DOCUMENT DE PRESENTATION DU PROJET DE GOUVERNANCE

PEPR ENSEMBLE

Pilote(s) scientifique(s)	Université Paris-Saclay (UPSaclay), CNRS, Inria, Université Grenoble Alpes (UGA),		
Directeur(s) du programme	Gilles, Bailly, DR Michel, Beaudouin-Lafon, PU Stéphane, Huot, DR Laurence, Nigay, PU		
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Titre du programme en français	*Futur de la collaboration numérique*		
Autres établissements impliqués dans le programme	Institut Mines-Télécom (IMT), Sorbonne Université (SU), Université Claude-Bernard-Lyon 1 (ULyon1), Université de Lille (ULille), Université Toulouse III - Paul Sabatier (UToulouse3)		
Durée du programme	96 mois		
Aide demandée Gouvernance	4410000 €	Coût complet	7 097 385,54 €

Résumé du projet de gouvernance en français (Non Confidentiel – 4000 caractères maximum, espaces inclus)

L'objectif du PEPR eNSEMBLE (*Future of Digital Collaboration*) est de redéfinir fondamentalement les outils numériques de collaboration. La stratégie globale du projet est double :

- Favoriser l'émergence et la durabilité d'une communauté forte et interdisciplinaire sur la collaboration médiatisée avec des outils numériques.
- Développer des théories de la collaboration qui tiennent compte de la richesse des outils et dispositifs numériques qui médiatisent les interactions entre les individus et redéfinissent nos notions d'espace et de temps.

L'organisation du PEPR englobe cinq Projets Ciblés et deux appels à projets (AAP et AMI). Les 4 directeurs du programme ont été désignés par le président ou le directeur général de chaque institution chef de file : CNRS, Inria, Université Grenoble Alpes (UGA) et Université Paris-Saclay (UPSaclay). Ils sont chargés du suivi stratégique et de la gestion opérationnelle du PEPR. Chaque projet ciblé est géré par trois coordinateurs. Ces coordinateurs sont des personnalités scientifiques issues de différents domaines de l'informatique et des sciences sociales et humaines afin d'assurer une bonne représentation et implication des différentes communautés scientifiques dans chaque projet ciblé.

La gouvernance du programme est composée :

- d'un **Comité de pilotage** (*Steering Committee*), composé d'un représentant de la gouvernance de chaque institution pilote ou partenaire (nommé par leur PDG/président). Il valide la désignation des coordinateurs de projets ciblés. Ce comité est également le garant de la conformité avec l'accord de consortium.
- du **Comité exécutif** (*Executive Committee*), composé des quatre Directeurs de programme, du *programme manager* et des coordinateurs de chaque projet ciblé. Le Comité exécutif assure la mise en œuvre, la gestion et le suivi du programme. Il assure la supervision des phases du programme dans chacun des projets ciblés. Le Comité exécutif est assisté par cinq comités correspondant aux actions transversales (voir ci-dessous).
- du **Comité consultatif** (*Advisory Board*), composé de 6 à 12 scientifiques internationaux dans les domaines du PEPR et de 6 à 12 représentants du tissu socio-économique. Son rôle est de fournir au Comité exécutif une expertise indépendante et informée sur les orientations scientifiques et d'innovation du programme et de sa mise en œuvre.

Le PEPR eNSEMBLE met en œuvre cinq actions transversales sous le contrôle du Comité exécutif :

- **Coordination** du programme pour assurer son succès, en se concentrant sur (1) le suivi et l'articulation des phases du programme ; (2) la définition et le suivi des cas d'utilisation communs ; et (3) le suivi et la coordination des aspects techniques ;
- **Développement technologique** pour assurer le développement de briques logicielles, de plateformes intégratives et de démonstrateurs ainsi que pour soutenir les spécifications et les normes ouvertes ;

- **Communication et diffusion** pour assurer l'animation d'une communauté pluridisciplinaire française autour des enjeux scientifiques et sociétaux de la collaboration médiée ; pour assurer l'organisation d'événements ; pour assurer la diffusion des résultats du programme (scientifiques, technologiques, pédagogiques, économiques et sociétaux) ;
- **Valorisation et transfert** pour construire des collaborations concrètes avec les partenaires socio-économiques ;
- **Éducation et formation** pour former une génération de doctorants et de chercheurs post-doctoraux à même de relever les défis à long terme de la collaboration avec les outils numériques ;
- **Stratégie internationale** pour assurer la visibilité du projet au-delà de la France par l'organisation et la participation à des événements scientifiques et autres et par l'échange de chercheurs.

1. Governance: context and objectives

1.1. Challenges and objectives of the program and strategy of the scientific pilots

The purpose of eNSEMBLE (Future of Digital Collaboration) is to fundamentally redefine digital tools for collaboration. The pandemic has demonstrated both the possibilities and limitations of current tools for computer-mediated collaboration. Whether it is to reduce our travel, to better mesh the territory and society, or to face the forthcoming problems and transformations of the next decades, the challenges of the 21st century will require us to collaborate at an unprecedented speed and scale.

To address this challenge, a paradigm shift in the design of collaborative systems is needed, comparable to the one that saw the advent of personal computing. To collaborate in a fluid and natural way while taking advantage of computer capabilities, collaboration and sharing must become native features of computer systems, in the same way that files or applications are today. To achieve this goal, eNSEMBLE will invent mixed (i.e. physical and digital) collaboration spaces that do not simply replicate the physical world in virtual environments, but aim at enabling co-located and/or geographically distributed teams to work together smoothly and efficiently.

The strategy of the project is twofold:

- Fostering the emergence and sustainability of a strong and interdisciplinary community on mediated collaboration with digital tools. Many French laboratories and research teams are addressing this topic in isolation and through different perspectives/fields. The objective is to identify, structure and animate this community to ensure long-term success.
- Developing theories of collaboration that account for the wealth of digital tools and devices that mediate interactions among individuals and redefine our notions of space and time. eNSEMBLE will build upon this knowledge to develop a new generation of infrastructure and tools that support efficient, sustainable and inclusive collaboration across a variety of areas from knowledge work to education, from play to factory work, and more. It will also identify effective models of organization that enable society to invent new modes of collaboration suited to their needs.

To achieve these goals, the program is organized into five Targeted Projects that are contracted separately from the present Governance project. Four Targeted Projects address specific aspects of collaboration: Collaboration spaces, Long-term collaboration, Collaboration with intelligent systems, and Managing collectives at larger scales. The fifth Targeted Project addresses transversal issues about methodology, ethics, and legal, economical and societal impact. The program has been designed in two main phases, "Maturation" (2-3 years) and "Concretization" (4-5 years). The maturation phase will consist of addressing the identified high-priority scientific issues. These initial results will lead to new scientific challenges to be addressed in the concretization phase and to a plan for the technological developments to be conducted in parallel.

1.2. Strategy of the pilot institutions

The four pilot institutions (University Paris-Saclay, University Grenoble Alpes, CNRS, Inria) are major actors in research fields related to digital tools for collaboration such as Human-Computer Interaction,

Distributed Systems or Artificial intelligence. In particular, UGA and UPSaclay are historical and pioneering centers of Human-Computer Interaction in France and in Europe. They also provide skills through their LabEX, EquipEX+ CONTINUUM, AI institutes and scientific clusters essential for the eNSEMBLE project.

The pilot institutions complementarity is strong: Inria and the INS2I institute of CNRS are recognized for their scientific excellence in computer and digital sciences. Their strategies involve strong partnerships with French players in the field (telephony/communication, cloud, software publishers and digital services) and already collaborate closely through numerous joint research teams and national initiatives. Finally, the four pilot institutions support and promote interdisciplinarity which is at the center of human collaboration with digital tools.

1.3. Governance

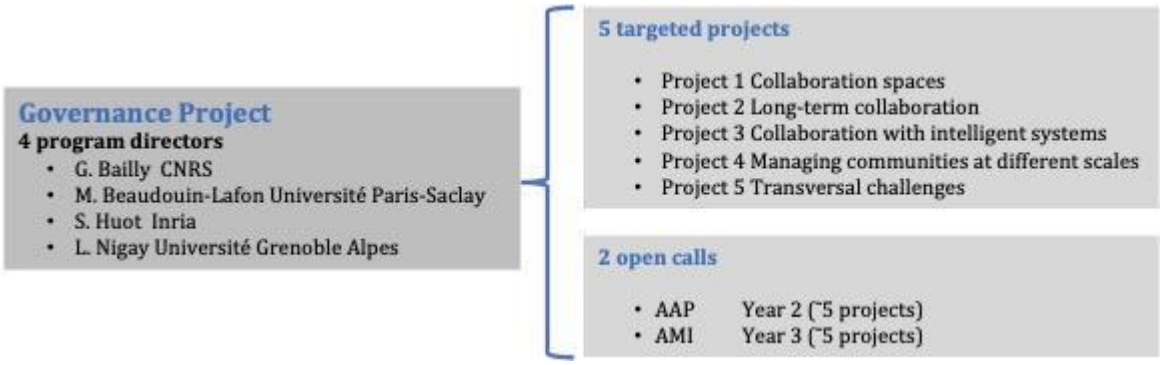

Figure 1: Organization of the PEPR eNSEMBLE. For the 5 targeted projects, we indicate the corresponding research theme and not the project title in order to emphasize the complementarity of the projects and thus the overall coherence of the program.

The organization of the PEPR is depicted in Figure 1: the **Governance Project** described in this document overlooks the five **Targeted Projects** («Projets Ciblés») that are contracted with ANR separately and the two **calls for projects** (AAP and AMI) that will take place during the program and will be managed by ANR. The four PEPR **Program Directors** were designated by the President or CEO of each lead institution: CNRS, Inria, University Grenoble Alpes (UGA) and University Paris-Saclay (UPSaclay). They are in charge of the strategic monitoring and operational management of the PEPR. Each Targeted Project is managed by three **Project Leaders**. These coordinators are scientific personalities who come from different fields of Computer Science and Social Sciences & Humanities in order to ensure a good representation and involvement of the different scientific communities in each Targeted Project.

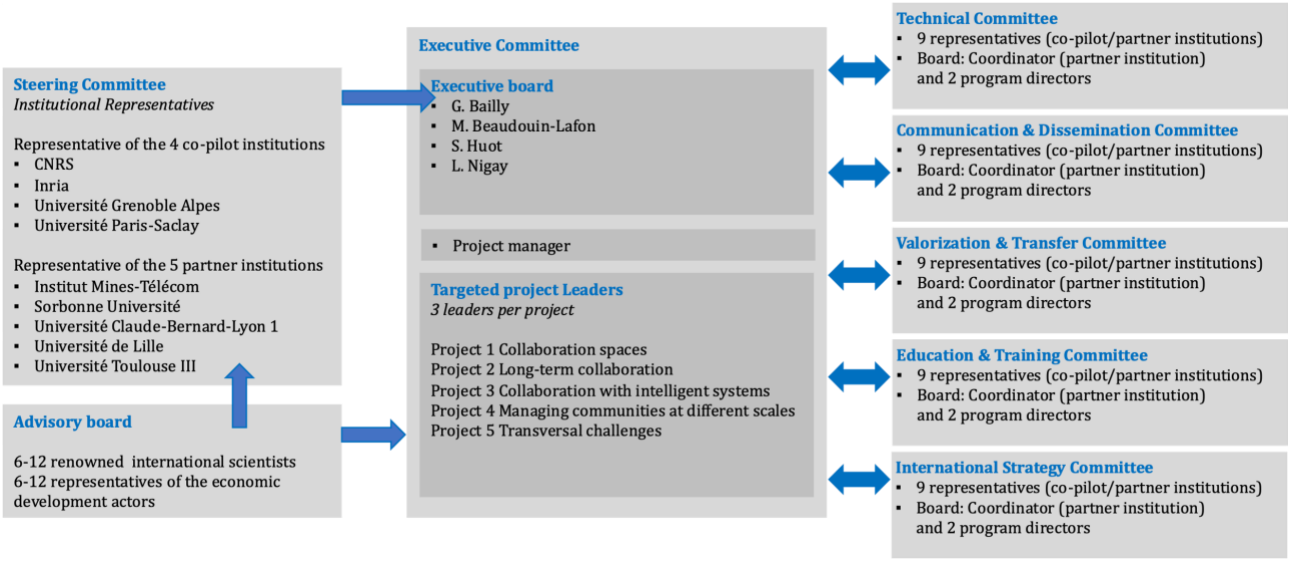

Figure 2 : Governance of the PEPR eNSEMBLE

The governance of the program is outlined in Figure 2. The **Steering Committee** is composed of one representative from the governance of each co-pilot or partner institution (appointed by their CEO/President). The committee is chaired by one of the representatives of the pilot institutions (Université Paris-Saclay in 2023). The four Program Directors are permanent invited guests of the Steering Committee.

The Steering Committee meets at least once a year and issues recommendations to the Program Directors on the execution and main orientations of the program. It validates the designation of the Project Leaders as recommended by the Program Directors and the strategic recommendations by the Project Leaders. It is also responsible for ensuring compliance with the consortium agreement.

The **Executive Committee** includes the four Program Directors, the program manager and the Project Leaders of each Targeted Project. The four Program Directors make up the **Executive Board** of the Executive Committee.

The Executive Committee ensures the implementation, management and monitoring of the program. Together, they ensure the supervision of the program phases in each of the Targeted Projects, as detailed in section 2.1.1 Program coordination.

- It ensures effective coordination with the task force, validates the progress of the different Targeted Projects, the annual reports and budget allocations;
- It defines research priorities, develops the scientific program, proposes and implements funding instruments (AAP, AMI, equipment, etc.);
- It ensures the representation and communication about the program in the various relevant ecosystems: academic, institutional, industrial, etc.;
- It meets as frequently as necessary and is supported by a project management team, including a **project manager** and administrative support staff;
- It regularly reports to the Steering Committee. Together, they guarantee the long-term vision of the PEPR.

The Executive Committee meets regularly and at least once a year in order to prepare the report to the Steering Committee on the progress of the program and to propose a possible revision of the roadmap for each Targeted Project. During these progress points and in particular at the end of the first phase (see section 2.1.1 Program Coordination), it will present the call for expressions of intent ("Appel à Manifestation d'Intérêt"; AMI) and the call for projects ("Appel à Projet"; AAP) for validation by the Steering Committee.

The Executive Committee is assisted by five committees corresponding to the transversal actions described in Section 2.1: the **Technical Committee**, the **Communication and Dissemination Committee**, the **Valorization and Transfer Committee**, the **Education and Training Committe**e, and the **International Strategy Committee**. Each of these five committees is coordinated by a board composed of one representative of a Partner Institution and two of the four Program Directors. Their members are representatives of the 9 co-pilot and partner institutions and will be proposed by the Executive Board and validated by the Steering Committee. Each of these five committees meets as frequently as necessary and meets at least once a year with the Executive Committee to report on its activities.

The **Advisory Board** (AB) is composed of 6-12 international scientists in the fields of the PEPR – Computer Science (Distributed Systems, Human-Computer Interaction, Virtual / Augmented Reality, Artificial Intelligence), Social Sciences and Humanities (psychology, sociology, ergonomics, management science, design) – and of 6-12 representatives from the relevant industrial ecosystem and from civil society (companies, clusters of companies, company incubators, partnership-based research institutes, civic organizations). It will be composed by the Steering Committee from a list of personalities proposed by the Executive Board. In particular, the Executive Board will ensure that the Advisory Board is composed of independent international experts covering the disciplinary diversity of the program.

Its role is to provide the Executive Committee and the Steering Committee with independent and informed expertise on the scientific and innovation orientations of the program and its implementation. It is consulted during the definition of the roadmap of the major phases of the program. It is invited to the annual eNSEMBLE event where a meeting with the Executive Committee is held. The Advisory Board is also consulted as often as necessary by the Executive Board.

2. Detailed description of actions

2.1. Implementation of the Different actions

Besides the five Targeted Projects, the PEPR eNSEMBLE implements five transversal actions:

- **Coordination** of the program to ensure its success, focusing on (1) the monitoring and articulation of the phases of the program; (2) the definition and monitoring of common use cases; and (3) the monitoring and coordination of technical aspects;
- **Technology development** to ensure the development of software bricks, integrative platforms and demonstrators as well as to support open specifications and standards.
- **Communication and dissemination** to ensure the animation of a French multidisciplinary community around the scientific and societal issues of mediated collaboration; to ensure the organization of events; to ensure the dissemination of the results of the program (scientific, technological, pedagogical, economic and societal).

- **Valorisation and transfer** to build concrete collaborations with non-academic partners.
- **Education and training** to train a generation of Master's and Ph.D. students as well as post-doctoral researchers to address the long-term challenges of collaboration with digital tools
- **International strategy** to ensure the visibility of the program beyond France through the organization and participation in scientific and other events and the exchange of scholars.

Except for the Coordination action, which is managed directly by the Executive Committee, the realization of the other five transversal actions is under the responsibility of the Executive Board. Each of them is managed by a dedicated committee and implemented as detailed below. Each committee meets as frequently as necessary. and once annually with the Executive Committee to help prepare the Executive Committee's report to the Steering Committee on the progress of the program, and to align the committee's actions according to the progress of the program and the possible revisions to the roadmap.

2.1.1.Program Coordination

In charge: Executive Committee

The Executive Committee will ensure the supervision of the program phases — Maturation and Concretization (section 2.2) — in each of the five Targeted Projects. It will define roadmaps and milestones (scientific challenges and demonstrators) at the beginning of each phase of the program, which will be discussed at the beginning of the phase and evaluated at mid-term together with the Advisory Board.

The Executive Committee will define the call for expressions of interest (AMI) and call for projects (AAP). These calls will be validated by the Steering Committee and managed by ANR. The selected projects are expected to last three to four years. They will be dedicated to some aspects of the program where the task force was not identified within the partners and not included in the targeted projects, to cross-cutting topics identified from the studies of each Targeted Project or new interdisciplinary challenges identified during the first phase. The emphasis will be put on interdisciplinary projects that contribute to federating the community around common problems.

Finally, the Executive Committee, assisted by the Technical Committee, will manage the network of engineers in charge of technological development and select the integrative platforms to develop (see Section 2.1.2 Technological Development).

2.1.2. Technological development

In charge: coordinator (Université Toulouse III - Paul Sabatier) and two program directors (from Inria & Université Grenoble Alpes)

The Technical Committee assists the Executive Committee in the management of the technological aspects of the program. Its main missions are the coordination and animation of a network of engineers of the program and the management of an "integration platform".

An objective of eNSEMBLE is to develop software bricks, integrative platforms and demonstrators as well as to support open specifications and standards. To achieve this, a network of engineers involved in the different Targeted Projects of the program will set up shared tools and ensure the mutualization

of resources, best practices and technological development when possible and relevant. More precisely, this action consists of:

- Managing the network of engineers, organizing exchange sessions and technological training in order to contribute to the empowerment of engineers on the technologies required by the program;
- Requesting human and technological resources from the Executive Committee for finalizing the development of the demonstrators and integrating them into the platform so that the other partners can benefit from them;
- Choosing, developing and managing the "integrative platforms". It also consists of facilitating the realization and mutualization of the demonstrators of the program and their integration in the integrative platforms so that the other partners can benefit from them;
- Sharing technological developments to promote the use of the developed tools within the program, in a logic of iterative design as well as promoting their use by external partners (organizations, companies), e.g., for evaluation and validation on real use cases;
- Creating and promoting connections with major equipment programs, e.g., Equipex+ / Research Infrastructures CONTINUUM / Huma-num;
- Supporting open specifications and standards to promote interoperability and ensure the long-term impact of the program's technological contributions.

2.1.3. Communication and Dissemination

In charge: coordinator (Sorbonne Université) and two program directors (from CNRS & Inria)

• Animation and internal communication

A major objective of eNSEMBLE is the **emergence and sustainability of a strong and interdisciplinary community** on mediated collaboration. The process of putting the program together has highlighted the fact that many French laboratories and research teams were addressing this topic in isolation and through different perspectives/fields. The animation of the program thus consists of consolidating this new community and ensuring its long-term success.

To this end, each Targeted Project is coordinated by three Project Leaders from different fields (mainly Computer Science and Social Sciences & Humanities) in order to ensure a good representation and involvement of the different scientific communities. Similarly, the governance features a balanced representation of the disciplines involved in the program. In particular, the Program Directors will ensure that the Advisory Board is composed of independent international experts covering the disciplinary diversity of the program.

• Meetings and events

Project Leaders are in charge of organizing at least one general meeting per year bringing together all the participants in their Targeted Project in order to share their results and ensure that everyone is following the established roadmap. They will encourage the organization of events/workshops within and between the Targeted Projects, through internal calls using program funds. They will also organize a bimonthly seminar, open to all members of eNSEMBLE, to present the advances of the program and where recognized speakers from the academic world or civil society will be invited to address relevant topics.

Starting in year 2, the Executive Committee will organize the annual eNSEMBLE days, which could include:

- Conferences to present and discuss the major results from the program's Targeted Projects to other participants and to the governance bodies (Steering Committee and Advisory Board). Some of these conferences will be opened to a larger academic or general audience;
- A multidisciplinary Young Researchers School/Seminar (YRS), dedicated to young researchers involved in the program, and favoring the opening to other scientific fields (an ad-hoc organization and program committee will be composed every year under the responsibility of the Program Directors);
- "Innov' eNSEMBLE", a forum and exhibition of demonstrations targeting users, companies and institutional representatives, which will foster connections with these actors and more generally with civil society (this session will take place once enough demonstrators have been developed).

- **Dissemination**

The dissemination of results, whatever their nature (scientific, technological, societal) is a primary objective of the program.

From a scientific point of view, we will ensure the publication and dissemination of results in major journals and conferences in the relevant fields (e.g., by supporting the organization of workshops associated with the main conferences in the fields).

We will follow ANR's **Open Science policy** by requiring all funded research projects within the program to publish their data and outputs on national platforms: HAL open archive for publications, TGIR Huma-Num's Nakala for data. All the produced code will be released and maintained under open-source licenses and referenced in the Software Heritage database, with the support of the program's research engineers who will be specifically trained in these practices.

To ensure the visibility of the community beyond its scientific results, we will establish connections with national (AFIHM, AFIA, AFXR, ARPEGE) and international (ACM, EUSSET) learned societies, taking advantage of the fact that several Program Directors and members of the Executive Committee are strongly involved in them.

Regarding the general public, civil society and institutions, the Executive Committee will encourage the participation and presentation of the program's activities in annual national events such as *Fête de la Science*, or in outreach initiatives in high schools such as Chiche!. They will also work closely with local initiatives of pilot and partner institutions to bring the academic world closer to society, such as contributing to funding programs for artists' or designers' residencies in research laboratories (e.g. AIRlab at University of Lille). This will feed our research but also produce artifacts adapted to communication towards the general public (interactive artworks, serious games, performances) that will be showcased e.g., during public sessions of the eNSEMBLE days.

2.1.4. Valorization and Transfer

In charge: coordinator (Institut Mines Télécom) and two program directors (from CNRS & Inria)

The program has received strong support from major French industrial players in the field. This transversal action strives to transform this support into concrete collaborations through targeted actions:

- Reinforce the partnerships already in place between these companies and the PEPR pilot and partner institutions;
- Identify potential companies as "users" of the PEPR results; identify relevant use cases with them and ensure that these practical cases are addressed in the different axes of the program;
- Set up collaborative projects involving industrial partners through the program calls for project;
- Organize the annual "Innov' eNSEMBLE" event dedicated to potential users and companies;
- Establish and animating a "community of users" beyond these companies, e.g., taking advantage of the users of the Equipex+ CONTINUUM platforms;
- Create and promote connections with Research Infrastructures, e.g. Huma-Num, research programs, e.g. PEPRs (Acceleration PEPRs on Digital Education, Digital Health, Cloud, IA, Cybersecurity), and research networks, e.g., CNRS GDR "Internet, IA and Society", IG-RV "Computer Graphics and Virtual Reality". This will open up a variety of large-scale application domains and use cases for eNSEMBLE, but also give access to the necessary technological resources for the execution of the program.

We will hire a transfer and innovation engineer (24 person.month). She/He will be in charge of implementing these actions under the responsibility of the board of the transversal action, in close collaboration with the innovation and partnership departments of the different involved institutions and with the advice of the advisory board, particularly its representatives of the economic development actors.

2.1.5. Education and Training

In charge: coordinator (Université de Lille) and two program directors (from Université Grenoble Alpes & Université Paris-Saclay)

Studying collaboration is inherently transdisciplinary. Although there are educational programs dedicated to digital transformation, community management, interaction design, human-computer interaction (HCI), Virtual and Augmented Reality, there are no master program dedicated to collaborative technologies in France. A major objective of eNSEMBLE is to train a generation of Master's and Ph.D. students as well as post-doctoral researchers to address the long-term challenges of collaboration with digital tools. eNSEMBLE will develop education and training programs at several levels:

- **Undergraduate and Graduate levels**

At the undergraduate and graduate level, the actions of eNSEMBLE aim to:

- Identify existing training in France and abroad;
- Create a scholarship program for attracting exceptional candidates who wish to obtain a master's degree from the universities involved in eNSEMBLE and then apply to a doctoral program within one of the laboratories associated with eNSEMBLE ("PhD track");
- Develop an interdisciplinary Master track (planned to start during the second phase of eNSEMBLE, see Figure 3), especially in the pilot universities (UGA and UPSaclay), bringing together social sciences, management and computer science, to train a generation of experts;
- Develop shared curricula to be integrated into existing Bachelor and Master programs in universities, business schools and engineering schools;

- Encourage and develop pedagogical initiatives related to the PEPR eNSEMBLE such as building dedicated rooms, providing specific equipment for teaching collaboration, financing external experts in teaching units (UE) labeled eNSEMBLE, etc.

• Doctoral program

Four waves of **doctoral programs** will be set up during the program. In the first phase, they will be focused on specific topics and challenges, typically within each of the Targeted Projects; In the second phase, they will be opened to more general topics, to foster the synergy across Targeted Projects. In both cases, the Executive Committee will favor collaborative interdisciplinary projects by implementing "twin" doctoral programs (to address a research question from different disciplinary perspectives), and provide support for students to visit different partners of the program in order to enrich their research experience during their Ph.D. or after (with the possibility of pursuing a post-doc in another partner institution or with major international partners). To ensure to get the best Ph.D. candidates on the highest priority topics with the most appropriate hosting teams, the Executive Committee will put in place the following process:

1. The Executive Committee will define a list of Ph.D. topics that should be funded in priority as well as the envisioned hosting teams;
2. The topics will be announced to the participating teams, who will propose detailed Ph.D. proposals with identified advisors and hosting teams;
3. The Executive Committee will decide which proposals will be part of the call;
4. A call for candidates will be widely disseminated and applications collected;
5. The Executive Committee, with the help of external evaluators, will assess the applications, i.e. the triplet consisting of the Ph.D. topic, the Ph.D. advisor(s) and the Ph.D. candidate, and will select those funded.

Several criteria will be considered, including:

- Scientific excellence of the topic/advisor/candidate topic;
- Match with the themes and priorities of the Targeted Projects;
- Balance across the participating teams, laboratories and advisors;
- Gender diversity;
- Balance across the Targeted Projects.

• Other education and training actions

eNSEMBLE will create short dedicated training programs, for instance, training programs dedicated to companies, Ph.D. students and high school teachers. eNSEMBLE will also be in contact with different organizations related to the French education system such as CLEMI, an organization in charge of Media and Information Literacy in the French Educational system and PEPR Digital Education ("*Enseignement et Numérique*"). Its mission is to train teachers to better understand and use new media systems, to foster critical thinking and media literacy of children.

When the software and platforms developed in the program will have reached a sufficient level of maturity (see Section Technological Development), eNSEMBLE will set up training sessions for professionals within the framework of Inria Academy.

2.1.6. International strategy

In charge: coordinator (Université Lyon 1) and two program directors (from Université Grenoble Alpes & Université Paris-Saclay)

The goal of the International Strategy is to ensure the visibility of the program beyond France through the organization and participation in scientific and other events and the exchange of scholars. Actions include but are not limited to:

- Organization of international summer/winter schools in France open to European doctoral students to foster exchanges;
- Organization of workshops during international events;
- Monitoring of European calls to encourage partners to participate;
- Foster the inclusion of research themes related to eNSEMBLE in European calls for projects and bilateral actions;
- Funding of scholarships for international Master-level students who are interesting in pursuing a Ph.D. in the program;
- Visits (short or long stays) of eNSEMBLE doctoral students to collaborate with foreign laboratories and prepare post-doc abroad;
- Visits of eNSEMBLE researchers to foreign laboratories and research centers;
- Visits of international researchers to eNSEMBLE teams.

2.2. Organization of the work - Gantt Diagram

The program has been designed in **two main phases** (Figure 3), "*Maturation*" (2-3 years) and "*Concretization*" (4-5 years).

The goals of the **maturation phase** are the following:

- To define and addressing the high-priority scientific issues;
- To foster new collaborations between fields;
- To elicit a set of promising use cases from the eNSEMBLE community (both scientists and industrials);
- To explore novel interaction models and testing their genericity, i.e. how well an interaction model can be transposed to different use cases.

These initial results will lead to new scientific challenges to be addressed in the concretization phase and to a plan for the technological developments to be conducted in parallel.

The goals of the **concretization phase** are three-fold:

- To select and consolidate a subset of the most promising use cases and interaction models proposed during the maturation phase;
- To develop concrete demonstrators based on the selected use cases and interaction models;
- To develop an integrative platform. It is a set of modules that guarantee interoperability within and between interaction models. The objective is that these modules will be used among the members of the program and outside of it.

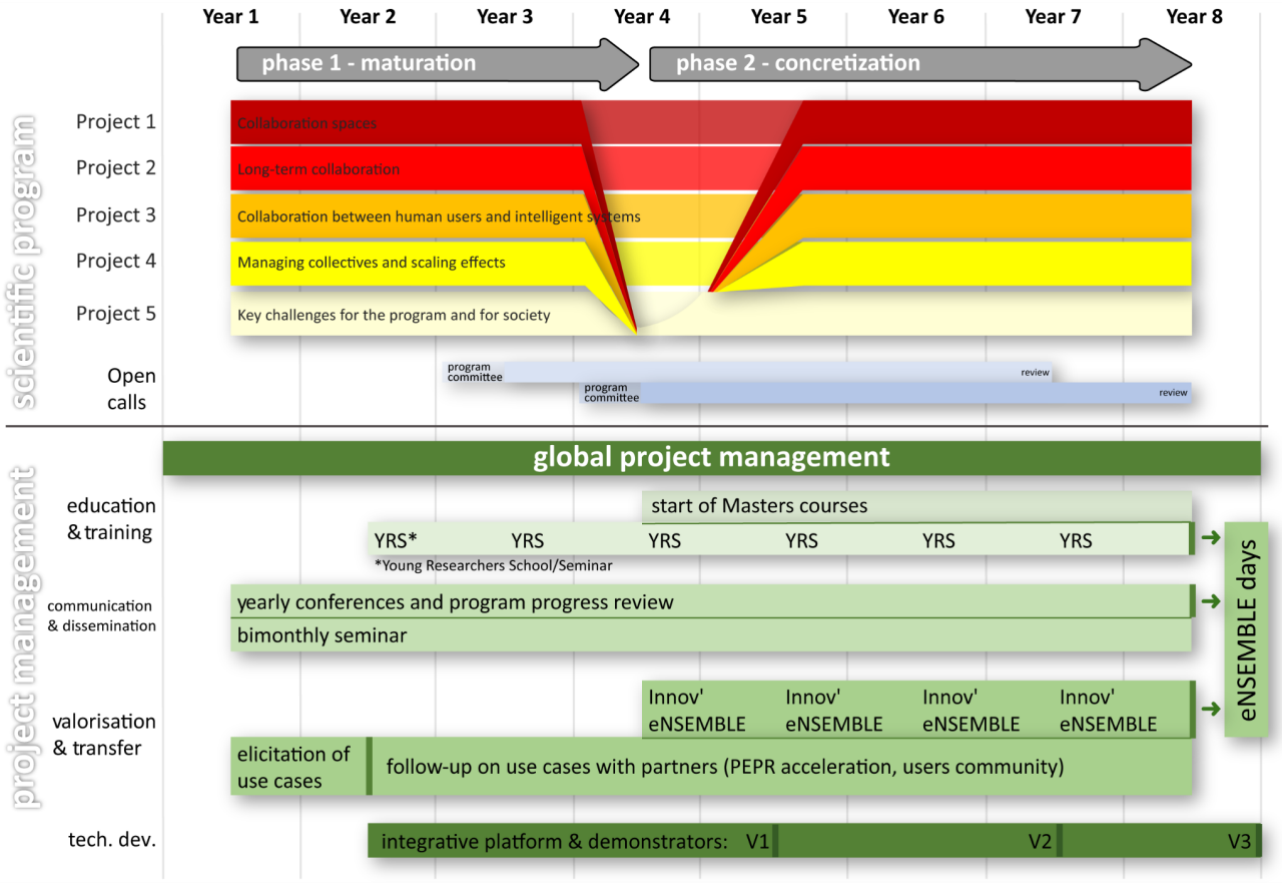

Figure 3 – Timeline of the eNSEMBLE program

Throughout the program duration, two open calls for projects (“AAP” or "AMI") will be launched to further expand the eNSEMBLE community, with the goal of funding about 10 projects. Each call will fund about five projects. The duration of the projects will be from three to five years. The budget of each project will be around 1000k€. The Executive Committee, in coordination with the Project Leaders, will define the topics of the calls. The themes of an "AAP" (*Appel à Projets*) will be selected upfront by the Executive Committee. An "AMI" (Appel à Manifestation d'Intérêt) will have a first phase where topics are gathered from the community and then selected by the Executive Committee for submission of full proposals.

2.3. Milestones and deliverables

Milestones of the maturation phase:

M1. The first milestone is at the end of Year 1 to select the most promising **use cases** that will structure the program.

M3. The next milestone is at the end of Year 3 to assess the theoretical contributions, meaning a **set of articulated interaction models** and the **measures of quality** and decide which ones will be developed in the concretization phase. We will also review the **proof-of-concept prototypes** and decide which ones should feed the demonstrators and integrative platform.

This will mark the beginning of the concretization phase.

Milestones of the concretization phase:

M5. We assume that after five years, the **interaction models and measures** will be refined and revised, and will assess them again. Moreover, the first version of the **integrative platform (V1)** and some **demonstrators (V1)** will be functional.

M7. The second version of the **integrative platform (V2)** and **demonstrators (V2)** will be functional. Some **specifications** will also be available.

M8. At the end of the program, we will assess its scientific and technical outputs.

For each milestone, a deliverable will be produced and shared among the community. Moreover, an annual report will be produced and shared with all the instances of governance.

Phase	**Deliverables Milestone**	**Year**	Results
Maturation	**M1**	1	Use case definition
	M3	3	Set of articulated interaction models (V1) Definition of measures of quality (V1) Proof-of-concept prototypes
Concretization	**M5**	5	Set of articulated interaction models (V2) Integrative platform (V1) Demonstrators (V1)
	M7	7	Integrative platform (V2) Demonstrators (V2) Specifications (V1)
	M8	8	Set of articulated interaction models (V3) Integrative platform (V3) Demonstrators (V3) Specifications (V2)

2.4. Key Project Indicators (KPI)

In this section, we describe the envisioned KPIs organized into three categories:

- Common France 2030 KPIs;
- KPI specific to the eNSEMBLE PEPR.

The different KPIs (and the target values) will be refined in 2023 in consultation with the ANR.

Common France 2030 KPIs

KPI	Relevance	Risk	Corrective measures
Scientific production			
Publications mentioning eNSEMBLE	High	Low	• Increase the communication of deadlines of conferences and journals relevant to the PEPR eNSEMBLE
Other publications	Low	-	-
Intellectual property			
Patent	High	Medium	• Encourage the members of the program to apply
Datasets	High	Low	• Encourage the members of the program to apply
Software	High	Medium	• Dedicate more funding to the technical committee
Technological production			
Number of technologies	High	Medium	• Dedicate more funding to the technical committee
External fundings			
External fundings	High	Low	• Dedicate more funding to the valorization and communication committees
ERC submitted/obtained	Medium	Medium	• Encourage the members of the program to apply and promote specific training or incubation programs
Human resources			
Number of EC/C & Gender	High	Low	• Advertise the program to relevant research groups who are not yet involved in eNSEMBLE • Lobby partner institutions to allocate permanent positions on the topics of the program
Engineers / technician & Gender	Medium	Low	• Lobby partner institutions to allocate permanent positions on the topics of the program
Education			
Number of educated persons in			
Bac+2	Low	n/a	*This education level is not targeted by the prorgam*
Licence	Low	n/a	*This education level is not targeted by the prorgam*
Master	High	Medium	• Advertise the eNSEMBLE accredited courses • At equal level, choose women and non-binary persons • Dedicate more funding to master grants in the Targeted Projects
Number of initiated PhD thesis	High	Low	• At equal level, choose women and non-binary persons • Encourage women and non-binary to apply
Number of initiated CIFRE	High	Medium	• Develop partnerships with industry
Number of postdocs	High	Low	• At equal level, choose women and non-binary persons Encourage women and non-binary to apply

KPIs specific to the eNSEMBLE PEPR

The list of KPI specific to the PEPR eNSEMBLE focuses on the main outputs of the program at the scientific, industry transfer, training and technical levels. We want to emphasize interdisciplinary work with specific KPIs for publications with authors from multiple disciplines and cross-disciplinary co-advised Ph.D.s.

KPI	Risk	Corrective measures
Scientific KPIs		
Number of Interdisciplinary publications	Medium	• Increase the ratio of funded PhD thesis involving interdisciplinary co-advising • offer dedicated training to value the work in different disciplines • Increasing the ratio of funding dedicated interdisciplinary micro-projects
Valorization KPIs		
Number of links / projects with industry partners	Medium	• Participate in industrial events Increase communication towards industrials
Training KPIs		
Number of co-advised PhD thesis	Low	• Favor open-call projects proposing PhD co-advising
Number of co-advised PhD thesis with advisors from different fields	High	• Favor open-call projects proposing Ph.D. co-advising with advisers from different fields
Number of students in the eNSEMBLE accredited courses	Medium	• Advertise the eNSEMBLE accredited courses
Seminars, summer/winter schools	Medium	• Dedicate more funding to the animation • Work in close collaboration with the pilot institutions and partners
Number of eNSEMBLE accredited courses	Low	• Advertise the eNSEMBLE accredited courses Provide support (funding, curricula, …) to Universities to develop these courses
Technical KPIs		
Number of functional demonstrators	Medium	• Dedicate more funding to the technical committee
Number of contributions per demonstrators	Medium	• Dedicate more funding to the technical committee
Number of specifications	Medium	• Create a working group managed by the technical committee Provide support for building specifications
Communication and Dissemination KPIs		
Number of dissemination actions	Low	• Encourage the community to communicate
Number of articles in the press	High	• Reinforce the dissemination actions with the Communications Board

International KPIs		
Number of international actions (visitors, events, masters)	High	• Encourage the organization of workshops in international events (conferences, schools, etc.)
Leverage KPIs		
Number of awards (ERC, IUF, Best papers, etc.)	Low	• Encourage members of the program to apply • Develop a program to mentor applicants

3. Justification of the requested means

The budget charged to the program for each of the transversal actions is as follows. One of the pilot institutions will be the administrative coordinator of each action (in bold in the table below) and will receive the corresponding budget. One partner institution will be coordinating each of the actions but will not manage the budget (in italics in the table below).

Types of expenses	without overhead	with 20% overhead	%total
Education & Training [**UGA** & *ULille*]	477 k€	572 k€	13.0%
Valorization & Transfer [**CNRS** & *IMT*]	317 k€	380 k€	8.6%
Communication & Dissemination [**CNRS** & *SU*]	317 k€	380 k€	8.6%
Technical development projects [**Inria** & *UToulouse3*]	632 k€	758 k€	17.2%
International strategy [**UGA** & *ULyon1*]	477 k€	572 k€	13.0%
Global project management [**UPSaclay**]	1457 k€	1 748 k€	39.6%
Total requested funding for Animation & Governance	**3675 k€**	**4 410 k€**	**100%**

The breakdown of each of these actions is as follows (with values rounded to 1k€):

Education and training (477k€, or 572k€ including 20% overhead)		
Organization of four summer / winter school (four schools x 17k€)	68k€	82k€
A two-day Phd Program committee per year (four years x 1.6k€)	6k€	7k€
Master Scholarships (45 students x 6.5k€)	293k€	352k€
Education platform	53k€	64k€
Education and Training meetings	6k€	7k€
Animation of education and training activities	50k€	60k€
Valorisation and Transfer (317k€, or 380k€ including 20% overhead)		
Five Video	35k€	42k€
Participation in industrial events (~3-5 events per year)	40k€	48k€
Participation in other events (e.g. PEPR)	6k€	7k€
Organization of four Innov'Ensemble (4 x 23k€)	92k€	110k€
One engineer (two years x 51.6k€)	103k€	124k€
Operating costs	15k€	18k€
Assistant manager (7.5PM)	26k€	31k€

Communication and Dissemination (317k€, or 380k€ including 20% overhead)		
Annual event (seven years x 20k€)	140k€	168k€
One-day workshop per Targeted Project and year (~35 wshops x 4k€)	145k€	174k€
Other actions	5k€	6k€
Assistant manager (7.5PM)	26k€	31k€
Technical development (632k€, or 758k€ including 20% overhead)		
96 person.month engineers (96 * 6k€)	576k€	691k€
One-day Implementation workshop per year	40k€	48k€
Engineers' travel expenses	10k€	12k€
Operating costs	6k€	7k€
International strategy (477k€, or 572k€ including 20% overhead)		
Organization of two international summer / winter schools (2 x 17k€)	34k€	41k€
International Master Scholarships (10 students x 10k€)	100k€	120k€
International visits (incoming and outgoing, ~50 visits x ~3k€)	147k€	176k€
Outgoing doctoral students / post-doctoral preparation (17 Ph.D. students x 10k€)	170k€	204k€
International strategy meetings	6k€	7k€
Animation of international strategy activities	20k€	24k€
Global project management (1457k€, or 1748k€ including 20% overhead)		
Project manager during eight years	432k€	518k€
Administrative assistant during eight years	288k€	346k€
Management meetings	100k€	120k€
Payroll of the four directors charged to the program (15% of their time)	636k€	763k€