Deliverable D1.17

5th GDI quarterly implementation report

Project Title Grant agreement no	**Genomic Data Infrastructure** Grant agreement 101081813
Project Acronym (EC Call)	GDI
WP No & Title	WP1: Coordination & Support
WP Leaders	Juan Arenas (1. ELIXIR Hub), Laura Carletti (1. ELIXIR Hub), Serena Scollen (1. ELIXIR Hub).
Deliverable Lead Beneficiary	1. ELIXIR Hub
Contractual delivery date 30/06/2024 **Actual delivery date** 02/08/2024	
Delayed	Yes
Partner(s) contributing to deliverable	1. ELIXIR Hub, 06. CSC
Authors	Melissa Konopko, Juan Arenas Marquez (ELIXIR Hub), Dylan Spalding (CSC)
Contributors	All GDI Nodes
Acknowledgements	NA
Reviewers	GDI-MB

Log of changes

Date	Mvm	Who	Description
04/07/2024	0v1	Melissa Konopko (ELIXIR)	Initial Draft
23/07/2024	0v2	Melissa Konopko (ELIXIR)	GDI-MB Review
02/08/2024	1VO	Yaseen Jakhura (ELIXIR)	Final version ready for upload

Table of contents

Contents

1. Executive Summary

The European Genomic Data Infrastructure (GDI) is a deployment project co-funded by the Digital Europe programme. GDI's main objective is to realise the data infrastructure required by the 1+MG initiative to share high-quality genotypic and phenotypic data across borders, the 1+MG Virtual Cohort. Countries participating have committed to reach a concrete operational level before the end of the project (progressing across different phases: onboarding, deployment or operational), which will require them to fulfil technical and non-technical requirements.

In addition, the establishment of required technical capacity in each Node has been identified as a critical factor for the success of the project and the long-term sustainability of the data infrastructure and the initiative.

This document presents the results of the initial European Genomic Data Infrastructure monitoring activities laid out in D1.12[1] that are initially focussed on:

- **the deployment of the technical expertise** required to deploy and operate the European Genomic Data Infrastructure to share access to data across borders, building the technical capacity to run the infrastructure beyond the end of the project, and,
- **the evolution of the European Genomic Data Infrastructure Nodes.** GDI Nodes will transition across different phases in their journey to be fully operational and integrated into the European Genomic Data Infrastructure.
- **identifying capacity-building actions required to target onboarding.** We acknowledge the different access to skills and resources each GDI Node has which implies that GDI Nodes will evolve and reach operational readiness at different speeds. We will use the information collected from GDI Nodes to identify gaps and opportunities to build capacity across the nodes both at the technical level and not technical levels to accelerate the journey across the different phases. In this case, we will focus on the onboarding phase.

These monitoring processes and tools aim to support GDI Nodes in their journey by assessing their progress on a quarterly basis and providing them with useful guidance and recommendations to reach their individual and project objectives, summarised in the commitment to have **6 Nodes technically operational by 2024**. This will be extended to **15 Nodes by 2026** with three additional Nodes reaching deployment and six more Nodes reaching onboarding.

A summary of the information collected every quarter will be presented to the 1+MG Group (in addition to being shared with project participants) in order to gather the contributions and support of the 1+MG Group on the direction of travel and their assistance in removing any roadblocks that could be identified.

---

[1] https://zenodo.org/record/7576210#.ZEYoBuzMJqs

The information presented here corresponds to the status of the Nodes by M18.

The current scope and content of the quarterly report could be updated if there is a need to modify it to better support the countries in their commitments or to facilitate reaching the overall project's initiatives. For instance, monitoring of the volume of data available in the European Genome Dashboard or via the 1+MG infrastructure could be implemented in the near future.

B1MG[2] has released the first full version of the 1+MG Framework https://framework.onemilliongenomes.eu/ which is a useful resource to build capacity and facilitate the dissemination of the 1+MG recommendation and guideline coming from the project support the implementation (B1MG, GDI, GoE, EHDS,….). The first official release in November 2023 is comprised mainly of B1MG outputs, but this alone could help GDI members to navigate recommendations and understand how the different components work together and align with the EHDS. The framework will now be updated and maintained by GDI, thus incorporating the latest resources that support the vision of the 1+MG initiative.

---

[2] https://b1mg-project.eu/

2. Contribution towards project outcomes

With this deliverable, the project has reached or the deliverable has contributed to the following project outcomes:

Outcomes	Contributed
Outcome 1 Secure federated infrastructure and data governance needed to enable sustainable and secure cross border linkage of genomic data sets in compliance with the relevant and agreed legal, ethical, quality and interoperability requirements and standards based on the progress achieved by the 1+MG initiative.	Yes
Outcome 2 Platform performing distributed analysis of genetic/genomic data and any linked clinical/phenotypic information; it should be based on the principle of federated access to data sources, include a federated/multi-party authorisation and authentication system, and enable the application of appropriate secure multi-party and/or high-end computing, AI and simulation techniques and resources.	Yes
Outcome 3 Clear description of the roles and responsibilities related to personal data and privacy protection, for humans and computers, applicable during project lifetime and after its finalisation.	No
Outcome 4 Business model including an uptake strategy explaining the motivation, patient incentives and conditions for all stakeholders at the different levels (national, European, global) to support the GDI towards its sustainability, including data controllers, patients, citizens, data users, service providers (e.g., IT and biotech companies), healthcare systems and public authorities at large.	No

Outcome 5 Sustained coordination mechanism for the GDI and for the GoE multi-country project launched in the context of the 1+MG initiative.	No
Outcome 6 Communication strategy – to be designed and implemented at the European and national levels.	No
Outcome 7 Capacity building measures necessary to ensure the establishment, sustainable operation, and successful uptake of the infrastructure.	Yes
Outcome 8 Financial support to the relevant stakeholders to enable the extension, upgrade, creation and/or physical connection of further data sources beyond the project consortium or to implement the communication strategy and for capacity-building.	No

3. Methods

The methods and processes to gather the monitoring information were established in D[3]1.12. In this report, we will present and analyse the data initially collected as part of the periodic reporting exercise.

4. Description of work accomplished

Project participants and GDI Nodes were asked to provide the monitoring information related to the deployment of the technical expertise and the self-evaluation of the Node status.

4.1 Monitoring of the technical expertise deployment - Q4 results

4.1.1 Deployment of technical expertise at the GDI Node Level - Q4

The data show that **44.2%** of the expected technical expertise to be in place on average during the duration of the project was deployed. However, this has increased by **3**% since the last quarter, so this shows steady improvement. All countries have started to use their allocated FTEs with particular countries (such as Belgium, Spain and France) that may need targeted support.

Project participants have reported delays in recruitment and some of them are also reorganising the national activities, which is expected to still have an effect in the forthcoming reports while the technical experts get fully deployed across all GDI Nodes. These challenges are also reflected in the Node technical deployment (section 4.2) below.

We have noted that the trend of slow deployment of resources is ongoing and we will continue to monitor it in the coming reports. The outcomes of recent meetings including the Work Package 5 meeting in March 2024 have started to help give Nodes clarity on what Pillar II will provide and what is expected from them. However, further development in this area is still required. This should serve as guidance on how best to use the FTEs that they have been granted in the project and we anticipate this will support Nodes in technical expertise recruitment. The management team has a meeting in early August to consider and plan targeted support to address the situation to support the 1+MG ambition, for example:

- 1:1 meetings with the leadership of key Nodes who are lagging in FTE deployment
- Support additional countries in joining GDI.
- Increase involvement of Nodes in WP6 to build data management capacity across all Nodes to accelerate the flow of data in compliance with the 1+MG Framework
- Guidelines/processes to prepare primary use data for secondary use, data quality aspects
- Federated/Distributed analytics Governance
- Making legacy data (https://dashboard.onemilliongenomes.eu/) data available for 1+MG (including synthetic data generation)

---

[3] https://zenodo.org/record/7576210#.ZEYoBuzMJqs

Table 1 Deployment of technical expertise across GDI Nodes

GDI Node	Operational Readiness (target)	Technical expertise deployment Pillar II	By M18	Based on inputs from 90.3%
		Baseline FTEs	Actuals FTEs	Actuals / Baseline
Belgium	Operational	4.0	0.3	7%
Czech Republic	Operational	4.0	1.7	42%
Denmark	Operational	4.0	1.5	36%
Estonia	Operational	4.0	3.3	82%
Finland	Operational	4.0	2.8	69%
France	Operational	2.0	0.1	4%
Germany	Operational	4.0	0.8	20%
Italy	Operational	3.9	2.6	67%
Luxembourg	Operational	4.3	1.1	25%
Portugal	Operational	4.0	2.5	62%
Slovenia	Operational	4.0	1.7	43%
Spain	Operational	3.5	0.2	5%
Sweden	Operational	5.0	2.2	43%
The Netherlands	Operational	5.0	2.6	52%
Norway	Operational	4.0	0.5	13%
Bulgaria	Deployment	1.8	1.8	98%
Latvia	Deployment	2.0	1.7	83%
Lithuania	Deployment	2.0	1.4	69%
Croatia	Onboarding	1.0	0.6	65%
Ireland	Onboarding	1.0	0.7	75%
Total:		**67.4**	**29.8**	**44.2%**

4.2 Monitoring the evolution of the European Genomic Data Infrastructure Nodes - Q4 results

- The main purpose of the GDI Nodes Operational Readiness data gathering is to monitor the Nodes' journey and identify capacity-building actions that will help them meet their targets by the end of the project.

- The Nodes have defined their timeline for advancement along the defined path towards operational readiness as illustrated in D3.2. However, this deliverable received limited input from the Nodes. Indicative timelines have been established for countries that have not provided a new roadmap based on the original data given at the onset of the project. As technical deployment has proceeded, we have begun to receive requests to update the timelines to match the technical and administrative realities the Nodes are facing. In particular, we expect to receive an updated deployment timeline from Spain. During the March meeting, Nodes timelines for the fulfilment of the commitments established in the 1+MG Roadmap and the project were presented (see annexe V) as well as recommended actions to demonstrate the development of technical capacity, the coordinator will follow up with the Nodes to ensure follow-through.

- The new Nodes (Cyprus, Hungary, Malta, and Romania) that were onboarded provided their deployment timelines at the time of their joining. All of the new Nodes are aiming for "Onboarding" by the end of the project.

- There are two different views provided from the collected data, detailed in the following sections: 4.2.1: The level of operational readiness and 4.2.2: the overall percentage of progress across all indicators.

- Further analysis of the overall progress has been provided to identify capacity-building and other actions required to support nodes to reach the onboarding stage and beyond, as indicated by the Node roadmap.

4.2.1 GDI Node Operational Readiness level - Q4 results

- The GDI Node Operational Readiness level shows the expected phase Nodes should have attained by the time that the data is collected: Onboarding, Deployment and Operational, and where the GDI Nodes see themselves (self-evaluation) at the time of providing the information.

- The Q5 progress was focused on MS7, with Nodes putting their efforts into meeting their requirements for that target. This also meant that a large percentage of FTEs were put into development work. There are still certain key indicators that, as noted by several Nodes, require some critical information to be decided at a project and governance level before they can move forward. Much of this information will be developed based on the finalisation of the minimal viable product (MVP), MS8, and defining the details of the project's technical end goal.

- At this point, no Node has attained the Onboarding level, although 11 Nodes have committed to reaching it by this point in time in the project. However, several Nodes have made significant progress. Finland, Portugal, Norway and Sweden have completed all of the technical onboarding indicators, with the exception of compliance testing. France, Ireland and Sweden have completed 100% of the Non-technical Onboarding indicators (see Annexe I). Fourteen countries have reported that they have now completed 50% or more of the combined technical and non-technical steps required, bringing them into a position to complete the steps in the next two quarters.

- We had an overall low response rate by the Nodes this quarter (60%), which could be masking some of the progress made by the other 40% of the Nodes. This low response rate is likely due to the timing of the due date with some major meetings and early impact of summer holidays. The requirement and value has been reinforced with the Nodes.

Table 2 GDI Nodes Operational Readiness level by M15

GDI Node Operational Readiness	Start date	2022-11		Overall status:
	Duration	48		
	By Month	18	2024-4	

Operartional Phase (2026)	GDI Node	Vanguard Node?	Expected Phase	Current Phase
Operational	Belgium	Yes	Onboarding	TBD
Operational	Czech Republic		Onboarding	TBD
Operational	Denmark		TBD	TBD
Operational	Estonia		TBD	TBD
Operational	Finland	Yes	Deployment	TBD
Operational	France		Onboarding	TBD
Operational	Germany		TBD	TBD
Operational	Italy		Onboarding	TBD
Operational	Luxembourg	Yes	Onboarding	TBD
Operational	Portugal		Onboarding	TBD
Operational	Slovenia		Onboarding	TBD
Operational	Spain	Yes	Operational	TBD
Operational	Sweden	Yes	Onboarding	TBD
Operational	The Netherlands	Yes	Onboarding	TBD
Operational	Norway	Yes	TBD	TBD
Deployment	Bulgaria		TBD	TBD
Deployment	Latvia		TBD	TBD
Deployment	Lithuania		TBD	TBD
Onboarding	Croatia		TBD	TBD
Onboarding	Ireland		TBD	TBD
Onboarding	Cyprus		TBD	TBD
Onboarding	Hungary		TBD	TBD
Onboarding	Malta		TBD	TBD
Onboarding	Romania		TBD	TBD

Phases (Metrics)		Plan	Actual
Onboarding		9	0
Deployment		1	0
Operational		1	0
TBD		9	20

Note: The "Expected Phase" is based on the Node Roadmap provided in D3.2. For the countries that have not given an updated timeline, the default timeline provided during the planning phase has been used.

4.2.2. GDI Node general progress indicator - Q4 results

The GDI Node general progress indicator view, provides us with a metric that looks at all the individual steps across all the phases of the GDI Node Operational Readiness and calculates an indicator of progress (%) based on how each individual question, regardless of its level, has been answered, assigning a score as follows:

- 1.0 if the step has been met,
- 0.5 if the step has been met partially or,
- 0.0 if not met or not reported

Table 3 GDI Node general progress indicator and comparison with previous quarter data

M18 Reporting Complete	Operartional Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator. (Yes =1, Partially =0.5)	Change since previous quarter
yes	Operational	Belgium	Onboarding	TBD	29%	4%
no	Operational	Czech Republic	Onboarding	TBD	19%	0%
yes	Operational	Denmark	TBD	TBD	44%	7%
no	Operational	Estonia	TBD	TBD	13%	0%
yes	Operational	Finland	Deployment	TBD	41%	-1%
no	Operational	France	Onboarding	TBD	26%	0%
no	Operational	Germany	TBD	TBD	25%	0%
yes	Operational	Italy	Onboarding	TBD	29%	3%
yes	Operational	Luxembourg	Onboarding	TBD	21%	0%
no	Operational	Portugal	Onboarding	TBD	37%	0%
yes	Operational	Slovenia	Onboarding	TBD	34%	16%
yes	Operational	Spain	Operational	TBD	44%	19%
no	Operational	Sweden	Onboarding	TBD	44%	0%
yes	Operational	The Netherlands	Onboarding	TBD	26%	-9%
yes	Operational	Norway	TBD	TBD	32%	0%
yes	Deployment	Bulgaria	TBD	TBD	9%	0%
no	Deployment	Latvia	TBD	TBD	12%	0%
no	Deployment	Lithuania	TBD	TBD	10%	0%
yes	Onboarding	Croatia	TBD	TBD	10%	1%
yes	Onboarding	Ireland	TBD	TBD	13%	0%
no	Onboarding	Cyprus	TBD	TBD	3%	0%
no	Onboarding	Hungary	TBD	TBD	0%	0%
no	Onboarding	Malta	TBD	TBD	6%	0%
no	Onboarding	Romania	TBD	TBD	0%	0%

For a breakdown of progress within the Onboarding indicators, see Annexe I. Slovenia and Spain in particular have made significant progress since the last report (M15) with an average of 2% increase across all indicators and Nodes. While "negative progress" appears in the Netherlands, this is because they have had to ensure their Node architecture aligns with the requirements from HealthRI. Countries expect to be unblocked after MS8 decisions are taken that will allow for the compliance tests to be drafted in accordance with the governance and technical decisions. And, well-aligned with the levels of technical expertise deployment seen in Table 1, several countries have noted that further advancements can be made once local experts have been hired and this activity remains ongoing.

4.2.3. GDI Node general progress indicator - Capacity building actions

At this point in the project, only Spain and Finland have planned to achieve a stage beyond Onboarding, though all Nodes are still seeking to attain Onboarding level, so support for advancement is focussed on these indicators. That said, there has been an overall 2% increase in progress on Deployment indicators across all Nodes since last quarter. As four new Nodes have been added to the reporting, some indicators show a lower percentage of overall completion since last quarter, but this is an artefact of the expansion of the number of Nodes. Looking at the information provided by the Nodes, clear actions emerge to build capacity both across Technical and non-technical requirements (see Annexe II). For the calculation, a "yes" answer is considered 100% complete, a "no" is 0% and "partially" is 50%:

- Steps with **0-25% completion** across all Nodes
  - **Compliance and stress tests drafted and refined in the context of 1+MG requirements**
    - **Action:** A workshop was completed during the Pillar II technical workshop in Rome October 9-11. Results can be found here and were shared with the Nodes to support future progress. However, further guidance is required from both Pillars I (for compliance) and II (for stress testing and compliance implementation) to draft these tests. This is now one of the focus areasof the MS8 work. Furthermore, we propose to alter this indicator to add clarity about the intention of the indicator; "draft compliance and stress tests" would be changed to "draft definitions of compliance and stress tests".
  - **Have developed a national genomic plan or similar that secures long-term funding that matches the target implementation level.**
    - **Action:** A workshop took place coordinated by ISCIII about the successful strategies of countries who have put a national genomic plan in place. The outputs and videos from this event will be shared on the Framework and will be linked to from the operational readiness reporting spreadsheet.
  - **Have deployed and validated an instance or PoC or an upgraded version incorporating additional use cases**
    - **Action:** The detailed explanation of this indicator requires that the proof of concept has been implemented and tested. Most Nodes indicated that they

have met most of the requirements, outside of the testing. This matches the fact that no Nodes have completed their drafting of compliance and stress tests as indicated above. Development and dissemination of the compliance and stress testing metrics in MS8 will help. However, it won't have immediate effects as it requires technical development to take place in each Node. We will keep monitoring progress on this indicator and use the planned Pillar II meetings of WP3 meetings to reinforce the support to Nodes to complete this step.

- Steps with **26-40% completion** across all Nodes
  - **Security mitigation, management, and reporting system being drafted.**
    - **Action**: Progress has been made in this indicator since last quarter, moving it up to 29% and 38% complete and partially complete respectively. We will continue to share best practices from Nodes that have completed this step, both as a document in a private repository and as a presentation in a forthcoming meeting. Organisation for this is underway.
  - **API use cases considered, specifications drafted and implementation in progress**
    - **Action:** MS8 has a focus on ensuring that the APIs meet use case requirements, so this should assist most Nodes in completing this indicator. As for country-specific needs, the Nodes are in a state where they are drafting their use cases and what will be required to meet them, with some Nodes working on hiring someone to manage this. The outcomes of the WP5 face-to-face meeting (held in March 2024) helped us understand the needs and expectations of the Nodes to support them in meeting their use cases.
  - **Decision on services and components utilised**
    - **Action:** More than half of countries have completed or partially completed this indicator. For the countries who have only partially completed it, they are mostly 1) waiting for some national level decisions to ensure the components meet the national needs and/or 2) waiting for the use case implementation in MS8 to help solidify the requirements. Pillar II is also planning to make changes to their github to make it easier to find the underlying APIs for the components to aid the countries in making software component decisions.
  - **Load of synthetic data, functionalities demonstrated in development environment**
    - **Action:** Completion of this indicator has increased to 38% and 50% complete and partially complete, respectively. Many Nodes have partially completed this, loading the data into a test environment, but functionalities still need to be tested. This follows the above issues of needing to complete compliance testing and will be supported by the testing metrics in MS8 being defined.

5. Results

- Use of resources has increased by 3% since last quarter, however still remains low due to challenges in recruitment and changes in their national landscape. A meeting in early August is planned and the coordination team will make recommendations to the General Assembly after discussion with the Management Board if required.
- Within the Nodes that were expected to have already reached the Onboarding stage, the two most commonly incomplete indicators are the compliance and stress tests and the completion of a National Genomic Plan. The work for MS8 includes testing metrics to help Nodes draft their tests, specifically to help meet this indicator. The recent national genomic plan workshop should help with the latter, but it is ultimately up to the governments to meet this requirement. We will keep monitoring the indicators and reinforce the support during the planned Pillar II meetings.
- Additional capacity-building actions have been identified.

6. Discussion

While some GDI Nodes have raised questions about the fact that a concrete phase can't be attained without fulfilling both technical and non-technical steps, we understand that this is a stage of the model that would prompt internal discussion within the GDI Nodes, not only at the technical level but at the strategic level too, which is crucial to ensuring the infrastructure can be deployed and operated in the long term.

7. Conclusions & Impact

The trend of resource use needs to be followed up and potential actions in addition to the one included in the preliminary analysis in section 4.1.1 could be identified to ensure resources are properly utilised to establish a sustainable infrastructure in case the trend is confirmed in the next two reports.

Identified technical capacity-building actions (section 4.2.3) could be accommodated as part of the current plans for the annual Pillar 2 retreat while non-technical ones would be tackled in a separate workshop organised by the coordinator with the support of the team looking after the national mirror groups in WP1.

8. Next steps

The next gathering of information from Nodes will take place in September 2024.

Annex I. GDI Node general progress indicator table – Onboarding Summary

M18 Reporting Complete	Operartional Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator. (Yes =1, Partially =0.5)	Change since previous quarter	Onboarding Overall Progress	Onboarding Tech Progress	Onboarding NonTech Progress
yes	Operational	Belgium	Onboarding	TBD	29%	4%	73%	75%	67%
no	Operational	Czech Republic	Onboarding	TBD	19%	0%	50%	44%	67%
yes	Operational	Denmark	TBD	TBD	44%	7%	77%	75%	83%
no	Operational	Estonia	TBD	TBD	13%	0%	41%	38%	50%
yes	Operational	Finland	Deployment	TBD	41%	-1%	91%	94%	83%
no	Operational	France	Onboarding	TBD	26%	0%	64%	50%	100%
no	Operational	Germany	TBD	TBD	25%	0%	68%	63%	83%
yes	Operational	Italy	Onboarding	TBD	29%	3%	64%	56%	83%
yes	Operational	Luxembourg	Onboarding	TBD	21%	0%	64%	56%	83%
no	Operational	Portugal	Onboarding	TBD	37%	0%	86%	94%	67%
yes	Operational	Slovenia	Onboarding	TBD	34%	16%	73%	69%	83%
yes	Operational	Spain	Operational	TBD	44%	19%	91%	88%	100%
no	Operational	Sweden	Onboarding	TBD	44%	0%	95%	94%	100%
yes	Operational	The Netherlands	Onboarding	TBD	26%	-9%	55%	56%	50%
yes	Operational	Norway	TBD	TBD	32%	0%	77%	81%	67%
yes	Deployment	Bulgaria	TBD	TBD	9%	0%	27%	25%	33%
no	Deployment	Latvia	TBD	TBD	12%	0%	36%	25%	67%
no	Deployment	Lithuania	TBD	TBD	10%	0%	32%	13%	83%
yes	Onboarding	Croatia	TBD	TBD	10%	1%	32%	31%	33%
yes	Onboarding	Ireland	TBD	TBD	13%	0%	41%	19%	100%
no	Onboarding	Cyprus	TBD	TBD	3%	0%	9%	13%	0%
no	Onboarding	Hungary	TBD	TBD	0%	0%	0%	0%	0%
no	Onboarding	Malta	TBD	TBD	6%	0%	18%	6%	50%
no	Onboarding	Romania	TBD	TBD	0%	0%	0%	0%	0%
60%						2%	62%	57%	74%

18

Annex II. GDI Node general progress indicator table – Onboarding

Operational Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator (Yes =1, Partially =0.5)	Change since previous quarter	Onboarding Overall Progress	Onboarding Tech Progress	Onboarding NonTech Progress	1.1.1 Onboarding Technical — API use cases considered, specifications drafted and implementation in progress	1.1.2 Onboarding Non Technical — Have started to build national capacity (ELSI, data quality, data standards, technical infrastructure functions) for the deployment of the 1+MG node and to support data flow.	1.1.3 Onboarding Non Technical — Have developed the 1+MG NMG or equivalent structure to contribute to the 1+MG initiative.	1.1.4 Onboarding Non Technical — Have developed a national genomic plan or similar that secures long-term funding that matches the target implementation level.	1.2.1 Onboarding Technical — Decision on services and components utilised	1.2.2 Onboarding Technical — Software development best practises identified and implemented at the node	1.3.1 Onboarding Technical — Security mitigation, management, and reporting system being drafted.	1.4.1 Onboarding Technical — Compliance and stress tests drafted and refined in context of 1+MG requirements	1.5.1 Onboarding Technical — Have deployed or made available the initial physical infrastructure for the evaluation of the current PoC, or an upgraded version incorporating...	1.6.1 Onboarding Technical — Have deployed and validated an instance or PoC or an upgraded version incorporating additional use cases	1.7.1 Onboarding Technical — Load of synthetic data, functionalities demonstrated in development environment
Operational	Belgium	Onboarding	TBD	29%	4%	73%	75%	67%	Partially	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Partially	Yes
Operational	Czech Republic	Onboarding	TBD	19%	0%	50%	44%	67%	Partially	Yes	Yes	No	Partially	Yes	Partially	No	Partially	Partially	No
Operational	Denmark	TBD	TBD	44%	7%	77%	75%	83%	Yes	Yes	Yes	Partially	Partially	Yes	Yes	Partially	Yes	Partially	Partially
Operational	Estonia	TBD	TBD	13%	0%	41%	38%	50%	Partially	Partially	Yes	No	Partially	Yes	No	No	Partially	Partially	No
Operational	Finland	Deployment	TBD	41%	-1%	91%	94%	83%	Yes	Yes	Yes	Partially	Yes	Yes	Yes	Partially	Yes	Yes	Yes
Operational	France	Onboarding	TBD	26%	0%	64%	50%	100%	Partially	Yes	Yes	Yes	Partially	Yes	Partially	No	Yes	Partially	No
Operational	Germany	TBD	TBD	25%	0%	68%	63%	83%	Partially	Yes	Yes	Partially	Partially	Yes	Partially	No	Yes	Partially	Yes
Operational	Italy	Onboarding	TBD	29%	3%	64%	56%	83%	Partially	Yes	Yes	Partially	Yes	Yes	Partially	Partially	Partially	No	Partially
Operational	Luxembourg	Onboarding	TBD	21%	0%	64%	56%	83%	Partially	Yes	Yes	Partially	Partially	Partially	Partially	No	Yes	Partially	Yes
Operational	Portugal	Onboarding	TBD	37%	0%	86%	94%	67%	Yes	Yes	Yes	No	Yes	Yes	Yes	Partially	Yes	Yes	Yes
Operational	Slovenia	Onboarding	TBD	34%	16%	73%	69%	83%	Yes	Yes	Yes	Partially	Yes	Yes	No	No	Yes	Partially	Yes
Operational	Spain	Operational	TBD	44%	19%	91%	88%	100%	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Operational	Sweden	Onboarding	TBD	44%	0%	95%	94%	100%	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partially	Yes	Yes	Yes
Operational	The Netherlands	Onboarding	TBD	26%	-9%	55%	56%	50%	Partially	Yes	Partially	No	Partially	Yes	Yes	Partially	Yes	No	No
Operational	Norway	TBD	TBD	32%	0%	77%	81%	67%	Yes	Partially	Yes	Partially	Yes	Yes	Partially	Partially	Yes	Partially	Yes
Deployment	Bulgaria	TBD	TBD	9%	0%	27%	25%	33%	No	Partially	Partially	No	Partially	Partially	Partially	No	Partially	No	No
Deployment	Latvia	TBD	TBD	12%	0%	36%	25%	67%	Partially	Partially	Yes	Partially	Partially	Partially	No	No	Partially	No	No
Deployment	Lithuania	TBD	TBD	10%	0%	32%	13%	83%	Partially	Yes	Yes	Partially	Partially	No	No	No	No	No	No
Onboarding	Croatia	TBD	TBD	10%	1%	32%	31%	33%	Yes	No	Yes	No	No	No	No	No	No	Yes	Partially
Onboarding	Ireland	TBD	TBD	13%	0%	41%	19%	100%	Partially	Yes	Yes	Yes	Partially	Partially	No	No	No	No	No
Onboarding	Cyprus	TBD	TBD	3%	0%	9%	13%	0%	No	No	No	No	No	No	Partially	No	Partially	No	No
Onboarding	Hungary	TBD	TBD	0%	0%	0%	0%	0%											
Onboarding	Malta	TBD	TBD	6%	0%	18%	6%	50%	No	Partially	Yes		No	No	No	No	Partially	No	No
Onboarding	Romania	TBD	TBD	0%	0%	0%	0%	0%											
	Yes				2%	62%	57%	74%	33%	63%	79%	17%	33%	58%	29%	0%	50%	21%	38%
	No								21%	17%	13%	46%	21%	25%	38%	71%	21%	42%	50%
	Partial								46%	21%	8%	38%	46%	17%	33%	29%	29%	38%	13%
	Total	Total							56%	73%	83%	35%	56%	67%	46%	15%	65%	40%	44%
									47%	87%	93%	20%	53%	93%	47%	0%	80%	27%	60%

Annex III.   GDI Node general progress indicator table – Deployment

M18 Reporting Complete	Operational Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator (Yes =1, Partially =0.5)	Change since previous quarter	Deployment Tech Progress	Deployment Non Tech Progress	2.1.1 Deployment Non Technical (Storage and network capacity needs achieved ad hoc by hosting institution)	2.1.2 Deployment Non Technical (Common software development best practises employed)	2.2.1 Deployment Technical (Minimal set of APIs for the five functionalities)	2.2.2 Deployment Non Technical (Have built national capacity (ELSI, data quality, data standards, technical infrastructure functions) for the deployment of the 1+MG node)	2.3.1 Deployment Non Technical (Network and storage meets reliability, robustness, performance, security, and capacity requirements)	2.3.2 Deployment Technical (Deployment of 1+MG national node for connection to the staging environment with synthetic data loaded)	2.4.1 Deployment Technical (Implementation & successful performance of compliance and stress tests of node in isolation)	2.5.1 Deployment Technical (Have completed the initial data load of synthetic data and linking to staging version of 1+MG European Infrastructure)	2.6.1 Deployment Technical (Deployment of 1+MG national node but it is not yet connected to the 1+MG Infrastructure)	2.7.1 Deployment Technical (Communication established with user portal and 1+MG Infrastructure)	2.8.1 Deployment Technical (Have finalised the initial deployment of national 1+MG production node enabling data access across borders in a staging environment)	2.9.1 Deployment Technical (Production version ready to be deployed into production within the wider GDI)
yes	Operational	Belgium	Onboarding	TBD	29%	4%	6%	38%	Partially	Partially	Partially	Partially	No	No	No	No	No	No	No	No
no	Operational	Czech Republic	Onboarding	TBD	19%	0%	0%	25%	Partially			Partially								
yes	Operational	Denmark	TBD	TBD	44%	7%	6%	75%	Partially	Yes	No	Partially	Yes	Partially	No	No	No	No	No	No
no	Operational	Estonia	TBD	TBD	13%	0%	0%	0%	No	No	No	No	No	No	No	No	No	No	No	No
yes	Operational	Finland	Deployment	TBD	41%	-1%	13%	75%	Yes	Yes	Yes	Partially	Partially		No	No	No	No	No	No
no	Operational	France	Onboarding	TBD	26%	0%	0%	50%	Partially	Partially		Partially	Partially							
no	Operational	Germany	TBD	TBD	25%	0%	6%	13%	Partially		Partially									
yes	Operational	Italy	Onboarding	TBD	29%	3%	13%	50%	Partially	Yes	Partially	Partially			No	Partially				
yes	Operational	Luxembourg	Onboarding	TBD	21%	0%	0%	0%	No	No	No	No	No	No	No	No	No	No	No	No
no	Operational	Portugal	Onboarding	TBD	37%	0%	19%	38%	Yes	Partially	Partially	No	No	Yes	No	No	No	No	No	No
yes	Operational	Slovenia	Onboarding	TBD	34%	16%	19%	50%	Yes	Partially	Partially	Partially	No	Yes	No	No	No	No	No	No
yes	Operational	Spain	Operational	TBD	44%	19%	25%	75%	Yes	Yes	Partially	Partially	Partially	Partially	No	Partially	No	Partially		
no	Operational	Sweden	Onboarding	TBD	44%	0%	13%	88%	Yes	Yes	Partially	Partially	Yes	No	No	No	Partially	No	No	No
yes	Operational	The Netherlands	Onboarding	TBD	26%	-9%	13%	50%	Partially	Yes	No	Partially	No	No	No	No	No	Yes	No	No
yes	Operational	Norway	TBD	TBD	32%	0%	13%	38%	Partially	Partially	Partially	No	Partially	No	No	No	Partially	No	No	No
yes	Deployment	Bulgaria	TBD	TBD	9%	0%	0%	0%												
no	Deployment	Latvia	TBD	TBD	12%	0%	0%	0%	No	No	No	No	No	No	No	No	No	No	No	No
no	Deployment	Lithuania	TBD	TBD	10%	0%	0%	0%	No	No	No	No	No	No	No	No	No	No	No	No
yes	Onboarding	Croatia	TBD	TBD	10%	1%	0%	0%	No	No	No	No	No	No	No	No	No	No	No	No
yes	Onboarding	Ireland	TBD	TBD	13%	0%	0%	0%												
no	Onboarding	Cyprus	TBD	TBD	3%	0%	0%	0%												
no	Onboarding	Hungary	TBD	TBD	0%	0%	0%	0%												
no	Onboarding	Malta	TBD	TBD	6%	0%	0%	0%												
no	Onboarding	Romania	TBD	TBD	0%	0%	0%	0%												
60%			Yes			2%	7%	33%	21%	25%	4%	0%	8%	8%	0%	0%	0%	4%	0%	0%
			No						46%	54%	63%	58%	75%	83%	100%	92%	92%	92%	100%	100%
			Partial						33%	21%	33%	42%	17%	8%	0%	8%	8%	4%	0%	0%

Annex IV. GDI Node general progress indicator table – Operational

M18 Reporting Complete	Operational Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator (Yes =1, Partially =0.5)	Change since previous quarter	Operational Tech Progress	Operational Non Tech Progress	3.1.1 Operational Technical – Periodic review of security of existing infrastructure to make sure it complies with current best practice	3.2.1 Operational Technical – APIs assessed against users needs and feedback, updates scheduled	3.3.1 Operational Technical – Periodic auditing and revision of network and storage capacity to ensure stakeholders needs are met	3.4.1 Operational Technical – Compliance and stress tests regularly reviewed to ensure correspond to updated requirements and use cases	3.5.1 Operational Technical – Deployment of national 1+MG Infrastructure node (production) enabling data access across borders when agreement allowing it are in place	3.6.1 Operational Technical – Continuous support to Node interoperability, development, and security	3.7.1 Operational Technical – Continuous 1+MG infrastructure developments to meet use cases needs	3.8.1 Operational Technical – Evaluate and support technical solutions tested and and proposed by pillar III based on explicit use cases requirements	3.9.1 Operational Technical – Node meets technical KPIs	3.2.2 Operational Non Technical – Continuous Capacity building at European level	3.2.2 Operational Non Technical – Continuous support to EU users via node helpdesk (ELSI, data quality, data standards, technical infrastructure functions)
yes	Operational	Belgium	Onboarding	TBD	29%	4%	0%	#VALUE!	No	No	No	No	No	No	No	No	No	No	No
no	Operational	Czech Republic	Onboarding	TBD	19%	0%	0%	#VALUE!											
yes	Operational	Denmark	TBD	TBD	44%	7%	33%	#VALUE!	Yes	Partially	Partially	No	Partially	Partially	No	No	No	No	No
no	Operational	Estonia	TBD	TBD	13%	0%	0%	#VALUE!	No	No	No	No	No	No	No	No	No	No	No
yes	Operational	Finland	Deployment	TBD	41%	-1%	0%	#VALUE!											
no	Operational	France	Onboarding	TBD	26%	0%	0%	#VALUE!											
no	Operational	Germany	TBD	TBD	25%	0%	0%	#VALUE!											
yes	Operational	Italy	Onboarding	TBD	29%	3%	0%	#VALUE!											
yes	Operational	Luxembourg	Onboarding	TBD	21%	0%	0%	#VALUE!	No	No	No	No	No	No	No	No	No	No	No
no	Operational	Portugal	Onboarding	TBD	37%	0%	0%	#VALUE!	No	No	No	No	No	No	No	No	No	No	No
yes	Operational	Slovenia	Onboarding	TBD	34%	16%	0%	#VALUE!	No	No	No	No	No	No	No	No	No	No	No
yes	Operational	Spain	Operational	TBD	44%	19%	0%	#VALUE!	No	No	No	No	No	No	No	No	No	No	No
no	Operational	Sweden	Onboarding	TBD	44%	0%	0%	#VALUE!											
yes	Operational	The Netherlands	Onboarding	TBD	26%	-9%	0%	#VALUE!											
yes	Operational	Norway	TBD	TBD	32%	0%	0%	#VALUE!											
yes	Deployment	Bulgaria	TBD	TBD	9%	0%	0%	#VALUE!											
no	Deployment	Latvia	TBD	TBD	12%	0%	0%	#VALUE!											
no	Deployment	Lithuania	TBD	TBD	10%	0%	0%	#VALUE!	No	No	No	No	No	No	No	No	No	No	No
yes	Onboarding	Croatia	TBD	TBD	10%	1%	0%	#VALUE!	No	No	No	No	No	No	No	No	No	No	No
yes	Onboarding	Ireland	TBD	TBD	13%	0%	0%	#VALUE!											
no	Onboarding	Cyprus	TBD	TBD	3%	0%	0%	#VALUE!											
no	Onboarding	Hungary	TBD	TBD	0%	0%	0%	#VALUE!											
no	Onboarding	Malta	TBD	TBD	6%	0%	0%	#VALUE!											
no	Onboarding	Romania	TBD	TBD	0%	0%	0%	#VALUE!											
60%				Yes		2%	2%	#VALUE!	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
				No					96%	96%	96%	100%	96%	96%	100%	100%	100%	100%	100%
				Partial					0%	4%	4%	0%	4%	4%	0%	0%	0%	0%	0%

GDI project receives funding from the European Union's Digital Europe Programme under grant agreement number 101081813.

Onboarding: Croatia, Cyprus, Hungary, Ireland, Malta, Romania *Addressing national challenges for deployment*	Support
Involvement in 1+MG initiative (2024-Q4): - MS representatives participate in 1+MG MS meetings and Pillar I (GDI) - National experts are named and participate on the 1+MG WGs meetings (National implementation, ELIS, Sequencing, Standards, Infrastructure, Healthcare implementation, Health economics, Rare Diseases, Cancer, Common and complex (icl. Population genomics and Pharmacogenomics, infectious diseases)	EC & Project coordination
Establishment of National Mirror groups (2025-Q2) National mirror group is in place (replicating 1+MG WG structure) and have regular meeting (e.g quarterly) to drive national implementation and adoption of 1+MG Roadmap and 1+MG Framework	EC & Project coordination
National genomic plan or equivalent (2026-Q4) Secure multi year funding to support the national operations of the 1+MG infrastructure (=> Workshop being planned for 24/4/2024 registration to be open)	EC & Project coordination
Deployment of GDI products in test environment (2025-Q4) Deployment of synthetic data and starter kit products on test environment (first release on 2023-Q3) and connected to test services (e.g. Test Beacon Network)	Pillar II WP3 & WP5 Project coordination

Deployment (in addition to Onboarding): Bulgaria, Latvia, Lithuania *Operational at the national level, not connected to EU operations*	Support
Deployment of GDI products in test environment (2024-Q4) Deployment of synthetic data and starter kit products on test environment (first release on 2023-Q3) and connected to test services (e.g. Test Beacon Network)	Pillar II WP3 & WP5 Project coordination
Deployment of GDI products or interoperable solutions in pre-production environment (2025-Q3) Decision has been made on products that would be part of the national node and they are deployed in pre-production environment to join countries that has implemented Milestone 7 Data access governance demonstrator	Pillar II WP3 & WP5 Project coordination
National GDI node up up running in production environment providing services to the national community (2026-Q2) Deployment node realised	Pillar II WP3 & WP5 Project coordination

Operations (in addition to Deployment): Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Italy, Luxembourg, Portugal, Slovenia, Spain, Sweden, The Netherlands,Norway *Fully deployed national node Interconnected to EU services, able to provide access to data across borders following 1+MG Governance*	Support
Deployment of GDI products in test environment (2024-Q2) Deployment of synthetic data and starter kit products on test environment (first release on 2023-Q3)	Pillar II WP3 & WP5 Project coordination
Deployment of GDI products or interoperable solutions in pre-production environment (2024-Q4) Decision has been made on products that would be part of the national node and they are deployed in pre-production environment to join countries that has implemented Milestone 7 Data access governance demonstrator	Pillar II WP3 & WP5 Project coordination
National GDI node up up running in production environment providing services to the national community (2025-Q3) Deployment node realised	Pillar II WP3 & WP5 Project coordination
National GDI node connected to EU level services and providing across border access (2026-Q2) Operational node realised	Pillar II WP3 & WP5 Project coordination