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ELI Delivery Consortium Search Committee

Background information on the ELI Delivery Consortium

- **Basic elements on the ELI project**

Initiated in 2005 and listed on the Roadmap of the European Strategic Forum for Research Infrastructures (ESFRI) in 2006, the Extreme-Light-Infrastructure (ELI) aims at investigating the large variety of science and research applications of ultra-intense and ultra-short laser pulses. ELI will be based on a new generation of laser technologies producing sources of ultra-intense high-energy particle beams and ultra-bright radiations up to the attosecond timescale. As the first truly international laser research infrastructure, ELI will provide access to the international research and industrial community for prospective applications in medicine, radiography, fusion energy, environment, material sciences, nanotechnologies, bio-chemistry, etc.

Launched in November 2007, the Preparatory Phase of ELI involved nearly 40 research and academic institutions spanning 13 EU Member States. This 36-month phase aimed at bringing the project to the level of legal, organisational, financial and scientific maturity. As part of that work, the scientific community involved in the Preparatory Phase identified four branches of research and applications within the scientific scope of ELI:

1. Attosecond Laser Science**:** temporal investigation of electron dynamics in atoms, molecules, plasmas and solids at attosecond scale (10^{-18} sec., i.e. a billionth of billionth of a second)
2. High Energy Beam Science: development and usage of dedicated beam lines with ultra short pulses of high energy radiation and particles reaching almost the speed of light
3. Laser-Induced Photonuclear Physics: nuclear physics methods to study laser-target interactions, new nuclear spectroscopy, new photonuclear physics, etc.
4. Ultra High Field Science: investigation of laser-matter interaction in an energy range where relativistic laws could stop to be valid.

- **Decision on the distributed implementation of ELI**

The identification of these four pillars structured the discussions on the conditions of implementation of ELI. On 1 October 2009, the funding agencies represented in the Steering Committee of the ELI Preparatory Phase Consortium decided to give the mandate to the Czech Republic, Hungary and Romania to launch the implementation of ELI through the construction of three specialised, coordinated and complementary facilities dedicated to the first three scientific "pillars" mentioned above. Each facility will be based on cutting-edge laser systems optimised for their specific scientific case.

On the occasion of the same meeting, it was decided that the decision on the conditions of implementation of the fourth "pillar" of ELI – the emblematic ultra-high intensity facility – would be taken at a later stage, notably on the basis of a detailed review of the technological solutions currently under development in Europe.

The ELI facilities shall be placed under the single governance of a European Research Infrastructure Consortium (ERIC) in charge of ensuring their joint operation as a single

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research infrastructure. ERIC is a new legal form created by the EU[1] to facilitate the creation of pan-European consortia in the field of Research Infrastructures; this legal form is recognised in all Member States and benefits from exemptions similar to those of international organisations. ELI will be the first ESFRI research infrastructure to be implemented in new EU Member States.

- **Terms of the mandate given to the three hosting countries**

The resolutions of the Steering Committee lay down a few fundamental principles on the way ELI should be implemented and subsequently operated from the legal and organisational point of view:

- The mandate given to the three hosting countries concerns the development of an "integrated" infrastructure, i.e. of an infrastructure that should be operated under the coordination of a single governance structure
- The three hosting nations have therefore the responsibility to establish a pan-European consortium to operate ELI
- The hosts should sign as soon as possible a Memorandum of Understanding defining a strategy leading to the establishment of a European Research Infrastructure Consortium (ERIC), followed by those countries "ready and willing to contribute to the realisation of ELI".

- **Funding scheme and current financial status**

The availability of funding from the European Regional Development Funds (ERDF) in the three hosting countries represented a tremendous opportunity for ELI. The investment and start-up costs of the three facilities will be co-funded[2] by ERDF through the following Operational Programmes dedicated to R&D&I:

- The Operational Programme "Research and Development for Innovations" in the Czech Republic
- The Operational Programme "Economic Development" in Hungary
- The Operational Programme "Economic Development for Competitiveness" in Romania.

The situation in the three hosting countries is currently as follows:

- The Institute of Physics of the Academy of Sciences of the Czech Republic, which is the entity in charge of the implementation of the so-called "Beamlines" facility of ELI, submitted its application for funds (approximately €268 million without VAT) on 30 June 2010. The project was eventually approved by the European Commission in April 2011 and the grant agreement was signed between the beneficiary (i.e. the Institute) and the Czech managing authority in August 2011
- The ELI-Hu Kft., a non-profit limited liability company with the Hungarian State, the municipality of Szeged and the University of Szeged as shareholders, will be the legal entity in charge of implementing the "Attosecond Light Pulse Source" facility of ELI. ELI obtained full governmental support in Hungary in January 2011. The application for structural funds (approximately €245 million of investment and start-up costs) is being prepared and should be submitted to the European Commission for approval in January 2012
- The "Horia Hulubei" National Institute of Research and Development for Physics and Nuclear Engineering is the entity in charge of the implementation of the ELI Nuclear Physics facility. The project is officially supported by the Romanian government, who has decided to include it on the list of projects to be funded under the Operational Programme "Economic Development for Competitiveness". The grant application is in

[1] Council Regulation (EC) No 723/2009 of 25 June 2009 on the Community legal framework for a European Research Infrastructure Consortium (ERIC)

[2] In all three countries, part of the investment is co-funded by national financial resources (approximately 15% in the three countries).

its final phase of development (review by JASPERS) and should be submitted in the coming months to the European Commission.

- **What strategy for the institutional implementation of ELI?**

Following the decision taken in October 2009 by the ELI Preparatory Phase Steering Committee, a detailed legal analysis was conducted in order to identify under which conditions ELI's institutional setup should be implemented. The main objective of this analysis was to define, more precisely, under which legal arrangements the establishment of the ELI-ERIC could be feasible, especially given the constraints pertaining to the use of structural funds by the three hosting countries.

It resulted from this analysis and from the local institutional arrangements decided in the three hosting countries, that the legal implementation of the project as a whole should be based on two main phases:

- During the implementation of the project (2011-2015), the three hosting countries will apply for funding and conduct all activities linked to the construction, research and development, setting-up, assembling, testing and commissioning of the three ELI facilities by the proxy of three local legal entities acting as grant applicants and beneficiaries. These entities will be the founding members of an interim structure, the ELI Delivery Consortium, with the purpose of maintaining ELI as a single pan-European infrastructure. Its main mission will consist in ensuring the permanent cooperation between the three local teams through an institutional framework facilitating the transition to the ELI-ERIC.
- Additionally, the ELI Delivery Consortium will carry out the work and organise the negotiations leading to the establishment of the ELI-ERIC. In due time, when all required conditions will be satisfied and when negotiations will be completed, the application for establishing the ELI-ERIC will be submitted to the European Commission for approval. The main task of the ELI-ERIC will be to coordinate and manage the operation of ELI as a single research infrastructure based on the three (and eventually four) facilities. The date of the establishment of the ELI-ERIC will naturally depend on the outcomes of the negotiation process, but it is anticipated that this establishment should be completed no later than in the second half of 2014 in order to organise efficiently the opening of the infrastructure to users in 2016.

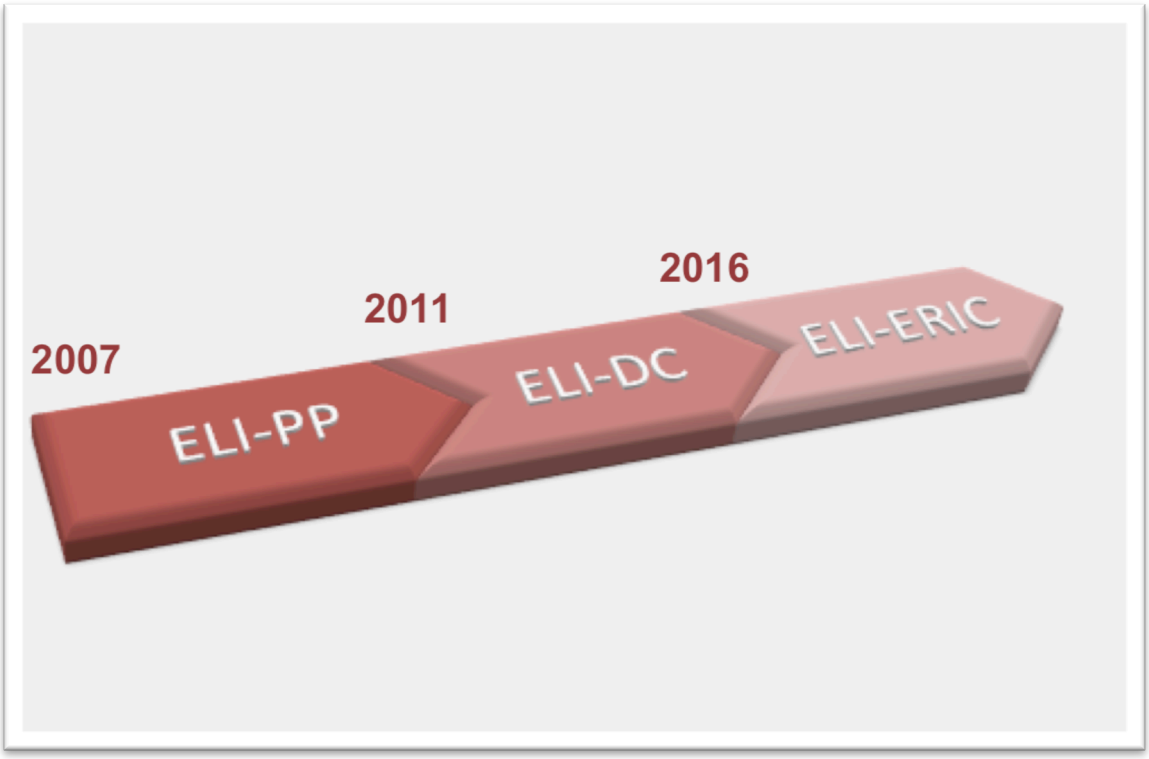

Figure 1: Overview of the institutional implementation timeline of ELI

The option of entrusting the ERIC with the responsibilities of implementing the three facilities – which would have had a significant tax impact – was rejected, for the legal and practical feasibility of such an option was extremely doubtful (uncertain eligibility of the ELI-ERIC as the beneficiary of the grants, impossibility of securing membership from partner funding agencies in such a short period of time, willingness to leave time for negotiations with partners on the conditions of operation of the infrastructure, etc.).

As a result of this implementation strategy, the local entities in charge of applying individually for the funding of the three ELI facilities will be solely accountable to their respective national Managing Authority for the due execution of the activities described in the grant agreements. The ELI Delivery Consortium will ensure that the individual responsibility of the three beneficiaries in the implementation of the facilities does not affect the consistency of ELI, its visibility and its development as a single pan-European initiative. The three grant applications will comply entirely in their content with the decisions taken by the ELI-PP Steering Committee.

Governance of ELI during the implementation phase[3]

In this part, we provide basic elements of information on the governance of ELI at the European level during the implementation phase. We also detail the missions and organisation of the ELI Delivery Consortium (ELI-DC).

- **Rationale behind the creation of the ELI-DC**

[3] The arrangements described below are the result of the on-going negotiations between the three hosting countries. Some slight modifications and improvements may be decided in the coming weeks.

Given the phased institutional setup described above and the individual responsibility of the three beneficiaries in the implementation of the first three facilities, ELI needs a structure that can ***represent the project as a single research infrastructure initiative*** during the transition between the preparatory phase and the operational phase. From that point of view, the establishment of the ELI Delivery Consortium expresses the recognition by the three hosting countries that the three ELI facilities are not national facilities, but that they are indeed the complementary units of a whole that requires an international effort to be successfully implemented. Beyond the technological challenge it represents – a challenge that calls already for European collaboration[4] –, ELI needs strong international support in the definition and implementation of the concepts that will organise its operation as the first international laser research infrastructure.

Furthermore, the distributed implementation of ELI calls for the development of coordination structures between the three sites to ***maintain scientific consistency, develop common practices when required by the interest of the project, and, very importantly, optimise the use of resources by the three beneficiaries***. This latter objective aims at ensuring the timely of cost-contained delivery of the facilities, but also at promoting the sustainable development of the resources needed for the operational phase. In this respect, the ELI-DC is a necessary institutional level because the workload borne by the individual implementation teams and the natural attraction of the implementation activities to the national level would not allow them to enter efficiently into collaboration and coordination without a structure overarching them.

- **Objectives and activities of the ELI-DC**

Optimisation and cooperation between the three facilities, negotiations with partners on the establishment of the ELI-ERIC, and representation and development of ELI as a single initiative are the three main objectives of the ELI-DC.[5]

Optimisation and cooperation between the three facilities

The optimisation and cooperation between the three facilities will be carried out at various levels:

- From the scientific point of view, the ELI-DC will aim at preserving consistency and preventing overlaps in the definition of the respective scientific missions of the ELI facilities. The local scientific teams will have the responsibility of investigating the research opportunities of their part of ELI's scientific case and of preparing the future access to the facility from the point of view of the experimental environment. Each local team will be assisted and advised by committees of international experts advising them on the scientific and technical aspects[6]. One function of the advisory committees will be to connect the implementation teams to the user community specific to each facility. In this context, the role of the ELI-DC will be to organise the periodic review of the scientific work done at the local level (including the work of the advisory committees), and to suggest measures to preserve the specificity and complementarity of the three facilities and thereby maintain ELI's consistency as a single infrastructure project.

[4] The three first facilities would be within the individual reach of nations such as France, Germany and the UK, but not of the hosting countries, that will need support from European partners. At this stage, the fourth pillar of ELI remains undeniably beyond the financial and technological reach of an individual country.

[5] The materialisation of all four scientific pillars of ELI is an objective of the ELI-DC. In compliance with the decisions of the ELI-PP Steering Committee, the ELI-DC will also promote the analysis and definition of the scientific, technical, financial, and legal conditions for the implementation of the fourth pillar of ELI through the organisation of a competitive call for proposals open to all countries willing to host the ultra-high intensity facility. We do not detail this activity here as its timing is not yet decided.

[6] Depending on the site, there can be one single advisory committee (International Scientific and Technological Advisory Committee) or two of them (International Scientific Advisory Committee and Technical or Machine Advisory Committee). This does not affect the scope and type of their missions.

- Given the individual legal responsibility of the three beneficiaries in the implementation of the facilities, there is a need for the definition of common strategies in the use of resources in order to ensure a cost-contained and timely delivery of the project. The role of the ELI-DC is consequently not to challenge the strategic orientations (in particular of a technological nature) decided at the local level on the conditions of implementation of the facilities (this is rather the role of the local advisory committees), but to facilitate cooperation in order to ensure their complementarity.
- Beyond the scientific and technical coordination of the implementation phase, the success of ELI[7] calls for a common evaluation of the resources of various kinds (mainly human and technological) necessary for the future operation of the infrastructure, and the definition of strategies ensuring their availability and sustainable development. Ensuring access to qualified personnel will be one of the immediate objectives pursued by the ELI-DC in this field. One of the immediate tasks will be to coordinate the definition of common tools for the management of human resources and for strategic workforce planning. This joint approach is expected to facilitate the joint evaluation of the needs for personnel (detailed in terms of activity, skills, career paths, evaluation methods, etc.) all along the lifecycle of the research infrastructure. The end product of this activity should be the establishment of a long-term European collaboration framework for the development of initial and lifelong training programmes and mobility schemes for students (and prospective employees), ELI employees, and future users. These activities will be carried out in close connection with the national ELI academic consortia and structures already set up or on the verge of being established in the three hosting countries (see the Academic Forum in the case of Romania).

Negotiations on the establishment of the ELI-ERIC

Apart from the scientific and technical coordination and optimisation of the implementation activities, the ELI-DC will have a central role in the preparation and organisation of the negotiations on the establishment of the pan-European Consortium – preferably a European Research Infrastructure Consortium (ERIC) – that will be tasked with the joint operation of the ELI facilities. These negotiations will be organised within the framework of the "International Committee" of the ELI-DC (see last section of this document for further details), where funding agencies interested in this process will be represented.

In practice, negotiations will include discussions on the overall governance of ELI, on its conditions of operation (and in particular on the access policy), on contributions to the operating costs and on the rights granted to contributors.

As the first truly international laser research infrastructure, ELI aims at offering unprecedented opportunities to the user community and should provide excellent conditions of access. The ELI-DC will therefore initiate and coordinate the definition of the future access policy of ELI by relying on the work already carried out in this area by the European Commission, ESFRI and other specialised fora (ERF for instance) and involving relevant experts. The long and successful experience of initiatives such as the Laserlab Europe Consortium will also be essential. However, success in this field will also depend on the ability of the ELI project teams to deliver on site the objectives of quality and performance expected by the future users. Here again, the ELI-DC will initiate and manage coordination between the three sites to define and monitor common operational concepts.

Communication and outreach

Finally, the ELI Delivery Consortium will heavily invest into communication and outreach activities, in complement to the activities initiated at the local level. These activities will aim at highlighting the scientific and technological opportunities of the Project to the scientific and industrial communities, but also to advertise careers within ELI, and, more generally, promoting ELI to funding agencies and to the public

[7] And relatedly negotiations with funding agencies on the establishment of the ELI-ERIC.

- **Legal nature of the ELI-DC**

In compliance with the resolutions of the ELI-PP Steering Committee, the plenipotentiaries of the Czech Republic, Hungary and Romania signed a Memorandum of Understanding on 16 April 2010 expressing the official commitment of the hosting countries to implement ELI on the basis of conditions approved within ELI-PP. In the same document, they agreed on the creation of the ELI Delivery Consortium.

Fully aware of the crucial role that will be played by the Delivery Consortium in the governance of ELI at the European level in the coming years, the three hosting countries are currently working on the establishment of this interim organisation as an autonomous legal entity – an international non-profit association under Belgian law – granted with a fully dedicated permanent administrative and management team. The Institute of Physics of the Czech Academy of Sciences, the ELI-HU non-profit Ltd. and National R&D Institute for Physics and Nuclear Engineering (IFIN-HH) will be the founding members of this international association.

The choice of this legal form rather than a more traditional one (such as a foundation, or a limited liability company) is connected to the difficulty for the founding members of transferring (in cash or in kind) funding (and in particular structural funds) to these types of entities and to the need for a structure based in a "neutral" country from the point of view of ELI (not a country hosting an ELI facility, not a country likely to be involved in the future negotiations). A detailed review of the AISBL legal form has been carried out. Colleagues from PRACE, who were involved in the establishment of this infrastructure as an AISBL, were contacted. The conclusion of these discussions is that the AISBL is adapted to the objectives of the ELI-DC and to its interim nature.

- **Organisation and governance of the ELI-DC**

The Belgian law applying to the creation of AISBLs is flexible, but commands that the association includes at least a direction body and an executive body (their denomination should not be ambiguous, but can be freely adapted to each association).

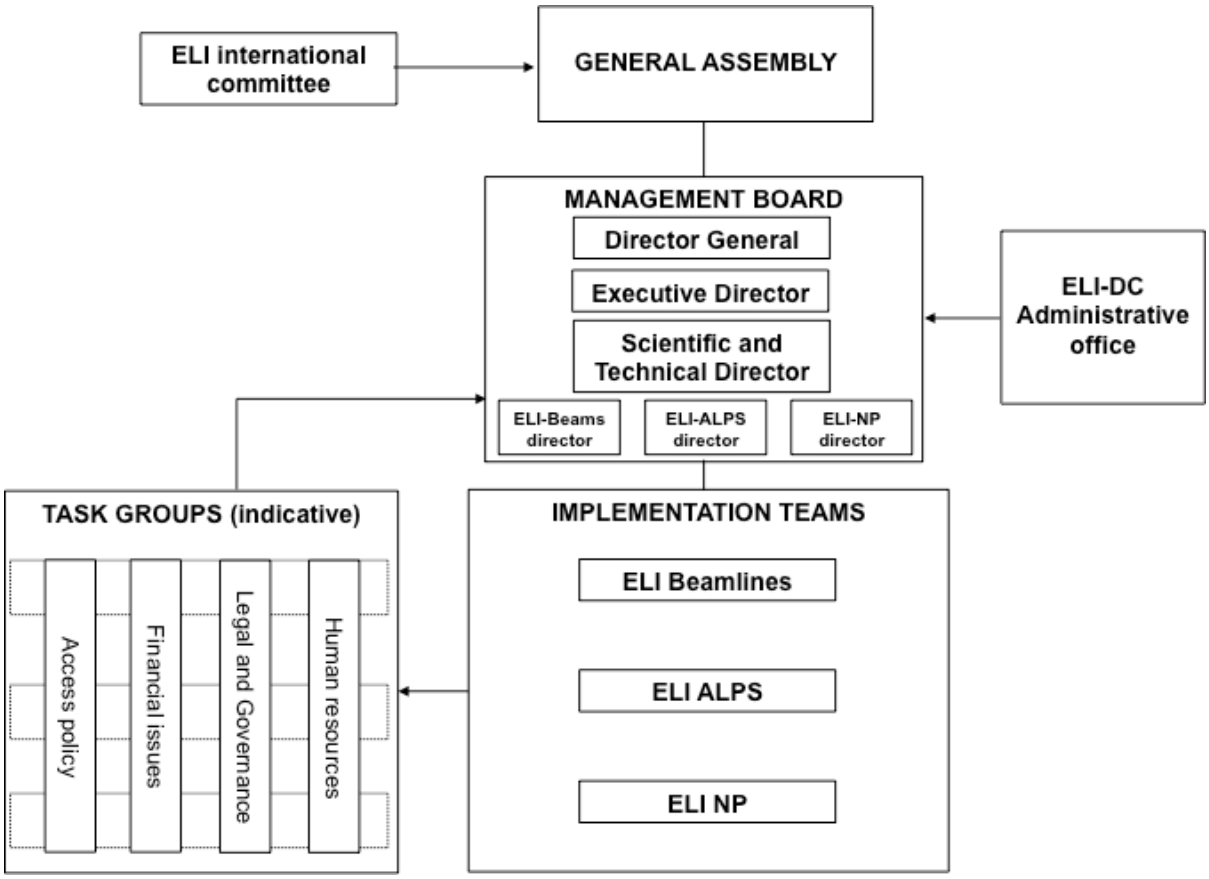

Figure 2: Internal organisation of the ELI Delivery Consortium

As shown in **Figure 2** above, the institutional setting of the ELI Delivery Consortium will rely on three main bodies:

- The *General Assembly*, which will involve representatives of Members[8] of the Association, will be the supreme body of the Consortium. It will decide on the strategic orientations of the activity of the ELI-DC, approve the annual activity plans and budgets, deliberate on the scientific and technical recommendations of the Management Board, and appoint the ELI-DC directors. The General Assembly should ensure the representation of the three hosting countries, which have been entrusted with an eminent responsibility and commit funding in the ELI-DC. The Statutes of the association specify that the decisions of the General Assembly shall not affect the capacity of the founding Members to comply with the legal obligations resulting from their grant agreements as well as the equal status of the three facilities as ELI hosts
- The *Management Board* will be the executive body in charge of the daily activity and representation of the Consortium with the support of a permanent team of employees. The Management Board is not meant to be a national representation of the Members. The Board will involve three full-time managers (a Director General, a Scientific and Technical Director, an Executive Director), who will interact with the project directors of the three ELI local implementation teams. The latter will take part in the meetings of the Management Board. The Management Board will be the main actor responsible for

[8] The three hosting countries are represented as founding members of the ELI-DC. They have two representatives (likely the plenipotentiary and a representative of the funding agency). Funding agencies from countries other than the three countries hosting the ELI facilities are allowed to join, even though it is anticipated that most of them will take part in the ELI-DC as "Partners" represented within the ELI International Committee. The ELI International Committee will be the body in charge of negotiating on the establishment of the ELI-ERIC.

the scientific and technical coordination of the project as well as for the preparation of the negotiations with funding agencies. It will create and rely on ad-hoc task groups of international experts whenever necessary (the task groups listed in Figure 2 are only indicative).

- Finally, the ELI-DC will include an *ELI International Committee* allowing funding agencies interested in the establishment of the future ERIC to be represented. It is within this framework that funding agencies will have the possibility to discuss on the future governance and conditions of operation of ELI, and negotiate on all other aspects related to the establishment of the future ELI consortium.

The International scientific advisory committees already established at the local level to advise each local implementation team will be maintained to promote the scientific specificity of each ELI facility: the committees should contribute to the investigation of the research opportunities *specific* to each ELI facility and the consolidation and development of their own user communities. The ELI-DC, and in particular the Management Board, will interact with the local teams and the local Scientific Advisory Committees (the ISTAC in the case of Romania) to ensure consistency and complementarity in the distribution of the scientific missions of the facilities by reviewing the development of the three scientific and research cases and by suggesting relevant measures for their optimisation.

The Scientific and Technical director of the ELI-DC who will be in direct touch with the local implementation units and with the committees, will investigate how the implementation of the facilities could be best coordinated in order to minimise the use of resources by the three hosting countries, maximise the chances of timely delivery and promote sustainability. These activities will address all types of resources (expertise, finance, and human resources for instance), with the help of relevant international experts hired by the ELI-DC.