HEROES

D1.2
Final deliverable on HWF planning: data, models and skills

Overarching and comparative synthesis of the evidence

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HEROES

Deliverable Plan

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ABSTRACT

Strong health systems and a well-functioning health workforce are essential to Europe's competitiveness, supporting a productive labour force, reducing absenteeism, and enabling longer, healthier working lives. Effective health workforce planning is key to anticipating skills needs, addressing shortages and regional disparities, and ensuring the workforce can benefit from digitalisation and innovation. By aligning education, labour market and health policies, it helps build more resilient and efficient systems that support both economic growth and social cohesion.

Joint Action HEROES (Health woRkfOrce to meet health challEngeS) was implemented between 2023 and 2026 with the objective of strengthening health workforce (HWF) planning capacities across participating European countries. Building upon previous European initiatives, HEROES moved beyond methodological exchange towards implementation-oriented support, institutional development, and long-term sustainability of HWF planning systems.

The Joint Action addressed four interconnected dimensions of HWF planning: data and HWF intelligence systems, forecasting models and planning tools, skills and capacities for HWF planning, stakeholder involvement and governance mechanisms. Through a structured methodology based on the AS IS, TO BE, and TO DO phases, participating countries analysed their existing systems, defined strategic objectives, and implemented concrete actions adapted to their national contexts.

The project demonstrated that HWF planning cannot be reduced to a technical forecasting exercise. Effective planning requires the integration of reliable and interoperable data systems, analytical and modelling capacities, governance arrangements, institutional ownership, stakeholder engagement, and continuous policy feedback mechanisms. Across countries, HEROES contributed to strengthening HWF intelligence systems, improving data interoperability, refining forecasting methodologies, developing analytical and governance skills, and reinforcing collaboration between ministries, agencies, educational institutions, professional bodies, and healthcare providers.

One of the key innovations of HEROES was the development of the Advanced Minimum Dataset (AMDS), aimed at supporting more comprehensive and comparable HWF intelligence across Europe by integrating quantitative and qualitative workforce dimensions. The Joint Action also reinforced the importance of scenario-based and multi-professional planning approaches capable of incorporating demographic change, workforce mobility, skill mix evolution, organisational transformation, and emerging technological developments. It also provided for the discussion and exchange of experience on using artificial intelligence (AI) to support health workforce planning.

A major added value of HEROES was its strong emphasis on peer learning, co-creation, and implementation support. Workshops, bilateral exchanges, policy dialogues, expert meetings, and the Community of Practice enabled countries to exchange experiences, adapt methodologies to national contexts, and progressively strengthen workforce planning as a strategic governance function. The project highlighted that countries progress through different pathways depending on their institutional maturity, data availability, and governance structures, confirming that HWF planning development is both context-dependent and path-dependent.

The findings of HEROES have important implications for policymakers. Sustainable HWF planning requires permanent institutional structures, stable mandates, integrated governance mechanisms, and long-term investments in workforce intelligence systems. HWF planning outputs must be linked to concrete policy instruments, including education and training policies, recruitment and retention strategies, organisational reforms, and health system transformation processes.

The Joint Action HEROES also demonstrated the importance of maintaining a European dimension in HWF planning. Cross-border mobility, demographic transitions, labour market interdependencies, and common health system challenges require continued European collaboration, knowledge exchange, and capacity building. The learning ecosystem created through HEROES provides an important foundation for future cooperation and for strengthening health system resilience across Europe.

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Overall, Joint Action HEROES confirms that HWF planning should be recognised as a permanent, integrated, and evidence-informed governance function essential for sustainability, resilience, and future transformation of European health systems.

STATEMENT OF ORIGINALITY

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

DISCLAIMER

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AUTHORS

Giulia Menin, National Agency for Regional Health Services – AGENAS
Lisa Baldini, National Agency for Regional Health Services – AGENAS
Marco Di Marco, National Agency for Regional Health Services – AGENAS
Ines Kuniko Mogami Gonzalez, National Agency for Regional Health Services – AGENAS
Zoltán Cserháti, Semmelweis University – SU
Eszter Kovács, Semmelweis University – SU
Rita Kóródi, Semmelweis University – SU
Anna Kozák, Semmelweis University – SU
Ronald Batenburg, Nivel Netherlands Institute for Health Services Research – NIVEL
Linda Flinterman, Nivel Netherlands Institute for Health Services Research – NIVEL
Aamina Hassan, Nivel Netherlands Institute for Health Services Research – NIVEL
Blashko Kasapinov, Nacionalni inštitut za javno zdravje/National institute of Public Health – NIJZ
Sabina Arnault, Nacionalni inštitut za javno zdravje/National institute of Public Health – NIJZ

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HEROES

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EXECUTIVE SUMMARY

Strategic context and rationale

European health systems are facing profound and interconnected challenges, including demographic ageing, increasing demand for chronic and long-term care, health workforce (HWF) shortages, evolving professional expectations, technological transformation, and growing pressures on the sustainability of healthcare delivery. Across Europe, HWF planning has therefore become a strategic priority for health system resilience, sustainability, and reform.

At the same time, the experience of recent years, particularly during and after the COVID-19 pandemic, has demonstrated that traditional HWF planning approaches based solely on numerical projections are no longer sufficient. HWF planning increasingly requires integrated governance approaches capable of connecting data systems, forecasting models, institutional capacities, stakeholder engagement, and policy implementation.

Within this context, Joint Action HEROES represented a major European collaborative initiative aimed at strengthening HWF planning capacities across participating countries. Building upon previous European cooperation in this field, HEROES moved beyond methodological exchange towards practical implementation, institutional development, and long-term sustainability.

The Joint Action supported countries in strengthening HWF intelligence systems, improving HWF forecasting methodologies, developing analytical and governance capacities, and reinforcing collaboration between ministries, agencies, professional bodies, educational institutions, and other stakeholders. Through peer learning, policy dialogue, technical exchange, and implementation-oriented activities, HEROES contributed to the progressive institutionalisation of HWF planning as a permanent governance function within European health systems.

Main cross-cutting achievements of Joint Action HEROES

Joint Action HEROES generated important achievements across countries despite substantial differences in health system organisation, planning maturity, institutional structures, and data availability. While implementation pathways varied, several common patterns of progress emerged across participating Member States.

A first major achievement concerned the strengthening of HWF intelligence systems. Many countries improved the quality, interoperability, granularity, and integration of workforce data by linking administrative, educational, labour market, and service delivery information systems. HEROES also supported the development of the Advanced Minimum Dataset (AMDS), contributing to more structured and comparable HWF information across Europe.

The Joint Action also accelerated the development and refinement of HWF planning models. Several countries moved from predominantly descriptive approaches towards more dynamic and forward-looking forecasting methodologies capable of incorporating demographic change, HWF flows, skill mix evolution, service transformation, and scenario analysis.

Another major contribution of HEROES was the strengthening of analytical, strategic, and governance capacities. Countries implemented training programmes, workshops, bilateral exchanges, and Community of Practice aimed at improving modelling competencies, data interpretation, policy translation, and stakeholder communication skills.

Importantly, HEROES reinforced the recognition that effective HWF planning depends not only on technical tools, but also on governance arrangements, institutional ownership, and stakeholder engagement. Across countries, policy dialogues and collaborative mechanisms contributed to stronger intersectoral coordination, increased policy ownership, and greater alignment between HWF planning and broader health system priorities.

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The Joint Action also demonstrated the added value of European collaboration. Peer-learning activities, bilateral exchanges, workshops, expert meetings, and Community of Practice facilitated the transfer and adaptation of good practices, accelerated implementation processes, and strengthened the emergence of a shared European workforce planning community.

Key cross-cutting achievements emerging from HEROES

- Strengthened national HWF intelligence systems and data interoperability.
- Improved HWF forecasting models and scenario-based planning approaches.
- Increased integration between HWF planning and health system governance.
- Enhanced analytical, technical, and communication capacities among HWF planners.
- Reinforced stakeholder engagement and interinstitutional collaboration.
- Advanced the development of the Advanced Minimum Dataset (AMDS).
- Promoted implementation-oriented learning and practical application of HWF planning tools.
- Strengthened European collaboration, peer learning, and Community of Practice meetings.
- Increased recognition of HWF planning as a permanent governance function rather than a one-time technical exercise.

National implementation highlights

Belgium

Strengthened integrated and multidisciplinary HWF planning

- Improved HWF data integration through the implementation of the Practice Registry, enhancing identification of active professionals and enabling more accurate activity-based HWF analysis.
- Strengthened data linkage, quality, and alignment between HWF supply and demand while incorporating qualitative dimensions such as well-being, skill mix, and care organisation into HWF intelligence to complement quantitative data.
- Refined established stock-and-flow planning model through stakeholder consultation and exploration of epidemiological and career-related variables.
- Strengthened analytical, modelling, and data interpretation competencies through targeted national training programmes and reinforced collaboration across federal and federated levels.
- Enhanced stakeholder engagement through policy dialogues, surveys, and multi-level collaboration, supporting more anticipatory and coordinated HWF planning on issues such as digital transformation, task shifting, and HWF sustainability.

Croatia

Established new institutional and analytical foundations for HWF planning

- Integrated the National Register of Healthcare Providers with the Croatian Pension Insurance data to improve HWF information quality and completeness.
- Introduced a more advanced and structured Excel-based HWF planning model for supply and demand analyses.
- Developed a national Action Plan 2026-2030 through stakeholder dialogue involving ministries and all the healthcare professional chambers.
- Established dedicated an Independent Sector within the Ministry of Health and a specialized department within the Croatian Institute of Public Health to support sustainability.
- Strengthened national capacities through education, international cooperation, and knowledge exchange, reinforcing the importance of continuous learning for sustainable HWF planning.

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Czechia

Shifted from reactive analyses towards a structured, coordinated, and evidencebased HWF workforce planning approach

- Opened, for the first time, a national policy dialogue on HWF planning through WHO-supported policy dialogues and dedicated stakeholder analysis involving a broad range of actors.
- Strengthened cooperation between the Institute of Health Information and Statistics (IHIS) and Charles University, linking workforce data collection with demographic and analytical expertise and creating the basis for permanent analytical capacity.
- Proposed a transparent HWF planning process with defined steps, responsibilities, and stakeholder involvement mechanisms, positively received during its first presentation in 2025.
- Improved HWF data availability and transparency through structured datasets and visualisations for the National Health Information Portal, including new insights into mobility among nurses and midwives.
- Reinforced mutual learning and long-term capacity building through international cooperation, national training activities, and exchange of good practices with WHO, Slovakia, and the Netherlands.

Estonia

Established structured national forecasting capacity and dedicated HWF planning governance

- Transformed a previously fragmented workforce planning landscape by integrating the Healthcare Professionals' Information System (21,000 workers, 77 specializations) with contractual workload data, education statistics, Health Insurance Fund utilization data, and Statistics Estonia's demographic projections, populating the Advanced Minimum Data Set across professions, age, FTEs, region, specialization, and gender.
- Developed three forecasting models through an Agile approach: the Primary Healthcare Workforce Model, the Emergency Medical Services Model, and the Healthcare Workforce Training Intake Model supporting residency quotas and university admission planning.
- Introduced scenario-planning capabilities validated by professional associations, strengthening the use of evidence-informed forecasting in policy decisions.
- Established a dedicated HRH team within the Ministry of Social Affairs under a newly created HWF Policy Lead, with long-term responsibility for maintaining the forecasting models.
- Strengthened national planning capacity through targeted training activities involving ministries, universities, and professional associations.

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Germany

Advanced federal monitoring and forecasting capacity through European collaboration

- Made significant progress in implementing a federal-level HWF monitoring and forecasting model through the development of a feasibility study concept and subsequent pilot activities.
- Benefited extensively from professional exchange and constructive sharing of experiences within the HEROES community, including work package meetings and Community of Practice activities.
- Strengthened analytical reflection and mutual learning through international dialogue on common HWF planning challenges and emerging practices across Europe.
- Reinforced the understanding of HWF as a strategic, collaborative, and governance-oriented process rather than a purely technical exercise.
- Contributed to the development of a more informed and capable European Community of Practice on HWF planning.

Greece

Improved HWF intelligence and governance coordination

- Developed, for the first time, a structured and stakeholder-prioritised set of HWF indicators together with an Advanced Minimum Data Set aligned with EU and WHO standards.
- Improved the quality, governance, and interoperability of fragmented workforce data systems, linking HWF indicators with the national HEALTH-IQ platform and broader quality-of-care monitoring.
- Advanced exploratory HWF planning and forecasting models beyond purely supply-based approaches towards more dynamic and scenario-based planning incorporating demographic trends, service needs, and labour market dynamics.
- Implemented capacity-building activities focused on institutional strengthening for senior planners, academics, and professional bodies.
- Established structured policy dialogues involving the Ministry of Health, regional authorities, professional associations, academia, and WHO, fostering stronger governance culture, shared ownership, and more coordinated evidence-informed HWF planning.

Hungary

Strengthened governance-oriented HWF planning capacity

- Improved coordination across policy domains and elevated HWF sustainability within the national policy agenda through a structured HEROES implementation framework.
- Introduced policy dialogues supporting a more integrated and sustainable governance approach to HWF planning.
- Progressively shifted from predominantly monitoring-oriented capacities towards a broader capability framework integrating analytical, strategic, and communication skills.
- Strengthened competencies related to modelling, scenario analysis, and integrative planning, laying the foundation for a more sustainable and evidence-informed HWF planning function.
- Enhanced HWF intelligence through strengthened data systems and the introduction of modelling tools supporting more proactive HWF planning.

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Ireland

Strengthened national HWF planning foundations

- Refined the Advanced Minimum Data Set through collaborative work with professional regulators and other national data holders.
- Expanded the scope and capacity of the national HWF projection model through ongoing analytical development activities.
- Strengthened modelling and planning skills through collaboration between the National Doctors Training and Planning team and the Department of Health.
- Reinforced stakeholder engagement and professional networking through bilateral meetings, Community of Practice meetings, and policy dialogues within HEROES.
- Developed action plans focused on data, modelling, HWF planning capability, and sustainability, and published the strategic paper "*Ireland's Future Health and Social Care Workforce"*, outlining an evidence-informed direction for the next 15 years.

Italy

Advanced integrated and evidence-informed HWFplanning

- Expanded the ISTAT (Italian National Institute of Statistics) integrated information system and improved classification of active, available, and inactive health professionals, strengthening the national evidence base for workforce planning.
- Developed new demand-side indicators incorporating demographic, epidemiological, organisational, and service-related drivers of HWF needs.
- Refined the AGENAS staffing needs methodology.
- Prototyped an agent-based simulation model for medical specialty training needs, addressing a critical gap in postgraduate workforce planning.
- Strengthened HWF planning capacities and stakeholder collaboration through national training activities involving around 100 professionals, with 36 participants completing the full training pathway.
- Strengthened collaboration among the Ministry of Health, AGENAS, ISTAT, regions, and professional federations through training and stakeholder engagement activities laying the foundations for more integrated, comparable, and sustainable HWF planning in Italy.

Lithuania

Modernised workforce data systems and forecasting infrastructure

- Improved HWF data quality and granularity through mandatory national collection of detailed employment relationship data (by workload, professional qualification, position and department) via the unified Information System of the Competence Platform for Lithuanian Health Care Specialists.
- Introduced legal amendments requiring all healthcare institutions to submit standardised HWF data, ensuring comprehensive national coverage.
- Migrated the national HWF forecasting model from Excel to the Palantir system (Contour) managed by the State Data Agency, substantially improving data integration, model reliability, and sustainability.
- Strengthened national forecasting and planning competencies through HEROES training activities, bilateral meetings, and a national event involving 357 participants focused on HWF planning capacity building.
- Reinforced long-term forecasting capacity through ongoing collaboration with international partners, including NIVEL (Netherlands) and Semmelweis University (Hungary), while strengthening policy-level advocacy for sustained investment in workforce intelligence, forecasting capacity, and data infrastructure.

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Malta

Transitioned towards evidence-based and institutionalised HWF planning

- Achieved a decisive shift from fragmented and reactive HWF management towards sustainable and evidence-based HWF planning embedded within national policy.
- Initiated a national HWF data repository integrating employment, education, and labour market intelligence across previously siloed stakeholders to support continuous forecasting and policy analysis.
- Adopted a national HWF planning and forecasting model developed with WHO and NIVEL, enabling scenario-based analysis of HWF supply, demand, skills, and task shifting options.
- Strengthened national capacity in HWF analytics, forecasting, and evidence-informed policymaking through structured training, hands-on workshops, and policy dialogues.
- Reinforced stakeholder engagement by transforming institutions from passive data holders into active co-owners of HWF planning processes and embedding HWF planning as a shared cross-sectoral responsibility.
- Established sustainability mechanisms institutionalising HWF planning within the People Management Division, including permanent governance structures, ongoing stakeholder forums, and continued refinement of the national planning model.

Netherlands

Strengthened collaborative learning and scenario-based planning approaches

- Enhanced the use of policy scenarios within HWF planning models to better translate policy ambitions into measurable HWF impacts.
- Improved the presentation and comparability of planning outputs, graphs, and scenarios to support policymaker decision-making and comparison of policy options.
- Strengthened mutual learning through workshops, exchanges, and study visits with European countries participating in HEROES.
- Reinforced national collaboration through two policy dialogues that expanded the Dutch expert network for HWF planning models and research.
- Organised a national working conference in 2026 integrating lessons from other sectors, including education and services, into HWF planning discussions.
- Established a permanent expert group to sustain national and international collaboration, improve access to strategic data sources, and strengthen coordinated evidence-based HWF planning, including in view of the European Health Data Space (EHDS).

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Norway

Enhanced forecasting infrastructure and policy integration

- Strengthened the national forecasting model (Helsemod) through improved, more comprehensive, and quality-controlled HWF datasets supported by a modernised data pipeline.
- Modernised modelling infrastructure by migrating from SAS to R, introducing transparent and shareable code for data transformation and quality assurance processes.
- Improved supply-side, demand-side, and gap analyses, enabling new projections, scenario development, and initial testing of regional-level modelling approaches.
- Generated new methodological insights through a scientific study on immigrants' use of health and care services to support more robust forecasting.
- Developed a prototype interactive dashboard to improve visualisation and accessibility of HWF projection results.
- Strengthened collaboration between Statistics Norway, the Directorate of Health, and key stakeholders through WHO-supported policy dialogue, contributing evidence-based input to Norway's Health Workforce Plan 2040 and supporting future transparency and international knowledge sharing.

Poland

Improved HWF analysis and stakeholder engagement

- Produced analytical reports on primary healthcare workforce structures covering physicians, nurses, and midwives, including specialisations, geographical distribution, education pathways, and generational replacement trends.
- Conducted preliminary analyses of medical specialisation training allocation mechanisms, highlighting imbalances between available residency positions and the number of medical graduates, with implications for alignment between specialty choices and health system needs.
- A review of the international literature on the competencies of nurses and midwives has been initiated to identify differences in their roles and the use of their competencies across countries.
- Organised stakeholder workshops on postgraduate medical education and residency allocation, supporting discussion on workforce replacement dynamics, health policy challenges, and future reforms of the medical training system.

Portugal

Strengthened institutional and forward-looking HWF planning

- Consolidated fragmented HWF, training, and demographic data sources through the "BI RH SNS" business intelligence system, improving data coverage, quality, and analytical use.
- Transitioned from predominantly descriptive reporting towards more prospective and medium- to long-term HWF forecasting approaches.
- Strengthened analytical, forecasting, and communication capacities through targeted training activities, including the International Course on HWF Governance and Strategic Planning, fostering a shared technical language among planners.
- Reinforced interministerial coordination and stakeholder dialogue by engaging professional bodies and technical agencies, helping build trust and consensus around HWF planning as a long-term governance function.

Slovakia

Strengthened integrated HWF intelligence and institutional governance

- Established structured upon-request access to individual-level data from the National Registry of Healthcare Workers (NRHW), replacing aggregated reporting and enabling more precise analyses of HWF shortages, mobility, and retention.
- Integrated NRHW data into the Hospital Network Optimisation evaluation framework, improving the assessment of staffing quality standards and incentivising more accurate HWF reporting by healthcare providers.
- Developed new analytical tools and HWF planning models to estimate minimum staffing needs, replacement demand, and expansion demand across healthcare professions and regions.
- Linked healthcare provider data with labour market employment data from the Ministry of Labour, achieving a more accurate and granular understanding of the HWF.
- Advanced the preparation of the National Strategy for Healthcare Workforce Planning, formally endorsed by the government in 2026, providing a long-term framework for HWF sustainability and shortage mitigation.
- Strengthened stakeholder cooperation by engaging representatives from across the health sector in consultations on HWF monitoring, stabilisation, and retention measures.

Slovenia

Improved HWF registry integration and stakeholder coordination

- Linked the nursing professions registry with the national Register for Health Workers and Providers, strengthening the completeness and integration of HWF data.
- Established regular monthly coordination meetings with registry administrators, creating a structured platform for continuous collaboration and register improvement, with expected gains in data quality and accuracy.
- Produced estimates on inflow and outflow into health professions, improving understanding of HWF dynamics.
- Updated HWF projection models using more recent data and initiated activities to support the long-term continuation and sustainability of planning processes.
- Strengthened stakeholder collaboration through structured engagement, regular coordination, and focused workshops, helping stakeholders better understand their roles, needs, and interdependencies within HWF planning.
- Improved coordination and evidence-informed decision-making by fostering mutual learning and bridging gaps between data and policy.
- Demonstrated that strong collaboration, shared understanding, and continued European cooperation are key enablers of effective and sustainable HWF planning.

Spain

Strengthened coordinated and policy-oriented HWF planning capacit

- Achieved national consensus on a Minimum Data Set (MDS), improving comparability, consistency, and alignment of HWF data across Autonomous Communities while advancing the development of central registries.
- Strengthened forecasting capacity by moving from predominantly descriptive analyses toward more forward-looking and policy-relevant modelling approaches, particularly for medical workforce projections.
- Enhanced analytical, strategic, and coordination capacities among HWF planners through targeted training activities, contributing to a more professionalised and shared approach to workforce planning.
- Reinforced collaboration between national and regional authorities, as well as academic experts, enabling a more coordinated, participatory, and evidence-informed planning process within a highly decentralised health system.

Sweden

Developed a learning-based and capability-oriented HWF planning approach

- Advanced the development of a national learning system supporting the effective and sustainable use of health and dental care personnel.
- Strengthened collaboration between national authorities, improving access to and use of HWF data, as well as analyses on HWF mobility and the relationship between education and labour market needs.
- Developed and tested a Capability Framework through five regional pilot initiatives (“guiding examples”), demonstrating how HWF planning can better integrate patient needs, service delivery models, competencies, and local conditions.
- Reinforced HWF planning capacities through action learning, mentorship, and international exchange, supporting a more continuous and practice-based approach to planning.
- Engaged stakeholders across national, regional, and local levels in jointly interpreting data, identifying challenges, and testing solutions.
- Promoted a more coordinated and learning-based approach to HWF planning, linking national analysis with local implementation.

Key policy messages emerging from HEROES and future directions

The experience of Joint Action HEROES demonstrates that effective HWF planning requires more than technical forecasting tools. Sustainable workforce planning systems depend on the integration of data infrastructures, analytical models, governance arrangements, institutional ownership, stakeholder engagement, and continuous learning mechanisms.

The Joint Action also confirmed that HWF planning systems must remain adaptable and iterative. Demographic change, digital transformation, labour mobility, evolving professional expectations, and health system reforms require planning systems capable of continuous adjustment and long-term strategic orientation. The initiative gave also an opportunity to discuss and learn how to benefit from technologies to support health workforce planning. While AI can strengthen health workforce planning models through enhanced analytics and predictive capabilities, the human factor remains central. Sound workforce planning requires professional judgement, contextual knowledge, and consideration of social and ethical dimensions that cannot be fully captured by automated systems. Continuous collaboration on health workforce planning may in particural focus on developping specific solutions and exchanging practices in this area.

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At European level, HEROES highlighted the importance of maintaining structured collaboration mechanisms capable of supporting peer learning, technical exchange, and collective capacity building across countries. The strong network of competent authorities and stakeholders and the Community of Practice framework created during the Joint Action represents an important foundation for future European cooperation on HWF planning and health system resilience. Key conclusions of work set a direction for future efforts:

- HWF planning should be institutionalised as a permanent governance function.
- HWF intelligence systems require continuous investment in data quality, interoperability, sustainability and targeted use of AI to support planning.
- Forecasting models should support policy decisions and organisational transformation, not only numerical projections.
- Stakeholder engagement and policy dialogue are essential enabling conditions for effective planning.
- HWF planning systems should adopt integrated multi-professional and scenario-based approaches.
- Analytical capacities, governance arrangements, and communication skills must be developed simultaneously.
- European collaboration significantly accelerates national implementation and learning processes.
- Sustainable HWF planning requires long-term commitment, continuous monitoring, and policy feedback mechanisms.

The achievements of Joint Action HEROES provide a strong foundation for the continued strengthening of HWF planning systems across Europe and for the development of more resilient, sustainable, and evidence-informed health systems.

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GLOSSARY

Terminology	Acronym	Definition
Advanced Minimum Dataset	**AMDS**	HEROES product that improved the MDS of JA EU HWF.
AGENAS	-	Agenzia Nazionale per i Servizi Sanitari Regionali, the Italian National Agency for Regional Health Services, which supports regions and the national level in planning, monitoring and improving health services.
Analytical Competencies	-	The broader "mindset" (as opposed to analytical skills) of using analysis to drive business results.
Basic Forecasting Model	-	A simple model that estimates future workforce requirements (the needs) based on projected population health needs.
Bilateral meetings	-	Structured discussions between two parties used to exchange information, review progress and agree on actions related to health workforce planning, governance or implementation.
Business Intelligence System for the National Health Service Health Workforce	**BI RH SNS**	-
Capabilities	**capability / capabilities**	Capability is a combination of required team activities, aggregated skills, processes and knowledge that deliver an outcome.
Capacity Building	-	Systematic efforts to develop and strengthen the knowledge, skills, organizational structures, processes and resources needed at individual, organisational and system levels to perform effective health workforce planning, governance and management.
Capacity-based planning process	-	A type of planning in which available resources (such as staff, beds, equipment, and space) aligns with patient demand.
Competencies	**competency / competencies**	Competency refers to the effective application and integration of knowledge, skills, judgement, and attitudes required to perform successfully in a professional context.
Database	-	The terms database and data set are often used interchangeably. A database is a logical collection of values relating to a single subject (OECD Glossary for statistical terms).
Demand data	-	Data enabling the determination of the need and demand for the number and composition of health workers.
Demand Modelling	-	Modelling based on demand. Demand represents the true need for services (for example based on data such as patient volume).
Demand side	-	Demand represents the true need for services (for example based on data such as patient volume).

Terminology	Acronym	Definition
Demand Side Data	-	Data on the demand side (see definition: demand side).
Demographic demand	-	Demand based on the demographics of the population (see definition: demographic trends).
Demographic Forecasting Principles	-	Demographic forecasting principles are structured, evidence-based methods for predicting future population size, age structure, and distribution.
Demographic trends	-	Demographic trends refer to the observable changes in the composition of a population over time, including factors such as gender, ethnicity, and age, which can impact workforce dynamics and health outcomes.
Emerging planning model	-	A newly developing approach to workforce planning that incorporates evolving methodologies, data sources or governance frameworks to improve projections and responsiveness to system changes.
Epidemiological indicators	-	Epidemiological developments (including their indicators and quantitative measures) used in HWF demand projections, mostly based on incidence and prevalence statistics in patient populations that are relevant for the HWF profession projected and planned.
Flow data	-	The movements inside and outside the health workforce and across countries.
Forecasting and scenario work	-	Combined analytical activities that use data to predict future health workforce supply and demand (forecasting) and explore multiple plausible futures under varying assumptions (scenario analysis).
Forecasting model	-	A framework (model) that takes different data such as historical and current workforce, service and demographic data to estimate future health workforce requirements.
Forecasting tool	-	An analytical instrument that supports the execution of forecasting models (see definition: forecasting model).
FTE-based adjustments	**FTE-based adjustments**	Modifications/adjustment to workforce estimates that take into account Full-Time Equivalent measures to reflect part-timing and variable working hours.

Terminology	Acronym	Definition
Full time equivalent	**FTE**	A unit expressing the workload of one full-time worker; used to standardise part-time and full-time work. (e.g. 1.0 FTE = full-time workload). It might vary by countries, gender or profession. Used to measure employed persons in a way that makes them comparable, although they may work a different number of hours per week (Girasek et al 2016). Unit used to measure employed persons to make them comparable, as they work a different number of hours per week, in different sectors. The unit is obtained by comparing an employee's average number of hours worked to the average number of hours of a full-time worker of the same kind. A full-time worker is therefore counted as one FTE, while a part-time worker gets a score in proportion to the hours he or she works or studies. For example, a part-time worker employed for 24 hours a week where full-time work consists of 48 hours, is counted as 0.5 FTE. (SEPEN Joint Tender, 2017-2020).
Gap Analysis	-	The systematic assessment of the gap between demand and supply (see definition: gap) in workforce planning.
GDPR		The General Data Protection Regulation (GDPR) is the toughest privacy and security law in the world. Though it was drafted and passed by the European Union (EU), it imposes obligations onto organizations anywhere, so long as they target or collect data related to people in the EU.
Governance	-	The structures, processes, norms and relationships by which decisions are made, implemented and held to account within a system or organisation, including allocation of authority, transparency, participation and oversight.
Harmonized Reporting cycles	-	Pre-standardized periods and standards for workforce data collection and reporting so that datasets are comparable across time and organisations.
Health & Care services	-	The range of preventive, promotive, diagnostic, curative, rehabilitative, long-term, palliative, clinical and public health interventions delivered across health, social care, and community settings through organised services, teams, facilities and care pathways to address population and individual health and care needs.
Health and Care Workforce	-	All paid and, where relevant, regulated occupations whose primary role is to promote, protect or improve physical or mental health, deliver health and social care services, or support their delivery (clinical and non-clinical staff).
Health professionals	-	Individuals working in the provision of health services, whether as individual practitioners or as employees of a health institution or programme, often defined by law through their set of reserved activities.

Terminology	Acronym	Definition
Health System Governance	-	The broader governance of the health system as a whole, encompassing policymaking, regulation, financing, accountability and strategic steering across all system functions.
Health Workers	-	Individuals engaged in actions whose primary intent is to enhance health, including clinical professionals, associate professionals, community health workers, personal care workers and other key support roles. Defined by the 2006 World Health Report [WHO] as "all people engaged in actions whose primary intent is to enhance health."
Health Workforce / Human Resources for Health	**HWF** ***use HRH only when referring to governance.**	The terms Health Workforce (HWF) and Human Resources for Health (HRH) are closely related but used with slightly different emphases. HWF is used throughout the project as the main operational term to refer to the health and care workforce across sectors and settings, including all relevant occupational groups involved in service delivery. Depending on the indicator used, HWF may refer to practising professionals, professionally active professionals, or licensed professionals, in line with OECD terminology and previous European workforce planning initiatives. HRH is primarily used when referring to broader governance, policy, and system-level perspectives, consistent with WHO and international policy frameworks.
Health Workforce Capacity	**HWF capacity**	The ability of the existing and projected workforce (capacity) to deliver required health services.
Health Workforce data	**HWF data**	Data related to the health workforce, including information on workforce stock, demographics, education and training, labour market participation, mobility, distribution, working conditions, skills, and professional activity, used to support workforce monitoring, planning, forecasting, and policy development.
Health Workforce Data Infrastructure	**HWF data infrastructure**	Infrastructure primarily includes data sources and their connectedness, as well as the operation of data system and the development of IT solutions. This factor also demonstrates the extent to which an integrated data system has been developed in a given country.
Health Workforce Forecasting	**HWF forecasting**	A framework (model) that takes different data such as historical and current workforce, service and demographic data to estimate future health workforce requirements.
Health Workforce Governance	**HWF Governance**	The specific governance arrangements, mechanisms and practices that shape how health work is organised, regulated, financed and managed across occupations and settings.
Health workforce information	**HWF information**	All relevant data on the workforce such as stock and retention of health and care workers.

Terminology	Acronym	Definition
Health Workforce infrastructure	**HWF Infrastructure**	The enabling foundation for health workforce planning and management, including legislation, institutions, information systems, education and training capacity, regulatory bodies, financing mechanisms and digital tools.
Health Workforce Intelligence	**HWF Intelligence**	A critical output of a well-functioning planning system; the timely, reliable and policy-relevant insight on the health and care workforce that enables evidence-informed decision-making, action, monitoring and evaluation.
Health Workforce Mobility	**HWF mobility**	Movement/mobility of health workers across regions, sectors or countries, affecting workforce availability.
Health Workforce needs projection model	**HWF needs projection model**	A model that estimates future workforce requirements (the needs) based on projected population health needs rather than only on current usage.
Health Workforce Planning and Forecasting Model	**HWF Planning and Forecasting Model**	A model that estimates future workforce requirements (the needs) based on projected population health needs. An analytical tool or modelling approach used within a health workforce planning system to estimate future workforce supply, demand, needs, or gaps under different assumptions and scenarios.
Health Workforce Planning System	**HWF Planning System**	The institutional, regulatory, technical and data arrangements through which a country or jurisdiction assesses current and future health workforce needs, projects supply and demand, and designs, implements and monitors policies to align the workforce with population health needs.
Health Workforce Planning Unit	**HWF Planning Unit**	A designated organisational entity responsible for leading or coordinating HRH/health workforce planning activities, including data analysis, modelling, policy advice and stakeholder engagement.
Health workforce skillset	**HWF / health and care workforce skillset**	A collection of abilities, skills and knowledge that an individual healthcare / health and care worker possesses.
Health Workforce stock model	**HWF stock model**	A model describing the current 'stock' of health workers and simulating changes over time based on information such as inflows and outflows of health and care workers.
Health Workforce supply	**HWF supply**	The number of health workers available or expected to be available, often based on information such as FTEs or headcount.
Healthcare System	-	The organized set of public and private institutions, people, financing, information, medicines, technologies and processes whose primary purpose is to maintain and improve population health, prevent disease, and provide health and care services.
HEROES Sustainability Framework	-	A conceptual and operational framework developed as part of the HEROES Joint Action that sets out key components, capacities and governance arrangements required for a sustainable, learning-oriented health workforce intelligence and planning system.

Terminology	Acronym	Definition
Health Workforce Planning	**HWF planning**	Planning for human resources for health, covering education, recruitment, deployment, retention and skill-mix strategies to meet service delivery and population health objectives. HWF planning aims to provide the right number of people with the right skills in the right place at the right time, to provide the right services to the right people (EC, 2012).
HWF Forecasting model (workforce projections)	-	A forecasting model designed for projecting future health workforce supply and needs.
Health Workforce planning skills	**HWF planning skills**	Skills needed for a systematic, data-driven process aimed at ensuring the right number of professionals, with the right skills, are in the right place at the right time.
Informal care	-	Unpaid care and support provided by family members, friends, neighbours or community members to people with health or care needs, usually outside formal employment contracts and regulatory frameworks.
Integrated workload	-	A combined measure of diverse clinical tasks and duties that translates service requirements into workforce needs.
Italian National Institute of Statistics	**ISTAT**	-
Joint Action Health Workforce Planning 2016	**JA EU HWF (2016)**	The EU-funded Joint Action on Health Workforce Planning and Forecasting (2013–2016), which developed common methodologies, tools, guidelines and pilot projects to support health workforce planning and forecasting.
Medical Workforce	-	The subset of the health workforce consisting of physicians and, where relevant, medical trainees and related medical specialist roles, as defined by national regulation and classification.
Member States	**MS**	Countries that are formally members of the EU which participate in and are bound by its governance processes, policies and agreements.
Minimum Dataset	**MDS**	A widely agreed upon set of terms and definitions constituting a core of data acquired for reporting and assessing key aspects of health system delivery.
Mobility Data	-	Data enabling the tracking of international mobility of health professionals between countries, as well as their movement within countries.
Mobility Indicators	-	Well-known indicators to track international mobility: foreign trained, foreign born and foreign nationality.
Morbidity-Driven modelling	-	Forecasting that links workforce requirements directly to disease and morbidity patterns in the population.
Multi-occupational planning	-	Workforce planning that simultaneously considers several different health professions and their interdependencies.
NIVEL	**NIVEL**	NIVEL, short for 'Netherlands Institute for Health Services Research'.

Terminology	Acronym	Definition
NIVEL Forecasting methodology **NIVEL HWF model** **NIVEL Methodology**	**NIVEL HWF forecasting model**	Forecasting and planning methods developed by NIVEL for training workshops within the JA HEROES, based on stock and flow and demand increase estimations, and designed in an Excel tool. Originally developed by a collaboration between NIVEL and WHO to support the HWF strategy of the Maltese MoH.
Norm-based	-	An approach that estimates workforce requirements using predefined norms or standards, such as staffing ratios, establishment rules, or service delivery benchmarks, rather than actual observed workload alone.
Organisation for Economic Co-operation and Development	**OECD**	-
Out of Pocket	**OOP**	Direct payments made by individuals or households at the point of using health or care services that are not reimbursed by insurance or public schemes, and which can affect access to services and financial protection.
Outflows	-	The exiting of workers from the workforce through retirement, migration, career change or other causes.
Outpatient care	-	Health or care services delivered without an overnight stay in a facility, including consultations, day cases, diagnostic tests, treatments and follow-up visits.
Planning of medical staff	-	Planning the required capacity of health care professionals often labeled as hospital staff, including physicians or medical doctors, nurses and others approved by governing bodies such as pharmacists, nurse practitioners, and physician assistants.
Population-needs-based approach	-	Estimating workforce requirements based on the health needs of the population rather than solely service utilisation.
Primary care	-	First-contact, accessible, continuous and coordinated services that address the majority of common health needs of individuals and families in the community, typically delivered by multidisciplinary primary care teams.
Primary Health care	-	A whole-of-society approach to health that includes primary care services plus public health functions, intersectoral action on social determinants of health, and community engagement.
Production ratios	-	Ratios linking training outputs (e.g. graduates) to future workforce supply.
Professional distribution indicators	-	Measures showing how different professional groups are spread geographically or across care settings.
Projection model	-	Any model used to project future values (workforce, demand or supply).
Refined staffing norms	-	Detailed, context-specific staffing standards used for more accurate workforce planning.

Terminology	Acronym	Definition
Regional modelling	-	Forecasting applied at sub-national levels to capture regional differences in workforce and demand.
Scenario modelling **Scenario-based** **Scenario-based approaches** **Scenario-based planning** **Scenario-based reasoning**	-	Models to explore alternative futures by varying assumptions; focusing on what could happen under different conditions rather than a single projection.
Secondary care	-	Specialist clinical services usually provided on referral from primary care, often in hospital or specialist outpatient settings, for conditions requiring more complex diagnostics or treatments.
Sensitivity and scenario analyses	-	Analytical methods that test how outcomes change when key assumptions or input values are varied, used to assess uncertainty and explore alternative futures in workforce planning.
SEPEN Joint Tender 2017-2020	**SEPEN**	The EU-funded 'Support for the Health Workforce Planning and Forecasting Expert Network' Joint Action focusing on supporting an expert network, mutual learning and tools to strengthen health workforce planning in EU Member States.
skill mix	-	Skill mix in healthcare refers to the combination of different roles, responsibilities, tasks, and competencies exercised by healthcare professionals within a team or organization. It involves managing the mix of staff (e.g., skill level, experience) and adapting roles — such as task shifting or expansion — to improve care quality, efficiency, and system sustainability.
Skills	**skill / skills**	Skills are specific and measurable abilities or expertise that individuals acquire through education, training, and experience to perform particular tasks or functions. In the context of workforce planning, skills represent the operational or task-oriented dimension of professional performance ("what a person is able to do") and should be distinguished from broader concepts such as competencies and capabilities.
Skills gap	-	A skills gap is the significant mismatch between the skills employers need to meet business goals and the actual skills their employees or candidates possess.
Transforming Health and Care Systems	**THCS**	-

Terminology	Acronym	Definition
Transversal skills		Transversal skills and competences are relevant to a broad range of occupations and economic sectors. They are often referred to as core skills or 'soft' skills, they are generic and not job specific. Transversal skills are the cornerstone for the personal development of a person and are the building blocks for the development of the other job-specific skills and competences required to succeed on the labour market. Examples: communication, teamwork, shared decision-making, adaptive problem solving, continuous learning, and ICT skills.
Stewardship	-	The exercise of responsible, values-based leadership and oversight to ensure that the health system – and specifically the health workforce – is planned, governed and used in a way that protects population welfare over the long term.
Stock-and-flow forecasting model	-	A model that uses stock (current workforce) and flows (inflows/outflows) logic to forecast future workforce levels.
Stock-and-flow logic	-	The theory where workforce stock changes over time as a result of inflows (entry) and outflows (exit).
Strategic competencies	-	The holistic capacity to lead an organization toward its future state.
Supply modelling	-	Analysing and simulating how workforce supply will evolve over time.
Supply-and-demand forecasting	-	Forecasts that estimate future workforce supply and future workforce demand separately and graph them for comparison.
Supply-demand gap	-	The difference between the workforce capacity available [supply] and the workforce capacity required [demand], in order to identify shortages, surpluses, mismatches, and the actions needed to close them.
Supply-side data	-	Data and metrics that describe the workforce availability.
Task shifting	-	The redistribution of tasks between professional groups to make more efficient use of workforce resources.
Technical competencies	-	The ability to apply technical skills / tools effectively to solve professional problems within a role.
Technical skills	**technical skills / hard skills**	Task-specific and functional proficiencies required to perform technical or analytical activities, such as data management, coding, statistical analysis, modelling, or use of digital tools.
Tertiary care	-	Highly specialized, often supra-regional services providing advanced diagnostics, interventions or treatments for complex or rare conditions, usually concentrated in specialized centres.

Terminology	Acronym	Definition
Triangulation	-	A powerful technique that facilitates the validation of data through cross-verification from two or more sources. It refers to the application and combination of several research methods in the study of the same phenomenon. By combining multiple observers, theories, methods and empirical materials, researchers hope to overcome the weaknesses or intrinsic biases and problems that come from single method, single-observer and single-theory studies (Bogdan, Biklen 2006; Rothbauer, 2008).
Vacancy rates	-	The percentage of funded/paid positions that remain vacant at a given point.
World Health Organization	**WHO**	The World Health Organization, the specialized United Nations agency responsible for international public health, providing leadership, norms and standards, technical support and monitoring of global health trends.
Workforce inflows	-	The addition of workers to the workforce through training completion, immigration or re-entry.
Workforce monitoring	-	Ongoing tracking of workforce data and indicators.

1. INTRODUCTION

1.1 Health Workforce Planning at a strategic crossroads for Europe

Strong health systems and a well-functioning HWF are essential to Europe's competitiveness, as they underpin a productive labour force, reduce absenteeism, and support longer, healthier working lives. Timely access to quality care helps maintain human capital and limits the economic burden of disease, while also making regions more attractive for investment and talent. In this context, effective HWF planning is critical to anticipate skills needs, address shortages and mismatches, and ensure the right distribution of professionals across regions and sectors. It is also essential for reaping benefits from digitalisation, which offers productivity gains, reducing administrative burden, supporting more efficient processes. HWF planning is a key tool to account for these benefits. By aligning education, labour market, health policies and innovations in healthcare delivery it enables more resilient and efficient systems that can sustain both economic growth and social cohesion.

Health systems across Europe are undergoing structural transformation. Demographic ageing, epidemiological transitions, fiscal constraints, workforce shortages, technological innovation, and evolving societal expectations are converging in ways that profoundly affect the organisation, sustainability, and resilience of healthcare delivery. At the centre of these transformations lies the HWF. The 2024 Health at a Glance report stresses HWF challenges and provides an estimate of the shortage of 1,2 million health professionals in the EU countries.

The availability, distribution, competencies, and working conditions of health professionals are now widely recognised as decisive determinants of health system performance. International evidence consistently demonstrates that strong HWF governance is associated with improved health outcomes, higher efficiency, and enhanced economic resilience (WHO, 2016; OECD, 2023; World Bank, 2023). Conversely, structural shortages, skills mismatches, and fragmented governance arrangements can undermine equity of access, service quality, and system stability.

The COVID-19 pandemic constituted a stress test for European health systems. It exposed pre-existing HWF fragilities, including insufficient surge capacity, uneven regional distribution, and limited integration between HWF planning and emergency preparedness (WHO, 2022). The pandemic also accelerated structural shifts: digitalisation, new forms of team based care, cross-sector collaboration, and expanded professional roles. These developments have permanently altered the context within which HWF planning must operate.

At the same time, Europe faces a demographic double transition: an ageing population requiring more complex and chronic care, and an ageing HWF approaching retirement in several Member States (OECD, 2023). These trends are compounded by a declining share of the working-age population in many countries, further increasing pressure on health labour markets and workforce sustainability. Younger generations of professionals enter the labour market with different expectations regarding flexibility, professional autonomy, and work-life balance. These shifts affect participation rates, retention patterns, and career trajectories.

HWF planning can no longer be understood as a technical forecasting exercise. It is a strategic governance function essential to the sustainability of national health systems and to the broader objectives of European cooperation. In an increasingly interconnected European labour market, HWF mobility, cross-border care arrangements, and shared crisis preparedness mechanisms require coordination beyond purely national frameworks.

Within this context, strengthening HWF planning and its effective use in policies supporting the transformation of health systems has become a structural priority for the resilience of health systems. At the same time, the resilience of health systems is at the core of the European Health Union. The Joint Action HEROES contributed to this framework, building more resilient health systems and HWF fit for healthcare models, which need to adapt to sustain the demographic pressure and benefit from modernisation, including from initiatives such as the European Health Data Space (EHDS).

The Joint Action HEROES also fostered the model of co-operation across Member States, and this cooperation was not limited to the exchange and learning from each other. It resulted in real cases of implementation of good practices in HWF planning. The Joint Action HEROES has also stepped-up efforts in the improvement of data on HWF. Working together on this challenge helped accelerate progress and build consensus across Member States on data needs for better policies. Finally, the Joint Action HEROES took the HWF planning to higher level in policy making. This happened thanks to a shift to demand-based planning, considering changing needs for healthcare and accounting for transformation of healthcare delivery models, modernization through digitalization and other opportunities for productivity gains. HWF planning must evolve from a fragmented analytical exercise into a core governance function capable of shaping health system transformation.

1.2 From analytical exercise to core health-system function: a retrospective European perspective

European cooperation on HWF planning has evolved progressively over the past two decades. Early initiatives focused on improving data comparability, supporting methodological exchange, and fostering dialogue among Member States. Two major European initiatives preceded the Joint Action HEROES. The Joint Action on Health Workforce Planning and Forecasting (JA EUHWF) represented an important milestone in building a shared knowledge base and strengthening analytical capacities (European Commission, 2015). This was followed by the SEPEN Joint Tender (Support for the Health Workforce Planning and Forecasting Expert Network), which further contributed to methodological exchange, capacity building, and the consolidation of a European expert community.

However, experience across Member States demonstrated that data collection and modelling, while necessary, are not sufficient conditions for effective HWF planning. In several contexts, planning exercises remained disconnected from decision-making processes, insufficiently institutionalised, or limited to single professions. Fragmentation across ministries, agencies, educational institutions, and professional bodies often hindered coordinated action.

The academic literature increasingly describes HWF planning as a “wicked problem”: complex, multi-level and dynamic, characterised by interdependencies between education systems, labour markets, regulatory frameworks, service models, and demographic trends (Buchan et al., 2019; WHO, 2016). Wicked problems cannot be “solved” once and for all: they require continuous management, adaptive governance, and incremental improvement.

This recognition marks a conceptual shift: HWF planning must move from episodic analytical projects to a permanent, institutionalised governance function embedded within health system architecture.

Joint Action HEROES represented a step change in this agenda by shifting the focus from methodological development towards implementation, from data and analytical tools towards systems and governance, and from knowledge exchange alone towards capacity building and institutionalisation. Bringing together 19 Member States over a three-and-a-half-year period, the Joint Action aimed to strengthen HWF planning capacities through a structured implementation framework focused on data, models, and skills. More detailed information on the methodology and activities of HEROES is provided in subsequent sections. The Joint Action represents a deliberate step towards consolidating workforce planning as a structural component of health system governance across Europe; one which not only seeks to provide data to inform decisions but to develop the systems and methodologies to allow governments to effectively change and support transformation of health systems reaping benefits from innovations.

1.3 Defining Health Workforce Planning

1.3.1 Traditional approaches

Historically, HWF planning has been defined as the systematic process of estimating future workforce supply and demand in order to prevent shortages or surpluses. Classical approaches relied on stock and flow models, demographic

projections, and provider to population ratios (O'Brien-Pallas et al., 2001; Birch et al., 2007; Ono et al., 2013). These quantitative methods remain foundational and constitute part of the "golden rules" of workforce forecasting.

Such models allow policymakers to anticipate trends related to training inflows, retirement patterns, migration flows, and service utilisation. They provide essential decision support tools for education capacity planning and resource allocation.

However, international analyses have increasingly underlined the limitations of purely quantitative forecasting. Traditional models are effective at tracking basic inputs and outputs, such as workforce stocks, training inflows, or retirement patterns, but they often remain overly focused on headcount rather than on the broader impact of workforce policies and system transformation. OECD reviews highlight the need to integrate modelling with governance arrangements, regulatory frameworks, implementation capacity and evolving service delivery models (OECD, 2023). Forecasting cannot operate in isolation from policy design and institutional structures, nor can it fully support long-term workforce sustainability if critical dimensions such as skills, competencies, organizational models, and governance mechanisms are not adequately incorporated.

1.3.2 An expanded institutional definition

Building on existing international literature on HWF planning and on extensive discussions within Joint Action HEROES consortium, health workforce planning is defined in this report as:

"a continuous, institutionalized, multi-level governance process that integrates quantitative forecasting, qualitative analysis of skills and competencies, organizational and service delivery models, and structured stakeholder engagement in order to ensure a sustainable, equitable, and resilient health workforce aligned with population health needs over time".

This definition introduces several key principles of HWF planning:

- Continuity: HWF planning must operate through iterative cycles of monitoring, evaluation, and adjustment.
- Institutionalisation and governance: it requires stable mandates, dedicated structures, and clear accountability mechanisms.
- Integration: alignment between data, models, governance structures, institutional arrangements and professional competencies.
- Skills based: Moving beyond professional 'stock-and-flow' models to consider skills and competence of teams and the workforce.
- Multi-level coordination: effective planning involves national, regional, and local authorities, educational institutions, professional bodies, and healthcare providers.
- Strategic alignment: HWF planning must be embedded within broader health system reforms, care model transformation, and sustainability strategies.

This expanded definition reflects the consensus that HWF planning is not only about the observation of "how many professionals are needed", but also about how health systems are institutionally designed, led and governed in order to ensure action governments are able to take effective intelligence-led actions to improve their workforce outcomes.

1.4 The current European landscape: diversity, emerging convergence and structural challenges

Across the 19 participating Member States of HEROES, HWF planning systems display substantial diversity in maturity and governance, which directly affects their ability to produce actionable policy outcomes. Differences exist in governance structure, data availability, model availability and level of sophistication, institutional development and consolidation, and integration into policy decision-making processes.

Some countries operate dedicated workforce observatories or permanent advisory councils with clear mandates and stable funding. Others rely on fragmented arrangements distributed across ministries, agencies, and professional bodies. Data infrastructures vary considerably in terms of interoperability, completeness and timeliness. At the same time, encouraging patterns of convergence are visible, particularly in the progressive adoption of similar analytical approaches, data systems and policy orientations across countries.

Despite this diversity, common structural challenges emerge:

- Limited integration between workforce planning and service and financial planning.
- Persistent data limitations, including fragmentation, limited interoperability, and gaps in demand-side and workforce flow data.
- Insufficient alignment between education policies and health system needs.
- Fragmented governance across administrative levels (e.g. national, regional, local).
- Difficulty ensuring planning outputs lead to binding policy decisions.

At the same time, the Joint Action HEROES enabled progress in challenging areas, fostering momentum for the use of HWF planning to inform reforms and encouraging patterns of convergence. Several Member States moved towards multi-professional modelling approaches, expanding analytical capacity beyond single professions. The action contributed clearly to the huge progress on cross-professional planning with the recognition of the importance of skill mix, task shifting, and interprofessional collaboration. Countries also invested in structured data systems and innovative analytical tools. Country-level examples are presented in the following sections to support the analytical discussion.

Importantly, no single “ideal model” of workforce planning can be universally applied. National systems reflect historical institutional arrangements and governance traditions. The model of co-operation developed under the Joint Action HEROES was very optimal and served not to rank or standardise systems, but to identify functional patterns, facilitate peer learning, effective implementation of good solutions and support sustainable institutional development.

1.5 Emerging transformations and forward-looking challenges

HWF planning must adapt to a set of structural transformations that fundamentally reshape demand, supply, and the organisation of care.

These developments are also aligned with broader European discussions on the transformation of health systems, including initiatives such as Transforming Health and Care Systems (THCS).

Digitalisation, AI, and advanced data analytics are redefining clinical workflows and decision support systems. The establishment of the European Health Data Space (Regulation (EU) 2025/327 on the European Health Data Space) and the AI Act (Regulation (EU) 2024/1689 laying down harmonised rules on AI) create new opportunities for interoperable health data infrastructures, potentially strengthening workforce analytics and cross-country comparability. At the same time, these developments raise governance, training, and ethical challenges that must be incorporated into HWF planning frameworks.

New care models (HEROES Policy Briefs, 2026), particularly integrated care, community-based services, and multidisciplinary team structures, require reconfiguration of professional roles and competencies. Task shifting and advanced practice roles, already implemented in several countries, illustrate the need for workforce planning systems capable of modelling not only headcounts but also evolving skill distributions (WHO, 2017, TaSHI 2024).

Demographic ageing, chronic disease prevalence, and long-term care needs will continue to drive demand for services. Meanwhile, HWF mobility within the European Union needs forward-looking coordination mechanisms to address imbalances and avoid unintended consequences of migration flows.

These dynamics reinforce the need for workforce planning systems that are adaptable, evidence informed, and resilient to shocks, including future public health emergencies such as the COVID-19 pandemic.

1.6 The conceptual contribution of the Joint Action HEROES

Joint Action HEROES demonstrated that HWF planning can be a powerful tool to support transformation of health systems. It brought to the policy attention attractiveness of HWF planning tools, showing clearly that HWF planning goes beyond addressing staffing needs; it serves as a key tool to support and drive reforms in healthcare delivery.

Joint Action HEROES created a very efficient model of European cooperation on HWF planning, combining technical expertise and policy makers.

While building upon previous initiatives such as JA EUHWF and SEPEN, HEROES introduced a stronger emphasis on:

- Practical implementation within Member States
- Institutional capacity building
- Peer learning and co-creation
- Integration of three interdependent domains: data infrastructures, forecasting models, and planning skills and competencies.

A central insight of the Joint Action is that sustainable HWF planning emerges only when these domains are developed simultaneously and embedded within governance structures. Data without service models cannot generate meaningful foresight; models without the necessary analytical and institutional capacities remain underused; and skills without effective governance mechanisms cannot translate into sustained policy impact. Each domain in isolation is therefore insufficient. Sustained improvement depends on the dynamic integration of data, models, skills, stakeholder engagement, and governance arrangements, allowing information to be transformed into action and action into long-term system change.

HEROES therefore supports the institutionalisation of HWF planning as a permanent strategic function of health systems, rather than a time limited project activity. This perspective aligns workforce planning with broader objectives of resilience, sustainability, and coordinated European action.

Joint Action HEROES represents the latest step in a series of European collaborative initiatives aimed at strengthening HWF planning capacity. Building upon previous Joint Actions, it contributes to the gradual strengthening and structuring of a European Community of Practice with the aim to effect change in Member States during the project and lay the foundations for long-term sustainability beyond the Joint Action.

1.7 Scope and structure of this report

This report serves as the introductory and overarching synthesis report for the three final country-cluster deliverables produced within Joint Action HEROES (D5.1, D6.1, and D7.1). It provides a comparative and policy-oriented overview of the evidence, findings, implementation experiences, and lessons generated through the Joint Action, aimed at informing national and European decision-making on HWF planning.

While this deliverable focuses on cross-country analysis, conceptual reflections, and strategic implications, the detailed national evidence, implementation pathways, and country-specific experiences are presented in the cluster deliverables D5.1, D6.1, and D7.1.

Following this introduction, this report is structured as follows:

1. **Conceptual framework and methodology of Joint Action HEROES**

   This section presents the conceptual foundations and implementation methodology of the Joint Action. It describes the strategic rationale of the initiative, its relationship with previous European collaboration on HWF planning, the cluster-based learning architecture, and the implementation pathway structured around the *AS IS*, *TO BE*, and *TO DO* stages. The section also outlines the operational domains of the Joint Action and clarifies the relationship between this deliverable and the country reports produced within the project.

2. **Overarching AS IS description**

   This section presents the methodological framework adopted by the Joint Action, the evidence collected across participating countries, and the coding and categorisation approach used in the comparative tables. It includes a structured reflection on the collected evidence and detailed analysis of the three core domains:
   - Task 1: Data infrastructures
   - Task 2: Forecasting models
   - Task 3: Skills and planning capacities

   In addition, reflections on stakeholder engagement (Task 4), governance arrangements, and policy dialogue processes are integrated throughout the analysis, reflecting their transversal role across all domains.

3. **Overarching TO BE and TO DO descriptions**

   This section outlines the strategic objectives and task-related action plans identified by participating countries, presenting comparative perspectives on future development pathways.

4. **Learning achievements**

   This section summarises country level and collective learning outcomes, including institutional developments, peer exchange processes, and capacity building achievements.

5. **Conclusions and policy implications**

   The final section reflects on the broader implications for national and European governance, sustainability mechanisms, and future cooperation frameworks.

Together, these sections provide both a comparative analytical overview across participating countries and a forward looking strategic perspective, aimed at supporting policymakers, technical experts, and European institutions in strengthening HWF planning as a permanent, institutionalised governance function.

2. CONCEPTUAL FRAMEWORK AND METHODOLOGY OF THE JOINT ACTION HEROES

2.1 Rationale and strategic orientation of the Joint Action

Joint Action HEROES was conceived in response to a shared European need to strengthen HWF planning capacities and to bridge the gap between workforce planning analysis and its effective translation into policy and system transformation, as outlined in the previous section. The COVID-19 pandemic further reinforced the urgency of this objective, highlighting both the central role of health workers and persistent structural weaknesses in workforce availability, geographical distribution, skill mix, working conditions and preparedness for crisis situations.

The Joint Action was built on the recognition that effective health systems depend on a sufficient, appropriately distributed, well-trained and adequately supported HWF. At the same time, it also reflects the growing awareness that traditional approaches based on simple quantitative indicators are no longer sufficient to guide decision-making in complex and rapidly changing health systems. Instead, countries increasingly need planning systems capable of integrating workforce supply, population health needs, labour market dynamics, organisational models of care, technological developments and potential system shocks.

Within this context, Joint Action HEROES aimed to improve the HWF planning capacities of participating countries by addressing three core analytical and operational areas:

- databases, data collection, data analysis and data linkages for HWF planning;
- forecasting tools and planning methodologies to address future workforce challenges;
- skills and capacities needed to effectively manage HWF planning systems.

In operational terms, the Joint Action also paid specific attention to stakeholder involvement as a fundamental enabling condition for effective and sustainable planning. In this sense, stakeholder engagement was not treated as an additional, separate element but as a transversal dimension supporting the development of data systems, planning models, skills, governance arrangements and implementation processes.

Joint Action HEROES therefore built on a broader understanding of workforce planning as a strategic and institutional function, rather than a purely technical forecasting activity. Its ambition was not only to improve analytical tools, but also to support countries in developing the structures, capacities and partnerships needed to make HWF planning more systematic, evidence informed and sustainable over time.

2.2 Building on previous European cooperation

Joint Action HEROES builds on previous European cooperation in the field of HWF planning, while also addressing key limitations identified in earlier initiatives, as outlined in the introduction. In particular, it is drawn on the results of the European Joint Action on Health Workforce Planning and Forecasting (JA EUHWF, 2013 - 2016) and the SEPEN Joint Tender (2017 - 2020).

These previous initiatives generated key methodological and analytical outputs, including collections of good practices, a minimum dataset for HWF planning, pilot activities, and a European network of experts. They also highlighted several challenges, notably in data comparability and completeness integration of demand side perspectives, strengthen governance and sustainability, and the need to support implementation at national level.

Joint Action HEROES brought HWF planning to a new level, addressing these remaining challenges by moving from methodological development towards implementation-oriented learning, institutional strengthening and long-term sustainability.

2.3 Overall conceptual approach

The conceptual foundation of Joint Action HEROES was based on a number of assumptions and framed HWF planning as an integrated system composed of interdependent domains, including data, models, skills, and governance, operating as a continuous policy-support function.

First, although European countries differ substantially in terms of health system organisation, legal frameworks, planning maturity, institutional cultures and policy traditions, they nevertheless face a number of shared challenges in relation to HWF planning. These include workforce shortages, geographical and skills maldistribution, changing population needs, digitalisation, labour market imbalances, mobility flows, and the need for greater flexibility and resilience in service delivery.

Second, the Joint Action assumed that, despite differences in health system structures, institutional contexts and workforce planning maturity, countries could learn effectively from one another if supported by structured mechanisms for contextual and mutual learning. This assumption was informed by previous research on learning country clusters in HWF planning, which suggests that grouping countries with similar planning characteristics can facilitate contextual learning and policy exchange (Batenburg, 2015). Consequently, the Joint Action initially organized participating countries into clusters in order to support targeted peer learning and experience sharing.

Third, the Joint Action adopted a developmental logic based on the idea that workforce planning capacity can be progressively strengthened through a combination of self-assessment, peer learning, expert support, implementation pathways and iterative feedback.

Finally, the project recognised that improvements in HWF planning require more than technical refinement of models or data collection. They also require governance arrangements, administrative capacity, institutional mandates, stakeholder partnership and long-term sustainability mechanisms.

Taken together, these assumptions led to a conceptual model in which HWF planning is understood as an evolving institutional ecosystem, supported by analytical, organisational and relational components that need to be developed in parallel. The HEROES conceptual approach therefore demonstrates that effective workforce planning depends not on isolated technical improvements, but on the integration of data, analytical capacity, skills, and governance within a coherent and institutionalized system.

2.4 Cluster-based learning and cross-cluster exchange

To facilitate learning and implementation, participating countries were initially organised into three learning clusters, each coordinated through a dedicated work package:

- WP5: Greece, Ireland, Italy, Norway, Portugal, Spain, Sweden
- WP6: Croatia, Hungary, Lithuania, Poland, Slovenia
- WP7: Belgium, Czechia, Estonia, Germany, Malta, the Netherlands, Slovakia

The cluster-based approach was designed to facilitate contextual and targeted learning and collaboration among countries facing similar challenges in terms of workforce planning maturity, health system organization, and labour market conditions.

At the same time, as the Joint Action progressed, learning was not confined to cluster boundaries. One of the important lessons emerging from the implementation experience is that cross-cluster exchange became equally relevant.

Countries often benefited from examples, methods, implementation experiences, and practical solutions developed outside their initial cluster, particularly when facing comparable challenges related to governance, capacity building, data gaps, or model development. Cross-cluster collaboration therefore evolved beyond knowledge exchange alone, supporting the contextual adaptation and implementation of workforce planning solutions across countries.

For this reason, the cluster-based architecture should be understood as a starting point rather than a rigid framework. The broader Joint Action progressively developed additional mechanisms for exchange across clusters through the Community of Practice, bilateral meetings, webinars, workshops, expert contributions, policy dialogue activities and project wide reflection processes such as evaluation activities of work package 3 (WP3). This broader circulation of knowledge became one of the strengths of HEROES and contributed to the emergence of a more genuinely European learning environment.

2.5 The methodological pathway: AS IS, TO BE, TO DO

A central methodological feature of Joint Action HEROES was the use of a stepwise implementation pathway structured around three sequential stages:

- AS IS: analysis of the current situation;
- TO BE: definition of the desired future situation;
- TO DO: design and implementation of actions to move from the current to the desired state.

This logic was applied across the main domains of the Joint Action and adapted to the national and regional contexts of participating countries.

The AS IS stage aimed to provide a structured assessment of the existing situation in each country, including the identification of strengths, weaknesses, needs, deficiencies and maturity levels in relation to workforce planning systems.

The TO BE stage focused on defining the desired long-term direction of travel, including national goals, strategic priorities, institutional development needs and visions for improved workforce planning.

The TO DO stage translated these strategic orientations into concrete implementation pathways. Countries defined action plans, short-term objectives, activities, milestones and key performance indicators, and then engaged in implementation processes supported by peer exchange, expert input and ongoing monitoring.

This three step logic made it possible to combine comparability across countries with flexibility and contextual adaptation. It also reflected a broader quality improvement approach, incorporating planning, implementation, monitoring, correction and re-planning.

2.6 Baseline assessment, sustainable framework and implementation support

As part of the initial phase of the Joint Action, participating countries were supported in conducting a baseline assessment of their HWF planning systems. This baseline assessment provided a starting point for identifying country specific needs, defining implementation priorities and situating each national experience within the broader Joint Action architecture.

Building on this initial assessment, countries were also invited to define a sustainable framework for HWF intelligence, supported by the relevant activities under the sustainability work package (WP4). This framework was intended to clarify the main elements, functions, institutional arrangements, stakeholder involvement mechanisms and paradigms necessary for an effective and sustainable workforce planning system.

The implementation work that followed combined several support mechanisms:

- peer exchange within and across clusters;
- expert guidance;
- work meetings and technical discussions;
- Community of Practice activities;
- policy dialogues and stakeholder forums;
- sustainability planning;
- evaluation and quality appraisal.

This support architecture was designed to ensure that countries were not only producing analytical descriptions but also moving toward concrete change processes capable of generating national ownership and longer-term sustainability.

2.7 Operational domains of implementation

At the operational level, Joint Action HEROES worked across four closely related domains (tasks):

1. Data and sources for HWF planning
2. HWF planning models and tools
3. Skills and capacities for effective HWF planning
4. Stakeholder involvement in workforce planning processes

Each of these domains was addressed through a similar stepwise methodology based on the AS IS, TO BE and TO DO logic.

In the data domain, countries assessed the availability and quality of workforce related data, identified gaps, explored supply and demand side indicators, defined and performed actions for data improvements and contributed to the evolution of a more advanced minimum dataset for planning purposes.

In the models and tools domain, countries analysed their existing planning methods, identified gaps in forecasting approaches, explored how different methods and tools fit different health system contexts and designed actions to improve their planning capacities.

In the skills domain, countries assessed administrative and technical capacities, identified training needs, developed competence-oriented approaches and implemented training activities aimed at strengthening workforce planning functions.

In the stakeholder involvement domain, countries analysed their stakeholder landscape, assessed levels of involvement, identified barriers and enablers, and developed or strengthened mechanisms for structural stakeholder engagement, expert networks and planning bodies or units.

Although these domains were operationally distinguished for implementation purposes, the experience of the Joint Action confirmed that they are deeply interdependent in practice. Countries have carried out several actions which contributed to the improvement in all three domains. For this reason, in the overarching analytical structure of this report, stakeholder involvement is treated both as a specific implementation area and as cross-cutting enabling dimension linked to governance, sustainability and institutionalization.

2.8 Learning mechanisms and knowledge exchange

A defining feature of Joint Action HEROES was its emphasis on collective and structured learning as a mechanism to support implementation, institutional development, and mutual capacity building across countries. Several mechanisms were designed to support the exchange of knowledge, practices and implementation experiences among countries.

These mechanisms included:

- Cluster based work meetings;
- Co-creation workshops at the annual in person project meetings;
- peer reviews and twinning actions (i.e. structured exchanges between countries to share experiences, tools and practices);
- a project wide and external Community of Practice;
- webinars and thematic workshops;
- contributions from external experts;
- dedicated policy briefs;
- stakeholder engagement activities at national and European level (e.g. stakeholder forums and EU policy dialogues).

The Community of Practice, led by the coordinator (AGENAS), provided a broader project wide space in which all participating countries could share challenges, lessons learnt, practices and emerging reflections. This was complemented by policy briefs focusing on cluster relevant policy questions and by European and national policy dialogues intended to connect analytical findings with governance and implementation processes.

These learning mechanisms played a central role in the Joint Action, not only as dissemination tools, but as instruments for co-creation, mutual support and capacity building.

2.9 Evaluation, sustainability and quality assurance

The methodological design of Joint Action HEROES also included dedicated components on sustainability, evaluation and quality assurance.

Sustainability was treated as an integral component of the implementation process rather than as an afterthought. Countries were asked to include sustainability elements in the TO BE and TO DO phases, and to develop sustainability action plans that could support the continuation of workforce planning improvements beyond the lifetime of the Joint Action.

Evaluation and quality appraisal were also embedded in the Joint Action architecture. Monitoring of implementation processes, assessment of progress, mid-term and final evaluation activities, and quality advisory mechanisms all contributed to documenting lessons learnt and identifying factors that may support or hinder long-term impact. These activities were supported in particular through the evaluation work package (WP3) and the Quality Advisory Board (QAB), which provided methodological guidance and independent quality oversight.

This approach reflects a broader understanding of workforce planning improvement as an iterative and evaluative process, in which evidence generation, implementation, sustainability, and system learning are closely connected. By integrating evaluation, quality assurance, and sustainability mechanisms, the HEROES approach aims to ensure that workforce planning systems remain effective, reliable, and capable of supporting continuous policy development over time.

2.10 Relationship between this report and the country reports

The present deliverable, D1.2 “Final deliverable on HWF planning: data, models and skills”, provides an overarching and comparative synthesis of the evidence, experiences and lessons generated through Joint Action HEROES. Its objective is not to replace the country reports, but to bring together their key findings within a broader analytical and policy-oriented framework.

Detailed country-level analyses are available in the following deliverables:

- D5.1 *Report on countries' data collection, HWF planning models and tools, planning skills improvement and stakeholders' involvement: Portugal, Norway, Greece, Sweden, Spain, Italy, Ireland*
- D6.1 *Report on countries' data collection, HWF planning models and tools, planning skills improvement and stakeholders' involvement: Croatia, Slovenia, Lithuania, Hungary, Poland*
- D7.1 *Report on countries' data collection, HWF planning models and tools, planning skills improvement and stakeholders' involvement: Belgium, Estonia, the Netherlands, Slovakia, Czechia, Malta, Germany*

These country reports contain the detailed national evidence and implementation narratives on which the overarching analysis is based. Readers interested in the specific trajectories, institutional contexts and country level action plans are invited to refer to these reports.

The present deliverable builds on them in order to identify common patterns, cross-country lessons, methodological implications and strategic directions for future European cooperation in HWF planning.

3. OVERARCHING AS IS DESCRIPTION

3.1 Methodological approach to the AS IS analysis

The overarching AS IS analysis builds upon the structured implementation framework of Joint Action HEROES, which was organised around three core domains: HWF data infrastructures, forecasting models and tools and skills of planners.

The analysis is based on country-level self-assessments conducted within work packages WP5, WP6, and WP7, following a common implementation logic structured around three steps: *AS IS*, *TO BE*, and *TO DO*. The detailed findings of these assessments are reported in Deliverables D5.1, D6.1 and D7.1, while this section provides a comparative and cross-country synthesis of the evidence collected.

Although countries were initially grouped into clusters to facilitate contextual and mutual learning, the analytical approach adopted in this report is not limited to cluster-based comparisons. Evidence collected throughout the Joint Action including workshops, expert meetings, bilateral exchanges/mutual learning meetings, and Community of Practice meetings demonstrated that learning processes extended beyond cluster boundaries, resulting in a more integrated and cross-cutting understanding of workforce planning systems.

The overarching analysis therefore combines:

- country-level evidence,
- cross-cluster comparisons,
- and project-level reflections,

in order to identify common patterns, structural challenges, and emerging trends across European HWF planning systems. Overall, this methodological approach ensures consistency, comparability, and analytical coherence across the three domains of the Joint Action: data, models, and skills.

3.2 Data collection and evidence base

The AS IS analysis is based on a combination of qualitative and structured evidence collected throughout the Joint Action.

Key sources include:

- baseline assessment questionnaire conducted at the beginning of the project;
- national self-assessment reports (country-specific AS IS reports) and action plans developed by participating countries;
- comparative mapping exercises conducted within each task;
- cluster-level discussions and workshops;
- expert meetings and policy dialogues;
- bilateral exchanges and peer-learning activities;
- thematic discussions within the Community of Practice meetings.

This mixed method approach allowed for a comprehensive understanding of both the technical and institutional dimensions of workforce planning systems, combining formal data with experiential and contextual knowledge.

3.3 Coding framework and analytical approach

To enable structured comparison across countries with diverse institutional contexts, a coding framework was developed to classify the collected evidence into comparable analytical categories.

This approach allowed qualitative information, such as descriptions of data systems, modelling approaches, and institutional capacities, to be translated into structured comparative tables. This ensured that heterogeneous country-level information could be systematically compared across the three domains. The coding was designed to capture:

- levels of development and maturity,
- presence or absence of key system components,
- and specific characteristics of national approaches.

Importantly, the objective of the coding framework was not to rank countries, but to support a structured and comparative understanding of similarities, differences, and development pathways.

3.4 Structure of the comparative analysis

The comparative tables included in this section provide a structured overview of the current state of workforce planning systems across participating countries.

For each domain (data, models, skills), the tables:

- summarise key characteristics of national systems,
- highlight common challenges and gaps,
- and support the identification of cross-country patterns.

Given the diversity of health systems, governance arrangements, and data infrastructures, the tables should be interpreted as analytical tools rather than normative benchmarks.

The overarching AS IS description is structured to provide a comprehensive and comparative overview of HWF planning systems across participating countries.

It includes:

- the methodological framework adopted for data collection and analysis,
- the evidence collected at country level,
- the coding and categorisation approach used to structure comparative tables,
- and a reflection on the main findings emerging across the three core domains: data, models, and skills.

The following sections present a detailed analysis of each domain, supported by comparative tables and country-level evidence.

Key achievements: Cross-cutting reflection on the AS IS situation

This section synthesises the findings across all domains to identify systemic patterns, interdependencies, and structural implications for HWF planning systems.The analysis of the three domains: data, models, and skills highlights a high degree of heterogeneity across countries, reflecting differences in governance structures, institutional capacity, and levels of system maturity.

At the same time, a set of common challenges emerges consistently across participating countries, including fragmentation of data sources, limited integration between data systems and planning processes, insufficient analytical capacity, and weak linkages between forecasting outputs and policy decision-making.

Beyond these shared challenges, the analysis reveals strong interdependencies across all components of HWF planning systems. Data availability and quality directly influence the development and reliability of forecasting models, while the effective use of both data and models depends on the presence of adequate skills and institutional capacities. In parallel, weak governance arrangements and limited stakeholder engagement can constrain the use of data and models, even when they are technically available.

Across countries, similar systemic patterns can be observed: fragmented data systems limit modelling capabilities, underdeveloped models reduce the strategic use of data, and gaps in skills hinder the translation of analytical outputs into policy decisions. These elements are not independent challenges, but form a mutually reinforcing system.

Overall, these findings confirm that HWF planning should be understood not as a set of separate technical components, but as an integrated system requiring coordinated and simultaneous development of data infrastructures, modelling approaches, skills, and governance arrangements.

These interdependencies can be conceptualised as an integrated HWF planning ecosystem, in which data infrastructures, forecasting models, and planning capacities operate in a mutually reinforcing way within broader governance and institutional frameworks.

Figure 1 illustrates this systemic perspective, highlighting how analytical components (data, models, skills) are embedded within governance arrangements, supported by monitoring and feedback mechanisms, and strengthened through European collaboration and peer-learning processes between countries.

Co-funded by the European Union

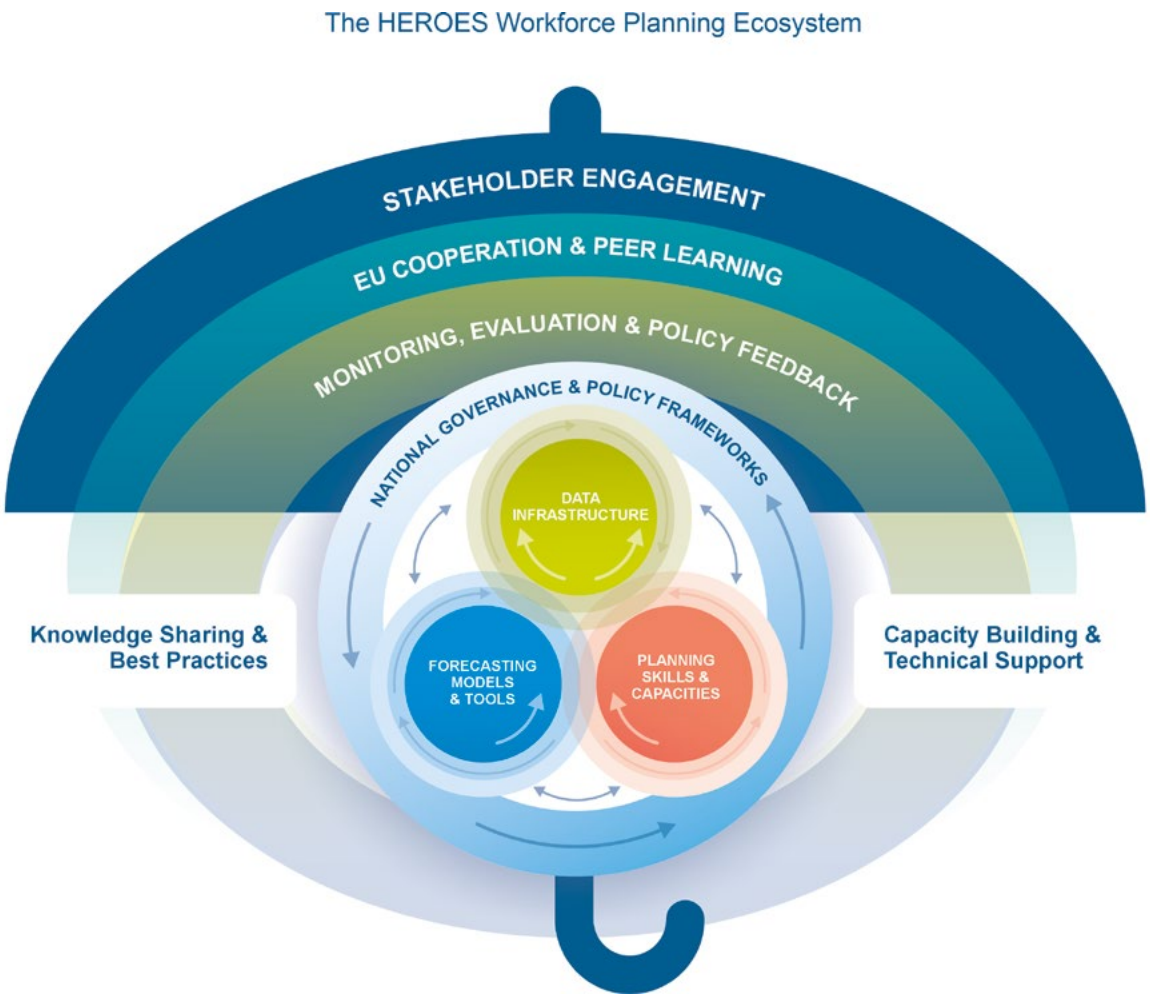

Figure 1. The HEROES Workforce Planning Ecosystem

The figure illustrates the integrated ecosystem for HWF planning emerging from Joint Action HEROES. At the core of the system lie the analytical components of HWF planning: data infrastructures, forecasting models, and planning skills. These operate within governance and institutional arrangements that enable policy implementation. Long-term sustainability requires monitoring, evaluation and policy feedback mechanisms. The outer layer represents the European and international cllaboration dimension, which strengthens national planning systems through peer learning, technical exchange and policy dialogue.

3.6 Task 1 – The data

This section presents the overarching AS IS analysis of HWF data systems across participating countries, based on the evidence collected within Task 1 and the comparative assessment conducted in the Joint Action.

The analysis highlights a high degree of heterogeneity in data infrastructures, reflecting differences in governance arrangements, institutional development, and levels of system maturity. At the same time, several common challenges emerge across countries, including fragmentation of data sources, limited interoperability, gaps in demand-side and mobility data, and constraints related to data quality and usability for planning purposes.

Compared to the situation on data availability, accessibility and quality in the period of the first Joint Action for European Health Workforce Planning and Forecasting, a significant impovement has been reached in many countries even at the start of JA HEROES. However, key challenges as integrating databases, providing data interoperability, monitoring practising workforce and estimating demand remained prevalent.

These findings confirm that data related challenges are not only technical, but are closely linked to broader governance, coordination, and capacity issues, requiring integrated and systemic approaches to HWF planning.

Key insights from the AS IS analysis: HWF DATA

Overall, the AS IS analysis confirms that while important progress has been made in strengthening HWF data systems across Europe, significant structural, methodological, and governance-related challenges persist. Although foundational elements of workforce planning systems are present across most participating countries, their fragmentation, uneven maturity, and limited integration continue to constrain their effectiveness as tools for strategic decision-making. In addition, due to the increasing complexity of health labour markets, data needs are continuously evolving, requiring planners to address emerging information needs in order to better capture current and future characteristics of HWF stock and flow. These findings have direct implications for the development of interoperable workforce intelligence systems capable of supporting evidence-informed policy decisions. They also provide the basis for the definition of the TO BE objectives and TO DO actions presented in the following chapters.

3.6.1 Introduction

HWF planning in Europe is characterised by a high degree of complexity and by diverse national approaches (EU 2021). A substantial share of EU Member States have formal HWF planning systems in place, but these systems differ significantly depending on governance arrangements, institutional traditions, and whether they are more state-driven or insurance-based. While planning has historically focused on medical doctors, there is an increasing tendency to include a broader range of professions in planning approaches (Buchan, Dal Poz, & Dussault, 2013; Buchan & Wray, 2019; EU Parliament 2025).

The availability of reliable data remains a fundamental barrier to effective planning (JA EUHWF WP4 2016, JA EUHWF WP5 2014, WHO 2016, WHO 2018, HEROES Policy Briefs, 2026). While almost all Member States maintain individual-level registries for medical doctors, the quality and coverage of registries for other health professions vary considerably. Most countries are relatively effective in tracking inflows, such as new graduates and inflow by international mobility, but outflow data, including outward mobility, retirement and attrition, are significantly less available and often rely on proxy indicators or aggregated estimates. Demand-side data also remain weaker than supply-side data, with many systems relying heavily on healthcare consumption and service activity data, which tend to reflect current service organisation rather than actual population needs or epidemiological developments (WHO, 2018; OECD, 2019; OECD & European Observatory on Health Systems and Policies, 2021).

Tracking international mobility is one of the most challenging areas of HWF data collection. Inflow is generally recorded more precisely than outflow, while outward mobility is often estimated using “intention to leave” certificates or similar proxies that do not necessarily result in actual migration (EU 2012, OECD 2024). This creates an incomplete picture of labour market dynamics and constrains the ability to assess the impact of mobility on national HWF supply (WHO, 2018; EU Parliament 2025).

HWF data challenges remain a critical bottleneck for effective HWF planning across Europe (JA EUHWF WP4 2016). These challenges are not isolated technical issues, but are embedded within broader systemic, methodological, and policy contexts. The challenges facing European health systems were grouped into two broad categories by SEPEN: methodological and policy-related (EU 2021). Methodological challenges include difficulties in linking multiple data sources, limited use of more advanced projection and forecasting models, and insufficient integration of qualitative evidence into planning approaches. Weaknesses in data management, standardisation and process structures may introduce bias into planning results and weaken the evidence base for forecasting (Buchan, Dal Poz, & Dussault, 2013; Buchan & Wray, 2019; WHO, 2010, WHO 2021).

Policy-related challenges are equally significant. Without explicit policy consideration, even sophisticated technical components such as high-quality data systems, advanced modelling techniques, skill-mix projections, and continuous skill development remain disconnected from real-world decision-making (HEROES D4.1). Europe faces a HWF crisis shaped by an ageing workforce, high expected retirement rates, and an ageing population with increasing chronic disease prevalence (EU Parliament 2025, OECD/European Commission 2024). Territorial maldistribution and persistent shortages in primary care and nursing remain critical concerns in many Member States. These pressures are closely linked to broader health system challenges and reinforce the need for more strategic and sustainable HWF planning (WHO, 2016; European Observatory on Health Systems and Policies, 2022).

From a health labour market and HWF systems perspective, the effectiveness of HWF planning in Europe is constrained not only by data gaps themselves, but by the interaction between data, governance and planning processes (JA EU HWF WP4 2016). Many countries still lack essential data categories defined in minimum planning data requirements, particularly on workforce flows, mobility and private sector employment (JA EUHWF WP5 2014). Even where data exist, they are often not collected in formats suitable for planning purposes, reflecting a misalignment between data systems and policy needs (WHO, 2018; WHO 2021, Dussault & Buchan, 2018).

Data quality is also a major challenge. Concerns about validity, reliability, timeliness and standardisation reduce comparability across countries and over time (JA EUHWF WP4 2016, JA EUHWF WP5 2015). Countries often rely on outdated datasets or estimates, which weakens evidence-informed decision-making and limits the robustness of forecasting and modelling in health labour market environments shaped by demographic change, migration and evolving models of care (OECD, 2019; OECD & European Observatory on Health Systems and Policies, 2021, OECD/ European Commission, 2024, HEROES Policy Briefs, 2026).

Another major challenge relates to methodological limitations and analytical capacity. Many systems struggle to link multiple data sources, to apply suitable forecasting models, and to integrate supply- and demand-side variables. Limited systematic tracking of workforce mobility and flows remains a particularly important weakness in the European context (JA EUHWF WP4 2015). These issues reflect insufficient investment in analytical tools, modelling approaches and broader workforce intelligence capacities (Buchan & Wray, 2019; WHO 2016, WHO 2018, WHO, 2023).

Equally important is the limited use of qualitative data and mixed-method approaches (JA EUHWF WP6 2014, EU 2021). HWF planning remains heavily dependent on quantitative indicators, while contextual, behavioural and organisational factors - such as working conditions, job preferences, career development and skill mix changes - are often insufficiently captured. This represents an important blind spot, as contemporary workforce planning requires a more comprehensive understanding of both measurable trends and the underlying drivers of change within health systems (Dussault & Buchan, 2018; OECD & European Observatory on Health Systems and Policies, 2021).

Beyond technical and methodological issues, governance and system-level barriers strongly affect the performance of HWF data systems (HEROES Policy Briefs, 2026). Fragmented data systems, weak information flows, unclear institutional responsibilities, and insufficient financial, technical and human resources hinder effective data collection, sharing and use (EU, 2021). In this respect, HWF data challenges are not merely technical, but are deeply rooted in institutional capacity and coordination arrangements (Dussault & Buchan, 2018; WHO, 2018).

A further important insight is that HWF data and HWF planning processes must be developed in parallel (JA EUHWF WP4 2016, EU 2021). Weak planning processes, including limited stakeholder coordination or unclear mandates, directly reduce data quality and data use, while poor data further undermine planning capacity. This circular dependency suggests the need for integrated policy approaches that strengthen data infrastructure, analytical capacity and governance mechanisms simultaneously (Buchan, Dal Poz, & Dussault, 2013; Dussault & Buchan, 2018; WHO, 2016, WHO, 2023).

In conclusion, the main HWF data challenges in Europe can be synthesised into four interconnected domains:

1. Evolving data needs linked to the need of better capturing more complex processes of care, care provided in community settings by a group of professionals rater than single individuals
2. data deficits, including limitations in availability, completeness and comparability;
3. data quality problems, including validity, timeliness and standardisation;
4. analytical and methodological gaps, including limitations in modelling, integration and mobility tracking; and
5. governance and system weaknesses, including coordination problems, insufficient resources and weak data management processes.

Addressing these challenges requires a more systemic approach to HWF planning, combining investment in interoperable information systems, stronger institutional capacity, better integration of quantitative and qualitative intelligence, and closer alignment between data systems and strategic workforce planning objectives (WHO, 2016; WHO, 2018; EU Parliament, 2025).

3.6.2 The AS IS: overarching analysis and general observations

Building on the general challenges described above, the Joint Action collected detailed country-level evidence to provide a comparative overview of the current state of HWF data systems across Europe.

HWF data collection systems show a high variety of maturity levels (EU 2021). All countries are implementing more integrated information systems and enhancing national registers to address data gaps and inconsistencies (WHO 2015). Some, such as Norway, the Netherlands, and Belgium, appear to have more integrated and comprehensive HWF information systems. Others, such as Germany, Greece, and Malta, reported particularly fragmented and heterogeneous data sources at the beginning of JA HEROES. It should be noted however that all countries faced common issues across HEROES country clusters and health systems, along with more context-specific issues at the national level. The common challenges were the following: fragmentation and incomparability of data sources, gaps in timely, disaggregated and longitudinal data, weak linkages between education, licensing and employment datasets, limited tracking of certain planning data categories, e.g. mobility or detailed demand data (EU 2021).

Establishing robust data infrastructures that are more centralized and improving national registers and databases to address data gaps and inconsistencies was an ongoing effort in all HEROES countries. Those who have managed to establish national human resources for health information systems - in Hungary, Norway, the Netherlands, Portugal, Slovakia, Slovenia and Sweden for example - are actively working on increasing the depth and range of the available data. Through this, the aim is to connect these systems to interoperable or integrated databases and, ideally, automate the process to reduce the amount of manual intervention needed to integrate HWF planning data. Other countries (e.g. Greece, Malta, and Estonia) lacking more unified data repositories are in the process of implementing them and

establishing dedicated HWF information/planning units with the necessary expertise to collect, manage, and analyse available data from multiple sources.

The institutional environment in which these information systems are established can be problematic, with countries reporting legal issues associated with regulations and GDPR limiting access to data completely or only making aggregate data available (e.g. Belgium, Estonia, Italy, Malta, Lithuania and the Netherlands). Furthermore, it is clear that the wide range of data stakeholders, from professional councils to health providers to different public institutions, are not always aligned and easily involved in sharing the necessary data for HWF planning. Many countries underline the importance of stakeholder involvement and, where required, policy implementation to ensure that data gathering, management, and quality assessment is standardized, periodic, and not just done on request for specific emerging needs.

In addition to the country-level baseline assessments and country specific AS IS reports, we considered status reports of HEROES country clusters and mapping exercises from 2024 on the availability of data categories in the 'Advanced Minimum Dataset' (AMDS).

We analysed the elements related to the systems, processes and availability of the data types by classifying them into different analytical categories, which are presented below.

Category	Brief description, definition
Data infrastructure	Infrastructure primarily includes data sources and their connectedness, as well as the operation of data system and the development of IT solutions. This factor also demonstrates the extent to which an integrated data system has been developed in a given country.
Data accessibility and quality	It includes factors related to the availability, accessibility, quality and timeliness of HWF information, and the potential challenges in the data collection and analysis processes.
Data on professional coverage	It indicates which professions and to what extent are covered by data for HWF planning. It also includes the range of data that enables multiprofessional planning or planning for skill-mix.
Employment data	Data on actually practising health workers, their institutional distribution, and considering the amount of working time (FTEs). The category also includes data on different forms of employment, such as being employed or self-contracted, as well as dual practice and employment in the private sector.
Data on education and training	Data on students in health professional education, graduates and those replenishing the HWF pool.
Mobility data	Data enabling the tracking of international mobility of health professionals between countries, as well as their movement within countries.
Demand data	Data enabling the determination of the need and demand for the number and composition of health workers.
Qualitative data	Data in care organization, health indicators and labour market characteristics (from the AMDS exercise), on the extent to and how countries use qualitative approaches and information to HWF planning.

These categories provide the analytical structure used to interpret and compare country-level evidence across the Joint Action.

The **data on the health workforce supply** is more developed in all reporting countries than demand. Coverage usually extends to all healthcare professions requiring formal registration to practice, with some countries with already extensive coverage reporting ongoing attempts to extend this to professionals without formal registration (e.g. Germany) and social and informal care settings (e.g. Italy, Lithuania and Slovenia). Registration alone is not without issues, though, as this data can sometimes be complex to access from the competent professional councils of each profession. Despite the good coverage of data on individual health professions, data on how the professions are interrelated is the least reported on. While the importance of data on skill mix is recognized (see Belgium, Sweden and the Netherlands), countries face challenges in obtaining information on how different healthcare occupations work together in teams, and the necessary data is often simply lacking. **Data on employment** is usually more extensive for the public sector, and many countries report issues with gathering more comprehensive supply data from the private sector or from self-employed professionals (e.g. Greece, Italy[1], Ireland, Malta, Portugal, Poland, and Slovenia). Data on full-time equivalents (FTE) or hours worked is not immediately available in many reporting countries (Girasek et al. 2016), and there are reported data gaps in determining the number of active/inactive professionals (e.g. Croatia, Czechia, Greece and Italy).

Data on inflows regarding graduating and starting students and trainees are usually available but not always directly linked to HWF data, and the same can be said for outflows in terms of retirement, career switches. Migration flows are generally more complex to track, and a standard solution reported by countries is to proxy mobility indicators (1) foreign outflows to requests for qualification certificates to be used abroad and (2) foreign inflows to registration requests of foreign-born or foreign-trained graduates. Tracking outflow of health professionals is a long-standing issue, many countries have recognized it as a challenge (e.g. Belgium, Estonia, Italy, Ireland, Lithuania, Slovakia and Slovenia).

Data on health workforce demand is less developed in most reporting countries compared to data on HWF supply. Even in countries with established planning models, there may not yet have been a supply and demand data linkage. The primary reported approaches are based on demographic data and data on healthcare consumption/delivered services. Some countries (e.g. the Netherlands) have developed more sophisticated techniques to integrate estimates based on potential demand changes due to policy, technological, professional, socio-cultural, or task-shifting developments, also gathering qualitative data to inform and develop these indicators. This sheds light on more complex data gaps, such as unmet demand, remains challenging.

In general, data management is rather concentrated on quantitative data, the role of **qualitative data** is mentioned to a lesser extent for planning purposes. The members of the Joint Action are nonetheless aware that qualitative data is indispensable in HWF planning, as it provides nuanced insights into stakeholder and population needs, specific contexts, and the real-world behaviours shaping healthcare delivery. The champions of available qualitative data based on the availability analysis of AMDS blocks are the following countries: Spain, Sweden, and the Netherlands. They operate established qualitative methods in their planning processes, e.g. consensus-building, scenario planning or Delphi exercises within national planning commissions. Slovenia, Slovakia and Lithuania have identified further opportunities to strengthen their data systems, particularly by incorporating qualitative information into workforce planning. Norway and Portugal also can access such data blocks at national level, but at the same time urge further improvements. Hungary, Italy, Croatia and Poland reported lack or no availability of qualitative data in their datasets. This does not mean that these countries see no added value of data triangulation, but these countries are very much focussed on advancing and cleansing their quantitative datasets first.

1 At baseline, Italy still reported gaps in distinguishing active, available and inactive professionals across the whole health workforce. During HEROES, the ISTAT integrated statistical information system substantially improved this classification for selected major health professions, although further work is still needed to ensure full coverage across all professions, medical specialties, employment settings and FTE-based measures.

By offering depth and context that complement quantitative metrics, it enables the design of tailored, needs-based interventions and helps planners understand barriers, engage stakeholders, and respond to evolving challenges. Through qualitative methods – such as interviews, focus groups, scenario analyses, and conceptual frameworks – HWF planning strategies become more adaptive, inclusive, and effective in meeting diverse and changing stakeholder and population needs. Efforts are ongoing to improve the ability of countries to gather and improve qualitative data and integrate it in their planning processes.

While each country faces unique challenges in collecting and managing HWF data, ongoing efforts are being made to improve data coverage, integration, and quality. Addressing common issues and implementing good practices will enhance the quality of HWF data and support informed decision-making in HWF planning. To strengthen HWF planning, an everyday recognized necessity is to develop information systems that integrate data from multiple sources, improving consistency and reliability. To ensure high data accuracy and completeness, it is paramount to carry out regular data quality checks and updates and to define legal frameworks that facilitate data sharing and integration while ensuring privacy and compliance. Expanding data collection to include all sectors, including the private healthcare and social sector providers, to ensure a more comprehensive understanding of the workforce is also considered an important issue. As part of developing more integrated and detailed HWF information systems, countries should start developing their methodology to collect data on skill-mix and qualitative data, to become more flexible and accommodate changing future healthcare practices. As part of the ongoing support of the HEROES Joint Action to these efforts, the Advanced Minimum Data Set (AMDS) on HWF planning has been developed to accommodate for different levels of HWF data complexity and maturity, and include qualitative data on high-level drivers of change to make them and integral part of the development process of planning data systems.

The main reported challenges on HWF data have been summarized below, with Table 1 presenting an overview of the same challenges ordered by their level of reported priority within each country. Countries have purposefully not been divided into their clusters as the goal is to give a cross-cluster overview of overarching issues and emerging commonalities and differences across clusters. Reported challenges regarding HWF data for planning have been categorized by macro categories (data context, supply data and demand data) and subcategories.

The table provides a cross-country overview of the main reported challenges, highlighting both common patterns and context-specific differences across participating countries.

Table 1. Reported challenges in health workforce data for planning across countries at the AS IS phase of JA HEROES

Reported data challenges in health workforce planning	BE	HR	CZ	EE	DE	GR	HU	IE	IT	LT	MT	NL	NO	PL	PT	RO	SK	SI	ES	SE
Data Infrastructure	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Data Accessibility and Quality	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Data on Professional Coverage	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Employment Data	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Data on Education and Training	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mobility data	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Demand Data	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Qualitative Data	●		●	●	●	●	●		●			●	●	●	●			●		

*BE=Belgium; CZ=Czechia; DE=Germany; EE=Estonia; ES=Spain; GR=Greece; HR=Croatia; HU=Hungary; IE=Ireland; IT=Italy; LT=Lithuania; MT=Malta; NL=The Netherlands; NO=Norway; PL=Poland; PT=Portugal; SI=Slovenia; SK=Slovakia; SE=Sweden and RO=Romania

● = The issue is not a challenge;

● = The issue is a challenge of secondary relevance;

● = The issue is a challenge of critical relevance. An empty cell means that the issue was not dealt with in the country reporting

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3.7 Task 2 – The forecasting models and tools

This section presents the overarching AS IS analysis of HWF planning models and tools across participating countries, based on the evidence collected within Task 2 and the comparative assessment conducted in the Joint Action. Task 2 analyses the forecasting models and analytical tools used across countries to assess their maturity, functionality, and capacity to support strategic workforce planning.

The analysis reveals significant variation in the maturity, scope, and methodological sophistication of HWF planning models, reflecting different historical developments and policy contexts. While some countries have established advanced modelling approaches, others are still in earlier stages of development or do not yet have formal models in place.

Across countries, common challenges include the predominance of supply-based or single-profession models, limited integration of demand and non-demographic factors, and insufficient consideration of skill mix and system-level dynamics. These findings highlight the need to move towards more integrated, multi-professional, and policy-oriented modelling approaches that can better support strategic workforce planning.

Key insights from the AS IS analysis: HWF PLANNING MODELS

Overall, the AS IS analysis confirms that countries entered the Joint Action with highly diverse levels of model development, ranging from the absence of formal models to more advanced and multi-dimensional approaches. At the same time, common priorities emerged across countries, particularly the need to strengthen demand forecasting, integrate skill-mix and regional dimensions, and connect modelling more explicitly to strategic policy and governance processes. All these priorities are made to resolve workforce shortages and to create a more resilient system on HWF planning. Strengthening modelling approaches is essential to support forward-looking and evidence-informed policy planning. The analysis indicates that forecasting capabilities across Europe are evolving from isolated technical exercises toward more integrated planning systems. Although major disparities remain in data quality, analytical capacity, and policy integrations.

3.7.1 Introduction

Task 2 analyses the forecasting models and analytical tools used across participating countries in order to assess their maturity, functionality, and capacity to support strategic HWF planning.

This introduction provides a brief overview of the status of HWF planning models in Europe prior to the start of the current Joint Action HEROES. This is important, as countries have different traditions around HWF planning (Giepmans et al., 2013). Hence the starting position of countries at the beginning of the Joint Action HEROES in 2023 was different in terms of data models and skills which effected their needs, improvement goals, and ‘learning pathways’ regarding developing and implementing HWF planning models.

Prior to the period before the Joint Action HEROES, in 2012 Matrix Insight published probably the first extensive overview study on HWF planning models in Europe (Matrix Insight, 2012). The report also served as an empirical base for the first Joint Action on HWF Planning and Forecasting (JA EUHWF), that was executed between 2013 and 2016 (Joint Action on Health Workforce Planning and Forecasting). Based on the Matrix Insight report, Batenburg et al. developed maturity scales to rank countries on the level of their HWF planning system (Batenburg, 2015). To

indicate the maturity of HWF planning models and tools (one of the key aspects of a HWF system), a 5-point scale was constructed based on five items that were included in the Matrix Insight report:

1. A HWF planning model is in place,
2. The HWF model is supply side projection based,
3. The HWF model is demand based,
4. The HWF model is needs based,
5. Projects, programmes or local models for monitoring and policy support are in place.

Countries have higher maturity on this scale when more points are in place.

In 2012, a wide variation in maturity scores was observed among the countries participating in the current Joint Action HEROES. At that time, Norway, Lithuania and the Netherlands had the highest score on the scale for 'model-based HWF planning', while Joint Action HEROES-countries as Poland, Romania and Greece scored lowest (Batenburg 2015).

After the JA EUHWF, support for the health workforce planning and forecasting expert network (SEPEN) project was granted in 2017. This project resulted in (among others) a new mapping of the HWF policies in the EU presented by country fiches. Based on these structured documents reporting the HWF situation for countries in 2019, the HWF maturity scoring exercise was replicated (Batenburg, 2023). Between 2012 and 2019, almost all countries showed progress on the model-based HWF planning scale. The group of countries having the highest score on the 5-point scale was expanded with 10 other countries, while only two countries remained with the lowest score (Greece and Romania).

At this point it should be noted that scoring countries on their level of HWF planning models is only one method and a limited method to monitor and evaluate the achievements of countries in this domain (Batenburg et al., 2013). Apart from the level and advancement of HWF models, it is of equal importance to focus on the question of what type of HWF models fits a countries HWF policy and health labor market situation. This was already noted in an evaluation paper published after the JA EUHWF in 2017, stressing that the main challenges are specifically the development of future-based planning, the use of qualitative methods and more international collaboration in HWF planning (Kroezen et al, 2018).

Although HWF planning has advanced across Europe and globally, it remains largely dependent on and embedded in systems marked by workforce shortages, regional disparities and professional silos. Apart from their 'technical level', most planning and forecasting models are single profession-oriented, focusing on stock and flows and projecting headcount capacities for aggregated groups of health occupations. While this remains common and an important base of HWF planning models, changing health systems and innovative care models require HWF planning that support policies for collaboration, coordination, and shared accountability across professions and sectors.

Already in the OECD Working Paper, Ono, Lafortune & Schoenstein (2013) reviewed 26 projection models across 18 countries and identified a gap in high-level, integrated multiprofessional planning. No model achieved full integration, i.e. capturing demand and supply across all professions and scenarios. They advocated multiprofessional models that consider task-sharing and substitution, and for countries to learn from peers with similar systems and labour markets.

Likewise, Lee et al. (2024) found in their reviewing study that new approaches to HWF models should embrace complex systems thinking to actually model the interactions between demand and supply factors and execute gap analysis by policy-sensitive scenarios. This requires a shift from supply-based and stock-flow models to models that are driven by skill-mix and the differentiated HWF. As described in Lee: "Whole-system, needs-based approaches must consider the ecology of a co-produced health and social care workforce." In conclusion that HWF innovation must extend beyond professions, Lee et al. also addresses that imbalances between (e.g.) generalist and specialist physicians should become a focus, as well between physicians and nurses, allied health professionals, care assistants.

In the following sections, the evolution of participating Joint Action HEROES countries is described in terms of the HWF models they have developed, implemented, and extended. The description starts from the beginning of the Joint Action HEROES in February 2023 to the end in July 2026. The following sections examine diversity, maturity, and operational systems across participating countries.

3.7.2 The AS IS: overarching analysis and general observations

Building on this background, the Joint Action HEROES collected baseline evidence on the existence and characteristics of HWF planning models across participating countries.

At the beginning of the Joint Action HEROES in February 2023, the 19 participating countries completed a baseline questionnaire to assess the existence and type of HWF planning models in use. The categories applied in the questionnaire, aligned with earlier studies (Batenburg, 2015), were consolidated into three main types of HWF planning models. The results highlighted a high degree of heterogeneity across countries in terms of both maturity and, scope of the models adopted (table 2):

Table 2. Types of models

Type of model	As defined in the baseline questionnaire
Supply based	The model monitors and projects the workforce supply in a country
Supply & demand based	The model monitors and projects both the supply of the workforce and its demand based on demographic factors
Needs based	The model monitors and projects the supply side of the workforce and its demand in terms of demographic and non-demographic factors

A number of countries did not have a model in place at the start of the Joint Action HEROES. Table 3 gives an overview of which countries had which type of model in place at the beginning of the Joint Action HEROES.

Table 3. Overview of types of models at start of HEROES in the participating countries

Type of model	Countries
No model	CZ EE GR HR HU MT SE
Supply based	PT ES PL
Supply and demand based	NO IT LT SI SK DE IE
Needs based	BE NL

*BE=Belgium; CZ=Czechia; DE=Germany; EE=Estonia; ES=Spain; GR=Greece; HR=Croatia; HU=Hungary; IE=Ireland; IT=Italy; LT=Lithuania; MT=Malta; NL=The Netherlands; NO=Norway; PL=Poland; PT=Portugal; SI=Slovenia; SK=Slovakia; SE=Sweden and RO=Romania

The table summarizes the baseline position of countries in relation to the main types of HWF models identified at the beginning of the Joint Action. The most mature models are implemented in countries with a needs-based or a supply and demand-based model.

Six countries did not have any of the three types of models in place at the beginning of the Joint Action (Czechia, Estonia, Greece, Croatia, Hungary Malta and Sweden). This group is larger compared to the HWF maturity scoring done by Batenburg in earlier studies as mentioned in section 3.7.1. This can be explained by the different types of data collection and definition of what ‘a HWF model in place’ applied.

From the baseline survey three countries indicated they were piloting a new system, namely Germany, Malta and Spain. Conversely, several countries had more than one model in place; a signal about the complex and heterogeneous landscape's HWF planning must adapt to. Italy and Slovakia had two models, and Norway three. Nonetheless, only Italy's and Norway's models overlapped or could (at least partially).

Inspecting the countries' models, they can be grouped in terms of the key factors that are included and define the goals of the HWF model.

- **Training inflow**, the number of students that start with education for a certain profession each year, is part of some models and a couple of countries developing this element. Training inflow used to be the main factor in HWF planning. Therefore, this factor is mainly observed in models from countries with a longer history of health and care workforce planning, such as Belgium and the Netherlands. Given the greying population in Europe, training inflow will no longer be the only method to resolve shortages, and other factors should be considered as well. Which explains why some of the countries did not focus on training inflow at the beginning of the JA HEROES.

- **Demographic developments**, the size and composition of the population regarding age and sex, are considered in most countries that have a model in place which considers the demand for HWF (e.g. Norway, Italy, Lithuania, Slovakia, Germany and Ireland). Most countries do have national projections for demographic development. These projections are used in the models to estimate the change in the future demand for health and care workforce. Not all countries with a model took this factor into account at the beginning of HEROES. Mostly these countries have a model that is only based on the supply or did not have a model in place (e.g. Greece, Malta, Hungary and Czechia).

- **Cross border mobility** is also one of the factors that connects the different countries together. It indicates the emigration and immigration of health workers in a country. Inflow from abroad to one country is mostly an outflow from a neighboring country. Only Belgium, the Netherlands and Norway take this factor into account separately in their model. Other countries with a model did not explicitly show the in- and outflow of professionals due to migration but included this factor in the 'regular' in- and outflow of a profession. Some countries are lacking data on this factor and therefore, do not take it into account separately in the model.

Next to the more basic parts of HWF models that were addressed, countries also reported more advanced modeling options at the start of the JA HEROES.

- **Planning both at national and regional level:** at the start of HEROES, most countries with a model did plan on national level. A couple of countries did also plan or were developing a model at regional level (e.g. Italy, Lithuania, Malta, Poland and Sweden). Some countries were trying to implement a regional planning model next to the national model. Most countries indicated that they lacked sufficient regional data to do regional planning. Next to data, it is important that results of the separate regions add up to the national level. This requires more detailed data, for example if workers do work in multiple regions and how many hours they work in each region.

- **Multiple occupations or skill mix**, planning for several occupations within one model, was not done at the beginning of HEROES by countries. However, most countries highlighted the need to extend their models to cover more professional categories and consider skill mix dynamics across those categories. These can be framed regarding the complementarity or interchangeability of different healthcare professions. This aspect seems more critical for insurance-based systems than others, which could be explained by the more flexible and market-driven functioning of these systems. In these systems, they focus, on average, more on task-shifting. Skill mix planning becomes also more important when there are shortages of certain professions. Planning the whole skill mix can support the HRH system to find the best combination or mix of professionals that is needed for the targeted population.

- **Non-demographic factors for demand** are another factor that countries are developing. Some countries did use other factors next to demography to estimate the future demand at the beginning of HEROES (e.g. The Netherlands

and Norway). Most countries highlight that developing or improving demand forecasting is still essential. Countries are looking at factors such as task-shifting (which is also related to skill mix planning) and informal care that they want to take into account. For most countries this is not necessarily a modelling problem, but a data problem, as limited data to predict future demand is available in most countries.

- **Model integrated into strategic health workforce planning**: although most countries have a model in place or are developing a model (table 3). Most countries indicate that the model is not used for strategic HWF planning in their country or that the model could be used more intensively. Most countries highlighted the need to increase participation of the relevant actors and institutions into the workforce planning processes, but also in the process of (further) developing the model (e.g. CZ, DE, EE, GR, HU, SI, SK).

There are three main clusters based on the model basics.

- ◊ Cluster 1: countries with a model in place (BE, IE, IT, LT, NL, NO, PL, PT, SI, SK)
- ◊ Cluster 2: countries that are developing a model (DE, ES, MT)
- ◊ Cluster 3: countries without a model (CZ, EE, GR, HR, HU, SE)

Based on these clusters' countries can find support from each other within the clusters, as these countries are facing the same challenges. For the clusters in the model basics, cluster 3 can learn from cluster 2 and 1 and cluster 2 from cluster 1. For the more advanced modelling options there are far less countries that already have implemented this option in their model and mostly not all of them. In this case, all clusters can learn from each other and support each other.

Table 4. Reported challenges with regard to models and tools at the AS IS phase of Joint Action HEROES per country

Reported challenges with regard to models and tools at the beginning of the HEROES project		BE	CZ	DE	EE	ES	GR	HR	HU	IE	IT	LT	MT	NL	NO	PL	PT	SI	SK	SE
Model basics	National projection/ forecasting model in place	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Model in place for training inflow control			●	●	●	●		●	●	●		●	●		●		●	●	
	Demographic developments as part of model	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Cross border mobility as part of model	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●
Advanced modelling options	Model at both the national and regional level	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Model for multiple occupations and skill-mix	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	
	Non-demographic developments as part of model	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Model is integrated in strategic health workforce planning		●	●	●	●	●		●	●	●		●	●	●	●		●	●	

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●=this was in place and not a challenge at the beginning of the HEROES project

●=this was in development at the beginning of the HEROES project

●=this was not in place and a challenge at the beginning of the HEROES project

No dot=was not mentioned in the AS IS report at the beginning of the HEROES project

3.8 Task 3 – The skills

This section presents the overarching AS IS analysis of skills and competencies for HWF planning across participating countries, based on the evidence collected within Task 3 and the comparative assessment conducted in the Joint Action.

The analysis confirms that HWF planning is not only a technical exercise based on data and models, but also a broader institutional and governance function requiring a comprehensive set of competencies. These include policy development, data analytics, stakeholder engagement, leadership, system thinking, workforce management, and financial planning.

Across countries, significant gaps emerged in several of these domains, particularly in the integration of analytical and policy skills, the translation of evidence into decision-making, and the coordination of stakeholders within complex governance environments. In addition, different maturity levels in data and models domains among countries have further stressed the necessity to address these gaps and link them to other skills required for comprehensive planning. These findings highlight the need to strengthen HWF planning capacities as a key enabling condition for effective and sustainable planning systems.

Key insights from the AS IS analysis: HWF PLANNERS‘ SKILLS

Overall, the analysis highlights that, while countries differ in their levels of maturity and institutional contexts, there is a shared recognition that strengthening skills and competencies is a critical enabling factor for effective HWF planning, particularly in bridging the gap between technical analysis and policy implementation, as skills gaps undermine the effective use of both data and forecasting models. Enhancing skills and competencies is a key enabling condition to translate analytical evidence into effective policy implementation.

3.8.1 Introduction

Workforce planning systems depend not only on data and models, but also on the human and institutional capabilities required to interpret evidence, support decision-making, and sustain implementation. The importance of skills and institutional capacities in HWF planning is widely recognized in international literature. Effective HWF planning requires not only data and modelling tools, but also the ability to interpret evidence, engage stakeholders, and translate analytical outputs into policy decisions (World Health Organization, 2016; OECD, 2023).

Recent studies emphasize that HWF planning should be understood as a governance function, requiring multidisciplinary competencies including leadership, system thinking, and strategic planning, in order to address complex and evolving health system challenges (Buchan & Wray, 2019; Dussault & Buchan, 2018; Rees, Willis & Scotter, 2025; Whittaker, Hodge, Mares & Rodney, 2015).

HWF planning is critical to ensure that health systems can meet the evolving needs of populations. To ensure effective HWF planning, it requires strong capacity building of the HWF planners with comprehensive set of skills. Undoubtedly, the planning process begins with data availability and accessibility, which is a foundation for development of or usage of already established models and tools for forecasting the future needs for HWF planning. Beyond these domains, a comprehensive and integrated set of competencies is essential to ensure that HWF projections are not only developed but also successfully translated into policy implementation and measurable outcomes. This set of skills encompasses but is not limited to health and care policy development, data analytics, partnership and communication, leadership, system thinking, workforce management, and financial planning. These skills are needed at different healthcare sector levels (national, regional, local) and by various actors such as health policy planners, professional bodies, healthcare providers, healthcare insurance companies amongst others.

3.8.2 The AS IS: overarching analysis and general observations

To ensure comparability across countries, a structured competency framework was adopted as a reference for the baseline assessment of skills and capacities.

One of the goals of the HEROES is to strengthen and further develop the skills and competencies of professionals responsible for HWF planning. each participant country's competent authority has been asked to determine which skills and abilities are in need of greatest attention in their own context and that can be addressed and improved with the foreseen activities within the HEROES. To ensure methodological consistency and comparability of assessments at both cluster and overall project levels, participating countries were provided with a predefined competency framework encompassing six core domains: (1) health policy development and HWF planning competencies; (2) data analytics and assessment competencies; (3) partnership and communication competencies; (4) leadership and systems thinking competencies; (5) HWF management competencies; and (6) financial competencies. These skills were founded on previous works for HWF planning as well as accessible literature on this field (SEPEN; Grimm et al, 2016). In addition, these skills domains were not considered exhaustive but rather as a broad framework that would allow easier comparison between the countries. In that sense, the aforementioned skill domains were to be used as a general guiding point for further improvement of HWF planners' skills and abilities within the task 3 activities in each of the countries, with a notion to adapt and address the skills and abilities depending on their own specific context. Due to the nature of the skills, the diverse maturity levels of the HWF planning systems of the countries and various needs in skills development, no specific clustering of the countries has been identified.

To support comparability across countries, the collected evidence was structured into a set of analytical domains and skills reflecting key dimensions of HWF planning capacities.

Table 5. Domains and skills for HWF planning capacity

Domains and skills		Skill description
Policy making	**Leadership**	Development of leadership skills in terms to influence, motivate, and enable HWF planners and other stakeholders to achieve the goals set.
	System thinking	Approach to problem solving that views "problems" as part of a wider, dynamic system. Systems thinking involves much more than a reaction to present outcomes or events. It demands a deeper understanding of the linkages, relationships, interactions and behaviours among the elements that characterize the entire system.
	Strategic planning	A data-driven process ensuring the workforce is configured to meet long-term strategic goals, focusing on quality, skill mix, and efficiency to handle future demands.
	Financial planning	The strategic integration of budgeting, forecasting, and resource allocation to ensure the right number of qualified staff are available at the right cost to meet patient demand
	Anticipating future trends	A proactive, strategic process that aligns human capital with evolving healthcare demands by forecasting future needs rather than merely reacting to current shortages. It involves analysing demographic shifts, technological advancements, and changing care models to ensure the right number of professionals, with the right skills, are in the right place at the right time
Human resources for health	**Integrative workforce development**	A collaborative, strategic process that aligns staff capacity with population health needs and service goals. A widely adopted framework is Six Step methodology involving: 1) Defining the plan, 2) Mapping service change, 3) Defining required workforce, 4) Understanding availability, 5) Planning delivery, and 6) Implementation.
	Change management	A structured, strategic approach to preparing, supporting, and enabling healthcare organizations and their staff to adapt to shifts in service delivery, technological advancements, or staffing requirements
	Workforce recruiting	A strategic process of attracting, sourcing, selecting, and appointing qualified clinical and non-clinical health professionals to deliver health services
	Workforce retention	Policies, strategies, and organizational efforts designed to keep skilled health professionals engaged, satisfied, and committed to their roles over time.

Domains and skills		Skill description
Data and tools	Data collection	A systematic process of gathering, measuring, and analysing accurate information from diverse sources to guide public health strategies.
	Data analytics	Systematic collection, management, and analysis of large-scale, population-level health data to inform evidence-based decision-making, optimize resource allocation, and improve public health outcomes. It transforms raw data into actionable insights to shape health strategies.
	Modelling tools application	Quantitative, data-driven, and simulation-based methods used to analyse, forecast, and optimize the supply, demand, and distribution of health professionals
Collaboration	Collaboration and communication	A strategic, participatory process where diverse stakeholdersincluding health providers, educational institutions, policymakers, and local authoritieswork together to analyse, design, and implement staffing solutions that ensure the right people with the right skills are in the right roles
	Stakeholder involvement	Active, bidirectional/interactive process of engaging individuals, groups, or organizations who can affect or are affected by workforce decisions.

Based on the application of this framework, countries identified priority areas for skills development across different domains.

Technical skills (such as data analytics, modelling, and forecasting) generate the analytical evidence needed for workforce planning; strategic skills (including policy interpretation, governance, and systems thinking) help translate this evidence into policy directions and long-term planning objectives; while operational skills (such as implementation management, stakeholder coordination, and communication) are essential to ensure effective execution and institutional uptake. The experience of the Joint Action demonstrated that deficits in any one of these categories can significantly reduce the effectiveness of the others, highlighting the need for integrated and balanced capacity development.

First, health and care policy development and strategic planning skills are foundational for effective HWF planning. Most countries highlight the need to strengthen competencies related to the development of planning policies that are closely aligned with evolving healthcare needs and demographic trends. In some cases, such as Italy, the emphasis is placed on ensuring that existing competencies are more systematically embedded and consistently available across the various institutions involved in the planning process. Other countries stress the need to further deepen and expand their skill sets in order to effectively anticipate and respond to a rapidly changing health system environment

Data analytics skills are crucial for evidence-based HWF planning and decision-making. Many countries report significant gaps in these skills, particularly regarding integrating and analyzing data from multiple sources, as noted by Greece, Italy, and Spain. The Netherlands and Germany demonstrate strong data analytics skills; however, they identified the need for better integration and handling of qualitative data to complement existing quantitative approaches. Belgium's robust data analytics skills need further development to handle more complex and integrated planning models and to include qualitative data. In contrast, Malta has suggested outsourcing data analytics to specialized private companies, highlighting the need for tailored training programs. In Slovakia, outdated analytical tools and modelling approaches had previously limited the development of more advanced data analytics capacities. However, since 2022/2023, significant progress has been achieved, including the development of robust analytical models and the successful integration of datasets, supported by an external contractor, which has substantially improved the quality of data used for modelling purposes. Overall, nearly all countries report the need to substantially enhance data collection methodologies, data governance, interoperability, and advanced analytical techniques to support effective workforce planning. The

availability of accurate, standardized, and timely data in an appropriate format is a fundamental prerequisite for the successful application of forecasting models and planning tools. While a limited number of countries - such as Belgium, the Netherlands, and Sweden - do not consider the application of models and tools to be particularly challenging in their national context, the majority report that modelling approaches are either not yet institutionalized or remain under development, thereby posing a challenge to effective HWF planning.

Other countries, such as Hungary and Lithuania, highlight the need for skills to inform decision-making processes more effectively. Some countries such as Norway and Sweden report possessing adequate data collection and analysis expertise, but these skills must be translated into informed decision-making processes.

Furthermore, collaboration in HWF planning is essential to engage stakeholders and foster effective partnership and communication skills as part of support. Many countries recognize the need for improvement in these areas. In some contexts, such as Greece, stakeholder involvement remains inconsistent. In other countries, the challenge lies not in establishing stakeholder engagement per se, but in continuously strengthening and structuring collaboration within a fragmented landscape of actors. This is particularly evident in regionalised or decentralised systems, such as Germany and Spain, where coordination among multiple stakeholders - including universities, professional bodies, regional authorities, and health service providers - represents an ongoing governance challenge. Others, such as Norway and the Netherlands, have established frameworks for stakeholder involvement, but still need to enhance partnership and communication skills to align interests and improve collaboration. In Poland, effective communication with stakeholders such as professional chambers and educational institutions is ongoing, though there is room for improvement in disseminating analysis and fostering collaboration.

In several countries, strengthening communication mechanisms and stakeholder engagement is considered a necessary precondition for advancing other technical components of HWF planning, such as improved data collection and inter-institutional collaboration. This is the case, for example, in Lithuania, Slovenia, and Czechia, where reinforcing structured dialogue, clarifying roles and responsibilities, and building trust among key actors are seen as essential first steps toward more coordinated and data-driven workforce planning systems. Leadership and system thinking skills are widely recognised as critical enablers for addressing complex health system challenges and fostering innovation in HWF planning. These skills are essential for translating technical analyses into strategic action, strengthening multi-sectoral collaboration, navigating institutional and political complexities, and positioning HWF planning within broader health system reform agendas. Many countries report gaps in these areas that need to be filled to implement sustainable improvements in HWF planning, develop multi-sector collaboration, navigate challenging environments, and make HWF planning more strategic. Slovenia, for instance, also views these skills as instrumental to improving data and model capabilities, while others need them to better interact with policymakers and decision-makers. In the latter case, HWF planners are required to deliver evidence-based suggestions and sustain them.

Moreover, adequate HWF management skills are crucial for recruiting, retaining, and supporting healthcare professionals. Across many countries, these skills are identified as an area requiring substantial strengthening. Countries such as Greece, Italy, Croatia, Poland, and Hungary report challenges related to the attractiveness of health professions, highlighting the need for more strategic and evidence-informed recruitment and retention policies. Spain and Portugal emphasize the importance of enhancing the strategies to improve workforce satisfaction and support professional development. Comprehensive management programs and incentives are needed to improve the management skills of the HWF, mainly to retain health workers.

Some countries report that recruitment and, more generally, management strategies are in place and well developed (e.g., Malta), but further training and continuous improvement are needed to maintain these skills and to integrate the skill mix into planning models. There is a need for more comprehensive management approaches that address the different needs of the health care system.

Finally, financial HWF planning skills are needed to manage and allocate financial resources within the health system efficiently and to ensure sustainable health financing. Many countries report gaps in these skills, partly because health-

financing policies are often disconnected from HWF planning. Some countries highlight the need to better understand health financing mechanisms and their impact on HWF planning. Others, such as Greece, have difficulty integrating health financing data into their planning processes. Belgium's financial planning skills are well developed but need continuous improvement to ensure that HWF planning is not disconnected from financial sustainability.

Table 6 presents an overview of the skills challenges identified across countries, ordered by their level of reported priority. Countries have purposefully not been divided into their clusters as the goal is to give a cross-cluster overview of overarching issues and emerging commonalities and differences across clusters. Reported challenges regarding HWF planning skills have been divided into 4 macro-categories/domains and sub-categories to give a better overview of issues within specific topics. These domains and skills are presented in the below spreadsheet with short description of the context used.

Table 6. Reported challenges regarding HWF planners' skills at the AS IS phase of JA HEROES

Reported skill gaps in health workforce planning at the beginning of the project		BE	CZ	EE	ES	GR	HR	HU	IE	IT	LT	MT	NL	NO	PL	PT	SI	SK	SE
Policy making	Leadership	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●
	System thinking	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
	Strategic planning	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Financial planning	●	●	●	●	●		●	●	●	●	●	●					●	●
	Anticipating future trends	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●
	Policy making domain		●	●	●	●	●	●		●	●	●	●	●			●	●	●
Human Resources for Health	Integrative workforce planning	●	●	●	●	●		●	●	●	●	●	●	●	●		●	●	●
	Change management	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●
	Workforce recruiting		●	●	●	●		●		●	●	●	●		●	●	●		
	Workforce retention		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
	Human Resources for Health domain		●	●		●	●	●		●	●	●	●	●			●	●	

Reported skill gaps in health workforce planning at the beginning of the project		BE	CZ	EE	ES	GR	HR	HU	IE	IT	LT	MT	NL	NO	PL	PT	SI	SK	SE
Data and tools	Data collection	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●
	Data analytics	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●
	Modelling tools application	●	●	●	●	●	●	●	●	●	●	●	●			●	●	●	●
	Data and tools domain	●	●	●	●	●	●	●		●	●	●	●	●			●	●	●
Collaboration	Collaboration and communication	●	●	●	●	●		●	●	●	●	●	●	●	●		●	●	●
	Stakeholder involvement	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
	Collaboration domain		●	●	●	●	●	●		●	●	●	●	●			●	●	

*BE=Belgium; CZ=Czechia; DE=Germany; EE=Estonia; ES=Spain; GR=Greece; HR=Croatia; HU=Hungary; IE=Ireland; IT=Italy; LT=Lithuania; MT=Malta; NL=The Netherlands; NO=Norway; PL=Poland; PT=Portugal; SI=Slovenia; SK=Slovakia; SE=Sweden and RO=Romania

●=this was in place and not a challenge at the beginning of the HEROES project

●=this was in development at the beginning of the HEROES project

●=this was not in place and a challenge at the beginning of the HEROES project

No dot=was not mentioned in the AS IS report at the beginning of the HEROES project

3.9 From AS IS to TO BE: moving towards system strengthening

Building on this systemic understanding, the evidence collected through the AS IS analysis highlights not only the current level of development of national HWF planning systems, but also the structural gaps and priority areas for improvement.

The following section therefore shifts from a descriptive perspective to a forward-looking approach, presenting the TO BE and TO DO dimensions identified by participating countries, including strategic objectives, planned actions, and pathways for strengthening HWF planning systems across Europe.

4. OVERARCHING TO BE AND TO DO DESCRIPTIONS

4.1 Methodological approach to the TO BE and TO DO analysis

The overarching TO BE and TO DO analysis builds upon the same structured implementation framework adopted in Joint Action HEROES, organised around the three core domains of HWF planning.

While the AS IS analysis focused on assessing the current state of HWF planning systems of the participating countries, the TO BE and TO DO analysis adopts a forward-looking perspective, capturing the strategic objectives identified by participating countries (TO BE) and the concrete actions planned to achieve them (TO DO). These elements were developed by countries within Work Packages WP5, WP6 and WP7, following a common implementation logic structured around three sequential steps: AS IS, TO BE, and TO DO.

The analysis is based on country-level action plans and strategic reflections developed throughout the Joint Action, which reflect national priorities, system-specific challenges, and varying levels of maturity in HWF planning capacities. These plans were iteratively refined through project activities, including workshops, expert meetings and bilateral exchanges.

Although countries were initially grouped into clusters to facilitate contextual learning, also the analytical approach adopted in this section goes beyond cluster-based perspectives. The evidence collected demonstrates that learning processes and strategic developments evolved through both within-cluster and cross-cluster interactions, resulting in a more integrated and dynamic understanding of future development pathways.

- The TO BE and TO DO analysis therefore combines:
- country-specific objectives and planned actions,
- cross-country comparison of strategic priorities,

and project-level reflections on common trajectories and enabling conditions.

This approach allows the identification of shared strategic directions, recurring policy priorities, and differentiated implementation pathways across countries, while preserving sensitivity to national contexts.

The TO BE and TO DO methodology therefore provides a structured pathway through which countries can progressively transform workforce planning systems from fragmented arrangements toward more integrated, sustainable, and governance-oriented models.

Overall, the analysis provides a structured and comparative overview of how participating countries intend to strengthen their HWF planning systems, highlighting both convergence in strategic goals and diversity in implementation approaches.

4.2 Evidence base and country action plans

The TO BE and TO DO analysis is based on a combination of structured and qualitative evidence collected throughout the implementation of Joint Action HEROES, including country assessments, comparative analyses, workshops, stakeholder consultations, cluster and cross-cluster exchanges, bilateral meetings, and existing national data and reports, with a specific focus on country-defined objectives and planned actions.

The primary source of evidence consists of national TO DO action plans developed for each task by participating countries within Work Packages WP5, WP6 and WP7. These task-related action plans were elaborated following the

AS IS assessments and represent the strategic priorities and operational steps identified at national level to strengthen HWF planning systems.

- In addition to the action plans, the analysis draws on:
- iterative updates provided by countries during the implementation phase;
- structured templates used to define TO BE objectives and TO DO actions;
- discussions and validation processes carried out during workshops, expert meetings, and policy dialogues;
- insights emerging from bilateral exchanges and peer-learning activities;

thematic reflections developed within the Community of Practice meetings.

This evidence base reflects both formal planning outputs and the dynamic learning processes that characterised the Joint Action. In many cases, country objectives and actions evolved over time, benefiting from continuous feedback, technical exchanges, exposure to practices from other countries, and bilateral meetings with task leaders. The TO BE and TO DO methodology enabled countries to translate analytical assessment into structured transformation pathways, supporting the progressive institutionalization of workforce planning systems.

Importantly, the TO BE and TO DO elements were not developed as abstract or theoretical constructs, but as context-specific and operationally grounded components of national planning processes. As such, they reflect different levels of ambition, feasibility, and system maturity across countries.

This mixed and iterative evidence base allows for a comprehensive understanding of how countries intend to move from their current situation (AS IS) towards more advanced and sustainable workforce planning systems, while continuously benefiting from European collaboration, peer learning, and knowledge exchange within Joint Action HEROES.

4.3 Comparative and analytical approach

To enable a structured comparison of country objectives and planned actions, a comparative and analytical approach was applied across the three domains of HWF planning: data, models, and skills. The approach was designed to identify common patterns, structural differences, and transferable lessons across diverse workforce planning systems.

The analysis focuses on identifying common strategic priorities, recurring implementation patterns, and key differences in national approaches, based on the TO BE objectives and TO DO actions defined in country action plans. Rather than applying a rigid classification or scoring system, the approach adopts a qualitative and comparative perspective, aimed at capturing the diversity of development pathways across countries.

Comparative tables were developed for each domain to provide a structured overview of:

- the main objectives identified by countries (TO BE),
- the actions planned to achieve them (TO DO),

and the areas of convergence and divergence across national contexts. Given the heterogeneity of health systems, governance arrangements, and levels of maturity, the analysis does not aim to rank countries or define normative benchmarks. Instead, it seeks to highlight shared directions of reform, context-specific priorities and emerging trajectories of workforce planning development.

Attention is given to the relationship between objectives and actions, in order to assess the extent to which strategic ambitions are supported by concrete and feasible implementation steps.

This approach allows the identification of both common European trends and differentiated national strategies, contributing to a better understanding of how countries intend to strengthen their HWF planning systems over time.

The following sections present the TO BE objectives and TO DO actions across the three core domains of HWF planning providing a comparative overview of country priorities and planned implementation pathways.

4.5 Task 1 – Data: TO BE and TO DO

4.5.1 Introduction

HWF data systems represent a foundational component of strategic workforce intelligence, enabling evidence-informed planning, monitoring, forecasting, and policy development.

Building on the AS IS analysis of HWF data systems, the TO BE perspective reflects how participating countries envisaged the optimisation of data sources and the evolution of their data infrastructures in order to support more robust, integrated, interoperable, and policy-relevant workforce planning systems.

The TO BE objectives capture a forward-looking vision of national workforce intelligence systems, highlighting both common strategic directions and context-specific priorities across countries.

Key points of the TO BE and TO DO trajectories: HWF DATA

The analysis of the TO BE objectives and TO DO actions highlights a clear convergence across participating countries towards more integrated, planning-oriented and policy-relevant HWF data intelligence systems. Improving HWF data intelligence systems requires a systemic and iterative approach while adapting to evolving data needs of complex health systems and responding emerging policy challenges. Countries worked closely with the support of the task leader, cluster leader and peer countries towards more mature and planning-oriented HWF data intelligence systems, with stronger links between data collection, forecasting, and policymaking.

While countries differed in their starting points, institutional arrangements and levels of maturity, a common trajectory can be observed. This trajectory moves from fragmented, registry-based data environments towards more interoperable, comprehensive and analytically meaningful data intelligence systems, capable of supporting forecasting, scenario-building and evidence-informed decision-making.

The actions implemented within Joint Action HEROES demonstrate that progress in this domain is not driven by single interventions, but by the combined development of data infrastructures, governance frameworks, analytical capacity and capability of planners, as well as proper stakeholder coordination mechanisms.

Importantly, the alignment between strategic objectives (TO BE) and operational actions (TO DO) appears as a key enabling factor. Countries that were able to connect their long-term vision with concrete and context-sensitive implementation steps show more advanced progress in strengthening their workforce data intelligence systems.

The achievements demonstrate that data development is strongly linked to governance, stakeholder cooperation, analytical capacity, and long-term planning structures, with countries recognising that sustainable HWF planning requires continuous collaboration, standardisation, and gradual system development.

A key lesson emerging from Task 1 is that sustainable workforce planning depends on the interconnected development of all domains. Investments in data infrastructures alone are insufficient without corresponding progress in modelling capacity, analytical skills, governance arrangements, stakeholder coordination, and the ability to translate data into policy-relevant intelligence.

4.5.2 The TO BE: overarching analysis and proposed actions on data optimization

The following analysis synthesizes country-level TO BE objectives related to HWF data systems.

Across the HEROES countries, the TO BE situation points towards a shared professional vision of what HWF planning data systems should become in order to support more robust, systematic and sustainable workforce planning. Although countries differed in their starting points and institutional contexts, their future-oriented perspectives show a high degree of convergence.

Table 7. Common strategic priorities for strengthening HWF data systems across participating countries

	WP5	WP6	WP7
Planning dataset	GR, ES	RO	CZ, EE,
Data source harmonisation	GR, IT, ES	HR, HU, RO, SI	BE, CZ, EE, MT
Practising health professionals	NO	HR, HU, LT, PL, SI	BE, MT, SK
Private sector	IT, NO, SE	HR, HU	MT, SK
Demand data	IT, NO, PT	LT	BE, EE, NL
Data on education and training	SE	HU	MT, SK
Data on mobility	SE	-	EE, SK
Multi-professional planning	SE	PL	NL
IT solutions	GR, IT, NO, PT, ES	HR, LT, SI	BE, MT, NL

*BE=Belgium; CZ=Czechia; DE=Germany; EE=Estonia; ES=Spain; GR=Greece; HR=Croatia; HU=Hungary; IE=Ireland; IT=Italy; LT=Lithuania; MT=Malta; NL=The Netherlands; NO=Norway; PL=Poland; PT=Portugal; SI=Slovenia; SK=Slovakia; SE=Sweden and RO=Romania

Table 7 showed that countries were interested in developing several essential aspects of their HWF data. As countries indicated their intentions, we can state that there are no cluster-specific characteristics among them. Most of the topics were relevant for all clusters.

A first prominent element of the TO BE vision is the development of **planning-oriented datasets**, rather than data collections designed primarily for administrative, regulatory or financial purposes. In this perspective, HWF data are expected to serve not only reporting functions, but also forecasting, scenario-building and strategic decision-making. This implies clearer definitions, stronger standardisation and a better alignment between the data collected and the information actually needed for workforce planning.

A second central element is **greater integration across data sources**. The desired future state is not simply one with more data, but one in which data from registries, employment systems, education databases, service-use information and other relevant sources can be linked and interpreted together. The emphasis is therefore on coherence, interoperability and the ability to generate datasets that reflect the workforce more comprehensively across its education, entry, employment and practice trajectory.

A third strong component of the TO BE vision is **improved measurement of the practising workforce**. Across countries, there is a clear recognition that planning requires better understanding of actual workforce participation and service capacity. This includes more accurate information on employment relationships, full-time equivalent (FTE),

working time, multi-job holding, subcontracting, exits from the profession and the distinction between registered and actively practising professionals. In most of the cases, linking data from different data sources - into a central HWF data intelligence system - is a prerequisite for obtaining this information. In this sense, the future direction is towards data systems that reflect real labour market activity rather than nominal professional stock alone.

A fourth major element is the strengthening of **demand-side intelligence**. The TO BE visions consistently suggest that future workforce planning should rely less exclusively on supply-side monitoring and more on a structured understanding of current and future demand. This includes demographic change, epidemiological developments, healthcare utilisation, service delivery models, organisational changes and policy priorities. In several cases, the desired future state also points towards a more explicit capacity to assess mismatches between supply and demand in the present, not only in long-term projections.

A fifth recurrent feature of the TO BE visions is the broadening of the planning perspective beyond traditional stock-and-flow monitoring. Countries increasingly emphasise the need for data on **mobility, education-to-employment transitions, regional distribution, competencies and skill mix**. This suggests a shift from narrowly profession-based counting towards a more dynamic understanding of the health labour market, in which movement between sectors, roles, places and career stages becomes more visible.

A sixth important dimension is the expectation that data should become more **accessible, interpretable and decision relevant**. The future state described in many countries is one in which HWF data are not only available to technical experts, but can also support planners, managers and policymakers through clearer outputs, visualisation tools, dashboards and more transparent analytical processes. This reflects a growing understanding that the value of data depends not only on their existence, but also on their capacity to inform action.

Taken together, the TO BE visions across the HEROES countries suggest a move towards HWF data systems with six strongly emphasised features:

1. planning relevance, meaning closer alignment between datasets and workforce planning needs;
2. integration, meaning stronger linkage across fragmented data environments;
3. better representation of actual workforce capacity, especially through improved information on practising professionals and labour input;
4. stronger demand-side orientation, including the use of demographic, epidemiological and service-related indicators;
5. broader scope, including mobility, competencies, education transitions and skill mix;
6. greater usability, meaning better accessibility and translation of data into planning and decision support.

From an overarching perspective, the TO BE situation therefore reflects a shared strategic orientation towards more mature HWF intelligence systems. The emphasis is not on the accumulation of more data as such – either quantitative or qualitative -, but on the development of data environments that are more integrated, more analytically meaningful and more capable of supporting evidence-informed workforce planning. Achieving the TO BE vision for workforce data systems requires a transition from fragmented and institution-specific datasets toward integrated, interoperable, and governance-oriented ecosystems capable of supporting strategic workforce intelligence and long-term policy development.

4.5.3 Link to implementation (transition to TO DO)

The strategic directions outlined above are translated by participating countries into concrete implementation pathways, reflecting different levels of system maturity, institutional capacity and policy priorities.

The following section presents the main TO DO actions identified by countries to operationalise these objectives and progressively move towards more integrated and planning-oriented HWF data systems. Several action plans on data

and data source optimalisation were actually implemented during the HEROES Joint Action timeframe, achieving multiple goals set at the TO BE phase.

4.5.4 The TO DO: overarching analysis

The TO DO actions identified by participating countries translate the strategic objectives outlined in the TO BE vision into concrete implementation steps, reflecting different levels of system maturity, institutional capacity, and policy priorities.

The HEROES Joint Action provides technical support and creates a common learning platform for mutual exchange and peer learning. Within this framework, participating countries developed action plans and implemented actions focusing on HWF-related data, planning models and tools, and the development of HWF planning skills. The following section summarises and presents experiences related to actions addressing data quality, data availability and the usability of data for workforce planning.

To improve data supporting workforce planning, Member States prepared action plans describing the background, objectives, expected outcomes and timelines of the activities, as well as identifying required resources, preconditions, policy relevance and potential risks. Member States were asked to prepare a first draft of potential action plans on data in the summer of 2024. A supporting template was provided by the task leader Previously, countries collected their ideas for the Rome Workshop in May 2024, where at a specific session the TO DO action plan template was presented and tested for one action per each country. After considering the details and future steps of implementation, typically, each country developed action plans covering between two and five feasible actions. These action plans were discussed with the respective task leaders and with peer countries working within the same cluster. The interim meeting in Budapest November 2024 provided a great opportunity to further develop the action plans and monitor the progress made in the first steps of implementation. Member States developed national action plans containing concrete activities, outputs, and key performance indicators (KPIs) related to HWF data development. The process focused on identifying gaps in data availability, quality, accessibility, and usability for planning purposes. Countries selected actions adapted to their own national contexts, such as mapping data sources, creating harmonised datasets, improving registries of practising professionals, strengthening demand-side indicators, or developing forecasting-related data structures. Group discussions at the interim meeting focussed on the success factors and bottlenecks of action plan implementation. In the beginning of 2025, bilateral meetings were organized between each country and the task leader to monitor the progress, discuss the policy relations and provide further technical support. The rest of the project duration, countries received a monitoring template that could be filled with the advancements, as well as the 3 monthly reports provided a great opportunity for following up all the progresses made. The whole process also relied strongly on collaboration and exchange between countries at various platforms that fostered mutual learning and peer review. The Malta Workshop in 2025 provided a platform for integrating all actions in the interconnected areas of data, methods and skill optimisation.

In many countries, HWF planning and data development represent strategic priority areas, often linked to national strategies or implemented through domestically funded or EU-supported projects. In several Member States (e.g. Greece, Czechia, Italy, Sweden, Spain, Malta and Portugal), the WHO provided technical support for the development of HWF information systems, the introduction of systematic planning approaches or the testing of innovative solutions. In these cases, Joint Action HEROES complemented ongoing efforts by providing financial resources, a structured development framework and a supporting community.

In other countries, e.g. Estonia, Lithuania, Slovakia, Croatia, Slovenia, Hungary, Norway, Belgium and Poland, HEROES played a strong catalysator role: as a result of the Joint Action, previously planned or newly identified actions were actually launched, and the value of existing activities became more visible. Recurring feedback from Member States is that a significant share of the implemented actions would not have taken place without Joint Action HEROES, or not in the same form or timeframe. An important lesson learned is that Joint Action support is most effective when project activities are aligned with existing policy priorities and with efforts that are necessary or ongoing independently of the project. For example, Greece developed a complete Human Resources Information System (HRIS) as part of the

Health-IQ Platform that was already a policy priority at national level. In Lithuania and Poland, the HWF planning agenda was brought to the attention of high-level decision makers of various sectors during the HEROES years, therefore the implementation of the actions became strategic policy priorities. Italy also has found synergies with more national level HWF development actions, such as TSI on Health Hub for sustainable investing in health programme. Slovenia also showed a shared commitment in refining the national HWF strategy. During HEROES, close collaboration with the Ministry of Health was established through a workshop conducted during the development phase of the National Strategy for the Management and Development of Health Workers and Healthcare Associates in the Healthcare System 2025–2035. Particular emphasis was placed on improving methodologies and strengthening future HWF planning approaches.

Actions addressing data development can be grouped into the following main areas:

- developing better data sources or minimum planning datasets;
- creating integrated databases;
- better monitoring of the practising workforce;
- ensuring data for planning demand;
- data visualisation;
- obtaining additional information to enable better planning.

Achievements of HEROES Joint action for each category above are presented in the following sections.

Achievements in developing better data sources or minimum planning datasets

In some countries, ensuring adequate data for planning required an initial review of existing data sources. After mapping the data gaps by using various methodologies, countries achieved accurate and appropriate HWF planning datasets.

Accordingly, Czechia processed an overview of available data sources and defined data interfaces for input files, while Estonia conducted a comprehensive data audit. In countries with a regionally organised health system, planning and data collection had often taken place at regional level, and actions focused on moving towards nationally harmonised datasets. Spain conducted a Delphi study to reach consensus on a country-level Minimum Data Set for HWF planning and forecasting and obtained approval from the regions. In other cases, changes in data categories required adjustments in data management practices. For example, in Ireland, the registration process for nurses and midwives is being modified to distinguish between health professionals practicing as nurses and those practicing as midwives.

Achievements in creating integrated databases

When data required for planning originate from multiple sources, this presents several challenges. Beyond the need for cooperation among multiple stakeholders, data linkability and interoperability are often limited due to legal, technical and process-related barriers. The most advanced form of registries is achieved when planning-relevant data can be linked within an integrated database. The development and further strengthening of integrated HWF information systems is a long-term process, to which Joint Action HEROES supported countries at different stages. Many countries managed to overcome data source linking difficulties during the Joint Action.

For example, Greece developed a Human Resources Information System (HRIS) as part of the WHO-supported Health-IQ Platform, defining data sources and key HRH indicators. Germany harmonised and linked heterogeneous and granular datasets to conduct the first baseline projection of HWF supply and demand, measured both in persons and full-time equivalents, across 55 healthcare occupations. Malta harmonised data on the current workforce employed by health service providers within the Ministry for Health and Active Ageing and established a database for educational institutions including data on enrolled students.

Achievements in better monitoring of the practising workforce

A fundamental basis for HWF planning is accurate information on the size and distribution of practising health professionals delivering health services. The category of practising professionals is emphasised in the Joint Questionnaire on Non-Monetary Health Statistics. Nevertheless, defining the practising workforce remains challenging in many countries due to multiple data sources, limited availability of private sector data, lack of information on actual working time and the presence of dual practice.

During Joint Action HEROES, Croatia integrated data from the national register of healthcare providers with pension insurance data to identify employed persons in healthcare institutions. Hungary implemented a legislation-supported comprehensive data upload from health service providers, completing the database of practising health professionals and significantly improving data quality within the integrated HRH data system. Lithuania established a unified competence platform for healthcare specialists, integrating employment-related data supported by legislative amendments. Slovakia gained access to practice-related data and data on foreign health workers and integrated these into the national registry. Slovenia obtained data on the socio-demographic characteristics of HWF staff leaving the profession and automated the integration of this information. Italy developed an integrated information system for six health professions to improve data on practising professionals and used the system for Joint Questionnaire reporting. All these examples clearly show the effort for up-to-date and real-time registry data, and better integrated HWF datasets for planning purposes.

Achievements in ensuring data for planning demand

While data related to workforce supply are generally more precisely defined, demand-side data have, until recently, been limited in most countries. Increasing attention is being paid to estimating current and future demand and to incorporating changes in needs and demand-shaping factors into planning models. This requires the availability of relevant demand-side data and indicators.

Within Joint Action HEROES, several countries undertook efforts in this area. Belgium mapped epidemiological data and consulted stakeholders to incorporate such data into demand planning. Italy identified relevant demand indicator categories based on international practice and literature review, while in Portugal business intelligence tools are under development to support policy decision-making. Portugal conducted a scoping review to identify demand-side indicators for HWF planning. Norway explored health service utilisation among inhabitants with immigrant backgrounds to better estimate related demand. The Netherlands established a new expert group to integrate different policy domains into demand estimation.

Achievements in data visualisation

At policy level, HWF data are used to support decision-making. For effective interpretation and rapid overview, information must be easily accessible and clearly presented. To support this, several countries implemented developments focused on data visualisation.

Portugal identified and quantified data, sources and indicators for a Health Workforce Business Intelligence system to enhance policy decision-making. Estonia developed a forecasting model covering both supply and demand for various professions, with model outputs presented through a dashboard. Czechia defined data interfaces for input files to enable visualisation in a Power BI tool.[2]

Achievements in obtaining additional information to enable better planning

Further areas also contribute to strengthening HWF information systems, including the expansion and refinement of specific data elements. Particular attention is given to planning across multiple professions, competencies, skills and

2 Power BI is *Microsoft's business analytics platform* that helps you turn data into actionable insights.

skill mix. While this topic is currently addressed mainly at a conceptual level, initial steps have already been taken in some countries.

For example, Poland conducted a review of international literature on the competences of nurses and midwives in various countries, which allowed for the identification of differences in tasks and levels of use of nursing staff competences. Data development efforts may also focus on specific areas such as international or internal mobility, education, regional planning, informal care or primary care. Within the Joint Action, Sweden conducted a study on the internal mobility of newly graduated nurses and their transition from education to clinical practice.

Policy relevance

The country action implementations on data and data source optimisation showed significant achievements. As underlined earlier, advancing technical components such as better data for HWF planning might remain disconnected from the real-world unless policy interventions utilize them in an effective way. While the provision of appropriate data is primarily the responsibility of professionals managing databases and analytical tools, data availability and utilisation generate several policy implications. Member States frequently highlighted that strong ownership from the responsible ministry or ministries is essential for both implementation and sustainability; it is not sufficient for a competent authority alone to manage such developments. HWF data development and utilization typically involve multiple stakeholders, authorities and professional bodies, making effective inter-stakeholder cooperation a prerequisite for successful data development. This strengthens the recurring need for continuous stakeholder engagement and proper governance mechanisms.

Many changes - particularly those related to data sharing, data transfer, data use or data linkage - require legislative amendments. In the field of HWF data, privacy, data security, protection of sensitive data and adherence to legal and regulatory standards (i.e. GDPR) must be addressed with particular care. Especially in relation to IT systems and highly specialised tasks, it is inevitable to secure adequate funding and allocate sufficient resources to ensure sustainability and effectiveness.

4.6 Task 2 – Forecasting models and tools: TO BE and TO DO

4.6.1 Introduction

Forecasting and analytical tools are essential components of strategic workforce intelligence systems, enabling evidence informed planning, scenario analysis, and anticipatory governance. Building on the AS IS analysis of health HWF planning models, the TO BE perspective reflects how participating countries aim to strengthen, expand or develop their modelling capacity to support more robust and forward-looking workforce planning.

The TO BE objectives highlight both the need to establish basic modelling capacities in some countries and to enhance the sophistication, scope and policy relevance of existing models in others.

Key points of the TO BE and TO DO trajectories: HWF planning models

The most important part for the models and tools actions was in fact more related to skills or a more overarching theme in HWF planning, namely a good governance and infrastructure on HWF planning that is embedded in the current structure and is sustainable.

HWF planning is crucial for ensuring sufficient healthcare capacity over the medium and long term. Tools such as HWF planning and forecasting models estimate the future supply and demand of healthcare professionals by considering demographic trends, disease burden, and retirement rates. These tools help policymakers identify potential shortages or surpluses and guide evidence-based decision-making. However, planning tools alone cannot solve HWF gaps. They highlight potential problems but cannot train, retain, or redistribute staff. Addressing HWF shortages requires targeted policies and structural reforms.

Skill-mix planning is one strategy to mitigate shortages. Instead of focusing solely on professional categories (e.g., physicians versus nurses), it emphasizes the competencies and tasks needed to deliver care. This includes task shifting and role expansion, where responsibilities are reassigned across professions while maintaining quality standards. Skill-mix approaches increase both flexibility and efficiency. For example, during the COVID-19 pandemic, healthcare systems successfully deployed staff from different backgrounds in intensive care teams or reassigned tasks based on competencies rather than job titles. Planning based on competencies instead of FTE per profession also enables retraining and career mobility, helping fill urgent vacancies and improving job satisfaction by offering more varied work.

The analysis of the TO BE objectives and TO DO actions highlights a clear transition across countries from basic or fragmented modelling approaches towards more integrated, policy-relevant and system-oriented HWF planning models.

While countries differ significantly in their starting points, a common trajectory emerges. This trajectory moves from single-profession, supply-based models towards more comprehensive approaches that incorporate demand-side factors, skill mix, regional dimensions and broader system dynamics.

Importantly, the implementation experience shows that strengthening HWF models is not only a technical process but also a governance challenge. The effectiveness of models depends on the availability of high-quality data, the integration of analytical capacities, and the embedding of modelling processes within institutional and policy frameworks.

Overall, task 2 confirms that the future development of HWF planning models requires a systemic approach, combining methodological innovation, data integration, and strong governance arrangements to ensure that modelling outputs effectively support decision-making.

4.6.2 The TO BE: overarching analysis of country objectives

The TO BE objectives identified by participating countries reflect a wide range of priorities, depending on their starting point and level of maturity in HWF planning models.

After analyzing the country's AS IS situations, concrete action plans were drafted by each Member State to reach the desired stage or maturity level of their model for HWF planning. Several discussions during workshops and bilateral meetings supported countries to formulate their action plans for models and tools.

The topics for improving the HWF planning model were:

1. Develop a model (for certain professions) (PT, ES, GR, HR, HU, CZ, EE, MT, IE)
2. Include migration trends in the model (SK)
3. Include/improve recruitment and retention in the model (PT, BE, CZ, SK)
4. Extend the demand predictions with non-demographic factors (NO, LT, SI, BE, NL, IT, IE)
5. Pilot with regional planning (NO, PL, NL)
6. Skill-mix planning (pilot) (SE, PL, NL)
7. Evaluate the current model (NO, LT)
8. Create a dashboard for the model (NO, LT)
9. Improvement and integration of model methodology internally and externally (IT, GR, SI, MT, IE)

Some of the actions described for the model were more related to the data task. In most cases countries do have an idea how to make these developments part of the model, but they are lacking the data for it. For example, data on recruitment and retention, and data on future demand. The implementation and development of a model is for some countries the extension of the use of the model for more professions. In addition, in this case data of these professions is needed to be able to model the professions. Lastly, the improvement and integration of the model methodology is closely related to cross-cutting task 3 in the JA HEROES on governance and planning skills.

If we investigate the actions regarding the models and tools, we can see that the common topics exceed the clusters; no specific cluster-level pattern can be emphasized.

To provide a structured overview of country priorities, Table 8 summarizes the main TO BE objectives related to HWF models and tools across the three work packages.

Table 8. Overview of country objectives on HWF models and tools

Action	WP5	WP6	WP7
Develop a model	PT, ES, GR, IE	HR, HU	CZ, EE, MT
Include migration trends			SK
Include/improve recruitment and retention	PT		BE, CZ, SK
Extend demand	NO	LT, SI	BE, NL
Regional planning	NO	PL	NL
Skill-mix planning	SE	PL	NL
Evaluate model	NO	LT	
Create dashboard	NO	LT	
Improvement and integrations of model	IT, GR, IE	SI	MT

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The overview of actions from different countries shows that countries are making a transition from models as isolated technical exercises toward more integrated planning ecosystems that can support adaptive and evidence-informed governance.

4.6.4 The TO DO: overarching analysis

The objectives outlined above are translated into concrete implementation actions, reflecting different levels of model development and varying degrees of integration with data systems and governance structures. The TO DO actions implemented by participating countries translate the objectives identified in the TO BE phase into concrete steps for developing, expanding, and integrating HWF planning models and tools within national systems.

Based on the action plans from the TO BE phase of HEROES countries implemented actions focusing on HWF planning and forecasting models and tools. The following section summarizes and presents experiences related to actions addressing models and tools for HWF planning.

Develop a model

Several countries indicated in their action plans that they were planning on implementing a model during the joint action.

- Malta started with the development of a model and piloting of the model prior to HEROES. Driven by the JA HEROES, they were able to finish and implement the supply and demand-based model. The next priority is to establish a permanent team to work on the topic of HWF planning.
- Estonia developed a supply-based model during the Joint Action HEROES. The goal of the model is to support experts on a daily basis. Next to the model, a policy action plan was developed which ensures that HWF planning will be integrated in a wider strategy framework ensuring cross-departmental support across the MoH.
- Croatia is developing a model, supported by the policy dialogues an outline of the model and its functions was made. At this moment the model is under construction, and it will be implemented in the coming years together with a governance structure to make HWF planning sustainable.

- Czechia realized approval for the planning process from the MoH, established a dedicated planning unit and a network of stakeholders and experts for HWF planning. With the basis in place, the next step is to develop a model based on the available data.
- In addition, Hungary made a start with the basis of a model. They started with the development of an institutional staffing framework that links workforce levels to service performance and care pathways. Based on this framework, further actions on governance structure, institutionalization, and political and technical commitment will be taken.
- Portugal and Spain, did not implement a new model but did mainly invest on the governance, creating a common language among all stakeholders within health work force planning, to make the models and HWF planning in general more sustainable. An improved model will follow after HEROES.

Include new data in the model

One of the actions of Slovakia was to include migration trends into the model. To be able to include migration trends, data on these trends is needed. Up to now, this data is not available yet and is therefore not included in the model.

Several countries wanted to improve the recruitment and retention options in the model. The improvement of these options is still ongoing and does rely on the availability of (more detailed) data of these countries mostly.

Extend the demand predictions with non-demographic factors

- Lithuania was planning on adding healthcare services data to the demand side of the model. First steps for the integration of this data are made. There is dialogue with the National Health Insurance Fund, who owns the data, about the necessary sample needed.
- In Slovenia the first main action related to the demand predictions was to update the model with the latest data and to start using the model again. After the joint action the demand predictions will be further improved.
- The Netherlands looked at different ways to do the demand predictions with the non-demographic data and based on these new scenarios were created. Before, there were nine different scenarios. In each scenario, another factor was added, and some factors were considered more important than others. In the new scenario, all the factors are treated equally, and all factors are included at once.
- Belgium focused on the integration of epidemiological data into the existing planning model. The possibilities were investigated during the policy dialogues and technical discussions. During these meetings, the groundwork for implementing epidemiological factors into the planning model was done. The actual implementation will occur after the course of HEROES.
- Norway mainly focused on the other actions first, the further development of the non-demographic factors in the model are planned for after the joint action.

Pilot with regional and skill mix planning

- For the Netherlands this action on both regions and skill mix is postponed until after HEROES. In the Netherlands planning takes place every three years and it was not possible to align a pilot on regional and skill mix planning in the latest planning cycle. The possibilities and available data for both regional and skill mix planning were discussed during the policy dialogues, and the plan is to pilot regional and skill mix planning during the next planning cycle.
- In Poland an in-depth analysis is done on primary care staffing. This analysis focused on the role of primary care in the Polish health care system and the regional differences in the needed staffing levels.
- In Sweden, the exploratory work on a capability framework has been undertaken in regional pilots and at national policy dialogue. The capability framework will be used to find the best skill mix and mix of capabilities in practice.

Evaluation and visualization of the current model

Norway and Lithuania evaluated their current model as part of HEROES. Lithuania performed an external evaluation of the model with the Task 2 (models and tools) leaders of HEROES and discussed possible improvements of the model. In Norway an internal evaluation was performed and improvement to the model were made based on the evaluation. As part of this, they migrated the model to a different statistical program, from SAS to Phyton. Both countries also created a dashboard to visualize projection results in a more accessible and engaging way.

Improvement and integration of model methodology internally and externally

Several countries had the improvement and integration of HWF planning as one of their actions. In the previously described actions, this action of integration of planning within a country was often a part of the described action, or this action was one of the first steps to improve planning. This shows how important it is for countries to have a dedicated imbedded system for HWF planning. The model or tool is part of this whole system. All countries did take steps to (further) integrate HWF planning in their systems. This can be with a dedicated institute or department and support of stakeholders and the MoH. Also, in countries that already have a dedicated institute or department, efforts were made during policy dialogues and other actions to show the added value of such a department or institute.

4.7 Task 3 – Skills and planning capacities: TO BE and TO DO

4.7.1 Introduction

Skills and planning capacities represent a critical enabling dimension of sustainable HWF planning systems. While data infrastructures and forecasting models provide the analytical foundation for workforce intelligence, their effective use depends on the existence of institutional, technical, governance, and communication capacities capable of translating evidence into policy action.

Building on the AS IS analysis of skills and planning capacities across participating countries, the TO BE and TO DO perspective reflects how countries aim to strengthen both technical and strategic competencies required for effective workforce planning. These include analytical and modelling skills, but also governance capacities, stakeholder engagement, communication, leadership, and systems-thinking competencies.

The implementation experience of Joint Action HEROES highlighted that strengthening workforce planning capacities is not limited to individual training activities. Rather, it requires the progressive institutionalisation of learning mechanisms, knowledge exchange, and organisational capacities supporting long-term workforce planning functions.

The TO BE objectives therefore reflect both the need to address existing skill gaps and the ambition to embed workforce planning competencies within sustainable institutional and governance structures.

Key points of the TO BE and TO DO trajectories: HWF planners' skills

The analysis of the TO BE objectives and TO DO implementation highlights a clear transition towards more structured, practice-oriented and sustainable approaches to skills development in HWF planning.

Across countries, a common trajectory emerges from fragmented or ad hoc training initiatives towards more institutionalised and strategically aligned capacity-building systems. Training activities increasingly combine technical competencies with policy, governance and communication skills, reflecting the multidimensional nature of HWF planning.

Importantly, task 3 confirms that skills development acts as a critical enabler across all domains. Strengthened competencies directly support the effective use of data systems and modelling tools and enhance the capacity of countries to translate analytical outputs into policy decisions.

Overall, the experience of task 3 demonstrates that sustainable workforce planning requires continuous investment in human capital, embedded within institutional structures and supported by long-term strategies for capacity development on both country and EU level.

4.7.2 The TO BE: overarching analysis of country objectives

Building on the AS IS assessment of skills and competencies, the TO BE phase focused on defining structured capacity-building strategies to strengthen the skills required for effective HWF planning across countries.

For the TO BE phase of task 3, participating countries were requested to complete to fill a unified questionnaire, designed to function as a structured action plan. This instrument supported countries in systematically identifying their target groups and the specific competencies to be addressed during the subsequent TO DO phase through dedicated training activities. The action plans have contained detailed specification of the identified target audiences, strategies for engagement and ensuring successful participation, priority skill areas and thematic topics to be covered, the conceptual framework and pedagogical design of the trainings and implementation of trainings. Given the limited life span of the HEROES, the countries were encouraged to define skills challenges that they plan to improve not only during the HEROES lifetime, but also beyond it. In order to facilitate the process of creation of action plans, followed by the process of provisional training program creation, a dedicated guiding document was prepared, serving as a step-by-step guideline for the countries to follow. Similarly to activities that took place within other tasks, several discussions during workshops and bilateral meetings supported countries to formulate their action plans for skills improvement. Given the considerable diversity among participating countries in terms of levels of maturity of their HWF planning skills, the organization of their health systems, their local specificities and political context, countries were granted flexibility to design provisional training programmes tailored to their specific needs. At the same time, it was recommended that the actual plan for the execution of the programs has to be in line with the HEROES timeline. Countries were therefore encouraged to prioritise topics that could be realistically addressed within the project's duration. A key consideration was to ensure that task 3 activities were coordinated with other concurrent project initiatives, while adhering to the technical standards and requirements established by the HEROES framework. Given that sustainability component of the project is of paramount importance, it was also suggested programs could stretch well beyond the completion of the HEROES project. This approach aimed to maximise the lasting impact of skills development and institutionalise improvements in HWF planning practices.

Design and scope of training programmes

The analysis of the provisional training programs revealed substantial heterogeneity across countries in terms of the size and composition of the target audience (ranging from a few individuals to several hundred participants), the training formats employed (in-person, online, or hybrid), and the specific topics addressed. Several countries opted for more

tailored, targeted approach addressing limited number of skills. Croatia, for instance, aimed to train participants in the application of a basic HWF model at both national and county levels. Hungary sought to strengthen decision-making capacities by using insights from the HEROES project, providing a broader understanding of HWF planning in the country. Spain's objectives were to analyse demand drivers and master predictive models. Notably, no country aimed to comprehensively cover all four skill domains identified in the project framework. From the countries with more diversified programs, Portugal and Greece designed training programmes that integrated theory and practice, allowing participants to work on a sequence of structured activities. The expectation was that participants would acquire competencies to lead and facilitate HWF policy dialogue on HWF issues, participated in HWF policy development and implementation, and developa basic level of proficiency in conducting related analyses. Likewise, the Lithuanian program was designed to strengthen the skills and capabilities of those involved in HWF planning in order to ensure comprehensive coverage and participant engagement. The Maltese program was designed to provide training for clinical and non-clinical service leaders within their Ministry of Health to facilitate a transition from a reactive approach to a more strategic, evidence-based human resource planning system.

Priority skill domains emerging from the TO BE phase

The analysis of the frequency with which specific skills were targeted in the provisional training programmes indicates that certain competencies have emerged as particularly high priorities across countries. **Data analytics** is unanimously the skill that is important to be addressed by most of the countries. This is not unexpected, having in mind the data system pose a fundament for HWF planning. It only highlights countries' efforts to further improve not only their national systems for data collection but for their extensive usage in modelling, forecasting and strategic planning per se. Closely aligned to data analytics is **modelling tools** application skills, which also has provoked considerable interest among the countries. This comes to no surprise as NIVEL, one of the projects partners and competent authority, have presented their basic modelling tool during the project's meetings and workshops. As a result, many countries have decided to include trainings for this skill set. **Anticipating future trends** is another skills set that countries have highlighted as being of great importance. These skills are tightly related to modelling, as forecasts for HWF are all but unidimensional and many developing factors within and outside of health sector greatly influence the demand for HWF. Such factors include demographic transition, epidemiological transition, technological advancements, HWF profession attractiveness, generational and societal changes, AI surge, new models of care and all of these can shape the future demand of HWF. Illustrating these priorities, Italy designed its programme to combine theoretical and practical components, aiming to strengthen the capacity to use digital tools and forecasting models. The goal was to promote integrated, data-driven planning, which is critical for ensuring the sustainability and efficiency of the National Health System. Belgium, meanwhile, focused on enhancing understanding of how epidemiological changes impact the future supply and demand of healthcare professionals, reflecting the importance of connecting analytical insights with strategic workforce planning.

To provide a structured overview of the priority skills identified by countries, Table 9 presents the competencies targeted within the provisional training programmes.

Table 9. Reported skills priorities in the TO BE phase

Reported challenges with regards to skills TO BE met in the project		BE	CZ	EE	ES	GR	HR	HU	IE	IT	LT	MT	NL	NO	PL	PT	SI	SK	SE
Policy making	Leadership		●			○					○	○				●	●		
	System thinking															●			○
	Strategic planning		●	●		●		●	○	●	○	●		○		○	●		○
	Financial planning											●						●	
	Anticipating future trends	○		●	●	●				○	○		○	○	○	●	●	●	
	Policy making domain																		
Human Resources for Health	Integrative workforce planning	●				●										●			●
	Change management					●						○							
	Workforce recruitment					○					○					●	○		
	Workforce retention					●					○					●	○		
	Human Resources for Health domain																		

Reported challenges with regards to skills TO BE met in the project		BE	CZ	EE	ES	GR	HR	HU	IE	IT	LT	MT	NL	NO	PL	PT	SI	SK	SE
Data and tools	Data collection	●	○	●				○			○								
	Data analytics	●	○	●	●	●		○		●	○	●	○	○	○	●	●	○	○
	Modelling tools application	○	○	●	○		●		●	●	○		○		○	●	●	○	
	Data and tools domain																		
Collaboration	Collaboration and communication		○	○									○						
	Stakeholder involvement			●			○			●			○				●		
	Collaboration domain																		

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○=this was in development or not a challenge at the beginning of the HEROES project and defined in the country action plan

●=this was not in place and a challenge at the beginning of the HEROES project and defined in the country action plan

No dot=was not mentioned in the action plan

4.7.3 The TO DO: implementation of training programmes

The TO DO phase operationalised the priorities identified in the TO BE phase through the implementation of training activities and capacity-building initiatives tailored to national contexts.

As already stated, HEROES provides technical support and creates a common learning platform for mutual exchange and peer learning. The TO DO phase of the task 3 activities has saw the countries materializing their plans defined in the previous phase. Similarly to other tasks, the improvement of skills and abilities of the staff in charge of HWF planning represent strategic priority areas that are linked to national strategies or implemented through domestically funded or EU-supported projects. It is significant to point out that within the HEROES, a close cooperation has been established between several countries and partners within the project consortium for the training delivery. In this manner Croatia, Czechia, and Lithuania have teamed up with the NIVEL, who have shared their HWF planning and forecasting tool and additional experiences with HWF planning. Similarly, Slovenia has teamed up with the WHO team for a presentation of the HWF planning and forecasting tool, including an overview of the data required for effective workforce planning.

Training approaches and formats

Given the already described heterogeneity of countries' levels of maturity of the HWF planning processes, priorities to be addressed and capabilities of delivering the foreseen activities within the HEROES time frame, the countries have opted for specific approaches that fits their needs best. This heterogeneity reflects not only in the content of the trainings but also in their formats, structures, target audiences and so on. In general, most of the countries have opted for physical, in person trainings, while others like Greece, Czechia, Italy and Slovakia have opted for hybrid events or mixture of in person and online sessions. Estonia was the only country, which has opted for solely online execution of their events. Almost all of the countries have chosen a structured training pathway where several different topics have been addressed, usually by workshop-oriented discussions, lectures or round tables. Sweden was the only country, which has opted for different approach as they have chosen to deliver a practice-based learning approach, organised through a pilot initiative. The learning model was based on mentorship and reciprocal learning between five participating regions. Table 10 summarises the developments in terms of training activities implemented by countries to address identified skill gaps.

Table 10. Reported developments with regard to skills at the end of the TO DO phase

Reported skills trainings conducted		BE	CZ	EE	ES	GR	HR	HU	IE	IT	LT	MT	NL	NO	PL	PT	SI	SK	SE
Policy making	Leadership				●	●										●			●
	System thinking			●				●			●					●			●
	Strategic planning		●	●	●	●	●	●	●	●	●	●		●		●	●		●
	Financial planning				●							●							
	Anticipating future trends	●	●				●			●	●	●	●	●	●	●	●		
	Policy making domain																		
Human Resources for Health	Integrative workforce planning		●			●	●				●		●			●	●		●
	Change management	●										●							
	Workforce recruitment														●	●			
	Workforce retention	●											●			●			
	Human Resources for Health domain																		

Reported skills trainings conducted		BE	CZ	EE	ES	GR	HR	HU	IE	IT	LT	MT	NL	NO	PL	PT	SI	SK	SE
Data and tools	Data collection		●	●							●						○		
	Data analytics	●	●	●	●	●		●		●	●	●		●	●	●	●	●	
	Modelling tools application	●	●	●	●		●	○	●	●	●	○	●	○		●	●	●	
	Data and tools domain																		
Collaboration	Collaboration and communication	○		●	○			○		●			●	○	○				○
	Stakeholder involvement			●	○		●	○		●			●		○				○
	Collaboration domain																		

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○=this was not a challenge or not defined in the country action plan

●=this was a challenge and defined in the country action plan

No dot=was not mentioned in the training report

Priority areas addressed through training activities

Table 10 summarizes the developments in terms of trainings conducted to challenge skills gaps by the end of HEROES, by countries. Actions undertaken to tackle skill gaps indicate that several areas have been identified as priority for most of the countries. Data analytics, modelling tools application, strategic planning as a part of health policy development, anticipating future trends and collaboration and communication with different stakeholders were the areas of joint interest for most of the countries. Although data and planning models and tools were main area of interest of the other two transversal tasks, the countries have stressed out the importance of more extensive analytical skills needed when interpreting data in context of the comprehensive HWF planning, as technical tools alone were not sufficient to enable sustainable workforce planning, as reported by Hungary. In that manner, Spain has pointed out the importance of improving the understanding of data requirements, interpretation of indicators and the limitations of existing data systems, but also the need for interoperability and collaboration with IT units rather than purely descriptive statistics. Lithuania has likewise stressed the importance of advanced analytical and technical capabilities and skills in data analytics, data engineering and programming, as these are prerequisite for establishing a model in new data environment.

Strengthening modelling-related competencies

As data is fundamental for laying basis for models and for modelling tools development, it was expected many countries would opt in for further improvement and bridging gaps in this area as well. Modelling of supply and demand in HWF planning draws on demographic, epidemiological and other datasets and subsequent integration of these data in models and modelling tools. Importantly, beyond this technical execution, HWF planners also require a thorough conceptual understanding of the overall model architecture, including the role of individual modules, the sequencing of inputs, and the interpretation of outputs. To fulfil these requirements, Slovakia has held trainings in usage of their recently developed model, where the training activities have contributed to consolidating the HWF planners' ability to operate, maintain, and further develop the HWF planning model. Croatia has opted for dedicated interactive session in a form of a workshop, where NIVEL experts have provided training for the usage of their basic model, adapted for Croatia's context in terms of data and scenarios. Belgium's training activities focused primarily on the demand side of the Federal planning model and the usefulness of epidemiological data to refine it, with specific attention being given to the Belgian Burden of Disease study and to projection tools such as the PROMES (PROjecting Medical Spending) microsimulation model. Slovenia has dedicated a training session, provided by the WHO, on practical implementation and usage of their forecasting tool, complemented by planning methodologies, data interpretation, and the use of evidence to support strategic decision-making in HWF policy.

Strengthening policy and strategic capacities

Strategic planning and policy development are essential components of comprehensive HWF planning and countries' interest in addressing these in the training sessions show these skills are in constant need of improvement, evaluation and update, all in line with the contextual trends countries are facing. Closely attached to these are anticipating future trends that encompass factors within, but also out of the health and care sector, which can prove to be of paramount importance for the overall HWF planning. In that manner, Ireland training sessions focused on knowledge and understanding of the complexities of HWF planning and policy challenges that arise within HWF planning and the postgraduate training ecosystem, and why future HWF planning policies need to be cognisant of population demand for health services and the current training landscape and migration trends. Similarly, Italy's sessions contributed to consolidate the understanding of the contextual variables influencing HWF planning and to share experiences across regions and professional groups. In the Netherlands, the training has exposed HWF planners to insights from labour market research, economics, and technology and at the same time it has enhanced their ability to analyse and discuss recent labour market trends and developments, and to reflect on their implications HWF planning.

Strengthening collaboration and stakeholder engagement

Close collaboration and communication with all the relevant stakeholders pave the way to successful comprehensive HWF planning. Sweden and Estonia have highlighted strengthened cross-regional dialogue on HWF planning with collaboration, communication and stakeholder involvement. Czechia, with the stakeholder involvement, has aimed to verify the viability of the proposed model and process for HWF planning. In Poland stakeholder's attention was drawn to the most critical aspects of this process of residency distribution while at the same time it enabled two-sided communication for a better understanding of local communities' experiences, opinions, and expectations, going beyond the institutional perspective.

Sustainability and continuation of capacity-building efforts

HEROES has provided an excellent opportunity for countries to build upon their HWF planning systems and has enabled possibilities for mutual learning, exchange of ideas and knowledge and further capacity building. The limited time frame for execution of skill gaps recognized by the countries, together with the multitude of other HEROES activities running concurrently and the unique position of each country in relation to other intrinsic and extrinsic factors influencing the completion of the envisaged activities (e.g. staff turnover, competing priorities, stakeholder availability, political developments, or limited availability of trainers) proved to be significant enough for all skill gaps to be addressed. Still, the countries have been able to recognize these barriers and training delivery in most of the cases was prioritized according to immediate needs and available resources. In addition, not all skill gaps could have been addressed in depth. In many instances, these trainings helped consolidate a shared understanding of planning concepts, data requirements, and forecasting logic. All these achievements work synergistically towards supporting sustainability of these activities within the national contexts and lay the ground for continuation and expansion of training activities targeted towards various stakeholders on different levels in the HWF planning matrix. Moreover, such activities should be embedded as a regular component of professional development rather than ad hoc initiatives as continuous capacity building is essential to sustain the HWF planning function over time. This could also be a basis for future EU level targeted HWF planning initiative.

Cross-task interdependencies

Another observation coming to light following the completion of task 3 activities is the interconnectedness between the three HEROES transversal tasks. While the three tasks were set aside as three stand-alone major activities within HEROES, the reality has undoubtedly shown the complex interference of all these activities, thus further stressing the fact how comprehensive HWF planning actually is. HEROES experience has once more re-confirmed the paradigm that data are fundamental for modelling and modelling are fundamental for forecasting, creating policies and planning, which are to be evaluated through data indicators and the cycle continues. The robust HWF planning is a complex matrix involving different technical, analytical, strategic and social skills, based on sound data systems and models. HWF planners should be able to set the pieces of the mosaic from variety of perspectives, and this is a reason why their capabilities should be systematically and continuously updated.

5. THE ADVANCED MINIMUM DATASET (AMDS)

Building on the challenges identified in the AS IS analysis on data situation and the strategic directions outlined in the TO BE and TO DO phases for optimised data, the Advanced Minimum Dataset (AMDS) represents a key enabling framework for strengthening HWF planning systems across Europe. The AMDS aims to establish a structured and interoperable workforce intelligence framework capable of supporting evidence-informed planning, comparability, and strategic governance across health systems. The AMDS provides the set of the minimum data requirements for HWF planning that might enable benchmarking and might support a future European HWF planning model.

5.1 The evolution of the Minimum Planning Dataset

This section presents the evolution of the minimum planning dataset in Europe and the development of the Advanced Minimum Dataset (AMDS) within Joint Action HEROES.

In 2012, the European Commission adopted the “Action Plan for the EU Health Workforce”, marking a significant step toward strengthening HWF planning and forecasting across Member States. The initiative aimed to support evidence-based policy interventions and informed investment decisions, ultimately contributing to a better alignment between workforce supply and population health needs. Central to this effort was the recognition that improvement depends on the identification of key indicators and the systematic collection of relevant, high-quality data. The EU Action Plan also highlighted the necessity of establishing an international agreement on minimum data requirements for HWF planning. This led to the concept of a Minimum Data Set (MDS), designed to provide a foundational level of information for countries initiating or developing their planning systems. Such a standardized approach enables the development of common practices, facilitates the exchange of meaningful and comparable data, and strengthens collaboration across the European Union.

The MDS represents the necessary and sufficient core data needed to construct key planning indicators. It comprises a standardized set of variables, typically collected at national level, to support reporting and assessment of critical aspects of health system performance and workforce dynamics. Importantly, the MDS is not intended to replace comprehensive national workforce planning systems; rather, it serves as a baseline framework that countries can build upon. To support adaptability, the framework also includes recommendations for supplementary data, enabling Member States to further develop and tailor their data systems to meet specific domestic planning needs.

The Minimum Planning Data Requirements were established in 2014 the Joint Action on European Health Workforce Planning and Forecasting as a foundational step toward harmonising data for workforce planning across Europe (JA EU HWF WP5 2015, WHO 2015). An expert workshop was convened to design the Minimum Data Set (MDS), followed by a pilot phase in 2015 during which 14 Member States assessed the availability of the required data within their national systems. In 2016 a comprehensive report on HWF planning data presented a total of 12 country responses from Belgium, Finland, Germany, Greece, Hungary, Iceland, Italy, Poland, Portugal, Slovakia, Spain, and the Netherlands (JA EUHWF WP4 2016).

5.1.1. The quantitative dataset of the AMDS

In 2016, the availability of data for the different MDS categories showed a complex picture. **Only three** data categories were reported to be **available in all 12 countries, resulting in no data gaps**. All of these three categories are within the **labour force supply data** area on the supply side: **profession, age and headcount**. The training and retirement data availability means that on average seven countries reported available data for these data areas. Furthermore, on the demand side, **population data** (age and size of the population) seem to be easily available (data categories are available in 9-11 countries), however, not utilised in HWF planning.

The least available data categories - the **largest gaps** - are those related to the **Migration-Outflow** data area (geographical area, specialisation, profession, age and headcount). Only 2-4, in average 3 countries reported that data is available in these categories, sometimes solely by using estimates or proxy indicators. Despite experiencing the largest gap in Migration data, as 5-8 countries reported that they collect **Migration-Inflow** data based on diverse methods in the different data categories. When investigating the different data dimensions of the data areas: the availability of the **Country of first qualification** data reached the lowest level, since only 2-6 countries, in average 4 countries reported to have these data. This indicates the gap, which is also linked to migration-mobility issues (JA EUHWF WP4 2016).

HEROES (2023-2026) task 1 having the mandate to optimize data sources and HWF planning data reviewed the MDS designed by JA EUHWF. Expert discussions revised the quantitative data categories and investigated the potential of adding a qualitative dataset, module next to the quantitative one. Since the contemporary studies (see EU 2012 and SEPEN webinar/workshop outcomes, results of the HWF Projects Cluster on medical deserts, retention and task shifting practices in Europe), as well as the baseline assessment of HEROES countries posed the need for having more clarity on high-level drivers of change in the labour market. HEROES proposes the so-called “Advanced Minimum Dataset” that revised the data availability and utilization of MDS categories in HEROES countries and added a new qualitative data block to the previous MDS.

An AMDS exercise was carried out in 2024 and later updated in 2026, in which **National Planning Datasets at country level** were tested against the AMDS. 16 of the 20 countries indicated that planning goals mostly focus on “Making future forecasts & Complex planning and forecasting for sustaining the system” in 2024, therefore we can state that almost all of the HEROES countries can forecast and plan based on their data coverage. This represents advanced HWF planning goals in all MS (cf. Levels of HWF data in JA EUHWF 2026). Experts agreed during the data availability exercise that **quantitative data set - particularly** the supply side data - **is quite developed in all MS**. In 2024, 20 countries filled in the AMDS survey about their data situation: Belgium, Estonia, Czechia, the Netherlands, Malta, Slovakia, Germany, Italy, Greece, Ireland, Norway, Spain, Portugal, Sweden, Lithuania, Hungary, Poland, Romania, Slovenia, and Croatia[3].

In 2024, data availability showed an improved level; which show that plenty of data improvements took place in the last decade. Similarly to 2016, **three** data categories of **labour force supply data** area on the supply side: **profession, age and headcount** were reported to be **available in all 20 countries, resulting in no data gaps**. In addition, most of the labour force, training and retirement data were available for these data areas in at least 17 countries. This means a significant rise in data coverage and significant improvement in lack of data.

On the demand side, **population data** (age and size of the population) seem to be easily available (data categories are available in 18-19 countries), however, still underutilised in HWF planning. Some countries started demand data development activities during HEROES with an increasing interest, e.g. Italy, Spain, Slovakia, Estonia and Czechia.

The least available data categories - the **largest gaps** - are those related to the **Migration-Outflow** data area (geographical area, specialisation, profession, age and headcount). Only half of 10-12 countries reported that data is available in these categories, sometimes solely by using estimates or proxy indicators. **Migration-Inflow** data showed that up to 15 countries have available data in this data area.

When investigating the different data dimensions of the data areas: the availability of the **Country of first qualification** data reached the lowest level again, since less than 15 countries were able to provide such data. This indicates the long-standing gap in tracking Country of first qualification, which also questions the role of this indictor in the AMDS.

3 There was a change in 2025 among the HEROES participating countries, Romania leaving and Ireland joining the work of HEROES, therefore the first AMDS exercise was completed by both countries.

Table 11. The data coverage in the quantitative planning dataset

Quantitative data set in 2016	Supply side					Demand side	
	Labour force	Training	Retirement	Outflow migration	Inflow migration	Population	Health consumption
Profession	12	10	9	4	8		
Age	12	5	7	2	5	11	8
Head count	12	10	10	4	7	11	8
FTE	7						
Geographical area	11	6	7	2	5	9	7
Specialisation	11	8	6	2	6		
Country of first qualification	6	3	3	2	5		
Gender	10						
Quantitative data set in 2024	Supply side					Demand side	
	Labour force	Training	Retirement	Outflow migration	Inflow migration	Population	Health consumption
Profession	20	20	18	12	14		
Age	20	17	18	12	15	19	17
Head count	20	19	19	14	15	18	16
FTE	15						
Geographical area	19	18	17	10	14	17	14
Specialisation	19	18	18	10	14		
Country of first qualification	15	13	14	11	14		
Gender	19						

The table provides an overview of data availability across countries and highlights progress achieved over time as well as remaining gaps in key data domains.

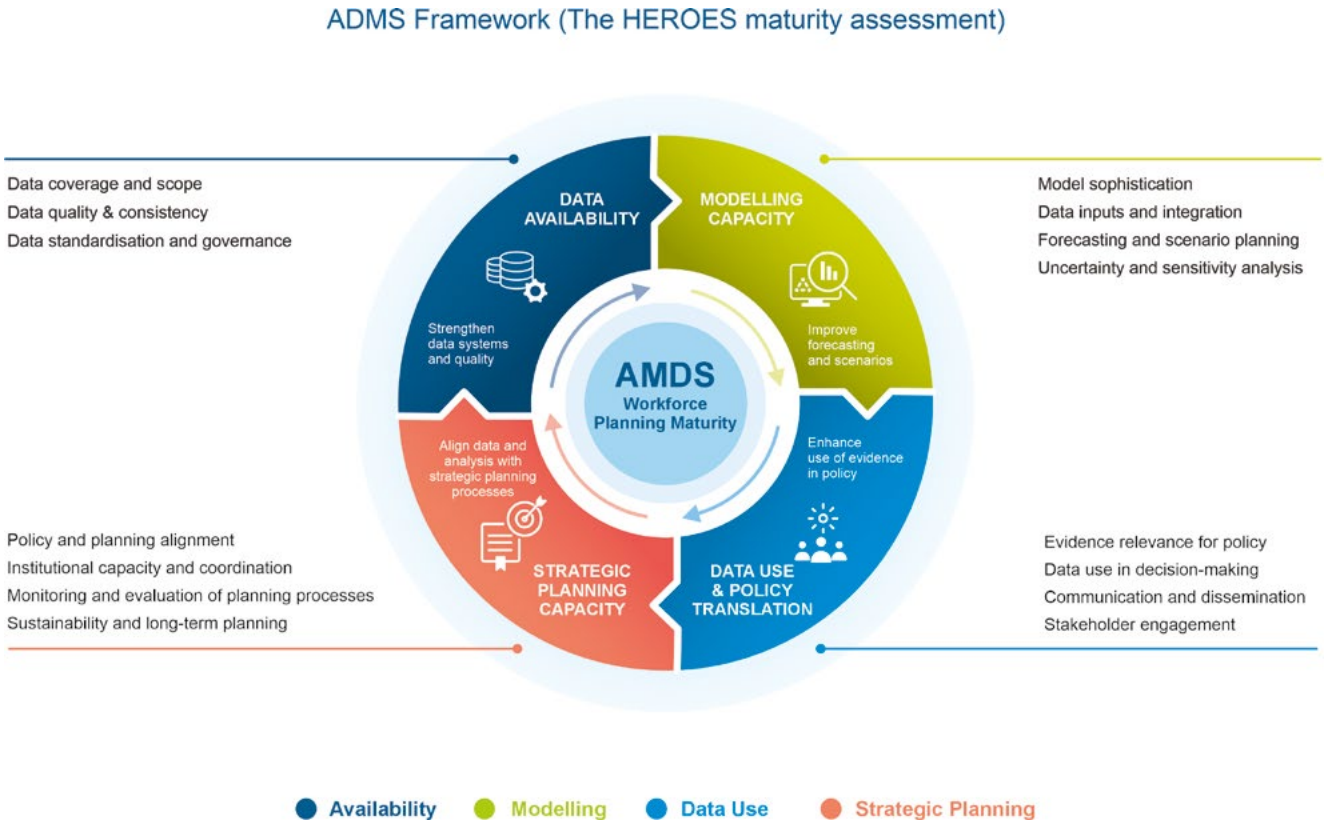

Figure 2. Advanced Minimum Dataset (AMDS) Framework for Workforce Planning

The figure illustrates the Advanced Minimum Dataset (AMDS) framework developed within Joint Action HEROES to support the assessment and strengthening of HWF planning systems. The framework integrates key dimensions of workforce planning maturity, including data availability, modelling capacity, data use, and strategic planning.

By combining quantitative data components with qualitative and governance-related dimensions, the AMDS provides a structured approach to evaluate the completeness, usability, and policy relevance of national workforce planning datasets. It also enables cross-country comparability and supports the progressive development of more integrated, planning-oriented HWF information systems.

The framework reflects the shift from basic data collection towards more advanced, system-oriented workforce intelligence, where data, models, and policy processes are increasingly aligned.

5.1.2. Key findings from the AMDS quantitative dataset

The analysis of the AMDS quantitative dataset highlights several key developments and remaining challenges across countries. Data availability and quality improved significantly in the last decade; a remarkable rise is detected in data coverage.

In summary, when analysing the quantitative dataset of the HEROES AMDS, we can see that countries reach a high availability of data - even if they are not necessarily used for planning purposes yet. Not only the amount of data, but the health professions tracked have developed in the last decade. Although the MD data tends to be to most comprehensive and accessible in most of the countries investigated in 2024, more and more countries are able to use data for all health professions. Not only nurse categories, even more coverage of health professions became more commonly monitored in the HEROES countries, e.g. in Norway and Italy.

On the supply side, HWF stock data is widely available, particularly headcounts of health professionals - even by specialization-, gender, age and territorial distribution were frequently reported. FTE data can bring us closer to the measurement of working hours; however, its availability was not detected in all the 20 countries (e.g. Greece, Italy[4], Hungary, Romania lack FTE data).

HWF flow data showed a great coverage in terms of the data availability. The inflow via training or immigration and the outflow via retirement and emigration were available more than half of the countries investigated in 2024. Country respondents highlighted less data improvement needs for training data than for retirement data. The data linked to international mobility still poses challenges, but its availability and use for planning have advanced significantly. A quarter of the countries consider “Country of first qualification” not really needed for HWF planning. Indicators for foreign health workers progressed in the last decade. Not only data for in- and outflow mobility have become more available at national level, but they are used in HWF planning more frequently – 7-8 countries plan with the consideration of HWF mobility.

On the demand side, the data categories of the AMDS could be easily covered by the countries. Member states engage for collecting better data and optimizing data source to achieve the desired planning dataset in Europe, there is a particular interest in many Member States to deepen the AMDS with more data categories on the demand side. The achievement of some HEROES countries, that is, deepening demand side indicators indicates a revision of the quantitative demand side data and articulates the need for further improvements of the AMDS.

Based on these results, HEROES considers the AMDS as an important framework, a useful tool in refining HWF planning data at national and even at European level. However, AMDS works on an aggregated level, it can bring clarity on the necessary minimum data categories, on data gaps for planning and show guidance on the specific data categories that should be collected, cleansed and linked in one central HWF planning data intelligence system. HEROES recommends countries to use the AMDS tool in evaluating their own national level datasets - that might be

4 In Italy, the National Head Count of Public administration included FTE data during HEROES.

much broader or less broad than the AMDS - on a regular basis. On the policy pillar, AMDS also supports goal setting for HWF planning, puts the planning ambitions into a strategic and systematic pathway and finally fosters evidence-based data-driven decision making in health policy.

However, data-base developments usually require time, some of the HEROES countries indicated important actions towards more precise and better fitting dataset to country planning objectives.

- Countries like Italy[5], Spain, Croatia, Lithuania, Belgium, Estonia, and Malta made lot of efforts to advance the minimum planning data and additionally new data was integrated in HWF planning data, particularly on the demand-side or on qualitative information.
- Countries like Greece, Hungary, Poland, Slovenia. Czechia, Germany and Slovakia made a lot of efforts to cleanse and link the current databases and have better quality and granularity dataset for planning.
- Countries like Norway, Portugal, Ireland and the Netherlands have access to detailed data that is necessary for effective HWF planning, in which the AMDS exercise served as a validation tool.

Although, tremendous interventions aimed to improve and optimize data and datasets during HEROES, some common challenges that are still detectable are the following:

1. Fragmentation and incomparability of data sources,
2. Gaps in timely, disaggregated and longitudinal data,
3. Limited tracking of mobility and foreign health workers,
4. Weak linkages between education, licensing and employment datasets, and
5. Limited analytical capacity and data governance constraints.

QUANTITATIVE DATA SET	Supply side					Demand side	
	Labour force	Training	Retirement	Outflow migration	Inflow migration	Population	Health consumption
Profession	X	X	X	X	X		
Age	X	X	X	X	X	X	X
Head count	X	X	X	X	X	X	X
FTE	X						
Geographical area	X	X	X	X	X	X	X
Specialisation	X	X	X	X	X		
Country of first qualification	X	X	X	X	X		
Gender	X						

QUALITATIVE DATA SET	
	Care organisation
Teamwork	X
Task shifting and skill-mix	X
Reconfiguring health services including digital	X
	Health indicators
Mortality and morbidity of HWF	X
Mental health and well-being of HWF	X
Health workforce equity	X
	Labour market
Financial investment, economical background	X
Performance and productivity	X
Governance	X

Figure 3. AMDS data development

5 Italy provides a relevant example of progressive data enrichment. In 2026, the expansion of the ISTAT integrated information system was further strengthened through the publication of a dedicated database on active medical specialists for 2023–2024, providing more granular information by specialty and supporting the future refinement of medical specialty workforce forecasting.

5.1.3 The new qualitative data block of the AMDS

The JA HEROES – even its predecessors JA EUHWF and SEPEN – emphasized the role of qualitative methods and information in HWF planning and forecasting. Still, plenty of resources, modification of data collections and consensus of various stakeholders are needed to introduce qualitative methods and information to HWF planning and evidence-informed policy making.

Qualitative methods are an essential complement to quantitative data. The JA EUHWF highlighted that qualitative approaches strengthen HWF planning by capturing dimensions of workforce dynamics, system performance, and policy impact that cannot be fully understood through numerical indicators alone. Relying solely on demographic and numeric projections fails to account for the dynamic evolution of health systems. To ensure long-term resilience, planning must move beyond static counting to a multifaceted approach that incorporates in-depth interpretation of quantitative indicators. Qualitative evidence is the essential catalyst for moving beyond basic data collection toward strategic utility. Qualitative insights provide the clarity required to navigate complex strategic directions and help to look behind aggregated data. Planners can determine why specific interventions succeed or fail, providing a depth of understanding that numerical data alone cannot generate. In summary, qualitative information describes sophisticated, implicit workforce realities.

When revising the JA EU HWF MDS, experts considered the involvement of complexity into the AMDS. Since health labour markets are quite dynamic, particularly in the last decade, macro-level multi-dimensional challenges e.g. infectious diseases, COVID-19, wars and conflicts, refugee crisis, urbanisation, growing population need by NCDs, acceleration of digital transformation etc. require health systems and health workforces to be resilient. Therefore, a new qualitative module was introduced to the AMDS, that is, estimating high-level drivers of change that impact or bias HWF planning systems. The qualitative dataset serves as contextual interpretation. As calculating such data and indicators might face some significant challenges, HEROES formulated the importance of qualitative information in filling this gap.

The HEROES AMDS incorporates quantitative data into three main categories (Figure 3). These categories capture:

- Care organization, including teamwork, task shifting, and digital transformation;
- Health indicators - HWF health and well-being, including mortality, morbidity, mental health and equity; and
- Labour market and system-level conditions, including financial investment, productivity and performance, and governance.

Experts set the list for qualitative block and provided definitions used for the qualitative data module:

1. Care organisation

- Teamwork: working in interdisciplinary teams offers individuals contributing with their own set of skills and strengths to the team's achievements. Collaborative practice enables learning from each other, more resilient, more effective and productive work and better equipped teams to deal with new challenges.
- Task shifting and sharing shape the scope of practice, when certain tasks are delivered by different professionals. It can break the silos and modify the required supply composition, skill-mix, effectiveness in performance etc.
- Digital transformation highly impacts various workflows and tasks performed by machines that can ease the workload of professionals. This means that the task distribution of reallocation to digital results in time savings etc.

This approach and collecting this information on care organisation support the trend of going towards skill-based planning, better performing teams planning instead of purely headcounts and occupation-based ones.

2. Health indicators - HWF health and well-being

- Mortality and morbidity: better understanding of the physical health status of the HWF, why and where are they facing better/worse perspectives in different jobs, geographical areas, etc.

- Mental health and well-being: continuous monitoring of the mental health status and well-being variables could better estimate the availability and performance of the HWF (e.g. stress, anxiety, burnout, suicide attempts, substance use etc.).
- Health workforce equity: disparities exist in the new entrants of the HWF, how they are educated and trained; how they are distributed geographically and by specialty (feminization of certain occupations); which patients and communities are served; how their practice is oriented; and which are their working conditions, possible differences in their pay (gender pay gap).

The abovementioned health indicators can influence HRH composition: attrition, drop out from the labour market or staying fit to practice, turnover rates, absenteeism, mental exhaustion and added psychosomatic symptoms, autonomy, isolation due to burnout, meaning in work, job satisfaction and motivation etc.

3. Labour market and system-level characteristics.

- Financial investment, economical background is meant as better understanding the labour market situation of the HWF and reflect on the circumstances which influence planning, such as the level of governmental investments in HWF, and how they prioritize actions and relating budgets for HWF development.
- Performance and productivity: HWF efficiency and effectiveness, progress in service delivery or organisation, what does it mean to policy landscape, responding to crisis, ability of health systems to provide protection to the population, optimizing resources connecting to non-clinical services in the communities etc.
- Governance: establishing stable governance structures that ensure consistency and integration of planning efforts. It has implications for consistent management and resourcing of teams undertaking planning. The continuous improvement of accountability requires clearly defined institutional responsibilities for planning, and policymaking to prevent fragmentation. It also includes stakeholder management, co-creation and consensus building with engaged stakeholders including policymakers, healthcare providers, and education systems to ensure system alignment.

These factors on labour market and system characteristics show the macro-level enablers/obstacles, which also influence the prioritization of HWF and health system development issues on the national health agenda.

Since it is quite challenging to operationalise these trends and changes, qualitative information was not translated into measurable indicators, however we recommend using them as estimates for forecasting the future HWF and health systems. With this new module, AMDS provides an opportunity to further strengthen the link between data-driven health and strategic decision-making processes. AMDS can concretely support planning choices, priority setting and policy development at national or regional level.

5.1.4. Key findings on the AMDS qualitative dataset

The AMDS exercise in 2024 included checking the availability of qualitative information for this new data block. When analyzing the data availability for the HEROES AMDS qualitative block in 2024, we can see that countries have recognized the role and benefits of qualitative information but the utilization of it remains low.

By topics of the first qualitative data category, we can state that measuring “Task shifting” or incorporating the impact of changing professional roles and scopes of practice reached the highest data availability in 9 countries, closely followed by “Teamwork” in 8 countries. Not surprisingly, countries are very much interested to capture emerging technologies and their impact on service delivery models and HWF composition. Although 11 countries underlined the significant need for data in digital shaping care organization, the number of countries reporting available data is rather low, 6 countries. In the second data category, among health indicators, countries tend to have satisfactory information about their HWF’s physical health, mortality and morbidity trends (12 countries), while information on mental health and wellbeing of health workers remains challenging to collect (5 countries). At the end, the third qualitative data category, “Labour market and system-level ” characteristics were quite widespread in the 19 countries, as more than half of them could access information on financial investments or performance, and the discussion on governance became quite

frequent due to the HEROES JA Sustainability work, including the organization of Policy Dialogues or setting priorities for national sustainability action plans.

The champions of available qualitative data based on the AMDS blocks are the following countries: Spain, Sweden, and the Netherlands. They operate established qualitative methods in their planning processes, e.g. consensus-building, scenario planning or Delphi exercises within national planning commissions.

Slovenia, Slovakia and Lithuania have identified further opportunities to strengthen their data systems, particularly by incorporating qualitative information into workforce planning. Norway and Portugal also can access such data blocks at national level but at the same time urge further improvements.

Hungary, Italy, Croatia and Poland reported lack or no availability of qualitative data in their datasets. This does not mean that these countries see no added value of data triangulation, but these countries are very much focussed on advancing and cleansing their quantitative datasets first. Reliance on historical quantitative data alone is not enough, all JA HEROES countries are engaged to advance their minimum datasets for HWF planning and enable new approaches that support these aims. Qualitative approaches allow planners to anticipate future changes, set quantifiable estimates in the planning model, rather than extrapolate past trends.

Based on the AMDS exercise on the qualitative data block, HEROES recommends collecting qualitative information and identifying qualitative methods. Qualitative data help HWF planning by providing contextual and process-related information that cannot be captured through quantitative indicators alone. It can also help to understand complexity by capturing multiple perspectives and revealing how high-level drivers of change. Considering the information covered with the qualitative data categories, they can shape the way of thinking about future health systems and support the preparedness of workforce planners even for less expected macro-level environment changes.

In summary, robust HWF planning emerges from the integration of qualitative insight, quantitative data, transparency, and stakeholder consensus. Qualitative methods foster transforming workforce planning from a technical forecasting exercise into a strategic, participatory, and evidence-informed policy process that is better equipped to manage complexity, uncertainty, and change. At the end, HWF Planning itself becomes more resilient and flexible, when combining quantitative data and methods with qualitative ones.

5.3 Synthesis of overarching patterns in HWF data development

Beyond individual countries' results, the AMDS analysis allows the identification of broader patterns in the development of HWF data systems.

The analysis of the HEROES countries reveals several distinct but interrelated group patterns in the development of HWF data systems and planning capacities. These patterns do not follow geographical or cluster-based divisions; rather, they reflect different stages of planning system maturity and strategic focus areas across countries.

A first prominent pattern is the transition from **registry-based systems to integrated health workforce information systems**. Countries such as Hungary, Lithuania, Belgium, Slovenia, Croatia, Italy, Germany, and Norway have moved beyond fragmented professional registers toward more interconnected data infrastructures. This evolution enables the linkage of data across education, employment, and practice, providing a more comprehensive understanding of workforce dynamics and supporting more advanced planning functions.

A second pattern concerns the **development and harmonisation of minimum datasets and key indicators**. Countries like Spain, Greece, and Czechia have focused on defining core datasets and standardising indicators to improve comparability and usability of data. These efforts represent an essential step toward building planning-oriented datasets and aligning national systems with European-level frameworks, facilitating both domestic decision-making and international data exchange.

A third group of countries demonstrates a **"forecasting leap"**, characterised by the adoption of advanced modelling techniques and scenario-based planning approaches (interrelations with task 2). Italy, the Netherlands, Norway, Estonia, Germany, and Slovakia exemplify this pattern through the use of system dynamics, agent-based models, or long-term projection frameworks. These countries are moving toward more sophisticated, forward-looking planning systems capable of integrating multiple variables and addressing uncertainty in workforce supply and demand.

A fourth pattern highlights the importance of **institutional anchoring of health workforce planning within national strategies**. In countries such as Portugal, Malta, Ireland, Slovakia, and Germany, workforce planning and data development are embedded within broader health system or workforce strategies. This institutionalisation strengthens governance, planning capacity (linkage to task 3), ensures sustainability, and enhances the policy relevance of data-driven planning processes.

Finally, a cross-cutting pattern emerges around **capacity building and policy dialogue as key enablers of progress**. Countries including Sweden, Spain, Portugal, Italy, Belgium, Malta, Hungary, Poland, and Greece emphasise the role of expert networks, peer learning, and stakeholder engagement in advancing their data systems. These soft governance mechanisms support knowledge exchange, improve analytical capacity, and facilitate the implementation of technical solutions.

Overall, these group patterns illustrate that progress in HWF data development is not linear but occurs through multiple pathways. While countries differ in their starting points and priorities, there are multiple overlapping scenarios, and a common trajectory can be observed toward more integrated, standardised, analytically advanced, and policy-embedded HWF information systems.

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6. CROSS-CUTTING SYNTHESIS AND SYSTEMIC INSIGHTS

The analysis of the Advanced Minimum Dataset (AMDS) further reinforces the importance of structured and comparable data systems as a foundation for effective workforce planning. This section synthesises the findings emerging across the different domains and implementation phases of the HEROES framework in order to identify systemic patterns, structural interdependencies, and strategic implications for the future of workforce planning systems in Europe. Building on these findings, the following sections provide a cross-cutting synthesis of the main insights emerging across the three domains.

6.1 Towards an integrated health workforce planning system

The analysis of the three core domains - data, models, and skills - together with the insights emerging from the development and testing of the Advanced Minimum Dataset (AMDS) across the AS IS, TO BE, and TO DO phases reveals a clear and consistent message: HWF planning cannot be effectively developed through isolated interventions. Instead, it requires a systemic and integrated approach.

Across all participating countries, progress trajectories converge towards the development of comprehensive HWF planning systems in which data infrastructures, modelling capacities, and human competencies are not treated as separate components, but as interdependent elements of a single governance ecosystem.

The implementation experience also showed that progress was uneven when investments focused on only one domain in isolation. Several countries demonstrated that strong data availability alone was insufficient to support policy development when governance arrangements, institutional ownership, or analytical capacities remained weak. Conversely, countries investing simultaneously in data systems, modelling capacity, stakeholder coordination, and governance mechanisms showed faster progress towards more institutionalised and sustainable workforce planning systems.

6.2 Interdependencies across data, models, and skills

The findings of the Joint Action consistently demonstrate strong interdependencies between the three domains:

- Data systems provide the foundational infrastructure for workforce intelligence, but their value depends on the capacity to analyse and interpret them.
- Models and tools enable forecasting and scenario-building, but their effectiveness relies on both data quality and the skills required to operate and interpret them.
- Skills and competencies determine the ability to translate data and modelling outputs into policy relevant insights and actionable decisions.

Weaknesses in any of these domains directly affect the performance of the others. Fragmented data systems limit modelling capacity; insufficient modelling reduces the strategic use of data; and gaps in skills hinder the translation of evidence into policy.

In practice, countries with advanced analytical models but fragmented stakeholder coordination often experienced difficulties in integrating forecasting outputs into decision-making processes. Similarly, several countries reported that improvements in workforce datasets did not automatically translate into stronger planning capacity when technical expertise, institutional mandates, or communication mechanisms were insufficiently developed.

This confirms that HWF planning should be understood as a mutually reinforcing governance system, rather than a set of independent technical functions or isolated analytical exercises.

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In this context, the AMDS represents a concrete operational tool that supports the standardization, comparability and policy relevance of workforce data across countries, reinforcing the data dimension of this integrated system.

6.3 From fragmented approaches to integrated system maturity pathways

Although countries started from different baseline conditions, a common development pathway can be identified.

This pathway moves:

- from fragmented and registry-based data systems (or from the absence of registries) → to integrated and interoperable workforce intelligence systems;
- from single-profession, supply-based models → to multi-professional, demand-oriented and system-level planning models;
- from ad hoc or individual competencies → to structured, institutionalised and continuous capacity-building systems.

Importantly, this transition does not follow a linear trajectory. Countries advance through different combinations of reforms, reflecting national priorities, governance structures and resource availability. Countries such as Estonia and Malta focused primarily on building foundational forecasting infrastructures and governance mechanisms, while others such as Belgium and the Netherlands concentrated on refining, integrating, and expanding already established planning systems. These different trajectories reflect varying levels of system maturity but also demonstrate that workforce planning development is context-dependent and cumulative over time. However, the overall direction of change is consistent across the Joint Action. The development and application of the AMDS further illustrates this transition, providing a shared reference framework that supports countries in moving towards more structured, comparable and planning-oriented data systems.

6.4 The central role of governance and institutional capacity

A key cross-cutting finding is that technical improvements alone are insufficient to strengthen workforce planning systems.

Across all tasks, countries emphasised the importance of:

- clear governance structures and institutional mandates,
- coordination between stakeholders and data owners,
- clear institutional ownership and coordination mechanisms between ministries, public health institutes, regional authorities, statistical agencies, educational institutions, and professional bodies, particularly in decentralised systems,
- alignment between analytical outputs and policy processes,
- and sustained political and financial commitment.

In this perspective, governance emerges as the enabling layer that allows data, models and skills to function effectively together. Without strong institutional anchoring, even technically advanced tools remain underutilised. Several countries reported that fragmented responsibilities for workforce data collection, management, and analysis reduced the capacity of planning systems to effectively support coordinated decision-making.

The implementation of common frameworks such as the AMDS also highlights the importance of coordinated governance and shared standards at European level.

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6.5 The role of learning and European cooperation

The experience of Joint Action HEROES also highlights the importance of learning mechanisms and European collaboration as drivers of system development and mutual institutional learning.

Workshops, bilateral exchanges, Community of Practice meetings, expert meetings and policy dialogues created a dynamic learning environment in which countries:

- shared experiences and practices,
- adapted methodologies to their national contexts,
- and accelerated their development trajectories through peer learning.

Importantly, learning processes extended beyond predefined clusters, creating a cross-cutting European learning ecosystem that supported both technical development and institutional change.

6.6 From project-based actions to sustainable systems

Another key insight concerns the transition from project-based activities to sustainable system development.

While Joint Action HEROES provided a structured framework and technical support, long-term impact depends on the ability of countries to:

- institutionalise workforce planning functions,
- integrate data, models and skills into permanent structures,
- and embed planning processes within national policy cycles.

The alignment between TO BE objectives and TO DO actions emerged as a critical success factor. Countries that linked strategic vision with concrete and context-sensitive implementation steps showed more advanced progress.

6.7 A systemic vision for the future of workforce planning

Overall, the findings of the Joint Action support a shift in how HWF planning is conceptualised.

Rather than a technical forecasting exercise, workforce planning should be understood as a strategic governance function, which:

- integrates data, modelling and policy processes,
- supports long-term system sustainability,
- and enables adaptive responses to changing health system needs.

This systemic vision aligns with broader international evidence and reinforces the need for continued investment in workforce intelligence, institutional capacity and European cooperation.

KEY MESSAGE

HWF planning systems are most effective when data, models and skills are developed together, embedded within strong governance frameworks, and supported by continuous learning and collaboration at both national and European levels.

Chapter 8 builds on these systemic insights to discuss their policy implications and strategic relevance for the future development of workforce planning systems in Europe.

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7. LEARNING ACHIEVEMENTS

7.1 Learning as a core outcome of Joint Action HEROES

Joint Action HEROES has generated a wide range of technical outputs, including data frameworks, methodological developments, and national implementation experiences. However, one of its most significant contributions lies in the learning processes activated across countries and institutions.

Beyond the production of analytical tools and reports, the Joint Action functioned as a multi-level learning environment, enabling participating countries to reflect on their own systems, compare approaches with other countries (HEROES members), test new solutions, and progressively strengthen their workforce planning capacities.

Learning within HEROES was not limited to knowledge transfer. It involved institutional learning, capacity development, and governance innovation, supported by continuous interaction among national authorities, experts, and stakeholders. Mechanisms such as peer exchange between countries, Community of Practice activities, expert meetings, and policy dialogues created structured opportunities for co-creation and mutual learning, rather than one directional dissemination of practices.

This section presents the main learning achievements emerging from the Joint Action, distinguishing between country level learning, bilateral and cluster-based exchange, project level learning processes, and broader institutional and governance insights.

Importantly, the learning processes initiated through HEROES were not conceived as time-limited project activities, but as foundations for longer-term institutional development. Several countries have already integrated elements of the learning process into national planning structures, governance arrangements, and ongoing collaboration mechanisms, while European level exchange networks established during the Joint Action are expected to continue supporting future cooperation and capacity building activities.

Learning architecture of Joint Action HEROES

The Joint Action HEROES developed a multi-level learning architecture combining structured mechanisms for knowledge exchange, co-creation, and institutional capacity building.

Country level learning

- National implementation processes (AS IS → TO BE → TO DO)
- Development of planning capacities, governance arrangements, and stakeholder engagement
- Integration of data, models, and policy perspectives

Bilateral and cluster-based learning

- Peer exchanges within country clusters
- Twinning activities and targeted bilateral collaboration
- Contextual adaptation of tools, methods, and organisational solutions

Cross-cluster and European level learning

- Exchange of experiences beyond cluster boundaries
- Identification of common challenges and shared solutions
- Progressive convergence of approaches across different system contexts

Project level learning mechanisms

- Community of Practice (continuous knowledge exchange bringing expertise inside and outside HEROES)
- Workshops and webinars (thematic, relationship building and technical discussions)
- Expert meetings (strategic reflection and synthesis)

Institutional and governance learning

- Recognition of HWF planning as a governance function
- Strengthening of stakeholder involvement and coordination mechanisms
- Development of policy feedback loops at national and EU level and sustainability strategies

Together, these elements contributed to the emergence of a European learning ecosystem for HWF planning.

7.2 Country level learning achievements

At national level, the Joint Action supported significant learning processes that contributed to strengthening HWF planning capacities across participating countries.

A first key area of learning concerns the development of planning capacities and competencies. Through ”skills” (task 3) activities and related implementation processes, countries improved their understanding of the skills required for effective workforce planning, including not only technical modelling capacities but also governance, communication, and stakeholder engagement skills. In several cases, this resulted in the development of training pathways, competence frameworks, or strengthened roles for workforce planning within public administrations.

A second area of learning relates to increased institutional awareness. Participation in the Joint Action contributed to a broader recognition of HWF planning as a strategic function within health system governance. Countries reported a shift from viewing planning as a technical exercise towards understanding it as a continuous, institutionalised process linked to policymaking, system reform, and long-term sustainability.

A third dimension concerns the integration of analytical and policy perspectives. Countries increasingly recognised the need to connect data collection, forecasting models, and policy decisions. This includes a better understanding of how HWF planning can inform education policies, recruitment and retention strategies, and organisational reforms.

Finally, countries reported learning related to governance, coordination arrangements and stakeholder collaboration. The Joint Action highlighted the importance of clearly defined roles and responsibilities, inter-institutional coordination, and structured stakeholder involvement. In several cases, this led to the strengthening of coordination mechanisms, the creation or consolidation of working groups, or the exploration of more formalised workforce planning structures. In some countries, these learning processes also translated into more formal institutional developments, including the establishment of dedicated workforce planning structures, the integration of workforce planning into national strategic processes, and the strengthening of inter-institutional coordination mechanisms involving ministries, public health institutes, universities, and professional bodies.

Importantly, these learning processes occurred in very diverse national contexts. Countries started from different levels of maturity, with varying degrees of data availability, institutional capacity, and policy integration. The Joint Action therefore demonstrated that workforce planning development is context-dependent and path-dependent, and that progress can take different forms depending on national starting points.

7.3 Bilateral and cluster-based learning

The initial organisation of the Joint Action into country clusters provided a structured environment for contextual and peer-based learning. Countries sharing similar health system characteristics and labour market conditions were able to exchange experiences, compare challenges, and explore solutions that were more directly transferable to their contexts.

Within this framework, bilateral exchanges and twinning activities played a particularly important role. These interactions allowed countries to engage in more focused and in-depth discussions on specific topics, such as data systems, modelling approaches, or governance arrangements. In several cases, bilateral exchanges facilitated the adaptation of tools, methods, or organisational solutions from one country to another.

At the same time, the implementation experience showed that learning was not confined to cluster boundaries. As the Joint Action progressed, countries increasingly benefited from cross-cluster exchange, particularly when addressing common challenges related to data gaps, stakeholder involvement, capacity building, or policy integration. In some cases, geographical proximity and shared historical or institutional contexts further facilitated collaboration.

This evolution highlights an important lesson: while cluster-based learning grounded in similarities across health systems provides a useful starting point, effective knowledge exchange in HWF planning requires flexible and interconnected learning environments, where experiences can circulate beyond predefined groupings.

Bilateral exchange, peer-learning mechanisms and mutual learning

In addition to structured cluster-based activities, Joint Action HEROES strongly promoted bilateral exchange and twinning mechanisms as flexible and targeted tools for mutual learning.

Participating countries engaged in a wide range of bilateral interactions, focusing on specific dimensions of workforce planning, including:

- development and use of data systems,
- forecasting models and tools,
- governance arrangements and stakeholder involvement,
- and capacity building strategies.

These exchanges allowed countries to move beyond general discussion and engage in practice-oriented dialogue, often centred on concrete challenges and implementation needs. Compared to larger group settings, bilateral interactions enabled:

- more in-depth technical discussion,
- better understanding of context specific constraints,
- and more effective adaptation of tools and approaches to national systems.

Twinning and bilateral meetings also contributed to the emergence of informal networks of collaboration, supporting continuous exchange beyond formal project activities. In several cases, these interactions facilitated:

- the transfer and adaptation of methodologies,
- joint reflection on policy options,
- training opportunities within task 3,
- and alignment of approaches across countries facing similar challenges.

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Importantly, bilateral learning complemented both cluster-based and project-level activities, contributing to a multi-layered learning ecosystem in which knowledge could circulate flexibly across countries and contexts.

Bilateral exchange and twinning proved to be essential mechanisms for translating shared knowledge into context specific solutions, strengthening both technical capacity and institutional learning. In several cases, bilateral collaborations and informal expert networks established during HEROES continued beyond specific project activities, creating a basis for sustained cooperation, future joint initiatives, and ongoing methodological exchange across countries.

The figure below provides an overview of bilateral exchanges and twinning activities across participating countries, illustrating the diversity and intensity of mutual learning processes within the Joint Action. Bilateral exchanges covered multiple domains (data, models, skills, governance), with varying levels of maturity and implementation across countries.

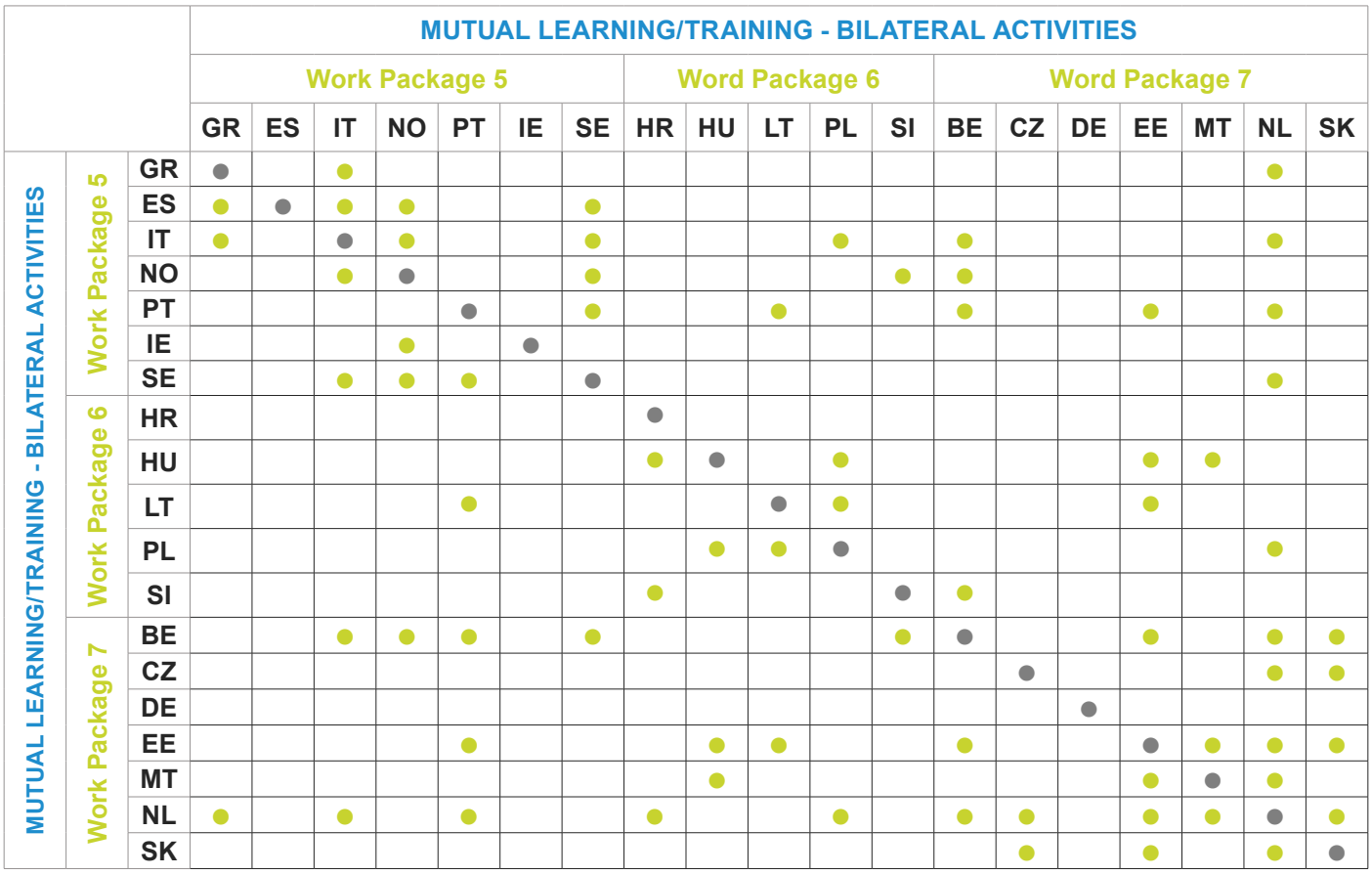

Figure 4. Overview of bilateral exchanges and mutual learning activities across HEROES countries

*BE=Belgium; CZ=Czechia; DE=Germany; EE=Estonia; ES=Spain; GR=Greece; HR=Croatia; HU=Hungary; IE=Ireland; IT=Italy; LT=Lithuania; MT=Malta; NL=The Netherlands; NO=Norway; PL=Poland; PT=Portugal; SI=Slovenia; SK=Slovakia; SE=Sweden and RO=Romania

7.4 Project level learning and Community of Practice

At project level, Joint Action HEROES established a range of mechanisms that supported collective learning and knowledge exchange across all participating countries, while also involving external stakeholders and international organizations.

The Community of Practice represented a central element of this architecture. It provided a structured and continuous platform for sharing experiences, discussing challenges, and reflecting on emerging issues. Through workshops,

webinars, and thematic exchanges, the Community of Practice facilitated dialogue among countries at different stages of development, enabling both the dissemination of good practices and the identification of common challenges.

Community of Practice as a continuous learning and collaboration platform

The Community of Practice established within Joint Action HEROES represented a key mechanism for supporting continuous learning, knowledge exchange, and collaboration across participating countries.

Unlike time bound activities such as workshops or bilateral meetings, the Community of Practice provided a permanent and structured platform where countries could regularly share experiences, discuss challenges, and reflect on ongoing implementation processes. It enabled interaction across different levels of expertise, institutional contexts, and stages of workforce planning maturity.

The Community of Practice was implemented through a series of 13 online thematic sessions (April 2024 - March 2026), involving experts, policymakers, and stakeholders from participating countries, as well as contributions from international organisations. Sessions addressed a wide range of topics relevant to workforce planning, including:

- workforce flexibility, mobility, and retention,
- workforce demographics and skill mix,
- task shifting and competency reallocation,
- data governance and forecasting tools,
- and structural challenges affecting health systems.

Each session followed a structured and interactive format, combining expert presentations with roundtable discussions and peer exchange, ensuring a balance between knowledge sharing and active participation.

From a learning perspective, the Community of Practice facilitated:

- the identification of shared challenges across countries, including workforce shortages, retention issues, and skill imbalances,
- the exchange of transferable practices and innovative approaches, particularly in relation to data systems, forecasting methods, and workforce organisation,
- and the strengthening of stakeholder engagement, by creating a continuous space for dialogue among national authorities, experts, and international organisations.

A distinctive feature of the Community of Practice was its role in fostering horizontal, peer-based and cross-country learning, allowing knowledge to circulate beyond cluster structures and supporting a more integrated European perspective on HWF planning.

Importantly, insights generated through the Community of Practice also contributed to the implementation of activities across the Joint Action, supporting reflection on operational challenges and policy development needs.

The Community of Practice in HEROES functioned as a continuous learning infrastructure, connecting countries, supporting implementation processes, and reinforcing the collective dimension of workforce planning development in Europe. The relationships, knowledge exchange mechanisms, and collaborative networks established through the Community of Practice are expected to continue supporting future European cooperation and capacity building activities beyond the duration of the Joint Action.

Workshops and webinars played a complementary role by supporting focused discussions on specific technical and policy topics, as well as broader reflection on implementation experiences. These activities contributed to aligning

understanding across countries and creating a shared vocabulary around key concepts such as workforce planning governance, data integration, skill mix, and sustainability.

Workshops as drivers of co-creation and implementation learning

Workshops organised throughout Joint Action HEROES played a central role in supporting co-creation, peer exchange, and implementation-oriented learning across participating countries.

In-person meetings added significant value in building relationships and trust.

Rather than functioning as traditional dissemination events, workshops were designed as interactive working environments, combining country presentations, hands-on exercises, parallel cluster sessions, and cross-cluster exchanges. Participants were actively engaged in applying tools, discussing real data, and reflecting on national implementation pathways.

Early cluster workshops (Porto, Utrecht, Budapest, 2023) focused on the AS IS phase, supporting countries in analysing their baseline situation and identifying key challenges across the three domains (data, models, and skills). These workshops included practical exercises, such as working with planning tools and national datasets, which enabled countries to explore how methodological approaches could be applied in their own contexts.

A key feature of these early workshops was the emphasis on hands-on learning and problem-solving, including exercises on forecasting models, scenario analysis, and identification of policy levers to balance supply and demand. Participants were encouraged to use their own country data and engage in structured discussions on challenges, feasibility, and adaptation of tools.

The Rome workshop (May 2024) marked a transition towards a more integrated and comparative perspective. It focused on:

- the presentation and discussion of cross-country AS IS evidence,
- the co-definition of TO BE and TO DO objectives,
- and the combination of cluster based and cross-cluster sessions, enabling both contextual and broader learning.

Interactive formats, including poster sessions, informal discussions, and country specific working sessions, facilitated collective reflection on implementation strategies and the alignment of national action plans.

The Malta workshop (October 2025) further advanced the process by focusing on:

- policy dialogues and policy briefs,
- sustainability strategies,
- and translation of analytical results into policy options.

Through subgroup sessions and interactive discussions, participants explored how workforce planning outputs could inform concrete policy decisions, reinforcing the link between planning and governance.

Across all workshops, a key learning achievement was the progressive shift from technical understanding to implementation and policy integration, supported by continuous interaction among countries, task leaders, and stakeholders.

Workshops in HEROES acted as catalysts for transforming analytical knowledge into shared practices, strengthening both national capacities and collective European learning.

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Creative visual tools and interactive methodologies for co-creation

A distinctive feature of the HEROES workshops was the systematic use of creative visual tools and interactive methodologies to support co-creation and collective learning.

These tools were designed to facilitate:

- brainstorming and dialogue across countries,
- integration of different perspectives (technical, policy, institutional)
- supporting creative thinking and facilitating communication beyond traditional knowledge exchange and creation.
- and translation of abstract concepts into concrete planning actions.

One of the core approaches involved the use of visual frameworks (e.g. “tree models”) representing the different dimensions of workforce planning (data, models/tools, skills). Within this framework:

- the roots represented the existing situation (AS IS),
- the fruits represented desired outcomes (TO BE),
- the trunk and branches reflected implementation pathways (TO DO),
- while opportunities and risks captured enabling and limiting factors.

These visual exercises supported an iterative and participatory process, allowing participants to progressively build a shared understanding of:

- current system strengths and weaknesses,
- desired future states,
- and concrete actions needed to bridge the gap.

Importantly, visual tools enabled communication beyond technical language, helping to overcome differences in background, roles, and national contexts, and facilitating more inclusive participation across stakeholders.

The use of visual and interactive methods proved to be a powerful enabler of co-creation, transforming workshops into spaces for collective reflection, alignment, and action-oriented learning.[6]

The expert meetings added an additional layer of strategic reflection. They provided a space for synthesising lessons emerging from national experiences, discussing methodological challenges, and identifying key issues for future development. Importantly, these meetings helped bridge the gap between technical analysis and policy relevance, reinforcing the positioning of HWF planning as a governance function.

Overall, these mechanisms contributed to the emergence of a European learning ecosystem on HWF planning, characterised by continuous exchange, co-creation, and mutual support.

6 The creative visual tool exercises as collaborative tool and its effectiveness was evaluated. The results were presented at different European conferences. Including at the European Conference of Creativity and Innovation Connect2Create and at the European Health Management Association conference in 2025. Download PowerPoint Presentations from Abstract Sessions | EHMA 2026 Annual Conference

Expert meetings as spaces for strategic reflection and policy alignment

Expert meetings were organised at key stages of the Joint Action (e.g. mid-term reflection and final synthesis phases), providing a structured space for strategic and policy oriented reflection and playing a crucial role in elevating the learning process from technical exchange to governance oriented discussion.

While workshops and Community of Practice activities focused on implementation, relationship building and peer learning, expert meetings provided a dedicated space to:

- synthesise emerging evidence from country experiences across the three core domains (data, models, and skills),
- reflect on cross-cutting challenges,
- and discuss the broader implications for health system governance.

A key contribution of these meetings was the progressive reframing of HWF planning from a technical forecasting exercise to a core governance function. Discussions consistently highlighted that data, models, and analytical tools can only support decision-making if embedded within appropriate institutional structures, policy processes, and stakeholder frameworks.

Expert discussions also contributed to clarifying several critical conceptual distinctions, including:

- the difference between strengthening HWF planning systems (data, models, skills, governance) and addressing broader policy challenges (e.g. migration, task shifting, system redesign),
- the need to move beyond single profession and purely quantitative approaches,
- and the importance of integrating workforce planning within long-term health system strategies.

Another important outcome was the recognition of HWF planning as a dynamic and iterative process, requiring continuous monitoring, adaptation, and policy feedback mechanisms. This perspective reinforced the importance of sustainability, institutionalisation, and long-term commitment beyond the duration of the Joint Action.

Finally, expert meetings contributed to strengthening a shared European vision of workforce planning, emphasising the role of cooperation, knowledge exchange, and collective learning in addressing common challenges across countries.

Expert meetings in HEROES functioned as strategic spaces where technical knowledge was translated into governance insights, supporting the alignment of workforce planning with broader health system policy and reform agendas.

All these reflections were further supported by evaluation and quality assurance activities conducted under WP3 and by the Quality Advisory Board (QAB).

7.5 Institutional and governance learning

One of the most significant learning achievements of Joint Action HEROES concerns the growing recognition of HWF planning as a governance function.

Across participating countries, there was increasing awareness that data and models alone are not sufficient to ensure effective planning. Their impact depends on the existence of institutional structures, governance arrangements, and decision-making processes capable of integrating analytical outputs into policy actions. Countries increasingly recognized that workforce planning responsibilities cannot remain confined to technical or operational levels alone, but require clear political ownership, institutional leadership, and accountability mechanisms capable of connecting

analytical outputs with strategic policy decisions. In several national contexts, this contributed to stronger involvement of ministries, public authorities, and senior decision-makers in workforce planning processes.

A key lesson is the need to distinguish between strengthening workforce planning systems themselves, including data infrastructures, models, skills, and governance and the broader policy questions that workforce planning is intended to inform, such as migration management, task shifting, or health system redesign. This distinction helps clarify the role of workforce planning as a decision support function within a wider policy ecosystem.

The Joint Action also highlighted the importance of stakeholder involvement as a structural component of planning systems. Effective workforce planning requires the engagement of ministries, educational institutions, professional organisations, healthcare providers, and other relevant actors. Learning in this area included both the identification of key stakeholders and the development of mechanisms to involve them systematically in planning processes.

Finally, countries recognised the importance of policy feedback mechanisms. HWF planning should not be limited to forecasting exercises, but should be embedded in iterative cycles linking planning, implementation, monitoring, and revision. This perspective reinforces the need for sustainable institutional arrangements capable of supporting continuous learning over time.

7.6 Key cross-cutting lessons from Joint Action HEROES

The experience of Joint Action HEROES allows the identification of a set of cross-cutting lessons that are relevant across countries and contexts.

Key learning messages from JA HEROES:

- HWF planning is a governance function, not only a technical exercise.
- Data, models, skills, and governance are interdependent components and must be developed in an integrated way.
- Learning processes, including peer exchange and stakeholder engagement, are as important as technical tools.
- Workforce planning systems must be adaptable and iterative, capable of evolving in response to changing conditions.
- There is no single model of workforce planning: development pathways are context dependent and path dependent.
- European cooperation significantly enhances national capacities by providing shared knowledge, legitimacy, and support for implementation.
- Sustainable workforce planning requires early attention to institutionalisation, governance, and policy feedback mechanisms.
- The creation of long-term networks of collaboration and mutual learning represents one of the most important and sustainable achievements of the Joint Action.

These lessons provide a foundation for future policy development and for the continued strengthening of workforce planning systems across Europe.

From learning mechanisms to system level impact

Joint Action HEROES demonstrates how structured learning processes can translate into tangible improvements in workforce planning systems.

Learning mechanisms → Outcomes → System impact

- Peer exchange and structured bilateral learning
  → Transfer and adaptation of practices
  → Improved national planning approaches
- Community of Practice and workshops
  → Shared understanding and common vocabulary
  → Greater alignment across countries
- Expert meetings and policy dialogue (both national and EU-level)
  → Integration of technical and policy perspectives
  → Stronger link between planning and decision-making
- National implementation processes
  → Capacity building and institutional development
  → Increased sustainability of planning systems
- Stakeholder engagement
  → Enhanced legitimacy and ownership
  → More effective policy implementation

Learning is not an auxiliary component of workforce planning systems, but a core driver of their effectiveness, sustainability, and capacity to support health system transformation.

7.7 From learning to sustainability

The learning achievements of Joint Action HEROES are closely linked to the question of sustainability.

The Joint Action demonstrated that strengthening workforce planning is a long-term process of institutional development and continuous learning. The knowledge, relationships, and capacities developed through HEROES represent an important asset for participating countries and for European collaboration more broadly.

As highlighted in the previous section, sustaining these achievements requires continued investment in learning processes and collaborative mechanisms, ensuring that progress achieved during the Joint Action translates into lasting impact. In this perspective, the learning generated by HEROES should be understood not as a final outcome, but as the foundation for a next phase of development, in which HWF planning becomes increasingly embedded as a permanent and strategic function of health system governance across Europe, supporting resilience, sustainability, and coordinated policy action.

Table 12. From learning mechanisms to system-level impact

Learning mechanism	Immediate output	Institutional impact
Bilateral exchange	Transfer of methods	Improved planning models
Community of Practice	Shared vocabulary	Cross-country alignment
Workshops	Co-creation	National implementation
Expert meetings	Governance reflection	Policy integration
Policy dialogues	Stakeholder engagement	Institutional ownership

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Maintaining these achievements will require continued political commitment, institutional ownership, and European cooperation mechanisms capable of sustaining collaboration, knowledge exchange, and mutual learning beyond project-based funding cycles.

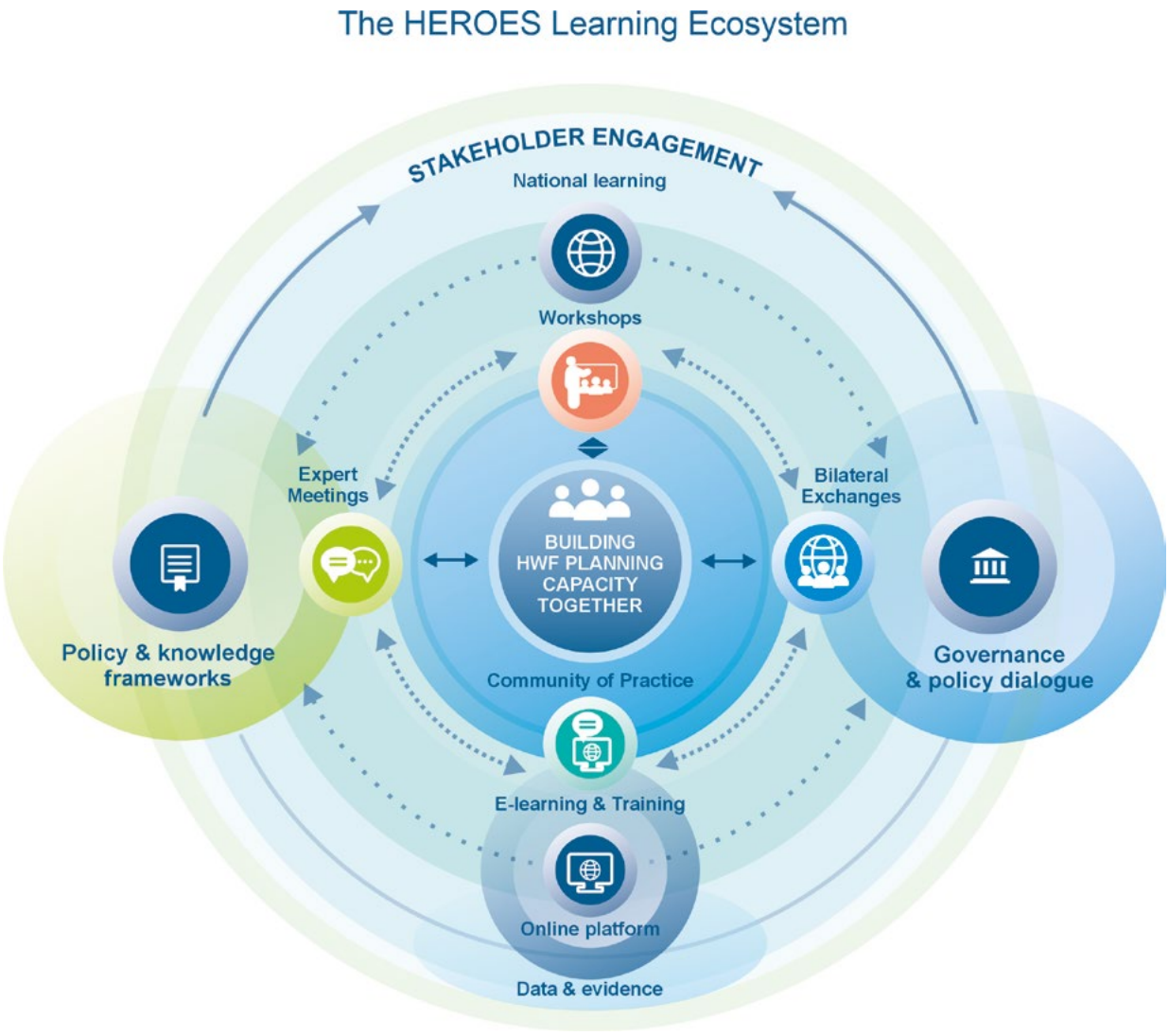

Figure 5. The HEROES Learning Ecosystem for Health Workforce Planning

This figure illustrates the learning ecosystem developed within Joint Action HEROES, highlighting how different learning mechanisms, such as workshops, Community of Practice, bilateral exchanges, and expert meetings, interact to support capacity building in HWF planning. The ecosystem reflects a dynamic and non-linear process, where knowledge circulates across countries, clusters, and governance levels, supported by stakeholder engagement, data systems, and policy dialogue processes.

8. CONCLUSIONS AND POLICY IMPLICATIONS

8.1 Main findings from the Joint Action HEROES

HWF planning has increasingly become a central strategic function for health systems. The work carried out within Joint Action HEROES confirms that workforce planning cannot be reduced to a technical forecasting exercise. Instead, it should be understood as a complex governance process that connects analytical capacity, institutional arrangements, and policy decision-making.

International evidence consistently shows that strong governance of health systems and HWF policies is associated with better health outcomes, greater system efficiency, and improved economic sustainability. The central importance of the HWF for the functioning of health systems has long been recognized in the international literature, which emphasizes that there is *"no health without a workforce"* (Campbell et al., 2013). Studies from the WHO, the World Bank, and the World Economic Forum highlight that investments in HWF governance contribute to reduced indirect costs related to workforce shortages, such as absenteeism, burnout, and staff turnover, while strengthening overall health system resilience (WHO, 2016; World Bank, 2023; World Economic Forum, 2022).

At the same time, the literature widely recognises HWF planning as a "wicked problem", characterised by high levels of uncertainty, multiple interacting variables, and long-time horizons. Workforce supply, service demand, demographic changes, technological innovation, and professional expectations interact dynamically, making it impossible to produce definitive solutions. Instead, effective workforce planning requires continuous monitoring, iterative adaptation, and long-term institutional commitment.

Recent research also highlights the limitations of traditional forecasting models that focus exclusively on numerical projections for individual professions. While stock and flow models and demand projections remain essential methodological foundations, systematic reviews increasingly emphasise the need to integrate multiple professions, evolving skill mix, organisational changes, and care delivery models into workforce planning frameworks (Lee et al., 2021; OECD, 2023).

Against this background, Joint Action HEROES represents an important step forward in the European effort to strengthen workforce planning capacities.

Key message - HWF planning is not a one-time analytical exercise, but a permanent governance function that supports health system resilience, sustainability, and reform.

8.2 The added value of Joint Action HEROES

One of the most important contributions of HEROES lies in its shift from predominantly descriptive approaches towards implementation-oriented workforce planning. Previous European initiatives in this field successfully raised awareness and developed conceptual frameworks. HEROES, however, placed stronger emphasis on translating these frameworks into concrete national action.

Through country action plans, technical exchanges, and peer learning activities, participating Member States engaged in the practical development or strengthening of workforce planning systems. These efforts included improvements in data infrastructures, development or refinement of forecasting models, and the establishment of governance mechanisms capable of supporting long-term workforce planning processes.

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A central innovation introduced by the Joint Action is the Advanced Minimum Dataset (AMDS). While previous datasets focused primarily on quantitative indicators describing workforce numbers and flows, the AMDS integrates qualitative dimensions that help explain the underlying drivers of workforce dynamics. By incorporating elements such as working conditions, organisational context, and professional preferences, the dataset supports a more comprehensive understanding of workforce challenges.

Beyond its analytical relevance, the Advanced Minimum Dataset represents a strategic step toward strengthening HWF intelligence systems across Europe. Reliable workforce planning depends fundamentally on the availability, quality, and interoperability of workforce data. However, many countries continue to face challenges related to fragmented information systems, inconsistent definitions, and limited integration between administrative, educational, and labour market datasets.

The AMDS provides a structured framework for collecting core information necessary to support workforce planning, including:

- workforce stock and demographic characteristics
- education and training pipelines
- labour market participation and attrition patterns
- geographical distribution of professionals
- working conditions and retention dynamics
- mobility of health professionals across countries.

Beyond national planning needs, the development of a shared minimum dataset can support cross-country comparability, benchmarking and even European modelling, as well as facilitate policy dialogue at European level, and strengthen the evidence base for HWF governance.

Investing in sustainable HWF intelligence systems therefore represents one of the most important enabling conditions for effective workforce planning.

The findings of the Joint Action also highlight the central role of robust HWF intelligence systems. Effective workforce planning depends on the availability, quality, and integration of data across multiple sources, including education, labour market, and service delivery systems. The development of the Advanced Minimum Dataset (AMDS) represents an important step in this direction, supporting more comprehensive and comparable data for workforce planning across countries. However, further efforts are needed to improve data interoperability, standardization, and linkage to policy processes.

In the European context, the progressive implementation of the European Health Data Space (EHDS) may further strengthen HWF intelligence by facilitating interoperability of health data systems and enabling more consistent analytical approaches across countries. While workforce planning remains primarily a national responsibility, European initiatives such as the EHDS can provide important enabling infrastructure for improved data availability and comparability.

HEROES also placed particular emphasis on strengthening the capacities and competencies of workforce planners. Beyond technical modelling skills, effective workforce planning requires the ability to engage stakeholders, communicate complex analytical results, and translate evidence into policy relevant insights. The project therefore highlighted the importance of combining analytical expertise with governance and communication capacities.

Another distinctive feature of HEROES has been the strong co-creation approach adopted throughout the implementation process. Rather than transferring predefined solutions, the Joint Action created spaces for peer exchange and collaborative problem-solving among participating countries. This approach allowed Member States to adapt methodologies to their own institutional contexts while benefiting from shared learning.

The experience of the participating countries clearly demonstrates that progress in workforce planning does not follow a uniform trajectory. Countries started from different baseline conditions in terms of data availability, modelling capacity, institutional structures, and policy priorities. As a result, national implementation pathways varied significantly. This diversity confirms that workforce planning development is context dependent and path dependent, and that flexible approaches are required to support countries at different stages of maturity.

Key achievement of JA HEROES - The added value of JA HEROES lies not only in its technical outputs, but in its systemic framework, which helps countries rethink HWF planning as an integrated institutional ecosystem combining data, modelling capacity, governance structures, and stakeholder engagement.

8.3 From three domains to an integrated workforce planning ecosystem

HEROES was structured around three core domains: data, models, and skills. While these domains provided a useful organisational framework for the Joint Action, the implementation experience demonstrated that they cannot operate as independent pillars.

Country action plans and implementation activities consistently revealed strong interdependencies between the three domains. For example, the development of forecasting models required improvements in data availability and analytical skills. Similarly, efforts to strengthen workforce datasets often depended on institutional ownership and modelling capacity to make the data meaningful for policy decisions.

The expert meetings confirmed that these three domains should therefore be understood as structurally interconnected components of a broader workforce planning ecosystem. Governance arrangements, sustainability mechanisms, stakeholder relationships, and communication capacities emerged as critical enabling conditions that allow data and models to effectively support decision-making.

Even countries with relatively advanced workforce planning systems reported the need for continuous investment across all domains. Data infrastructures require regular updates and validation, forecasting models need periodic recalibration, and institutional capacities must evolve to address emerging policy challenges. Workforce planning maturity does not eliminate the need for integration; rather, it reinforces it.

The experience of HEROES therefore suggests that future analytical frameworks should explicitly consider the interaction between data infrastructures, modelling approaches, and governance arrangements. Instead of ranking national systems according to individual components, comparative analyses should focus on understanding how different configurations of these elements function in practice. Governance arrangements act as enabling conditions that allow analytical tools and workforce intelligence systems to effectively inform policy decisions.

The integrated nature of workforce planning emerging from the Joint Action can be conceptualized as a dynamic ecosystem, where analytical, institutional, and policy dimensions interact continuously, as illustrated in Figure 6.

Figure 6. The HEROES Workforce Planning Ecosystem

The figure illustrates the integrated ecosystem for HWF planning emerging from Joint Action HEROES. At its core lies the analytical components of workforce planning, data infrastructures, forecasting models, and planning skills, embedded within governance and institutional arrangements that enable policy implementation. Long-term sustainability is supported by monitoring, evaluation, and policy feedback mechanisms. The outer layer reflects the European and international cooperation dimension, strengthening national planning systems through peer learning, technical exchange, and policy dialogue.

Key finding from implementation - Effective HWF planning requires the simultaneous development of data infrastructures, modelling tools, investments in improving skills and institutional capacities, supported by stable governance arrangements and stakeholder engagement.

8.4 Policy implications for health systems

The findings of the Joint Action have several important implications for national decision-makers and health system leaders.

First, HWF planning must be embedded within broader health system governance and policy processes. Data and models provide valuable insights, but they cannot replace political decision-making. Forecasting results must therefore be linked to concrete policy instruments, including education planning, recruitment strategies, retention policies, and organisational reforms.

Second, planning frameworks should move beyond purely quantitative projections. While estimating HWF supply and demand remains essential, policy discussions increasingly require a deeper understanding of skill mix, care delivery

models, working conditions, and professional roles. Workforce planning should therefore not only anticipate workforce shortages, but also support organizational transformation, including new care delivery models, task shifting, and optimization of professional roles across care settings. In this perspective, workforce planning can support strategic decisions about system redesign, including advanced practice development and new models of integrated care. In this context, it is important to distinguish between strengthening workforce planning systems themselves, including data infrastructures, forecasting models, analytical skills, and governance arrangements, and the broader policy questions that workforce planning is intended to inform, such as migration management, task shifting, or health system redesign. In this perspective, workforce planning becomes a strategic tool not only for anticipating future workforce needs, but also for shaping future models of care and health system transformation.

Third, effective workforce planning requires clear governance architectures. Roles and responsibilities among ministries, agencies, educational institutions, professional bodies, and regional authorities must be clearly defined. Fragmentation in governance arrangements can significantly reduce the impact of workforce planning outputs.

Finally, workforce planning must be recognised as a long-term strategic process that often spans ten to fifteen years. This time horizon inevitably extends beyond electoral cycles and short-term political priorities. For this reason, planning systems must rely on technically credible, impartial, and transparent analytical processes that can maintain trust among stakeholders.

Experiences from countries outside Europe, such as Canada and New Zealand, further illustrate the importance of institutionalised workforce planning structures supported by strong governance arrangements and integrated data systems. These examples demonstrate that sustained investments in workforce intelligence and policy coordination can significantly improve the capacity of health systems to anticipate workforce needs and align workforce policies with broader health system objectives.

Key message - Workforce planning should not be seen as an isolated technical activity, but as a decision support function embedded within health system governance and reform processes.

8.5 Sustainability and policy feedback mechanisms

A recurring theme throughout the Joint Action HEROES concerned the long-term sustainability of workforce planning systems. The experience of previous European initiatives shows that the impact of Joint Actions may diminish if mechanisms for continuity are not established after the project period.

Sustainable workforce planning systems require permanent institutional structures, stable mandates, and adequate resources. They also require structured mechanisms for monitoring, evaluation, and continuous improvement. Several participating countries highlighted the relevance of iterative frameworks such as the Plan-Do-Check-Act (PDCA) cycle, which allows planning processes to evolve in response to new data and changing policy priorities. In addition, workforce planning systems should contribute to health system preparedness by enabling scenario analysis and coordinated responses to systemic shocks, including pandemics and other health emergencies.

Equally important is the development of policy feedback loops that connect planning activities to implementation outcomes. Workforce planning should not end with the publication of projections. Instead, planning outputs should inform policy decisions, whose effects are then monitored and used to refine future projections and strategies.

The Joint Action has initiated several mechanisms that support such feedback loops, including National and European policy dialogues and the development of sustainability action plans. These sustainability dimensions and continuation strategies are further explored in the Joint Action HEROES *"Final sustainability report at the EU-level"* (D4.2), which provides additional reflections on long-term institutionalization, governance mechanisms, and future cooperation

pathways. In some countries, the collaboration structures created during the project have already been institutionalised through permanent intersectoral working groups.

Policy feedback cycle

Planning → Policy implementation → Monitoring of outcomes → Policy revision

Embedding this cycle within national governance systems is essential to ensure that workforce planning remains responsive to changing health system needs.

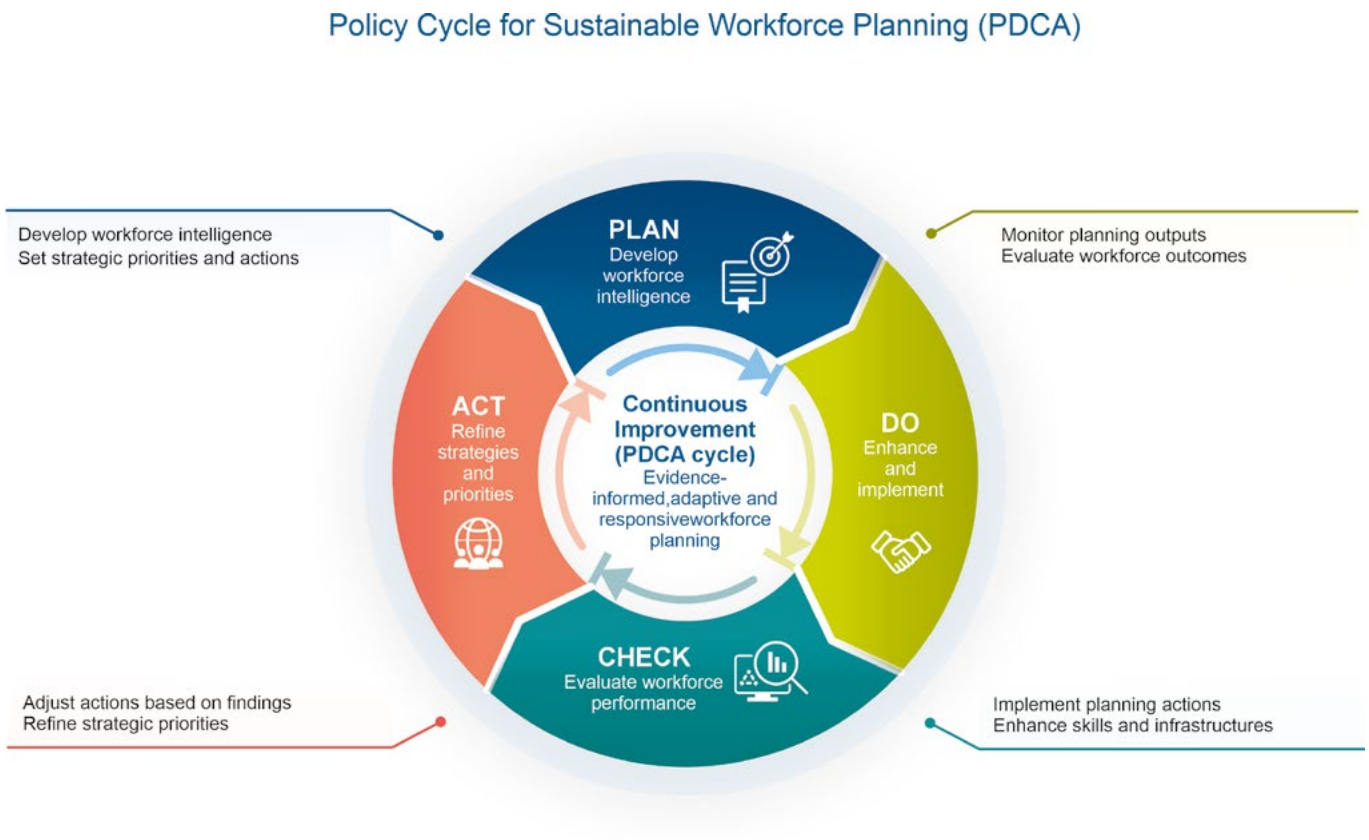

Figure 7. Policy Cycle for Sustainable Workforce Planning (PDCA)

The figure illustrates the application of the Plan–Do–Check–Act (PDCA) cycle to HWF planning as a continuous and iterative governance process. The cycle begins with the planning phase, where workforce intelligence is developed and strategic priorities are defined. This is followed by implementation, in which policies and actions are carried out and system capacities are strengthened. The monitoring and evaluation phase assesses outputs and outcomes, generating evidence on the effectiveness of interventions. Finally, the adjustment phase enables the refinement of strategies and priorities based on observed results.

This iterative cycle highlights the importance of feedback mechanisms in ensuring that workforce planning remains adaptive, evidence-informed, and responsive to evolving health system needs.

8.6 The European dimension and future cooperation

Results achieved strongly emphasised the added value of the Joint Action at European level and importance of maintaining a European dimension in workforce planning.

Although, HWF governance remains primarily a national responsibility, several structural dynamics, such as cross-border mobility, demographic change, and labour market interdependencies, transcend national boundaries. For this reason, many experts highlighted the need to progressively incorporate a European analytical perspective into workforce planning processes.

In particular, the mobility of health professionals within the European labour market requires increasing attention in workforce planning strategies. While professional mobility contributes to knowledge exchange and labour market flexibility, it may also generate imbalances between countries. Strengthening analytical capacity to monitor mobility patterns and incorporating cross-border dynamics into workforce planning models therefore represents an important area for future cooperation.

At European level, collaborative frameworks play an important enabling role by supporting platforms for knowledge exchange, Joint Actions, Community of Practice, and access to technical expertise. The EU can help maintain workforce planning as a policy priority across Member States. Future collaboration could also benefit from greater exchange with sectors outside healthcare, including education, labour market planning, and digital governance, where relevant experiences in forecasting and system planning already exist.

There was also strong consensus that the Community of Practice created through HEROES represents a valuable asset that should be preserved beyond the lifetime of the Joint Action. Possible mechanisms for continuity include peer-learning platforms, thematic working groups, structured bilateral exchanges between countries, and recurring expert forums. The Joint Action HEROES contributed to the implementation of specific solutions in the spirit of learning from each other. This highlights the effectiveness of the Joint Action in supporting implementation through learning or “twinning” mechanism.

Key message - European collaboration significantly accelerates national progress in workforce planning by providing technical expertise, shared learning, and stronger alignment of policy approaches across countries.

8.7 AI and digital transformation

Digitalisation and AI are expected to significantly influence the future of HWF planning. AI and digital technologies may also influence workforce planning models directly, by affecting productivity, task allocation, and service delivery patterns. Incorporating these factors into forecasting models represents an emerging methodological challenge for workforce planners.

On the one hand, advanced analytical tools may enhance modelling capabilities by enabling more sophisticated scenario analysis and processing of large datasets. At the same time, emerging digital infrastructures, real-time data environments, and advanced analytics may progressively complement traditional indicator-based approaches such as minimum datasets, enabling more dynamic and responsive workforce intelligence systems. On the other hand, the increasing use of AI raises important governance questions related to transparency, interpretability, and democratic accountability.

Workforce planning inherently involves politically sensitive decisions regarding resource allocation and professional roles. Excessive reliance on opaque algorithmic systems could therefore undermine stakeholder trust and weaken policy endorsement processes.

For this reason, future European collaboration should promote a structured dialogue on the responsible and transparent use of AI in HWF planning, ensuring that digital tools strengthen rather than replace evidence informed decision-making.

8.8 "Golden rules" and operational recommendations for effective workforce planning

8.8.1 Conceptual principles for effective workforce planning

The discussions conducted during the Joint Action and the expert meetings highlighted a set of guiding principles that underpin effective HWF planning systems. These principles reflect both the international literature on workforce forecasting and the practical experience of participating countries.

These conceptual "golden rules" provide the normative foundation upon which operational workforce planning systems should be built.

1. **Workforce planning must be system oriented**
   HWF planning should not focus solely on professional categories or numerical targets but should be integrated with broader health system planning, including service delivery models and financial planning.
2. **Planning should be needs-based rather than supply-driven**
   Planning approaches based exclusively on historical staffing levels or provider to population ratios are increasingly insufficient. Needs-based approaches that consider demographic and epidemiological trends provide a stronger basis for long-term planning.
3. **Workforce planning must adopt a multi-professional perspective**
   Modern health systems rely on multidisciplinary teams of professionals. Workforce planning should therefore consider skill mix, task shifting, and evolving professional roles.
4. **Data and evidence must enable decision-making**
   Reliable and interoperable workforce data systems are essential to support forecasting models, but outputs should seek to inform policy decisions rather than simply observe trends.
5. **Workforce planning must be embedded in governance processes**
   Planning only becomes impactful when their results are systematically integrated into policy processes such as education planning, recruitment policies, retirement policies and health system reforms.
6. **Stakeholder engagement is essential**
   Effective workforce planning requires the sponsorship of ministries and active involvement of stakeholders across the health system including professional organisations, education institutions, regulators, and healthcare providers. It also should consider the coordination and involvement of regional governments.
7. **Workforce planning must be dynamic and iterative**
   Planning should be understood as a continuous process supported by monitoring, evaluation, and policy feedback mechanisms.

Key insight from JA HEROES - Effective workforce planning requires both conceptual principles and operational implementation capacities. The golden rules provide the strategic orientation, while operational recommendations translate these principles into concrete institutional actions.

While the previous section outlines the conceptual foundations of HWF planning, the following operational principles translate these into practical implementation approaches.

8.8.2 Operational implementation principles

Based on the implementation experience of the Joint Action, several practical principles can be identified for countries seeking to strengthen their workforce planning systems.

First, workforce planning should be recognised as a permanent institutional function supported by dedicated structures such as observatories, specialised units, or formal coordination mechanisms. Such structures help ensure continuity and accountability beyond individual projects.

Second, planning systems should adopt an integrated multi-professional approach, avoiding fragmentation across professional groups and sectors. Health and long-term care workforce dynamics are increasingly interconnected and should therefore be analysed jointly.

Third, modelling approaches should prioritise transparency and usability. Simple and understandable models often prove more effective for policy dialogue and stakeholder engagement than highly complex "black-box" tools.

Fourth, workforce planning systems should evolve progressively. Countries are encouraged to start with available data and develop their analytical frameworks step by step, expanding from single professions to multi-professional models and integrating qualitative dimensions over time.

Finally, workforce planning should actively support strategic reforms rather than merely documenting workforce shortages. Forecasting results should stimulate discussions on organisational innovation, optimisation strategies, new professional roles, and improved working conditions.

"Golden Rules" emerging from JA HEROES

1. Start with integration in mind: data, models, and governance must be designed to work together.
2. Prefer transparent and understandable models to complex black-box systems.
3. Define the policy questions before refining technical sophistication.
4. Build sustainability mechanisms from the outset.
5. Use workforce planning as a tool for health system reform, not only workforce monitoring.

8.9 Final reflections and call to action

Joint Action HEROES demonstrates that HWF planning is evolving from a technical forecasting activity towards a strategic governance function that supports resilient and sustainable health systems.

The experience of the participating countries shows that meaningful progress occurs when workforce planning is integrated into broader policy processes, supported by stable institutional capacities, and reinforced through international collaboration.

At the same time, the project highlights the importance of maintaining momentum beyond the duration of Joint Actions. The network effects, peer-learning relationships, and technical capacities developed during HEROES constitute a valuable foundation for future European cooperation. The sustainability pathways and continuation mechanisms supporting this transition are further explored in the Joint Action HEROES *"Final sustainability report at the EU-level"* (D4.2).

Looking ahead, several challenges will shape the future of workforce planning in Europe, including demographic ageing, evolving professional expectations among new generations of health professionals, digital transformation, and increasing labour mobility across borders. The Health at a Glance Europe 2024 edition stresses the importance of HWF

planning in evidence-based policies. These challenges also reflect broader global trends highlighted in the WHO Global Strategy on Human Resources for Health: Workforce 2030, which emphasizes that strengthening HWF governance, planning capacities, and data systems is essential to achieve resilient and sustainable health systems (WHO, 2016). The strategy underlines that effective workforce policies require coordinated action across education, labour markets, and health system governance. Addressing these challenges will require continued investment in analytical capacity, governance innovation, and collaborative learning.

For these reasons, stakeholders across Europe are encouraged to build on the lessons of HEROES and to continue strengthening the institutional ecosystems that support effective workforce planning.

The following recommendations summarize the key policy lessons emerging from the implementation experience of Joint Action HEROES and the discussions held during the expert meetings.

Key Policy Recommendations for national implementation emerging from Joint Action HEROES

Based on the implementation experience of the Joint Action and the insights generated during the expert meetings, the following policy recommendations can support countries in strengthening their HWF planning systems.

1. **Institutionalise workforce planning capacities**
   Establish permanent units, observatories, or advisory councils with stable mandates, clear roles, and adequate resources.

2. **Adopt integrated multi-professional planning approaches**
   Move beyond single profession projections by incorporating skill mix, task shifting, and team-based models of care.

3. **Invest in robust health workforce intelligence systems**
   Develop interoperable workforce datasets and implement the Advanced Minimum Dataset to support evidence informed planning.

4. **Link workforce planning to governance and policy cycles**
   Ensure that planning outputs inform education policies, recruitment strategies, retirement policies and health system reforms.

5. **Link workforce planning to reforms of healthcare delivery**
   HWF planning is not only about numbers of health professionals. It can support a more profound rethinking of healthcare delivery reaping benefits from more patient-centred models of care and innovations.

6. **Promote stakeholder engagement and structured dialogue**
   Engage ministries, professional bodies, education institutions, providers, and patient representatives in planning processes. Particularly in decentralized countries it is essential to engage regional governments.

7. **Ensure adaptability and resilience of planning systems**
   Develop forecasting approaches capable of responding to demographic change, technological innovation, and systemic shocks.

8. **Embed monitoring and policy feedback loops**
   Regularly evaluate workforce policies and use the results to update planning models and strategies.

9. **Strengthen and institutionalize European cooperation and knowledge exchange**
   Support permanent mechanisms for international collaboration, peer-learning, and Community of Practice that enable continuous exchange, mutual learning, and coordinated development of workforce planning capacities across countries.

10. **Invest in capacity building and analytical expertise**
    Strengthen modelling skills, workforce intelligence capacities, and institutional expertise.

11. **Prioritise workforce sustainability and retention policies**
    Address working conditions, career development opportunities, generational expectations and ethical international recruitment practices in line with international frameworks to support long-term workforce stability and sustainability.

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Illustrative implementation examples emerging from Joint Action HEROES

Recommendation	Illustrative examples from countries	Risks / pitfalls to avoid
Institutionalise workforce planning capacities	Norway strengthened permanent collaboration between Statistics Norway and Directorate of Health; Malta embedded planning within People Management Division	Reliance on temporary project teams without permanent institutional ownership
Robust workforce intelligence systems	Lithuania integrated detailed workforce data into national information systems; Italy expanded ISTAT integrated datasets	Fragmented datasets without interoperability
Multi-professional planning	Sweden piloted capability-based approaches; Netherlands explored policy scenarios across sectors	Single-profession silo planning
Governance and stakeholder engagement	Greece established structured policy dialogues; Spain improved coordination across Autonomous Communities	Weak coordination between ministries and regions
Sustainability mechanisms	Slovakia adopted a national strategy; Portugal linked planning to long-term governance structures	Treating workforce planning as a one-off forecasting exercise

In conclusion, sustainable HWF planning requires long-term commitment, integrated analytical frameworks, and strong European collaboration. By consolidating these elements, the achievements of Joint Action HEROES can serve as a foundation for the next generation of workforce planning initiatives in Europe, supporting more resilient, sustainable, and coordinated health systems.

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HEROES

HEROES involved

19 countries in 3 clusters, altogether
53 partner organisations

Cluster 1 (WP5): Portugal, Norway, Greece, Sweden, Spain, Italy, and Ireland.
Cluster 2 (WP6): Croatia, Slovenia, Lithuania, Hungary, and Poland.
Cluster 3 (WP7): Belgium, Estonia, the Netherlands, Slovakia, Czechia, Malta, and Germany.

Joint Action HEROES has been coordinated by AGENAS Agenzia Nazionale per i Servizi Sanitari Regionali Agenas: https://www.agenas.gov.it/

HEROES final deliverables

D1.2 – Final Deliverable on HWF planning data, models and skills
D2.2 – Initial Leaflet
D2.3 – Website
D2.4 – Policy Briefs
D2.5 – Final Dissemination Report
D2.6 – Layman report
D3.3 – Final evaluation report
D4.1 – 20 policy action plans derived from policy dialogues
D4.2 – Final sustainability report at the EU level
D5.1 – WP5 Report on countries' data collection, HWF planning models and tools, stakeholders' involvement
D6.1 – WP6 Report on countries' data collection, HWF planning models and tools, stakeholders' involvement
D7.1 – WP7 Report on countries' data collection, HWF planning models and tools, stakeholders' involvement

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