LOCAL ACTION PLAN
SUSTAIN3D & CFI NETWORK DENMARK

Figure 1 Danish stakeholder group

September 2023

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INTRODUCTION

Building on insights from the Northsea programme project COM3 SUSTAIN-3D identifies barriers, solutions and mitigating initiatives to help SMEs further implement additive manufacturing (AM)-technology.
The partnership consists of knowledge Institutions and Business developers with a strong outreach to SMEs. Their main objective is to ensure, that companies can profit from new technologies and be at the forefront of R&D.

Implementing new technology like AM is in its essence a wicked problem. On the one side, SMEs know, that AM will help them innovate and stay ahead of competition. On the other hand, it is hard to grasp exactly what AM can do in their production. Some SMEs invest heavily in AM. But often investments aren't monetized. Deployment of already installed AM machinery is in some cases under 3%. Others don't invest or invest in cheap machines that do not meet expectations. All three scenarios slows transition toward Industry 4.0. SUSTAIN-3D seeks to mitigate this issue.

Studies of the problem point to complex causes:

- lack of skilled workers and innovators
- lack of (digital and structural) infrastructure and
- lack of objective institutional and digital support.

A complex problem like this is beyond any one company to solve. Companies across Denmark, Belgium, France and the Netherlands have teamed up with knowledge institutions, and local industry networks to analyze and develop and implement solutions to the problem.

GOALS

The overall goals of the project SUSTAIN3D are to:

- Create demand:
  - More SMEs need to invest in the right AM technology
- Create effect:
  - Expensive production grade machines must be utilized better
  - Ensure, that SMEs invest in the right equipment

During 18 months (September 2023- February 2025) the project SUSTAIN3D will:

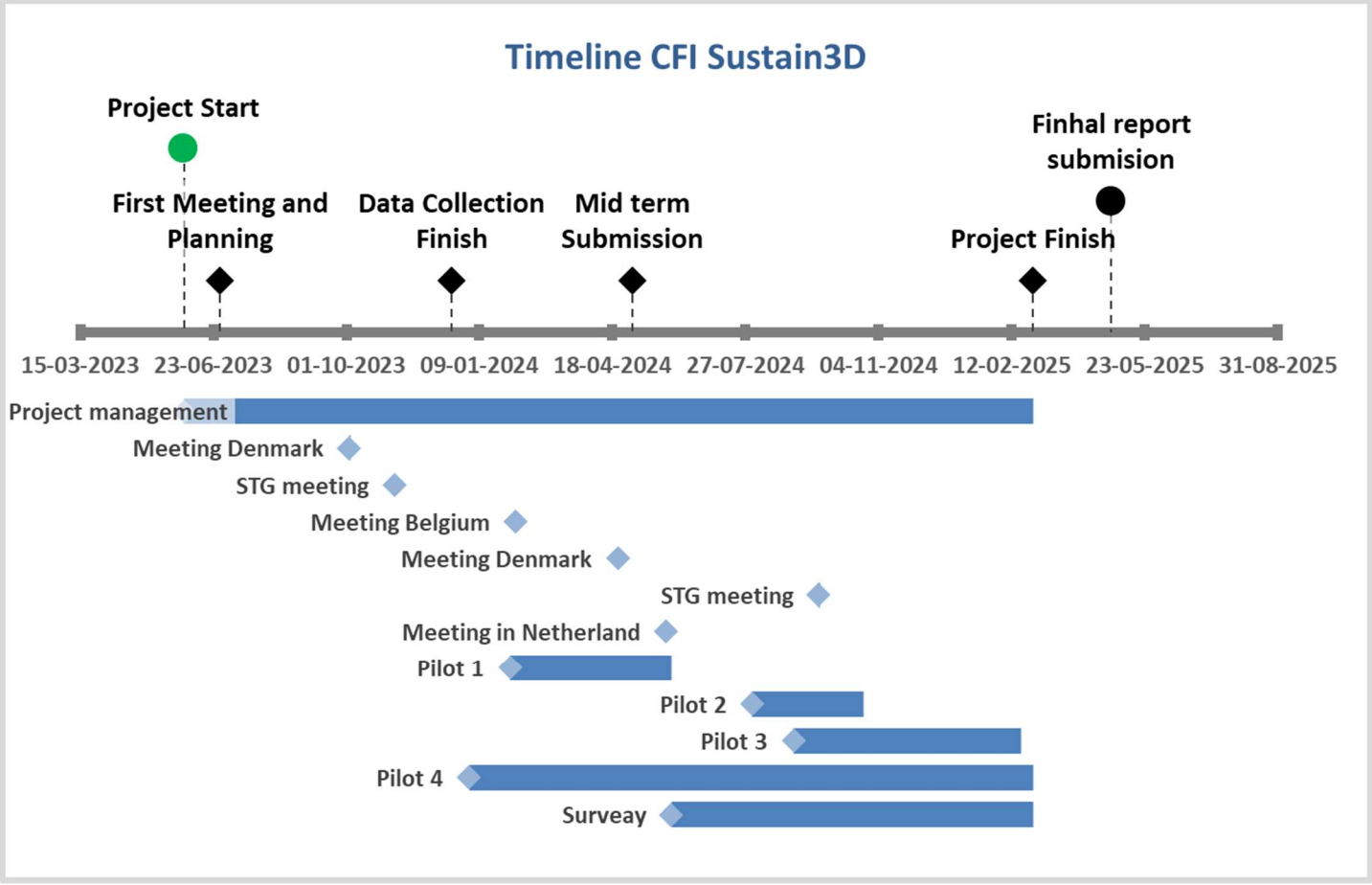
- Asses if the CORA/COM3 model for digital transformation can be meaningfully applied to the case of AM-technology. This will create a foundation for the partners to work on also after the project period. See appendix 1.
- Implement local action plans related to Skill, Services and Infrastructure. This will ensure after effect help 30 SMEs and 5 partners to increase capacity for implementing AM

TASK FOR PROJECT PARTNERS

Activities for CFI as the lead project partners, include:

- Project management
- Dialog and communication with Interreg North Sea
- Doing desk Research for “Infrastructure”

- Summarize the desk Research
- Organize the start up workshop In Denmark
- Organize the Workshop Infrastructure in Denmark
- Attending the workshop Services in the Netherlands
- Attending the workshop Skills in Belgium
- Organize 3 local stakeholder Group Meetings
- Execute 4 pilots with our sub partner
- Develop a Local action plan
- Organizing the Final Conference
- Project management for WP Infrastructure including monthly meetings in PM team
- Summarize the final reporting.



ROLE CFI

The above activities take place in affiliated countries (Denmark, Belgium, France, and the Netherlands).

CFI is the work package leader for Infrastructure, focusing on enabling SMEs to access both internal and external infrastructure. This ensures they can produce the desired prints using the appropriate technology, meeting their expectations effectively. Additionally, CFI represents workshops organized by other countries in the areas of Skills and Services.

As a service provider with an extensive network of Danish SME's, CFI acts as the voice of Danish SMEs. Its subpartner, Herningsholm, a vocational school, contributes by bringing a practical and educational perspective to the collaboration.

The aim of CFI is to gain knowledge about its stakeholders (Danish SME's) to develop and test the best possible activities that enable stakeholders to enhance their capacity in the AM field. The CFI "3D Technology Network" serves as the backbone of its stakeholder engagement, consisting of around 30 companies working with or interested in 3D technology and AM. The network holds 3-5 meetings annually, which also function as Stakeholder Group meetings, providing valuable input for the Local Action Plan and pilot projects.

CFI's subpartner, AM-Learning Lab at Herningsholm, has its own Local Action Plan. However, the long-standing partnership between Herningsholm and CFI ensures a shared focus on education and lifelong learning, particularly in the STEM education field.

SKILLS, SERVICES & INFRASTRUCTURE

SKILLS

The definition of skills is:

"Learning skills for 3D printing is about understanding how to make digital models into physical things. This includes multidisciplinary – or soft - skills, which use expertise from different fields without combining them; interdisciplinary – or hard -skills, which blend knowledge from various fields to innovate. This involves CAD skills, which focus on using design software effectively for 3D printing, Knowledge about which materials to use and other specific engineering skills"

- Admire-project 2023

INFRASTRUCTURE

The definition of technological infrastructure is:

"In the context of additive manufacturing within a small or medium sized enterprise, "technological infrastructure" refers to the required hardware, software, and networking components required to support the entire workflow of 3D printing processes"

- Inspired by: Kristin et. Al 2020 & Ruraldigital.eu 2023)

SERVICES

The definition of services is:

Service within additive manufacturing (3DP) in the context of small and medium-sized enterprises (SMEs) refers to an ecosystem of services that focuses on specialized support that facilitates the adoption, optimization, and utilization of 3D printing technology.

- Inspired by: Søberg et. al 2018

See also appendix 2.

DETAILED ACTIVITIES PROJECT PARTNER CFI

Activities	Participants	Date
TAKE UP PROJECT ON PATH	PE/CAMILLA	12/06 2023
TEAMS INTRO MEETING	FULL SUSTAIN 3D TEAM	28/06 2023
PRESENTATION TO DANISH DEFENCE	REPR. DANISH DEFENCE	23/08 2023
KICK-OFF MEETING	FULL TEAM	31/08 2023
MEETING IN AM ALIANCEN	10 MEMBER ORGANIZ.	31/08 2023
PHYSICAL MEETING IN HERNING	FULL TEAM	03/10 2023
PHYSICAL MEETING IN HERNING	FULL TEAM	04/10 2023
DANISH CHAMPIONSHIP 3D PRINT	FULL TEAM	05/10 2023
FORMNEXT 2023	DANISH STAKE HOLDER GRP	06/11 2023
STAKE HOLDER MEETING	DANISH STAKE HOLDER GRP	06/11 2023
STAKE HOLDER MEETING	BIRN plus OTHER	07/11 2023
NAVIGATION TOWARDS COHESION	BUVI/CFI/THOMAS MORE	28/11 2023
NAVIGATION TOWARDS COHESION	BUVI/CFI/THOMAS MORE	30/11 2023
PLANNING MEETING IN BELGIUM	BUVI/CFI/THOMAS MORE	30/11 2023
MEETING IN AM ALIANCEN	10 MEMBER ORGANIZ.	06/12 2023
LEAD- / SUB PARTNER MEETING	BUVI/CFI/HERNINGSHOLM	13/12 2023
DESK RESEARCH VERSION 1.0	FULL TEAM	19/12 2023
TEAMS MEETING	FULL TEAM	21/12 2023
Stake holder meeting ExpoPartner	Jesper/Kurt/Poul Erik	15/01 2024
Webinar: How to report indicators	FULL TEAM / VIDEO	18/01 2024
Contract signed / submitted	Nils Hedegaard	25/01 2024
AM Hub sustainable 3D printing	Jesper Heltzen	30/01 2024
Stake holder meeting Manomatic	Jesper Heltzen	30/01 2024
Sustainability within 3D Technology	Jesper Heltzen	30/01 2024
Contract signed / submitted	Poul Erik	01/02 2024
Physical Meeting in Antwerb host: TM	FULL TEAM MEETING	05/02 2024
Physical Meeting in Antwerb host: TM	FULL TEAM MEETING	06/02 2024
Physical Meeting in Antwerb host: TM	FULL TEAM MEETING	07/02 2024
Meeting with BIRN	BIRN 3D Team (6 pax-team)	09/02 2024
Stake holder Meeting with Grotrian	Poul Erik	12/02 2024
TEAMS MEETING	FULL TEAM	15/02 2024

Mutual Stake Holder meeting DAC	ALL team	19/02 2024
TEAMS MEETING	FULL TEAM	21/03 2024
Stake holder meeting 3D NW-Group	Group meeting #1 2024 (23 participants)	22/03 2024
Template for MID TERM REPORT out	to ALL LP / SP	29/03 2024
TEAMS MEETING	FULL TEAM	18/04 2024
DEAD LINE MID TERM REPORT	ALL	19/04 2024
Physical MEETING IN DK	FULL TEAM	22/04 2024
Physical MEETING IN DK	FULL TEAM	23/04 2024
DEAD LINE FOR MID TERM REPORT	ALL	03/05 2024
Physical MEETING FME NL	FULL TEAM	28/05 2024
Physical MEETING FME NL	FULL TEAM	29/05 2024
Stake Holder Group Meeting 3D NW-Group	Group Meeting #2 (28 participants)	
ONLINE MEETING 10-12:00	FULL TEAM	20/06 2024
TEAMS MEETING	Reduced attending (holidays)	15/08 2024
PREPERATION DANISH CHAMP. SHIP 3D	GRP MEETING WITH STEERING GROUP	09/09 2024
Stake Holder Group Meeting 3D NW-Group	Group meeting #3 (36 participants)	20/09 2024
BUILDING UP FOODTECH SHOW in Herning	DM3D SECTION / CONFERENCE AREA	27/09 2024
BUILDING UP FOODTECH SHOW in Herning	DM3D SECTION / CONFERENCE AREA	30/09 2024
FOODTECH SHOW DAY 1		01/10 2024
FOODTECH SHOW DAY 2		02/10 2024
FOODTECH SHOW DAY 3		03/10 2024
INTERREG NORTH SEA SEMINAR BILLUND	BUILD UP	22/10 2024
INTERREG NORTH SEA SEMINAR BILLUND	BUILD UP	22/10 2024
AM-SUMMIT EXHIBITION COPENHAGEN	INTRODUCTION – AM METROLINE	29/10 2024
MEETING CAROLINE MUSCATO CD EU		30/10 2024
EVALUATION DANISH CHAMP 3D	GRP MEETING WITH STEERING GROUP	31/10 2024
MEETING ESA-EUROPEAN SPACE AGENCY	Herning meeting with Andreas Mogensen	04/11 2024
FORMNEXT FRANKFURT	28 PARTICIPATING STAKE HOLDERS	18/11 2024
FORMNEXT FRANKFURT	28 PARTICIPATING STAKE HOLDERS	19/11 2024
FORMNEXT FRANKFURT	28 PARTICIPATING STAKE HOLDERS	20/11 2024
TEAMS MEETING ONLINE		21/11 2024
FOLLOW UP TEAMS MEETING		25/11 2024
INTERNAL FOLLOW UP 3D TEAM		26/11 2024
MEETING JESPER JÖNSSON INTERREG NS		03/12 2024
TEAMS MEETING	FULL TEAM PARCIPATING	16/01 2025

JESPER HELTZEN TAKES OVER SUSTAIN		20/01 2025
FINAL CONFERENCE	Physical/online combination	10/02 2025

PILOTS DENMARK

PILOT 1: AM-KUGA

The KUGA project, intent to explore the innovative large-scale 3D printing technology by combining robotic arms with 3D print heads to address complex manufacturing challenges. Inspired by the Thomas More institute in Belgium, Center for Industry (CFI) is developing a KUGA robot-based 3D printing unit in collaboration with the local vocational school MERCANTEC in Viborg. This initiative builds on insights from Thomas More's scalable and flexible solutions and is supported by a parallel efforts from Herningsholm's AM Learning Lab. Together, these activities aim to showcase the technology to enhance productivity, foster innovation, and provide advanced manufacturing opportunities for Danish SMEs, and support the STEM field education.

PILOT 2: RECORDINGS FROM STAKEHOLDER GROUP MEETING

When Center for Industries (CFI) organizes network meetings with its stakeholders, they typically include 1-3 presentations by experts focusing on different aspects of AM technology. These presentations provide valuable insights into the latest advancements, case studies, and practical applications of AM in industrial contexts. However, the reach of these meetings is limited to in-person participants. The Recordings from Stakeholder Group Meeting pilot seeks to overcome this limitation by recording these presentations, editing them into concise, engaging video content, and making them available online. The videos will be tailored to suit SMEs, ensuring the content is accessible to a non-technical audience while still providing in-depth knowledge for those with an AM background.

PILOT 3: BRING YOUR OWN PRINT

The goal of this pilot is to facilitate meaningful interaction, collaboration, and knowledge-sharing among AM technicians and stakeholders during CFI's network meetings. By encouraging participants to bring a 3D-printed object that they either take pride in, find technically fascinating, or have encountered challenges with, the pilot aims to create an environment where discussions and idea exchange are naturally initiated. This method shifts the focus from traditional top-down information flow to a more interactive, participant-driven knowledge exchange.

PILOT 4: AM METROLINE

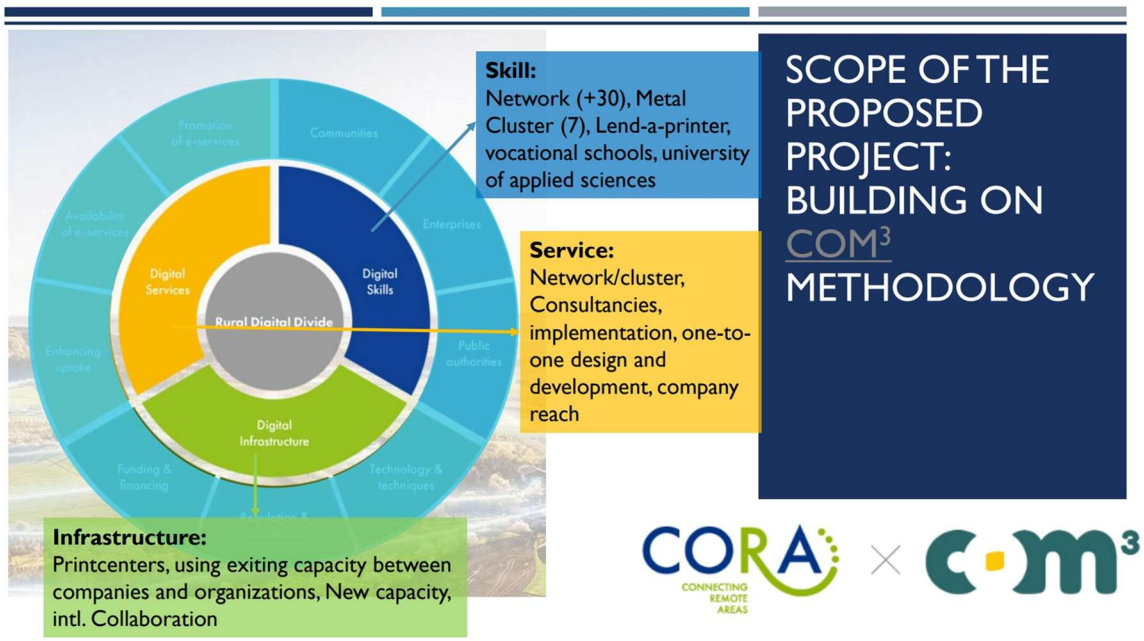
AM technology is not a single technology but a combination of around 30 different technologies, each with its own unique characteristics and applications. This diversity makes it challenging for companies to determine what knowledge and skills they need to adopt and implement AM effectively. Additionally, training requirements vary depending on the role within a company: technicians require hands-on, technical knowledge; middle managers need to understand workflows, feasibility, and implementation strategies; and executives require a high-level understanding of the business case for AM.

Inspired by a workshop in the Netherlands, the AM Metro Map pilot introduces a visual and interactive tool modeled after a metro map. Each "line" on the map represents a specific AM learning pathway tailored to a particular group (e.g., technicians, middle managers, C-level executives). The pathways are further divided into

smaller, topic-specific "stations" (e.g., materials selection, design for AM, quality control, cost analysis). Some lines will intersect, enabling cross-disciplinary learning, while others will remain specific to one role or technology. This map will also point companies toward the appropriate training providers for each station, ensuring they can access the necessary resources to build their skills and knowledge.

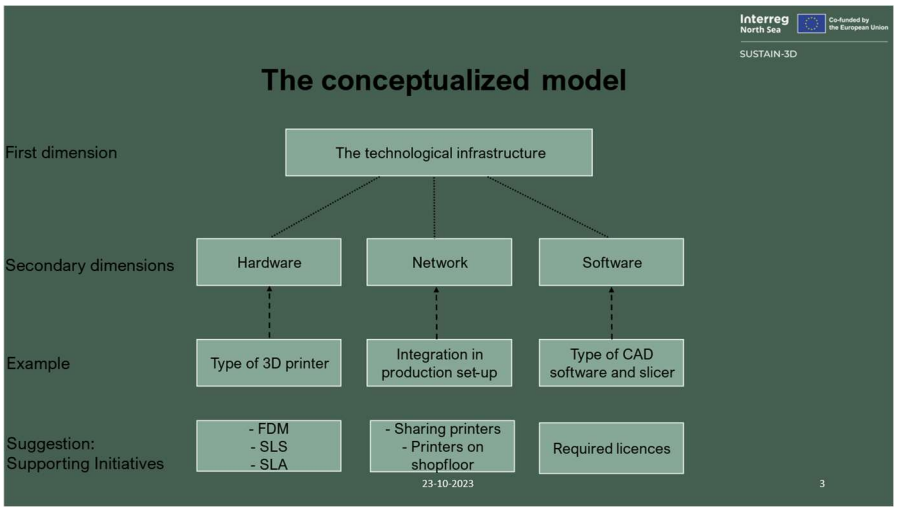
APPENDIX 1

https://ruraldigital.eu/model/

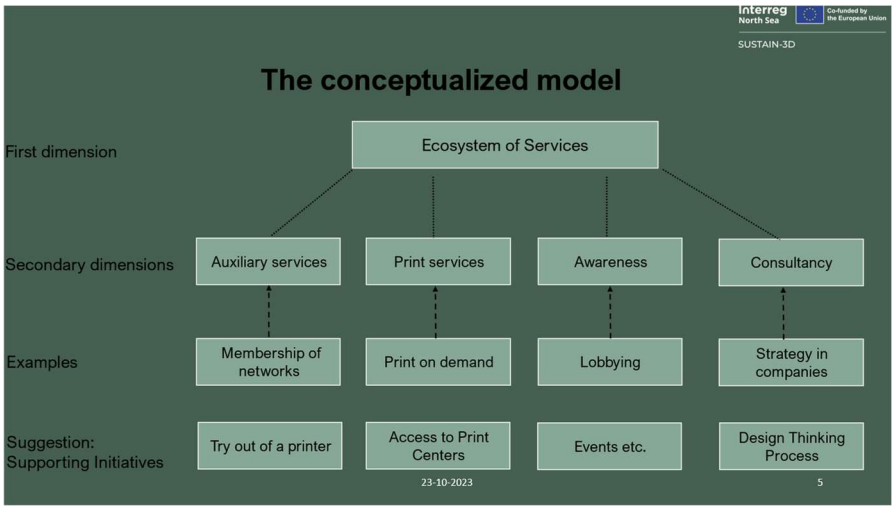


APPENDIX 2

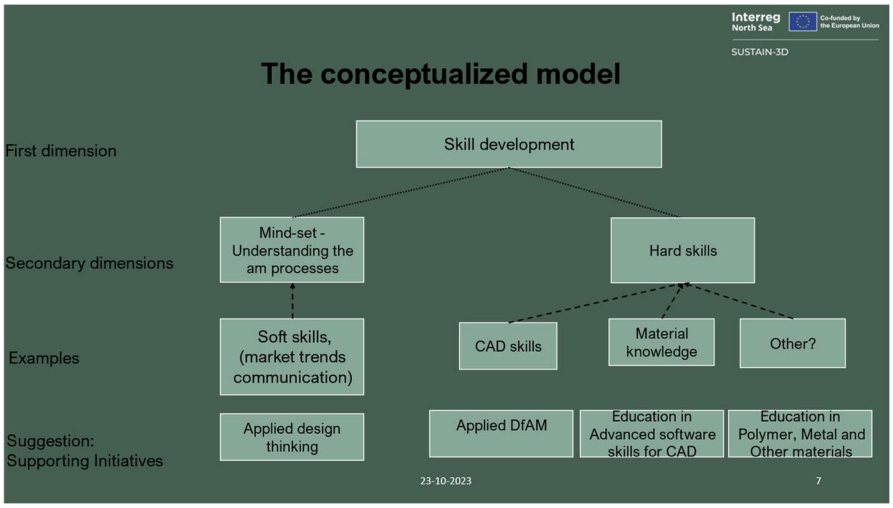
Technical Infrastructure



Services



Skills


Interreg North Sea
Co-funded by the European Union
SUSTAIN-3D
The conceptualized model
First dimension
Skill development
Secondary dimensions
Mind-set - Understanding the am processes
Hard skills
Examples
Soft skills, (market trends communication)
CAD skills
Material knowledge
Other?
Suggestion: Supporting Initiatives
Applied design thinking
Applied DfAM
Education in Advanced software skills for CAD
Education in Polymer, Metal and Other materials
23-10-2023
7

APPENDIX 3 CORA.COM3 SUSTAIN3D MODEL