

# Internal Milestone 7.1.2 - SWOT Analysis

## Work Progress Update

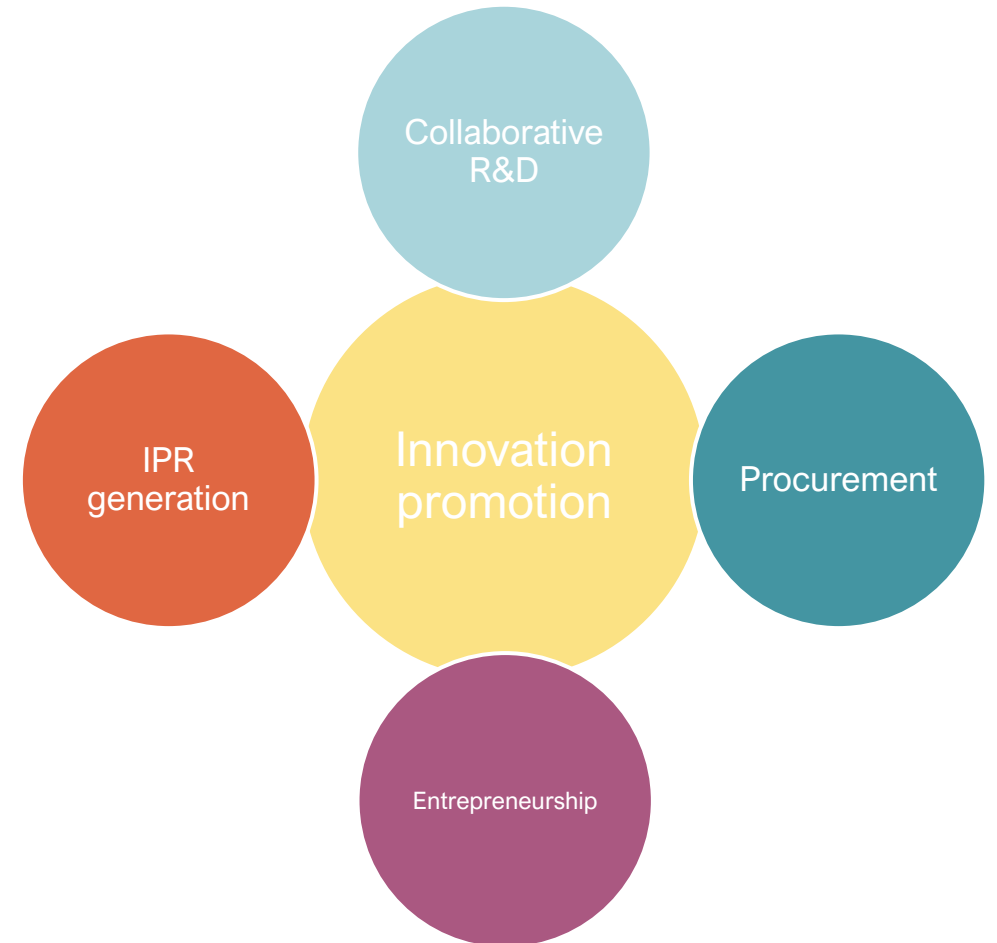
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# Objective

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The WP 7.1 SWOT analysis is pointed directly at developing an Innovation Plan for the ET-PP project. It should help to address which are the best initiatives to promote the generation of innovative technologies, which in turn impact the market and the society.



# Methodology - Approach

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- Bibliography research on previously conducted studies of socio-economic impact of BSROs
  - ↳ Literature review on innovation promotion
- Institutional reports and other public information from KTT offices (or equivalent)
  - ↳ Primary sources and experiences

# Methodology - Subjects

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## CERN

Facility-scale experiment

International autonomous organization

Social impact and *just retour* policy

Particle physics

## LIGO/VIRGO

Scientific measurement delocalized facilities

International collaboration

Gravitational wave physics

## ESA

## ITER

# Methodology - Sources

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**Bibliography available in the Drive** – to get extended as we advance in the other perspectives

For **Collaborative R&D** the research has been carried out with **12 secondary sources** (including peer-review articles, thesis dissertations and experts reports) and **around 10 primary sources** (including KTT offices reports and information available in the institutions websites)

# Elaborating a SWOT analysis

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## Strengths

1. What is ET's innovation competitive advantage?
2. What ET resources are dedicated to innovation & industrial engagement?
3. What ET innovation outputs are performing well?

## Opportunities

1. What new innovation programme can ET use?
2. Can ET expand its innovation operations?
3. What new industry partners can we interact with to generate innovative technologies?

## Weaknesses

1. Where can ET improve in innovation matters?
2. What ET innovation outputs are underperforming?
3. Where is ET lacking resources concerning innovation issues?

## Threats

1. What innovation regulations are changing?
2. What are other Big Science Research Organizations (BSROs) competitors doing in the innovation field?
3. How are innovative technology development trends changing?

# R&D Collaboration

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## S1. What is ET's innovation competitive advantage concerning the R&D collaboration perspective?

Basic research needs radically new technologies; therefore, **collaboration represents an opportunity for firms both in the development of new products and innovation, and in terms of learning** (Scarrà & Piccaluga, 2022). More specifically the ET project expects improvements and **new developments in the fields of cryogenics, coating both via new materials or processes, vacuum, and optics**, among other technological limitations that might emerge (Marx et al., 2011).

## W3. Where is ET lacking resources concerning innovation issues for the case of the R&D collaboration perspective?

The realization of a new research facility is a technological and social process (Horlings et al., 2012) and a such the human capital and the strategic consensus reached by all the parties are key in the desired output. From a collaborative R&D perspective **if the goal is to implement an active innovation environment around the ET, hubs and liaison offices with specialized personal should be set into place.**



# R&D Collaboration

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## O2. Can ET expand its innovation operations in terms of the R&D collaboration perspective?

It is expected that for the ET innovation landscape will also be mostly limited to complementary fields in the process of design and operation. **The creation of a fruitful innovation ecosystem with ET as the key stone actor can foster this transfer of knowledge into the development of new artifacts by stablishing proper platform of tools, services and technologies,** that expands and facilitates the active dissemination of knowledge (Li-Ying et al., 2022).

## T1. What innovation regulations are changing in regard to the R&D collaboration perspective?

Most of these R&D paths [key technologies need to develop the ET] are potentially interesting to a broad range of sectors and as such **fostering collaborations can speed up and facilitate the development process.** There is a **tendency towards the interdisciplinary approach towards technological development** and the lines between applied science and basic science are becoming more blur (Horlings et al., 2012).

# R&D Collaboration - References

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Horlings, E., Gurney, T., Somers, A., van den Besselaar, P., & van Saksenlaan, A. (2012). The societal footprint of big science. *Report of the Rathenau Instituut*, The Hague, The Netherlands.

Li-Ying, J., Sofka, W., & Tuertscher, P. (2022). Managing innovation ecosystems around Big Science Organizations. *Technovation*, 116, 102523. <https://doi.org/10.1016/j.technovation.2022.102523>

Marx, J., Danzmann, K., Hough, J., Kuroda, K., McClelland, D., Mours, B., Phinney, S., Rowan, S., Sathyaprakash, B., & Vetrano, F. (2011). The Gravitational Wave International Committee Roadmap: The future of gravitational wave astronomy. *ArXiv Preprint* ArXiv:1111.5825.

Scarrà, D., & Piccaluga, A. (2022). The impact of technology transfer and knowledge spillover from Big Science: A literature review. *Technovation*, 116, 102165. <https://doi.org/10.1016/j.technovation.2020.102165>

# Moving Forward

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# Milestone 7.1.3.

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Define appropriate objectives that ET could establish to support and enhance the development of innovative technologies and incorporation of new ventures in the implementation of the ET project.

Define bullet-points with initiatives that could be adapted and implemented in the ET

Identify KPIs to assess those initiatives

Establish the innovation goals of the project

# Identifying KPIs for Collaborative R&D

Technology	Type of agreement	Type of partner	Country
Solar Collector	R&D License Agreement	Commercial	ES
Hadron therapy	Partnership Agreement	Commercial	AT
Hadron therapy	License Agreement	Commercial	CH
Hadron therapy	Agreement for Protection and Use of IP	Commercial	AT
Fuka particle physics Monte Carlo simulation software	4 License Agreements	Commercial	DE, CN, SE, IT
Carbon nanotubes nanocomposites	Technology assignment & revenue sharing agreement	Academic	CH
Photonic Crystals	License agreement	Commercial	FR
Giga Tracker	Partnership Agreement	Commercial and Academic	UK
High Temperature Radiation Resistant Piezo Stack	Collaborative R&D Agreement	Commercial	DK
Fiber Bragg Grating Fiber Optic Sensors	Collaborative R&D Agreement	Commercial	PT
Kryolize software for sizing safety valves	4 License Agreements	Academic	DE, CA
Kryolize software for sizing safety valves	Collaborative R&D Agreement	Academic	DE
ActiWiz radiological hazard assessment software	3 License Agreements	Academic	US, SE
RoSe software for the electromagnetic simulation and optimization of accelerator magnets	3 License Agreements	Academic	RO, US, UK
Navigation for Unmanned Aerial Vehicles in GPS denied environments	2 Framework Collaboration Agreements	Commercial	FR
Know-how relating to vacuum set-ups and connections	License Agreement	Commercial	UK
SRS-Scalable Readout System for Micropattern Gas Detectors	2 License Agreements	Commercial	RO, DE
3D Tracking Semiconductor Detector	Assignment of IP Rights	Academic	CZ, DE
Klystrons with improved efficiency	Research Collaboration Agreement	Commercial	FR
GEM	License Agreement	Academic	PK
NINO-IRPICS chip	3 R&D License Agreements	Academic	IT, FR, IN
NINO-IRPICS chip for large-scale use	License Agreement	Academic	IN
Portable radiation survey meter	License Agreement	Commercial	IT
Medipix3 chip	3 License Agreements	Commercial	ES, NL, CZ
Large scale automated system to monitor radioactivity in waste containers	Collaborative R&D Agreement	Commercial	JP
Medicis - Radiation-hard conveyor system	License Agreement	Commercial	CH
High Pressure Laminates	Collaboration Agreement	Academic	IT
Silicon Photomultiplier-based ClearPEM detector module	Collaboration Agreement	Commercial and Academic	IT, PT
Timing and High Rate Capable Gas Detector	Protection and exploitation of jointly owned IP	Academic	IT
CELESTA ("CERN Latch-up Experiment Student Satellite")	Framework Collaboration Agreement	Academic	FR
CubeSat Radiation Monitoring Project	Assignment of IP Rights	Academic	ES
Software framework for standards-based control and communication with hardware devices	BIC Agreement	Academic	FI
	BIC Agreement	Commercial	ES
IT platform for Innovation Monitoring	Collaborative Research Arrangement	Academic	EU

## Knowledge Transfer 2015 CERN report

High Temperature Radiation Resistant Piezo Stack	Collaborative R&D Agreement	Commercial	DK
Fiber Bragg Grating Fiber Optic Sensors	Collaborative R&D Agreement	Commercial	PT

Year	# of knowledge transfer contracts	# of collaboration R&D agreements	Academic	Commercial
2015	50	8	3	5