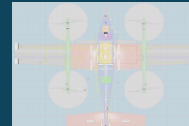


Requirements

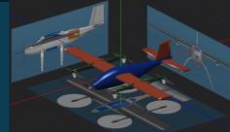
Title	Maturity
TestSpec - Kolibri	1 In Work
Wing - Structural	
Fuselage - Structural	
Fuselage - Electronics	
Fuselage - System Integration	
Fuselage - Subsystems	



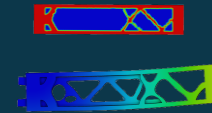
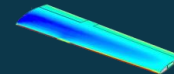
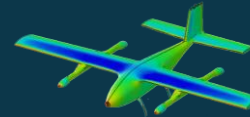
Architecture



Validation



Modeling



Simulation

MODSIM: Management Overview



Project Management

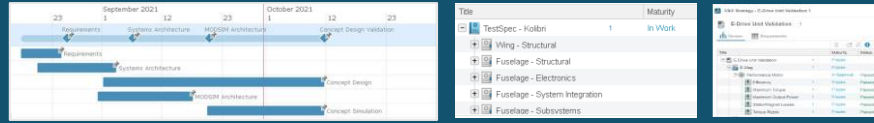
Requirements

Architecture

Validation

Modeling

Simulation



The screenshot shows the 3DEXPERIENCE | 3DDashboard interface. The top navigation bar includes Admin, Project Management, Design, and Simulation. The main content area displays a Gantt chart for 'ENOVIA - Project Gantt - HORIZN - Kolibri' with a filter for 'October 2024'. The Gantt chart shows tasks such as 'Wing - Structural - Tip Deflection - Simula', 'Wing - Structural - Obtain Pressure Distri', 'Fuselage - Structural - Subsystem Connec', 'Fuselage - Structural - Subsystem Connec', 'Fuselage - Structural - Subsystem Connec', and 'Fuselage - Structural - Subsystem Connec'. Below the Gantt chart, there are three panels: 'ENOVIA - Requirements Structure Editor', 'ENOVIA - Requirements Specification Edit...', and 'V&V Strategy - TestSpec - Kolibri 1'. The 'Requirements Structure Editor' shows a table with columns for Title, Revision, and Type. The 'Requirements Specification Edit...' panel shows a tree view of requirements and a 3D model of an aircraft. The 'V&V Strategy - TestSpec - Kolibri 1' panel shows a table with columns for Title, Maturity, and Status.

MODSIM: Validation



Project Management

Requirements

Architecture

Validation

Modeling

Simulation

The screenshot displays the 3DEXPERIENCE software interface. At the top, there are two 3D models of an aircraft wing: one showing the physical structure and another showing a color-coded pressure distribution. Below the models, the text 'CFD simulation for wing load' is visible. The interface includes a navigation bar with 'Admin', 'Project Management', 'Design', and 'Simulation'. A search bar and user profile 'Gerhard OETTL' are also present. The main content area is divided into several panels: a 'Physics Simulation Review' panel on the left with a 'Guided tour' button and 'Open Content'/'Most Recent Content' buttons; a central panel showing simulation results with a color map and a line graph; and a right-hand panel titled 'ENDOVA - Collaborative Tasks - Wing Workspace' which contains a 'To Do' list and a 'Test Results Capture' section. The 'To Do' list includes items like 'Wing - Structural - Obtain Pressure Distribution Simulation' and 'Wing - Structural - Clamping Force Simulation'. The 'Test Results Capture' section shows a table with columns for 'Title', 'Maturity', and 'Status'. A table below it shows a single entry: 'CFD Analysis Report' with 'In Work' maturity and 'Passed' status.

Title	Maturity	Status
CFD Analysis Report	In Work	Passed

MODSIM: Validation



Project Management

Requirements

Architecture

Validation

Modeling

Simulation

Structural simulation of the wing

3DEXPERIENCE | 3DDashboard | 3DEXPERIENCE Votrug

Gerhard OETTL

SIMULIA - Physics Simulation Review - Structural_Analysis_Wing_Koellert

Content Chooser

Displacement: 1 mm

Static Step: 1 - 1 s

Min: 0.00 | Max: 4.13

Deformation Scale: 1.00

Structural_Analysis_Win...

Gerhard OETTL | 16/10/2024 | 17:46:47 PM

Information

Mode Statistics	
Number of elements	38015
Element types	S3R2(343) S4R(27472)
Number of nodes	49539
Number of DOF	242234
Number of sections	12

Entity Variables

U, Translations
Values at Nodes
Quantity
Magnitude

Sensors

ENOVIA - Collaborative Tasks - Wing Workspace - Owned by me or assigned to me (6)

COMBAT My Tasks

To Do (1)

- Wing - Structural - Clamping Force Simulation | 16/10/2024 | To Do | To Do

In Work (1)

- Wing - Structural - Tip Deflection Simulation | 16/10/2024 | In Work | In Work

In Approval (1)

- Wing - Structural - Obtain Pressure Distribution Simulation | 16/14/2024 | In Approval | In P

Test Results Capture

Search for a Test Execution

MODSIM: Simulation-Driven Design



Project Management

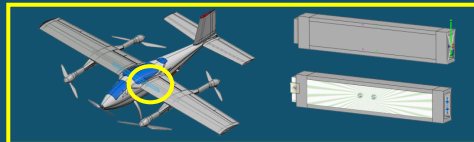
Requirements

Architecture

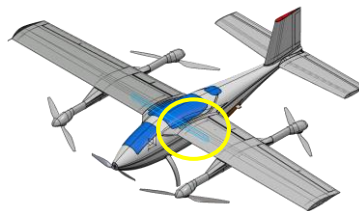
Validation

Modeling

Simulation

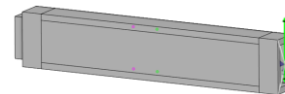


Topology optimization of bracket

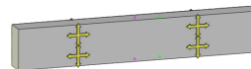


Assembly of the design spaces
Including all loads & boundary conditions

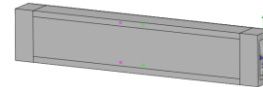
Design spaces plug-in unit assembly



Design space of the insert

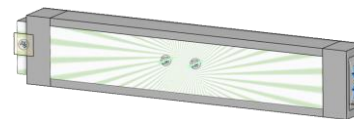


Design space of the slot



Optimization objective

Minimization of the mass of the assembly
taking into account different constraints (e.g.
milled from the solid in cross direction)



MODSIM: Simulation-Driven Design



Project Management

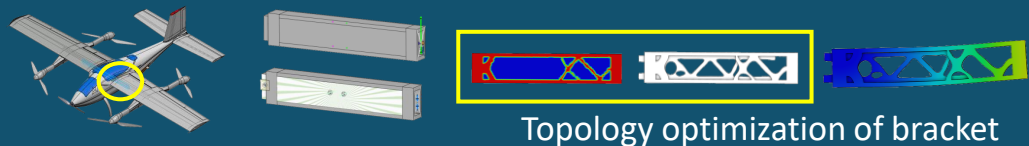
Requirements

Architecture

Validation

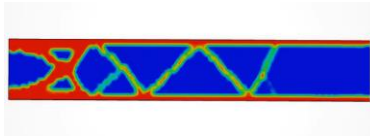
Modeling

Simulation

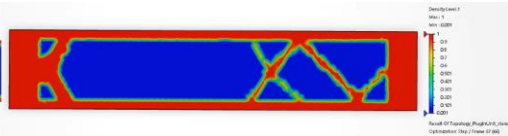


Topology optimization at work: Material removal and redistribution

Design proposal for the insert



Design proposal for the slot



Automatically generated Concept Shape Bodies

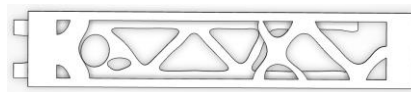
Concept Shape Body of the insert



Concept Shape Body of the slot



Assembly of Concept Shape Bodies



MODSIM: Simulation-Driven Design



Project Management

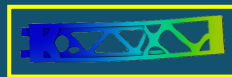
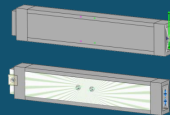
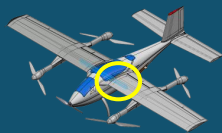
Requirements

Architecture

Validation

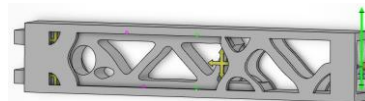
Modeling

Simulation



Topology optimization of bracket

Concept Shape validation



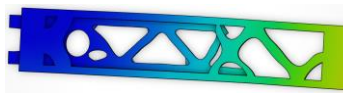
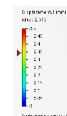
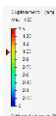
Load case: Vertical force up



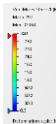
Load case: Vertical force down



Displacement



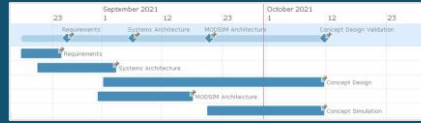
Von Mises Stress



MODSIM: Connected Engineering



Project Management

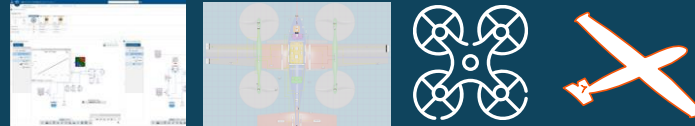


Requirements

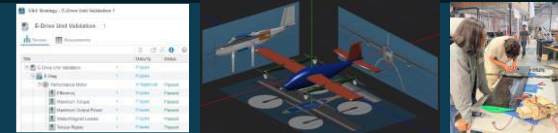
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Fuselage - Electronics	
Fuselage - System Integration	
Fuselage - Subsystems	



Architecture

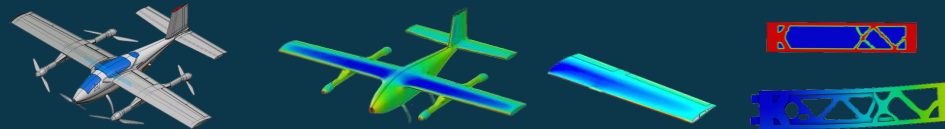


Validation



Modeling

Simulation







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