



The European Materials Modelling Council

Increasing the impact of materials modelling in industry: the contribution of EMMC

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<https://materialsmodeling.com>

Executive Secretary



*EMMC ASBL
Brussels,
Belgium*

<https://emmc.info>

<https://emmc.eu>



European Materials Modelling Council

- ALL Stakeholders
 - Modellers, Software Owners, Translators, End Users in Industry
- ALL modelling related to materials
 - electron to continuum, molecule to material, process, manufacturing
- Coordination, support, lobbying
- About 1000 registered members.

EMMC – The European Materials Modelling Council

https://emmc.info

The European Materials Modelling Council

Search ...

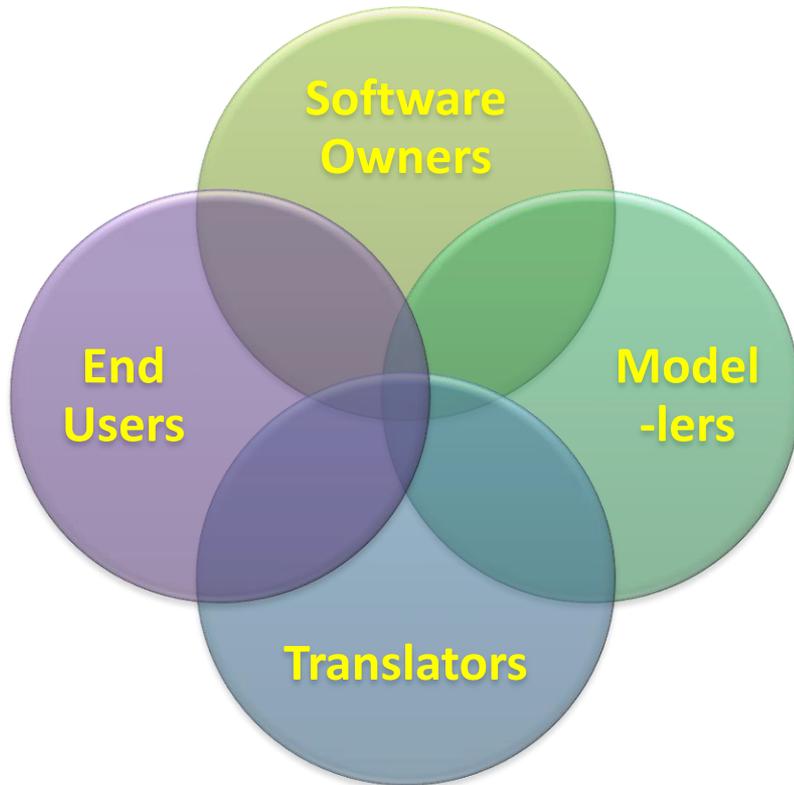
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About Roadmap Participation MODA Discuss Taxonda

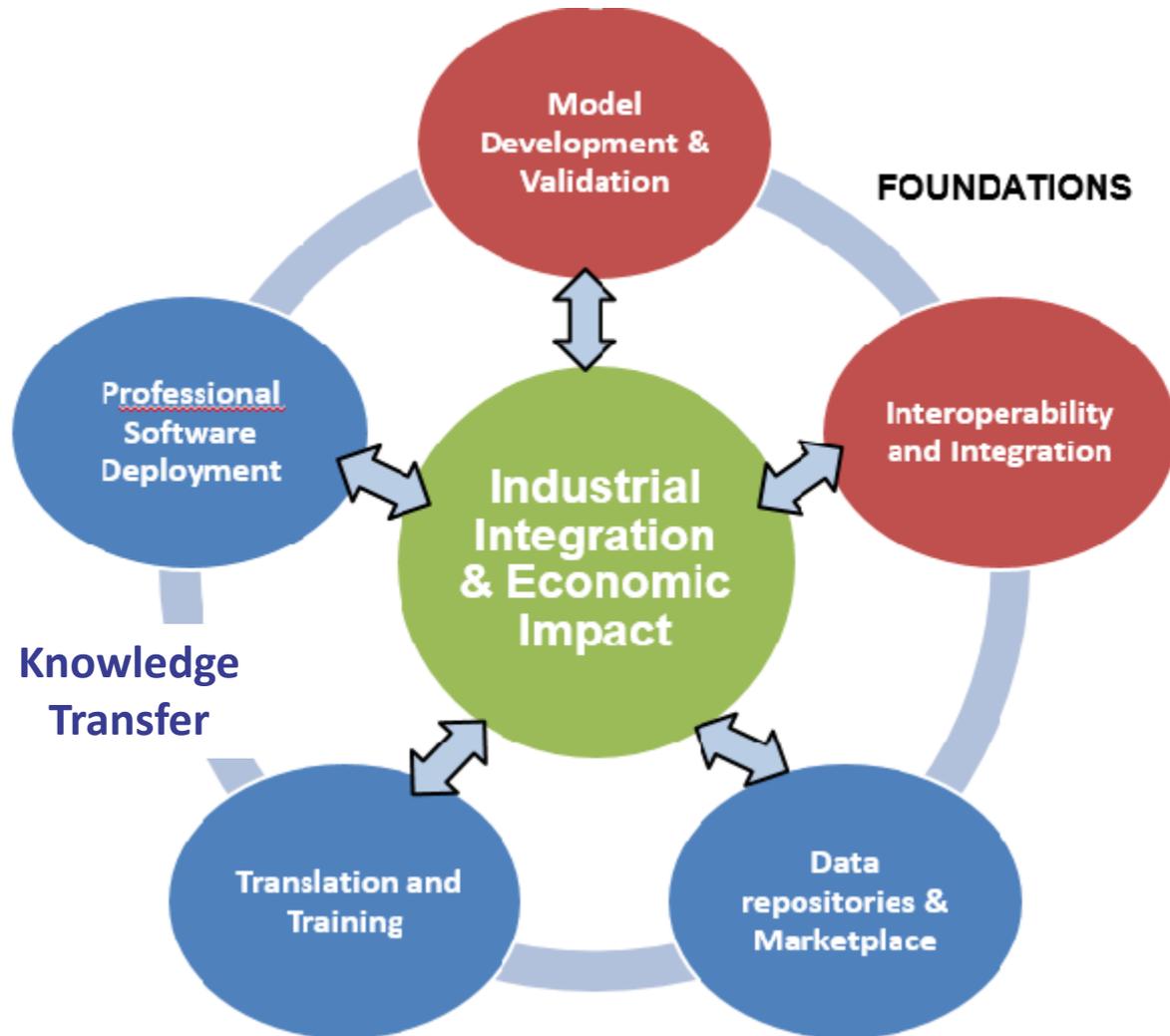
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European Materials Modelling Council

- H2020 funded project (1 Sep 2016- 31 Aug 2019)



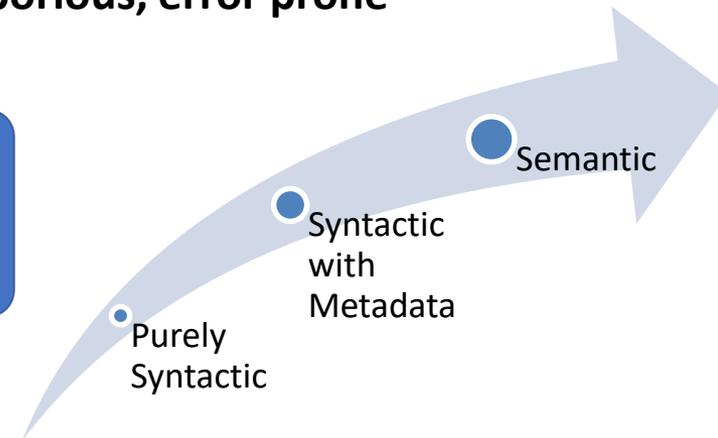
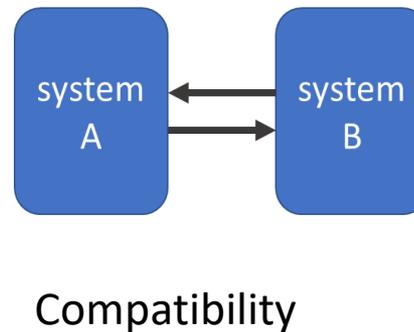
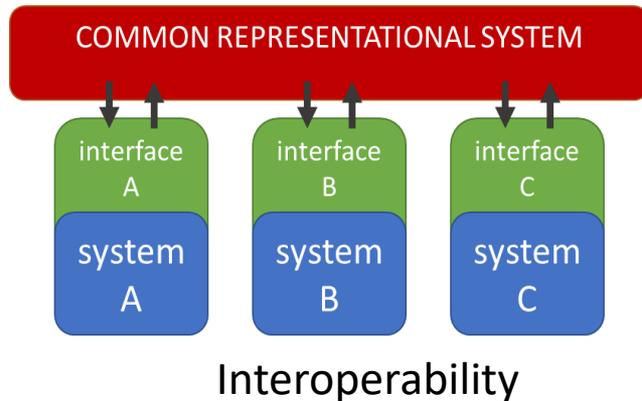
EMMC Focus Areas



Interoperability

Correct and meaningful communication and integration among intelligent agents

- Existing solutions:
 - **Dependent** on adhering to **particular formats (Syntactic)**
 - Lack generality, lack a **“common representational system” (Semantics)**
 - Require **input by experts** to go across domains: **laborious, error prone**



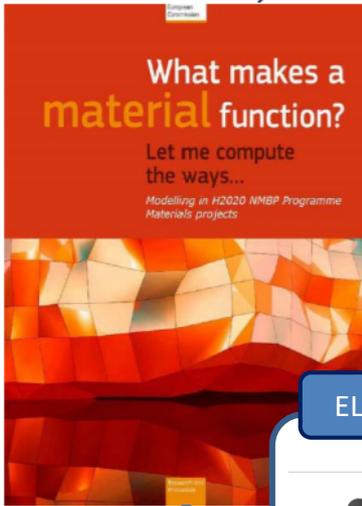
Interoperability: Ontology

Common Language

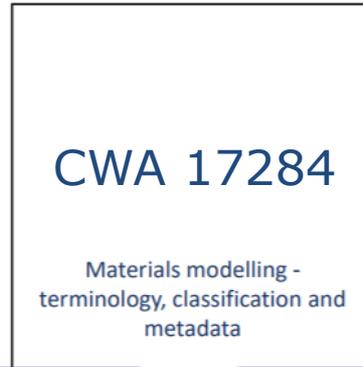
Standardised Terminology

Standardised Documentation

RoMM
Review of Materials Modelling VI
Anne de Baas, EC

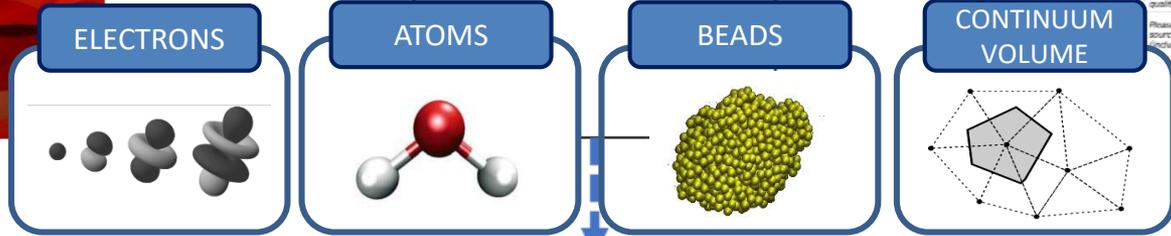


CEN Workshop Agreement
Endorsed by >15 EU organisation



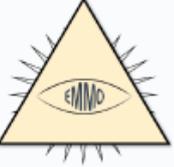
EMMC - MODA template

MODA for <user-case> Simulated in project <acronym>	
OVERVIEW of the SIMULATION	
1	<p>User Case</p> <p>Please give the properties and behaviour of the particular material, manufacturing process and/or in-service-behaviour to be simulated. No information on the modeling should appear here. The idea is that this user-case can also be simulated by others with other models and that the results can then be compared.</p>
2	<p>CHAIN OF MODELS</p> <p>Model 1 Please identify the first model. Note these are assumed to be physics-based models unless it is specified differently. Most modeling projects consist of a chain of models (workflow). Here only the Physics Equations should be given and only names appearing in the content list of the Review of Materials Modelling VI should be entered. This review is available on http://ec.europa.eu/research/industrial_technologies-library.cfm. All models should be identified as electronic, atomic, mesoscopic or continuum.</p> <p>Model 2 Please identify the second model.</p> <p>DATA-BASED MODELS If data-based models are used, please specify.</p> <p>PUBLICATION PEER-REVIEWING THE Please give the publication which documents the data of this ONE simulation. This article should ensure the quality of this data set (and not only the quality of the models).</p> <p>Please list whether the model and/or data are free, commercial or open source. Please list the owner and the name of the software or database (include a web link if available).</p> <p>Please list whether the model and/or data are free, commercial or open source. Please list the owner and the name of the software or database (include a web link if available).</p> <p>Please list whether the model and/or data are free, commercial or open source. Please list the owner and the name of the software or database (include a web link if available).</p> <p>Please list whether the model and/or data are free, commercial or open source. Please list the owner and the name of the software or database (include a web link if available).</p>
3	<p>REVIEWING THE</p> <p>Please list whether the model and/or data are free, commercial or open source. Please list the owner and the name of the software or database (include a web link if available).</p> <p>Please list whether the model and/or data are free, commercial or open source. Please list the owner and the name of the software or database (include a web link if available).</p> <p>Please list whether the model and/or data are free, commercial or open source. Please list the owner and the name of the software or database (include a web link if available).</p> <p>Please list whether the model and/or data are free, commercial or open source. Please list the owner and the name of the software or database (include a web link if available).</p>





EMMO released on github

 **European Materials and Modelling Ontology**

<https://emmc.info> info@emmo.tech

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EMMO
European Materials and Modelling Ontology (EMMO)

[materials](#) [ontology](#) [modelling](#)

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<https://github.com/emmo-repo>

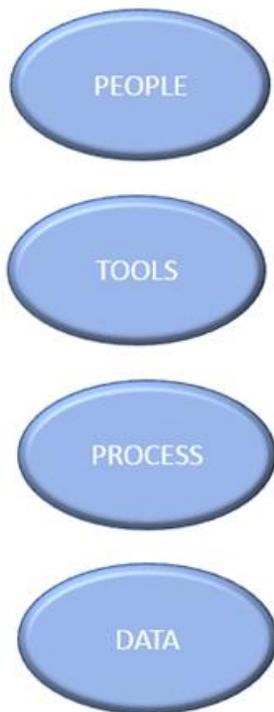
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EMMC White Paper: *Strategies to engage in Materials Modelling*

4D-QBTM: four dimensional Quantitative Benchmark Time to Market Framework

We need 4D ...



...to accelerate
all stages from
design to market...

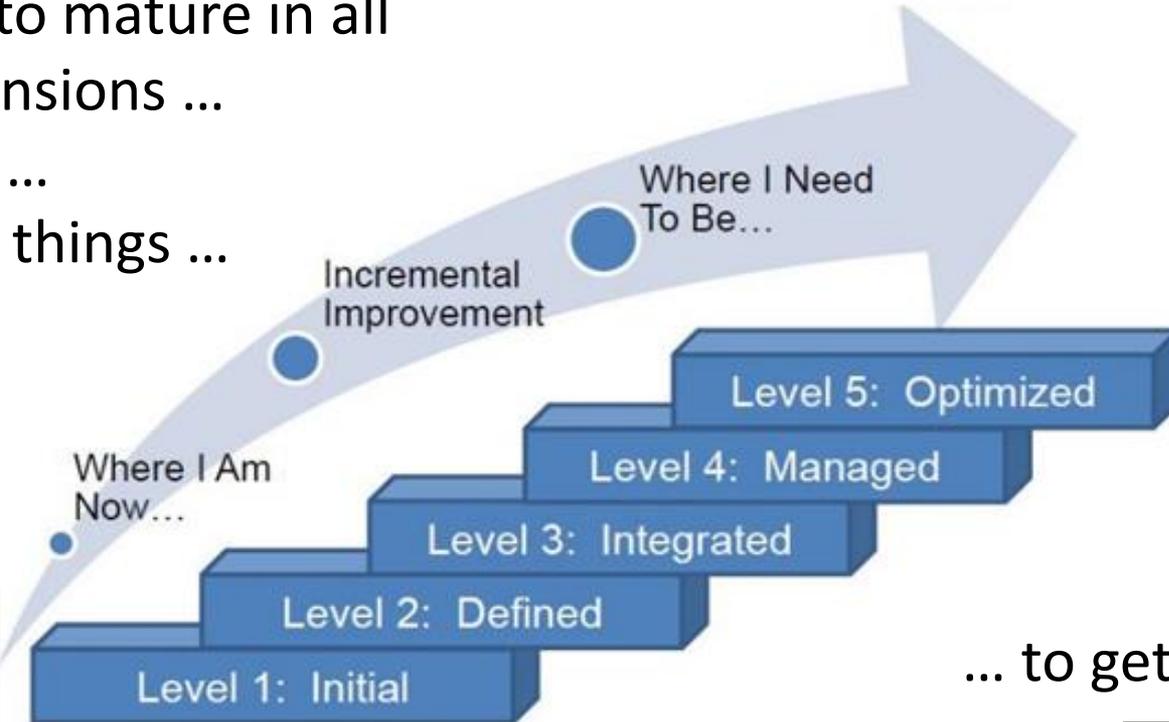


... and have efficiency and
effectiveness metrics



Strategies to engage in Materials Modelling

We need to mature in all
four dimensions ...
... change ...
... do new things ...



... to get the benefits!





Strategies for industry to engage in Materials Modelling

EMMC White Paper



1. Look at the **dimensions** people, tools, process and data, identify the **status quo**.
2. Perform a **4D-QBTM**, state where the status quo of people, tools, process and data can aid. Provide effectivity and effectiveness **metrics**
3. Use **benefit analysis** and play through **what-if scenarios**: if you had additional/different people, tools, processes or data, could you get more benefits?
4. **Revisit** the **Maturity model** and look into the **detailed facets** of each dimension and see which one you need to mature and how.
5. **Apply new strategy** and provide 4D-QBTM and full metrics to **evidence success**.

Case Studies

- Showcase use of materials modelling and its benefit
- Report barriers and how to overcome them
- Talk about investments
- Share with the community where we need to improve



 **EMMC Case Studies**

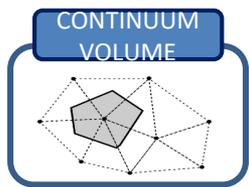
     

August 28, 2019

Other **Open Access**

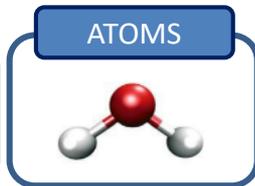
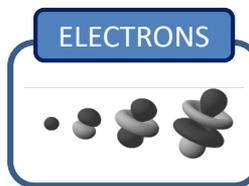
A GUIDE TO FIND THE RIGHT BUSINESS MODEL FOR MATERIALS MODELLING SOFTWARE

Gerhard Goldbeck;
 Alexandra Simperler;
 Natalia Konchakova;
 Daniel Höche

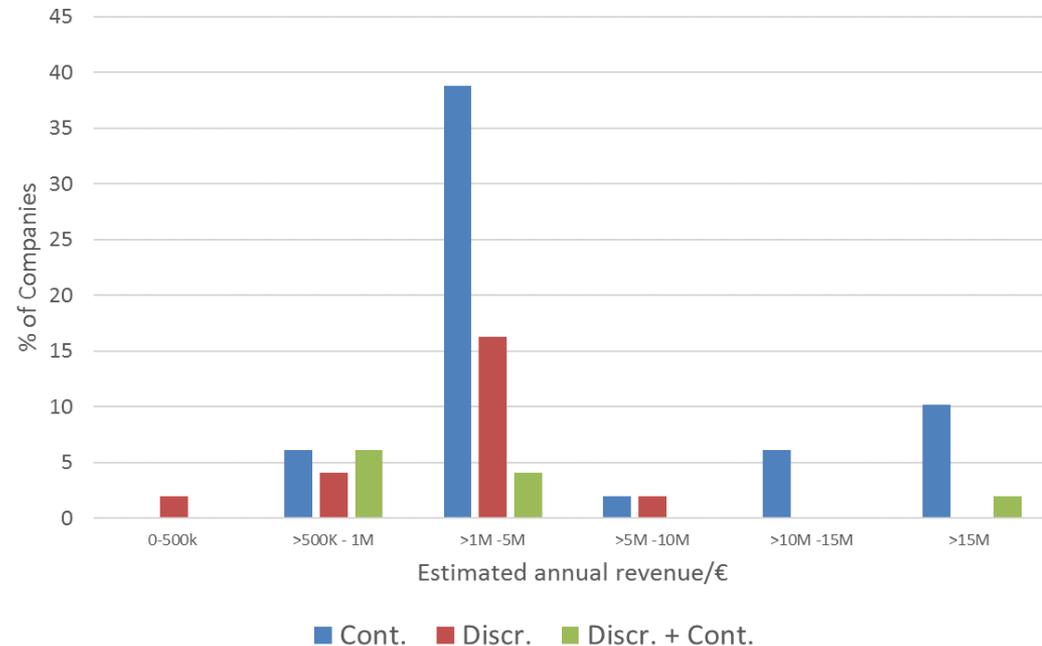


The continuum material modelling market is estimated in the region of €500m.

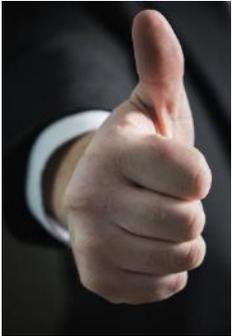
The discrete modelling is estimated in the region of €50m



Market size for materials modelling



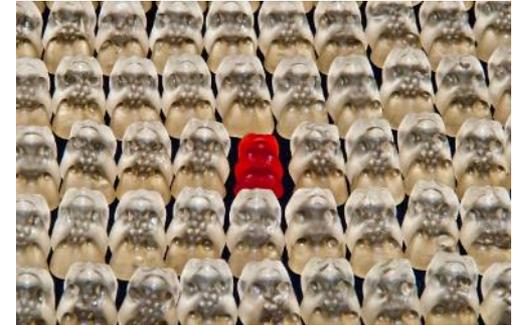
Materials Modelling Software



Software ready to go!



Clear ownership, licensing
and customer base
Business model selected



Uncontested market was
well researched



multi-scale and **multi-physics** problems

Circular Industry : aid with cradle to cradle

Interoperability to achieve a '**digital continuum**'.

Novel **HPC architectures** and **Quantum Computing**

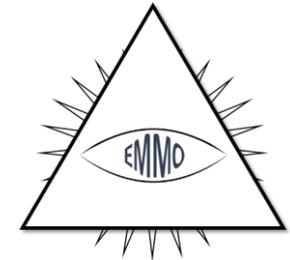
Evolving user interfaces: **Apps, Virtual Reality**

On-demand services: Cloud-based and SaaS offering

Digital marketplaces

Future

- An integrated knowledge framework
 - *Semantic Foundation*
 - *Interoperability*
- Digital Marketplaces
 - *Deploy/source software*
 - *Exchange*
 - *Translate*
 - *Enable*
- Integration into all business levels
 - *Tasks to Business Processes*
 - *Continuous improvement of maturity*



<https://emmo.tech>



- **Registered non-profit association in Brussels, July 2019**
 - Modelling and digitalisation of materials, including processes and manufacturing.
 - Strategies to increase awareness and use of modelling and digitalisation of materials in European industry.
 - Support a solid scientific and technical basis for modelling.
 - Coordinate and support the rapid transfer of academic innovation to end users and potential beneficiaries in industry.
 - Support the sustainability of modelling and digitalisation of materials in Europe.
 - Support materials modelling and digitalisation software industry.
- Directors: Nadja Adamovic (Chair), Adham Hashibon, Kersti Hermansson, Rudy Koopmans, Erich Wimmer
- Executive Secretary: Gerhard Goldbeck
- Membership now open to individuals and organisations
- Bookmark: <http://emmc.eu/>



Acknowledgements

- EMMC Co-authors,
in particular Alex Simperler (Goldbeck Consulting)
- Funding received from the European Union's Horizon 2020 research and innovation programme: **EMMC-CSA** project, Grant Agreement No. 723867