This project has received funding from the Euratom research and training programme 2014-2018 under grant agreement No 662287.

EJP-CONCERT

European Joint Programme for the Integration of Radiation Protection Research

H2020 – 662287

D9.120 –Exploitation Plan

Lead Authors: E. Carinou, M. Ginjaume, F.Vanhavere R.Tanner, U. O'Connor A.Almen, M.Zankl

Reviewer(s): Z.Thrapsanioti, F. Vanhavere and CONCERT coordination

Work package / Task	**WP 9**	**ST9.6 (PODIUM)**	**SST9.6.2**
Deliverable nature:	**Report**		
Dissemination level: (Confidentiality)	**PU**		
Contractual delivery date:	**2019-12-31 (M55)**		
Actual delivery date:	**2020-01-13 (M56)**		
Version:	**1**		
Total number of pages:	**17**		
Keywords:	**Exploitation, applications, software**		
Approved by the coordinator:	**M56**		
Submitted to EC by the coordinator:	**M56**		

Table of contents

Summary of the deliverable

This deliverable gives an overview of the main results of the PODIUM project and a roadmap on how consortium partners intend to use these results in future activities, in further research and development and possible product marketing strategies.

The document will define all the important details about the exploitation of the results of the project, the impact in the relevant research and development fields and the individual strategies of the project partners. In general, the exploitation plan defines the objectives adapted to the relevant target users and sets up an exploitation strategy.

Therefore, the following issues are addressed:

- The final products,
- The potential partnerships for the further development of each product,
- Strategy for continuation of the project.

The deliverable is structured as follows:

Chapter 1: The first chapter gives an introduction, background information, a summary of the project and an overview of the exploitation plan focused on the main software applications of PODIUM.

Chapter 2: The second chapter describes the PODIUM results and how these results are distilled to exploitation results.

Chapter 3: It starts with the exploitation objectives for the project and follows with the list of exploitation results.

Chapter 4: The fourth chapter presents the outline of the general exploitation strategy as a guideline for formulating partners' exploitation strategies.

Chapter 5: This chapter presents the business canvas for PODIUM applications to be brought to the market.

Chapter 6: The exploitation strategy for each exploitation result is studied through the implementation of the BFMULO Matrix.

Chapter 7: This chapter introduces the individual exploitation plans by the project partners.

1 Introduction

Monitoring the individual exposure of workers constitutes an integral part of any radiation protection programme. The total estimated number of radiation workers monitored in Europe is close to 1 million people. Individual monitoring of exposed workers to external ionizing radiation is essential to ensure safe and satisfactory working conditions; demonstrate compliance with regulatory dose limits and the application of the ALARA principle.

The vision of PODIUM is to improve occupational dosimetry by an innovative approach: the development of an online dosimetry application based on computer simulations without the use of physical dosemeters. Operational quantities, protection quantities and radiosensitive organ doses (e.g. eye lens, brain, heart, extremities) are assessed based on the use of modern technology such as personal tracking devices, flexible individualized phantoms and scanning of geometry set-up. Combined with fast simulation codes, the PODIUM application aims at performing personal dosimetry in real-time.

The main output of PODIUM is a set of software applications in which the occupational doses are individually calculated, instead of measuring them with one or more dosemeters. For this purpose, the position and movement of the exposed workers is captured using indoor position systems based on a time-of-flight sensors and then the calculation of the radiation field is performed leading to the dose of interest.

A validation and proof of concept of the proposed methodology has been performed in two fields that could most benefit of the advantages of this methodology: interventional radiology and workplaces with mixed neutron/photon fields.

In this deliverable the exploitation plan of the PODIUM project will be presented. All project results have been collected and further analysed regarding their imminent potential to be exploited. The heart of the exploitation objective of PODIUM project is the development of applications able to assess the doses of the workers in real workplace fields.

Based on the promising results of WP4 and WP5, we made an exploitation plan to explore the placing of the PODIUM results to the market. At present the technology readiness level (TRL) is 3-5, depending on the application field, and requires a second phase to complete its demonstration to a TRL of 8 or 9.

For the definition of this second phase, a business model canvas is used for the exploitable results. New Consortia are envisaged to integrate some more industry-driven partners together with the PODIUM scientific partners. Experienced partners in innovation and exploitation strategies should collaborate in the new PODIUM to ensure its introduction in the market.

2 Results of the project

In this part the results of the PODIUM project are listed (Table 1). Most of the Project Results (PR) are linked to WP deliverables. However, there are some PR (such as no.4) which have been developed in our effort to overcome the pitfalls encountered during the project. In the same table there is a short description of the results, the relevant format and WP and the IPR owners.

The PR are stand-alone applications (which can lead to separate exploitable results) or are used to support the manufacture of the software applications.

Table 1: List of project results

Project Results (PR)	Title of the Result	Format	Short description	WP	IPR owners
1	Phantom library	Software	Donna2018 (Donna with lead apron) Irene2018 (Irene with lead apron)	2	HMGU
2	Flexible phantoms	Software	Adjusted RAF phantom	2	SCK-CEN
3	Conversion coefficient set of data for IC/IR	- Paper to describe the methodology of the calculation - Database with ASCII file	Conversion coefficients expressed in absorbed dose per fluence in mSv cm^2	2	HMGU
4	Reduction techniques to reduce the number of look up tables	Paper	Estimation of conversion coefficients of smaller fields from those of a larger field via windowing	2	HMGU, PHE
5	IPS software for worker tracking 1 Kinect/2 Kinect	Software	Software for worker tracking, adapted to medical workplace	1	SCK-CEN, UPC
6	DCA (version X rays)	Software	Web application to do the dose calculation using as input the X-ray data and the worker tracking	3	UPC, SCK-CEN
7	Software (version mixed neutron/gamma)	Software	Structure of the web application, not customized for neutrons yet.	3	SCK-CEN, UPC, PHE
8	IPP	Software	Software to define and set-up a geometry for simulations	2	SCK-CEN
9	Validation results IC/IR	Paper	Validation of the dose calculation procedure by comparing it with measurements and with look up tables	4	SJH, LU, SCK, UPC, HMGU

Project Results (PR)	Title of the Result	Format	Short description	WP	IPR owners
10	Sensitivity study	Paper	Analysis of the influence of different radiation source parameters on operator's doses	2	SJH, LU, SCK, UPC
11	Characterisation of PHE and SCK-CEN Workplace fields	Paper	Innovative methodology and computer models to derive the protection and operational quantities in workplace mixed neutron-photon fields	5	PHE, SCK-CEN
12	Conversion coefficients for neutrons	Paper	Conversion coefficients for the reference adult ICRP phantoms for the calculation of effective dose at angles intermediate to those calculated by the ICRP	2	PHE
13	MCGPU-IR	Software	Software to do fast MC calculation to obtain organ doses, effective dose and operational quantities in fluoroscopy guided procedures.	2	Based on the improvements in the open code MC GPU beta version (By A. Badal), New version property of UPC provided the origin is cited
14	Penelope/penEasyIR	Software	Software to obtain the energy fluence distribution, air kerma and $H_p(d)$ at a position of interest in fluoroscopy guided procedures.	2	Based on the improvements in the open code PENELOPE/penEasy (By J. Sempau), New version property of UPC provided the origin is cited

3 Characterization of the Exploitable Results (ERs)

The overall goal of the project is to develop software tools that will calculate radiation doses to workers by combining information on staff position, orientation and posture (and position of objects, such as radiation protection screens) with information on the field of scattered radiation and the room geometry.

Depending on the way the tool is used and developed, the applications may be used as:

- General training tool, where specific procedures can be practised and recorded without sources, to be analysed afterwards with virtual sources, and where the doses to the staff can be simulated. Training can be gamified to make it motivating, by adding a narrative thread of the simulation, a scoring system and instructional and feedback messages. Ergonomic issues in relation to the position and orientation of the staff in relation to the source can be simulated and validated with real data.
- ALARA tool: The application could include phantoms in the visualisation, making it more realistic. The visualization could be two-fold: on one hand an animation of the room with the furniture and staff, on the other hand a volume model of the phantom showing the computed distribution of doses. Similar simulations can be done in the mixed photon/neutron field.
- Dosimetry tool offline: To calculate the doses of staff after the work/procedure with possible specific modules for some practices in hospitals or industry.
- Dosimetry tool online: To determine the doses during the practice, with some visualisation relating to possible specific modules for practices in hospitals or industry.

The above uses of the applications can be implemented in various fields:

- in medical applications (fluoroscopically guided procedures, nuclear medicine practices,…)
- in industrial facilities (including radioisotope production)
- in nuclear industry (including neutron dosimetry applications)
- in space dosimetry.

Based on the above description of the applications and the exploitation potential the following InterCom (Interest in Commercialization) matrix is produced (Table 2). In the Table the TRL numbers are included. It is noted that the TRL scale is a metric for describing the maturity of a technology. The scale consists of 9 levels. Each level characterizes the progress in the development of a technology, from the idea (level 1) to the full deployment of the product in the marketplace (level 9). The evaluation of the TRL has been based on the progress made up to the time the present report is written. Most of the results are in the scale range 3-5.

Table 2: Interest in Commercialization Matrix (Exploitable results)

Exploitable Result[1]	Title of the Result	Exploitation potential	Field of interest	Organisation contributed to the generation of this result during the project's lifetime	TRL	Expertise needed outside PODIUM consortium
1	Phantom library	Needed for further look-up tables	All fields	HMGU	TRL5	No
2	Flexible phantoms	Potential use for any application with GPU, and for visualisation.	All fields	SCK-CEN	TRL5	No
5	IPS software for worker tracking 1 Kinect/2 Kinect	Software for worker tracking, adapted to medical workplace	All fields	SCK-CEN, UPC	TRL6	No
6	DCA (version X rays)	Software application in X-ray facilities used for the estimation of the doses of the exposed staff using as input the X-ray data and the worker tracking	Interventional procedures (medical field)	UPC, SCK-CEN	TRL5	Yes
7	Software (version mixed neutron/gamma)	Software to define and set-up a geometry for simulations	Industry and nuclear Industry	SCK-CEN, PHE	TRL3	Yes
8	IPP	Software application to define and set-up a geometry for simulations	Interventional procedures (medical field)	SCK-CEN	TRL4	Yes
13	MCGPU-IR	Software application in X-ray facilities (one of the dose calculation methods)	Interventional procedures (medical field)	UPC	TRL4	No
14	Dose calculation Penelope/penEasyIR	Software application in X-ray facilities (one of the dose calculation methods)	Interventional procedures (medical field)	UPC	TRL5	No

[1] Number taken from Table 1 (Project results)

4 General Exploitation Strategy

The goal of the Consortium is to achieve the widest possible development and use of technologies and methodologies to enable the possibility for commercial exploitation of the results. More specifically, it is our intention to ensure the continuation of the project's results beyond the project end and to demonstrate how PODIUM will influence the individual dosimetry landscape in the future.

The eventual exploitation of the outcomes will be based on three main inputs: the market context, the technology capabilities and partner's interests and opportunities (including financial).

The market context helps identify and evaluate opportunities for the exploitation and puts the project in context with respect to other initiatives (commercial or research). There is currently no similar product in the market. The PODIUM Consortium masters the knowledge required to complete the development of the present status of PODIUM so that it could contribute to better healthcare of workers by controlling and reducing their occupational dose. Capabilities and constraints of the technology determine what can and cannot be done. PODIUM has been a success bringing together Indoor Personal System (IPS) technology and new IT capabilities to lead a change of paradigm in occupational monitoring of workers exposed to ionizing radiation, in particular in the field of image guided invasive procedures and in mixed neutron-gamma fields.

Finally, individual partner's interests and opportunities will drive PODIUM exploitation. The PODIUM partners have agreed to meet, discuss and share ideas for the future exploitation of the results also after the project ends. The exploitation will be explored jointly but also reflecting each partner's position. Since the Consortium, as per today, consists of a variety of partners, their interests are different: training, research, and commercialization. Consequently, the strategy for individual partners is driven by the specific goals within the longer term project's vision. The overall exploitation strategy is based on and leads to specific plans per partner. All of these plans contribute to the overall exploitation strategy.

Possible continuation forms of PODIUM include: engagement of new scientific projects (for example EU-funded) or engagement of commercialization projects (like Fast Track to Innovation-FTI). Moreover, the results of the project can stimulate innovation and technological progress in industry and therefore, collaboration with industrial companies is also an option. Also, continuation on the partners' own budgets is possible.

However, a generic business model for the various fields of the EPs of PODIUM is a first step before going into detail to each partner's individual exploitation plans. This model is presented in the following chapter.

5 Business model for Podium ERs

The main purpose of this chapter is to present information that can help in defining business models. Through such an approach, the potential of bringing the developed innovative applications to the market can be investigated.

A generic business model template that follows the Business Model Canvas approach, is presented.

Business Model Canvas is a strategic management tool for developing new or documenting existing business models. It is a visual chart with the following elements (shown in Table 3) answering the following questions:

- Customer Segments: For whom are we creating value? Who are our most important customers?
- Customer Relationships: What type of relationship does each of our customer segments expect us to establish and maintain with them?
- Channels: Through which channels do our customer segments want to be reached? How are we reaching them now?
- Value Propositions: What value do we deliver to the customer? Which one of the customer's problems are we helping to solve?
- Key Activities: What Key Activities do our value propositions require?
- Key Resources: What Key Resources do the value propositions require?
- Key Partnerships: Who are the Key Partners? Who are the key suppliers? Which key resources are we acquiring from partners? Which key activities do partners perform?
- Cost Structure: What are the most important costs inherent in our business model?
- Revenue Streams: For what value are our customers really willing to pay? For what do they currently pay?

Table 3: Business Model Canvas

<table>
<tr><th>Key Partners</th><th>Key Activities</th><th>Value Propositions</th><th>Customer Relationships</th><th>Customer Segments</th></tr>
<tr>
<td rowspan="2">– PODIUM partners,
– Dosimetry services,
– ALARA tool providers,
– XR manufacturers,
– NPPs, industrial companies,
– Training centres,
– Radiation protection experts,
– Companies supplying radiation protection tools or software.</td>
<td>– Training tool for exposed workers to practise without the use of sources
– ALARA tool for visualization of the staff doses using an animation of the room and/or distribution of doses in a phantom
– Analysing the use of protective measures and thus train of the exposed staff (off line)
– Calculation of doses after/during each procedure (off line or on line)</td>
<td rowspan="2">– Optimal management of personnel doses
– Optimization through the proper implementation of ALARA principle
– Improved quality of dosimetry services
– Improved accuracy in dose assessment
– Better timing in improving the knowledge of radiation dose to staff
– Meeting the demands of the clinical environment (addressed in D4.3)</td>
<td>– Automated services
– Self service
– New spin off company
– New activity in the portfolio of radiation protection companies</td>
<td rowspan="2">– Hospitals where fluoroscopically guided procedures are performed
– Nuclear industries
– Training centres
– Radiation protection companies that provide services on occupational exposure</td>
</tr>
<tr>
<td>Key Resources
– Experienced staff engaged in the partners already involved in the project
– New partners to provide expertise in the project
– Proprietary knowledge
– Customers’ computer network</td>
<td>Channels
– Networking
– Direct contact</td>
</tr>
<tr><th colspan="3">Cost Structure</th><th colspan="2">Revenue Streams</th></tr>
<tr><td colspan="3">– Technical and personnel costs
– Legal and administrative costs</td><td colspan="2">– Partners’ funding
– Research funds or FTI
– Company investment
– Sales</td></tr>
</table>

6 Exploitation challenges and aims

In order to assess the exploitation strategy for each EP the BFMULO Matrix is implemented (Table 4).

According to each partner IPR intentions:

- B = IPR's on background information,
- F = IPR's on foreground information,
- M = Making the products,
- U = Using the result,
- L = Licensing the result,
- O = Other, any other exploitation means (e.g.: consultancy, provide services, etc).

Table 4 BFMULO matrix

Exploitation result	SCK•CEN	UPC	HMGU	LU	PHE	EEAE	SJH
1	U	U	F,M,U	U,O		U,O	U,O
2	B,F,M,U,L,O	U	U	U,O		U,O	U,O
5	B,F,M,U,L	B,F,M,U,L		U,O		U,O	U,O
6	F, U,L,O	F,M,U,LO	U	U,O		U,O	U,O
7	F,M,U,L,O			U,O	B,F,U,L,O	U,O	U,O
8	B,F,M,U,L,O	U	U	U,O		U,O	U,O
15		B,F,U,L,O		U,O		U,O	U,O
16		B,F,U,L,O		U,O		U,O	U,O

7 Description of individual exploitation plans and strategies

This section provides the PODIUM partners' individual exploitation plans.

The following paragraphs aim to take into account the different partners' expectations according to their strategic plans. The individual partners' plans to undertake exploitation actions for the PODIUM project are expected to be updated in the following years based on the engagement of future projects and acquiring further funding at the national and EU level.

SCK•CEN

The Belgian Nuclear Research Centre SCK-CEN, is a research centre dealing with peaceful applications of radioactivity. We perform forward-looking research and develop sustainable technology. In addition, we organise training courses, we offer specialist services and we act as a consultancy.

The Radiation Protection Dosimetry and Calibration group of SCK-CEN is a leading research group in all kind of dosimetric applications. At the same time, we are operating a large personal dosimetry service.

The PODIUM approach for personal dosimetry is and will be a focus point of our research in the next years.

a) Dissemination of the PODIUM results: the results from PODIUM will be presented in conferences, and will be published in open access scientific journals.
b) Scientific improvements: A PhD thesis is on-going on the PODIUM approach for interventional fields, and this will continue for another year.
c) Research with own funding: as this field of research remains important for SCK-CEN, new projects will be set-up on own funding to continue the research. One new PhD will start on applying the PODIUM approach in nuclear medicine applications (starting date February 2020), and one PhD will start further developing the neutron dosimetry approach (foreseen starting date October 2020). The team presently active in PODIUM will also continue partially on own funding to further improve the PODIUM results.
d) Acquiring funding for continuation project: We have participated in the Consortium of a Fast-Track-to-Innovation proposal (FTI-H2020) submitted in October 2019 to continue the work started in PODIUM. We will continue looking for European and national funding opportunities which are needed to the continuation of the PODIUM application, together with part of the PODIUM partners, and industrial partners. Both real innovation and market-oriented funds, as more scientific funds will be searched for.
e) Exploring Technology transfer: PODIUM application is a product with high commercial potential. During PODIUM several contacts were established with commercial companies that have shown interest in our work. These contacts will be elaborated after the project, with the goal to set up collaborations that can advance our results to bring them to the market.
f) New fields of applications: PODIUM was focussed on interventional fields in hospitals and on neutron applications. There are many other fields where our idea can be applied to, like nuclear medicine, space, nuclear power plants, decommissioning,etc. Partners and projects will be looked for in these new fields as well.
g) Continuation with PODIUM partners. Most of the partners in PODIUM are active in the same dosimetry community, and we have the opportunity to meet in several occasions, like EURADOS working groups, or dosimetry conferences. It is intended that periodically we would organise a follow up meeting with the partners (and possible new interested players) during such occasions.

UPC

The Universitat Politècnica de Catalunya, BarcelonaTech, (UPC) is a Spanish public institution of research and higher education. The PODIUM research team is a multidisciplinary group of junior and senior researchers of the Biomedical Engineering Research Centre (CREB) at UPC. Our fields of expertise include radiation dosimetry, computer vision and graphic computing. In these areas, we support and promote innovation to provide solutions to any need or demand from the biomedical field.

As summarized in Tables 1, 2 and 4, we have been strongly involved in the development of the PODIUM approach in the medical field. We are interested in continuing to work in the PODIUM idea. The feasibility study has been a success, but additional improvements are needed to be ready for its use in clinical environment.

Our exploitation strategy includes four main lines of action that are not exclusive among them and that may have a greater or lesser development depending on the funding obtained for the continuation of the project.

a) Dissemination of the PODIUM results: this is a general strategy of the Consortium and it started from the beginning of our work by presenting at several scientific and professional meetings first the idea and finally the results at the PODIUM and ALARA Workshop (D9.10). We plan to participate in writing several papers and participate in congresses to present the results. This is very important to increase awareness of the potential of PODIUM and to help raise funding. The efforts along this line shall continue.
b) Scientific improvements: A PhD thesis and a master thesis are under development. We continue working on the improvements and new applications of MCGPU-IR and PENELOPE/penEasyIR fast Monte Carlo codes as well as on the development of the tracking software to overcome some of the limitations identified in the development of PODIUM.
c) Technology transfer: PODIUM application is a product with high commercial potential. The product is not yet ready for its use in hospitals but a good collaboration between some of the research partners of PODIUM and some industry and commercial driven company would be useful for a fast introduction to market. In addition, taking advantage of our experience in serious games technology, we could collaborate in the development of a training application based on PODIUM results.
d) Acquiring funding for continuation project: We have participated in the Consortium of a Fast-Track-to-Innovation proposal (FTI-H2020) submitted in October 2019 to continue the work started in PODIUM. We will continue looking for European and national funding opportunities which are needed to the continuation of the PODIUM application.

HMGU

HMGU is a national research centre for environmental health that will probably not perform commercial exploitation of the PODIUM results. Nevertheless, HMGU is interested in remaining a consortium partner and providing additional results in case a continuation research project would acquire funding at national and/or EU level.

a) General strategy: To acquire funding for continuation project
b) Scientific and technical goals: To provide additional results for wider applicability
c) Economic factors: To acquire research funding
d) Intellectual property: Software (voxel phantoms)

LU

The research at LU is well in line with the research carried out in the PODIUM project. At the department, radiation protection research is conducted in a number of different areas and we see a broad interest in the issues that have been raised in the PODIUM project. We can conclude that projects in this area are of interest to our research profile, but funding will be required in the event of greater commitment. We plan to contribute in the production of several articles and to present results at congresses if opportunity is given. We also work closely with other research institutes where similar interests exist. Although our main interest is not commercialization of products, we see a continued interest in contributing scientifically to any such continuation within parts of the consortium. Collaboration with industry in research projects is nothing new for our institution and to some extent generally encouraged in Sweden.

PHE

Public Health England (PHE) is an Executive Agency of the UK Department of Health, which incorporates the Centre for Radiation, Chemical and Environmental Hazards (CRCE), which has participated in PODIUM. CRCE advises the Government, Industry and the Public on the risks associated with ionizing radiation and runs commercial services to monitor radiation exposures. It issues personal dosemeters and provides radiation protection advisory consultancy services. CRCE will seek to evolve the way in which it provides these services in the light of the outcomes of the PODIUM project.

In the short term, the CRCE project team will seek to disseminate the results from PODIUM at national and international conferences and symposia, and via publication in open access journals. This will be done in collaboration with PODIUM partners. The PODIUM contributors from PHE are involved with the relevant EURADOS working groups and will meet regularly with the contributors from other PODIUM laboratories at international meetings: these will provide valuable opportunities for discussions about exploitation of the results.

The PODIUM contributors from PHE will seek to continue PODIUM type work using our existing research budgets. However, PHE has research funds, to which we will seek to access for continuation of the PODIUM concepts. This may be via PhD studentships, in partnership with academic and commercial partners, ideally with collaboration with PODIUM colleagues. There are other potential funding sources which are being explored. The possibility of using these methods in the UK nuclear power sector has been discussed and there are potential applications in space being considered.

EEAE

As competent authority in matters of radiation protection EEAE is a non-profit organization that will not perform commercial exploitation of the PODIUM results. Nevertheless, EEAE has significant benefits to reap from the project results such as the offering of web courses and web seminars with topics related to the optimization in occupational exposure.

a) General strategy outline: to identify drivers for a successful exploitation in continuous education and training
b) Scientific and technical goals: to pay attention to non-technical developments (legal aspects, privacy aspects, etc) and their influence on exploitation.

St. James's Hospital

St. James's Hospital (SJH) is an academic teaching hospital and the hospital's fundamental purpose is the delivery of health treatment, care and diagnosis as well as health promotion and preventative services. The hospital is committed to the creation of an environment and the circumstances in which education and research in the health science and allied areas is possible and flourishes. It is also driven by criteria of excellence, continuous improvement and innovation.
In relation to PODIUM, the hospital will not perform commercial exploitation of the PODIUM results. Nevertheless, SJH is interested in remaining a consortium partner and providing additional results in case a continuation research project acquires funding at national and/or EU level. Our exploitation strategy includes the following actions.

a) Dissemination of the PODIUM results: the results from PODIUM will be presented in conferences, and will be published in open access scientific journals.
b) Continuation with PODIUM partners. Most of the partners in PODIUM are active in the same dosimetry community, and it is intended that periodically SJH will attend follow up meeting with the partners to explore further opportunities.

8 Conclusion

Concluding, PODIUM is perceived as an innovative way forward. The PODIUM approach has the potential to be brought to the market using it as a training tool and/or as individual dosimetry option in many different fields, as shown in the business canvas. It is envisaged that the availability of individual dose data will increase awareness of radiation dose, improve accuracy in the field of monitoring, assist with the compliance with radiation protection tools and the application of the ALARA principle.

From the validation results and the work done within the two year period of the project, it seems that there is the potential to move from TRL of 3-5 to TRL of 8 or 9. Within the consortium there are partners who are willing to continue in the way indicated in BFMULO matrix, based on their individual plans as described in the previous paragraphs. However, expertise is needed from partners outside the project, as shown from the Intercom matrix. New consortia are envisaged to integrate some more industry-driven partners together with the PODIUM scientific partners. Moreover, experienced partners in innovation and exploitation strategies should collaborate in the new PODIUM to ensure its introduction in the market.