Mission & Vision

ODIN is a European multi-centre pilot study focused on the enhancement of hospital safety, productivity and quality. This project will contribute to the implementation of the European Smart Hospitals of the Future.

The main objective is to deliver an open digital platform, supporting a suite of services and Key Enabling Resources (KERs) empowered by robotics, Internet of Things (IoT) solutions and specialized AI. These resources will be implemented in three Reference Areas of Hospital Interventions: workers, robots and medical locations and will be tested through seven Clinical User Cases in leading hospitals of six European countries: Spain, France, Germany, Poland Netherlands and Italy.

The platform will gather information and data from the participating hospitals and through high levels of AI, it will enable Problem Perception, Cognitive Reasoning and Knowledge Optimization. The utilization of the resulting data will translate into an optimized management and innovative products and services, enabling Value-Based Healthcare and fostering an open innovation approach between hospital partners and industrial partners to collaborate with research institutions, academia and regulatory experts, bridging the gap between healthcare suppliers and providers.

Objectives

ODIN project pursues the following objectives:

- To deliver an open and secure platform, supporting a suite of services and Key Enabling Resources (KERs)

empowered by robotics, IoT solutions and specialized AI. The platform will integrate an Evidence-Based Medicine approach, gathering data from tangible and intangible resources that will be analyzed and interpreted by AI.

- To build a dynamic and collaborate co-creation mechanism for Innovative Procurement Journey between healthcare suppliers and providers, identifying healthcare challenges and needs to guarantee the delivery of innovative services that are accepted, safe, trusted and compliant with current standards and rules, according to national and European legal frameworks. ODIN will identify and contribute to remove barriers for the adoption and scaling of ODIN technology.
- To implement a multi-centre cohort study demonstrating the safety, effectiveness and cost-effectiveness of ODIN´s Key Enabling Resources and platform, while assessing the impact, scalability, interoperability and innovation potential for other domains. A combination of three Areas of Intervention (eWorkers, eLocations and eRobots) and seven Clinical Use Cases, will be studied in 6 Exemplar Demonstrators: Spain, France, Germany, Poland Netherlands and Italy. ODIN will act as a reference demonstrator for a new generation of digital care services and patient centric care, as well as new business, financial and collaborative models for health care and medical research.
- To set up a communication and dissemination program, together with an exploitation strategy to reach a significant number of users and business partners that will allow ODIN solutions to be delivered during and after the project lifetime. This will include two phases of open calls and existing open innovation initiatives from the demand and supply side, in order to:

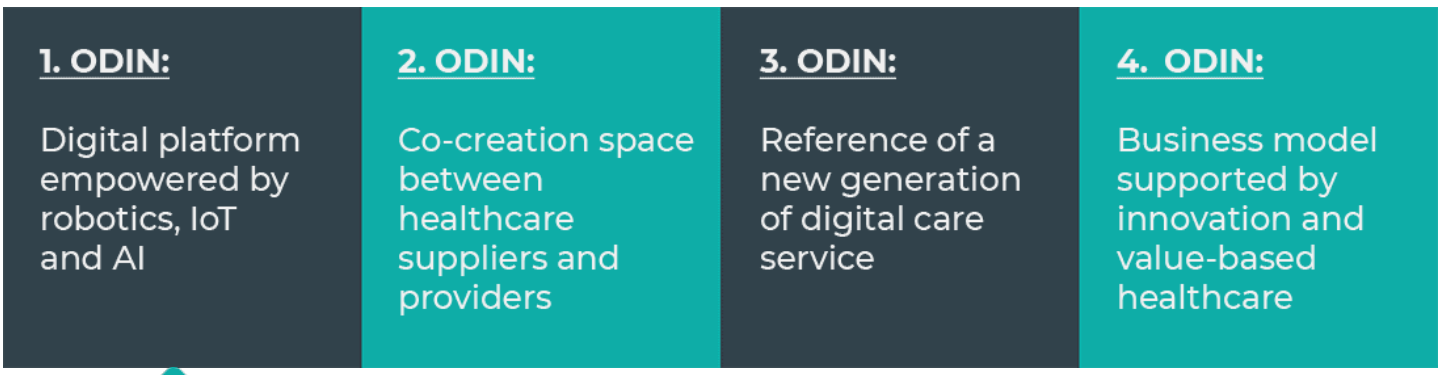
1) Delivering data to the European Data Space.

2) Promoting dialogues with standardization bodies, scientific and industrial societies to make ODIN solutions interoperable and scalable.

3) Developing a business model through innovation, integrating digital services into value-based healthcare.

Summary of Objectives in squares:

1. ODIN Digital platform empowered by robotics, IoT and AI.
2. ODIN Co-creation space between healthcare suppliers and providers.
3. ODIN as a Reference demonstrator of a new generation of digital care services.
4. ODIN exploitation strategy: development of a Business model supported by innovation and value-based healthcare.



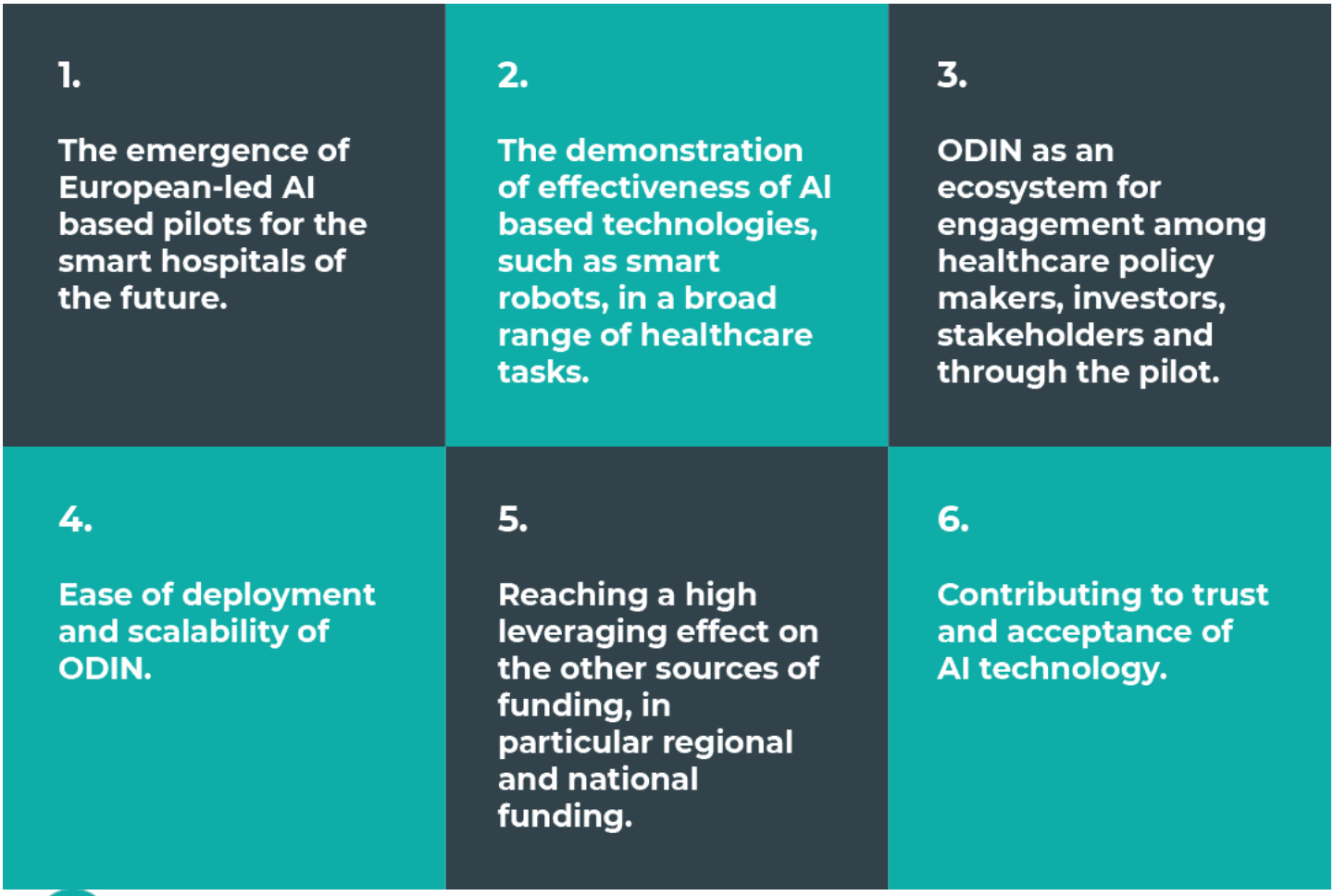
Impact

The impact of ODIN project will be based on:

- The emergence of European-led AI based pilots for the smart hospitals of the future: ODIN will deploy a set of six pilot demonstrations that will deliver innovative AI based solutions in six renowned and large hospitals: CBM (Italia), UMCU (Netherland) CHB (Germany) HUSC (SERMAS España), MUL (Poland) y AMIE (France).
- The pilots will behave as a federation of multicentre longitudinal cohort studies, while reducing costs, bridging the clinical and logistic domains, enhancing the management of the hospital, and in synergic relation to its territory. Moreover, pilots will be monitored through the ODIN open source platform to overcome bottlenecks that currently exist in data proprietary systems of equipment vendors (e.g. medical images equipment), facilitating interoperability with other platforms and enabling fast deployment of Smart Hospital Digital Services across intersecting areas of healthcare.
- The demonstration of effectiveness of AI based technologies, such as smart robots, in a range of healthcare tasks: ODIN services and platform will create unique collaborative capabilities that machines and humans bring to the different areas supported by ODIN: better screening, diagnostic and treatment capabilities and more efficient managerial capabilities through the efficient use of tangible and intangible resources. ODIN aims at going further in the concept of Smart Hospitals, by redesigning work, rethinking work architecture, retraining professionals and rearranging the organization to transform current services offered by hospitals into value-based health services.
- Engagement of healthcare policy makers, investors, stakeholders and through the pilot: The partners of ODIN consortia will participate and cooperate with local, regional and national policy makers through the different hubs and ODIN ecosystem (different ethical and legal working groups or standardization working groups). ODIN partners will also influence and support the implementation of the Electronics Components and Systems Strategic Roadmap Agenda (ECS SRA) which will translate into economic value and will contribute to meet the European challenge of sustainable living. Engagement of ODIN partners and investors will take place through the pilots ecosystem (hospital living lab hub, hospital networks and the digital innovation hub) and through open calls. The open calls will connect industry, researchers and investors. In addition, ODIN will collaborate with the application of regulatory frameworks like the EU GDPR in the context of new models of information provision, data sharing and data reuse.
- Ease of deployment and scalability of ODIN: ODIN will create a digital platform that will offer easy to access microservices based on robotics, IoT and AI. The platform will be based on APIs and through such approach, ODIN will be easy to deploy and scale in terms of eWorkers, eRobots and eLocation. ODIN low-code microservices will allow hospitals to quickly build and evolve AI-based apps to meet the hospital needs and support the interorganizational (Health Territorial) and intraorganizational (Health clinic and managerial) services, as well as driving digital transformation on a larger scale.
- Reaching a high leveraging effect on other sources of funding, in particular regional and national funding: Various hospital partners participating in ODIN project have already participated in cooperation programs, at national and EU level. ODIN will implement sustainable solutions and promote real market opportunities. However, in order to properly exploit different innovation dimensions that will be generated by ODIN, other sources of funding will be addressed. ODIN will cooperate with regional, national and EU funded programs, providing content and engaging in common dissemination activities, sharing experiences and aligning the design of the ODIN platform. This will prepare the ground for further sources of funding. ODIN partners will analyze different funding schemes to secure funding for the sustained existence of the platform.
- Contributing to trust and acceptance of AI technology: Artificial Intelligence (AI) adoption is gradually becoming more prominent in health systems. However, many healthcare insiders are concerned with AI. ODIN proposes that evidence and measurement of health services outputs (key performance indicators, KPIs) are needed to demonstrate the current, and potential impact of AI in order to drive acceptance and trust for both the technology users and the patients themselves. ODIN aims at showing the healthcare stakeholders why and how AI works, by gathering tangible results of the application of AI technologies. For example, this means to provide tangible experience of personalised medicine, customer/end-user examples, more effective clinical workflows and in general, human impact stories which demonstrate how new technologies can directly change patient and value-based healthcare outcomes. Moreover, ODIN will set transferability actions based on a collection of stories, guidelines and educational/training activities.

Summary of Impacts in squares:

1. The emergence of European-led AI based pilots for the smart hospitals of the future.
2. The demonstration of effectiveness of AI based technologies, such as smart robots, in a broad range of healthcare tasks.
3. ODIN as an ecosystem for engagement among healthcare policy makers, investors, stakeholders and through the pilot.
4. Ease of deployment and scalability of ODIN.
5. Reaching a high leveraging effect on other sources of funding, in particular regional and national funding.
6. Contributing to trust and acceptance of AI technology.



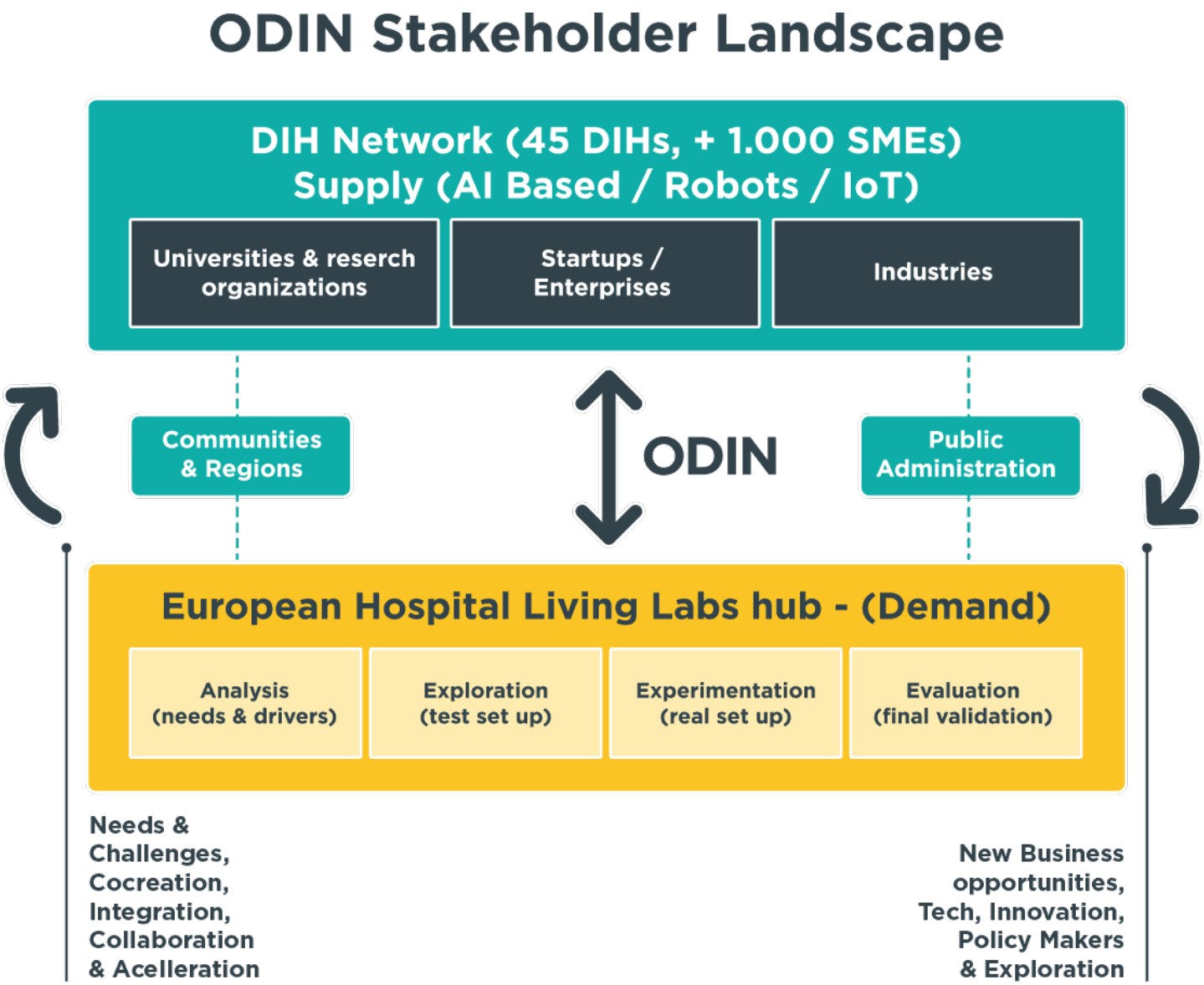
ODIN Ecosystem

The value of ODIN services is expected to increase according to the number of users integrated with the ODIN platform. The consortium will be enlarged through the current established networks and participants from the open calls. In this context the ODIN ecosystem will engage partners mainly from the healthcare and ICT domains (AI, robotics, IoT).

ODIN ecosystem can be seen as two sides that interact with each other:

- **The Demand side:** potential users that consume services, such as hospitals.

- **The Supply side:** partners and associated partners which produce/create and offer their services.



Supply side: new technologies and applications will be incorporated to the platform through the Digital Innovation Hubs, involving citizens, academia, research institutions, public bodies, SMEs, start-ups, industry, ICT innovators, investors, etc. All these stakeholders will have the opportunity to demonstrate the benefits of the AI solutions they bring to ODIN platform, including apps, robots and IoT systems. Within this ecosystem, there is the opportunity to create evidence of application through the "Trusted evidence chain" to both communicate the capacity of the application, while measuring the impact produced in the healthcare environment. Moreover, this produces a transferability effect by replicating best practices, transferring know-how, standards, tools and APIs, to facilitate the market growth for AI enabled applications

Demand side: ODIN platform attracts and connects current and potential new users through the European Hospital Living Lab Hub, part of the EIT Health Living Labs and Tested Network. These new stakeholders are the adopters and users of the platform, who will validate the tools, services and applications provided from the supply side.

By early adopting, testing and validating this offering in the Hospital pilots (or other facilities), ODIN covers the whole value chain and allows creating a full ecosystem.

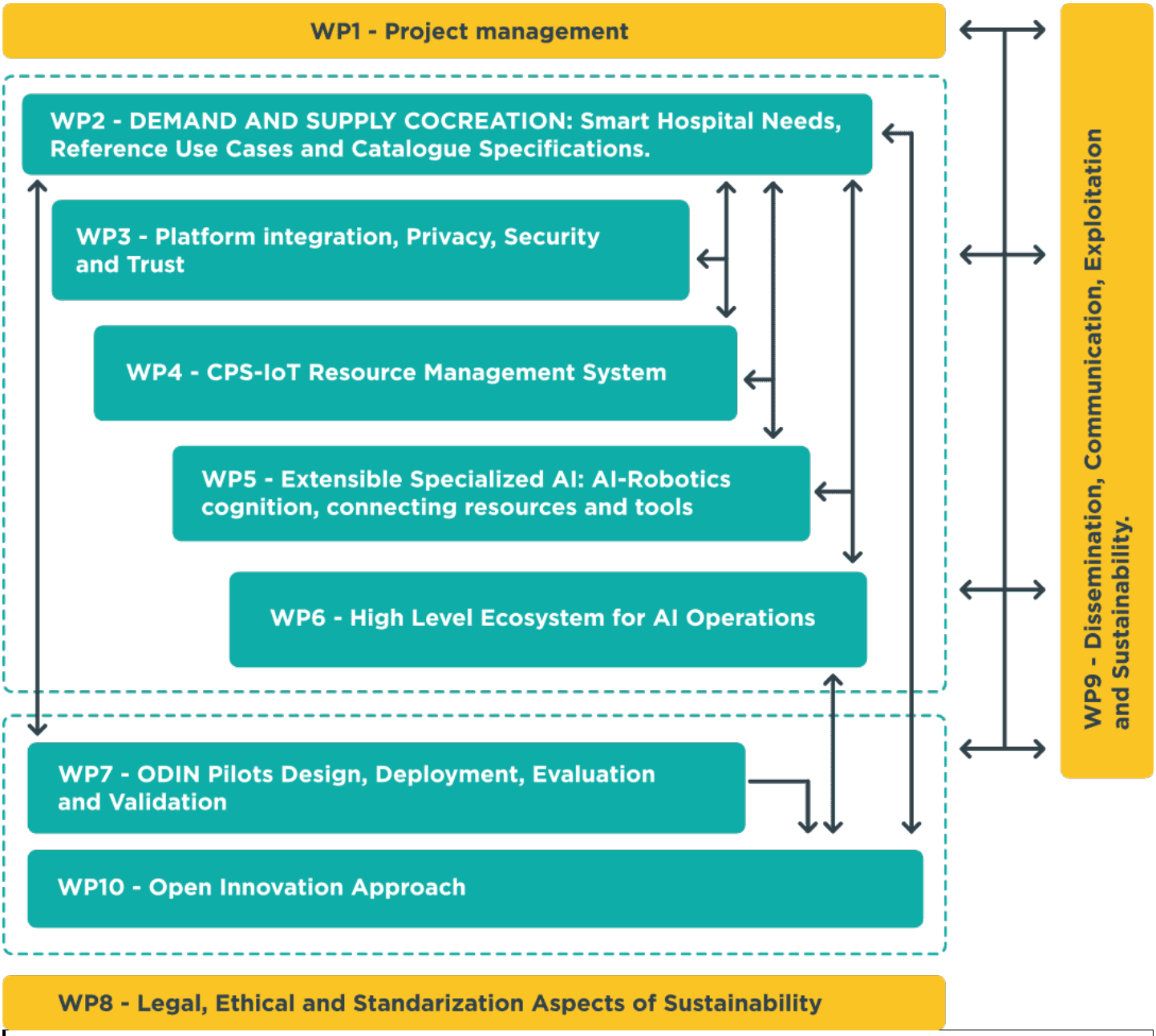
Both sides of the ecosystem must be strongly inter-connected and there will be incentives to use the platform and create strong network effects. The connection with the Digital Innovation Hub and with the European Hospital Living Lab Hub will increase the demand and supply side with new stakeholders.

Another way to expand the ecosystem will be through the open innovation approach. During this phase, innovation

aspects and needs from potential users will be captured to support services optimization and scaling up.

In summary, ODIN ecosystem will work as follows: the supply side will provide a catalogue of technologies that will be completed and expanded as required, through the ODIN open calls and the demand side will perform an internal health technology management cycle (test, install, deploy) and assessment in order to identify potential challenges, needs, bottlenecks and opportunities

Governance



WP1: Project Management and coordination

The aim of this work package is to guarantee a smooth and effective coordination of the activities within ODIN project and the emerging platform.

- Continuous monitoring of the project's progress and timely initiation of corrective actions.
- Ensuring the adherence of the work to the overall project plans, resources and timing ensuring a high quality of the ODIN outcomes.
- Scheduling and organising project meetings, coordinating its organisation and execution.

WP2: Demand and Supply co-creation: Smart Hospital needs, Reference Use Cases and Catalogue specifications

The goal of WP2 is to ensure that ODIN project expands, involving health and care professionals, patients and external stakeholder (demand) and high tech industry and business (supply) using co-creation methodologies.

- Plan and implement the co-creation driven elicitation of end users´ needs for aligning the supply solution catalogue to the specifications and requirements of all components of the platform demand.
- Gather and prioritize the hospital of the functional, non-functional and technical requirements at pilot setting and healthcare facilities of ODIN partners.
- Share understanding of needs and barriers, novel service models, impact of resources, staff training and alignment with the existing practices in the three pillars, to be translated in future implementation strategies.

WP3: Platform integration, Privacy, Security and Trust + knowledge + cognition

This work package encompasses the coordination of activities that have to do with the integration of the platform as well as all the needed infrastructure for development, validation and operation of the platform.

- Semantic models, creating an efficient data model, based on standards and from the most appropriately selected datasets by efficient and effective preprocessing of all available data.
- Knowledge Base, providing the component hold and populate it with the standard knowledge needed and collected in the hospital environment.
- Integration of the platform, ensuring all the components in the platform integrate correctly in a single execution context, and that this execution context is easy to deploy in pilots.
- Implement privacy, security and trust mechanisms in the platform. – Ensure Platform documentation provides the necessary information and at the appropriate level.
- Provide any user or tool support.

WP4: CPS-IoT Resource Management System

The specification and development of the CPS-IoT Resource Management System (CPS-IoT RMS), which is the layer in ODIN platform that supports the interconnection of available resources (virtual, physical, internal, external, etc.) to enable data collection, context awareness and service orchestration.

- Specification of the CPS-IoT RMS requirements based on input from WP2.
- Definition and development of the Resource Descriptor module.
- Specification and development of the Resource Gateway module.
- Specification and development of DLT Resource Federation and management framework.
- Specification and development of Resource Choreographer module.
- Specification of KPI and metrics collection framework.

WP5: Extensible Specialized AI: AI-Robotics cognition, connecting resources and tools

This work package aims at creating a technical bridge between the Resource Management System (RMS), the Hospital Knowledge (HK) and the High-Level Ecosystem for AI operations layer.

- Providing Specialized technologies to build context awareness of eRobots, eLocations and eWorkers.
- Developing complex models of human behaviour to ensure the system understands how humans behave.
- Providing the means to actuate and control intelligently eRobots, eLocations, and eWorkers.
- Implementing innovative Digital User Experience in the hospital through human-system interaction taking advantage of all the available interactive resources and considering the context.
- Conducting specific robotic and complementary resources integration and validation operations

WP6. High level ecosystem for AI Operations

This work package aims at developing the components for providing learning capabilities, data management and data sharing, data-model creation and High-level AI support to the ODIN project.

- Design and implement the necessary data services for modelling, optimization and efficiency relevant workflows in the clinical environments and implement interfaces to acquire data for algorithm development.
- Develop data services based on the High-Level AI methods and provide support for the scheduling, planning and optimization in the different working scenarios.
- Apply specific machine learning algorithms and deep learning techniques to "learn" from the hospital environment and produce the most efficient results.
- Enabling the system to cope with emergency situations on all the phases; learn from its operation (and other input), predict and plan future emergency operations.

WP7: ODIN pilots design, deployment, evaluation and validation

The main objective of this WP is to define, manage and execute the ODIN Pilot activities in each pilot site, focused on planning, managing, executing and assessing the deployment of ODIN technologies, proving their efficacy, cost-effectiveness, safety and acceptability.

- To establish and consolidate the different Use Cases throughout Europe while ensuring the safe, secure, ethical and effective deployment of ODIN technologies among all the different EU pilot countries.
- To ensure that users' requirements (WP2) are met correctly in a coordinated deployment of ODIN technologies (WP3-6).
- To oversee the deployment of the new Use Cases from the Open Calls (WP10) ensuring the complete integration of novel technologies and enlarging the local innovation ecosystems.

WP8: Legal, ethical and standardization aspects for sustainability

This work package will be focused on activities related to compliance with current and forthcoming legal framework and standardization requirements, as a prerequisite for innovation sustainability and going to the market.

- Identify and elaborate upon the legal aspects of using AI, big data in hospital environments, and collaborative robotics, smart care environments with regards to data processing and privacy
- Provide the ODIN Policy, Legal and Ethics framework
- Certification and standardization initiatives
- Data ethics and public procurement

WP9: Dissemination, communication, exploitation and sustainability

This work package will focus on the development and execution of viable plans for the ODIN communication, dissemination, and exploitation activities.

- Tailored comprehensive, effective, and interactive communication outreach and dissemination of the ODIN results with measurable KPIs.
- Exploitation of the project results, prioritising contributions for adoption of the ODIN technology. – Maximization of the project's impact in sectors for healthcare-related technologies.
- Providing a toolset for the ODIN partners, which will help in stakeholders communication, alignment, collaboration and sharing of knowledge.
- The Definition and mapping of related stakeholder network, in order to characterize their individual needs and expected benefits, and their interrelation.
- Foster and empower community building activities by offering a wide range of collaborative services.

WP10 : Open innovation approach

The goal of this work package is to implement the open call aspects of the project.

- Shaping the procedures and prepare the necessary documents to ensure smooth implement of the open calls.
- Setting up the web platform for submission, evaluation and monitoring of the open call projects.
- Implementing the open calls, evaluation of the proposals and contraction of the project.
- Monitoring and evaluate the implementation of the open caller selected project.
- Processing payments to the beneficiaries of the open calls.

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