



# International Open Market Consultation

Scoping Document

26<sup>th</sup> June 2023



Funded by  
the European Union

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# 1 The DYNAMO Solution in a Nutshell

Disruptive threats to health systems such as pandemics, natural disasters or economic crises have profound implications for population health, economic progress, and social cohesion. These unexpected systemic shocks challenge the absorptive capacity of a health and care system to maintain the same level (quantity, quality, and equity) of services and protection of the population despite adverse impacts on available resources. Health system resilience – the ability to adjust to both expected and unexpected conditions while maintaining functionality – is key to coping with such threats. Trends like ageing populations and the increase of chronic diseases evoke further challenges to the transformative capacity of the health and care system to adjust to these shocks.

Providing high quality health care tends to be a complex process which is difficult to manage even under routine conditions. This often involves health and care staff from different professions and institutions who need to work together smoothly. Multi-disciplinary care pathways are one instrument to develop and communicate collaborative health and care service delivery processes. They bundle interdependent tasks and activities in the sense of a "patient journey" through the health and care system, either for individuals or for patient groups. DYNAMO aims to provide a digital solution that allows alternative care pathways to be easily modelled and assessed during the planning process in terms of their respective impact on service delivery and associated outcomes.

What is urgently needed is a lean and powerful solution that enables IT platform-independent planning of care pathways for disruptive care situations, knowing that existing health care IT infrastructures will not be able to support a fully or partially automated implementation of such "crisis pathways" at the point of care. As a strategic planning tool, such a solution needs to be able to effectively guide a non- or partially automated pathway implementation across different health sectors and adjacent public service domains. Also, such a tool should be suitable to reliably inform medium-term investment planning for the adaptation and/or expansion of existing health IT infrastructures, with a view to further increasing the level of automated cross-sectoral pathways delivery at the point of care even in disruptive crisis situations.

As part of the EU's HORIZON programme, the DYNAMO consortium is using a special funding instrument, pre-commercial procurement (PCP), to have such a novel care planning tool developed by market participants. The current view is that the new tool should at least provide three core functions to effectively support adaptive service planning in times of crisis, namely:

- a) dynamic pathway planning and design across various organisations and settings, suitable to deal with a range of system threats,
- b) ex-ante impact assessment concerning alternative service pathways that includes relevant parameters and is suitable for situations where health system function is threatened,
- c) and task-based staff planning and skills matching that is appropriate for the health system in crisis situations.

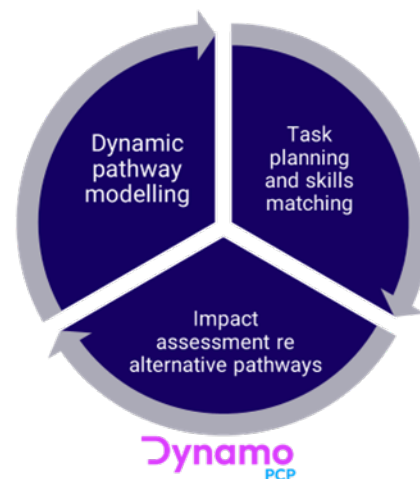
This way, DYNAMO will help health planners and service providers to improve the speed and quality of their responses to pandemics, natural disasters, or other crises. By delivering a flexible planning tool effectively supporting the modelling of "crisis pathways" across different health care settings, the novel DYNAMO solution will effectively support current health systems in becoming more resilient.

## 2 Core Components of the DYNAMO Solution

Experiences gained in the context of the COVID 19 pandemic clearly underline the need for better aligned service delivery processes, both within the health care system and in conjunction with other sectors such as social care. Fostering the response capacities of the health care system by increasing the cooperation between a diverse range of service providers and planners, not only in the immediate health care domain, therefore is of decisive importance for strengthening the resilience of health care systems.

The DYNAMO procurers seek a digital solution that enables evidence-based planning and modelling of sharable multi-disciplinary, platform independent care pathways. Such a pathway planning tool is to support flexible adaptation to changing conditions during crises. In this sense, the solution is expected to effectively support a dynamic adaptation of routine care pathways across hitherto disconnected service silos, with a view to significantly accelerating the response time for re-planning of health and care delivery processes and improve the quality of the resulting response. As a result, the envisaged planning tool is expected to support service providers and planners, based on multidisciplinary service delivery pathways, to better coordinate health care services and, consequently, provide better care for their clients or attenuate adverse effects of a crisis.

Beyond mere pathway design, the DYNAMO procurers are to be enabled to use data available from existing health IT infrastructures (EHR, HIS, etc.) to assess alternative pathways in advance for possible impacts in terms of their practical feasibility and expected outcomes under crisis conditions. Also, high pressure situations often require task shifting within the workforce or community. The DYNAMO procurers, therefore, seek a solution that supports task planning and skills matching beyond occupational groups. All in all, the availability of a powerful tool for



rapid, evidence-based modelling of multi-sectoral care pathways is envisaged to complement the digital health infrastructures already available to the DYNAMO procurers for rules-based service delivery at the point of care. Therefore, a dedicated interoperability approach is to be proposed with a view to ensuring that the DYNAMO solutions will be replicable in different health care systems.

In summary, the DYNAMO procurers seek a scalable multi-disciplinary pathway planning and modelling tool allowing local customisation and multi-disciplinary pathway design and ex-ante assessment. The tool is expected to support health and care organisations in rapid planning of pre-emptive measures against potential system threats. In the following sections, the core functional components of the envisaged DYNAMO solution are discussed in more detail.

### Dynamic Care Pathway Modelling

Health and care provider organisations face considerable difficulties in adapting their routine service delivery processes to "external" disruptions. In its initial market research, the DYNAMO procurers found a lack of digital solutions for the modelling of integrated pathways across a diverse range of health and adjacent public services domains to facilitate re-planning of

routine processes. The market also lacks solutions enabling crisis-related ex-ante impact assessment to be applied at the pathway planning stage, facilitated by flexible integration of data and information - e.g., to identify those people at risk and most likely to benefit from adaptation of care practices or to identify the most cost-effective intervention strategy. Also, current solutions fail to smoothly integrate into heterogeneous IT landscapes, with a view to ad-hoc adaptation to diverse disruptive conditions.

Against this background, DYNAMO will go beyond disease-specific pathway modelling to develop sharable multi-disciplinary, platform independent care pathways which are interpretable and usable by different actors. At the current stage, several core requirements have been identified as follows:

- The DYNAMO solution is envisaged to build on an open architecture and the use of standard protocols to achieve organisational, semantic, and syntactic as well as technical interoperability, ultimately leading to pathways that are shareable amongst and applicable by a diverse range of stakeholders beyond the clinical health care environment. Standards-based pathway modelling is to make outputs available between parties that cannot currently interact or effectively co-create joint service delivery pathways. The DYNAMO solution will thus need to be interoperable with procurer's existing key systems such as EHRs for patient and population health information, GP computer systems, or Patient Administration Systems that sometimes do not have the aspired interfaces and are difficult to change because they are linked with other systems and fulfil the local requirements of the respective agency quite well. Diverse standards of relevance to DYNAMO are expected to be considered, e. g. FHIR, HL7 and the openEHR framework with its specifications for a semantic framework.
- Based on relevant standards, e.g., Business Process Modelling and Notation (BPMN), Unified Modelling Language™ (UML®) 2.7 or ISO 5807:198528, the DYNAMO solutions should enable the modelling of different types of models. Depending on whether structured or unstructured workflows must be modelled, these may include process (BPMN) models, case (CMMN) models and decision models (DMN). To be useful as a basis for implementing cross-sectoral health and care workflows, they need to be made explicit with formal, repeatable semantics, i.e., they must be truly shareable.
- A diverse range of stakeholders to be involved in crisis related health and care planning need to be enabled to remotely access the DYNAMO solution in a safe and easy manner. Compliance with relevant legal and regulatory requirements must be ensured. During the planning process, remote communication is to be enabled by appropriate means, e.g. messaging, chatting or others. Any outputs should be made available in appropriate electronic and non-electronic formats.
- The solution should enable the collection of high-pressure scenario-based pathways which can be swiftly adapted to health care environments outside the consortium, thus providing the opportunity to establish an ever-growing stock of care pathways that can be utilised and contextualised by further stakeholders.

## **Ex-ante Impact Assessment re Alternative Service Pathways**

An initial scan of the market did not identify any tools readily available that satisfy the demands of the DYNAMO procurers of providing an ex-ante impact assessment functionality that allows for real-time prediction of likely effectiveness of outcomes of pathway alternatives before being implemented in the real world. Typically, impact assessment dimensions procurers need to assess include staff and resource availability, staff qualifications, cost implications as well as patient-related information. This requires the DYNAMO solution to be able to collect

potentially large volumes of data (from e.g., existing EHRs), and make these easily accessible and interpretable by different parties. Data to be used are expected to be very heterogeneous, ranging from individual level data (e.g., extracted from EHRs) to aggregated performance measures and singular values extracted from literature. Data sources to be used may also not be pre-defined in every case but may become necessary / available only on short notice, e.g., when a given pathway becomes operational. Similarly, data holding systems may be very varied in terms of formats, interfaces, and performance, as well as being subject to different forms of governance.

Against this background, the DYNAMO solution will provide ex-ante impact assessment that includes relevant parameters and is suitable for situations where health system function is threatened. This is to allow health and care provider organisations to assess alternative crisis-related health care pathways in advance for possible impacts in terms of their practical feasibility and expected outcomes under given crisis conditions. At the current stage a range of requirements have been identified in that regard:

- The DYNAMO solution is expected to provide intelligent decision support in relation to alternative crisis pathway options, including risk assessment and stratification capabilities in relation to affected population groups. Complexity is to be structured with a view to making dynamic pathway design and impact assessment workable by improving access to information across sectoral boundaries and remove friction. Data analytics and data mining capabilities are to be provided that enable identifying, combining, analysing, and classifying relevant data to inform multi-disciplinary decision making about future pathway implementation. To this end, the DYNAMO solution must be able to integrate and interpret data available from existing health IT infrastructures (EHR, HIS, etc.), including patient monitoring systems where appropriate. Effective data collection and integration is to be enabled under such conditions allowing for reliable predictive impact assessment of alternative pathways to provide guidance for implementation.
- DYNAMO will pursue a comprehensive interoperability concept differentiating different levels of interoperability considering automated data import as well as manual data integration, increasing utility of the new solution even in implementation settings where few or no data exist in electronic data repositories and/or other sources, and thus facilitate a broader market roll out even in a short-term perspective. Also, context data for a region or nation as conditions like weather or major events impact service demand are to be considered.
- For a range of different high-pressure scenarios, the solution must be capable of considering data points for diverse parameters such as regular capacities in health and care settings and additional resources, e.g., capacities that can be mobilised at short notice in institution, health care network and community as well as additional staff (pools of additional health care professionals and volunteers to be activated at short notice).
- The DYNAMO solution should support the identification of factors that can reduce demand on the system such as elective care (differentiating between “essential services” and “supporting elements” for different health care procedures according to their importance) or stable patients (identifying individuals to be discharged early according to their probability of complication).
- The solution should support quantitative and qualitative trend analyses. It should consider characteristics of the surge such as surge onset (differentiating between single peak surges, gradual onsets, or combinations), surge duration or special supply needs. Geolocation of available crisis management resources should be supported. Warnings and alerts with relevance to decision support should be provided in an

appropriate manner. The solution should also allow for an ethical triage concept to alleviate pressure in care disruption situations.

- Monitoring of crisis pathway implementation is to be supported, with a view to enabling a dynamic re-assessment of crisis pathways through an easy-to-handle interface, e.g. a dash board. When a “node” is down, for instance, the swift redirection of patient flows should be supported. Task and resource planning, staff allocation, skills matching, and shift planning should be enabled in a dynamic manner.
- The development and/or integration of standardized guidelines, tutorials and other informational content relating to crisis mitigation measures shall be supported.

## Task Planning and Skills Matching

On the part of established health care providers, the occurrence of crisis situations such as a pandemic often requires a shift in tasks, with duties being redistributed within the workforce or the community. This demands well defined mechanisms to guarantee quality of care. A solution that goes beyond simple staff scheduling and includes possibilities for task shifting depends on a good inventory of the staff’s skills. This could be through a standardised skills taxonomy inspired by European Skills, Competences, and Occupations (ESCO). This inventory could identify skills gaps hindering alternative care pathways and suggest alternative staff-allocation. This is not only crucial within established care teams, but more still with teams including foreign-educated health professionals, nursing students or new hires, for example.

The existing solutions are either not based around task and skills, or not designed for situations where health system functions are threatened. Also, they do not include any skills enhancement components beyond pure ad hoc information. Against this background, the following core requirements have been identified at the current stage:

- Task-based staff planning and skills matching capabilities are to be provided that are appropriate to health system threats to allow for modelling of multi-disciplinary pathways around task allocations instead of job titles. This is expected to be more flexible and allow to apply task shifting, so that professionals from care and community can more easily substitute each other for specific tasks.
- A catalogue of tasks and a skills inventory of relevant staff categories that is both in accordance with standard skills of different professional groups and with professional regulations is to be developed, with a view to serving as the basis for providing mechanisms for task shifting that also reach into the wider community. The skills inventory of relevant staff categories for different occupations may be based on skills bundles in the ESCO group 22 (Health Professionals), so that the DYNAMO solution can match the skills to each health care team member and use them as a basis to assign tasks.
- The DYNAMO solution should enable ad hoc care skills alerts informing health care planners that staff needs to be briefed on specific care standards. Contents should focus on DYNAMO use cases (e.g., heat waves: treating elderly patients with dehydration, considering multimorbidity).
- A user-friendly tutorial including prepared training cases is to be provided.

### 3 Scenario-based Application Process

The DYNAMO solution must be designed to help health authorities, service providers and planners better respond to short- and long-term threats to adequate health care. Specific use cases to be considered for DYNAMO will be derived from several high-pressure scenarios, as summarised by Table 1. For each scenario, alternative pressure points are currently defined which can be expected to exert noteworthy influence on the performance of relevant stakeholder ecosystems in the procurers’ countries. Also, a set of health system goals are being identified and prioritised, and related use cases for the application of the DYNAMO system defined. The definition of high-pressure scenarios also entails the identification of situations that the system must deal with and the consideration of ethical issues for an alternative response process.

#### High-pressure Scenarios

The DYNAMO solution is to support the efficient and effective adaptation of existing health and care service delivery processes to structural health care threats. Structural threats to health care can take the form of short-term shocks, e.g., in the case of a heatwave posing particular health risks for certain groups. But they can also take the form of longer-term changes affecting the health care system in a negative way such as staff layoffs caused by structural staff shrinkage. The DYNAMO solution must be capable of dealing with systemic short-term shocks and long-term threats in a way that allows a given health care ecosystems to (i) sustain required operations, (ii) resume optimal performance as quickly as possible, (iii) transform its structure and functions to strengthen the system, and (iv) reduce its vulnerability to similar shocks and structural changes in the future. In this context, DYNAMO procurers have identified several high-pressure scenarios they wish to address (Table 1).

**Table 1 – Initial list of high-pressure scenarios to be considered for the purposes of DYNAMO**

Communicable	Non-communicable
Propagated epidemic	
	Migrants/ war refugees
	Anti-microbial resistance
	Nuclear hazard
	Heat Wave/ extreme Temperature
	Staff layoffs (e.g., caused by financial crises/structural staff shrinkage)
	Energy poverty inducing respiratory illness
Pandemic	



## A Generic Application Process Model

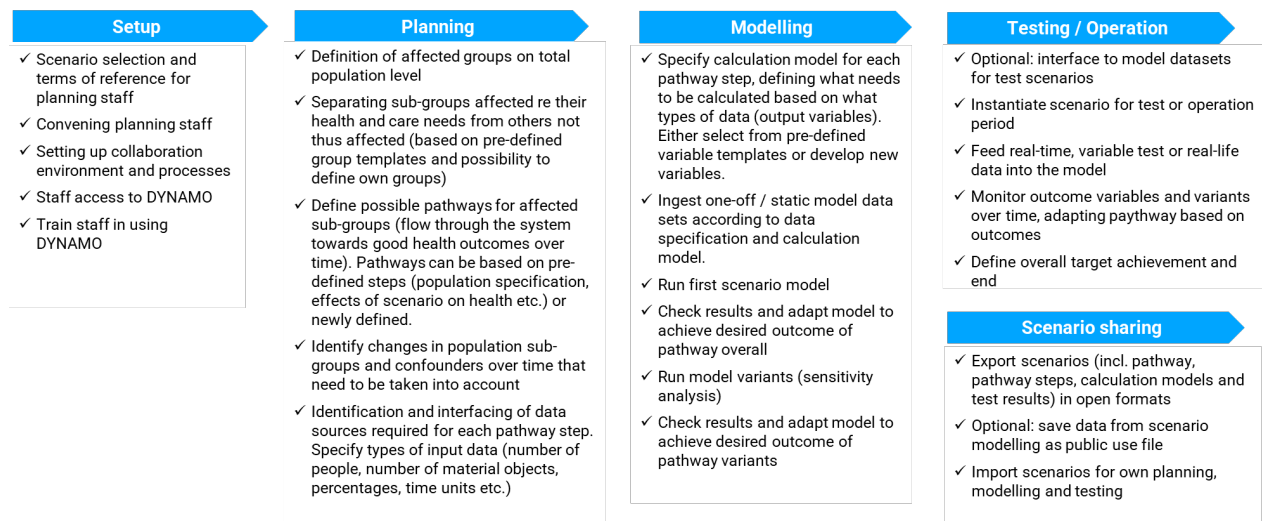
At each procurer site, a Local Modelling Group (LMG) will be set up. The group will consist of selected decision makers, health and care practitioner representatives, care managers, and IT planners/programmers. A data manager will be appointed who possesses the necessary skills in relation to data preparation and analysis as well as a knowledge of the (potential) data sources to be used. The LMG will have access to complementary expertise and capacity (legal, technical) as required.

At each procurer site the LMG will apply the DYNAMO solution according to a generic process model comprising several subsequent steps. In a nutshell, these can be summarised as follows:

- Step I: In the *set-up phase*, the LMG is constituted, and its operational capacity is established, with the roles and responsibilities of the individual members being defined in a binding manner.
- Step II: The *planning phase* focuses on identifying and documenting alternative pathways for distinguishable population groups and/or subgroups affected by a particular crisis scenario in terms of their health needs.
- Step III: In the *modelling phase*, work concentrates on data-driven impact modelling for the pathway options developed at the previous stage.
- Step IV: The *testing / operation phase* focuses on instantiating the high-pressure scenario and feeding real life data into the model defined in the previous work step, with a view to assessing alternative crisis pathways developed earlier (Step II).
- Step V: The resulting scenario is shared among the relevant stakeholders in an open format, including alternative pathways steps, calculation models and test results.

The following diagram (Figure 1) illustrates the individual steps of the generic application process of the DYNAMO solution in more detail.

**Figure 1 – Generic process model to be supported by DYNAMO**



For illustrative purposes, a hypothetical use case scenario is very briefly sketched in the following sections by example of a high-pressure scenario concerning a flooding in a rural area.

### **Step I - Set-up**

A flooding in a rural area in particular impacts the older population in hospitals, nursing homes and home care. A planning commission is convened by the mayor and headed by a municipal official. It includes representatives from hospitals in the region and around it. Also, representatives from nursing homes in the region and around it are included, as well as home care providers from the same area. Other members include representatives from the regional statistics unit and from the emergency service. All receive access to the DYNAMO system and training by the head of Local Modelling Group (LMG).

### **Step II - Planning**

Older people in retirement who receive hospital treatment, nursing home residents and home care recipients are identified as a population group that is particularly impacted by the flooding in terms of their health needs. Older people in primary care treatment and/or caring for themselves are excluded, as are home care recipients at lowest level of care.

Diverse pathway core elements are defined such as (a) identification of affected people from service records, (b) steer them into appropriate care in unaffected neighbouring areas is identified as the main aim, and (c) mapping of available services outside affected area.

In the actual situation, type and number of affected services will vary. The scenario may also affect “outside” areas. Changes over time can concern the number of people deteriorating while waiting for service (e.g. from social care to hospital).

Data from service records which need to be exported are identified. Unique identifiers for linkage are agreed. Relevant regional statistics for base population are identified.

Alternative crisis pathways are developed and documented.

### **Step III - Modelling**

A model for assessing the impacts of alternative crisis pathways is defined, based on available data. Calculations include (a) share of base population receiving care in each sector, (b) ratio of available service space to affected population, (c) change of patients over time, (d) mapping demand against supply in outside areas, and (e) the mapping number of transfers to transport capacity to determine time for total transfer.

### **Step IV - Testing/operation**

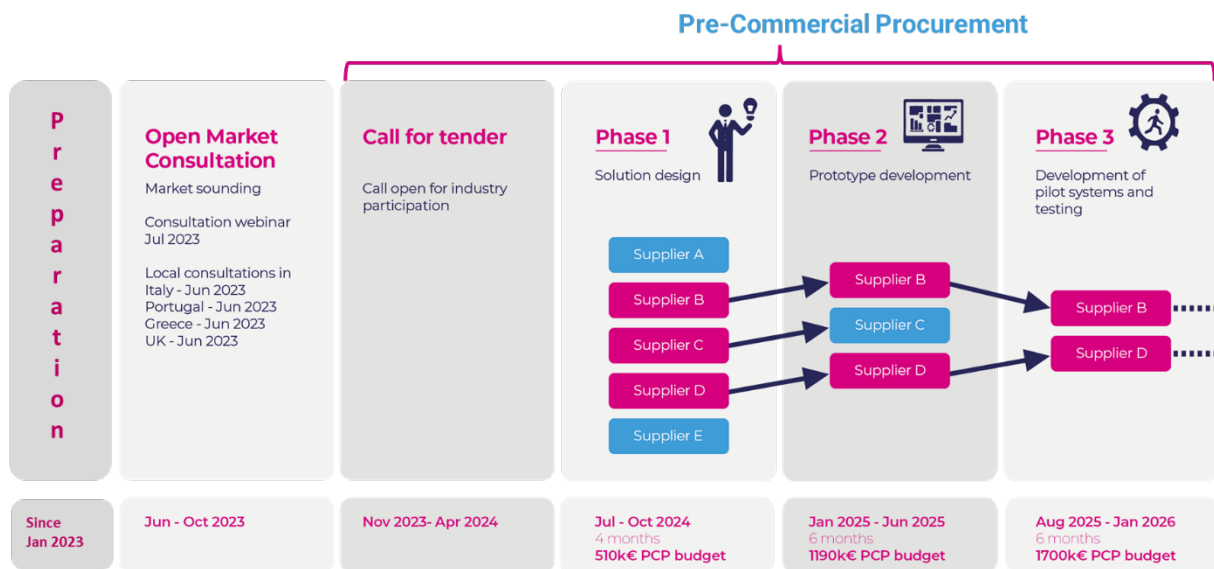
For testing purposes, the mayor convenes a dedicated testing board. The board defines test layout and parameters and runs test with the LMG. The test results are rated in terms of system performance and approximate outcomes.

For real-life operation the mayor convenes the LMG which instantiates a selected pathway. The LMG operates pathway for the required time.

## 4 Pre-Commercial Procurement Outlook

In pre-commercial procurement (PCP), public procurers buy Research & Development (R&D) from several competing suppliers in parallel to compare alternative approaches and identify the most cost-effective solutions that the market can deliver for their requirements. R&D is divided into phases (solution design, prototyping, initial development and testing of a limited number of initial products), with the number of competing R&D providers reduced after each R&D phase. The scheme below (Figure 2) graphically summarises how the procurement stages will be organised within the DYNAMO PCP.

Figure 2 – The DYNAMO life cycle



In total, there is a budget of €3.4 M for R&D. And a supplier that makes it to the final phase can get up to €1.3M. Each phase has a maximum budget allocated to be distributed among all participant organizations. By the end of 2023, a call for tender will be published encompassing all three phases. While the 1<sup>st</sup> PCP phase will focus on solutions design, the subsequent two phases will focus on prototype development and pilot system development as well as testing.

The selected R&D providers are expected to provide deliverables throughout all three phases advancing the solution to the largest extent possible. Hence, DYNAMO will apply a living document approach in which sections of core deliverables from earlier phases, beginning with the technical offer, are continuously developed achieving milestones and progressively come closer towards the final outcome expected.

### What's in it for you?

Innovation suppliers, of any type or size like SMEs, large corporations, research institutions, can benefit from Pre-Commercial Procurement projects in different ways. You will be able to:

- Supply innovation to the big public market (public procurement accounts for approximately 14% of GDP in the European Union).
- Get funding and support from subject-matter experts to develop a solution, the procurers.
- Co-create and test the innovative solution in real conditions.

- Increase your trust and credibility when approaching new customers, as you would have worked side-by-side with other customers.

## Phase 0: Open Market Consultation

During the Open Market Consultation (OMC) stage, DYNAMO consortium will:

- Inform potential suppliers (industry) about the DYNAMO pre-commercial procurement opportunities.
- Explain in detail the pre-commercial procurement process.
- Open a dialogue with market stakeholders about the scope of procurement envisaged in the project, including technical specifications.
- Facilitate matchmaking opportunities among interested suppliers needing from other parties to build consortia capable of addressing the needs of DYNAMO procurers.

To address such objectives, the OMC is composed of different events and initiatives:

- **Local OMC events:** Each procurer of DYNAMO held an OMC event in their local language to inform nation-wide stakeholders of project opportunities. The recordings and materials of the session can be found on DYNAMO's website:

Procurer	Region (Country)	Day	Language
<a href="#">Hywel Dda Local Health Board</a>	West of Wales (UK)	7 <sup>th</sup> of June	English
<a href="#">Agència de Qualitat i avaluació sanitàries de Catalunya (AQuAS)</a>	Catalonia (ES)	15 <sup>th</sup> of June	Spanish
<a href="#">Istituto Per Servizi Di Ricovero E Assistenza Agli Anziani (ISRAA)</a>	Treviso (IT)	22 <sup>nd</sup> of June	Italian
<a href="#">Irmandade Da Santa Casa Da Misericórdia Da Amadora (SCMA)</a>	Lisbon (PT)	23 <sup>rd</sup> of June	Portuguese

- **International OMC event:** In addition, an international OMC event will be held in English to welcome participants from any location. Furthermore, an added value of the international webinar will be a pitching session for market players interested in finding partners for a joint tender. In a parallel session, external procurers are invited to provide feedback on foreseen DYNAMO's solution.
- **OMC questionnaire for suppliers:** Technology suppliers interested in the project are invited to provide their feedback on the current stage of the market for similar solutions, already existing solutions, the high-pressure scenarios identified by the project, and further feedback on the PCP scope. This questionnaire will remain open until the 23<sup>th</sup> of August.
- **Matchmaking tool:** A matchmaking tool for suppliers is offered to potential applicants to join other organizations to develop together a solution for DYNAMO. This tool will be available on the website.
- **Frequently Asked Questions (FAQ):** Common questions and queries about the project that may arise at any stage of the Open Market Consultation can be asked either on any of the local or international OMC events, or by sending a mail to [suppliers@dynamo-pcp.eu](mailto:suppliers@dynamo-pcp.eu). All the questions and answers will be published on the website.

## Call for Tenders Overview

- Tentative launch:** ✓ November 2023 – April 2024.
- Submission:** ✓ Electronic
- Official language:** ✓ English
- Eligibility criteria:** ✓ Open to all types of operators (companies or other type of legal entities) regardless of their size or governance structure.
- ✓ Single entity or joint tender offer (consortia)
  - ✓ The organization or consortia of organizations must be able to cover all the requirements unless stated otherwise.
- Evaluation criteria:** ✓ The award criteria still in development phase, they will be announced and included in this section as soon as they are ready. A great impact will be put on quality instead of price.

### Intellectual Property Rights:

- ✓ Suppliers keeps ownership of the IPRs attached to the results generated during the PCP implementation.
- ✓ A financial compensation is calculated in the financial section of the tender, valuing the allocation of ownership of the IPRs by giving an absolute value for the price reduction between the price offered in the tender (actual price) compared to the exclusive development price (market price) to ensure compliance with the EU R&D&I state aid framework. The actual price is the price quoted by the bidder considering that they are retaining the IPR on the outcomes in accordance with the framework agreement to be signed and that they can exploit the developed project knowledge in the market. The market price is the price that the bidder would have quoted if the project IPR on the outcomes were fully retained by the contracting authority and the bidder did not have the possibility of exploiting the intellectual property (knowledge developed within the PCP).

## Phase 1: Solution Design

- Expected output:** ✓ Concept design, solution architecture and technical specifications based on procurers' requirements, use cases and process models.
- Duration:** ✓ From July 2024 until October 2024 (4 months).
- Phase total budget:** ✓ €510,000. Up to €85,000 per supplier.
- Suppliers:** ✓ Up to 6 suppliers.

## Phase 2: Prototype Development

- Expected output:** ✓ Development of prototype systems in two iterations.
- Duration:** ✓ From January 2025 until June 2025 (6 months).
- Phase total budget:** ✓ €1,190,000. Up to €396,667 per supplier.
- Suppliers:** ✓ The best 3 suppliers from Phase I.

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### **Phase 3: Development of pilot systems and testing**

- Expected output:** ✓ Final development and testing of a limited volume of services in real world conditions.
- Duration:** ✓ From August 2025 until January 2026 (6 months).
- Phase total budget:** ✓ €1,700,000. Up to €850,000 per supplier.
- Number of suppliers:** ✓ The best 2 supplier from Phase II.