Proposal writing training for Research and Innovation Actions (RIA) and Innovation Actions (IA) for the Horizon Europe Pillar 2 programme /Clusters 4 and 5

Trainer: Giles Brandon, Intelligentsia Consultants
Tuesday 8th November 2022
Agenda

- Investigate forthcoming calls in Horizon Europe Clusters 4 and 5.
- How to get started / how to structure the overall proposal.
- How to write Section 1 “Excellence”.
- Coffee break.
- How to write Section 3 “Implementation”.
- How to write Section 2 “Impact”.
- Q&A
- End of training

Some *stepping stones* to help you to write Horizon Europe proposals

FIT-4-NMP

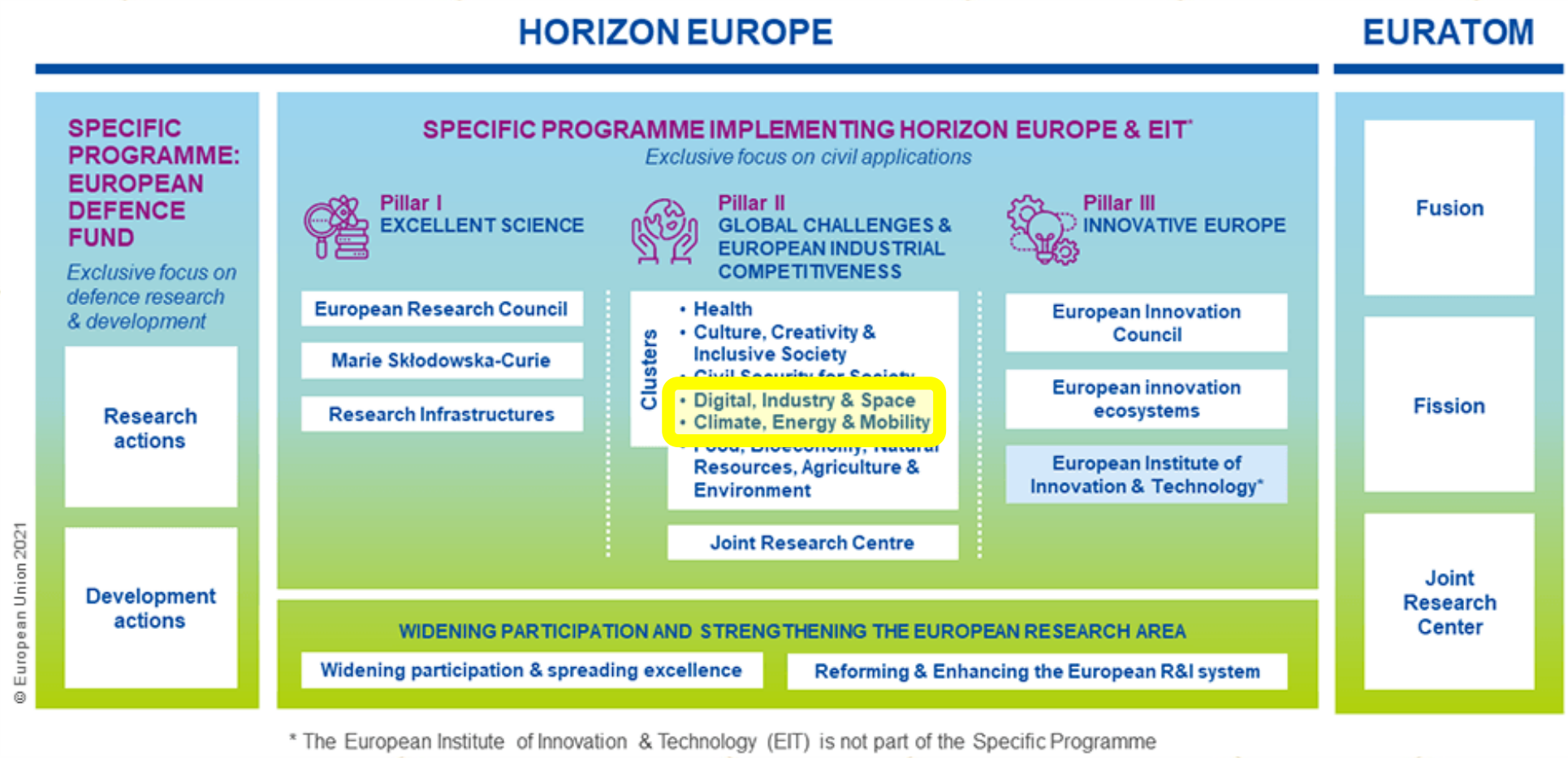
Strategic and targeted support
to incentivise talented newcomers
to NMP projects under Horizon Europe

Investigate forthcoming calls in Horizon Europe Clusters 4 and 5

Giles Brandon, Intelligentsia Consultants

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 958255

Horizon Europe Programme

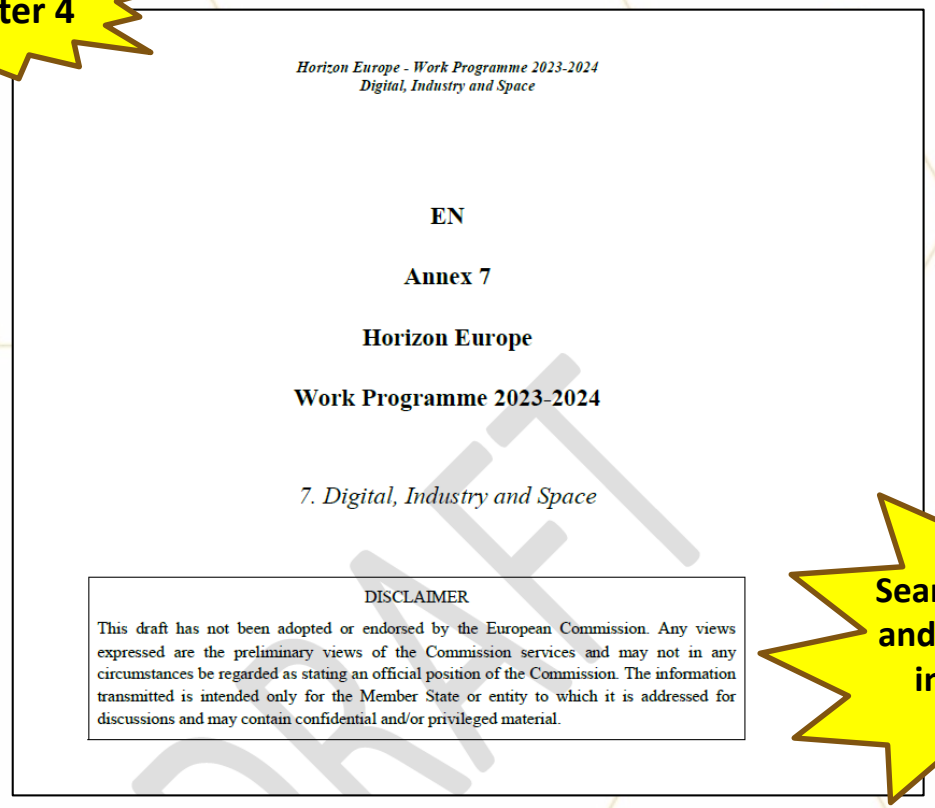


* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme

Training focused on proposals for **Research and Innovation Actions (RIA)** and **Innovation Actions (IA)** under **Pillar II Cluster 4 (Digital, Industry and Space)** and **Cluster 5 (Climate, Energy and Mobility)**

Download draft Work Programmes 2023-2024 for Clusters 4 and 5

Cluster 4



Horizon Europe - Work Programme 2023-2024
Digital, Industry and Space

EN

Annex 7

Horizon Europe

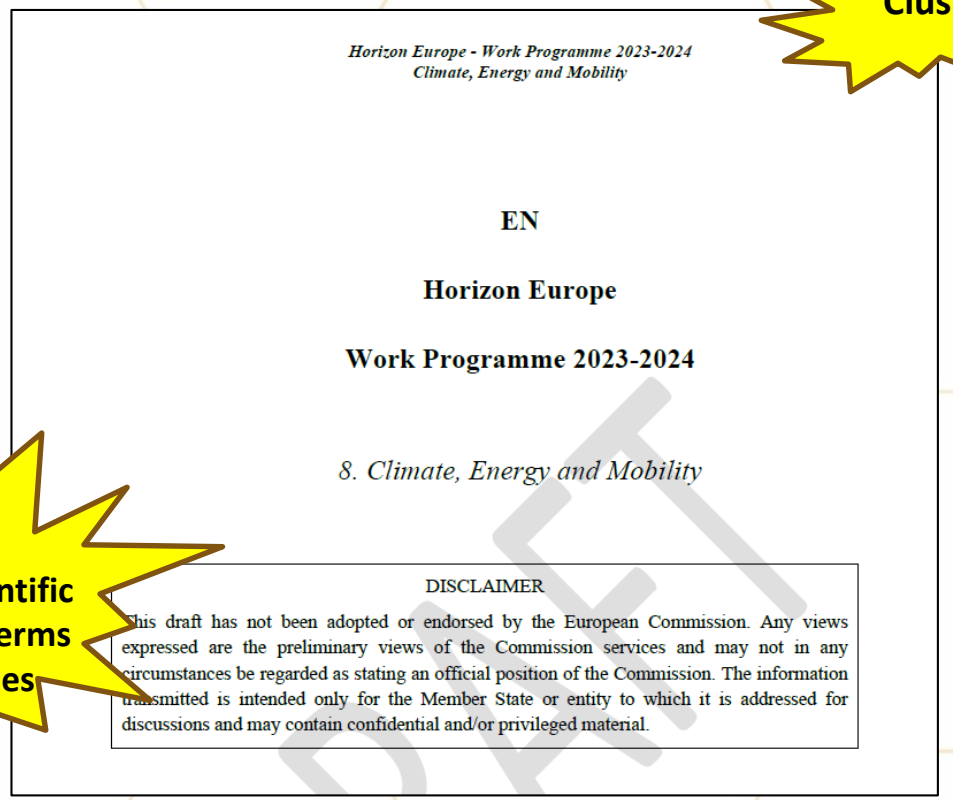
Work Programme 2023-2024

7. Digital, Industry and Space

DISCLAIMER

This draft has not been adopted or endorsed by the European Commission. Any views expressed are the preliminary views of the Commission services and may not in any circumstances be regarded as stating an official position of the Commission. The information transmitted is intended only for the Member State or entity to which it is addressed for discussions and may contain confidential and/or privileged material.

Cluster 5



Horizon Europe - Work Programme 2023-2024
Climate, Energy and Mobility

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Horizon Europe

Work Programme 2023-2024

8. Climate, Energy and Mobility

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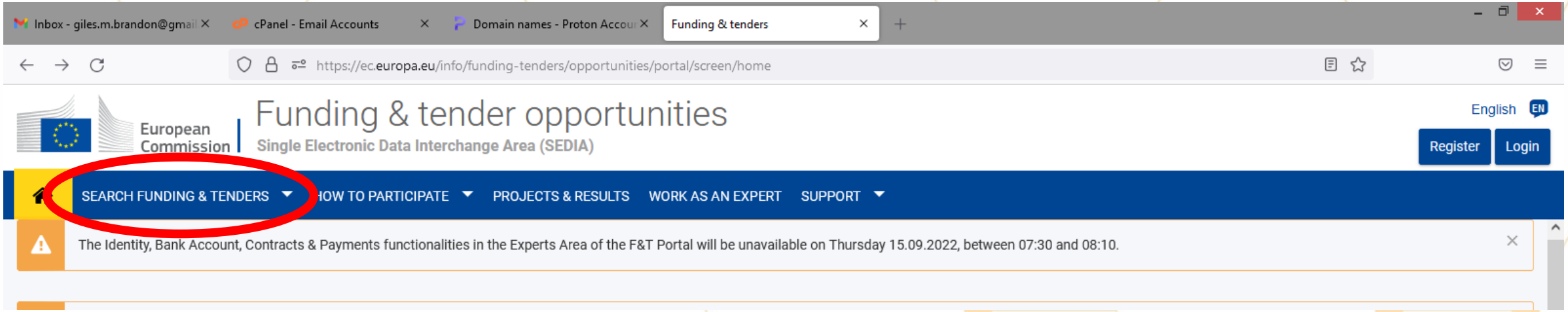
Search key scientific and technical terms in the .pdf files

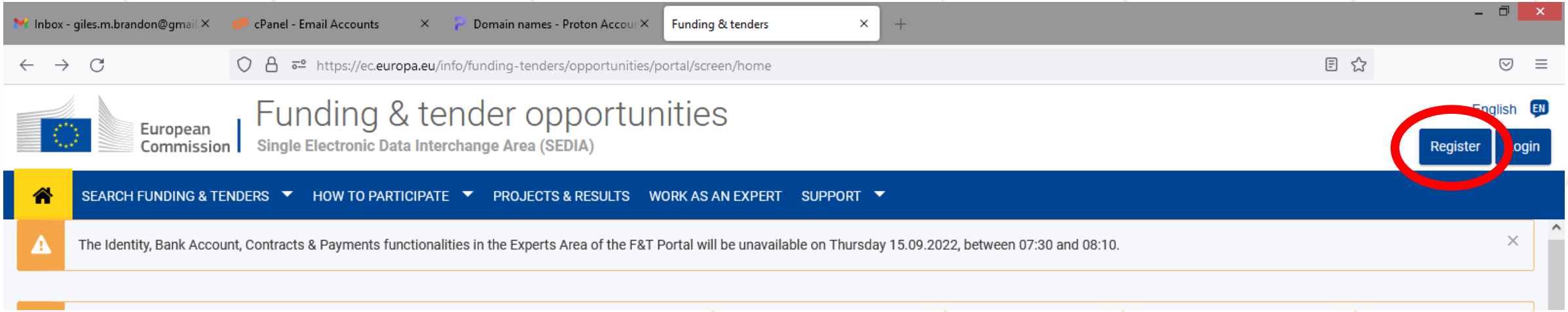
See https://sciencebusiness.net/framework-programmes/horizon-papers
and/or ask advice from Luxinnovation's Horizon Europe NCPs.

Search for Cluster 4 / 5 call topics on EC's portal



1. Search for Cluster 4/5 call topics via the EC's Funding and Tender portal (https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/home)
   - Select "Search funding and tenders"
   - Set "Submission status" = Open for submission
   - Set "Programming period" = 2021-2027
   - Set "Filter by programme" = Horizon Europe
   - Set "Programme part" = "Digital, Industry & Space" and/or "Climate, Energy & Mobility"
   - Click on the hypertext links for the call topics that interest you

How to register yourself and your organisation to the EC's funding and tender portal



1. **Before you can register your organisation to participate in a Horizon Europe proposal, both you and your organisation need to be registered to the EC's funding and tender portal**
2. **Personal registration:** Click "Register" button and follow the procedure on the following webpage: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/home
3. **Organisation registration (Participant Identification Code, PIC):** Click "Register your organisation" and follow the procedure on the following webpage: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/participant-register

FIT-4-NMP

Strategic and targeted support
to incentivise talented newcomers
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How to get started & how to structure the overall proposal

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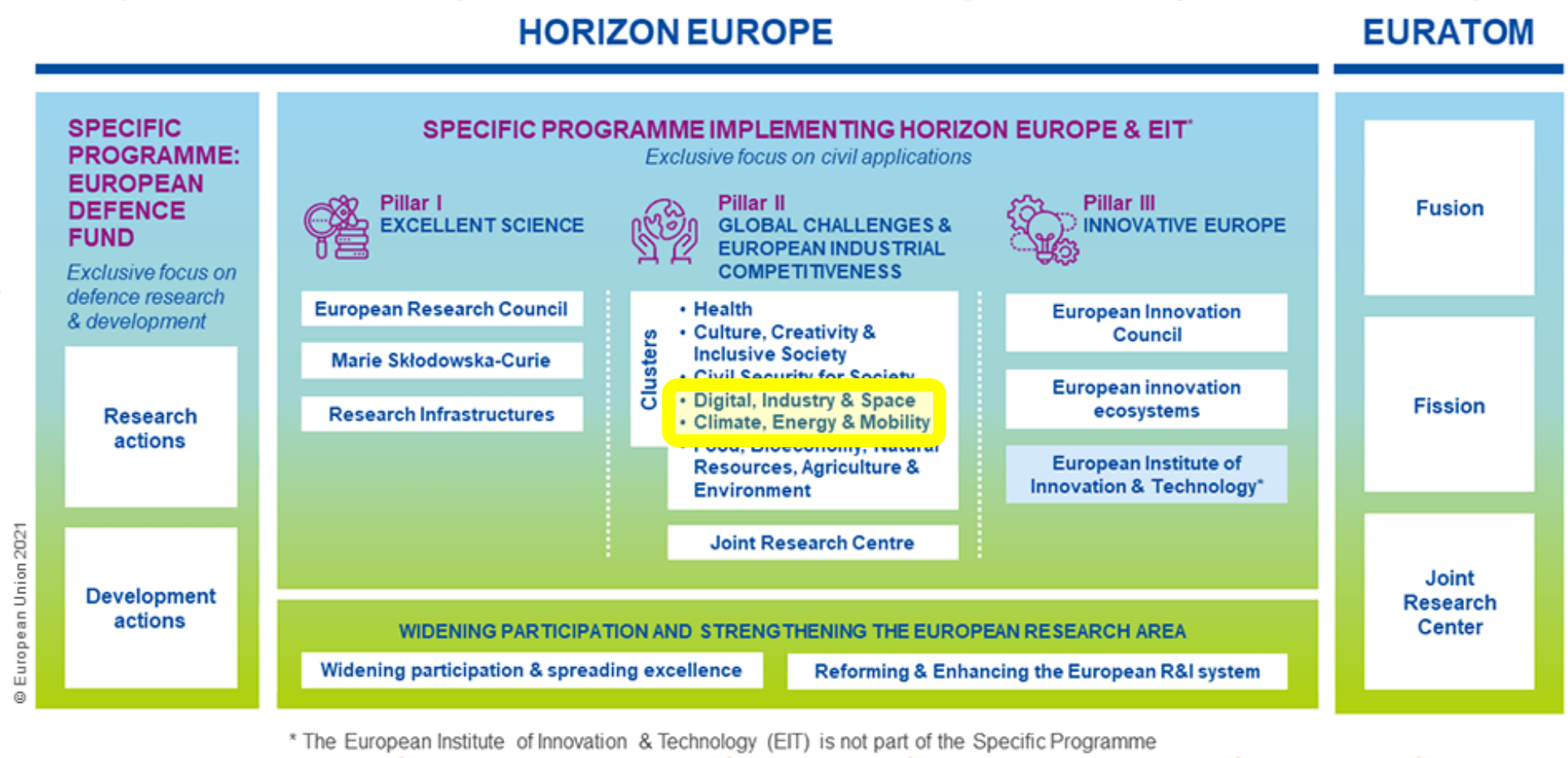
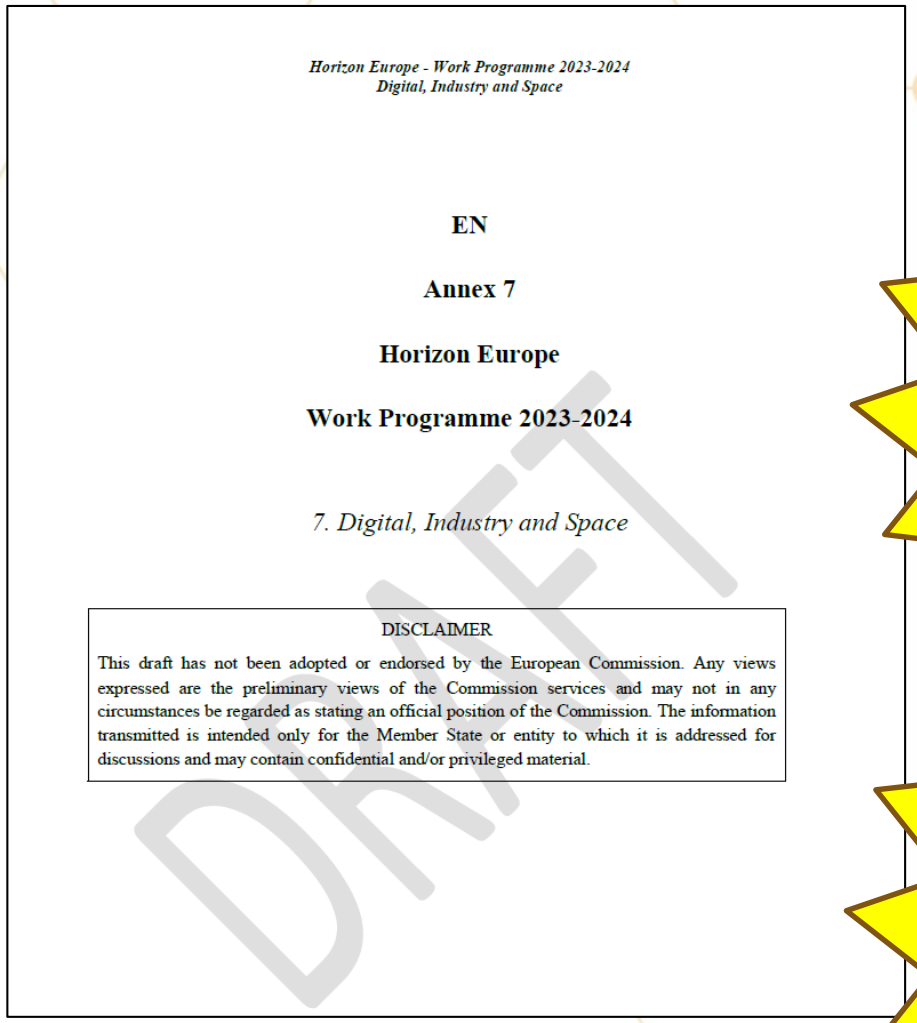
Horizon Europe Programme



Training focused on proposals for **Research and Innovation Actions (RIA)** and **Innovation Actions (IA)** under **Pillar II Cluster 4 (Digital, Industry and Space)** and **Cluster 5 (Climate, Energy and Mobility)**

Essential Documents



Horizon Europe - Work Programme 2023-2024
Digital, Industry and Space

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Annex 7

Horizon Europe

Work Programme 2023-2024

7. Digital, Industry and Space

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DRAFT

Work programme 2023-2024
(in this case Pillar II Cluster 4)

Print out the relevant pages and read repeatedly!

Check online to see if EC has run an info-day webinar about the call!

Horizon Europe Programme

Standard Application Form (HE RIA, IA)

Application form (Part A)
Project proposal – Technical description (Part B)

Version 4.0
21 January 2022

Standard application form for
RIA (Research and Innovation Actions)
and IA (Innovations Actions)

Example Call Text

HORIZON-CL4-2023-RESILIENCE-01-33: Smart sensors for the Electronic Appliances market (RIA)

1. Specific Conditions
   - Expected EU contribution per project, Indicative budget, Type of action (RIA or IA), Technology readiness level (TRL), Procedure, legal and financial set-up of the grant agreements
2. Expected Outcome
   - Typically, several bullet points identifying the expected outcomes the proposal is expected to contribute to.
3. Scope
   - Typically, extensive text describing the scope of the call.

Proposal for Horizon Europe RIA/IA

A proposal contains two parts (A and B):

1. **Part A** of the proposal is generated by the EC's portal.
   - It is based on the information entered by the participants through the submission system in the EC's Funding & Tender Portal.
   - The participants can update the information in the submission system at any time before final submission.
2. **Part B** of the proposal is the narrative part that includes three sections (Excellence, Impact, Implementation) that each correspond to an evaluation criterion.
   - Part B needs to be uploaded as a PDF document based upon the templates downloaded from the submission system for the specific call or topic.

Part A for an RIA/IA proposal

Part A contains the following sub-sections:

1. **General information**.
   - Proposal title, acronym, duration, keywords, abstract and declarations.
2. **Participants**.
   - Administrative data about each consortium partner; basic data about their researchers; role in project; list of top-5 publications, datasets, software; list of top-5 related projects; list of significant infrastructure/equipment; gender equality plan.
3. **Budget**.
   - Costs for personnel, travel, equipment, subcontracting, etc. for each consortium partner.
4. **Ethics and security**.
   - Checklist of ethics and security related questions.

Part B for an RIA/IA proposal

Total length: 45 pages (including cover page)

1. Excellence

1.1 Objectives and ambition [EC recommended length: 4 pages]

1.2 Methodology [EC recommended length: 14 pages]

2. Impact

2.1 Project's pathways towards impact [EC recommended length: 4 pages]

2.2 Measures to maximise impact - Dissemination, exploitation and communication

2.3 Summary [EC recommended length: 5 pages for Sections 2.2 and 2.3]

3. Quality and efficiency of the implementation

3.1 Work plan and resources [EC recommended length: 14 pages – including tables]

3.2 Capacity of participants and consortium as a whole [EC recommended length: 3 pages]

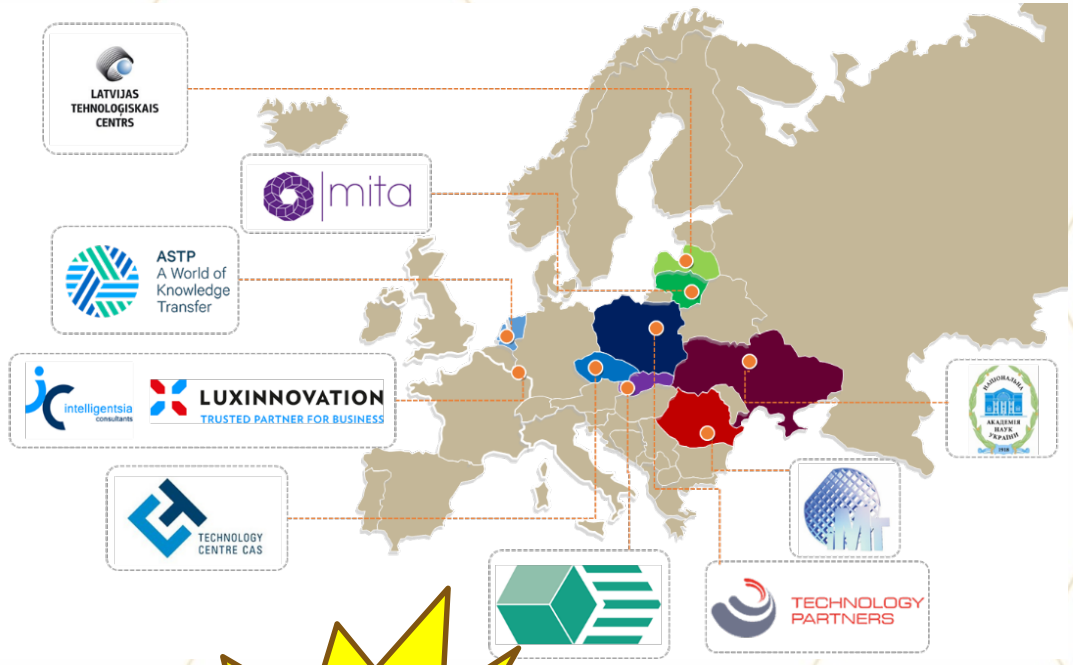
- **Don't deviate more than 1 page from the recommended limits!**
- **Consider starting Section 1.1 on the proposal cover page!**

Consortium Building (1 of 3)

- Check carefully the call text to identify the minimum consortium requirements (e.g. at least three independent legal entities from three different Member States or Associated Countries).
- Typically, 5-10 partners in an RIA and IA with a €3-6m budget.
- Identify an initial “critical mass” of partners e.g. 5+ partners.
- Identify who will be the proposal coordinator and who will be the lead proposal writer (not necessarily the same person!)
- Organise meeting(s) with the “critical mass” to structure the proposal
  - Ideally, face-to-face with a white board
  - Alternatively, online with one person good at editing MS Powerpoint

Consortium Building: Examples (2 of 3)

OLED Materials	OLED Stacks	OLED Micro-displays
• Shielded Emitter (Merck) • TADF Host (UDUR) • Photo-physical Characterisation (UDUR)	• Hyper-fluorescence OLEDs (Merck) • Optical Anisotropy (IOF)	• Hyper-fluorescence Microdisplays (MOD)
EU Project Management and Dissemination Support (Intelligentsia)		



Important to include companies across value chain!

Important to have a "nice" geographical spread!

Consortium Building: Examples (3 of 3)

Participant no.	Participant organisation name	Part. short name	Country
1 (co-ordinator)	Merck KGaA	Merck	Germany
2	MICROOLED S.A.S	MOD	France
3	Fraunhofer Institute for Applied Optics and Precision Engineering	IOF	Germany
4	Durham University	UDUR	UK
5	Intelligentsia Consultants Sarl	Intelligentsia	Luxembourg

Participant no.	Participant organisation name	Part. short name	Country
1 (co-ordinator)	MZ Denmark GmbH	MOZ	Germany
2	Ericsson AB	ERI	Sweden
3	F-Secure Oyj	FSEC	Finland
4	Intel Deutschland GmbH	INT	Germany
5	Intelligentsia Consultants Sarl	IC	Luxembourg
6	Luminem SRLs	LUM	Italy
7	Mind SRL	MIND	Italy
8	Riots Global Oy	RIO	Finland
9	Sensative AB	SEN	Sweden
10	Consiglio Nazionale delle Ricerche	CNR	Italy
11	RISE Research Institutes of Sweden AB	RISE	Sweden
12	Centria Ammattikorkeakoulu Oy	CEN	Finland
13	Politecnico di Torino	POL	Italy

Participant no.	Participant organisation name	Part. short name	Country
1 (co-ordinator)	Technische Universiteit Delft	TUD	Netherlands
2	Technische Universiteit Eindhoven	TUE	Netherlands
3	Rheinisch-Westfälische Technische Hochschule Aachen	RWTH	Germany
4	Institut National de Recherche en Informatique et en Automatique	INRIA	France
5	Eidgenössische Technische Hochschule Zürich	ETHZ	Switzerland
6	Stichting IMEC Nederland	IMEC	Netherlands
7	ARM Limited	ARM	UK
8	IBM Research GmbH	IBM	Switzerland
9	Intelligentsia Consultants Sarl	INT	Luxembourg

Participant no.	Participant organisation name	Part. short name	Country
1 (co-ordinator)	Intelligentsia Consultants *Sàrl*	Intelligentsia	Luxembourg
2	Novaled GmbH	Novaled	Germany
3	Astron Fiamm Safety *Sàrl*	Astron-FIAMM	France
4	University of Durham	UDUR	UK
5	Technische Universität Dresden	TUD	Germany
6	Kauno Technologijos Universitetas	KTU	Lithuania

How to structure Sections 1 and 3

Breakdown overall project goal into "chronological" scientific and technological objectives

1. Excellence

1.1 Objectives

Map each S&T objective to its own WP

3. Implementation

3.1 Work Plan

During discussions with consortium partners, start by sketching out the WPs and who will lead each WP.

Scientific and Technological (S&T) Objective 1 → WP1: Tasks to achieve S&T Objective 1

S&T Objective 2 → WP2: Tasks to achieve S&T Objective 2

S&T Objective 3 → WP3: Tasks to achieve S&T Objective 3

S&T Objective 4 → WP4: Tasks to achieve S&T Objective 4

Describe S&T objectives concisely in Section 1.1

Prepare Sections 1.1 and 3.1 concurrently

WP5: Dissem., Exploit. & Communication

WP6: Project Management

Put Dissemin. and Project Mgt WPs at the end!

Structuring Sections 1 & 3: Example

1. Excellence

1.1 Objectives

- S&T Objective 1: Screen potential ICT-TADF and Exciplex-TADF compounds with theoretical models
- S&T Objective 2: Synthesise the most promising ICT-TADF and Exciplex-TADF model compounds
- S&T Objective 3:Characterise and select the best ICT-TADF and Exciplex-TADF synthesised compounds
- S&T Objective 4: Design white stack units employing the selected TADF based emitter and block materials
- S&T Objective 5: Design close-to-production OLED lighting panel demonstrators

3. Implementation

3.1 Work Plan

- WP1: Modelling
- WP2: Synthesis
- WP3: Characterisation
- WP4: Emitter Layer Design and Stack Integration
- WP5: OLED Lighting Panel Demonstrators
- WP6: Dissem., Exploit. & Communication
- WP7: Project Management

FIT-4-NMP

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How to write Section 1 "Excellence"

Giles Brandon, Intelligentsia Consultants

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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

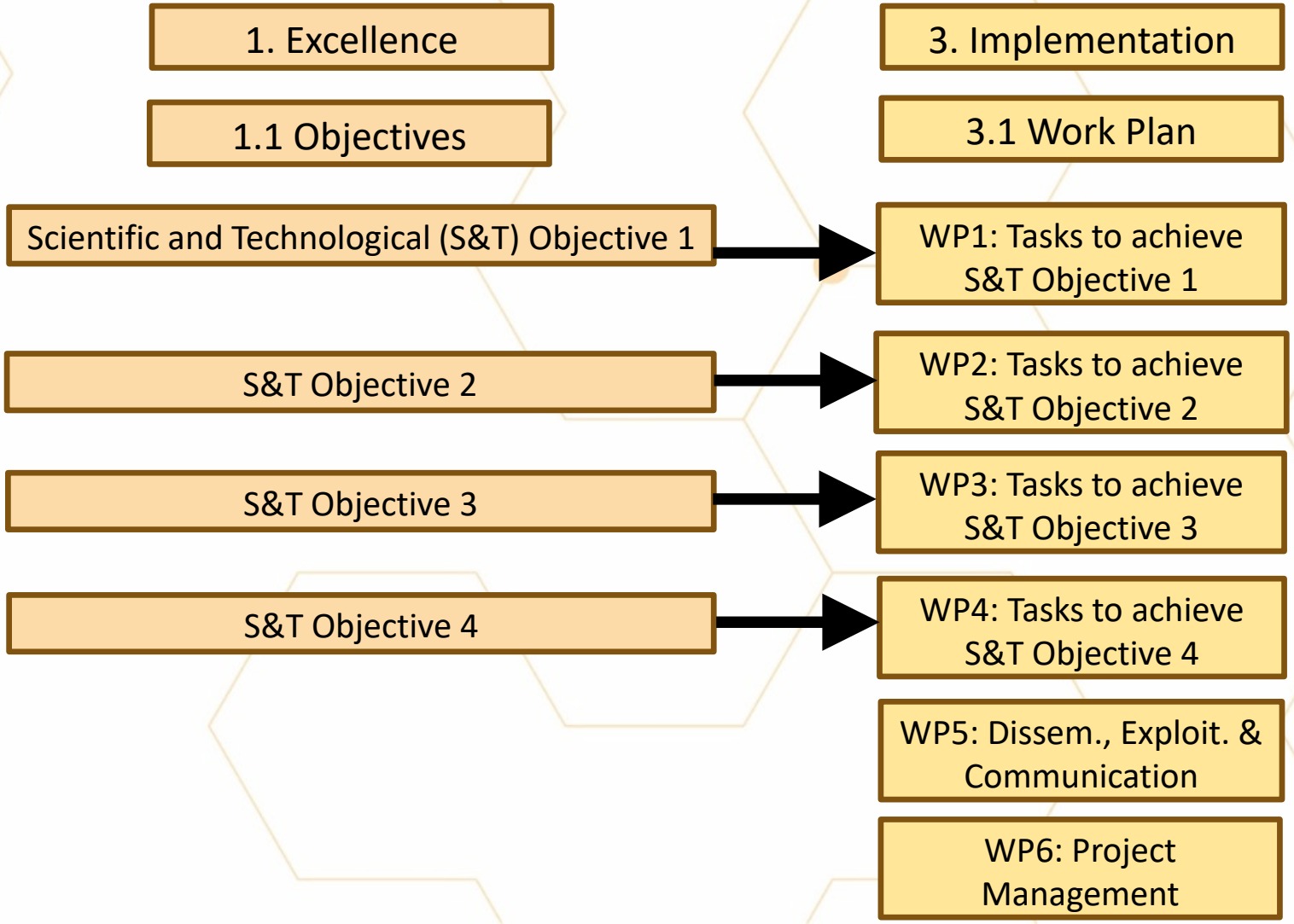
Section 1.1: Objectives and ambition

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 bilateral 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]

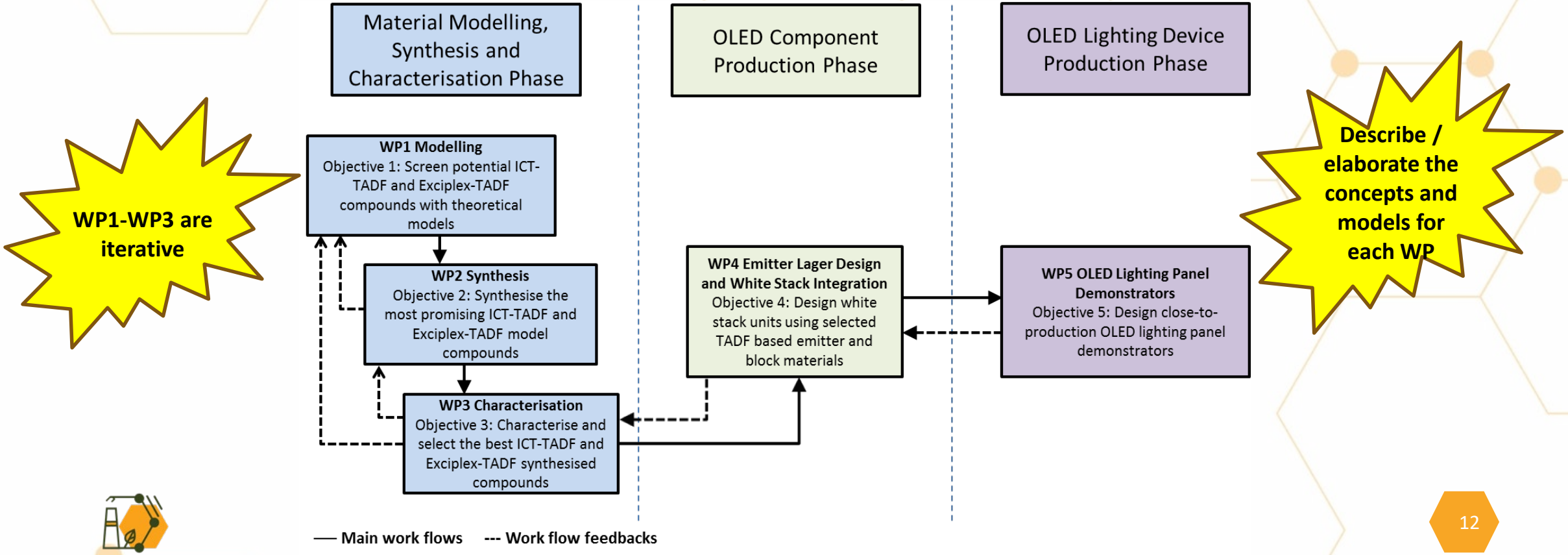
Section 1.2: Methodology (2 of 2)

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:

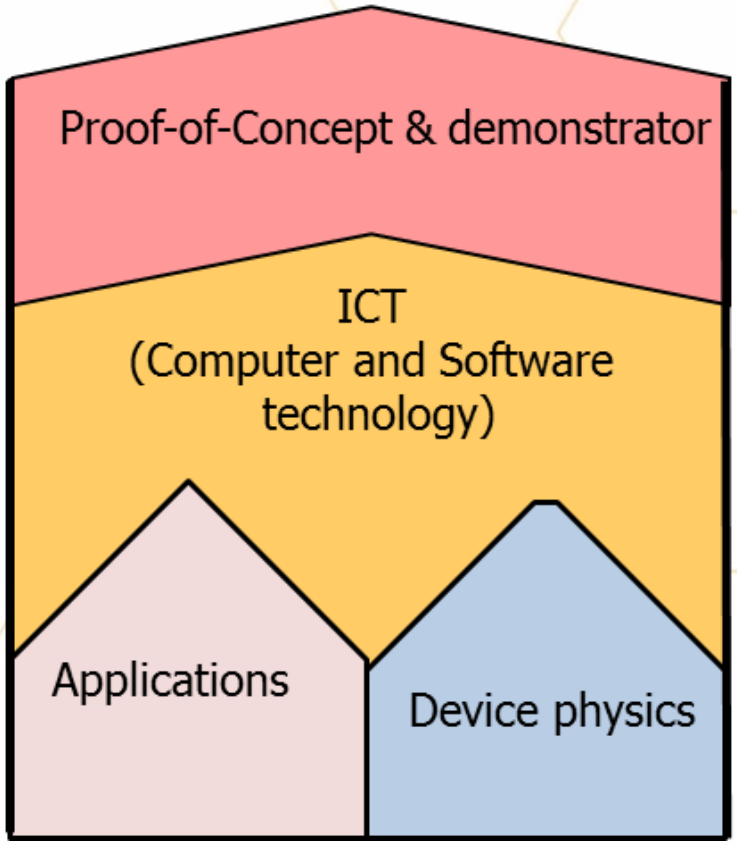


Figure 1e: Main components of the research method

Describe / elaborate the concepts and models for each component

Section 1.2: Methodology

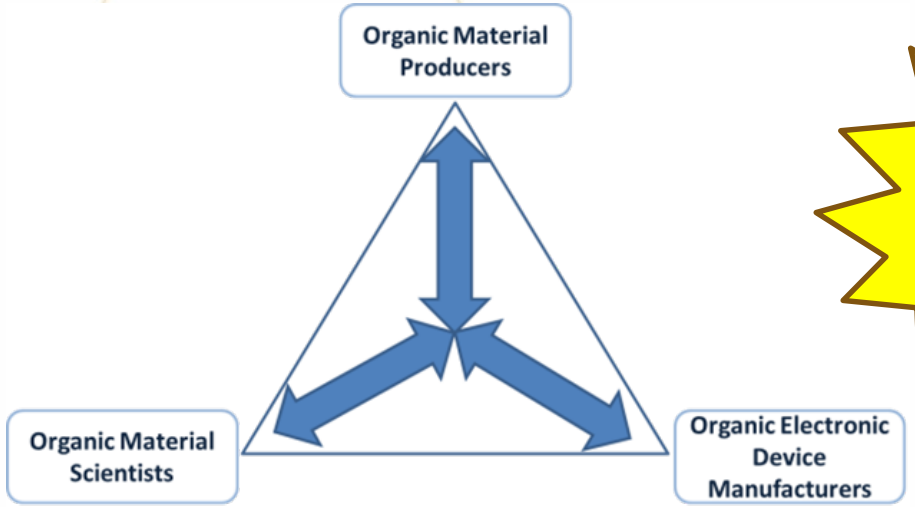
"Describe any national or international research and innovation activities whose results will feed into the project, and how that link will be established."

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.**

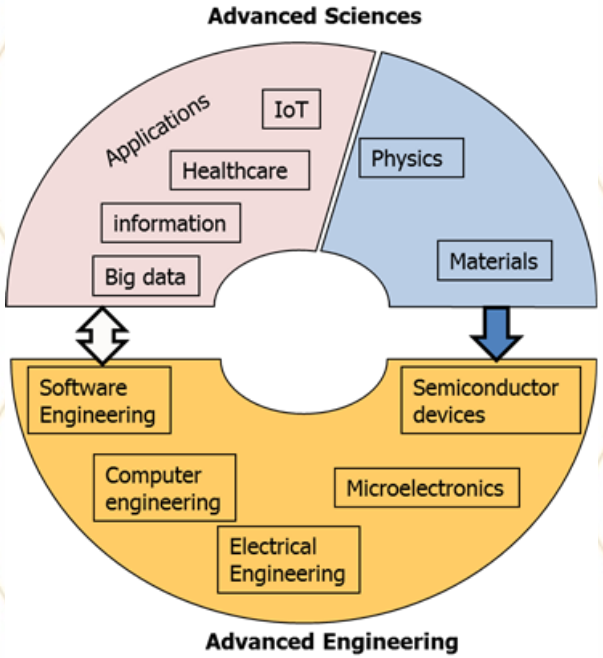


Figure 1d: MNEMOSENE' Interdisciplinarity

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.

FIT-4-NMP

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

How to write Section 2 “Impact”

Giles Brandon, Intelligentsia Consultants

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 958255

Section 2: Impact

- Section 2.1: Project's pathways towards impact
  - EC recommended length: 4 pages

- Section 2.2: Measures to maximise impact - Dissemination, exploitation and communication
  - EC recommended length: 5 pages, including Section 2.3

- Section 2.3: Summary

Section 2.1: Project's pathways towards impact

1. Provide a narrative explaining how the project's results are expected to make a difference in terms of impact, beyond the immediate scope and duration of the project. The narrative should include the components below, tailored to your project.

   a) Describe the unique contribution your project results would make towards (1) the outcomes specified in this topic, and (2) the wider impacts, in the longer term, specified in the respective destinations in the work programme.

   b) Give an indication of the scale and significance of the project's contribution to the expected outcomes and impacts, should the project be successful. Provide quantified estimates where possible and meaningful.

   c) Describe any requirements and potential barriers - arising from factors beyond the scope and duration of the project - that may determine whether the desired outcomes and impacts are achieved. These may include, for example, other R&I work within and beyond Horizon Europe; regulatory environment; targeted markets; user behaviour. Indicate if these factors might evolve over time. Describe any mitigating measures you propose, within or beyond your project, that could be needed should your assumptions prove to be wrong, or to address identified barriers.

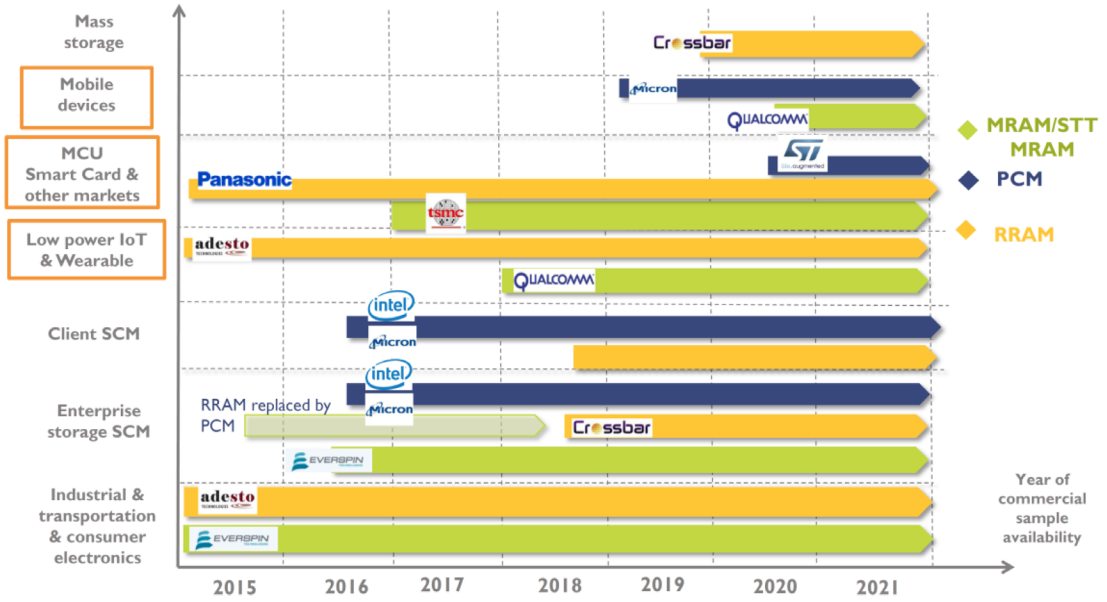
Section 2.1: Project's pathways towards impact

"*Describe unique contribution of project results towards (1) topic outcomes and (2) wider impacts*" (1 of 2)

Write in a narrative and engaging style (e.g. Marketing)

2.1.2 Helping to double economic value of semiconductor component production in Europe within 10 years

MNEMOSENE is focused on CIM and memristors which are disruptive technologies that are expected to create vast economic returns over the coming years. MNEMOSENE will assist European organisations to enter and maintain a position in this rapidly evolving technology market place and thereby support the Electronics Leaders Group's target of doubling the economic value of semiconductor component production in Europe within the next 10 years. The anticipated explosive growth for CIM and memristors is reflected in recent market reports. Yole Development forecasts the emerging market for memristor-based non-volatile memory (NVM) will surge from $56 million in 2015 to $4.6 billion by 2021. Similarly, Allied Market Research valued the global memristor market at $3.2 Million in 2015 and expected it to reach $79.0 million by 2022.



Section 2.1: Project's pathways towards impact

"Indicate the scale and significance of the project's contribution to expected outcomes and impacts" (1 of 2)

Expected outcomes – see text of call topic

Expected Outcomes	WP	Performance Indicators	Target
Outcome 1: Support the "Economic & Investment Plan" and "Innovation Agenda" for WBC by spurring economic recovery, supporting green and digital transition, fostering regional integration & EU convergence.	1, 2, 3, 4 and 5	• Preparatory research project on sustainable nanosensor on water pollution	1
		• Sustainable nanosensors developed to detect different water pollutants	3
		• Rivers and lakes in Albania where sustainable nanosensors are demonstrated	8
		• Joint research papers published in international peer-reviewed journals	9+
		• Joint research papers presented at international conferences	9+
		• SUSNANO workshops for private and public organisations in Albania	3+
		• Info-days and networking sessions attended about EU calls for proposals	5+
		• Joint research proposals submitted for EU funding (e.g. Horizon Europe)	3+
		• Patents submitted by UT researchers involved in SUSNANO	2+
		• Collaboration agreements between UT and Albanian private companies	3+
Outcome 2: Improved excellence capacity and resources in WBC enabling to close the still apparent research and innovation gap within Europe.	1, 2, 3 and 5	• UT experienced researchers trained in Research Sub-Topics A, B and C	5
		• UT early-stage researchers trained in Research Sub-Topics A, B and C	10
		• Summer schools hosted by UT, ICN2 and UPO	3
		• Joint PhD programme	1
		• Joint research papers published in international peer-reviewed journals	9+
		• Joint research papers presented at international conferences	9+
		• Increase in average H-Index of UT researchers involved in SUSNANO	>15%
		• Patents submitted by UT researchers involved in SUSNANO	2+
		• Collaboration agreements between UT and Albanian private companies	3+

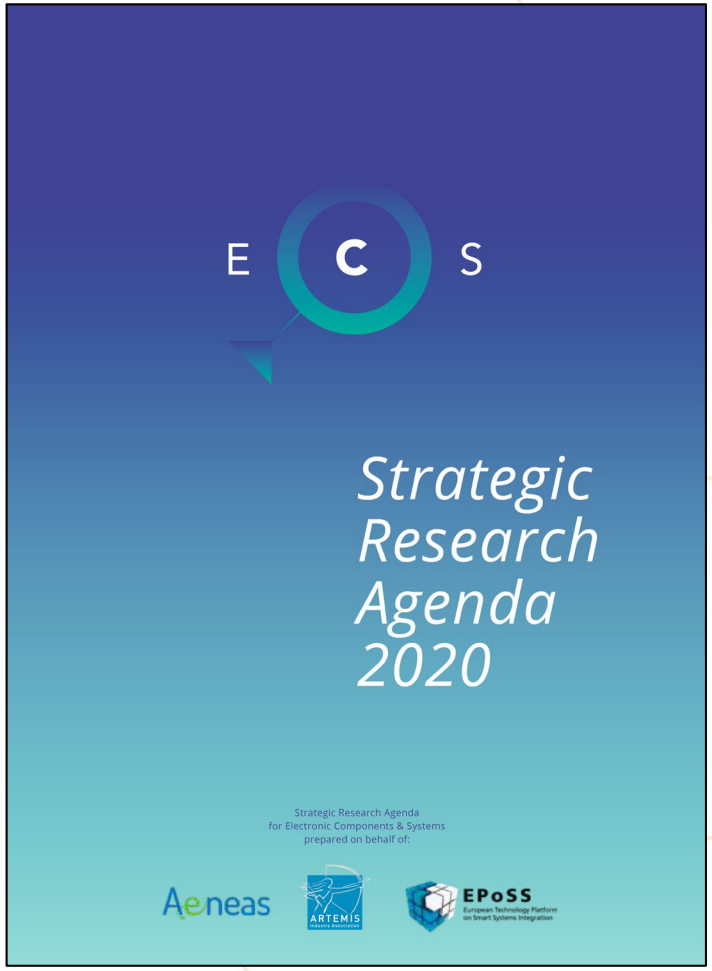
Section 2.1: Project's pathways towards impact
"Indicate the scale and significance of the project's contribution to expected outcomes and impacts" (2 of 2)

Expected impacts – see introductory text in work progamme

Expected Impacts for Destination 1 "Improved access to excellence"	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6
Impact 1: Increased science and innovation capacities for all actors in the R&I system in widening countries.	X	X	X			X
Impact 2: Structural changes leading to a modernised and more competitive R&I systems in eligible countries		X	X			
Impact 3: Reformed R&I systems & institutions leading to increased attractiveness & retention of researchers		X	X			X
Impact 4: Higher participation success in Horizon Europe and more consortium leadership roles		X	X	X	X	X
Impact 5: Stronger linkages between academia and business and improved career permeability	X				X	
Impact 6: Strengthened role of the Higher Education sector in research and innovation		X		X	X	
Impact 7: Greater involvement of regional actors in R&I process	X		X			

Section 2.1: Project's pathways towards impact
"*Describe any requirements and potential barriers*" (1 of 2)

Identify challenges / barriers in EU Strategic Research Agendas



Section 2.1: Project's pathways towards impact
"*Describe any requirements and potential barriers*" (2 of 2)

Describe project mitigation measures for each barrier / challenge

Potential barriers and requirements specific to sustainable nanosensors based on graphene

Challenge 1: Stability of graphene-based materials. The main challenge is maintaining the stability of graphene-based materials since they are prone to aggregation which results in decreased electrochemical properties.

⇒ SUSNANO's mitigation measure: we will provide graphene-related materials equipped with different functional groups overcoming such drawbacks.

Challenge 2: Limit of detection (LOD) of sustainable nanosensors. Development of novel sustainable nanosensors with a low LOD is essential since target analytes often exist only at trace concentrations in real samples.

⇒ SUSNANO's mitigation measure: we will develop graphene materials exhibiting significantly improved electrical conductivity compared to conventional graphene-based materials, which enable to build ultrasensitive nanosensors with enhanced values of LOD.

Challenge 3: Suppressing the non-specific adsorption of interfering species. The main drawback related to conventional graphene-based nanosensors is connected with non-specific adsorption of interfering species which results in lower selectivity and sensitivity of developed nanosensors.

⇒ SUSNANO's mitigation measure: we will prepare graphene-based materials modified with different functional groups which can selectively capture the target analytes.

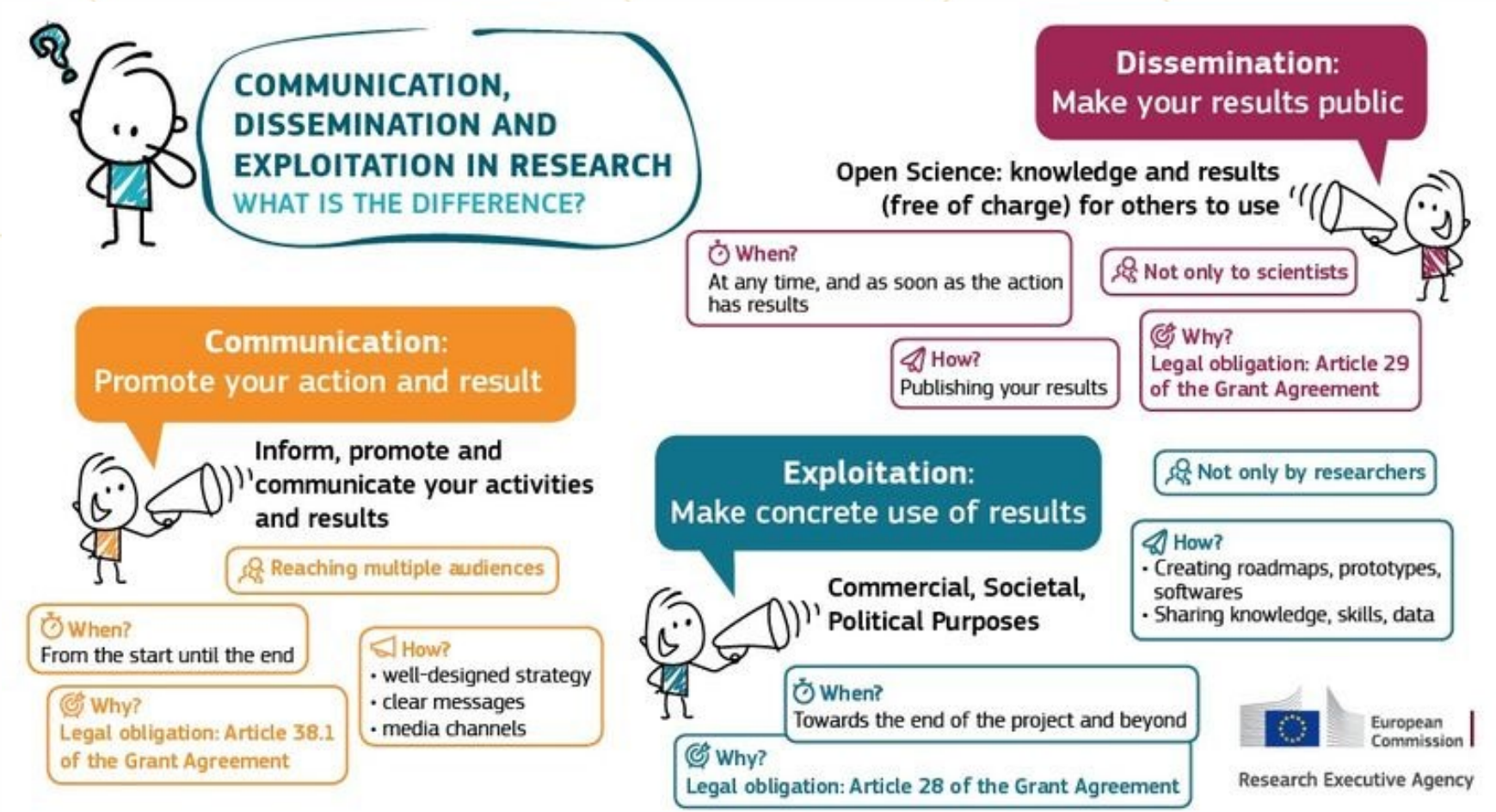
Challenge 4: Stability of sustainable nanosensors. The stability of nanosensors is the main challenge limiting their testing in real applications. Nanosensors are often evaluated by their shelf-life. Hence, it is important to develop sensing platforms capable to operate for long time. When using commonly available graphene-based materials, long-term stability becomes a major concern due to the issue related to aggregation of individual graphene flakes.

⇒ SUSNANO's mitigation measure: we will provide graphene-related materials equipped with different functional groups which can overcome such handicap.

Section 2.2: Measures to maximise impact - Dissemination, exploitation and communication (1 of 2)

1. Describe the planned measures to maximise the impact of your project by providing a first version of your ‘plan for the dissemination and exploitation including communication activities’. Describe the dissemination, exploitation and communication measures that are planned, and the target group(s) addressed (e.g. scientific community, end users, financial actors, public at large).
2. Outline your strategy for the management of intellectual property, foreseen protection measures, such as patents, design rights, copyright, trade secrets, etc., and how these would be used to support exploitation.

Section 2.2: Measures to maximise impact - Dissemination, exploitation and communication (2 of 2)

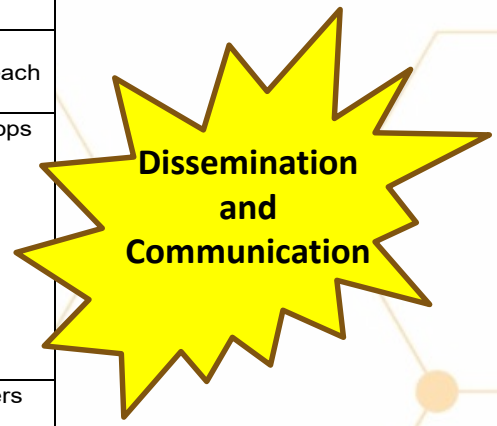


Section 2.2: Measures to maximise impact - Dissemination, exploitation and communication

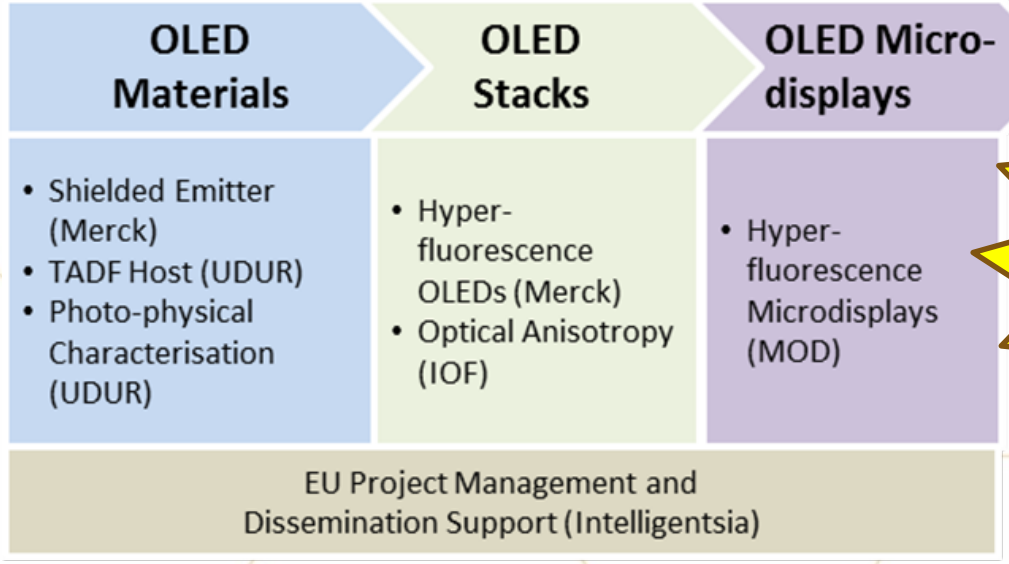
"Provide 1st version of plan for dissemination, communication & exploitation"

(1 of 4)

MNEMOSENE Dissemination and Communication Plan			
Project Result	**Dissemination Activity**	**Target Audience**	**Target Indicator**
Project leaflet and poster	Distribute during international conferences (e.g. ISSCC, ESSCIRC and DATE), public seminars and outreach events.	Scientists, engineers and general public	400+ leaflets distributed, 30+ events where poster displayed (including 9+ outreach events)
Project website	Publish project summary, regular news and event updates on website.	Scientists, engineers and general public	5000+ visitors
Project news	Publish project news releases and distribute through broader scientific news channels e.g. Cordis wire and Alpha Galileo.	Scientists, engineers and general public	3+ news releases, 10+ articles in broader scientific press
	Distribute project news releases via social media (e.g. LinkedIn, Facebook, Twitter, etc)	Scientists, engineers and general public	15+ announcements
Short project film	Publish film on Youtube and project website. Show during public outreach events.	Scientists, engineers and general public	1000+ hits, 9+ public outreach events
Open workshops	Present research results at open workshops: • MemTDAC workshops on memristor technology during the annual HiPEAC conference. • Workshops at DATE conferences (e.g. Workshop on Emerging Memory Solutions) • MemoCiS COST action workshops.	Scientific research community and industrial actors (SMEs and MNEs)	5+ open workshops
Scientific results from development of non-volatile memory domain technologies and methods.	Publish results in international peer reviewed journals (e.g. IEEE Journals). Gold open-access approach scheme will be adopted whenever possible.	Scientific research community	15+ journal papers
	Present results at international scientific conferences: materials and device technology (e.g. ESSCDRC, IEDM, SISPAD), circuit and hardware design (e.g. DATE, ISSCC, DAC, ISCAS), micro architecture and computing (e.g. MICRO, ISCA, HiPEAC, PACT), software technology and programming (e.g. CGO, PPoPP, CC, CSE), big-data applications (e.g., Int. Conf. on Big Data, IEEE BigDataSE), together with journals in the same fields (ISS, TC, Micro, TED, TOPLAS, TACO, etc.).	Scientific research community	15+ conferences
	Present results during seminars for university Master's students.	Young postgraduate students	6+ seminars



Section 2.2: Measures to maximise impact - Dissemination, exploitation and communication *"Provide 1st version of plan for dissemination, communication & exploitation"* (2 of 4)



Value chain for OLED proposal

Partners' individual exploitation plans

Partner	Individual Exploitation Plan
Merck (industrial partner)	Merck already supplies OLED materials for current state-of-the-art AMOLED displa… …es an established process of scaling-up material production from small R&D quantities to custome… …n and finally into standard production size. As recently reported, Merck is constantly investing… …uction capacity in Germany to answer to the increasing customer requests. OLED device manufa… …are mostly located in Asia and Merck already intensively cooperates with all display manufacturers in thi… …g. LG Display, SDC, AUO, EDO, Visionox, BOE, Tianma and JDI). Similar to its successful history in Liquid Crystal m…terial business, Merck is dedicated to develop the OLED technology focussing on the customers' technological and commercial needs. The core material production technology is developed in Europe and will be marketed to customers worldwide. **Based on HyperOLED's commercial potential, Merck has prepared the following post-project business plan …**
UDUR (academic partner)	UDUR have a very strong track record of publishing journal papers as well as collaborating with industry in the fields of OLED material synthesis and characterisation. Notably, Professor B. (h-index=57, >14,500 citations, 10 patents) and Professor M. (h-index=53, >10,500 citations, 7 patents) are world-renowned experts in their respective fields. Also, Lomox Ltd funds UDUR for the synthesis of OLED materials and Merck currently funds a PhD studentship at UDUR in photophysical studies of non-TADF OLED materials. Consequently, UDUR's plans to exploit the HyperOLED results include: • Publishing papers in international journals based on the project results (e.g. Nature Materials) • Attracting further public/private funding for R&D projects requiring their expertise in "OLED material synthesis" and "Photo-physical characterisation" (e.g. Novaled and EPSRC) • Licensing their IP created in the project (see earlier IP Ownership Tables)
etc.	

Section 2.2: Measures to maximise impact - Dissemination, exploitation and communication "*Provide 1st version of plan for dissemination, communication & exploitation*" (3 of 4)

TRL		BRL	
TRL9	Technology system proven in operational environment	BRL9	Business model finalised. Business scaling with recurring revenues.
TRL8	Technology system completed & qualified through test and demonstration	BRL8	Business model is fine-tuned. Sales & metrics show business model holds and can scale.
TRL7	Prototype demonstrated in an operational environment	BRL7	Product/market fit demonstrated. Attractive revenue/cost projections
TRL6	Technology demonstrated in a relevant environment	BRL6	Full business model including pricing verified on customers
TRL5	Technology validated in a relevant environment	BRL5	Business model testing, first revenue model, competitive position verified in market
TRL4	Technology validated in the laboratory environment	BRL4	First version of business model, first projections of economic viability & market potential
TRL3	Analytical & experimental PoC of critical function and characteristics	BRL3	Draft of business model Described market potential & competitive overview
TRL2	Technology concept and/or application formulated	BRL2	First business concept described. Identified overall market & some competitors
TRL1	Basic principles observed	BRL1	Hypothesizing on possible business concept

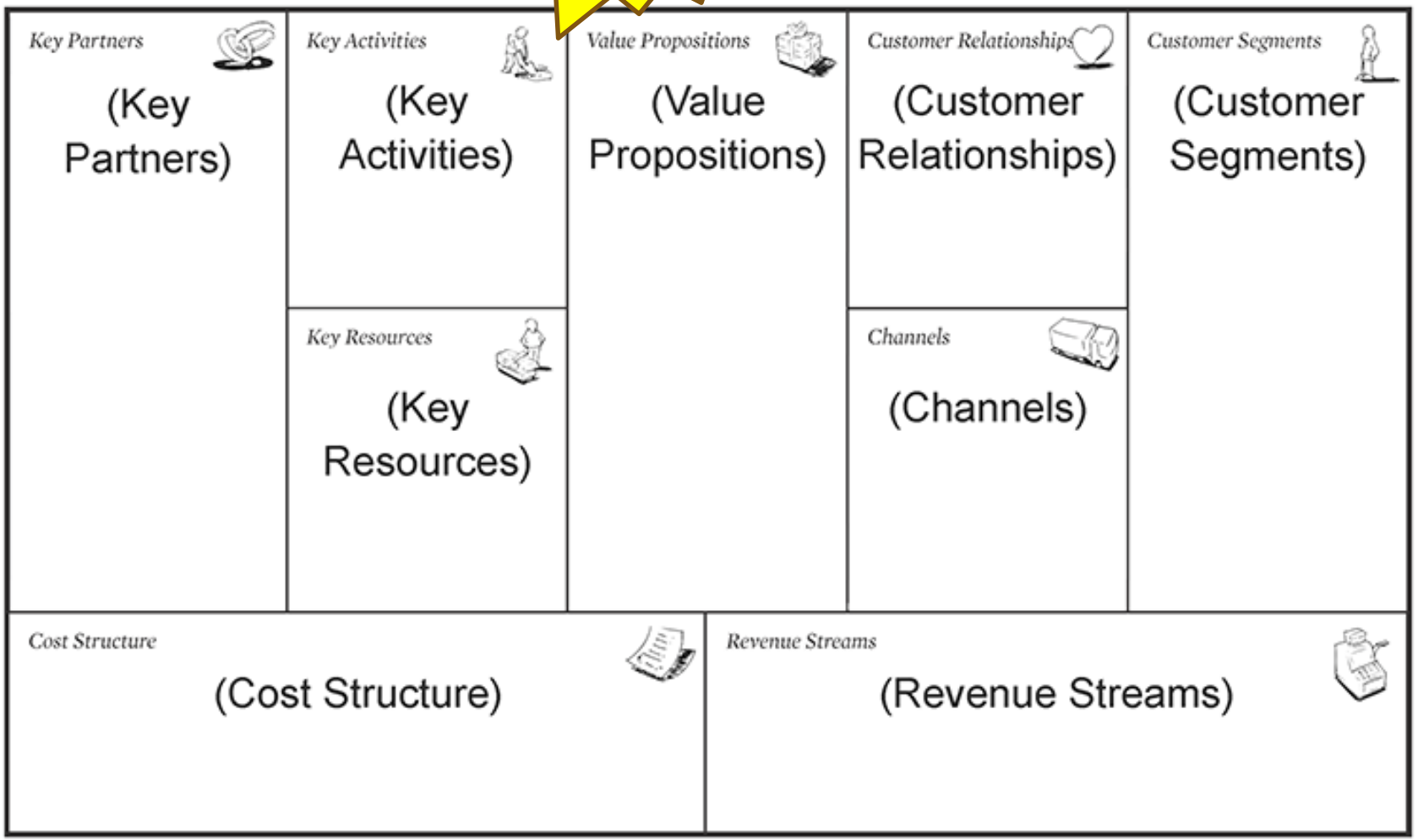
Technology Readiness Levels (TRL) + Business Readiness Levels (BRL)

Section 2.2: Measures to maximise impact - Dissemination, exploitation and communication

"Provide 1st version of plan for dissemination, communication & exploitation"

(4 of 4)

Business Model Canvas



Section 2.2: Measures to maximise impact - Dissemination, exploitation and communication

"*Outline strategy to manage intellectual property*" (1 of 2)

IP Ownership Tables		
Expected Foreground Knowledge	**Lead Partner Concerned**	**Other Partners claiming Ownership Rights**
Related to WP1		
New algorithms to tackle problems related to data analytics that are optimized for implementation in a CIM-based architecture	IBM, TUD, ARM	TUE
New algorithms to tackle problems related to healthcare and database applications that are optimized for implementation in a CIM-based architecture	TUD	TUE
Related to WP2		
2-D SIMD programming element	TUE, INRIA	ETHZ
Macro-programming interface for CIM tiles	TUE, INRIA	ETHZ
Portable programming model for CIM-accelerated kernels	TUE, INRIA	ETHZ
Related to WP3		
CIM macro architecture	TUE	TUD, ETHZ and ARM
Embedded circuits and energy-efficient digital/analogue interfacing between resistive compute units and external digital compute units	TUE, ARM	TUD, ETHZ
Related to WP4		
Models to enter into the micro-architecture simulator	IMEC, RWTH	-
CIM microarchitectures	IMEC	RWTH, ARM, IBM, TUD
PCM-based logical and arithmetic operations that can be implemented in a CIM module	IBM	-
Designs for parallel bit-wise and arithmetic operations within the crossbar	TUD	RWTH
Related to WP5		
Data collected based on measurements of crossbars (CIM)	TUD, RWTH	TUE, ETHZ, ARM, IBM,
Full CIM simulator	TUD	All

Capture initial strategy for Foreground Knowledge

Section 2.2: Measures to maximise impact - Dissemination, exploitation and communication

"*Outline strategy to manage intellectual property*" (2 of 2)

Background Knowledge	Contributing Partner	Included	Excluded
Related to WP2			
PENCIL language for domain-specific compilation	INRIA	X	
Skeleton-based instantiation from Bones framework	TUE	X	
New loop-nest fusion and inter-tile reuse techniques	TUE	X	
Related to WP3			
Two patents filed on resistive computing and computation-in-memory architecture	TUD	X	
Related to WP4			
Low level detailed non-volatile memory compiler models (STT_MRAM, SOT-MRAM, OxRAM, VMCO, CBRAM, NAND Flash)	IMEC		X
Black box models for non-volatile memories (STT_MRAM, SOT-MRAM, OxRAM, VMCO, CBRAM, NAND Flash)	IMEC	X	
PCM-based physical models that are not confidential	IBM	X	
Confidential information concerning PCM device technology	IBM		X
Circuit design schemes within the crossbar	TUD	X	

Don't overlook initial strategy for Background Knowledge!

Section 2.3: Summary

1. Provide a summary of this section by presenting in the canvas below the key elements of your project impact pathway and of the measures to maximise its impact. (1 of 2)

KEY ELEMENT OF THE IMPACT SECTION

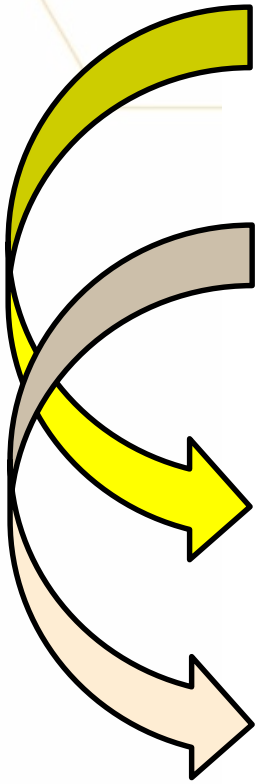
SPECIFIC NEEDS	EXPECTED RESULTS	D & E & C MEASURES
What are the specific needs that triggered this project? Example 1 Most airports use process flow-oriented models based on static mathematical values limiting the optimal management of passenger flow and hampering the accurate use of the available resources to the actual demand of passengers. Example 2 Electronic components need to get smaller and lighter to match the expectations of the end-users. At the same time there is a problem of sourcing of raw materials that has an environmental impact.	What do you expect to generate by the end of the project? Example 1 **Successful large-scale demonstrator:** Trial with 3 airports of an advanced forecasting system for proactive airport passenger flow management. **Algorithmic model:** Novel algorithmic model for proactive airport passenger flow management. Example 2 Publication of a **scientific discovery on transparent electronics.** **New product:** More sustainable electronic circuits. **Three PhD students trained.**	What dissemination, exploitation and communication measures will you apply to the results? Example 1 **Exploitation:** Patenting the algorithmic model. **Dissemination towards the scientific community and airports**: Scientific publication with the results of the large-scale demonstration. **Communication towards citizens:** An event in a shopping mall to show how the outcomes of the action are relevant to our everyday lives. Example 2 **Exploitation of the new product:** Patenting the new product; Licencing to major electronic companies. **Dissemination towards the scientific community and industry:** Participating at conferences; Developing a platform of material compositions for industry; Participation at EC project portfolios to disseminate the results as part of a group and maximise the visibility vis-à-vis companies.

Section 2.3: Summary

1. Provide a summary of this section by presenting in the canvas below the key elements of your project impact pathway and of the measures to maximise its impact. (2 of 2)

TARGET GROUPS	OUTCOMES	IMPACTS
Who will use or further up-take the results of the project? Who will benefit from the results of the project? Example 1 **9 European airports**: Schiphol, Brussels airport, etc. **The European Union aviation safety agency.** **Air passengers (indirect).** Example 2 **End-users**: consumers of electronic devices. **Major electronic companies**: Samsung, Apple, etc. **Scientific community** (field of transparent electronics).	*What change do you expect to see after successful dissemination and exploitation of project results to the target group(s)?* Example 1 **Up-take by airports:** 9 European airports adopt the advanced forecasting system demonstrated during the project. Example 2 **High use of the scientific discovery published** (measured with the relative rate of citation index of project publications). A **major electronic company** (Samsung or Apple) **exploits/uses the new product** in their manufacturing.	*What are the expected wider scientific, economic and societal effects of the project contributing to the expected impacts outlined in the respective destination in the work programme?* Example 1 **Scientific:** New breakthrough scientific discovery on passenger forecast modelling. **Economic:** Increased airport efficiency Size: 15% increase of maximum passenger capacity in European airports, leading to a 28% reduction in infrastructure expansion costs. Example 2 **Scientific:** New breakthrough scientific discovery on transparent electronics. **Economic/Technological:** A new market for touch enabled electronic devices. **Societal:** Lower climate impact of electronics manufacturing (including through material sourcing and waste management).

Section 2.3: Summary
"Canvas showing key elements of the project's impact pathways and measures to maximise its impact"



No.	SPECIFIC NEEDS	EXPECTED RESULTS	D & E & C MEASURES
1	UT's SWOT analysis highlights weaknesses and threats which need to be addressed with respect to its R&I for sustainable nanosensors for water pollution detection (see Section 1.2.2).	See Performance Indicators for Outcomes 2, 3, 4, 5 and 6 in Section 2.1.2	Communication: News releases via Press conferences, Project website, and Social media accounts. Dissemination: Research papers presented at international conferences.
2	Albania's rivers and lakes are polluted with heavy metals, pesticides and antibiotics (see Section 1.2.1).	Development of novel sustainable nanosensors. Extensive environmental assessment of Albania's rivers and lakes (WP1).	Communication: as above. Dissemination: Present env. assessment report to National Environmental Agency and Ministry of Tourism and Environment Exploitation: Industry workshops at UT and NanoAlb.

No.	TARGET GROUPS	OUTCOMES	IMPACTS
1	UT's Dept of Chemistry and UT's Directorate of Scientific Research, Projects and Foreign Relations.	Increased UT research papers in journals / conferences; Increased UT EU grant proposals.	Scientific/Economic: Albania's increased participation in EU R&D funding programmes.
2	Public organisations: e.g. National Environmental Agency, Ministry of Tourism and Environment Academic Associations: e.g. NanoAlb Private companies: e.g. EHW, LUFRA	Evidence-based policy development by Albanian government. Collaboration agreements between UT & Albanian private companies.	Societal: Albania's supported green transition and increased integration with EU. Technological/Economic: Albania's spurred digital transition and economic recovery.

FIT-4-NMP

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

How to write Section 3 "Implementation"

Giles Brandon, Intelligentsia Consultants

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 958255

Section 3: Implementation

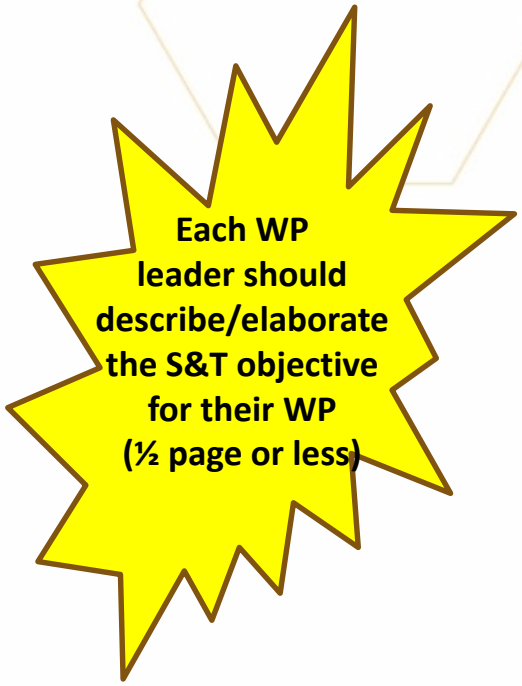
- Section 3.1: Work plan and resources
  - EC recommended length: 14 pages – including tables

- Section 3.2: Capacity of participants and consortium as a whole
  - EC recommended length: 3 pages

Section 3.1: Work plan and resources (14 pages)

1. Provide brief presentation of the overall structure of the work plan;
2. Provide timing of the different work packages and their components (Gantt chart or similar);
3. Provide graphical presentation of the components showing how they inter-relate (Pert chart or similar).
4. Provide detailed work description, i.e.:
   - a list of work packages (table 3.1a);
   - a description of each work package (table 3.1b);
   - a list of deliverables (table 3.1c); Distribute evenly over the project
5. Provide a list of milestones (table 3.1d); Distribute evenly over the project
6. Provide a list of critical risks, relating to project implementation, that the stated project's objectives may not be achieved. Detail any risk mitigation measures. You will be able to update the list of critical risks and mitigation measures as the project progresses (table 3.1e); Rule of thumb: describe at least two critical risks per work package
7. Provide a table showing number of person months required (table 3.1f);
8. Provide a table showing description and justification of subcontracting costs for each participant (table 3.1g);
9. Provide a table showing justifications for 'purchase costs' (table 3.1h) for participants where those costs exceed 15% of the personnel costs (according to the budget table in proposal part A);
10. Provide, if applicable, a table showing justifications for 'other costs categories' (table 3.1i);
11. Provide, if applicable, a table showing in-kind contributions from third parties (table 3.1j)

3.1: Work plan and resources



1. Excellence

1.1 Objectives

- Scientific and Technological (S&T) Objective 1
- S&T Objective 2
- S&T Objective 3
- S&T Objective 4

3. Implementation

3.1 Work Plan

- WP1: Tasks to achieve S&T Objective 1
- WP2: Tasks to achieve S&T Objective 2
- WP3: Tasks to achieve S&T Objective 3
- WP4: Tasks to achieve S&T Objective 4
- WP5: Dissem., Exploit. & Communication
- WP6: Project Management

Section 3.1: Work plan and resources
Work Package Description

See
MS Word file!

Section 3.1: Work plan and resources

Work Plan Timing

		WP/Task Leader	Task Support	Month 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36	
WP1	**Shielded Emitter**	**Merck**		MS1.1 MS1.2	
T1.1	Shielding substituents	Merck	-	D1.2 D1.4	
T1.2	Emissive core structure	Merck	UDUR	D1.3	
T1.3	Shielded deep blue emitter	Merck	UDUR	D1.5	
T1.4	Estimate shielding efficiency	Merck	UDUR	D1.1	
WP2	**TADF Host**	**UDUR**		MS2.1 MS2.2 MS2.3	
T2.1	Synthesise ICT molecules with high triplet levels	UDUR	Merck	D2.1 D2.2 D2.3	
T2.2	Batch scale synthesis and purification routes for new materials	UDUR	Merck	D2.4 D2.5	
T2.3	Changing molecular shape to induce higher degrees of self-ordering	UDUR	IOF		
WP3	**Photo-physical Characterisation**	**UDUR**		MS3.1 MS3.2 MS3.3 MS3.4	
T3.1	Elucidate photo-physics of shielded emitters	UDUR	Merck and IOF	D3.1	
T3.2	Determine photo-physical and energetic characteristics of TADF hosts	UDUR	Merck and IOF	D3.2 D3.3	
T3.3	Elucidate energy and electron transfer mechanisms	UDUR	Merck and IOF	D3.4	
T3.4	Determine microcavity and orientation effects on energy transfer	UDUR	Merck and IOF	D3.5	
WP4	**Optical Anisotropy**	**IOF**		MS4.1 MS4.2	
T4.1	Anisotropic dispersion of organic thin films in encapsulated samples	IOF	Merck and UDUR	D4.1	
T4.2	Orientation and internal emission spectra	IOF	Merck and UDUR	D4.2	
T4.3	Emitter ensemble average for different emitter systems	IOF	Merck and UDUR	D4.3	
T4.4	Simulation model of energy transfer inside an OLED	IOF	Merck and UDUR	D4.4	
T4.5	Experimental verification of energy and anisotropy effects	IOF	Merck and UDUR	D4.5 D4.6	
WP5	**Hyperfluorescence OLEDs**	**Merck**		MS5.1 MS5.2 MS5.3 MS5.4 MS5.5, MS5.6, MS5.7	
T5.1	Establish reference material system	Merck	UDUR and MOD	D5.1	
T5.2	Evaluate consortium materials and optimise stack	Merck	UDUR	D5.2 D5.8	
T5.3	"High throughput" characterisation	Merck	UDUR and IOF	D5.3	
T5.4	Model emission layer	Merck	UDUR and IOF	D5.5	
T5.5	Develop white OLED stack	Merck	MOD and IOF	D5.4 D5.6, D5.7	
T5.6	Conduct life cycle assessment for OLED stacks	Intelligentsia	Merck and MOD	D5.9	
WP6	**Hyperfluorescence Microdisplays**	**MOD**		MS6.1 MS6.2 MS6.3	
T6.1	Specifications	MOD	Merck	D6.1 D6.2	
T6.2	Microdisplay demonstration	MOD	Merck	D6.3	
WP7	**Dissemination and Exploitation**	**Intelligentsia**		MS7.1	
T7.1	Produce a data management plan	Intelligentsia	-	D7.1 D7.4 D7.7	
T7.2	Create and maintain a project website	Intelligentsia	-	D7.2	
T7.3	Create project promotional material	Intelligentsia	-	D7.3	
T7.4	Protect intellectual property	MOD	All	D7.5 D7.8	
T7.5	Disseminate achieved scientific and technological results	MOD	All		
T7.6	Produce exploitation plan	MOD	All	D7.6 D7.9	
T7.7	Cooperate with related European research actions	Intelligentsia	All		
WP8	**Project Management**	**Merck**		MS8.1 MS8.2 MS8.3, MS8.4	
T8.1	Collate deliverables, milestones and reports	Merck	Intelligentsia	D8.2 D8.3	
T8.2	Manage legal, contractual, financial, ethical and administrative matters	Merck	Intelligentsia	D8.1	
T8.3	Ensure communication between partners	Intelligentsia	All		
T8.4	Manage scientific and technical activities	Merck	All		
T8.5	Organise project steering committee meetings	Merck	Intelligentsia		
		Deliverables	◆		
		Milestones	✦		

Deliverables and milestones distributed "evenly" across the project

Section 3.1: Work plan and resources
Critical Risks

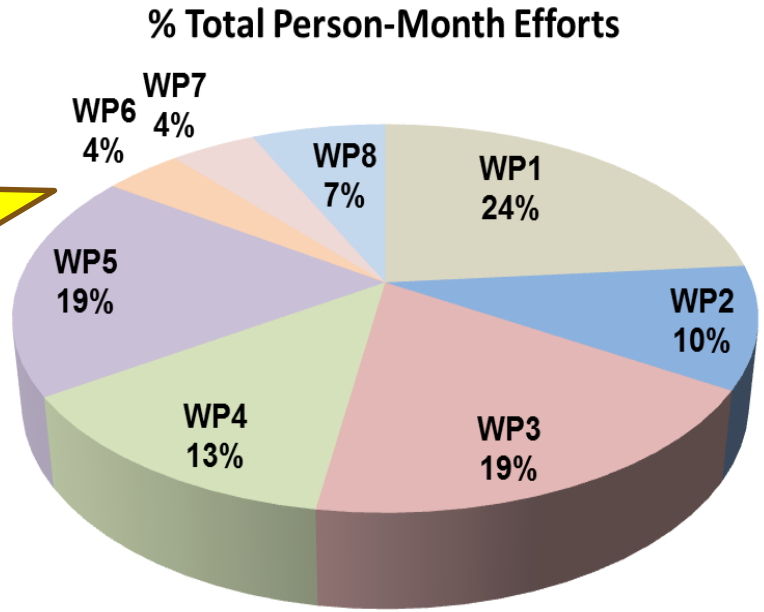
Risk No.	Description of Risk	WP(s)	Risk Rating	Proposed Risk Mitigation Measures
1	Molecular weight of shielded components could be too high for processing by thermal evaporation.	1	Low	Use compounds in OLEDs processed from solution.
2	If Dexter transfer is efficiently prevented by shielding, Forster coupling could be reduced to a level where efficient energy transfer from the TADF to the shielded emitter is not sufficient.	1	Low	The relative orientation of TADF to fluorescent core has to be optimised very carefully => shift resources to investigation of orientation and anisotropy effects.
3	New material designs cannot be synthesised.	2	Low	UDUR has developed many of the synthetic routes to D-A-D systems, especially the acceptor units, so varied approaches to the target molecules are in place to mitigate failure of one strategy.
4	Sufficiently high purity of materials cannot be achieved.	2	Low	UDUR has state-of-the-art facilities to analyse materials to determine impurities and a sublimation facilities in Physics for high quality purification. Multiple routes to materials exist to provide work-arounds to eliminate impurities that are impossible to separate.
5	Efficient fluorescence emitters will have weak or no phosphorescence making measurement of their triplet states difficult.	3	Med	UDUR has shown that steady state photo-induced absorption can be used to measure dark states in D-A-D molecules and will introduce time resol… measurements in this project to enable the dyna… measured.
6	Host and / or guest molecules do not show FRET.	3	Low	Change shie… …uce their separation.
7	Host and / or guest molecules do not orient.	3	Low	Induce enhance… …ing inert substituents.
8	Etc.	4	Etc.	Etc.

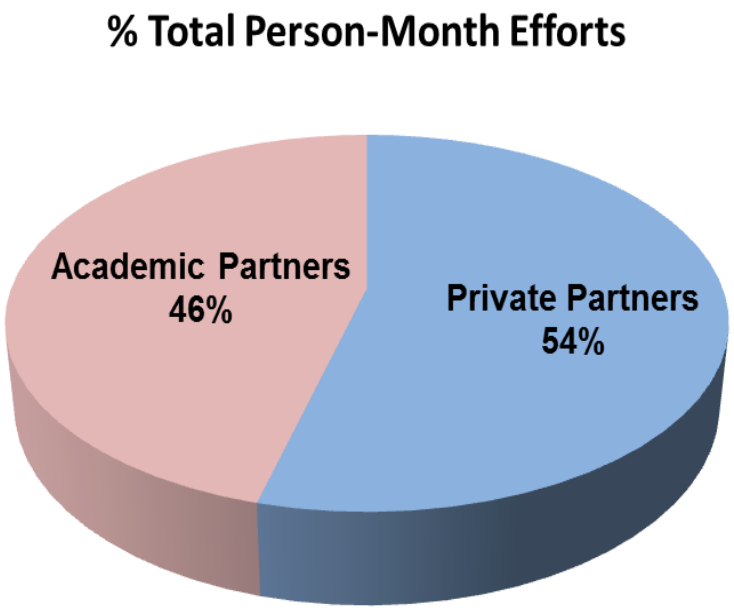
Rule of thumb: at least two risks per WP!

Section 3.1: Work plan and resources
Budget

Distribution of efforts (%)

5-7% of efforts (person-months) for Project Management (WP8)





- Concentration of efforts in WPs 1, 2, 3 and 4 reflects the project's strong focus on development of advanced materials, design and modelling tools and is in line with the call's scope.
- Several tasks/efforts (e.g. Task 5.5) in WP5 also directly contribute to WP6.
- Project management efforts (WP8) consistent with typical EU collaborative R&D projects.
- Good balance between efforts for academic partners (IOF and UDUR) and private partners (Merck, MOD and INT) also reflects the general balance between research and innovation tasks.

Section 3.2: Capacity of participants and consortium as a whole (3 pages)

1. Describe the consortium. How does it match the project's objectives, and bring together the necessary disciplinary and inter-disciplinary knowledge. Show how this includes expertise in social sciences and humanities, open science practices, and gender aspects of R&I, as appropriate. Include in the description affiliated entities and associated partners, if any.
2. Show how the partners will have access to critical infrastructure needed to carry out the project activities.
3. Describe how the members complement one another (and cover the value chain, where appropriate)
4. In what way does each of them contribute to the project? Show that each has a valid role, and adequate resources in the project to fulfil that role.
5. If applicable, describe the industrial/commercial involvement in the project to ensure exploitation of the results and explain why this is consistent with and will help to achieve the specific measures which are proposed for exploitation of the results of the project (see section 2.2).
6. Other countries and international organisations (based in a country or is an international organisation that is not automatically eligible for such funding).

Section 3.2: Capacity of participants and consortium as a whole (1 of 4)

Participant no.	Participant organisation name	Part. short name	Country
1 (co-ordinator)	Merck KGaA	Merck	Germany
2	MICROOLED S.A.S	MOD	France
3	Fraunhofer Institute for Applied Optics and Precision Engineering	IOF	Germany
4	Durham University	UDUR	UK
5	Intelligentsia Consultants Sarl	Intelligentsia	Luxembourg

Participant no.	Participant organisation name	Part. short name	Country
1 (co-ordinator)	MZ Denmark GmbH	MOZ	Germany
2	Ericsson AB	ERI	Sweden
3	F-Secure Oyj	FSEC	Finland
4	Intel Deutschland GmbH	INT	Germany
5	Intelligentsia Consultants Sarl	IC	Luxembourg
6	Luminem SRLs	LUM	Italy
7	Mind SRL	MIND	Italy
8	Riots Global Oy	RIO	Finla
9	Sensative AB	SEN	Swede
10	Consiglio Nazionale delle Ricerche	CNR	
11	RISE Research Institutes of Sweden AB	RISE	Sw
12	Centria Ammattikorkeakoulu Oy	CEN	
13	Politecnico di Torino	POL	

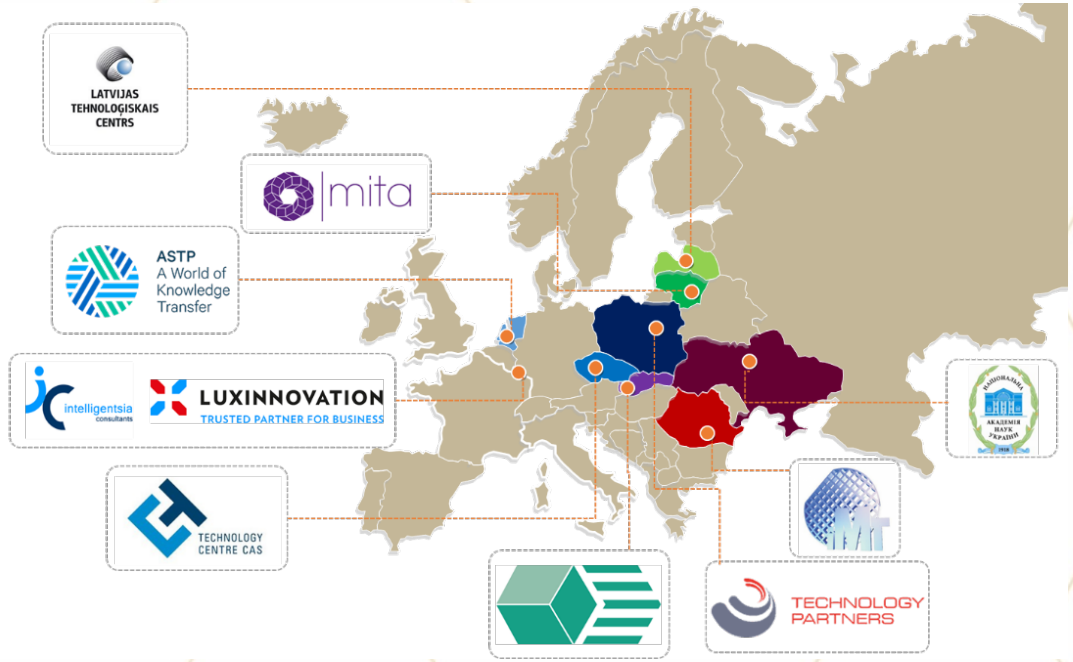
Participant no.	Participant organisation name	Part. short name	Country
1 (co-ordinator)	Technische Universiteit Delft	TUD	Netherlands
2	Technische Universiteit Eindhoven	TUE	Netherlands
3	Rheinisch-Westfälische Technische Hochschule Aachen	RWTH	Germany
4	Institut National de Recherche en Informatique et en Automatique	INRIA	France
5	Eidgenössische Technische Hochschule Zürich	ETHZ	Switzerland
6	Stichting IMEC Nederland	IMEC	Netherlands
7	ARM Limited	ARM	UK
8	IBM Research GmbH	IBM	Switzerland
9	Intelligentsia Consultants Sarl	INT	Luxembourg

Participant no.	Participant organisation name	Part. short name	Country
1 (co-ordinator)	Intelligentsia Consultants *Sàrl*	Intelligentsia	Luxembourg
	Novaled GmbH	Novaled	Germany
3	Astron Fiamm Safety *Sàrl*	Astron-FIAMM	France
4	University of Durham	UDUR	UK
5	Technische Universität Dresden	TUD	Germany
6	Kauno Technologijos Universitetas	KTU	Lithuania

Important to include companies across value chain

Section 3.2: Capacity of participants and consortium as a whole (2 of 4)

OLED Materials	OLED Stacks	OLED Micro-displays
• Shielded Emitter (Merck) • TADF Host (UDUR) • Photo-physical Characterisation (UDUR)	• Hyper-fluorescence OLEDs (Merck) • Optical Anisotropy (IOF)	• Hyper-fluorescence Microdisplays (MOD)
EU Project Management and Dissemination Support (Intelligentsia)		



Section 3.2: Capacity of participants and consortium as a whole (3 of 4)

Example: The project's scientific and technical objectives are perfectly aligned with the consortium partners' capabilities, contributions and complementarities:

No.	Scientific and Technical Objectives	Partner's Capabilities, Contributions and Complementarities
1	Develop new algorithmic solutions for targeted applications for CIM architecture	**IBM (WP leader)** is a pioneer of cognitive computing. The company has formed a new business unit called IBM Watson in 2014 offering services for data analytics and IoT. **TUD (Task leader)** has a strong record in developing and optimising healthcare (genomics and DNA sequencing) and data science algorithms for accelerated multi-core platforms.
2	Develop and design new mapping methods integrated in a framework for efficient compilation of the new algorithms into CIM macro-level operations	**INRIA (WP leader)** has extensive experience with the design and implementation of aggressive optimizations and analyses, including production compilers like Clang/LLVM and domain-specific code generators. **TUE (Task leader)** is specialised in research on low power single and multi-processor architectures, their programmability, and the predictable design of soft- and hard real-time systems.
3	Develop a macro-architecture based on the integration of group of CIM tiles	**TUE (WP leader)** is specialised in research on low power single and multi-processor architectures, their programmability, and the predictable design of soft- and hard real-time systems. **ETHZ (Task leader)** has a proven track record of working on novel processor and memory architectures.
4	Develop and demonstrate the micro-architecture level of CIM tiles and their models	**RWTH (WP leader)** has one of the World's leading groups on the process technology and basic physical-chemical understanding of functional oxide thin films w.r.t future integrated nanoelectronic devices, especially redox-based resistive switching memories (70+ papers, 3000+ citations). **IMEC (Task leader)** has past experience to lead the development of memristor crossbar based logic/ arithmetic and memory circuit design and simulation.
5	Design a simulator and FPGA emulator for the new architecture in order demonstrate its superiority	**ARM (WP leader)** is a world-renowned semiconductor IP company with around 3000 employees. ARM partners have shipped over 50 billion ARM microprocessors. The company has a strong track record on embedded processors, IoT devices, power-efficient server and HPC chips. **TUD (Task leader)** has a research focus on In-Memory Computing and targets the development, design and demonstration of new architecture paradigms to enable low energy and/or high throughput computing. TUD has a proven track record of implementing demonstrators.

Section 3.2: Capacity of participants and consortium as a whole (4 of 4)

The consortium partners will be able to effectively implement the MNEMOSENE project, because they have extensive past experience of working together on international research projects including:

- FP7 ENCORE involving TUD and ARM (2010-2013)
- H2020 ExaNode involving ARM and ETHZ (2015-2018)
- H2020 Antarex involving ETHZ and INRIA (2015-2018)
- H2020 neuRAM3 involving IMEC and IBM (2016-2018)

Their collaborative research work will also be facilitated by:

- Many researchers and engineers knowing each other on a personal level
- Management and technical issues being discussed during quarterly steering committee meetings
- Face-to-face consortium meetings occurring every six months
- Regularly using email, phone and Skype to communicate over the duration of the project

Work package number	3		Start Date or Starting Event		M1
Work package title	Photo-physical Characterisation				
Participant number	1	2	3	**4**	5
Short name of participant	Merck	MOD	IOF	**UDUR**	INT
Person/months per participant:	8	0	8	**54**	0

Objectives

Objective 3.1: Elucidate the photo-physics of shielded emitters including full energy level determination, fluorescence efficiencies and the effect of shielding structure and strategies on the emitter efficiency in regard to excitation and charge quenching.

Objective 3.2: Determine the photo-physical and energetic characteristics of each new TADF host material to aid proper design of hosts that efficiently couple to a dopant emitter, including detailed understanding of the host properties in an environment of other host molecules.

Objective 3.3: Elucidate the mechanisms of energy and electron transfer between a TADF host and emitter so that only singlet states can be harvested by the fluorescence emitter at near 100% effi

Objective 3.4: Determine the effects of anisotropic orientation on FRET coupling b emitters along will possible use of microcavity effects to enhance FRET energy transfer rates b

One task for each objective i.e. Objective 3.1 maps to Task 3.1, etc.

Description of work

This WP will provide full photo-physical characterisation of materials from WP1 and WP2 a well as collaborate with WP4 to optimise guest host hyperfluorescence emitter layer structures.

Task 3.1 Elucidate photo-physics of shielded emitters (Task Leader: UDUR; Support: Merck and IOF)
The main aim of this task is to design and undertake measurements to determine the efficiency of shielding an excitation on a shielded emitter to other excitations and charges in an OLED context. This will involve;

Etc ….

Task 3.2 Determine photo-physical and energetic characteristics of TADF hosts (Task der ort: Merck and IOF)
As described in the state-of-the-art section, the host 'environment' in terms of polarisabilit nt role in the photo-physical and energetic characteristics of any TADF material, thus to properl ly couples to a dopant emitter, careful characterisation of any host must be made.

Try to use the *imperative verb form* e.g. elucidate, determine, …

Etc ...

Task 3.3 Elucidate energy and electron transfer mechanisms (Task Leader: UDUR; Suppo Merck and IOF)
As described in the state-of-the-art section, the host 'environment' in terms of polarisability and polarity play an important role in the photo-physical and energetic characteristics of any TADF material, thus to properly design a host that efficiently couples to a dopant emitter, careful characterisation of any host must be made.

Etc …

Task 3.4 Determine microcavity and orientation effects on energy transfer (Task Leader: UDUR; Support: Merck and IOF)
Given that in a device various strengths of microcavities can be employed along with anisotropic orientation of emitters to improve outcoupling, the microcavity and orientational effects on energy transfer processes must be evaluated.

Etc …

Deliverables

D3.1: Report on TADF host tuning by the bulk host (UDUR, M12)
D3.2: Report on the photo-physics of first generation shielded emitters (UDUR, M24)
D3.3: Report on improved shielding strategies (UDUR, M30)
D3.4: Report on energy and electron transfer in TADF host shielded emitter guest s
D3.5: Report on microcavity effects on energy transfer in OLEDs (UDUR, M36)

Distribute deliverables evenly over the project …