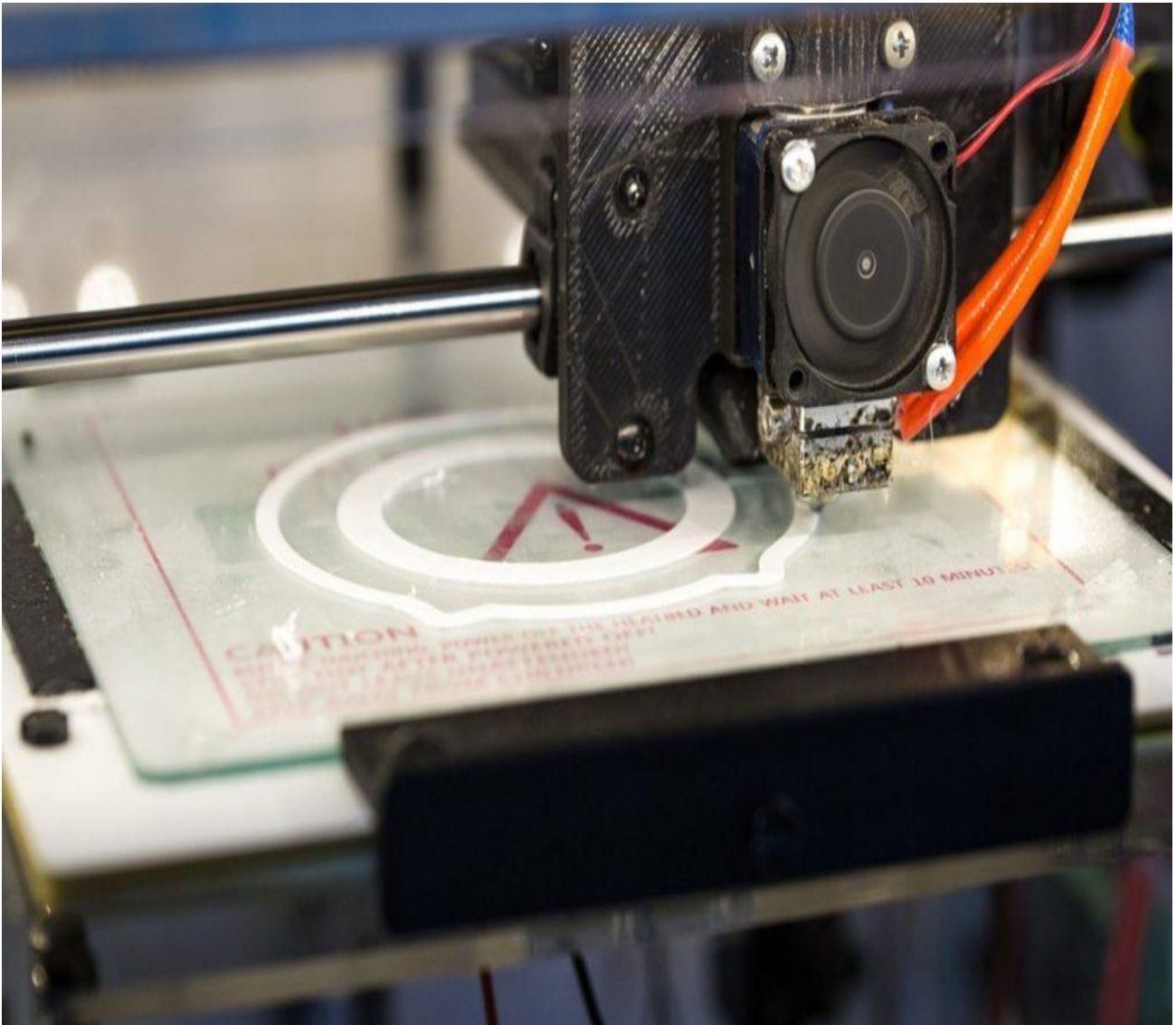




Curriculum of a 3DP Course for Adult Training



<http://3dhelp.euda.eu/>



Revision History

Revision	Date	Author/Organization	Description
V 1.0	31/5/2018	Nada Šeresova/ERA	Draft of main concept
V 1.1	13/6/2018	Liudmila Mecajeva/SIF	Review of the draft
V 1.2	15/6/2018	Ana Vojvodic/STSFV	Review of the draft
V 1.3	18/6/2018	Emanuel Balzan/MECB	Review of the draft
V 1.4	13/8/2018	Lucie Marková/ERA	Implementing feedback
V 1.5	17/8/2018	Doru Cantemir/Ludor	Review of the second draft
V 1.6	21/8/2018	Lucie Marková/ERA	Implementing feedback
V 1.7	22/8/2018	Ana Vojvodic/STSFV	Review
V 1.8	27/8/2018	Lucie Marková	Implementing feedback



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Objectives of the training program

The main objective of the whole training program is to help adult trainers to attract, reach out and assist adult learners to catch up with the 21st Century digital skills of 3D-Printing. Since the EU is lately actively engaging in a number of activities and events to help Europe to Re-Industrialise, European adults need to catch up with this technology to be competent for new jobs, opportunities and requirements created by this technology.

Total number of hours dedicated to the whole course: 23

Target Groups

The curriculum of 3DP Course for Adult Training was created for these main target groups:

- 1) EU Adult trainers who will help adult learners acquire skills on 3DP technology
- 2) Adult learners that need a second chance of catching up with 3DP technology
- 3) Stakeholders related to Adult Education sector including policy makers and managers that can influence the direction of adult training

Each group and each individual can acquire different level of knowledge and will have different needs in particular parts of the course, since everyone has different level of knowledge of 3D-printing. The whole curriculum can be used by all three target groups, however, mainly by the learners, however, there are also parts which can be interesting and efficient for trainers and stakeholders.



Introduction to 3D-Printing	
Learning outcomes	<ul style="list-style-type: none">- Understand why 3D print is nowadays becoming a more and more important technology- Understand core terms- Be aware of advantages and disadvantages of 3D print- Know where 3D printing is being used and know one specific example in detail
Pre-requisites	<ul style="list-style-type: none">- IT and internet skills
Sub-topics to be covered	<ul style="list-style-type: none">- 3D-P brief historical background- 3D-P theoretical approaches , terms and definitions, glossary of core terms in 3D-Printing- 3D-P advantages/disadvantages – given examples- 3D-P technology and application steps in practice- Example of one specific product in detail (description from the idea to a finished product)
Number of hours	3
Difficulty level	Beginner
Additional information for higher difficulty levels	<p>It is recommended that beginners understand well the link between the type of 3D Printing technology to be selected and the intended purpose of the physical model produced.</p> <p>Progress to the next chapter</p>
Additional information for stakeholders	<p>Typical applications used in industry in different sectors: Medical, Aerospace, Fashion, Architecture, Consumer Products, Engineering, etc.</p>



Available 3D printing technologies	
Learning outcomes	<ul style="list-style-type: none">- Understand 3D-P processes and its usage- Acquire knowledge of material and its use and issues- Acquire knowledge of file formats of 3D-P
Pre-requisites	<ul style="list-style-type: none">- Knowledge from the lecture “Introduction to 3D-Printing”
Sub-topics to be covered	<ul style="list-style-type: none">- Introduction of 3D-P technology system and material use- Introduction of used file formats in 3D-P- Comparison 3D printing with its alternatives (Subtractive Manufacturing technologies, vacuum forming, moulds, etc.)
Number of hours	4
Difficulty level	Beginner
Additional information for higher difficulty levels	Read more on different materials used in different 3D printing technologies and respective material data sheets (including properties, e.g. shrinkage factors). Select a 3D printer according to the expected properties of the printed model.
Additional information for stakeholders	Selecting a 3D printer according to the expected properties of the printed model - cost-benefit analysis including running costs, initial capital investment, education and additional resources needed.



Design with 3D-Printing in mind	
Learning outcomes	<ul style="list-style-type: none">- Learn how to avoid common design mistakes during CAD modelling that lead to defects in 3D printed parts and understand how sources of inaccuracies during 3D printing can be avoided- Understand important considerations when printing different parts that need to be assembled together- Learn how to best position and orient a 3D model for printing to achieve the best properties
Pre-requisites	<ul style="list-style-type: none">- Basic knowledge about 3D-Printing and its technologies
Sub-topics to be covered	<ul style="list-style-type: none">- Design thinking in the context of 3D-P
Number of hours	4
Difficulty level	Expert
Additional information for higher difficulty levels	<p>Consider in keeping up to date with newer developments on 3D printing by joining forums and groups on social media. Review defects for other types of 3D-P technologies</p> <p>More advanced topics on design:</p> <ul style="list-style-type: none">- Design of Living Hinges for 3D printing- How 3D Printing varies from Injection Moulding
Additional information for stakeholders	<p>It would be beneficial to look at real models with defects to understand different types of defects that may occur during printing.</p>



Slicer software for subsequent 3D-Printing	
Learning outcomes	<ul style="list-style-type: none">- Understand what a slicer software is and its importance in 3D printing- How to choose a 3D Slicer software- Get familiar with important slicer settings
Pre-requisites	<ul style="list-style-type: none">- Basic knowledge about 3D-Printing, its technologies and design
Sub-topics to be covered	<ul style="list-style-type: none">- Definition of the slicer software and its role- Definition of slicer software's processes (including case study examples)- Introduction of various 3D Slicer software tools- Get familiar with printing parameters (incl. temperature, layer thickness, printing speed and different materials) which can be changed to modify the printing accuracy, printing time, amount of support material, surface finish, etc
Number of hours	3
Difficulty level	Intermediate - Expert
Additional information for higher difficulty levels	Consider taking 'Design with 3D-Printing in Mind' module
Additional information for stakeholders	Consider meeting up with a 3D-printing hub to be shown the Slicing process.



Future of 3D-Printing technologies	
Learning outcomes	<ul style="list-style-type: none">- Understand wider potential of 3D-P in present and future- Understand its future impact
Pre-requisites	<ul style="list-style-type: none">- None
Sub-topics to be covered	<ul style="list-style-type: none">- 3D-P current trends and future development- Innovation of technologies, materials, future application fields- Interesting future projects
Number of hours	2
Difficulty level	Beginner
Additional information for higher difficulty levels	Consider in subscribing to social media channels/newsletters or attend expos/fairs to stay up to date with recent developments in the field of 3D printing.
Additional information for stakeholders	As above.



Case studies in the industry to show the potential for boosting entrepreneurial spirit, creativity and innovation	
Learning outcomes	- Understand of 3D-P potential and current impact in various fields
Pre-requisites	Basic knowledge about 3D-Printing
Sub-topics to be covered	3D-P case studies: <ul style="list-style-type: none">- education and training, medical field, architecture, technology, engineering- Given examples
Number of hours	2
Difficulty level	Intermediate
Additional information for higher difficulty levels	Understand how other organizations are using 3D printing to help them innovate and expand their business.
Additional information for stakeholders	Be inspired on how a case study can be applied (differently) in one's business.



3D-Printing to boost creativity and innovation	
Learning outcomes	<ul style="list-style-type: none">- Understanding of 3D-P creative and innovative possibilities, thinking out of the box
Pre-requisites	<ul style="list-style-type: none">- Acquiring basic knowledge about 3D-Printing and its usage
Sub-topics to be covered	<ul style="list-style-type: none">- Creative and innovative techniques- Including case study examples
Number of hours	2
Difficulty level	Intermediate - Expert
Additional information for higher difficulty levels	Consider taking 'Case studies in the industry to show the potential for boosting entrepreneurial spirit, creativity and innovation' module
Additional information for stakeholders	Be familiar to creative thinking methods and apply them in own business by taking into consideration the benefits of 3D Printing.



3DP and entrepreneurship	
Learning outcomes	<ul style="list-style-type: none">- Acquiring knowledge of different types of business opportunities
Pre-requisites	<ul style="list-style-type: none">- None
Sub-topics to be covered	<ul style="list-style-type: none">- Examples of successful start-ups and platforms- Required skills and opportunities on the market
Number of hours	3
Difficulty level	Expert
Additional information for higher difficulty levels	Consider taking 'Case studies in the industry to show the potential for boosting entrepreneurial spirit, creativity and innovation' module
Additional information for stakeholders	Acquire knowledge on general business planning, such as, market research, business plan, procurement, market channels, etc.

