

Topic 2: Next generation imaging and image-guided diagnosis and therapy for cancer

All information regarding future IHI Call topics is indicative and subject to change. Final information about future IHI Calls will be communicated after approval by the IHI Governing Board.

Expected impacts to be achieved by this topic

- Patients benefit from improved diagnostic and therapeutic procedures and innovations better adapted to their individual health condition, while meeting the needs of the health care system;
- Contributing to development of high-quality tools, high-quality data, advanced patient imaging and image-guided technologies and processes for improved early diagnosis, prognosis, staging, intervention planning, therapy and management of cancer
- Including next-generation imaging technologies and image guided solutions as part of combined cancer therapies (e.g., theranostics, chemotherapy, targeted therapy including immunotherapy, radiotherapy and/or surgery) through seamless integration of tools, data and algorithms into the care pathways
- Enabling the development of improved artificial intelligence (AI) and machine learning (ML) validation and evaluation methodologies for imaging and image guided diagnosis and image-guided therapy for cancer
- Better informed decision-making at different levels of the health care system that will in turn contribute to a better allocation of resources towards cost-effective innovations
- Contributing to the objectives of Europe's Beating Cancer Plan and to the Horizon Europe Mission on Cancer

Expected outcomes

The proposals are expected to focus on image-based cancer diagnosis, prognosis, treatment planning and therapy. Projects results should contribute to all of these expected outputs and outcomes:

- Expanded use of cancer patient imaging data sources, with improved data quality, annotation and computability, contributing to solutions that automatically link images to clinical data to improve diagnostic, staging, predictive and therapeutic tools for clinicians, including image-guided tools,
- Robust evaluation and validation frameworks for AI/ML-based algorithms applied on cancer patient images, to improve image guided diagnosis, prediction of therapy outcome, planning and therapy of cancer patients,

- Health care professionals across Europe get access to advanced, easy-to-use solutions for minimally invasive interventions, guided by medical imaging for monitoring of disease progression or treatment response monitoring in combination with biomarkers and other relevant data,
- Improved image-driven planning and predictive tools that enable health care providers to facilitate diagnosis, treatment, and follow-up to improve patient outcomes,
- Novel, continuously self-learning, explainable AI/ML-enabled image guided diagnosis, therapy planning, and interventional systems used in clinics/hospitals and possible related benchmarks,
- Demonstrated added value for end-users such as patients, health care professionals, national health systems, health care providers in using next generation imaging and image-guided diagnosis and therapy solutions for cancer,
- Enable seamless and successful further development of the achieved concepts and solutions leading to integrated products and services delivering proven benefits to patients, health care systems and society as a whole

Scope

The specific challenge to be solved by this call topic is to provide early evidence of improved cancer patient care when using next-generation imaging technologies and image-guided solutions as part of combined cancer therapies. An optimized image-based care path from early diagnosis and screening to treatment and follow-up is essential to improve the outcome of cancer patients and help optimize clinical workflows and the cancer patients' journey.

Innovative solutions in cancer diagnosis, therapy planning, interventions and outcomes can be achieved by pooling, linking, and using existing cancer patient imaging and other relevant data for development of robust AI/ML-based algorithms and enhancing of image-guided tools in clinical settings. A key point underpinning the use of AI and ML in the fight against cancer is access to high quality data. Furthermore, there are limited recognised validation and performance evaluation frameworks for AI/ML-based diagnostic algorithms.

Within the framework of the European Cancer Imaging Initiative¹, and building on the results of other relevant research projects, the proposal should enable secure, GDPR compliant and interoperable access to cancer imaging data sources for the purpose of developing and/or enhancing new innovative features of AI/ML-enabled tools used for diagnosis, prognosis, therapy planning, intervention, and follow up. Proposals should also focus on understanding challenges and propose sustainable solutions to close gaps in algorithm validation and algorithm evaluation in the context of developing AI/ML-based tools for cancer diagnosis and outcome prediction.

The proposal should aim to improve AI/ML-enabled imaging and image guided solutions in order to assist and guide clinicians during the diagnosis, staging, patient monitoring, therapy planning, intervention and follow-up, while Augmented Reality offers an intuitive way to interact with both the patient data as well as the system controls. Where appropriate, proposals should demonstrate novel ways to interact with the imaging data. The driving principle shall be improving and enhancing image-

¹ This initiative is part of the Europe's Beating Cancer Plan: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=COM:2021:44:FIN>

based diagnosis and therapy, e.g. through automated image interpretation and segmentation, quantitative disease assessment, intuitive treatment planning and smart guidance during the actual patient treatment and in post-treatment monitoring of response to therapy, to enable more efficient patient-centric diagnosis/therapies/interventions and better patient outcomes

The proposed R&I activities should result in simplified clinical workflows, for instance through enhanced or complementary robotic-assisted procedures, thus resulting in more precise therapeutic and interventional procedures for patients, reduced workload on staff, reduction of therapy planning and intervention time and shorter recovery times/hospital stays.

Why the expected outcomes can only be achieved by an IHI JU project

For realising the potential synergistic effects of next-generation imaging technologies and image-guided solutions being part of combined cancer therapies, it is essential that different industry sectors come together and exchange knowledge and experience and find optimal solutions. Combining expertise from various sectors is critical to the success of this proposal.

This cross-sectorial collaboration is expected to include academia and health care specialists to leverage innovative and novel image-guided concepts in diagnostic and therapeutic applications.

This will ensure the clinical relevance of technical and scientific innovations. IHI JU provides a unique opportunity to break the existing silos to enable faster development of people-centered, safe, effective, cost-effective, and affordable health solutions.

Indicative budget

Applicant consortia should ensure that out of the total project budget, at least 45% needs to be covered by contributions provided by project participants, the rest being covered by financial contribution received from IHI JU (see call conditions for further information).

Indicative duration of the actions

Applicants should propose a project duration such that it matches project activities and expected outcomes and impacts.

Dissemination and exploitation obligations

To be determined