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Introduction to the Project

This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723833, and is an initiative of the Photonics and Factories of the Future Public Private Partnership.





CHALLENGES

Laser Powder Based Fusion

AVAILABLE > 20 YEARS

NOT WIDELY USED

SLOW AND EXPENSIVE

LOW OVERALL EFFICIENCY

TOO MANY BUILD-EVALUATE-REDESIGN ITERATIONS

HIGH LIKELIHOOD OF DEFECTS DUE TO PROCESS INSTABILITY

HIGH AMOUNT OF INSPECTION AND DESTRUCTIVE TESTING

BACKGROUND OF THE PROPOSAL

Manufacturing

- 3 trillion € (21%) of the EU's GDP
- 20% of EU's employment \Rightarrow 30 million jobs in 230 000 enterprises (SME mostly) (Eurostat, 2016)
- EU market share of laser based manufacturing declined (39% in 2008 \rightarrow 33% in 2012) \Rightarrow due to competition from Asia (Helmrath, 2015)



AM market

- Threatened by lower wage economies and high tech rivals
- Grew at a GAGR \approx 35% to 35 bn € \Rightarrow will grow to over 90 bn € by 2020 if key technological challenges can be overcome (Wohlers Report 2015)
- Industrial machinery and consumer goods account for > 36% of the industries using (AM Valles, 2014)
- Automotive, Aerospace and Medical: focus end-users for ENCOMPASS – 43% of the industries using AM

ENCOMPASS CALL



H2020-IND-CE-2016-17-
FOF-13-2016 call



4 040 371.25 €



Factories of the Future:
From "Design to piece"



36 months



Rapid individualised laser-
based production



1st October 2016

CONSORTIUM



Altair



Rolls-Royce

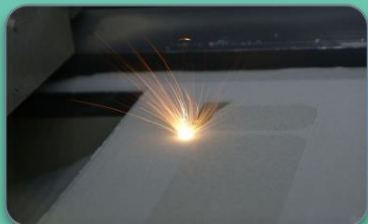


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UNIVERSITY OF
LIVERPOOL

OVERALL OBJECTIVES



Integrated Design Decision Support (IDDS) system — slide 10



The integration at digital level enables numerous synergies between the steps in the process chain and in addition, the steps themselves (design, build and post-build processes) are being optimised by ENCOMPASS to improve the capability and efficiency of the overall manufacturing chain



Allow Europe to achieve global leadership in this important field of net-shape AM

KEY FEATURES

The successful implementation of the ENCOMPASS project through our consortium will optimise AM post processing, enabling an average 42% reduction in time from 'design to piece', and an average 27% increase in process chain productivity. The associated cost of production will be reduced by 26%. This is achieved by:

46%

average reduction in
post processing time

51%

average reduction in
quality control time

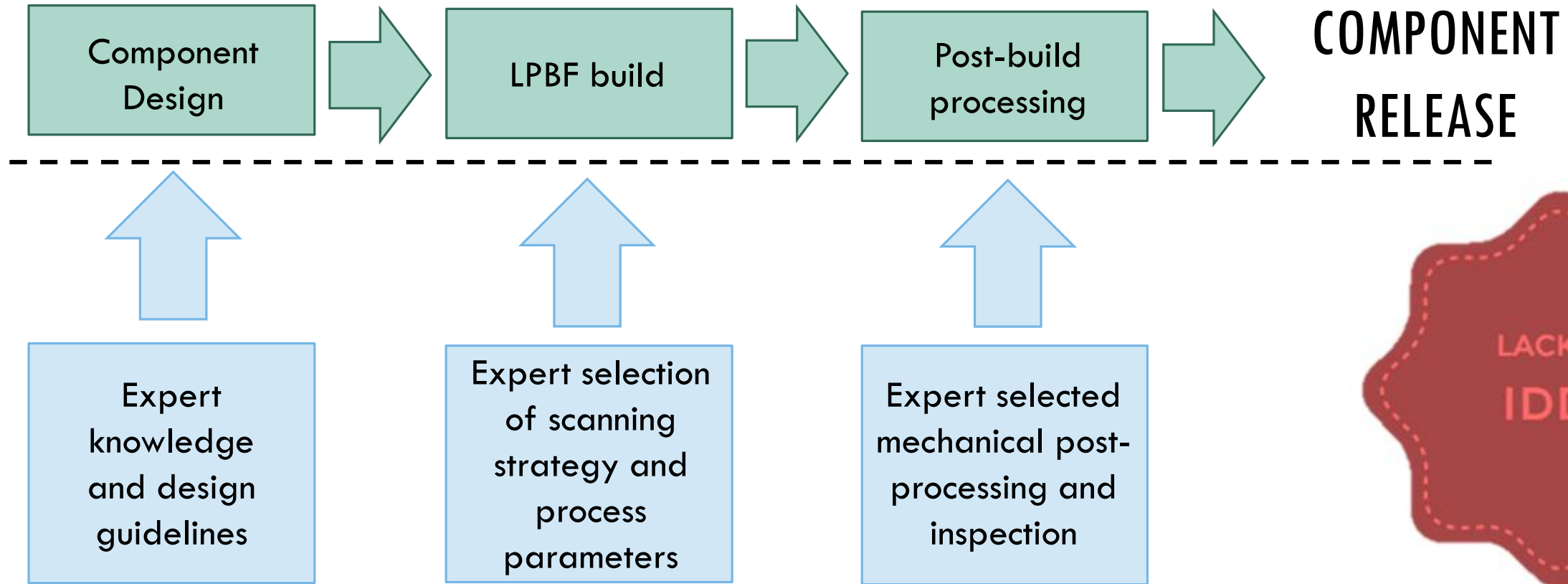
43%

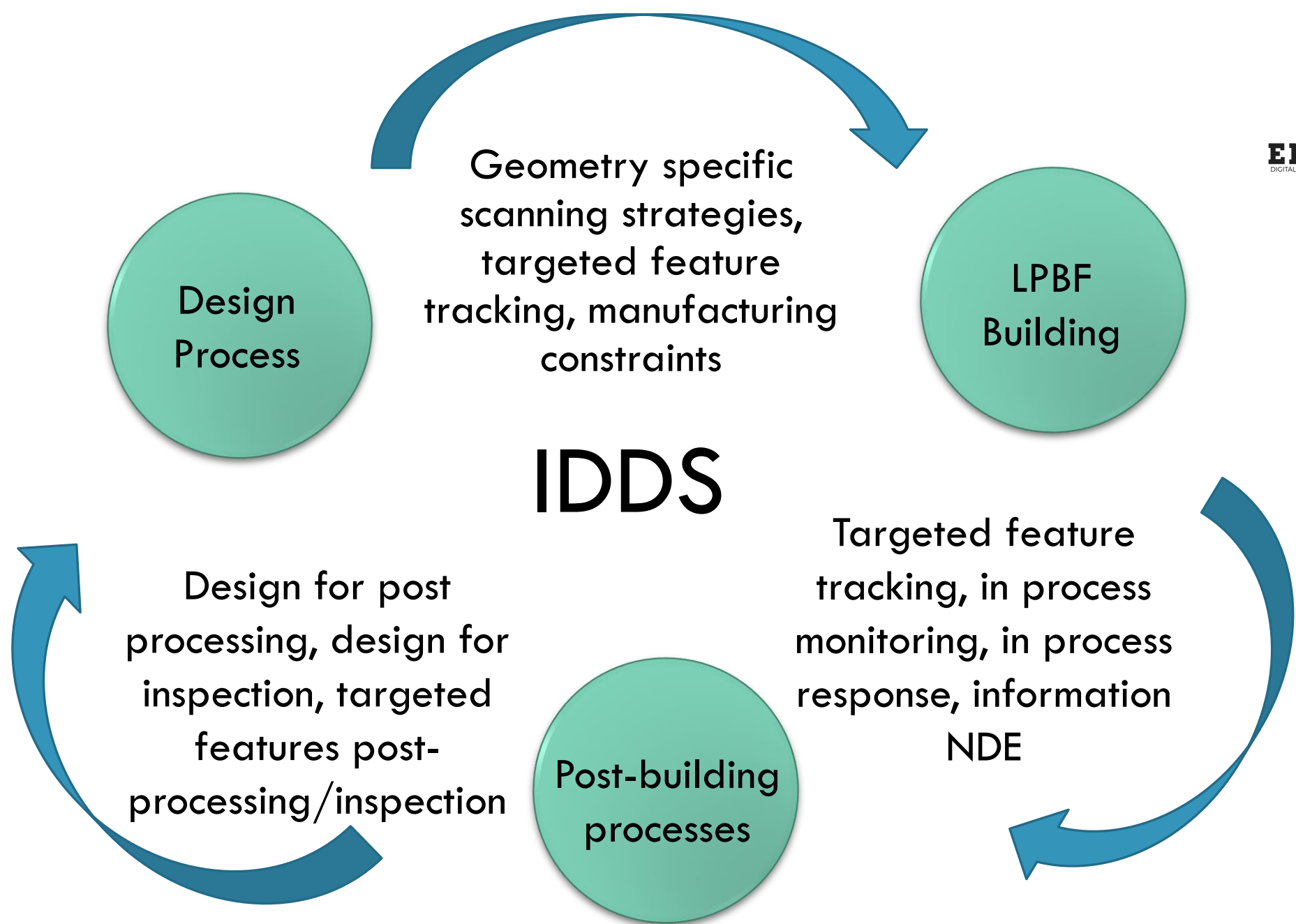
average reduction in
design time

Calculation procedure validated using EU AMAZE project methodology

CHALLENGES OF MULTI STEPPED PROCESS FOR:

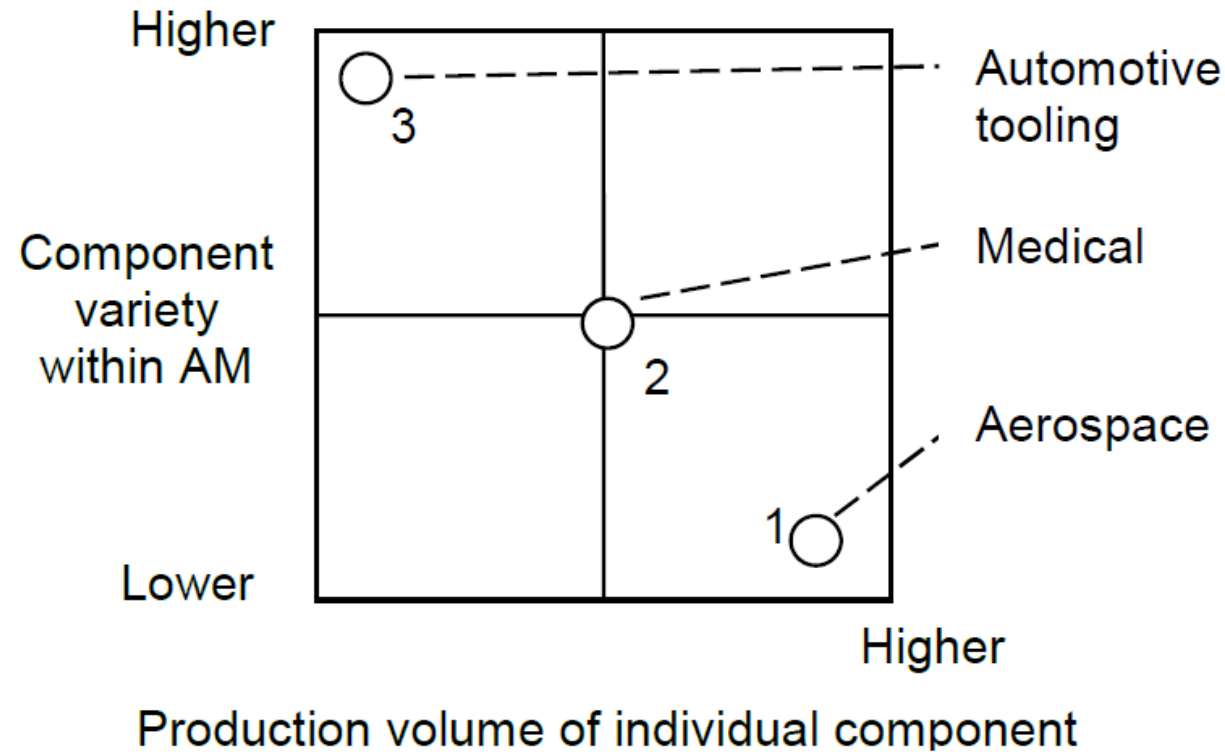
— LASER POWDER BASED FUSION (LPBF)





INDUSTRIAL SECTOR REQUIREMENTS FOR:

— Component Design Process



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Rolls-Royce

ENCOMPASS FOCAL POINTS

A user support
interface within the
CAD environment

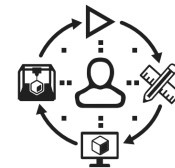
Digital tools for
simulating and
optimising **melt**
strategies

Digital tools for
simulating **post-build**
material and **quality**
processes

Apply **monitoring**
solutions for key
variables of the post-
LPBF processes

Develop a framework
for **optimisation** of
LPBF product and
process design

Demonstrate benefit of
IDDS for end user
driven case studies across
the aerospace, medical
and automotive sectors.

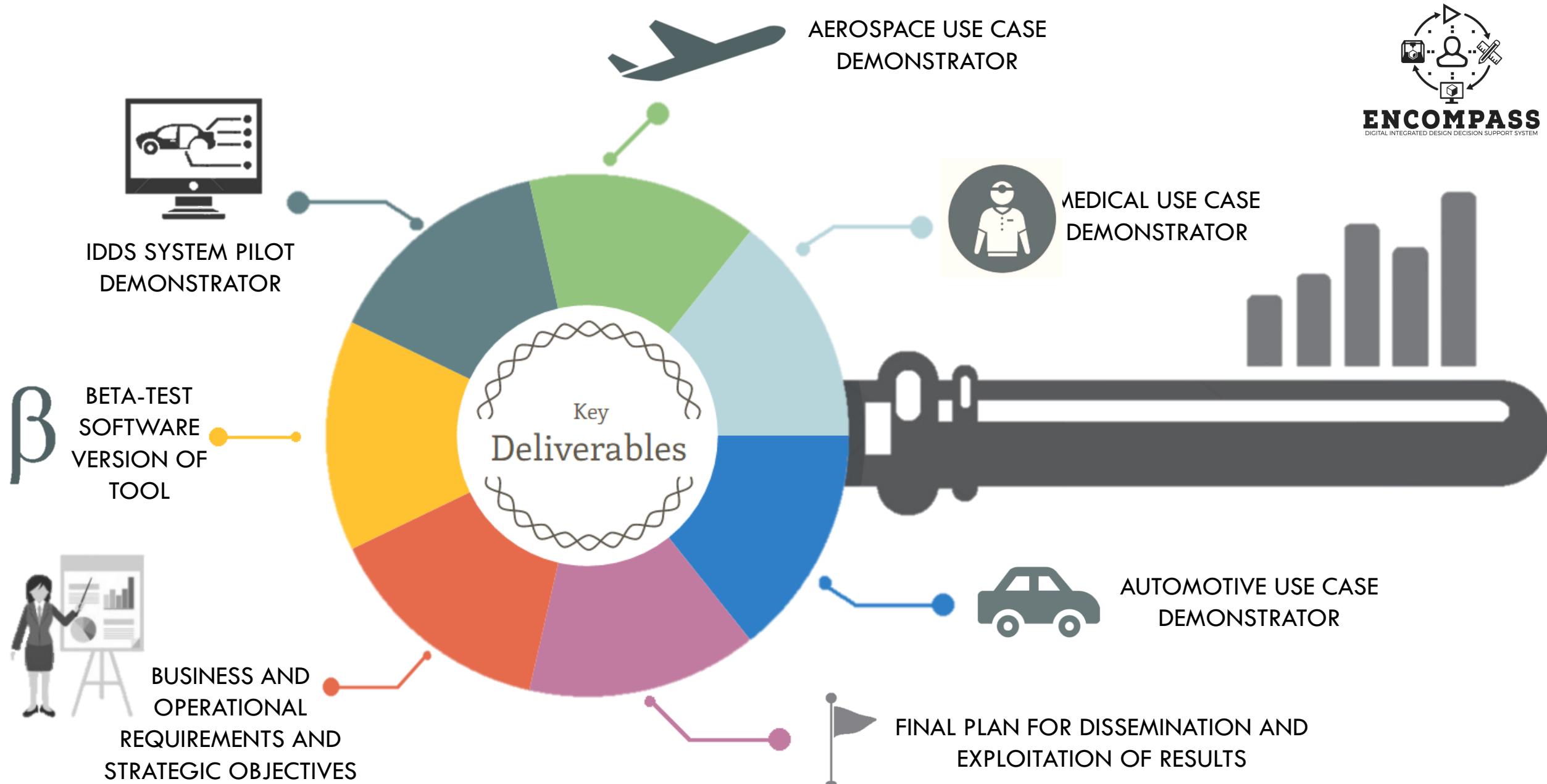


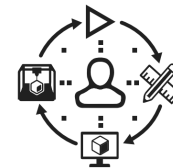
ENCOMPASS
DIGITAL INTEGRATED DESIGN DECISION SUPPORT SYSTEM

OVERALL PLAN FOR COMMUNICATION ACTIVITIES

- Website: www.encompass-am.eu – under construction
- Marketing Material
- Conferences, events and trade fairs
- Publications
- Electronic Newsletter







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