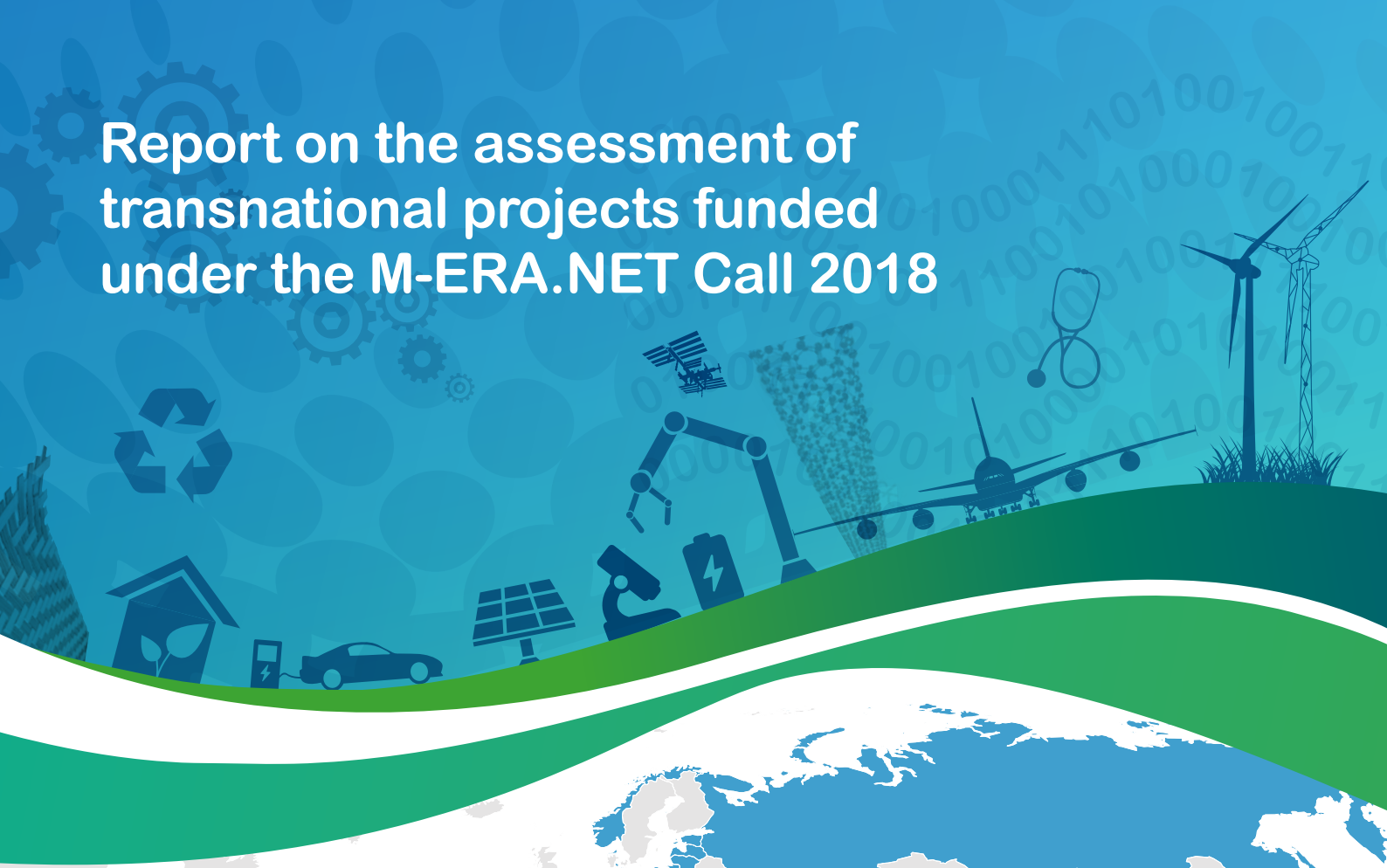
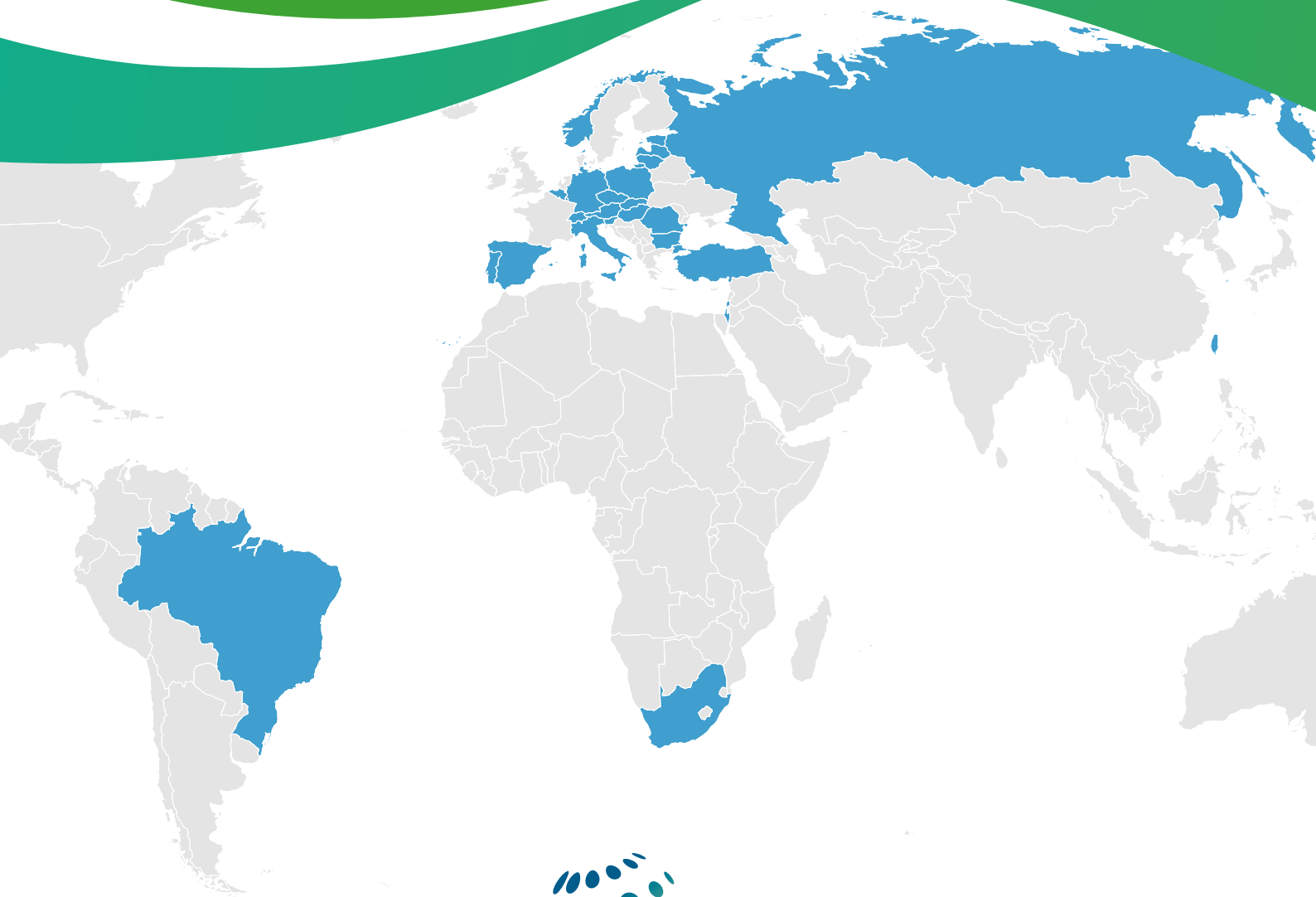
Report on the assessment of transnational projects funded under the M-ERA.NET Call 2018





M-ERA.NET

M-ERA.NET 2 has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 685451.

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Executive summary

This report covers the results of the assessment of the projects funded in the M-ERA.NET Call 2018. 27 full-proposals were selected for funding, corresponding to requested funding of 18.2 Mio EUR.

These projects are allocated to the call topics as follows:

- Multiscale modeling for materials engineering and processing: 1 funded project
- Innovative surfaces, coatings and interfaces: 10 funded projects
- High performance composites: 3 funded projects
- Functional materials: 8 funded projects
- New strategies for advanced material-based technologies in health applications: 2 funded projects
- Materials for Additive Manufacturing: 3 funded projects

The funded projects were assessed through an online questionnaire, covering assessment of scientific results, technical results, economic effects, and transnational benefits. The survey addressed 117 projects partners in 27 projects.

Most projects started in the same year they were recommended for funding. 54% of the consortia reported major changes in their respective consortium, budget and/or timeframe during the project duration, mostly related to COVID-19 pandemic situation. Despite this, in more than 70% of the projects the objectives, results, and deliverables were accomplished to full extent.

The main scientific results were mostly the creation of new knowledge. The large number of publications in peer reviewed scientific journals and the significant number of oral presentations indicates a good dissemination of the results and a high scientific level of the projects.

The projects usually started at TRL levels between 2 and 4 and ended at TRL levels 4 to 6. In many cases the innovation-related results comprised new methods, new products and/or new processes. The tentative time frame for commercialisation of the results (year to market) is usually between 3 and 5 years.

The main added value of M-ERA.NET compared to other transnational funding schemes are simpler rules and procedures and attractivity to newcomers. 85% of respondents reported that the project would not have been realised without M-ERA.NET, and in 82% there is a plan for future cooperation of the project consortium.

The report concludes that the assessed projects have a high impact at scientific and innovation level and a positive transnational effect and benefits.

1. Objectives

M-ERA.NET is a strong European network of public funding organisations supporting and increasing coordination and convergence of national and regional funding programmes on research and innovation related to materials and battery technologies to support the European Green Deal.

To follow up on the success of investments, M-ERA.NET has established a systematic approach to monitoring and assessing the impact of its joint transnational calls on an annual basis.
This joint analysis complements the routine efforts carried out by the national and regional funding organisations at national and regional level.

This report covers the results of the assessment of the 27 projects funded from the M-ERA.NET Call2018.

2. Process and Methods

The projects funded under the M-ERA.NET Call 2018 were assessed through an online questionnaire. The questionnaire was provided to all parties in the funded project consortia in June 2023. The questionnaire covered the following areas:

- Project implementation
- Project results
- Economic effects
- Transnational benefits

Note: all statistics and graphs presented in this report are related to individual answers from individual beneficiaries, not to project consortia as a whole.

The survey addressed 117 project partners in 27 funded projects. In total, 67 responses were received, including 21 from coordinators. These responses covered all 27 projects. The response rates were 100 % for projects and 57 % for individual beneficiaries. 35 % of the responses came from universities, 41% from research organisations, and 24 % from industry. Figure 1 shows the profile of organisations for all projects funded under Call 2018 (a) and organisation profile of survey respondents (b)

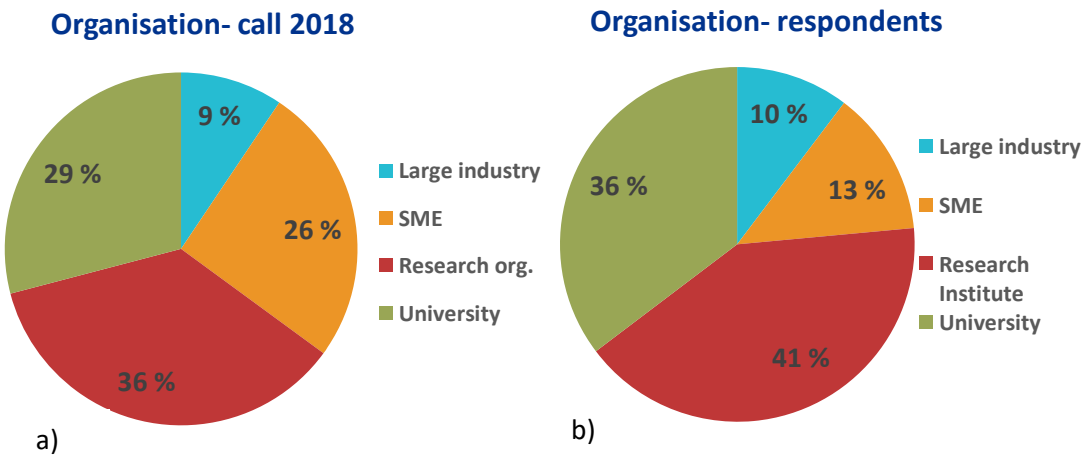


Figure1. Call 2018 a) beneficiaries per organisation type; b) survey respondents per organisation type

3. Statistics and results

3.1 General – project implementation

Q1. Have there been major changes since the project started (consortium, budget, timeframe etc.)?

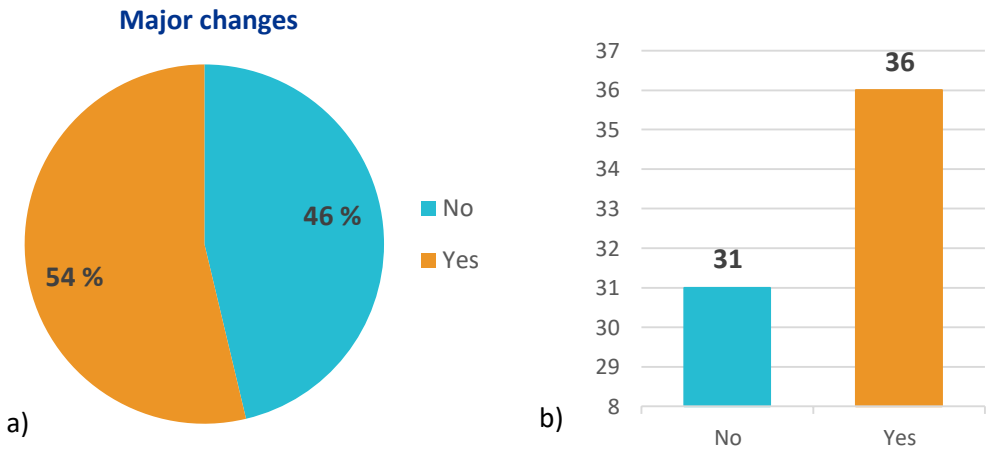


Figure 2. Project implementation – changes in consortium, budget and timeframe shown in % (a) and in number of responses(b)

46% of the respondents reported no changes with respect to consortium, budget and/or timeframe, whereas 54% (36 respondents) reported that there have been major changes since the project started. This is an increase by 12% in "yes" answer as compared to assessment of the projects funded under call2017. These major changes are in the most cases connected to the extension of the project period related to *COVID-19* pandemic situation.

Q2. To which extent have the project objectives been accomplished?

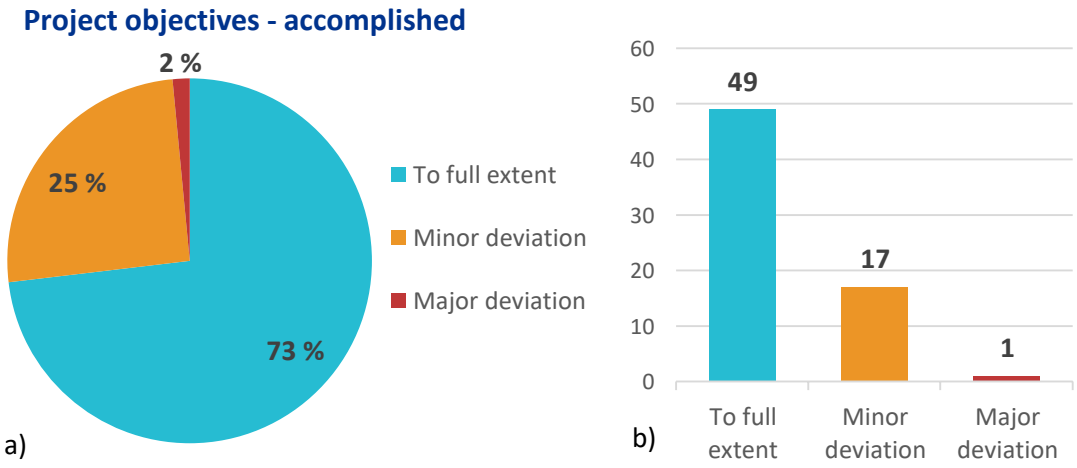


Figure 3. Project implementation – accomplishment of project objectives shown in % (a) and in number of responses (b)

73% of the respondents reported that the project objectives have been accomplished to full extent, whereas 26% reported minor changes and 1 major change. The changes were in the most cases related to *COVID-19* pandemic situation.

Q3. To which extent have the expected results and planned deliverables been accomplished?

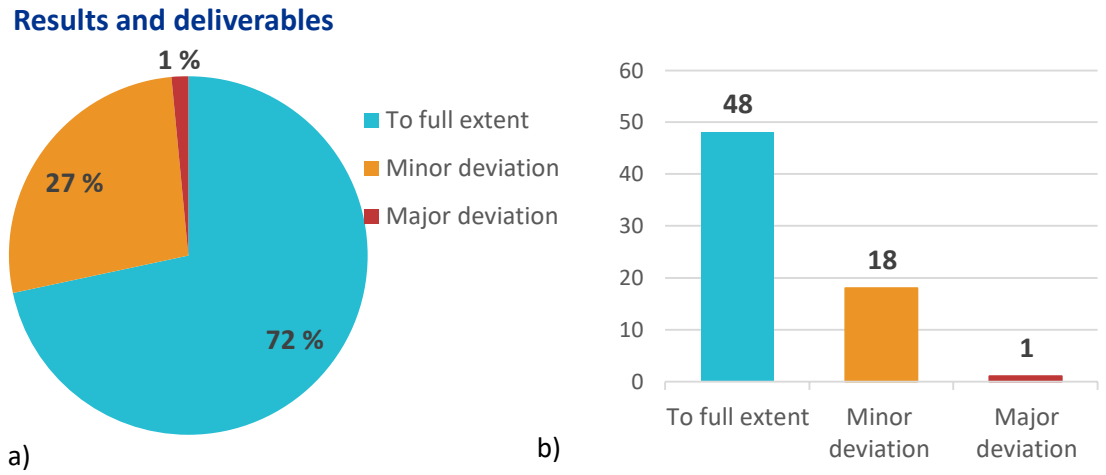


Figure 4. Project implementation – accomplishment of project deliverables shown in % (a) and in number of responses (b)

72% of respondents reported that the results and deliverables have been fully accomplished, whereas 27 % reported minor changes. Only in one case major changes were reported.

Q4. What was the project timeline?

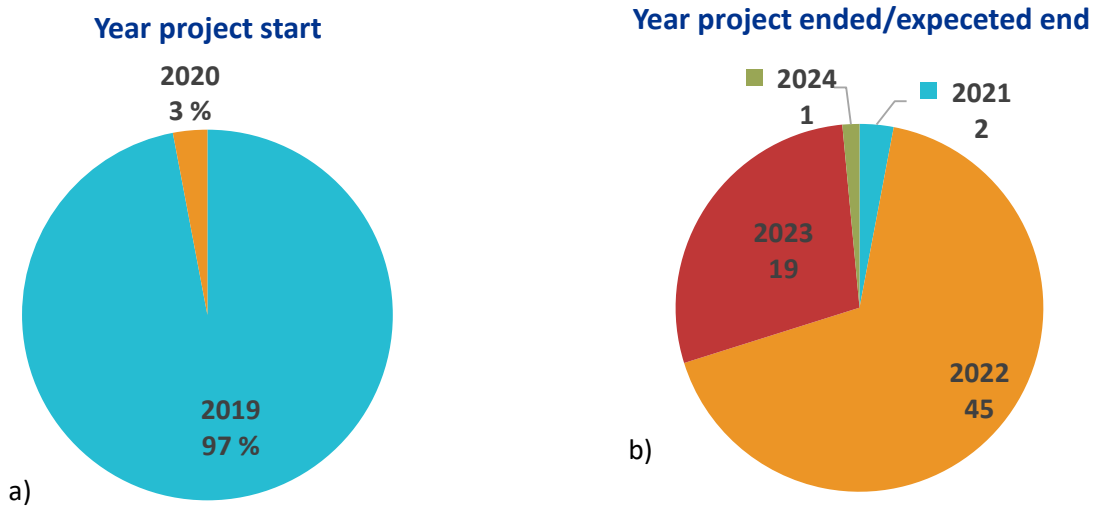


Figure 5. Project timeline. Year project started (a), year project ended or expected end (b)

97% of projects started in 2019 and the rest in 2020 (3%). Most of the projects ended in 2022 or 2023. In the most cases, the project period was 3-4 years.

Q5. Was the project influenced by the covid19 pandemic situation?

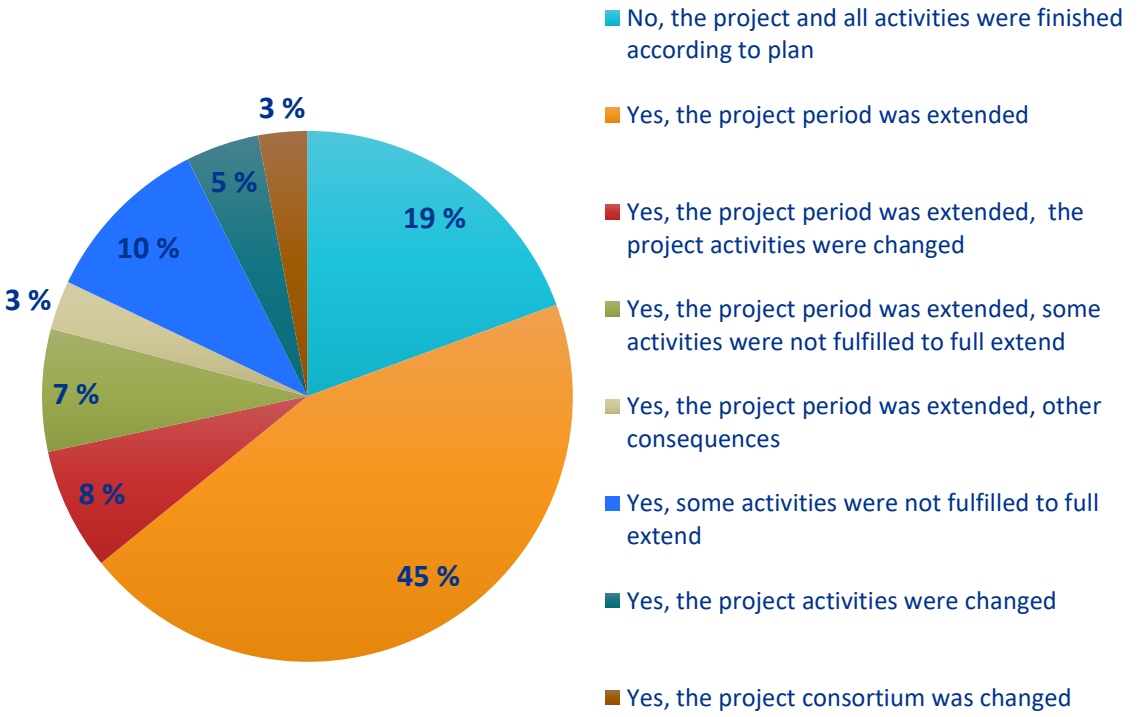


Figure 6. Impact if the Covid19 pandemic situation on the project

Only 19% of the respondents answered that the Covid19 pandemic situation did not influence the project. 81% reported one or more of the following consequences: extension of the project period, changes in the activities, changes in the consortia, and/or other consequences.

3.2 Project results

3.2.1 Scientific results

Q6. What are the results achieved? (Multiple answers possible)

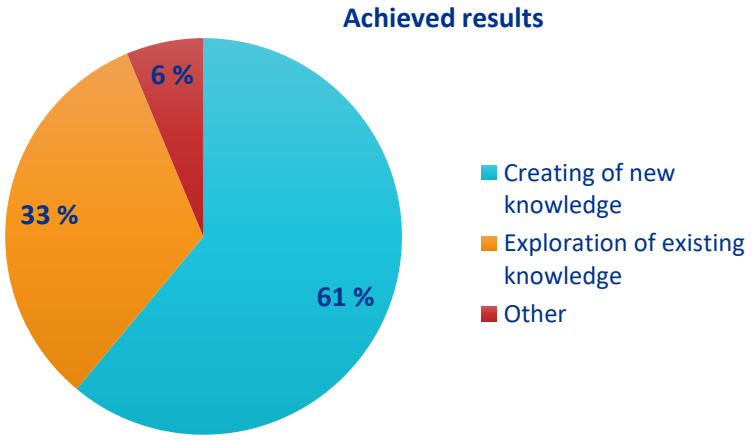


Figure 7. Type of results achieved in the project

The results most usually achieved are the creation of new knowledge in 61% and exploration of existing knowledge in 33%. Multiple answers were possible, and in 40% of the cases the answer was a combination of both above mentioned categories.

Q7. Please specify number of publications in peer reviewed scientific journals corresponding to results from this project for your organisation

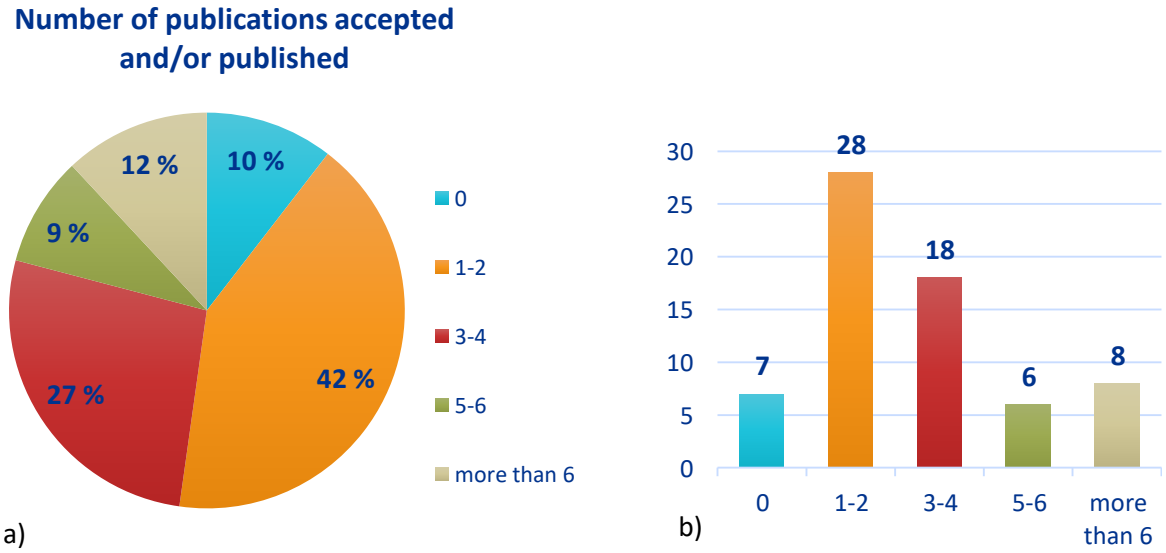


Figure 8. Number of publications in peer reviewed scientific journals shown in % (a) and in number of responses per each category (b)

In 90% of the cases the project results were published in scientific publications in peer reviewed scientific journals. The number of publications was between 1-2 in 42% of the cases, between 3-4 in 27%, between 5-6 in 9 % and more than 6 in 12%. This means that results from the assessed projects were published in more than 190 publications in peer reviewed scientific journals. This is a significant increase compared to previous calls. One possible explanation is that during the pandemic lock-down there was more time to focus on writing articles and publishing of the results.

Q8. Please specify the number of publications in peer reviewed scientific journals corresponding to results from this project for your organisation <u>planned</u> for submission within next year

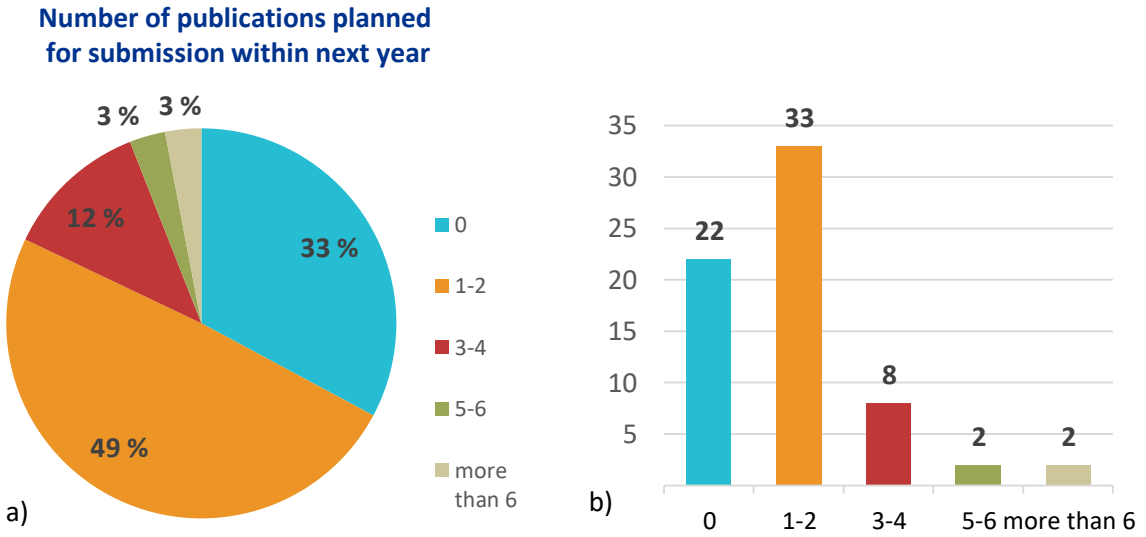


Figure 9. Number of publications in peer reviewed scientific journals planned for submission within next year, shown in % (a) and in number of responses per each category (b).

67% of respondents have scientific publications under preparation or plans for publication during the first year after the project end. In 49% of the cases one or two publications are planned for submission. This means that a significant number of publications is planned to be published after the project end.

Q9. Please specify the number of conference proceedings/presentations where the results from your project were presented (for your organisation)

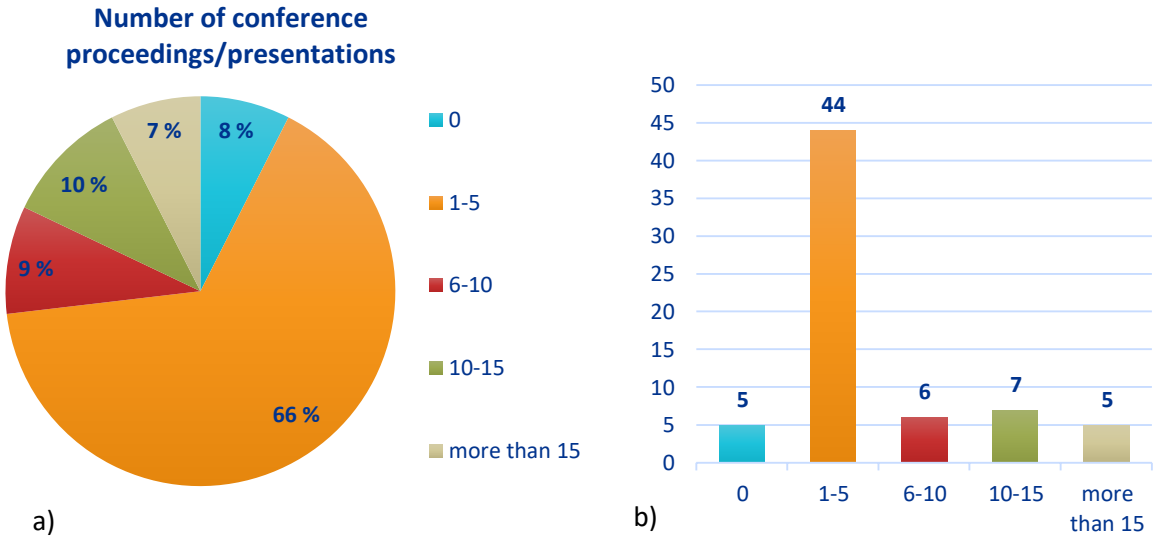


Figure 10. Number of conference proceedings/presentations shown in % (a) and in number of responses per each category (b)

In 66% of the cases the project results were presented at conferences. Only 8% did not present the project results in this form.

Q10. How many degrees have been achieved as a result of this project (for your organisation)

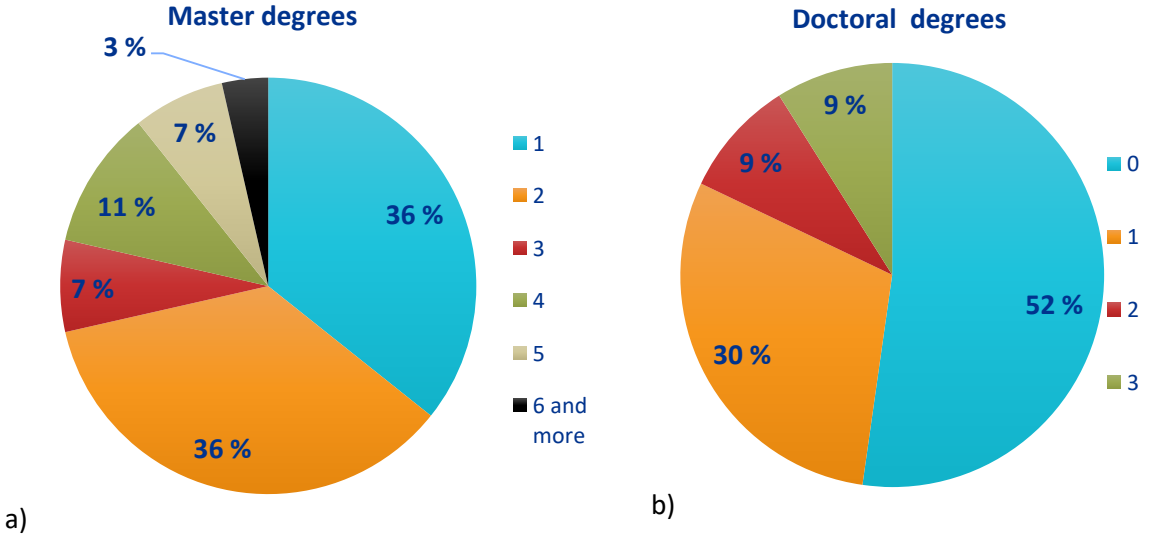


Figure 11. Type of degrees achieved as a result of the project shown in % per each category: (a) Master's degrees (b) Doctoral degree

42% reported that at least 1 Master's degree and 48 % that at least 1 Doctoral degree (PhD) were achieved as a result of the project.

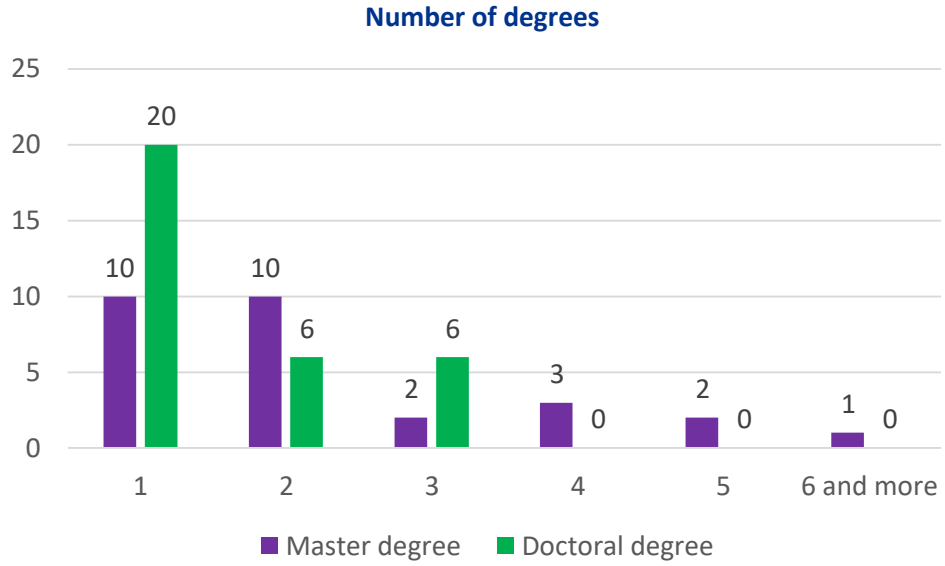


Figure 12. Number and type of degrees achieved in the projects.

In total, at least 64 Master's degrees and 50 Doctoral degrees have been achieved as a result of the projects.

Q11. Career stage - how many and what kind of researchers were involved in this project in your organisation?

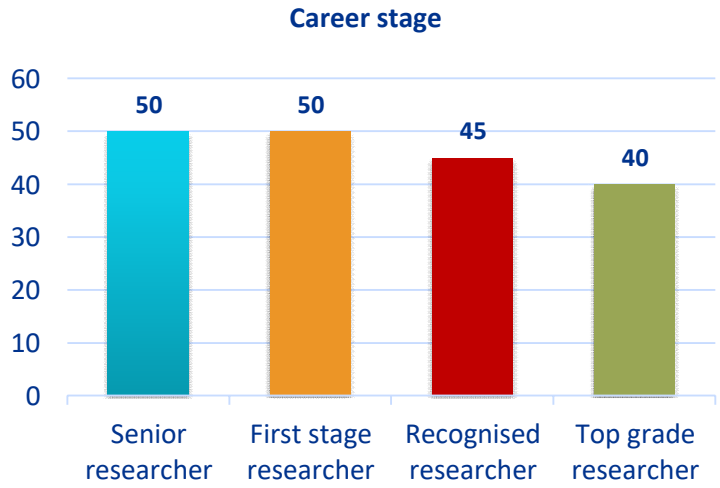


Figure 13. The career stage and number of researchers per each category

Career stages are the various steps in career development that a person will undergo throughout their working life. In recent years a work to define a common European framework for the standardisation of the "research career" was carried out. Figure 13 shows the number of researchers involved in the projects funded in M-ERA.NET call2018 and their career stage.

3.2.2 Innovation oriented results

Q12. Please indicate the technology readiness level-(TRL) at project start and project end

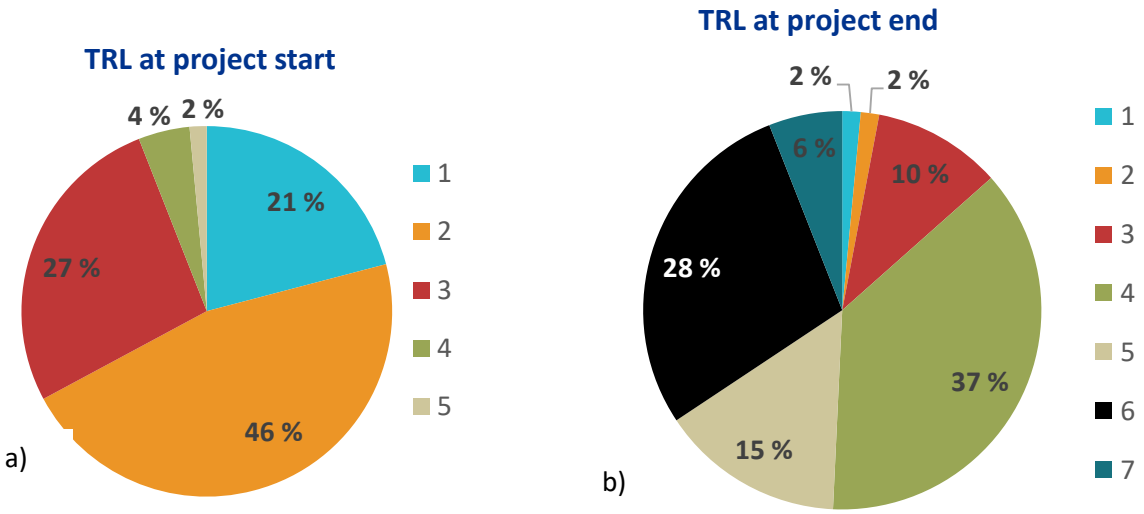
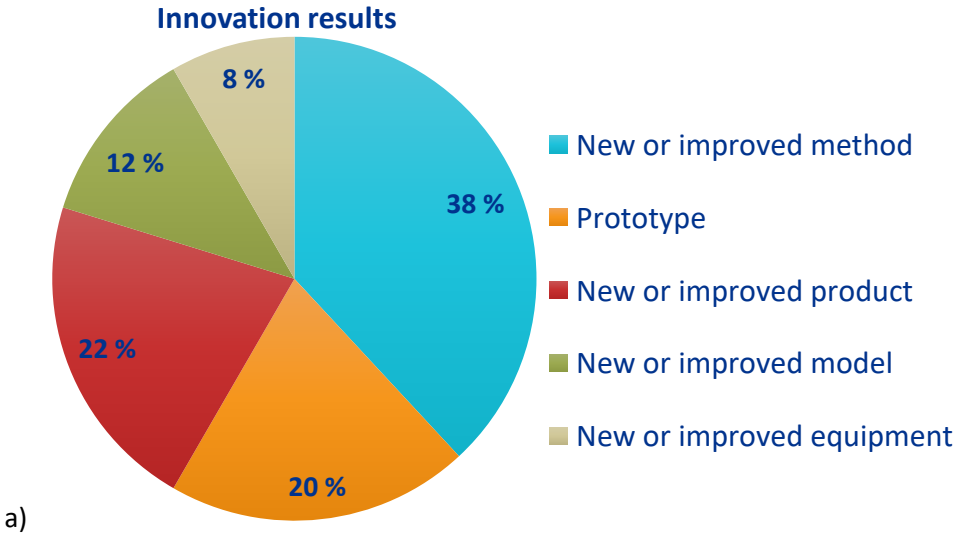


Figure 14. TRL shown in % per each category: (a) project start, (b) project end

Most of the projects started at TRL 2-4 and ended at TRL level 4-6. The delta TRL (difference between TRL at the project start and TRL at the project end) was usually in the range of 2-4.

Q13. What type of results have you achieved in this M-ERA.NET project? (Multiple answers possible)



b)

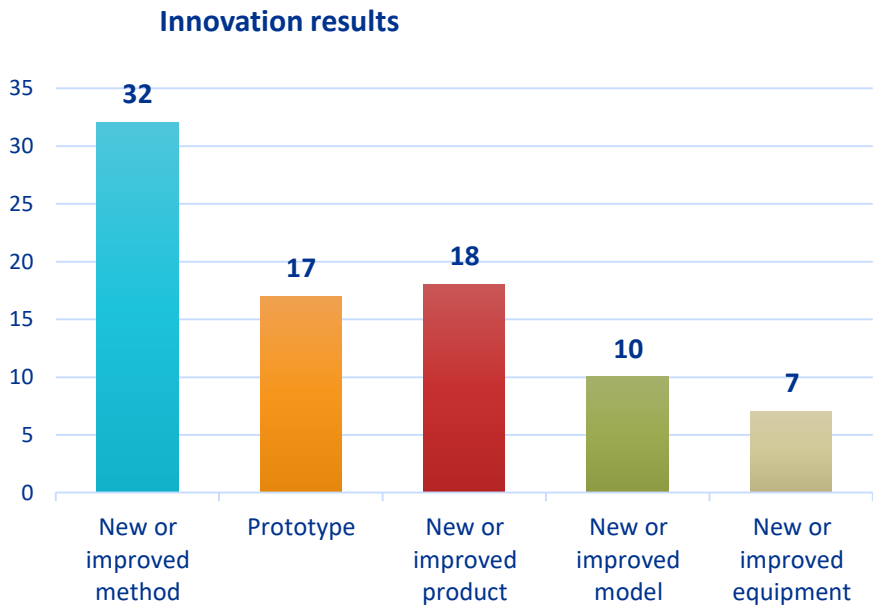


Figure 15. Type of innovation result shown in % (a) and in number of responses per each category (b)

The type of result most frequently achieved is a *New or improved method* (38%), *New or improved product (22%) and Prototype (20%).*

Q14. What is the main impact of this project for your organisation?

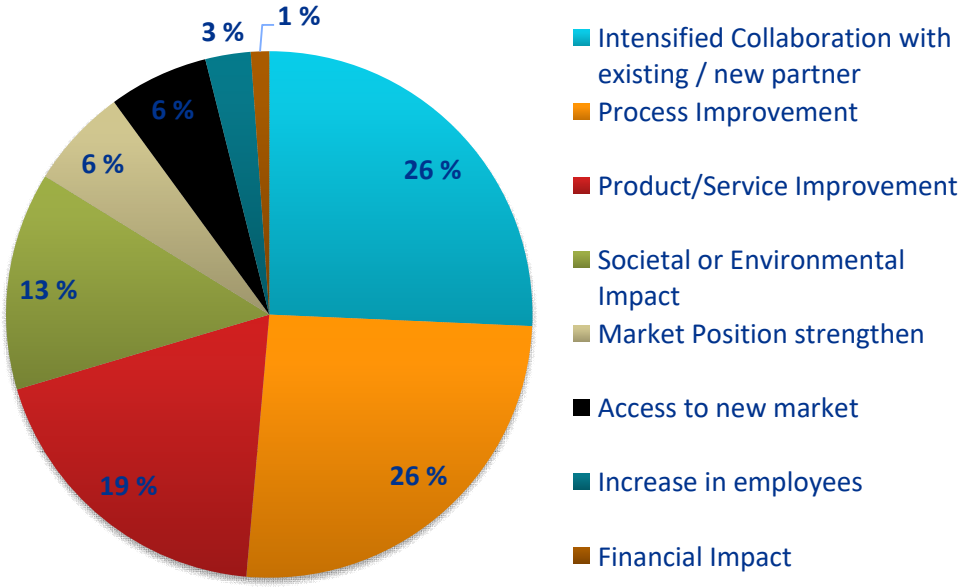


Figure 16. The main impact of the project shown in % per each category.

The main impact was mostly intensified collaboration with existing/new partner and improvement of the prosses, product and/or service**.**

Q15. What is the tentative time frame for commercialisation of the results from this project (year to market), where 0 is the end date of the project?

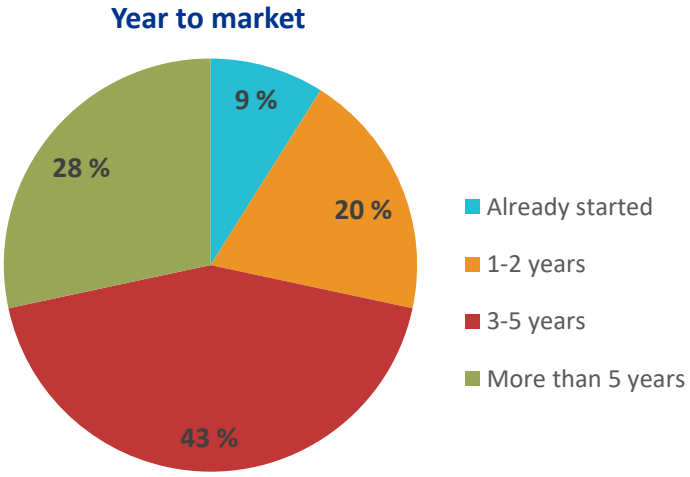


Figure 17. Tentative time frame for commercialisation (year to marked)

The tentative timeframe for commercialisation of the results (year to market) is most likely 3-5 years (43%). In 9% of the cases the commercialisation of the results has already started.

Q16. Please specify the number of approved patents, patent applications and licenses corresponding to results from the project for your organisation

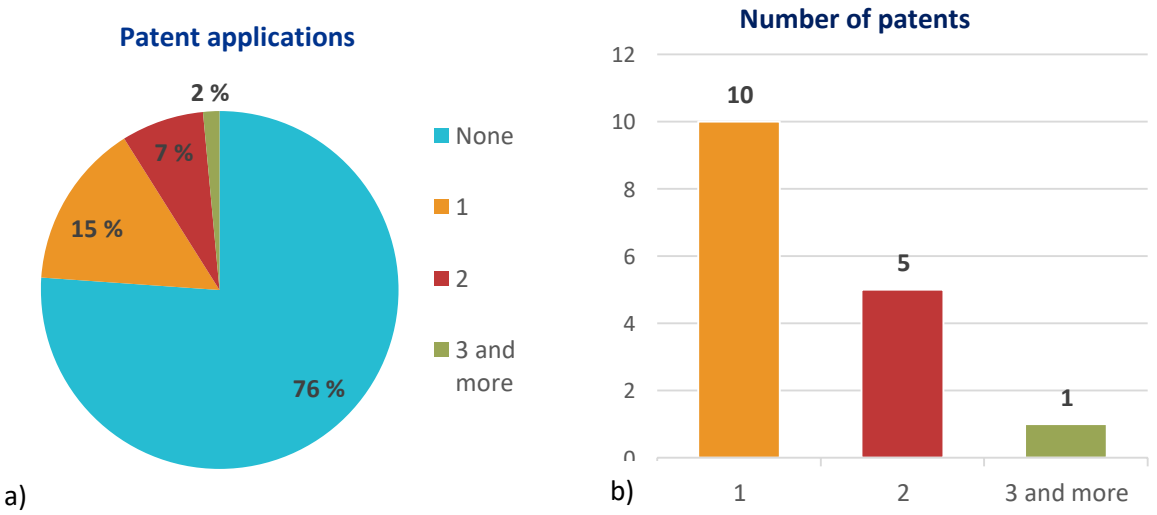


Figure 18. Patent applications shown in % per each category including all responses (a), and the number of submitted patent applications per each category (b).

In 24% of the cases the patent application was a result of the research in the assessed project. In total at least 18 patent applications were submitted.

Q17. Are you familiar with "Open Innovation Test Beds"?

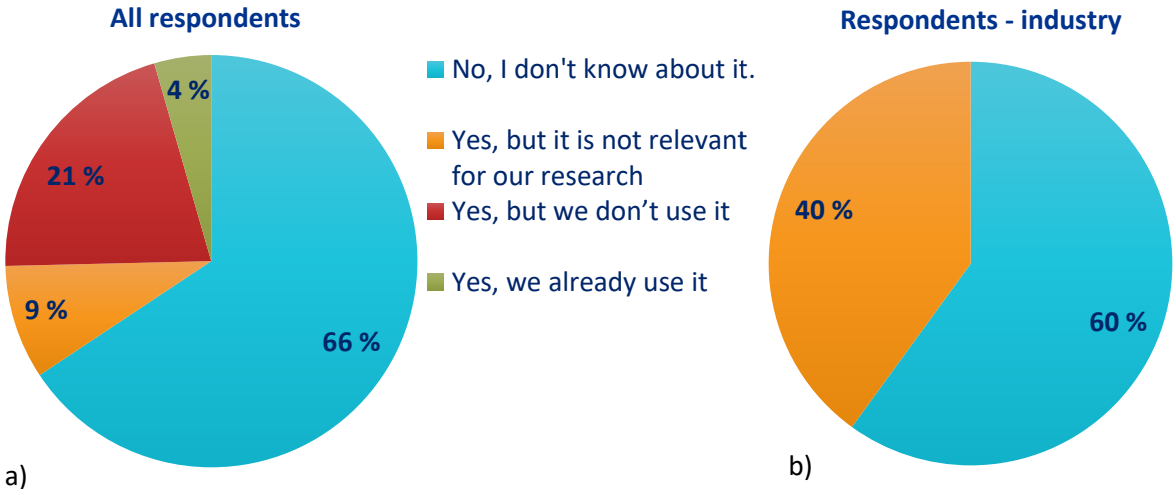


Figure 19. Familiarity with open innovation test bed concept: (a) all respondents; (b) industry only

Open Innovation Test Beds (OITB) were initiated by the EU in Horizon 2020 to provide the community access to physical facilities, capabilities and services required for the development, testing and upscaling in industrial environments[1]. Until 2023 the EU has invested more than EUR 319 million in Open Innovation Test Beds. The Call 2018 project beneficiaries were asked if they were familiar with this concept/offer and whether they have used this opportunity for their activities related to the M-ERA.NET call2018. Only 4% of the respondents were familiar with the OITB concept and used it in the assessed project. 66% of the respondents were not familiar with the concept.

Q18. What is in your opinion the largest benefit(s) of using the open innovation test beds (multiple answer possible)?

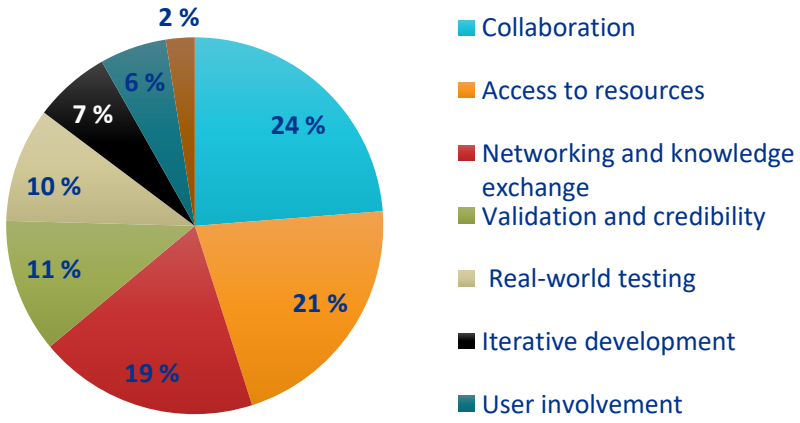


Figure 20. The largest benefit(s) of using Open Innovation Test Beds

The beneficiaries familiar with the OITB concept were asked about what were in their option the largest benefits of using Open innovation Test Beds. The collaboration, access to resources and networking and knowledge exchange were the most common answers.

[1] https://cordis.europa.eu/article/id/436434-open-innovation-test-beds-to-accelerate-european-innovation

3.3 Transnational benefits

Q19. Please indicate previous experiences in transnational funding programs (e.g. ERA-Networks)?

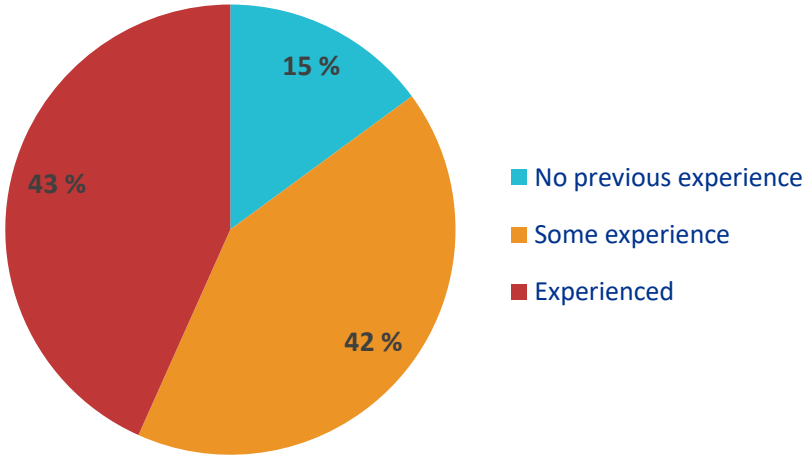


Figure 21. Previous experience in transnational project

85% of the respondents had at least some previous experiences in transnational projects, while 15% were newcomers to transnational project cooperation.

Q20. What is the main added value of M-ERA.NET compared to other transnational funding, e.g. EU framework programme?

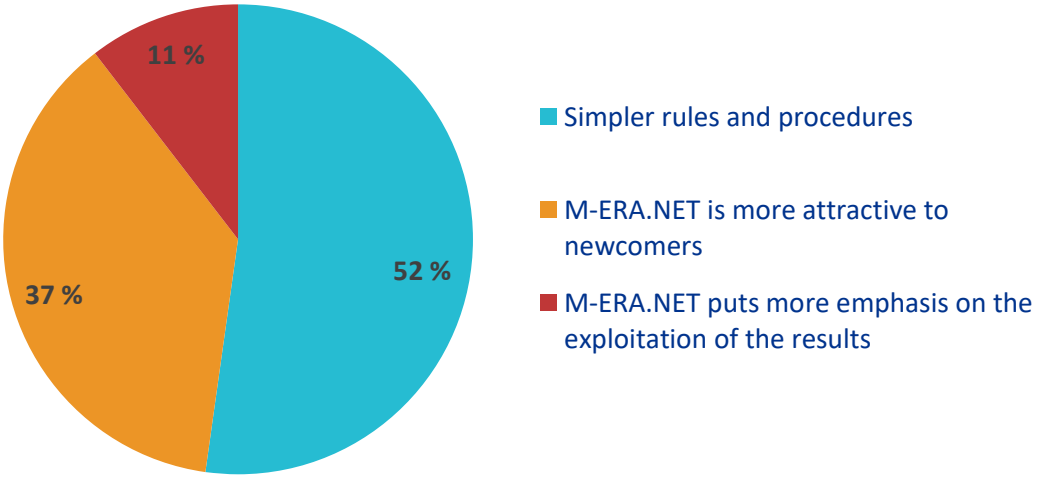


Figure 22. Added value of M-ERA.NET compared to other transnational funding e.g., EU framework programme.

The main added value of M-ERA.NET compared to other transnational funding are simpler rules and procedures and more attractivity for newcomers.

Q21. Experiences regarding implementation of the project

a) Were all project partners committed to the project?

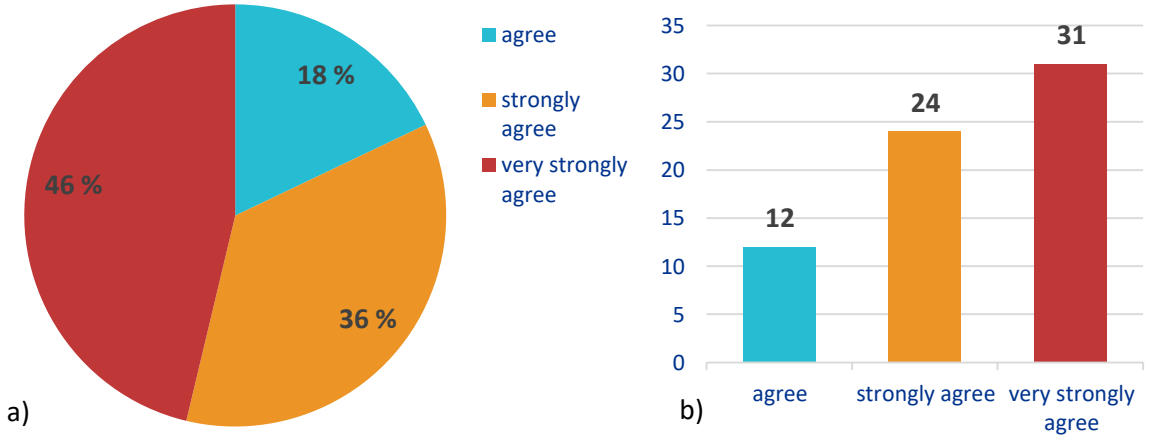


Figure 23. Project partners committed to the project in % (a) and in the number of responses per each category (b)

All respondents agreed that the project partners were committed to the project: agree very strongly (46%), agree strongly (36%) and agree (18%). None of the respondents disagreed at all.

b) Was the consortium stable during the project implementation?

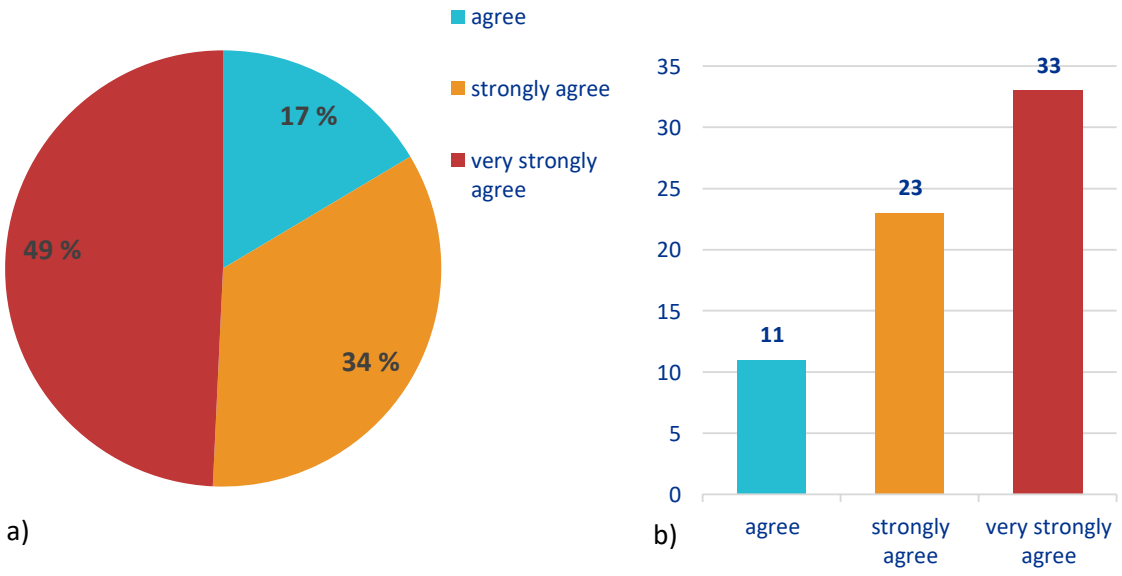


Figure 24. Stability of the project consortium during the project implementation shown in % (a) and in the number of responses per each category (b).

All respondents experienced stable consortia during the project implementation, answering from "very strongly agree" to "agree". None of the respondents disagreed at all.

c) Were the project objectives realistic (i.e. budget, effort, time)?

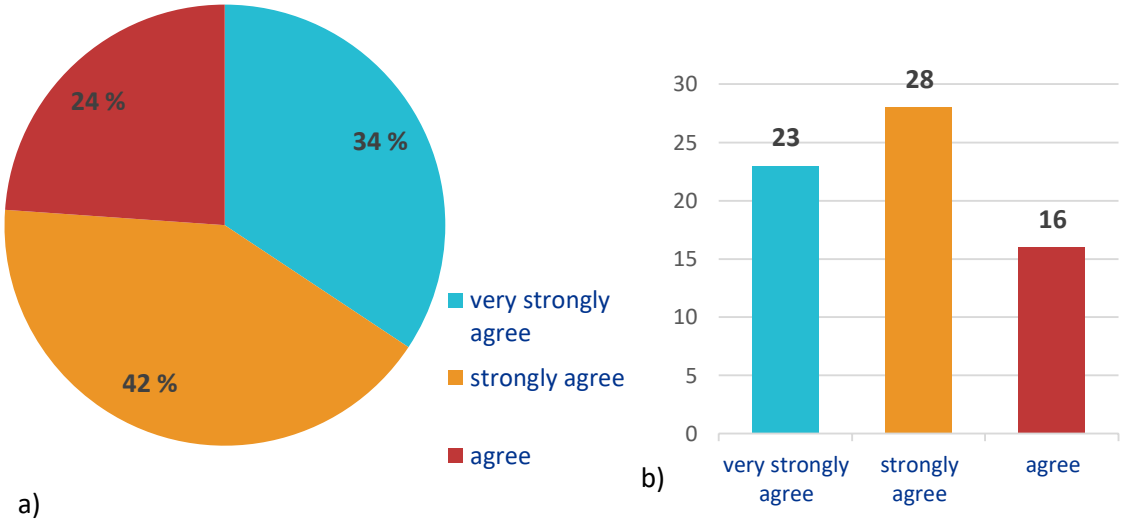


Figure 25. Realistic project objectives: a) shown in %, b) In numbers of responses per each category

All responses indicated that project objectives were realistic. The answers were: very strongly agree (34%), strongly agree (42%) and agree (24%). None of the answer was "disagree" "strongly disagree" or "very strongly disagree" on this question.

d) Was the project management effective?

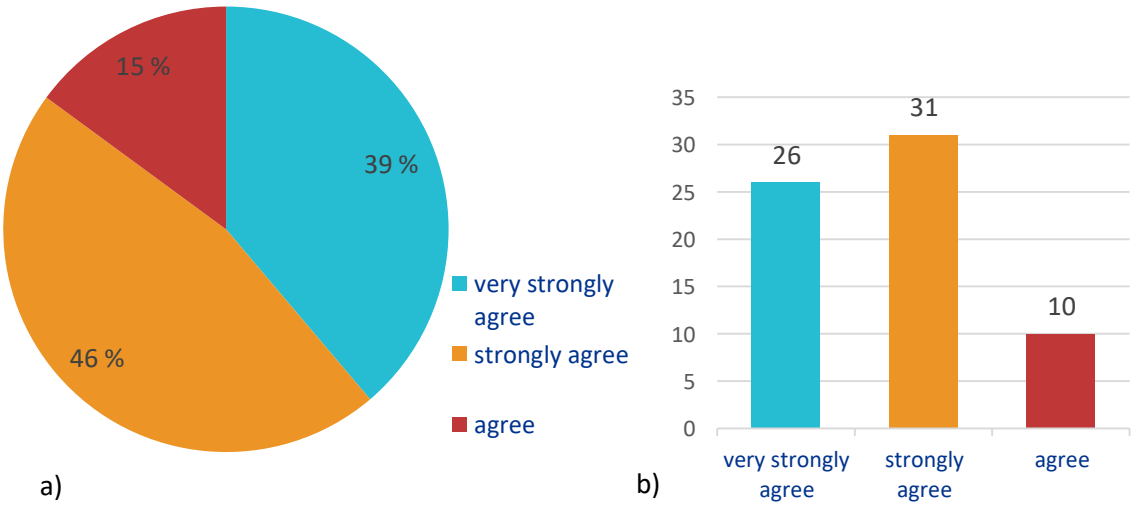


Figure 26. Effectivity of the project management shown in % (a) and in the numbers of responses (b) per each category.

The received answers indicate that the project management was good and effective in all cases. No respondent disagreed.

Q22. Was the interaction with the national/regional funding agency supportive throughout the application process and during the project implementation?

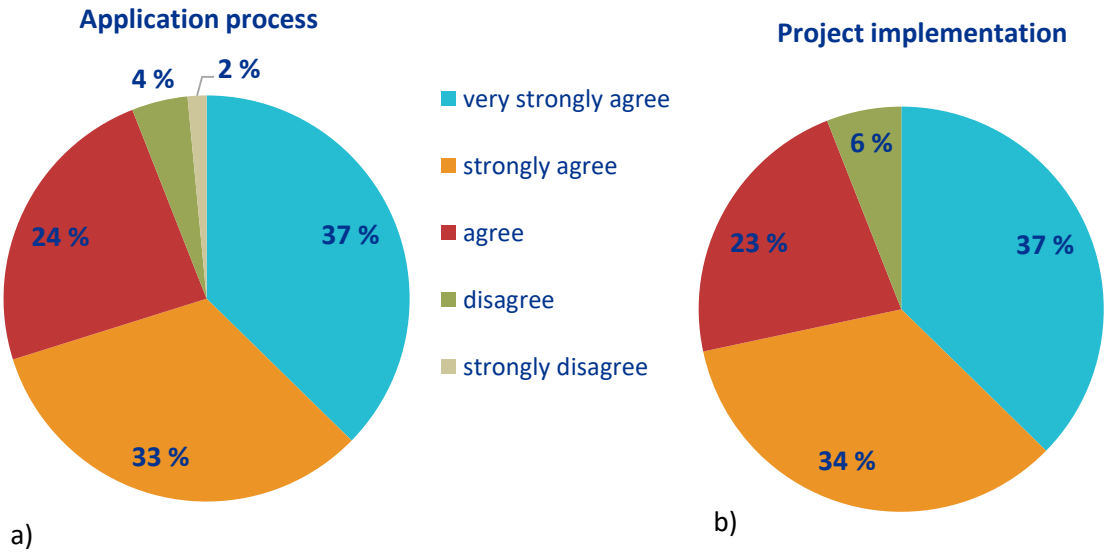


Figure 27. The interaction with the national/regional funding agency throughout the application process (a) and during the project implementation (b)

The national/regional agencies were supportive both during the application process and project implementation for 94% of the respondents. Only 3 respondents did not find the national/regional funding agency supportive.

Q23. Would the project have been realised without M-ERA.NET?

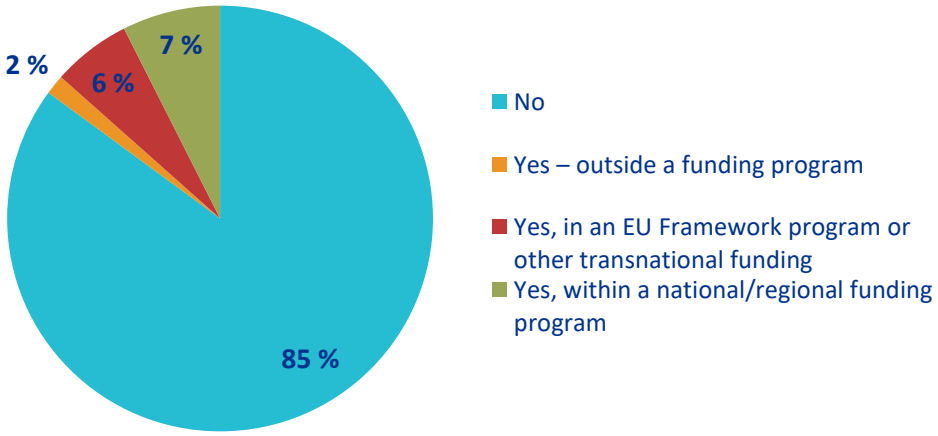


Figure 28. Project realisation without M-ERA.NET

For 85% of the respondents the project would have not been realised without M-ERA.NET. Only 10 respondents would have realised the project without M-ERA.NET, either in the EU framework programme or within a national/regional funding program.

Q24. Will the co-operation in the consortium continue?

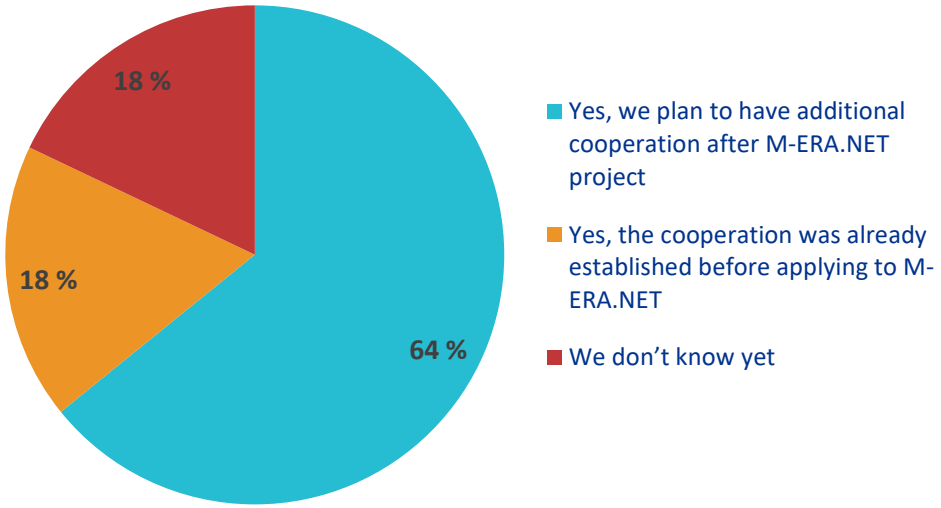


Figure 29. Future cooperation of project consortia

In 82 % of the cases, the co-operation in the consortium will continue beyond this M-ERA.NET project, while 18% don't know yet if the cooperation will continue. No one answered that there are no plans for further cooperation.

3.4 Conclusions

- The responses to the questionnaire covered **27 out of 27 project**s funded in Call 2018, giving a good background for assessing the impact.

Project implementation

- Most of the projects **started in 2019** and ended in **2022/2023**.
- **54%** reported **major changes** in consortium, budget and/or timeframe during the project duration, mostly related to COVID-19 pandemic situation. 81% answered they experienced one or more of the following consequences: extension of the project period, changes in the activities, changes in the consortia, and/or other consequences. Despite this, more **than 70%** answered that the project **objective**, **results, and deliverables** were **accomplished to full extend**.

Scientific results

- The results most usually achieved are the **creation of new knowledge** (61%) and exploration of existing knowledge in 33%.
- The large number of publications in **peer reviewed scientific journals** and the number of oral presentations/posters indicates a **good dissemination** of results. **Significant numbers** of publications are also **planned for submission** within one year after project end.
- In total, at least 64 Master's degrees and 50 Doctoral degrees have been achieved as a result of in the projects.

Innovation and economic results

- The most frequently reported results are **new methods, new processes and products** followed by prototypes, new or improved models and equipment.
- The tentative time frame for **commercialisation** of the results (year to market) is usually **3-5 years.**
- The projects usually started at **TRL level 2-4** and ended at TRL level **4 -6**. The delta TRL was mostly in the range 2-4.
- **In 24%** of the cases the **patent** application was a result of the research in the assessed projects. In total at least **18 patent applications** have been submitted.
- The main impact was intensified collaboration with existing/new partner and improvement of prosses, product and/or service**.**

Transnational effects

- **85%** of the respondents had previous **experience** in the transnational projects, while 15% were newcomer.
- The **main added value** of M-ERA.NET compared to other transnational funding schemes are **simpler rules and procedures** and **attractivity to newcomers.**
- **85%** of the respondents would **not have realised** the project **without M-ERA.NET**.
- **The majority** of the respondents **fully agree/agree** on a **good implementation** of the project**, stable consortium, good commitment** of project **partners** and **good support** from the **national/regional funding agencies**.
- In **82% of the cases the co-operation** in the consortium **will continue** after the M-ERA.NET project ended**.**

The report concludes that the assessed projects are found to have a high impact at scientific and innovation level and a positive transnational effect and benefits.

4. Attachments

Annex 1. Questionnaire call2018

Assessment of funded projects from the additional joint calls by the previous M-ERA.NET (2017--2020) and from additional joint calls by M-ERA.NET 3.

General Information

- Project acronym (call 2018)
- Name of organisation
- Category organisation
    - University
    - Research Institution
    - SME
    - Large industry
    - Other
- Category project partner
    - Coordinator
    - Partner
- Country
- Financing agency
- Year project start (2019-
- Year project end (expected end)

1. Project implementation

- Q1. Have there been major changes since the project started (consortium, budget, timeframe etc.)?
    - Y/N
    - if Y please explain

- Q2. To which extent have the project objectives been accomplished?
    - To full extent
    - Minor deviation – please explain
    - Major deviation - please explain

- Q3. To which extent have the expected results and deliverables been accomplished?
    - To full extent
    - Minor deviation – please explain
    - Major deviation - please explain

- Q4. The project timeline
    - Year project start (2019-
    - Year project end (expected end)

- Q5. Was the project influenced by the COVID-19 pandemic situation? (Multiple answer possible)
    - o No, the project and all activities were finished according to plan
    - o Yes, some activities were not fulfilled to full extend
    - o Yes, the project period was extended
    - o Yes, the project consortium was changed
    - o Yes, the project activities were changed
    - o Yes, other consequences – please explain

2. Scientific results & Innovation

- Q6. What are the results achieved?
    - o Creating of new knowledge
    - o Exploration of existing knowledge
    - o Other

- Q7. Please specify number of publications in peer reviewed scientific journals corresponding to results from this project for your organisation (accepted/published)
    - o Publications accepted and/or published 0 1-2 3-4 5-6 more than 6

- Q8. Please specify number of publications in peer reviewed scientific journals corresponding to results from this project for your organisation (accepted/published)
    - o Publications planned for submission within next year 0 1-2 3-4 5-6 more than 6

- Q9. Please specify number of conference proceedings/presentations where the project results were presented
    - o 0 1-5 6-10 10-15 more than 15
    - o Other dissemination activity

- Q10. How many degrees have been achieved as a result of this project (for your organisation)?
    - o Master degrees 0 1 2 3 5 6 more than 6
    - o Doctoral degrees 0 1 2 3 5 6 more than 6

- Q11? Career stage - how many and what kind of researchers were involved in this project (your organization)
    - o Top grade researcher 0 1 2 3 5 6 more than 6
    - o Senior researcher 0 1 2 3 5 6 more than 6
    - o Recognised researcher 0 1 2 3 5 6 more than 6
    - o First stage researcher 0 1 2 3 5 6 more than 6

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- Q12. Please indicate the technology readiness level (TRL) at project start and project end?
    - o TRL level project start (1-9)
    - o TRL level project end (1-9)

Technology Readiness Level – definition:

TRL 1. basic principles observed
TRL 2. technology concept formulated
TRL 3. experimental proof of concept
TRL 4. technology validated in lab
TRL 5. technology validated in relevant environment
TRL 6. technology demonstrated in relevant environment
TRL 7. system prototype demonstration in operational environment
TRL 8. system complete and qualified
TRL 9. actual system proven in operational environment

- Q13. What type of the innovation have you achieved in this M-ERA.NET project (multiple answers possible?
  - o New or improved method
  - o New or improved process
  - o New or improved product
  - o New or improved model
  - o New or improved service
  - o New or improved equipment
  - o Prototype
  - o Other

- Q14. What is the 3 main impact of this project? (Multiple answer possible)
  - o Process Improvement
  - o Product/Service Improvement
  - o Market Position strengthened
  - o Access to new market
  - o Financial Impact
  - o Increase in employees
  - o Intensified Collaboration with existing / new partners

- Q15. What is the tentative time frame for commercialisation of the results from this project (year to market), where 0 is the end date of the project?
  - o Already started
  - o 1-2 years
  - o 3-5 years
  - o More than 5 years

- Q16. Please specify the number of approved patents, patent applications and licenses corresponding to results from the project for your organisation
  - o Patent applications 0 1-2-3 and more
  - o Licenses 0 1-2- 3 and more

- Q17. Are you familiar with "open innovation test beds" Open Innovation Test Beds (OITBs) - Publications Office of the EU (europa.eu)?
  - o Yes, we already use it
  - o Yes, but we don't use it
  - o Yes, but it is not relevant for our research
  - o No, I don't know about it.

- If yes on Q17: Q18. What is in your opinion the largest benefit(s) of using the open innovation test beds? (multiple answer possible)
  - o Collaboration
  - o Real-world testing
  - o User involvement

- Iterative development
- Access to resources
- Networking and knowledge exchange
- Validation and credibility
- Policy and regulatory insights
- Other: please specify

3. Transnational effects

- Q19. Please indicate your (personal) previous experience in transnational projects (multiple answers possible)
  - Very experienced
  - Experienced
  - Some experience
  - Little experience
  - No previous experience

- Q20. What is the added value of M-ERA.NET compared to other transnational funding e.g. EU framework programme?
  - Simpler rules and procedures
  - M-ERA.NET is more attractive to newcomers
  - M-ERA.NET puts more emphasis on the exploitation of the results
  - Other: please specify

- Q21. Experiences regarding implementation of the project
  Scale: "very strongly agree- strongly agree- agree - disagree- strongly disagree- very strongly disagree"
  - All project partners were committed to the project
  - The consortium was stable during the project implementation
  - The project`s objectives were realistic (i.e. budget, effort, time)
  - Project management was effective
  - The interaction with the national/regional funding agency was supportive throughout the application process?

- Q22. Was the interaction with the national/regional funding agency supportive during the project implementation?
  - Scale: "very strongly agree- strongly agree- agree - disagree- strongly disagree- very strongly disagree"

- Q23. Would the project have been realised without M-ERA.NET?
  - No
  - Yes – outside a funding program
  - Yes, within a national/regional funding program
  - Yes, in an EU Framework program or other transnational funding
    - If yes: please specify which other funding possibility

- Q24. Will the cooperation in the consortium continue?
  - Yes, the cooperation was already established before applying to M-ERA.NET
  - Yes, we plan to have additional cooperation after M-ERA.NET project
  - We don’t know yet
  - No, there are no plans for further cooperation

Annex 2. Call 2018 -list of funded projects

List_of_funded_projects_2018_Call.pdf (m-era.net)

M-ERA.NET Call 2018:
List of projects recommended for funding

Call topic	Acronym	Full Title	No. of Partner	Participants	Funding organisations
Multiscale modeling for materials engineering and processing (M3EP)	TESTIMONIES	Theoretical and Experimental Study of TransItion Metal Oxyhydride NanomaterIals for supErconductivity and photocatalysiS	6	Institute for Energy Technology (Norway); Transilvania University of Brasov (Romania); Sunphade AS (Norway) ; Lithuanian Energy Institute (Lithuania) ; Institute of Experimental Physics (Slovakia); Keranor AS (Norway)	RCN (Norway); UEFISCDI (Romania); RCL (Lithuania); SAS (Slovakia)
Innovative surfaces, coatings and interfaces	CORR-PROOF	Graphene-based Environmentally-Friendly Corrosion Protective Coating for Aeronautics Industry	4	SINTEF AS (Norway); SINTEF OCEAN AS (Norway); TAI – Turk Havacilik ve Uzay Sanayii A.S. (Turkey); NANOGRAFI Nano Teknoloji Bilisim Imalat ve Danismanlik LTD. STI.; (Turkey)	RCN (Norway); Tübitak (Turkey)
Innovative surfaces, coatings and interfaces	FunKeyCat	Functional grading by Key doping in Catalytic electrodes for Proton Ceramic Cells	4	University of Oslo (Norway); SINTEF Industry (Norway); Gdansk University of Technology (Poland); Agencia Estatal Consejo Superior de Investigaciones Cientificas (Spain)	RCN (Norway); NCN (Poland); AEI (Spain)
Innovative surfaces, coatings and interfaces	HOTselflub	SELF-LUBRICATING SYSTEMS FOR HIGH TEMPERATURE TRIBO-APPLICATIONS	4	Tallinn University of Technology (Estonia) ; AC2T research GmbH (Austria) ; Institute for Sustainable Technologies – National Research Institute (Poland) Castolin Austria GmbH (Austria)	ETAG (Estonia); FFG TP (Austria); NCN (Poland)

Call topic	Acronym	Full Title	No. of Partner	Participants	Funding organisations
Innovative surfaces, coatings and interfaces	HyprSTEP	Development of novel hybrid process based on graphene modified smart textile filters and polymer membranes for advanced wastewater treatment	5	Hohenstein Institut für Textilinnovation gGmbH (Germany); PolymemTech Sp.z.o.o (Poland) ; Norafin Industries (Germany) GmbH (Germany) ; Warsaw university of technology (Poland) ; ATEC Automatisierungstechnik GmbH (Germany)	PTJ (Germany);
Innovative surfaces, coatings and interfaces	INCOMARC	Innovative coating materials for arc resistant electric contacts	3	MATELIOS (Italy); CRM group (Belgium); LaserCo (Belgium)	CALABRIA (Italy); SPW (Belgium)
Innovative surfaces, coatings and interfaces	ISOS	Multi-functional icephobic, robust, lightweight and transparent coatings for windows and lenses	3	University of Bergen (Norway); Christian Michelsen Research AS (Norway); Universidad Autónoma de Madrid (Spain)	RCN (Norway); AEI (Spain)
Innovative surfaces, coatings and interfaces	MARWEL	MAteRials for Wind farm componEnts Life improvement	4	IONTECH (Spain); IRAUNDI (Spain); AGATOS Energia (Italy); MATELIOS (Italy)	EJ-GV / Innobasque (Spain); CALABRIA (Italy)
Innovative surfaces, coatings and interfaces	Smart RESCyou	Personal protection through sensor surfaces on smart high performance fibres	7	STATEX Produktions + Vertriebs GmbH (Germany); Rofa-Bekleidungswerk GmbH & Co. KG (Germany); Texible GmbH (Austria); Zimmer Maschinenbau GmbHb (Austria); Hochschule Niederrhein (Germany); University Innsbruck (Austria); Hexonia GmbH (Germany)	PTJ (Germany); FFG TP (Austria)

Call topic	Acronym	Full Title	No. of Partner	Participants	Funding organisations
Innovative surfaces, coatings and interfaces	StressLIC	Addressing the stress-related functional limitations of thin-film Li-ion components for energy-intensive applications	5	Montanuniversität Leoben (Austria); Consejo Superior de Investigaciones Científicas (Spain); Universidad Autónoma de Madrid (Spain); Sandia National Laboratories (no funding, United States); Anstalt für Verbrennungskraftmaschinen List (Austria)	FFG TP (Austria); MINECO (Spain)
Innovative surfaces, coatings and interfaces	TriboHEA	High entropy alloy coatings for tribological applications	3	GOIZPER, S. Coop. (Spain); National Institute of Research and Development for Optoelectronics (Romania); SC MGM Star Construct SRL (Romania)	EJ-GV / Innobasque (Spain); UEFISCDI (Romania)
High performance composites	CompoRail	Fibre-reinforced composite road guardrails	4	Global Design Technology (Belgium); Desami (Belgium); University of Latvia Institute for Mechanics of Materials (Latvia); Sobelcomp (Belgium)	SPW (Belgium); VIAA (Latvia)
High performance composites	ECOPLACKAGING	Vegetal fibres-reinforced PLA antimicrobial composites for packaging applications	4	Azores University (Portugal); SPA 2000, s.r.o. (Czech Republic); SYNPO, akciová společnost (Czech Republic); Agencia Consejo Superior de Investigaciones Científicas (No funding, Spain)	FRCT (Portugal); TA CR (Czech Republic)

Call topic	Acronym	Full Title	No. of Partner	Participants	Funding organisations
High performance composites	EPIC	European Partnership for Improved Composites	4	Institute for Mechanics of Materials, University of Latvia (Lativa); Polymer Institute, Academy of Sciences (Slovakia); Department of Physical Electronics, Masaryk University (Czech Republic); SYNPO, akciová společnost (Czech Republic)	VIAA (Latvia); SAS (Slovakia); TA CR (Czech Republic)
Functional materials	2D-SPIN-MEM	Functional 2D materials and heterostructures for hybrid spintronic-memristive devices	4	Catalan Institute of Nanoscience and Nanotechnology (Spain); National Institute of Materials Physics (Romania); Institute of Optical Materials and Technologies (Bulgaria); Institute of Solid State Physics (Bulgaria)	AEI (Spain); UEFISCDI (Romania); BNSF (Bulgaria)
Functional materials	BioValue	Advanced Membranes for biogas upgrading and high added value compounds recovery	5	National Research Council - Institute on Membrane Technology (Italy); The University of Calabria (Italy); Membrain s.r.o. (Czech Republic); University of Chemistry and Technology (Czech Republic); Calabra Maceri e Servizi SPA (Italy)	CALABRIA (Italy); TA CR (Czech Republic)

Call topic	Acronym	Full Title	No. of Partner	Participants	Funding organisations
Functional materials	CATALEAST	Holistic design of fuel cell electrocatalysts for the least power applications	4	National Institute of Materials Physics (Romania); Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (no funding, Spain); Research Centre for Natural Sciences (Hungary); “Ilie Murgulescu” Institute of Physical Chemistry of the Romanian Academy (Romania)	UEFISCDI (Romania); NKFIH (Hungary)
Functional materials	En-ActivETICS	Energy Activated External Thermal Insulation Composite System - integration of thermal storage and photovoltaics for energy-efficient buildings.	4	Polymer Institute of the Slovak Academy of Sciences (Slovakia); Tallinn University of Technology (Estonia); Lodz University of Technology (Poland); Sto Sp. z o.o. (Poland)	SAS (Slovaika); ETAG (Estonia); NCBR (Poland)
Functional materials	NOEL	Innovative Nanostructured Electrodes for Energy Storage Concepts	3	UNIZAR (Spain); NIC (Slovenia); PUT (Poland)	AEI (Spain); MIZS (Slovenia); NCN (Poland)
Functional materials	SunToChem	Engineering of perovskite photocatalysts for sunlight-driven hydrogen evolution from water splitting	3	Advanced Materials Department, Jožef Stefan Institute (Slovenia); Department of Chemical Engineering, National Taiwan University (Taiwan); Institute of Solid State Physics , University of Latvia (Latvia)	MIZS (Slovenia); MOST (Taiwan) VIAA (Latvia)

Call topic	Acronym	Full Title	No. of Partner	Participants	Funding organisations
Functional materials	VOC-DETECT	Smart Portable System for VOCs detection	4	NANOM MEMS (Romania); National Institute for R&D in Microtechnologies (Romania); “Ilie Murgulescu” Institute of Physical Chemistry of the Romanian Academy (Romania); Institute for Technical Physics and Materials Science, Centre for Energy Research, Hungarian Academy of Sciences (Hungary)	UEFISCDI (Romania); NKFIH (Hungary)
Functional materials	ZMOMUVS	ZnMgO materials with tunable band gap for solar-blind UV sensors	5	University of Latvia (Lativia); Center for Physical Sciences and Technology (Lithuania); National Sun Yat-Sen University (Taiwan); Vilnius University (Lithuania); National Sun Yat-Sen University (Taiwan)	VIAA (Latvia) RCL (Lithuania); MOST (Taiwan)
New strategies for advanced material-based technologies in health applications	BIOMAG	Advanced magnetic nanoparticles for detection and quantification of biomarkers in biological fluids	4	Kyushu University (No funding, Japan); Universidad de Alcalá (Spain); iMdea Nanociencia (Spain); National Institute of Chemistry (Slovenia)	AEI (Spain); MIZS (Slovenia)
New strategies for advanced material-based technologies in health applications	NanoTENDO	Nanoparticle Transfer Through Endothelial Barrier	4	Riga Stradins University (Latvia); Latvian Biomedical Research and Study Centre (Latvia); University of Lodz, Department of General Biophysics (Poland); Universidad de Alcala, Organic and Inorganic Chemistry (no funding, Spain)	VIAA (Latvia); NCN (Poland)

Call topic	Acronym	Full Title	No. of Partner	Participants	Funding organisations
Materials for Additive Manufacturing	AluNanoCore	High strength nano reinforced aluminium powder cored wire for arc based ALM	5	GEFERTEC GmbH (Germany); MIGAL.CO GmbH (Germany); Brandenburg University of Technology Cottbus-Senftenberg (Germany); Bulgarian Academy of Sciences, Institute of Electronics (Bulgaria); KSC Kraftwerks - Service Cottbus Anlagenbau GmbH (Germany)	PTJ (Germany); BNSF (Bulgaria)
Materials for Additive Manufacturing	AM-Crash	Additive Manufacturing Technologies for Crash loaded structural Components	6	Salzgitter Mannesmann Forschung GmbH (Germany); Technische Universität Chemnitz (Germany); Wroclaw University of Science and Technology (Poland); Wadim Plast Sp z o. o. (Poland); EDAG Engineering GmbH (Germany); Simufact Engineering GmbH (Germany)	PTKA (Germany); NCBR (Poland)
Materials for Additive Manufacturing	A-MELIUS	Additive Manufacturing of functional and Effective LIght Use-caseS	5	AIRBUS DEFENCE AND SPACE GmbH (Germany); TECHNISCHE UNIVERSITAT DRSDEN (Germany); FUNDACIÓN ANDALUZA PARA EL DESARROLLO AEROESPACIAL (Spain); CT INGENIEROS A.A.I. DE ANDALUCIA, S.L. (Spain); PULSAR Photonics GmbH (Germany)	PTKA (Germany); IDEA (Spain)

Publishable abstract of the projects:

TESTIMONIES

During the last three decades it was established that theoretical modelling plays an important role not only in fundamental research, but also has strong impact on engineering disciplines and technical challenges. The main focus of the project is multiscale modelling of transition metal oxyhydrides – an emerging class of materials - combined with experimental verification of the theoretically predicted material properties and evaluate applications in superconductivity, energy saving, and photocatalysis for breakdown of contaminants in water. This is a multidisciplinary project combining expertize of specialists in materials science, environmental technologies, physicists, chemists, and engineers. The consortium consists of experts from education- and basic research-oriented Institutions, an applied research Institution, and SMEs. It will form a platform for enhancing the ongoing collaboration, provide training of young scientists, exchange of infrastructure, new ideas, and competence.

CORR-PROOF

European companies are about to abandon widely used corrosion-protective treatments containing hazardous substances such as Cr_{6+} according to REACH regulations of EU. The aim of CORR-PROOF Project is to develop a novel concept involving anti-corrosive coating formulations with low environmental impacts to European industry, beginning with the aerospace industry. The focus will be on developing corrosion-resistant coatings for aluminium aircraft components by combining (i) graphene derivatives with high barrier properties, (ii) derivatives of POSS for adhesion and self-healing, (iii) environmentally low impact material and solvents, and (iv) by implementing responsible research and innovation (RRI) by conducting HSE impact assessments in a ‘safe by design’ approach. A transnational consortium including a nanotechnology-based SME, two well-known research institutes and a leading aerospace corporation came together to realize the objectives and come closer to commercialize the technology.

FunKeyCat

Functional Grading by Key doping in Catalytic electrodes for Proton Ceramic Cells (FunKeyCat) is an effort to bridge the gap between fundamental science and applied research for a leap towards highly efficient electrochemical cells by understanding the effects of functional and mechanical properties of the constituent materials on the efficiency of the electrochemical cells. Challenges such as cell resistance and catalytic properties of the electrodes will be overcome through studies of how doping of key elements affects ionic and electronic transport in the electrode materials, and how the balancing between these correlates with chemical and thermal expansion. Functional grading will increase mechanical robustness,

minimise cell resistance and maximise electrochemical functionality. FunKeyCat will also explore a new concept of using electric potential for exsolution and regeneration of oxide nano catalysts to enhance cell durability and performance.

HOTselflub

Many high temperature manufacturing processes run with uncontrolled friction conditions resulting in high energy consumption and high wear. The only solution available to control friction at temperatures over 300°C is to rely on solid lubricants. However, they come with limitations such as added costs, need to clean the parts and environmental concerns. The aim of HOTselflub is to develop novel self-lubricating (self-lub) concepts to control friction in the range of 300°C to 1000°C. These concepts will be implemented as bulk and as coatings using several deposition techniques on novel additive-manufactured ceramic-based composites to obtain superior high temperature properties, besides self-lubrication. In those applications where the use of solid lubricants is inevitable due to severe contact conditions , the developed self- lubricating surfaces will be tailored to have synergy with solid lubricants, enabling the use of more environmentally friendly compounds.

HyprSTEP

The transmission of antibiotics and antibiotic-resistant bacteria in the hydrological cycle is one of the most critical issues for the global water security. Among others, ineffective wastewater treatment processes in sewage plants are responsible for contamination of water. To overcome these challenges, “HyprSTEP” project focuses on the development of a novel hybrid process based on a treatment of wastewater utilizing smart textile filters combined with membrane bioreactor (MBR). Important innovation steps are adsorptive and biocidal graphene-based coatings, which are applied on tailor-made textile filters and polymer membrane surfaces. The application of graphene will lead to the development of smart textile filter with self-cleaning properties. The optimization of polymer membranes and the tailor-made engineering of the MBR plant are also necessary. The project strives to demonstrate a strong increase in efficacy as well as profitability of the novel wastewater treatment processes.

INCOMARC

The INCOMARC project aims to develop new materials for Electrical Contacts (EC), i.e., the current carrying part of the contactor. The requirements for EC materials are: low resistivity; resistance to electric arc erosion; resistance to corrosion, to prevent formation of insulating oxides. State of the art materials contains potential hazardous materials, which use is restricted, as in the case of Ag/CdO.

The project will focus on new materials for EC, and on innovative deposition technologies. Metal Matrix Composites, constituted by hard ceramic phases dispersed in a conductive matrix, will be investigated. Constituent phases will be selected by an accurate material design; the use of

nanoparticles will be considered. EC materials will be deposited by Cold Gas Spray and Laser Cladding, which allow to process materials not obtainable by more conventional techniques.

The developed innovative coatings and the know-how obtained in the project can address to a wide range of applications.

ISOS

Ice on window/lens surfaces cause operational difficulties in optical sensors and windshields. We propose a passive, environmentally friendly method to prevent or delay ice formation without the application of energy while preserving the surface optical properties. This solution overcomes the limits of the active methods currently employed that are costly, energy consuming, environmentally harmful and dangerous for lens/window integrity. Two families of innovative materials (functionalized graphene and selflubricating liquid water layer) will be synthesised, characterised, and tested at lab level for multifunctional coatings (TRL4), with icephobic, robust, lightweight and transparent properties. The proposed approach is flexible, cost-effective and scalable in production, allowing a fast integration at industrial scale. The performances of the coatings for industrial application in the optical sensor market sector will be assessed and validated with the industrial advisory board.

MARWEL

Bearings, the most critical components of Wind Turbine drivetrains, show high incidence of unexpected failure with high maintenance costs. MARWEL Project aims at extending the service life of bearings Wind Turbine in rotors, generators and gearbox, developing protective solutions against wear and corrosion of such critical elements i) via Innovative Graded Coatings deposited by Cold Gas Spray and High Velocity Oxy Fuel, and ii) by the optimization of the induction hardening on bulk steel. The analysis of the vibration signals from bearings on Wind Turbine and signals from lab vibration monitoring system and new testing procedures will guide the optimization process. The vibrational data analyses will provide technical-statistical information for better comprehension of phenomena involved in bearings failure modes. The optimized solution will be evaluated to better address the O&M management plan from a technical-financial point of view with the aim of lowering costs.

Smart RESCyou

This research proposal focusses on the development of a digitally controlled metallisation of high performance fibres in order to integrate innovative sensors into multipurpose personal protective equipment (PPE). With this innovation, the research consortium is developing solutions to push PPE into the new era of digitally supported PPE.

The global PPE market is expected to reach 59.5 Billion Euro in the next five years and increases by 7 % per year in the fields of textiles. This development still is triggered by an increased need for work safety. The demands on functionality combined with light weight material have been growing steadily over the last decades. While the changes to more fashionable workwear led to growth in the last ten years, smart work wear and digital interconnection will be the new challenges for the European textile industry in order to keep their market share. The research proposal therefore focusses on the integration of smart textiles into PPE.

StressLIC

For electric cars to compete with traditional cars and complete an industrial transition required for global sustainability, we need Li-ion batteries (LIBs) with energy density 500% higher than current technology permits. Such a disruptive innovation is only feasible if we understand how mechanical stress gradients degrade battery performance on the nanoscale, and take remedial action. The StressLIC consortium will characterize and propose remedies for the stress-related limitations of current LIBs, by combining cutting-edge thin film measurement and simulation techniques from several disciplines. StressLIC is committed to improving battery performance in terms of capacity, power, lifetime and safety. The consortium includes three leading EU Labs specialized in nanoscale materials science, an expert in LIBs from Sandia National Lab, and a large battery-analysis EU company.

TriboHEA

The main objective of the TriboHEA project is to develop novel HEA (High Entropy Alloy) coating technology for applications requiring medium-to-high friction and wear resistant surfaces. Coatings with such tribological characteristics are especially desirable by machine and automotive industry for improving the performances and the life time of friction components, such as clutch plates. The projects will focus on the technology development for synthesis of mm-thick HEA coatings to engineer the friction surfaces of clutch plates, subject on which the end-user partner is very interested. The project is planning to advance the coating technology from TRL 3 to TRL 6 by demonstrating the coating performances in the end-user's clutch test rig. To realize that, the TriboHEA Consortium combines one research institution from Romania, one SME from Romania, and the end-user industrial partner from the Basque Country (Spain).

CompoRail

The objective is to design, manufacture and test an innovative road restraint system whose guardrail is made of a thermoplastic composite material. The partners will propose a material, a modelling methodology, a structural design and a manufacturing technology adapted to the

application. The development will be based on physical and virtual prototypes. The objective is to reach TRL 6, starting from TRL 2. Composite material is a good solution for replacing concrete and steel barriers that can damage cars a lot in case of light impact, and that are expensive and subjected to corrosion. The partners will put their expertise together: University of Latvia for the selection and testing of the composite material, GDTech for the simulation of crash, for modelling composite structures and for its knowledge of the safety barriers context for certification and standardisation, Desami for the design and installation of the barrier and soil testing and Sobelcomp as producer of the plastic beam.

ECOPLACKAGING

The development of bio-based antimicrobial packaging polymers is in great demand in order to overcome the huge environmental impact of conventional fossil-based plastic materials and guarantee food protection against physical, chemical, and microbiological effects that is why bio-based materials have attracted extensive interest in the packaging field. Poly(lactic acid) (PLA) is the ideal choice to achieve these goals because it is compostable and can be produced from renewable resources, however, pure PLA materials also have some shortcomings, such as poor hydrophilicity, poor mechanical properties and lack of antimicrobial functionality, which limit their range of application. In order to overcome these limitations ECOPLACKAGING aims to develop a fully biodegradable bioplastic composite consisting of a PLA matrix reinforced with: 1) vegetal fibres obtained from plant waste, namely island invasive plant species and 2) low-cost and environmentally-friendly antimicrobial glasses.

EPIC

The objective of European Partnership for Improved Composites (EPIC) is research, development and manufacturing of new hybrid composite materials based on epoxy/carbon fiber composites combined with certain types of special structured molecules and/or with the use of carbon or inorganic nanostructures.

Better compatibility and interconnection of polymeric system with carrying carbon matrix will be achieved by suitable chemical modification of primary materials. New types of organically modified nanostructured composites will significantly decrease delamination and crack propagation in epoxy carbon composites. If necessary, functionalization of carbon fibers will be carried out enabling resulting chemical bond with carrying polymeric system.

Expected result is a composite design which can be applied in more challenging applications in terms of mechanical strain and durability.

Systems intended for the transport industry (aviation, automotive, shipbuilding) and for the construction industry (concrete structures reinforcement) will be aimed to focus on the industrial implementation.

2D-SPIN-MEM

Magnetic memories (MRAM) and memristors are amongst the most promising technologies for emerging nonvolatile memories. MRAM implement concepts developed within spintronics, which uses spin –rather than electrons– to transfer and store information. In this project we will explore hybrid spintronic-memristor devices in graphene-based heterostructures comprising 2D transition metal dichalcogenides (TMDs) and less explored group-IV monochalcogenides (IV-MCs) materials. We will perform the first ever evaluation of the potential of 2D IV-MCs as memristors and implement graphene-based heterostructures with enhanced spin-orbit coupling using both TMDs and IV-MCs. With these heterostructures we aim at controlling graphene's spin properties by changing the memristive setting of the chalcogenides. They will be made and characterized such that new multifunctional 2D systems are generated for applications in ultradense and ultralow power nonvolatile memories and neuromorphic computer architectures.

BioValue

Bio-digester gas streams contain valuable products such as bio-methane and VFA whose recovery has important advantages for the environment protection, energy saving and waste valorization. BIOVALUE focuses on the development of a membrane-based innovative process for the treatment of biogas produced by a real bio-digester. Advanced membrane units will valorize the biogas by separating its various components, i.e., bio-methane, VFA, water, etc. Membrane operations are nano-based key enabling technologies, based on advanced functional materials, capable to selectively separate small molecules. This confers to the membrane a specific functionality that, coupled to its configuration (very thin layer), leads to continuous separations operated in steady state. BIOVALUE project will use membranes - advanced nano-structured functional materials - for driving environmental-friendly and little energivorous novel separation processes valorizing waste as required by circular economy dictates.

CATALEAST

Polymer Electrolyte Membrane Fuel Cells (PEMFCs) comprise the most important fuel cell type for mobile and portable electricity generation. Currently used PEMFC electrodes based on Pt/C electrocatalysts have stability issues resulting in limited lifetime and high price. Project CATALEAST, a consortium with complementary expertise in catalyst development and PEMFC design, proposes development of new types of composite-based corrosion resistant catalysts with improved stability and decreased Pt content; integration of these materials into Membrane Electrode Assemblies (MEAs); and building of PEMFC cells and stacks from these MEAs for laboratory tests and application in new portable devices. The novel generation of electrocatalysts and the completed small PEMFCs with MEAs built on these catalysts as the outcomes of the proposed work will contribute to the deployment of hydrogen fuel cells, one of the key technologies towards a sustainable, decarbonised and more efficient energy system.

En-ActivETICS

The main goal of En-ActivETICS project is to develop Energy Activated External Thermal Insulation Composite System for smart building envelope, by combination of traditional low thermal conductivity insulation system ETICS with high heat capacity phase change material (PCM) and flexible photovoltaic (FPV) system generating electrical power. The proposed solution is a new step in development of building facade technology allowing to achieve a component classified to the group of functional material. The innovative character of the project arises due to the research and technological challenge which is the development of novel, cost and energy effective building component, examination of its thermal and mechanical properties as well as validation and demonstration of the proposed solution in relevant environment. The final result of the project will be comprehensively tested En-ActivETICS, revealing the capability to adjust its physical properties for better building performance.

NOEL

Energy storage systems will play a fundamental role in reducing fossil fuel consumption and greenhouse gas emissions by providing solutions to store energy produced from renewable sources and to implement electrical vehicles.

Graphite is the traditional material used in standard rechargeable batteries or supercapacitors, but presents limitations because of its limited intrinsic capacity, lithium-ion insertion capacity, and specific capacitance. Moreover, graphite, but also lithium and cobalt, all standard materials for supercapacitors and lithium-ion batteries, are limited resources, and Europe is dependent on external supply.

To solve these shortcomings, NOEL aims at developing new low cost environmentally friendly layered semiconductor-carbon composites for their use as innovative electrodes for next generation batteries or supercapacitors, looking for improved performance, low price, high material availability, locally produced in Europe, and eco-friendly properties.

SunToChem

In SunToChem the latest knowledge in density functional theory (DFT), particle crystallization mechanisms, and reactor design are combined to promote the understanding of key parameters in photocatalytic water splitting and provide guidelines for preparation of $MTiO_3$ (M=Sr, Ba, Ti) perovskite photocatalyst particles by design. This concept includes enhancement of photocatalytic activity of defined-shape perovskite particles through improvement of the spatial separation of photogenerated charges on the same particle by means of ferroelectricity/flexoelectricity or different polarity of the facets due to different orientation/termination, and improvement of solar light absorption by doping. The main objectives of the project include band gap and crystal facet engineering by DFT to guide the development of the perovskite particles with defined size, shape, exposed facets, and terminations and evaluation of the particles for the H_2 generation from photocatalytic water splitting reaction.

VOC-DETECT

Most human environments are characterised by the presence of a large number of chemical substances which mainly belong to the group of volatile organic compounds (VOC). Numerous studies revealed the toxic and carcinogenic effects of these VOCs which usually can be found in indoor air, but the tools for the detection of VOCs are still not very precise and too expensive. The project will develop new sensors based on nano MOX and CNT materials for VOC detection, integrated into a smart portable system providing quantitative information about the concentration of Formaldehyde and Benzene in indoor air.

The results will be:

- Technology demonstrator and Smart, portable system prototype and new formaldehyde and benzene sensors;
- Technology for thin sensitive films deposition and integration in the microtechnology steps flow for sensors fabrication on silicon – Demonstration;
- E-Nose1 system, including sensor array, data processing algorithms and software for VOCs accurate detection.

ZMOMUVS

Deep UV photon sensors based on wide bandgap semiconductors can be used as biological and chemical sensors for ozone detection, detectors for water purification, determination of pollution levels in any biological agent. The concept of this project is to use the ZnO-MgO pseudobinary system, which has tunable bandgap from 3.3 eV to 7.8 eV, thus significantly enhancing the ability of the sensor to detect signals at different energies simultaneously. Our recent results indicated that the limitation of ZnO and MgO mutual solubilities can be broken by stablizing the high MgO-content wurtzite Zn1-xMgxO and high ZnO-content rocksalt Zn1-xMgxO epilayers by using low lattice mismatch substrates such as ScAlMgO4, MgO and Cu2O. The international consortium includes five partners: Partner 1 & 5 (Taiwan) will be responsible for the growth of single crystal substrate and epitaxial growth of ultra-wide bandgap Zn1-xMgxO epilayers/heterostructures. Partners 2-4 (Latvia & Lithuania) study opto-electrical properties, and provide feedback of the optimal growth parameters. Besides Partner 2 fulfills computer modelling of the material structure, providing the theoretical support of the project. Participation in this project will help to increase technology readiness level of all partners: up to TRL 4 in Taiwan and TRL 3 in Latvia and Lithuania. We believe this project will bring benefits for each partner and provide new contributions to the European society.

BIOMAG

An ever-increasing number of medical applications is adopting nanotechnology to go beyond the current state-of-the-art. BioMag aims to provide a quick, sensitive, reliable and low-cost in vitro diagnostic methodology based on functionalised magnetic nanoparticles (F-MNPs) for detection of biomarkers present in bodily fluids. The project aims to 1) design F-MNPs with recognition ligands that specifically interact with cardiac biomarkers related to myocardial infarction and MNP surface engineering to minimize unspecific interactions with off target biomolecules present in blood samples; 2) monitor changes of AC hysteresis loops of F-MNPs after specific interaction with biomarkers; 3) develop numerical simulations to model the variation of the AC hysteresis loops for quantifying the biomarker amount present in the studied sample. The BioMag consortium gathers excellent and multidisciplinary research teams for approaching material science fundamentals towards market applications.

NanoTENDO

The controlled delivery of drugs to the brain remains a challenge in the effective treatment of neurodegenerative diseases due to the role played by the endothelial barrier. The endothelial barrier is an important part of the body. It consists of the layer of the special cells organized in a complex system. This barrier surrounds our vessels and protects the body tissues from unwanted visitors: microbes and toxic substances. However, the fact that this barrier recognizes all substances as intruding species causes a huge medical problem in treatment for many severe brain diseases, among them the Alzheimer disease. Our project aims to develop the nanoformulations based on dendrimers, dendrons or gold nanoparticles which will overcome the endothelial barrier resulting in the effective and specific delivery of therapeutic substances.

AluNanoCore

Cost effective wire arc-based additive manufacturing (ALM) processes have the potential to deliver high build-up rates for large volume components. However, for the production of lightweight components, there exist currently only a limited range of low strength standard solid wires. The project objective is to develop a carbon nanostructure reinforced aluminium cored wire (AluNanoCore), which represents a fundamentally new type of filler material for wire arc ALM. The main technological goal of the development is a strength increase of three times compared to conventional AlSi-based materials. Due to this significant increase in strength, lightweight components with reduced wall thicknesses and cross sections can be produced. A new class of Al material will be available for the additive production of lightweight components, which has a superior strength-to-density ratio. The validation and demonstration of the project results will be carried out on at least two demonstrators.

AM-Crash

Metal-based laser additive manufacturing (LAM) technologies are able to create high performance parts featuring enormous geometrical complexity. The here proposed AM-Crash project will develop this technique for the automotive sector for highly dynamically loaded applications. Therefore, an adaptable 3D-manufacturing concept for different crash-loaded applications in automotive Body-in-White (BIW)-structures regarding to strength and ductility requirements will be educed.

The aim of AM-Crash is to achieve equivalent mechanical properties of LAM components compared to standard deep-drawn parts. This will create significant cost and lead-time benefits using LAM parts for prototype vehicles during car development for crash tests, for small batch series components and for spare parts.

The identical structural behavior of LAM components and deep-drawn sheet metal will be achieved by a multifactorial approach combining a specific LAM processing with suitable post treatment and joining/integration technologies. Numerical simulations to predict final part properties will accompany the entire process chain.

A-MELIUS

The nature of the project is to improve the performance of AM Additive Manufactured optimized aerospace parts, having an impact in their Efficiency by means of a LIght weight design, enhanced surface quality by laser processing, and therefore mechanical performance, together with the possibility of functionalizing ad-hoc surfaces and improving corrosion resistance. The target technologies will be proved in a dedicated series of Use-caseS from different aerospace platforms. The main benefits are the combination of materials and laser technology for enhancing the properties of manufactured components. These aspects will allow extending the applicability of AM beyond the current state-of-art and break new ground for the application of AM in aerospace. The foremost economic benefits for the envisioned aerospace use-cases are the possibility of saving raw materials and weight, improving surface or mechanical properties, adding desired functionalities, or reducing sub-components number.