FIT-4-NMP

Strategic and targeted support
to incentivise talented newcomers
to NMP projects under Horizon Europe

How to write Section 1 "Excellence"

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Section 1: Excellence

- Section 1.1: Objectives and ambition
  - EC recommended length: 4 pages

- Section 1.2: Methodology
  - EC recommended length: 14 pages

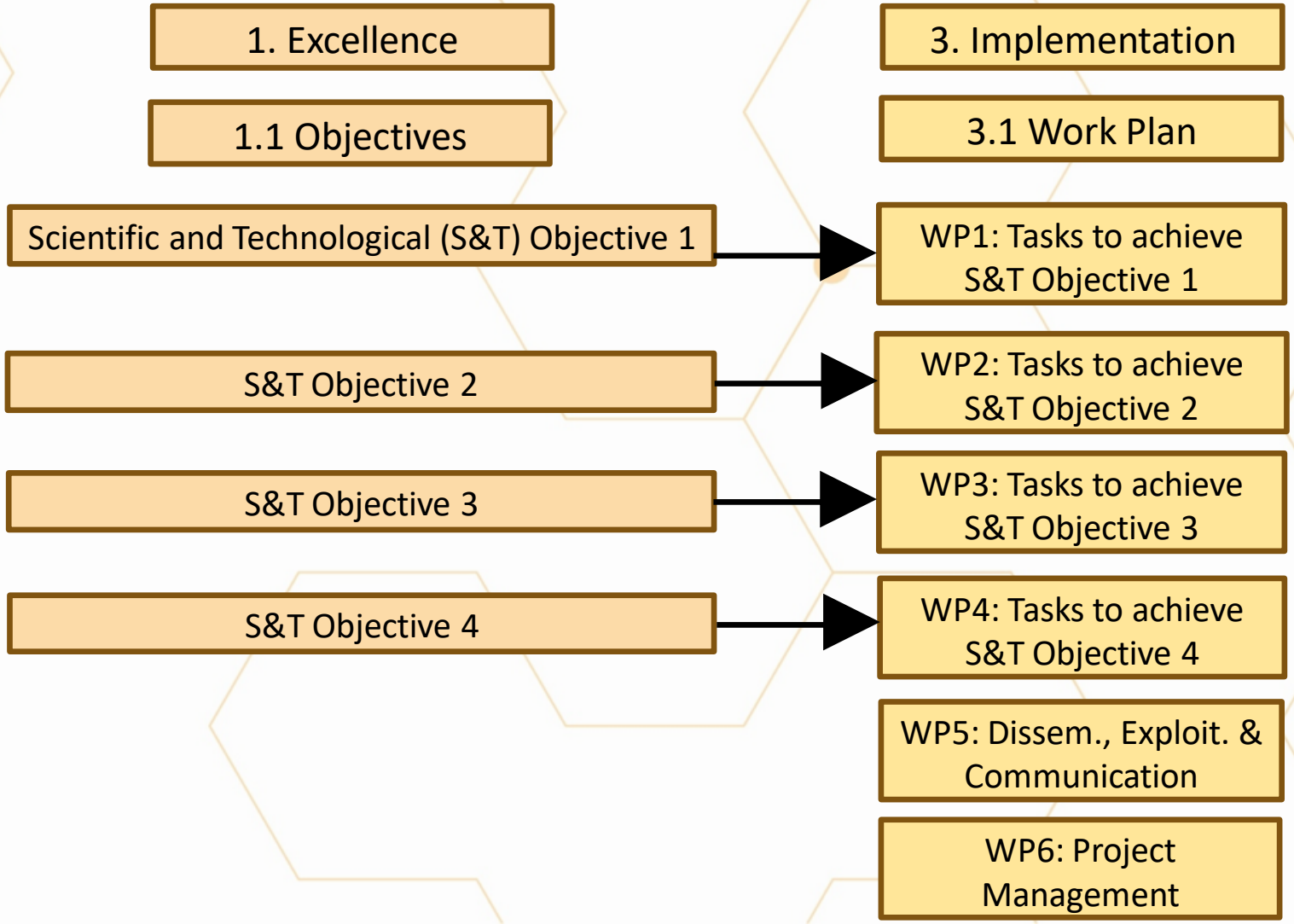
Section 1.1: Objectives and ambition

1. Briefly describe the objectives of your proposed work. Why are they pertinent to the work programme topic? Are they measurable and verifiable? Are they realistically achievable?
2. Describe how your project goes beyond the state-of-the-art, and the extent the proposed work is ambitious. Indicate any exceptional ground-breaking R&I, novel concepts and approaches, new products, services or business and organisational models. Where relevant, illustrate the advance by referring to products and services already available on the market. Refer to any patent or publication search carried out.
3. Describe where the proposed work is positioned in terms of R&I maturity (i.e. where it is situated in the spectrum from ‘idea to application’, or from ‘lab to market’). Where applicable, provide an indication of the Technology Readiness Level, if possible distinguishing the start and by the end of the project.

Section 1.1: Objectives and ambition

"Briefly describe the objectives of your proposed work. Why are they pertinent to the work programme topic?" (1 of 2)

Each WP leader should describe/elaborate the S&T objective for their WP (½ page or less)



Section 1.1: Objectives and ambition

"Briefly describe the objectives of your proposed work. Why are they pertinent to the work programme topic?" (2 of 2)

Create a table with each key requirement from the call text. Then, concisely explain how your proposal addresses each of them

Topic addressed by the Call	SIFIS-Home relevance
SU-ICT-02-2018-2020: Building Blocks for Resilience in Evolving ICT Systems	**This is the centre of gravity of the SIFIS-Home project, which especially focuses on solutions for security, privacy and accountability for Smart-Home networked systems.**
Algorithms, software and hardware systems must be designed having security, privacy, data protection and accountability in mind from their design phase in a measurable manner.	The planned work in the project is structured in order to successfully fulfil this requirement from the start. In fact, from a logical and chronological point of view: 1. The work starts with defining an architecture and related security & privacy goals (WP1). This will keep in mind a "measurable approach" from the start. 2. Building on previous results, guidelines/methods/tools for assessing quality and legal aspects will be developed in WP2 throughout the project. 3. Building on previous results, technical solutions such as algorithms and methods, as well as software and hardware systems will be designed and developed in WP3 and WP4. Measures will be produced on testbed level (WP5) and use case level (WP6), as to performance, requirement fulfilment, usability and user experience, as well as perceived and achieved security & privacy level.
Relevant challenges include: (a) to develop mechanisms that measure the performance of ICT systems with regards to cybersecurity and privacy and	Challenge (a) will be especially tackled through the work in WP2, by developing and providing methods, techniques, metrics and tools for performing an evaluation at IoT software level and at IoT infrastructure level. Performance indicators of interest include, but are not limited to: level of security and privacy provided to end users, as to the effectiveness in fulfilling the intended security requirements; impact on infrastructure, system and network functioning; risk of vulnerability exploitation.

Section 1.1: Objectives and ambition

"Describe how your project goes beyond the state-of-the-art, and the extent the proposed work is ambitious" (1 of 2)

Example from an organic electronics related project

	Current State-of-the-Art	HyperOLED Target
TADF host and shielded fluorescence emitter materials		
TADF host	Emission peak maximum 465nm	430nm to excite deep blue fluorescence emitters
Shielded fluorescence emitters synthesis	Phosphorescent emitters: Complex metal-organic synthesis and purification	Purely organic material: Easier synthesis and purification
Shielded fluorescence emitters analytics, quality control	Phosphorescent emitters: Difficult chemical analytics (purity, trace impurities etc.)	Well-developed analytical techniques for purely organic materials can be used
White OLED stack		
Simplified white stack	Hybrid tandem (fluorescent blue + phosphorescent red/green), approx. 10-15 organic layers	One-unit stack, approx. 6-8 organic layers
Efficiency	Hybrid tandem 30lm/W @ 1000cd/m², CIE x/y 0.39/0.39 (no outcoupling)	40lm/W with same CIE
Voltage	Hybrid tandem as above, 8.5V @ 10mA/cm²	5.5V @ 10mA/cm²
Lifetime	Full phosphorescent 50lm/W @ 1000cd/m², 1500h LT70 @ 1000cd/m², CIE x/y 0.49/0.42 (no outcoupling)	5000h LT70 (same efficiency etc.)
Blue TADF+shielded fluorescence emitter OLED		
Efficiency	Fluorescent, 11.5% EQE, CIE x/y 0.14/0.09 (EQE is the same for lighter blue)	20% EQE, CIE x/y 0.14/0.20
Lifetime	Phosphorescent 20% EQE, 90h LT70 @ 5mA/cm², CIE x/y 0.14/0.31	300h LT70 @ 5mA/cm² CIE x/y 0.14/0.20
High temperature lifetime	Phosphorescent: Lifetime decrease of factor 3 per 20°C	Factor of 2 per 20°C
OLED Microdisplay		
Brightness, operating voltage and backplane technology	Products: Full colour at 500cd/m² (MOD, eMagin, Sony), two-colour red green at 3000cd/m² (MOD) Prototype under development: full colour with high voltage (5V) CMOS process, proof of concept for 3000-5000cd/m² (MOD)	2000cd/m² using low voltage (2.5V CMOS process) backplane.

Section 1.1: Objectives and ambition

"Describe how your project goes beyond the state-of-the-art, and the extent the proposed work is ambitious" (2 of 2)

Example from a computation-in-memory related project

Table 1a: MNEMOSENE anticipated performance improvements relative to state-of-the-art
Improve the energy-delay product by factor of 100X to 1000X
Improve the computational efficiency (#operations / total-energy) by factor of 10X to 100X
Improve the performance density (# operations per area) by factor of 10X to 100X

Section 1.1: Objectives and ambition *"Describe where the proposed work is positioned in terms of R&I maturity"* (1 of 2)

Level of Development	TRL No.	TRL Definition	Means of Verification	Timing
Basic Technology Research	TRL 1	Basic principles observed	Research papers and patents.	Completed
Research to Prove Feasibility	TRL 2	Technology concept formulated	• The concept of CIM will be developed and demonstrated using real crossbar and memristive devices and by performing experiments and measurements. • Different memristive device technologies (e.g., PCM, RRAM) will be explored for CIM concept.	To be done during project
	TRL 3	Experimental proof of concept	• The potential of the CIM die combined with a conventional CPU will be demonstrated using full simulation and emulation. • Results of tests performed will be used to measure parameters of interest and compare to analytical predictions. • Potential practical applications will be defined and evaluated that will significantly benefit from such architecture. • Calibrated models (micro and macro level) will be provided that can be used to build different optimised versions of the architecture and experimented with it for specific applications.	To be done during project
Technology Development	TRL 4	Technology validated in laboratory environment	• The CIM dies will be integrated with a conventional CPU on a single chip to establish and validate the fact that when combined together on a single die they can deliver the expected system functionality and performance for a range of applications. • The key parameters of the intended approach will be measured and identified (e.g. power/energy, frequency/performance and chip size). • Insights (based on measurements) will be provided on how the architecture can be further refined and optimised for different applications. • Partners will consider potential bi-lateral spin-outs to ensure optimal knowledge transfer and valorisation.	Within 3 years of project completion. Partners envision a follow-up RIA project (TRL 4-7) involving additional industry partners.
	TRL 5	Technology validated in industrially relevant environment	• The basic technological components (CIM die integrated with a CPU, compiler, etc.) will be combined with supporting elements (DRAM, I/O, etc.) so that the whole architecture and its software components can be tested and simulated in an industrial environment. This w ill mimic a new computer based on the new architecture operating in a real application/ in field. • Insights will be obtained based on the experiments on problems - if any - and how to address them to further improve and refine the new CIM based computing sy stem and realize the overall system goals.	Within 3 years of project completion. Partners envision a follow-up RIA project (TRL4-7) involving additional industry partners.

Example from a low TRL project

Section 1.1: Objectives and ambition *"Describe where the proposed work is positioned in terms of R&I maturity"* (2 of 2)

Level of Development	TRL No.	TRL Definition	Means of Verification	Timing
Technology Demonstration	TRL 6	Technology demonstrated in industrially relevant environment	• The implementation of both the hardware and associated software stack of CIM based computer will be prototyped near or at planned operational functionalities. Metrics of interest will be measured and analysed as well as the scalability of the approach. This will be in order to demonstrate the functionality and expected improvements even under different environmental conditions and for variety of realistic applications. • The engineering feasibility of the new computation paradigm will be fully demonstrated. • Insights will be obtained based on a full demonstrator to further refine both the hardware and software components and provide a more "reliable" and "robust" demonstra tor at TRL7.	4 to 7 years after project completion
System Commissioning	TRL 7	System prototype demonstration in operational environment	• A mature CIM based computer prototype (hardware software integration) will be built to demonstrate the targeted performance for realistic applications in the actual operational environments and platforms. The prototype will have all the all key features needed for demonstration and test.	6 to 9 years after project completion
	TRL 8	System complete and qualified	• The final CIM based computer and final configuration will be demonstrated through test and analysis for its intended realistic applications in operational environments and platforms. The software of the CIM computer will have to be thoroughly debugged and fully integrated with operations CIM computer hardware. • The CIM computer will be characterised, verified and validated. • All user documentation, training documentation, and maintenance documentation will be provided.	8 to 10 years after project completion
System Operations	TRL 9	Actual system proven in operational environment	• The final CIM based computer will be built and its operation successfully demonstrated for the targeted applications in their associated environment. Debug software will be developed and fully integrated with hardware. Full documentation will be provided.	9 to 12 years after project completion

Section 1.2: Methodology (1 of 2)

1. Describe and explain the overall methodology, including the concepts, models and assumptions that underpin your work. Explain how this will enable you to deliver your project's objectives. Refer to any important challenges you may have identified in the chosen methodology and how you intend to overcome them. [e.g. 10 pages]
2. Describe any national or international research and innovation activities whose results will feed into the project, and how that link will be established. [e.g. 1 pages]
3. Explain how expertise and methods from different disciplines will be brought together and integrated in pursuit of your objectives. If you consider that an inter-disciplinary approach is unnecessary in the context of the proposed work, please provide a justification. [e.g. 1/2 page]
4. For topics where the work programme indicates the need for the integration of social sciences and humanities, show the role of these disciplines in the project or provide a justification if you consider that these disciplines are not relevant to your proposed project. [e.g. 1/2 page]

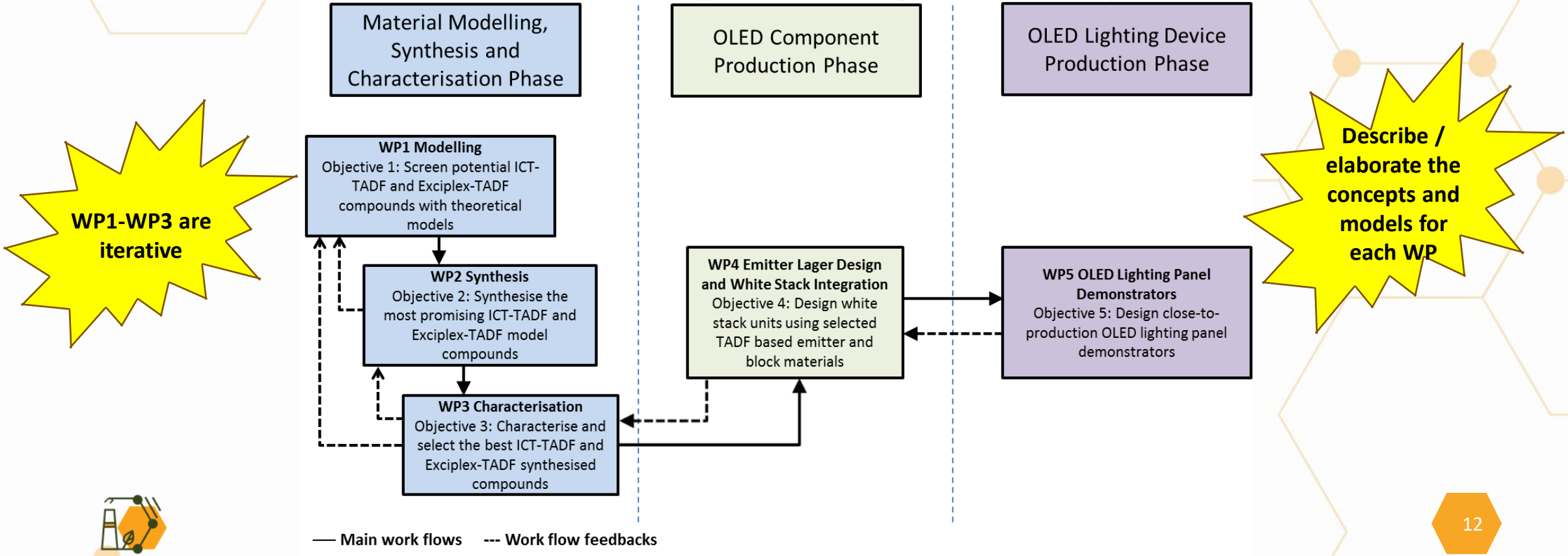
Section 1.2: Methodology (2 of 2)

5. Describe how the gender dimension (i.e. sex and/or gender analysis) is taken into account in the project's research and innovation content [e.g. 1 page]. If you do not consider such a gender dimension to be relevant in your project, please provide a justification.
6. Describe how appropriate open science practices are implemented as an integral part of the proposed methodology. Show how the choice of practices and their implementation are adapted to the nature of your work, in a way that will increase the chances of the project delivering on its objectives [e.g. 1 page]. If you believe that none of these practices are appropriate for your project, please provide a justification here.
7. Research data management and management of other research outputs: Applicants generating/collecting data and/or other research outputs (except for publications) during the project must provide maximum 1 page on how the data/ research outputs will be managed in line with the FAIR principles (Findable, Accessible, Interoperable, Reusable), addressing the following (the description should be specific to your project): [1 page]

Section 1.2: Methodology

"Describe & explain the overall methodology, including the concepts, models & assumptions that underpin your work" (1 of 2)

Example: The **methodology underpinning the PHEBE project is based on a new technology development process that is broken down into phases**, each with its own set of work packages and objectives. Indeed, the work packages dealing with scientific and technical activities have been defined so that they correlate very closely with the objectives described in Section 1.1. Graphically the technology development process with its phases looks as follows:



Section 1.2: Methodology

"Describe & explain the overall methodology, including the concepts, models & assumptions that underpin your work" (2 of 2)

Example: To achieve the project targets, a solid strategy has been set up that divides the needed work into four main interrelated components, as shown in Figure 1e:

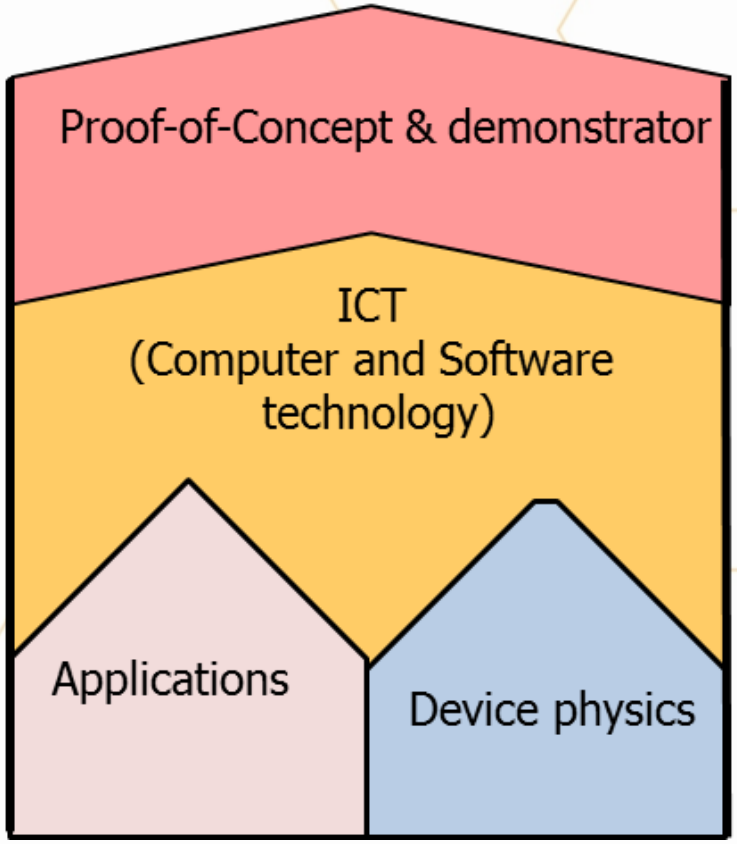


Figure 1e: Main components of the research method

Describe / elaborate the concepts and models for each component

Section 1.2: Methodology

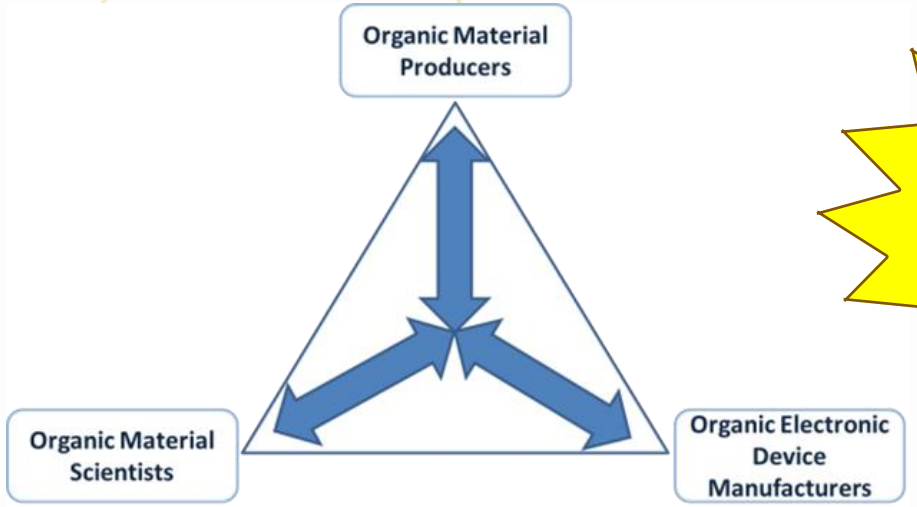
"Describe any national or international research and innovation activities whose results will feed into the project, and how that link will be established."

Example from a maritime cybersecurity proposal!

Initiative / Project	Duration	Reason for link with the ERA Chair
ECHO	2019-2022	TalTech is a partner in this European network of Cybersecurity centres and competence Hub for innovation and Operations. The ERA Chair will utilise this network as a source of partners and project ideas for EU proposals.
TOOP	2017-2020	TalTech is coordinating this H2020 project involving 20 EU Member States and two Associated Countries. One pilot addresses the introduction of ship and crew e-certificates.
Cyber-MAR	2019-2022	Cyber-MAR is a H2020 innovation action developing an innovative "cyber range" to support the maritime logistics value chain. The ERA Chair will use their expertise for Research Sub-Topic 2: Human Aspects of Cyber Security.
ENISA	2019-	The European Union Agency for Cybersecurity (ENISA) organises cyber exercises and cybersecurity education relevant for the ERA Chair.
EMSA	2018-	The European Maritime Safety Agency (EMSA) offers a course on Awareness in Maritime Cybersecurity relevant for the ERA Chair's Cyber Hygiene training.

Section 1.2: Methodology

"Explain how expertise and methods from different disciplines will be brought together and integrated in pursuit of your objectives."



Figures are always nice to help clarify

Example: Based on the interdisciplinary character of the proposed programme, there will be knowledge integrated from **three main expert groups: organic material scientists, organic material producers and organic electronic device manufacturers.**

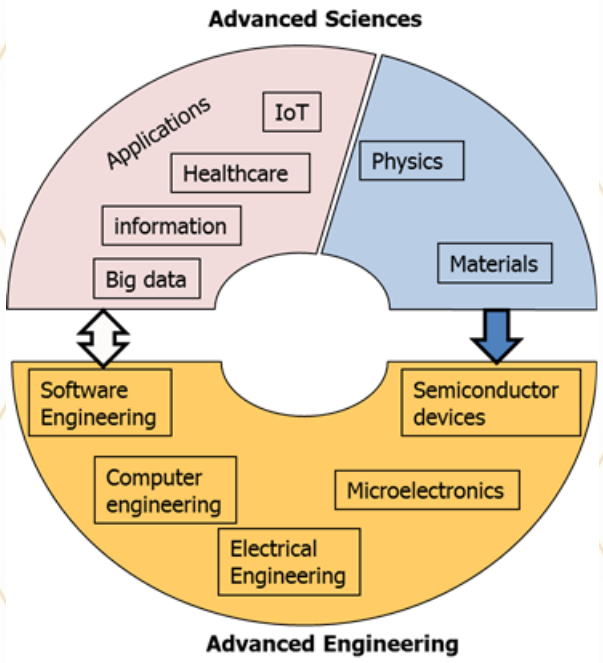


Figure 1d: MNEMOSENE' Interdisciplinarity

Example: MNEMOSENE is a highly interdisciplinary R&D project and collaboration; a cross and deep synergy is needed between different advanced sciences and cutting edge engineering disciplines in order to turn the ideas presented in this project to viable basis for a radically new computation paradigm for data-intensive applications. Figure 1d illustrates the different disciplines involved in this project.

Section 1.2: Methodology

"Describe how the gender dimension (i.e. sex and/or gender analysis) is taken into account in the project's research and innovation content." (1 of 2)

- See "Gender Analysis" Checklists and Case-Studies on http://genderedinnovations.stanford.edu/index.html
  - Engineering
  - Health and Medicine
  - Tissues and Cells
  - Urban Planning and Design

Section 1.2: Methodology

"Describe how the gender dimension (i.e. sex and/or gender analysis) is taken into account in the project's research and innovation content." (2 of 2)

- **The project is gender-agnostic, i.e., sex or gender separation and privileging do not play any role in the project.** In particular, human beings taking part in the project activities will be fairly considered based on their roles, motivations and abilities. All the project partners are aligned and fully agree with the EC objectives to promote gender equality and encourage the involvement of researchers of both sexes, whose recruitment is based uniquely on their qualifications and technical merit. In particular, the consortium will respect the European policy of non-discrimination and equality between women and men in the Treaty of the European Union (Articles 2 and 3). The project members also agree to encourage the practices for a better work/life balance achievement (e.g. maternity and paternity leave) and flexible work planning (e.g. teleworking), with no sex or gender distinction. Furthermore, our project consortium strives to achieve a balanced distribution of responsibilities and tasks with respect to gender. **This is challenging in IT-Security, due to the low numbers of female specialists in the field.**

- We have also analysed our technical work for possible gender-related aspects and have, at this point, not found relevant gender-specific aspects related to it. The reason for this is that many parts of the solutions we will work on apply to machine-to-machine interactions, which will not involve a human, and that are therefore unlikely to have a gender-related impact. We expect that the human interaction aspects of our work will mostly apply to interactions with back-end services, running on regular desktop PCs and handheld, mobile devices. At this point we cannot find any gender specific aspects to this part of the work either. Nevertheless, in order to ensure a continuity in this line of considerations, we will continuously analyse our results for gender-related aspects and include the corresponding findings in our reports.

Section 1.2: Methodology

"Describe how appropriate open science practices are implemented as an integral part of the proposed methodology."

Open Science Practices	
Open Access to Publications	The SUSNANO consortium will provide access to peer-reviewed scientific publications via self-archiving ("green" open access) and therefore only journals which are compatible with such policy will be considered for dissemination. Publications and data will be made available via the Zenodo repository, which is hosted by CERN and supported by the EU's OpenAIRE initiative. This guarantees that data will be curated and preserved according to the highest standards available. Additionally, project results may be made available via social media used by the academic community (e.g. ResearchGate) according to the rules defined by the publisher.
Open Research Data	A detailed FAIR (findable, accessible, interoperable and re-usable) data management plan will be produced near the start of SUSNANO in compliance with the Horizon Europe data management plan template (see WP5/Task 5.1). The data generated in the context of SUSNANO will mainly consist of text documents, spreadsheet tables, tab-delimited files, image files, etc. These will be saved in standard formats (txt, jpg, pdf, tiff, png, etc.) and made as FAIR as possible. Researchers aiming to publish the results of research performed in the framework of the project will first submit their paper and data to the Steering Committee, which will check for IP or ethical issues. Legal officers will be consulted on a case-by-case basis to address any concerns, if necessary. Once the researchers receive the authorisation to publish, they will submit their papers to be published in peer-reviewed journals and/or conference proceedings.
Open Societal Actor Engagement	The SUSNANO consortium will invite and train Albanian high school students and bachelor students to support the lab validation testing and field testing of the sustainable nanosensors in Albania.
Open Evaluation	The SUSNANO consortium will follow an open peer review approach - with respect to their peer reviewed scientific publications - to provide transparency about the reviewer and author identities, publication of review reports, and enable the wider research community to contribute to the peer review process. Also, the consortium will provide open metrics – open access to data, methods, and results of bibliometric analyses – to enable traceability and reusability of their evaluation procedures.
Open Methodology	SUSNANO's experienced researchers will document the scientific procedures used in the preparatory research project (WP1) in sufficient detail to enable the early-stage researchers to repeat the work and apply them elsewhere. These procedures will be made available via the project website and Zenodo repository.