Added value comes from the design & Finnish Additive Manufacturing Ecosystem (FAME) speeds up the industrialization of AM in Finland

2021-03-17

Etteplan
A growth company

Rapidly growing and developing engineering services company

Our customers are global machine and equipment manufacturers

We stand out by the high-level competence and service attitude

Founded 1983 | Nasdaq Helsinki Ltd
~259,7 REVENUE, EUR MILLION 2020
> 3,300 NUMBER OF PERSONNEL

Tero Hämeenaho

Etteplan AM lead – Department Manager

Chairman of the management board at Finnish Additive Manufacturing Ecosystem (FAME)

Mechanical engineering background

- Additive Manufacturing
- DFMA (Design For Manufacturing and Assembly)
- Project Management
- Service product development
- Trainer
- Business Development
- Sales

CORE FACTS

20+ AM DESIGNERS

100 Simulation experts

50+ AM DESIGN PROJECTS

AMO TEAM

- Product Expert
- AM Design expert
- AM expert
- FEM expert
- CFD expert
- Material expert

AM SERVICES

STRENGTHS

- Heavy industry expertise
- Simulation driven design for AM
- AM business case creation & tools e.g. amotools.com
- Strong partner network

And many more…

FOR DEMANDING CUSTOMERS

Critical motor components designed for Wärtsilä & Gas turbine components for Siemens Turbo machinery

Etteplan supports Patria and Finnish Defence forces in HX Fighter Program in Additive Manufacturing related task

We have trained more than 30 companies for AM at Nordics

Our customers can benefit from Etteplan's extensive research and development in the field of AM e.g materials, design process, software's.

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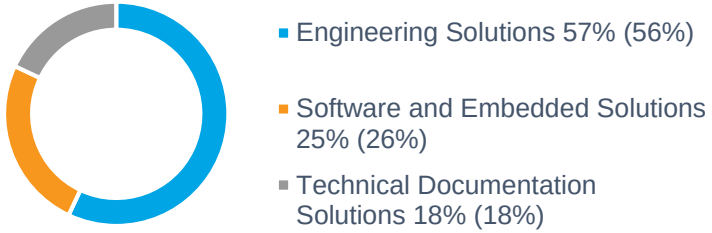
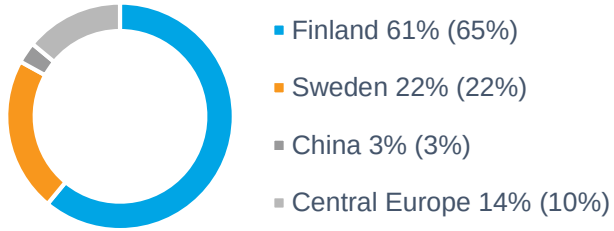
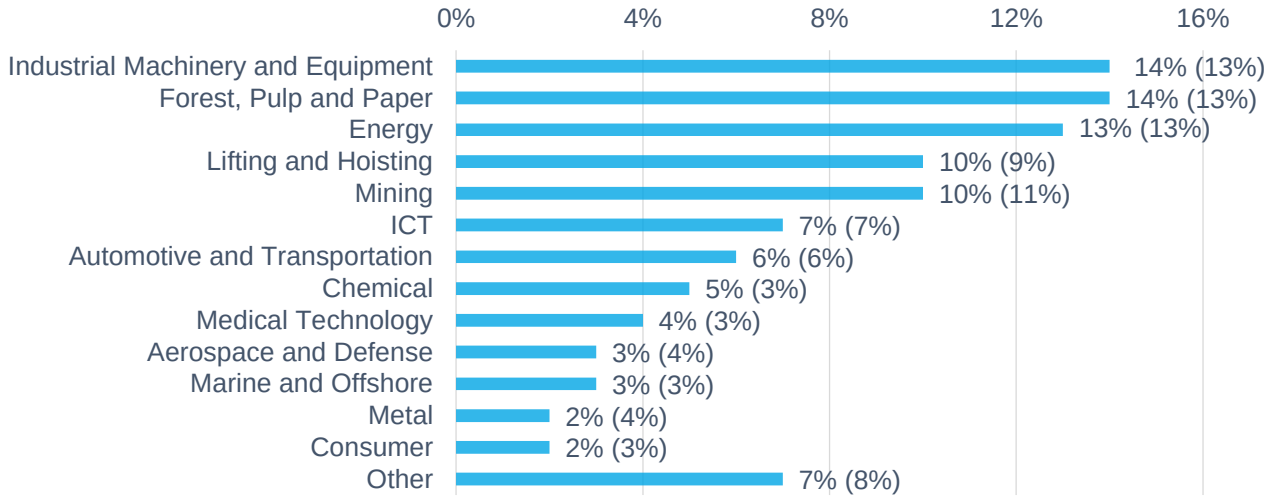
Revenue by service area 2020 (2019)



Revenue by country 2020 (2019)



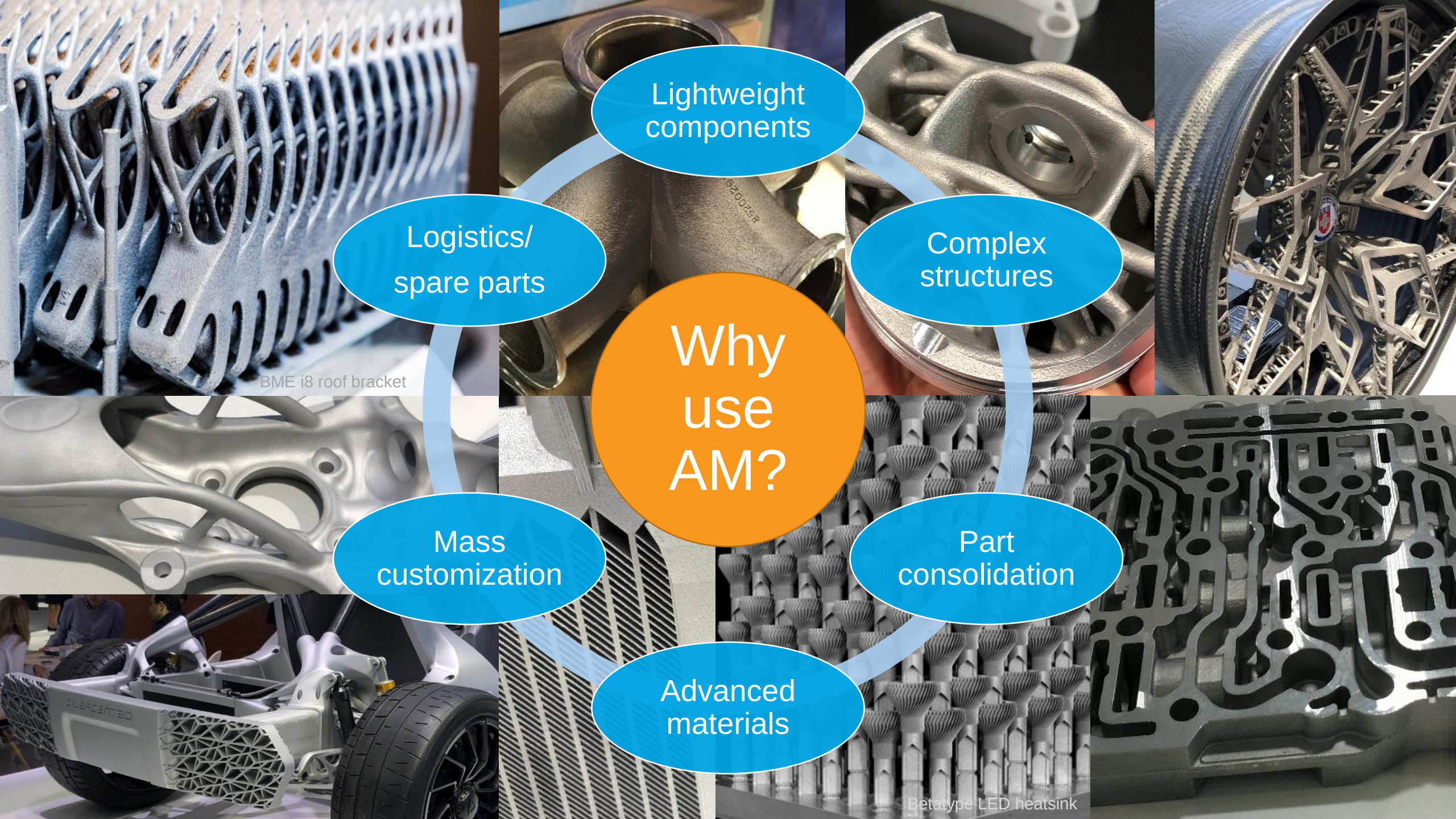
Revenue by customer segment 2020 (2019)



“We help you to implement Additive Manufacturing from idea to market”

Etteplan

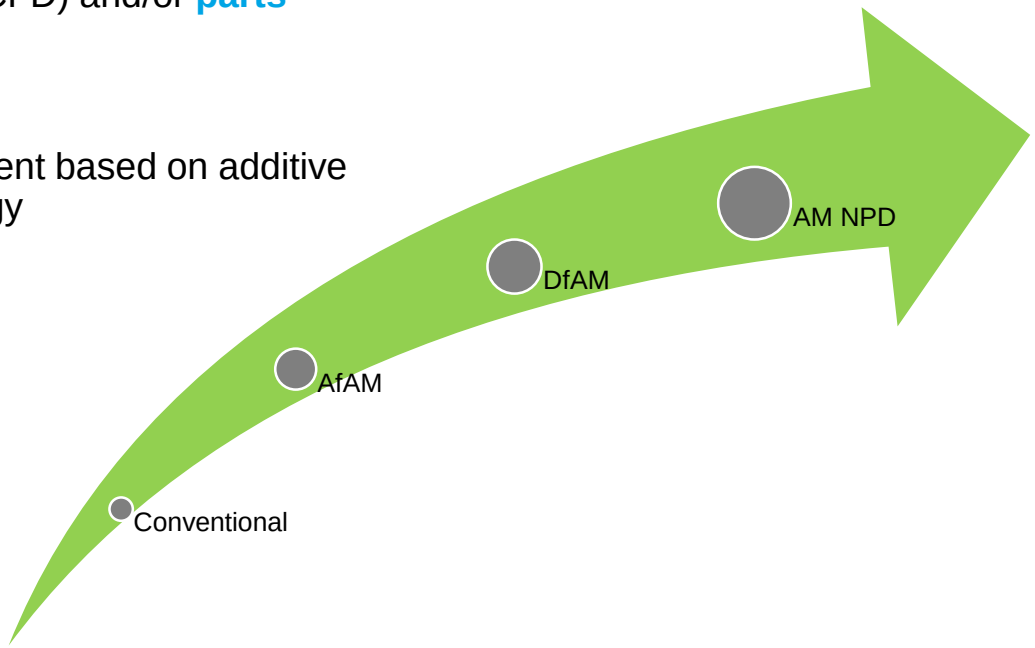
Added value comes from design!!!


Lightweight components
Complex structures
Part consolidation
Advanced materials
Mass customization
Logistics/ spare parts
Why use AM?
BME i8 roof bracket
Betatype LED heatsink

DESIGN LEVEL IN AM

- Conventional
  - Print as is
- Adaption of AM (AfAM)
  - Make small changes to print easier
- Design for AM (DfAM)
  - Make **better parts** by utilizing new degrees of freedom (incl. topology,CFD) and/or **parts consolidation**
- AM NPD (DfAM)
  - **New product** development based on additive manufacturing technology

Spare parts, material change, lead time benefits e.g



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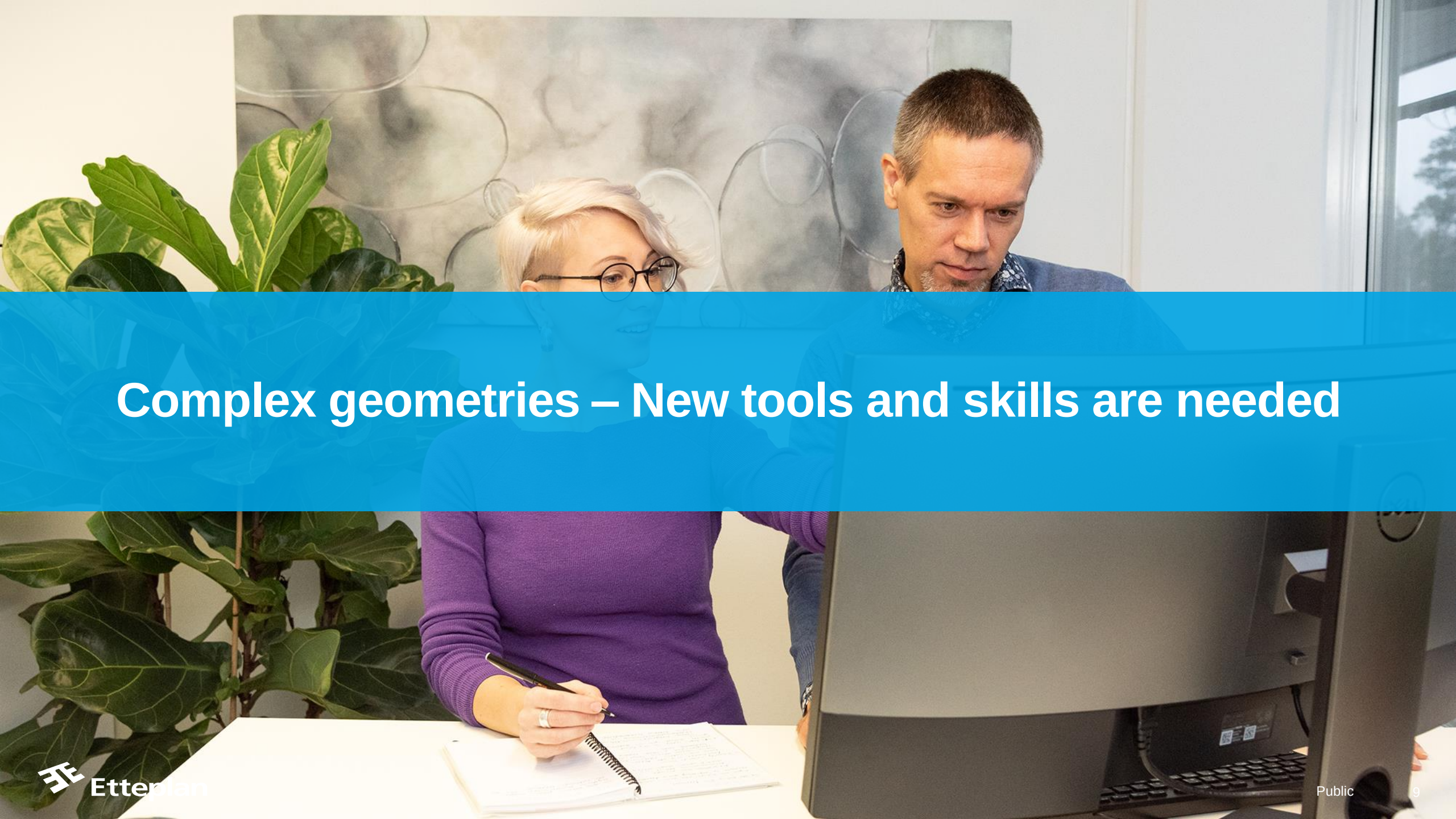
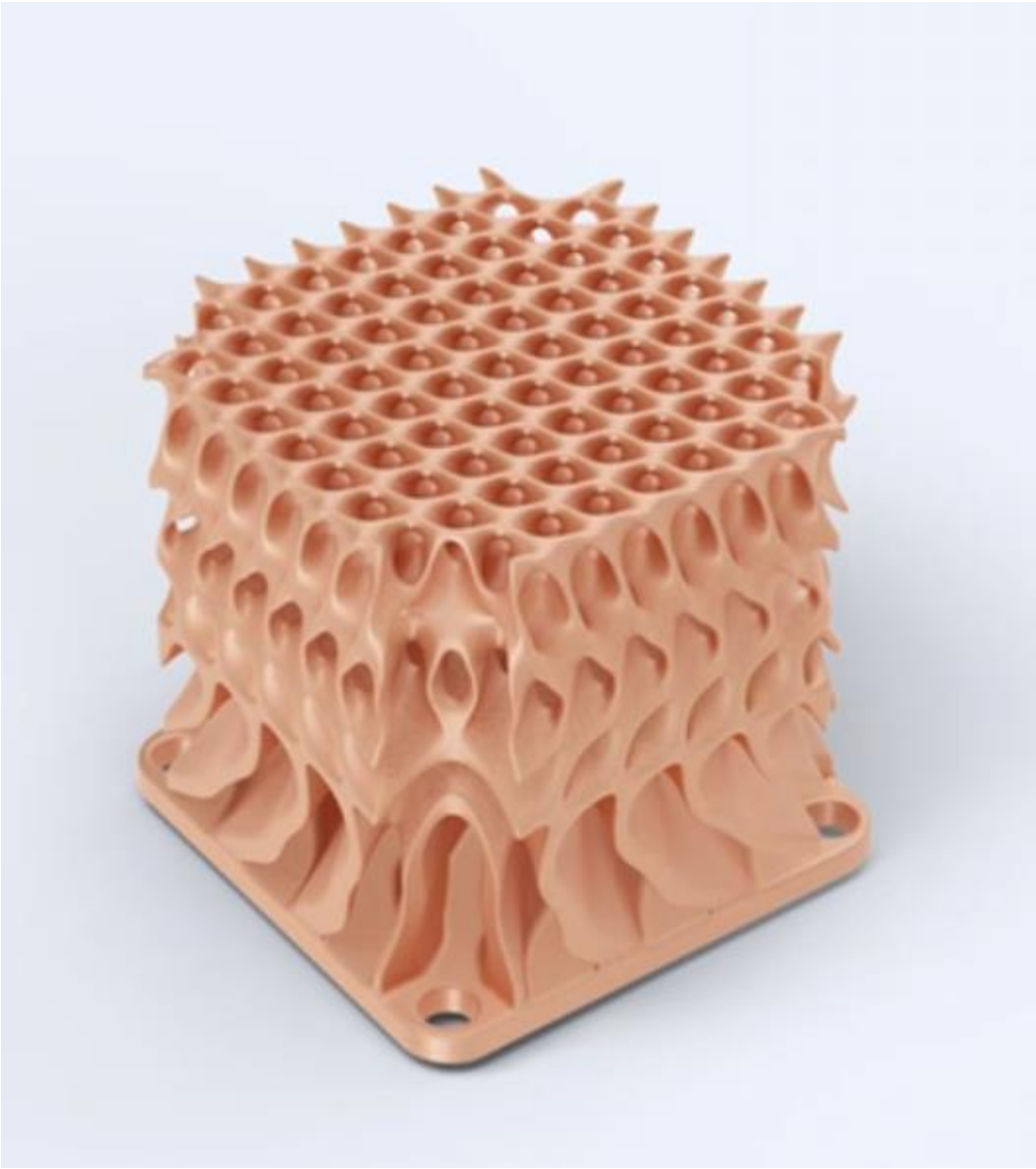
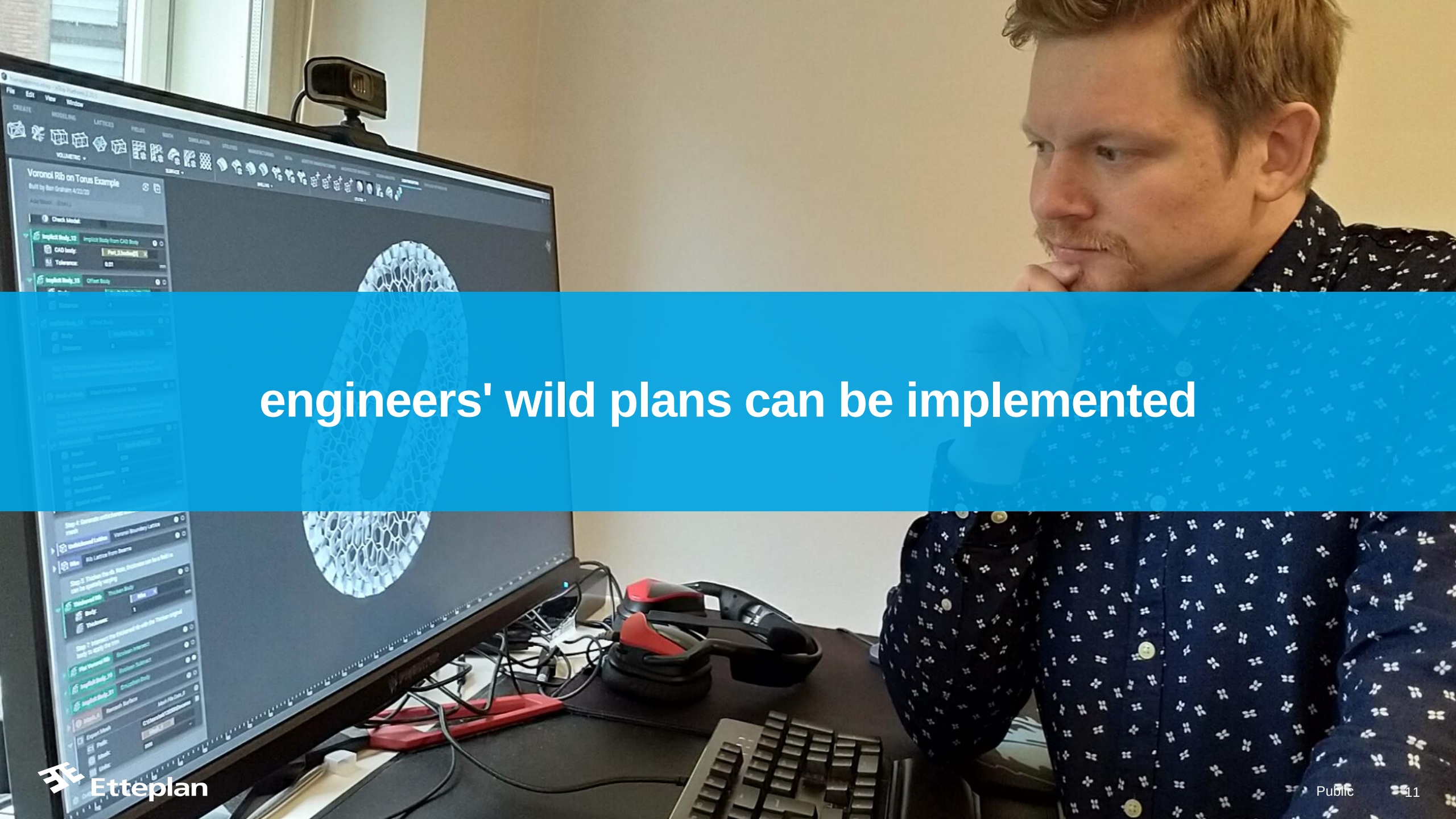


Complex geometries – New tools and skills are needed



nTopology software was used to generate triply periodic minimal surfaces (TPMS)



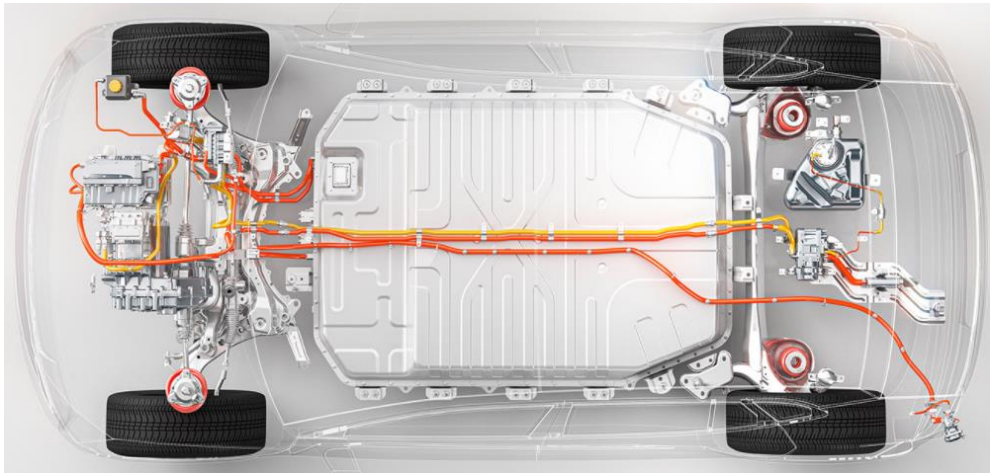
engineers' wild plans can be implemented

Additive Drives

highly efficient 3D-printed windings for electric motors

From traction drives to electrified auxiliary units

Hairpins are a new technology in the electric motor field. Rectangular copper rods replace wound copper wires.



Print optimized

3D printing allows **new hairpin geometries**. In particular, the winding heads can be fundamentally redesigned – in reference projects we were able to halve the winding head discharges in each case. This means that **30% more torque** can be accommodated in the same installation space.

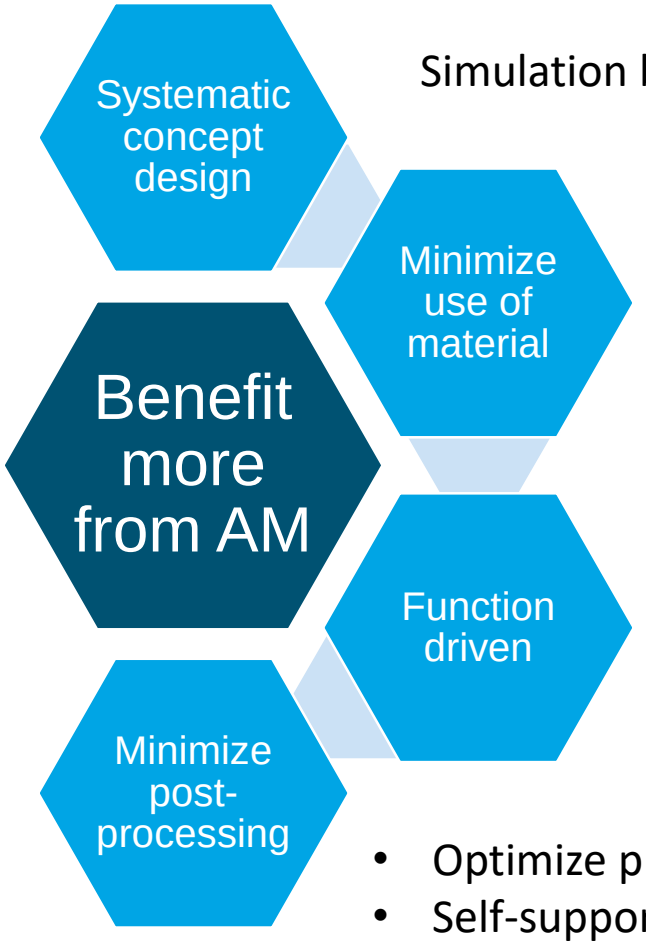
https://www.additive-drives.de/en/project/e-traction-motor/

Simulation Driven Design





Design approach



Simulation based design

Optimize: topology, shape, size

Take advantage of geometric freedom

- Lattice structures
- Internal channels
- Internal cavities
- Part consolidation

- Optimize print orientation
- Self-supporting shapes

Properties of a successful AM product

- New functionality
- Lightweight, compact
- Short build time
- Single consolidated part
- No assembly needed or design for assembly
- Minimal/easy machining & finishing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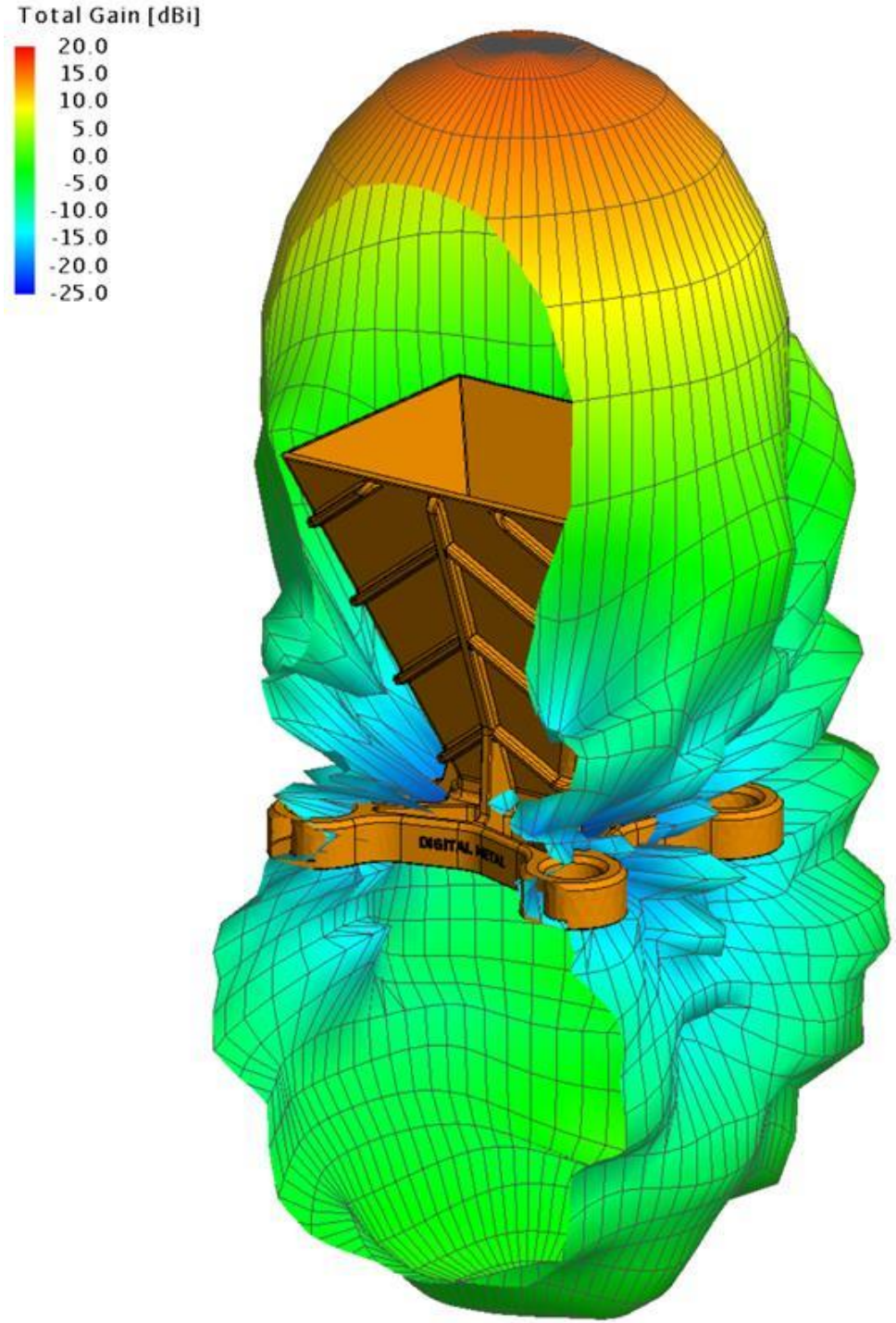
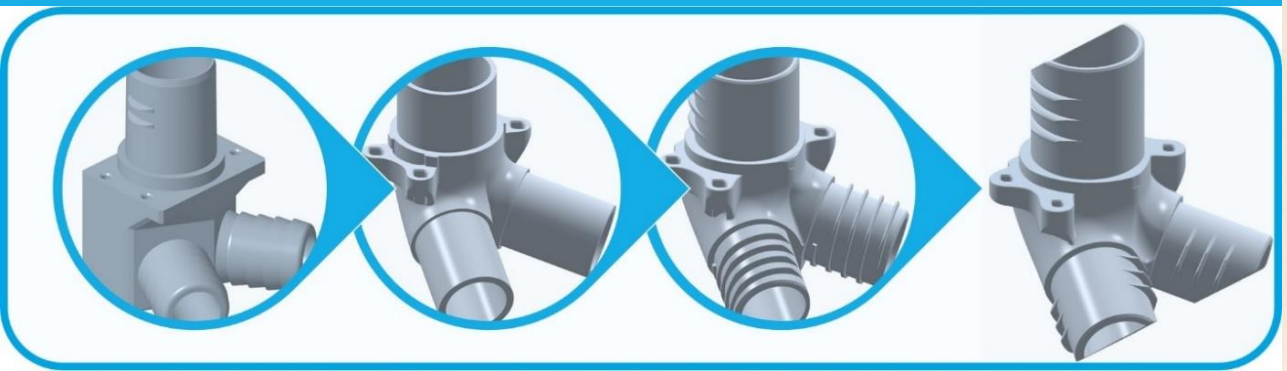

Total Gain [dBi]
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
DIGITAL METAL

Dust Extraction Channel for Robotic Sander

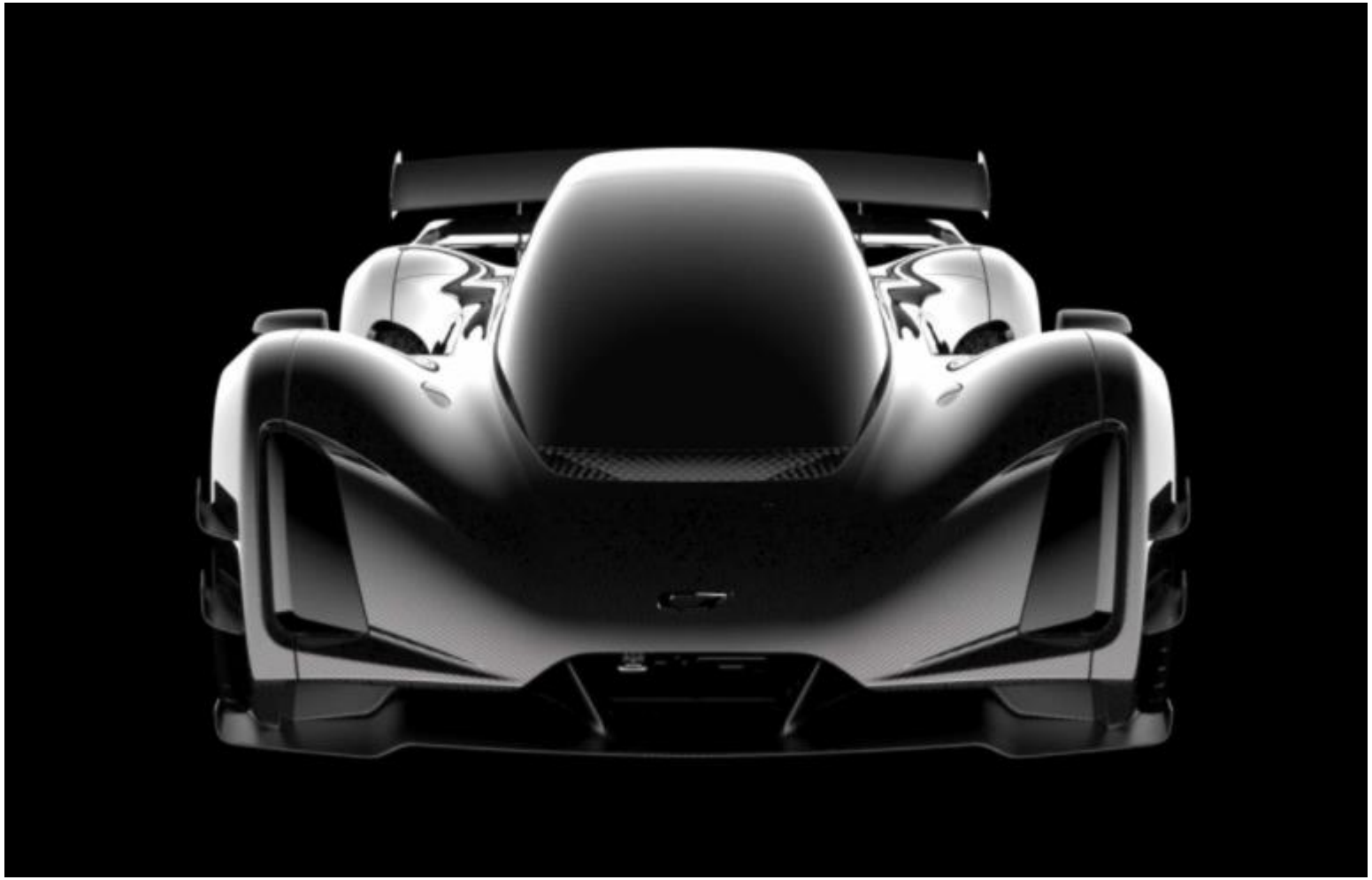
- Manufacturing costs reductions:
  - Fully nested build → **40%** cost reduction
  - Process parameter optimization with SLM Solutions reduced printing time and costs by an additional ~25%

- Exceeded customer's expectations:
  - Improved surface finish
  - More aesthetically pleasing
  - Significantly better airflow characteristics
  - Over 50% reduction in weight
  - Component codes embedded on the surface



3D printed car

https://www.divergent3d.com/



https://www.divergent3d.com/

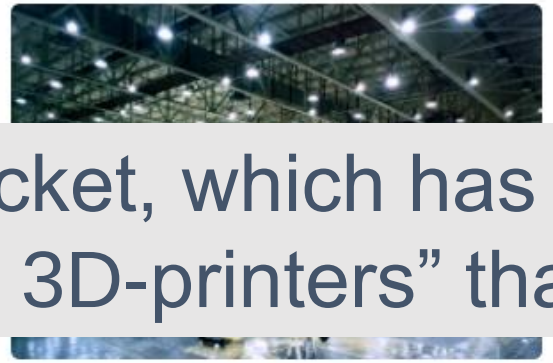
https://www.relativityspace.com/stargate

Relativity

DISRUPTING 60 YEARS OF AEROSPACE

TRADITIONAL

RIGID FACTORIES, FIXED TOOLING & HIGH LABOR COSTS



100,000+ Part Count

24 Month Build Time

48 Month Iteration Time

Complex Supply Chain

High **Physical Complexity**

RELATIVITY

ADAPTABLE, SCALABLE AUTONOMOUS ROBOTICS

<1,000 Part Count

2 Month Build Time

6 Month Iteration Time

Simple Supply Chain

Software Defined Factory

Terran 1 rocket, which has 95% of its parts made using “the world’s largest 3D-printers” that the company developed in-house.

https://www.relativityspace.com/stargate

INNOVATIVE

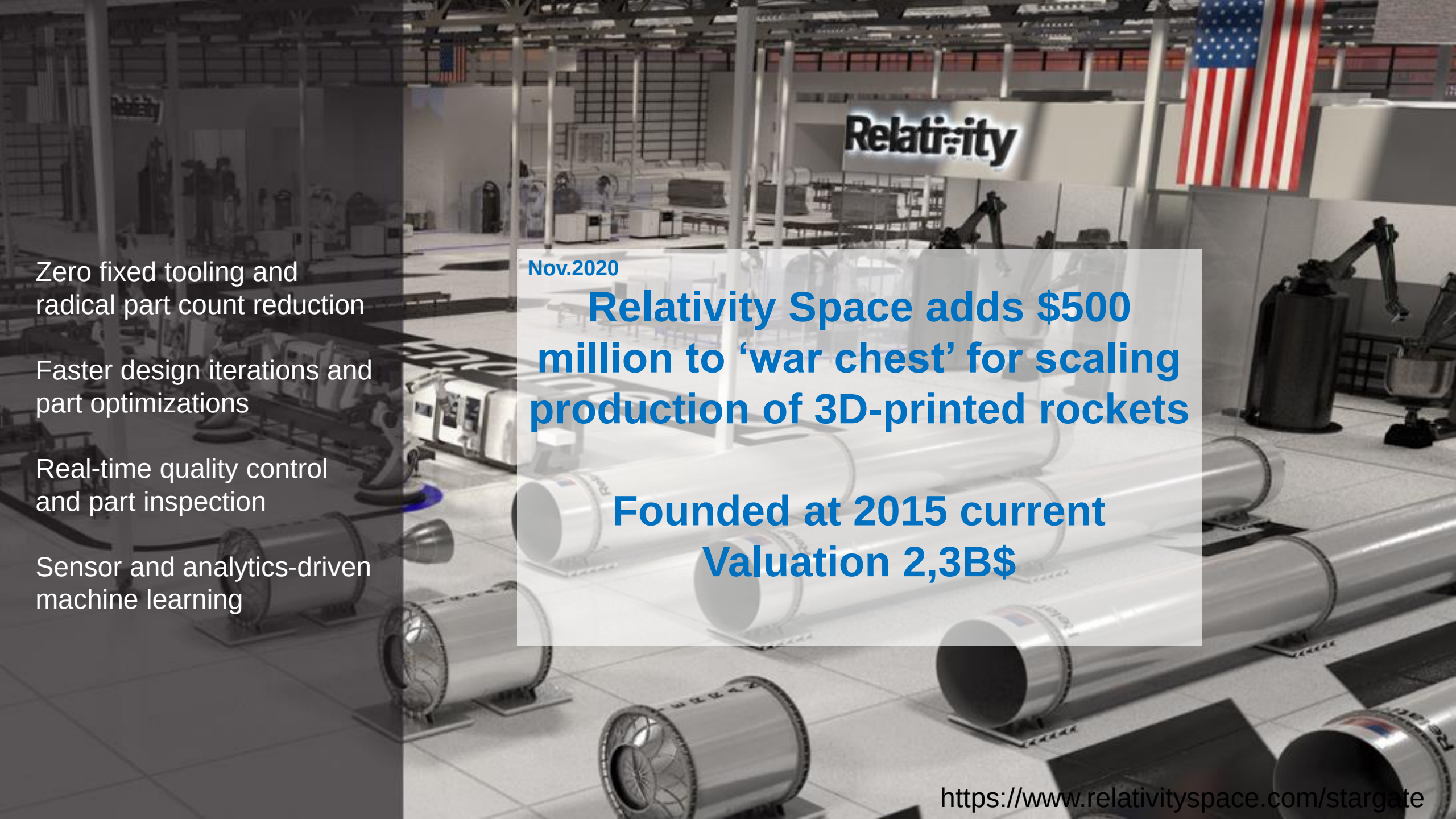
PRACTICAL

SCALABLE

Relativity built the Stargate factory, the first aerospace platform to automate rocket manufacturing, vertically integrating **intelligent robotics, software, and data-driven 3D printing technology.**

Incorporating the world's largest metal 3D printers and AI-driven controls, Stargate factory **continuously optimizes production**, resulting in greatly compounded quality and time improvements, lower costs, and product designs previously not possible.

https://www.relativityspace.com/stargate



Zero fixed tooling and radical part count reduction

Faster design iterations and part optimizations

Real-time quality control and part inspection

Sensor and analytics-driven machine learning

Nov.2020

Relativity Space adds $500 million to ‘war chest’ for scaling production of 3D-printed rockets

Founded at 2015 current Valuation 2,3B$

https://www.relativityspace.com/stargate

DIMECC
FAME
Finnish Additive Manufacturing Ecosystem

Finnish Additive Manufacturing Ecosystem

Why

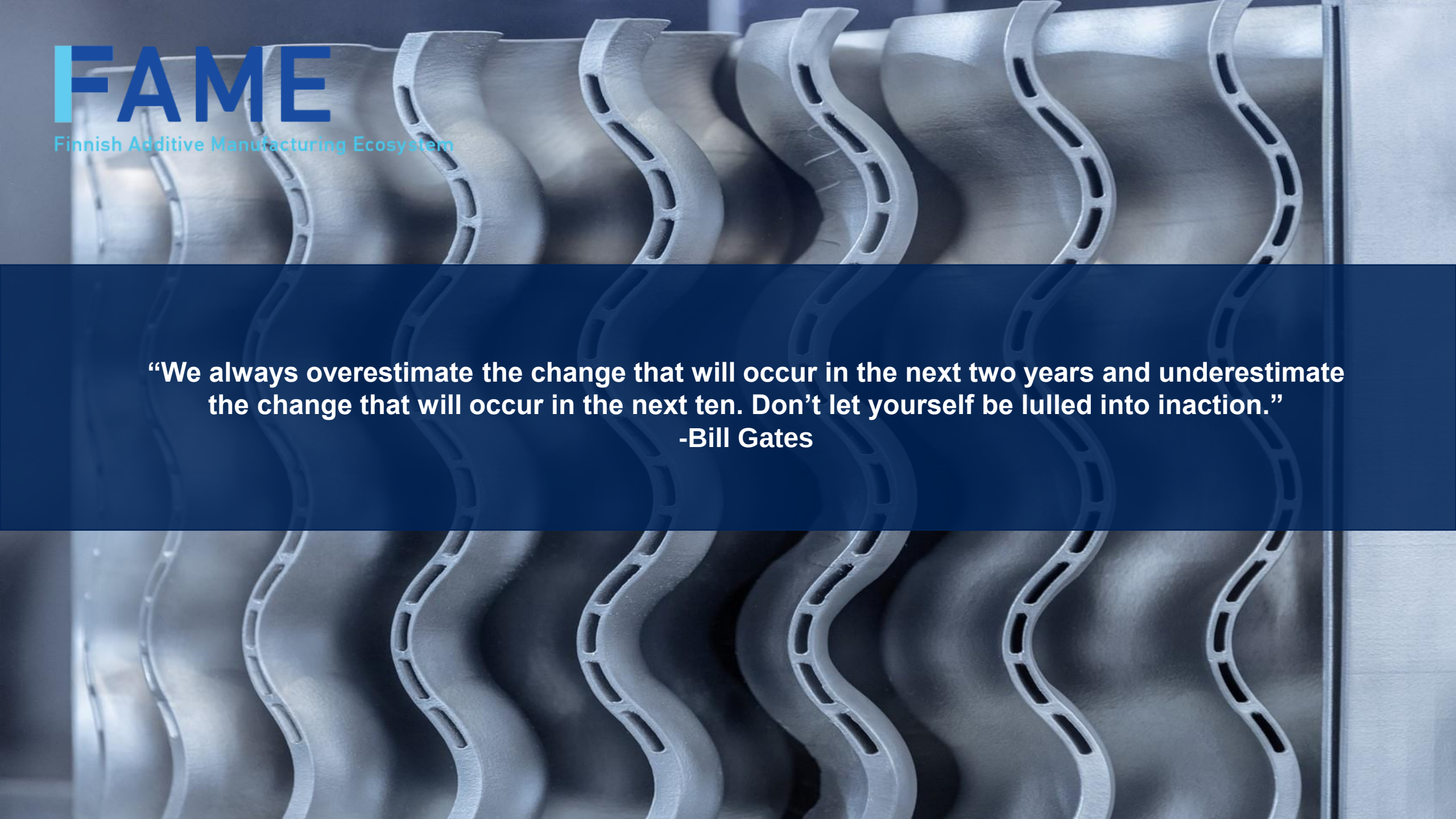
DIMECC
FAME
Finnish Additive Manufacturing Ecosystem

What is the challenge?

Additive Manufacturing as a technology in all of its application fields develops fast. Companies need to fully understand how AM will affect on their business and start to develop new products and services by utilizing future technologies.

Join the movement

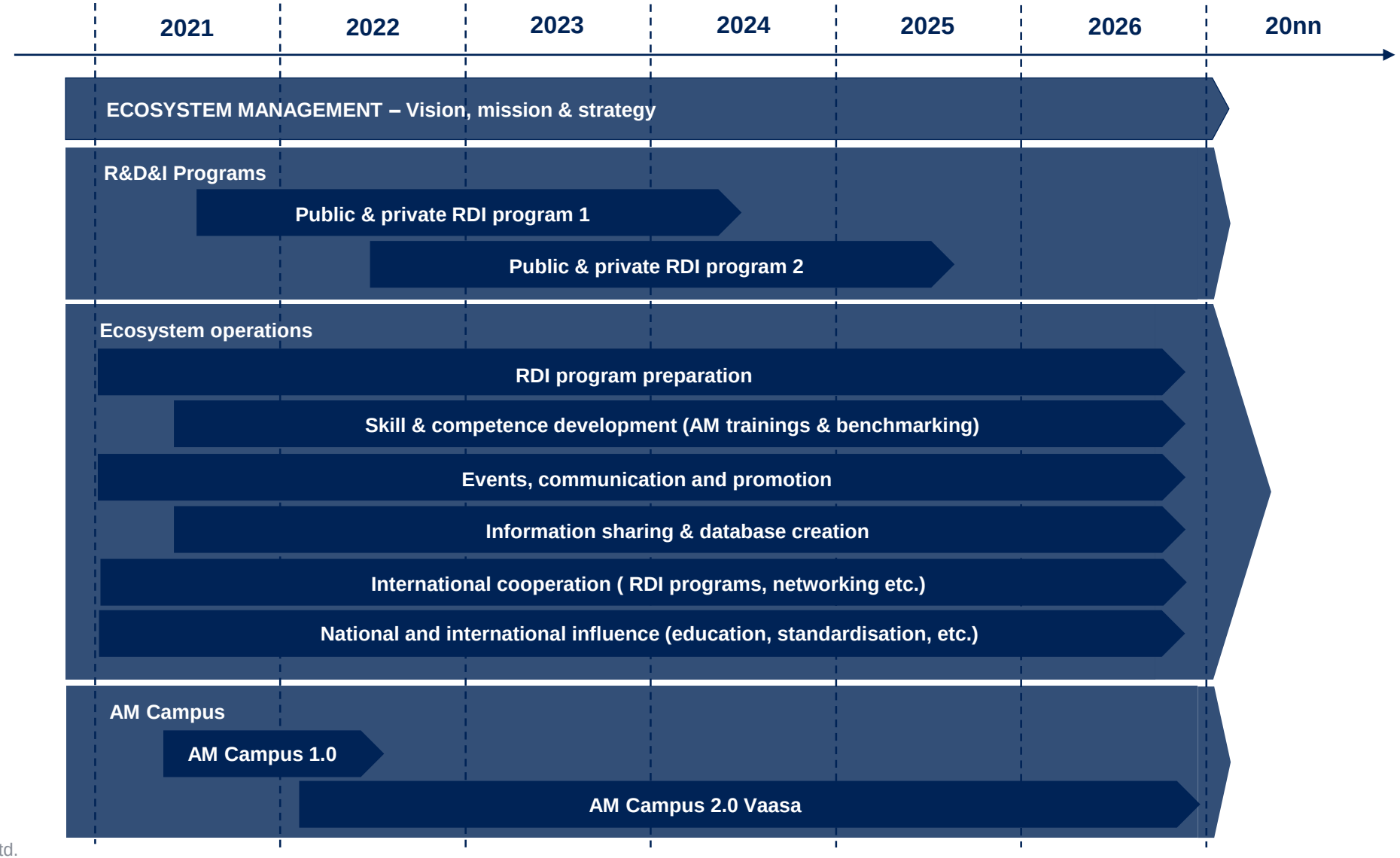
FAME is a professionally facilitated, business-driven and co-creative Additive Manufacturing ecosystem which brings all relevant parties together to share information, to create new business opportunities and applications. We work with companies, research & educational institutions, and public funding organisations to create a vital and flourishing Finnish Additive Manufacturing Ecosystem (FAME) to leverage investments from private and public stakeholders.



“We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten. Don’t let yourself be lulled into inaction.”
-Bill Gates

Break down the silos

FAME Roadmap



FAME
Finnish Additive Manufacturing Ecosystem

Join us!

www.fame3d.fi

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ANDRITZ
3D FORM TECH
eos
Lillbacka
WÄRTSILÄ
Patria
Etteplan
crtec
Delva
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CONSULTING & ENGINEERING
Työ- ja elinkeinoministeriö
Arbets- och näringsministeriet
Select AM
Digital Business Ecosystem
CORE
nordic
huld
DIMECC
MINIFACTORY
ORIGO ENGINEERING
RAUTE
VOSSI
SME
Elektro-Group
MEKANIIKAN JA ELEKTRONIIKAN SOPIMUSVALMISTUSTA
AIR FAAS

Etteplan

Engineering with a difference

You define your technology vision and goals. Together we find a solution which gives your customers the highest possible value.

With our industry domain expertise we enable your competitiveness.

Etteplan

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