Deliverable D1.18

6th GDI quarterly implementation report

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Date	Mvm	Who	Description
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14/10/2024	1VO	Yaseen Jakhura (ELIXIR)	Final version ready for upload

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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.

The information presented here corresponds to the status of the Nodes by M21.

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. 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 D1.12[3]. 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 - Q6 results

4.1.1 Deployment of technical expertise at the GDI Node Level - Q6

The data show that **37.6%** of the expected technical expertise to be in place on average during the duration of the project was deployed, however 29% of institutes did not report their FTE usage this quarter. 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 continued development across all of the three pillars will support the Nodes in guiding on how best to deploy their technical expertise. However, further development in this area is still required. The coordination team met in August to come up with a plan to support technical expertise deployment at the Nodes. Over the coming months, they will send the Nodes a survey on current and planned FTE usage for Node and project development and will follow up with 1:1 conversations, starting with the Operational goal Nodes and moving down from there. Additionally, other opportunities exist to leverage the existing funding for project support, including:

- Support additional countries in joining GDI
- Using Operational-goal Node project support FTEs to "mentor" Deployment & Onboarding Nodes
- 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

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[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 M21	Based on inputs from 71.0%
		Baseline FTEs	Actuals FTEs	Actuals / Baseline
Belgium	Operational	4.0	0.1	3%
Czech Republic	Operational	4.0	1.4	36%
Denmark	Operational	4.0	1.2	31%
Estonia	Operational	4.0	2.8	70%
Finland	Operational	4.0	2.4	59%
France	Operational	2.0	0.1	3%
Germany	Operational	4.0	0.7	16%
Italy	Operational	3.9	2.2	58%
Luxembourg	Operational	4.3	0.9	22%
Portugal	Operational	4.0	2.1	53%
Slovenia	Operational	4.0	1.6	39%
Spain	Operational	3.5	0.2	7%
Sweden	Operational	5.0	1.8	37%
The Netherlands	Operational	5.0	2.2	45%
Norway	Operational	4.0	0.7	17%
Bulgaria	Deployment	1.8	1.5	84%
Latvia	Deployment	2.0	1.4	71%
Lithuania	Deployment	2.0	0.7	37%
Croatia	Onboarding	1.0	0.6	55%
Ireland	Onboarding	1.0	0.6	64%
	Total:	**67.4**	**25.4**	**37.6%**
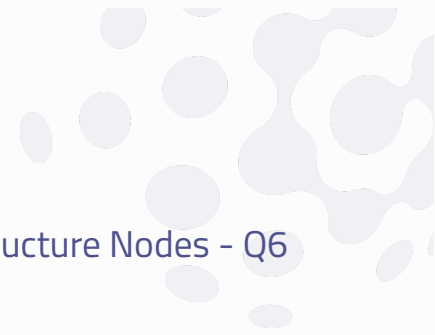
4.2 Monitoring the evolution of the European Genomic Data Infrastructure Nodes - Q6 results

- 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. We have received an updated timeline from Spain, which is now reflected in the table. Other countries have been encouraged to update their timelines based on recent developments. During the March 2024 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 - Q6 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 Q6 progress was focused on MS8, 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. After the completion of this penultimate major technical milestone, more focused work can occur to directly support Node maturation.

- At this point, 2 Nodes (Spain and Sweden) have attained the Onboarding level. When only considering technical indicators, Finland and Portugal have as well, with lack of a national genomic plan being the challenge for both. However, 15 Nodes have committed to reaching Onboarding by this point in the project. Spain now joins France, Ireland and Sweden in completing 100% of the Non-technical Onboarding indicators (see Annexe I). Sixteen 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.One of the technical indicators that many countries have not completed is 1.6.1, "Have deployed and validated an instance or PoC or an upgraded version incorporating additional use cases". As MS8 is focused on incorporation of a use case, we would expect many more Nodes to complete this after the delivery of that milestone.

- We had a moderate response rate by the Nodes this quarter (80%), which could be masking some of the progress made by the other 20% of the Nodes. This low response rate is likely due to the summer holidays. The requirement and value of completing this reporting has been reinforced with the Nodes.

Table 2 GDI Nodes Operational Readiness level by M21

GDI Node Operational Readiness		Start date	2022-11		Overall status:			
		Duration	48					
		By Month	21	2024-7				
Operartional Phase (2026)	GDI Node	Vanguard Node?	Expected Phase		Current Phase		Technical Phase	
Operational	Belgium	Yes	Onboarding		TBD		TBD	
Operational	Czech Republic		Onboarding		TBD		TBD	
Operational	Denmark		TBD		TBD		TBD	
Operational	Estonia		TBD		TBD		TBD	
Operational	Finland	Yes	Deployment		TBD		Onboarding	
Operational	France		Onboarding		TBD		TBD	
Operational	Germany		Onboarding		TBD		TBD	
Operational	Italy		Onboarding		TBD		TBD	
Operational	Luxembourg	Yes	Onboarding		TBD		TBD	
Operational	Portugal		Onboarding		TBD		Onboarding	
Operational	Slovenia		Onboarding		TBD		TBD	
Operational	Spain	Yes	Onboarding		Onboarding		Onboarding	
Operational	Sweden	Yes	Onboarding		Onboarding		Onboarding	
Operational	The Netherlands	Yes	Onboarding		TBD		TBD	
Operational	Norway	Yes	Onboarding		TBD		TBD	
Deployment	Bulgaria		TBD		TBD		TBD	
Deployment	Latvia		TBD		TBD		TBD	
Deployment	Lithuania		TBD		TBD		TBD	
Onboarding	Croatia		TBD		TBD		TBD	
Onboarding	Ireland		TBD		TBD		TBD	
Onboarding	Cyprus		TBD		TBD		TBD	
Onboarding	Hungary		TBD		TBD		TBD	
Onboarding	Malta		TBD		TBD		TBD	
Onboarding	Romania		TBD		TBD		TBD	

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.
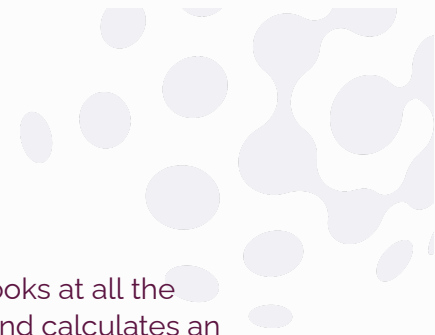
4.2.2. GDI Node general progress indicator - Q6 results

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

	M21 Reporting Complete	Operational Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator: (Yes =1, Partially =0.5)	Change since previous quarter
1	no	Operational	Belgium	Onboarding	TBD	31%	2%
2	yes	Operational	Czech Republic	Onboarding	TBD	19%	0%
3	yes	Operational	Denmark	TBD	TBD	44%	0%
4	yes	Operational	Estonia	TBD	TBD	19%	6%
5	yes	Operational	Finland	Deployment	TBD	41%	0%
6	no	Operational	France	Onboarding	TBD	26%	0%
7	yes	Operational	Germany	Onboarding	TBD	31%	2%
8	yes	Operational	Italy	Onboarding	TBD	34%	5%
9	yes	Operational	Luxembourg	Onboarding	TBD	24%	3%
10	no	Operational	Portugal	Onboarding	TBD	46%	9%
11	yes	Operational	Slovenia	Onboarding	TBD	34%	0%
12	no	Operational	Spain	Onboarding	nboardir	44%	0%
13	yes	Operational	Sweden	Onboarding	nboardir	47%	3%
14	yes	Operational	The Netherlands	Onboarding	TBD	25%	-1%
15	yes	Operational	Norway	Onboarding	TBD	32%	0%
16	yes	Deployment	Bulgaria	TBD	TBD	10%	1%
17	yes	Deployment	Latvia	TBD	TBD	15%	3%
18	yes	Deployment	Lithuania	TBD	TBD	15%	5%
19	yes	Onboarding	Croatia	TBD	TBD	10%	0%
20	yes	Onboarding	Ireland	TBD	TBD	15%	2%
21	no	Onboarding	Cyprus	TBD	TBD	3%	-7%
22	no	Onboarding	Hungary	TBD	TBD	0%	0%
23	yes	Onboarding	Malta	TBD	TBD	6%	0%
24	no	Onboarding	Romania	TBD	TBD	0%	0%

For a breakdown of progress within the Onboarding indicators, see Annexe I. Progress has been slow this quarter, likely due to the summer holidays, with the notable exception of Portugal which has

made significant progress into the Deployment phase, reaching 50% in both technical and non-technical indicators. One major blocker to technical advancement for all Nodes had been drafting compliance and stress tests. After re-analysis, we determined that the reason for this challenge is that the testing can only be drafted once the Node has moved to a production-like system. Therefore, the compliance and stress testing indicator has been moved to the Deployment stage as indicator 2.4.1; the pre-existing deployment-level testing implementation indicator has been moved to 2.4.2. Finally, hiring remains a challenge, 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 Finland has planned to achieve a stage beyond Onboarding, though only 2 of 13 countries aiming to have obtained the Onboarding level by this point have completed 100% of technical and non-technical Onboarding indicators, so support for advancement is focussed on these indicators. That said, there has been continuous improvement in Onboarding and Deployment indicators across all Nodes since last quarter. In the "Onboarding" section, we are down to 5 indicators under 40% from 7 last quarter. 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
  - **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. The completion of MS8 which incorporates a use case into the infrastructure demonstrator, should provide the Nodes what they need to complete this milestone.
- Steps with **26-40% completion** across all Nodes
  - **Security mitigation, management, and reporting system being drafted.**
    - **Action**: Most Nodes indicate that this work is underway and th information they require is available. 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:** There has been an overall 5% increase in completion of this indicator since last quarter. 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.

5. Results

- Use of resources remains a concern. A meeting of the coordination team has determined that 1:1 conversation with key Nodes is required to make further plans with regards to FTE usage. The coordination team can 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 PoC run with a use case and the completion of a National Genomic Plan. The work for MS8 is focused on this work and completion will help Nodes 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.A meeting of the Onboarding and Deployment goal Nodes was held in the September Pillar II workshop and capacity building and guidance requests were outlined for after the completion of MS8.
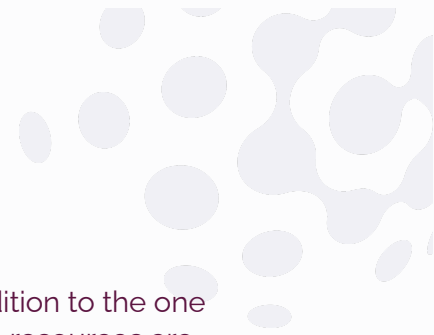
7. Conclusions & Impact

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) have been outlined, but a concrete plan needs to be put in place to support these when MS8 development work is completed.

8. Next steps

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

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

M21 Reporting Complete	Operartional Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator: (Yes =1, Partially =0.5)	Onboarding Overall Progress	Onboarding Tech Progress	Onboarding NonTech Progress
no	Operational	Belgium	Onboarding	TBD	31%	85%	86%	83%
yes	Operational	Czech Republic	Onboarding	TBD	19%	55%	50%	67%
yes	Operational	Denmark	TBD	TBD	44%	80%	79%	83%
yes	Operational	Estonia	TBD	TBD	19%	60%	64%	50%
yes	Operational	Finland	Deployment	TBD	41%	95%	100%	83%
no	Operational	France	Onboarding	TBD	26%	70%	57%	100%
yes	Operational	Germany	Onboarding	TBD	31%	75%	71%	83%
yes	Operational	Italy	Onboarding	TBD	34%	75%	71%	83%
yes	Operational	Luxembourg	Onboarding	TBD	24%	70%	64%	83%
no	Operational	Portugal	Onboarding	TBD	46%	90%	100%	67%
yes	Operational	Slovenia	Onboarding	TBD	34%	80%	79%	83%
no	Operational	Spain	Onboarding	nboardir	44%	100%	100%	100%
yes	Operational	Sweden	Onboarding	nboardir	47%	100%	100%	100%
yes	Operational	The Netherlands	Onboarding	TBD	25%	55%	57%	50%
yes	Operational	Norway	Onboarding	TBD	32%	80%	86%	67%
yes	Deployment	Bulgaria	TBD	TBD	10%	30%	29%	33%
yes	Deployment	Latvia	TBD	TBD	15%	45%	29%	83%
yes	Deployment	Lithuania	TBD	TBD	15%	40%	21%	83%
yes	Onboarding	Croatia	TBD	TBD	10%	35%	36%	33%
yes	Onboarding	Ireland	TBD	TBD	15%	50%	29%	100%
no	Onboarding	Cyprus	TBD	TBD	3%	10%	14%	0%
no	Onboarding	Hungary	TBD	TBD	0%	0%	0%	0%
yes	Onboarding	Malta	TBD	TBD	6%	20%	7%	50%
no	Onboarding	Romania	TBD	TBD	0%	0%	0%	0%
80%				Yes		69%	65%	76%

Annex II. GDI Node general progress indicator table – Onboarding

M21 Reporting Complete	Operational Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator (Yes =1, Partially =0.5)	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.	1.5.1 Onboarding Technical — Have deployed or made available the initial physical infrastructure for the evaluation of the current PoC, or an upgraded version incorporating additional use cases	1.6.1 Onboarding Technical — Have deployed and validated an instance or PoC or an upgraded version	1.7.1 Onboarding Technical — Load of synthetic data, functionalities demonstrated in development environment
1 no	Operational	Belgium	Onboarding	TBD	31%	85%	86%	83%	Partially	Yes	Yes	Partially	Yes	Yes	Yes	Yes	Partially	Yes
2 yes	Operational	Czech Republic	Onboarding	TBD	19%	55%	50%	67%	Partially	Yes	Yes	No	Partially	Yes	Partially	Partially	Partially	No
3 yes	Operational	Denmark	TBD	TBD	44%	80%	79%	83%	Yes	Yes	Yes	Partially	Partially	Yes	Yes	Yes	Partially	Partially
4 yes	Operational	Estonia	TBD	TBD	19%	60%	64%	50%	Partially	Partially	Yes	No	Yes	Yes	Partially	Yes	Partially	No
5 yes	Operational	Finland	Deployment	TBD	41%	95%	100%	83%	Yes	Yes	Yes	Partially	Yes	Yes	Yes	Yes	Yes	Yes
6 no	Operational	France	Onboarding	TBD	26%	70%	57%	100%	Partially	Yes	Yes	Yes	Partially	Yes	Partially	Yes	Partially	No
7 yes	Operational	Germany	Onboarding	TBD	31%	75%	71%	83%	Partially	Yes	Yes	Partially	Partially	Yes	Partially	Yes	Partially	Yes
8 yes	Operational	Italy	Onboarding	TBD	34%	75%	71%	83%	Yes	Yes	Yes	Partially	Yes	Yes	Partially	Partially	No	Yes
9 yes	Operational	Luxembourg	Onboarding	TBD	24%	70%	64%	83%	Partially	Yes	Yes	Partially	Partially	Partially	Partially	Yes	Partially	Yes
10 no	Operational	Portugal	Onboarding	TBD	46%	90%	100%	67%	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
11 yes	Operational	Slovenia	Onboarding	TBD	34%	80%	79%	83%	Yes	Yes	Yes	Partially	Yes	Yes	No	Yes	Partially	Yes
12 no	Operational	Spain	Onboarding	nboardin	44%	100%	100%	100%	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13 no	Operational	Sweden	Onboarding	nboardin	47%	100%	100%	100%	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14 yes	Operational	The Netherlands	Onboarding	TBD	25%	55%	57%	50%	Partially	Yes	Partially	No	Partially	Yes	Yes	Yes	No	No
15 yes	Operational	Norway	Onboarding	TBD	32%	80%	86%	67%	Yes	Partially	Yes	Partially	Yes	Yes	Partially	Yes	Partially	Yes
16 yes	Deployment	Bulgaria	TBD	TBD	10%	30%	29%	33%	No	Partially	Partially	No	Partially	No	Partially	Partially	Partially	No
17 yes	Deployment	Latvia	TBD	TBD	15%	45%	29%	83%	Partially	Yes	Yes	Partially	Partially	Partially	No	Partially	No	No
18 yes	Deployment	Lithuania	TBD	TBD	15%	40%	21%	83%	Partially	Yes	Yes	Partially	Partially	No	No	Partially	No	No
19 yes	Onboarding	Croatia	TBD	TBD	10%	35%	36%	33%	Yes	No	Yes	No	No	No	No	No	Yes	Partially
20 yes	Onboarding	Ireland	TBD	TBD	15%	50%	29%	100%	Partially	Yes	Yes	Yes	Partially	Partially	No	Partially	No	No
21 no	Onboarding	Cyprus	TBD	TBD	3%	10%	14%	0%	No	No	No	No	No	No	Partially	Partially	No	No
22 no	Onboarding	Hungary	TBD	TBD	0%	0%	0%	0%										
23 yes	Onboarding	Malta	TBD	TBD	6%	20%	7%	50%	No	Partially	Yes		No	No	No	Partially	No	No
24 no	Onboarding	Romania	TBD	TBD	0%	0%	0%	0%										
80%				Yes		69%	65%	76%	38%	67%	79%	17%	38%	58%	29%	54%	21%	42%
				No					21%	17%	13%	42%	21%	29%	33%	13%	38%	50%
				Partial					42%	17%	8%	42%	42%	13%	38%	33%	42%	8%
				Total	Total	58%	75%	83%	38%	58%	65%	48%	71%	42%	46%			
									53%	87%	93%	20%	60%	93%	47%	87%	27%	67%
									47%	13%	7%	80%	40%	7%	53%	13%	73%	33%
									0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

#	M21 Reporting Complete	Operational Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator (Yes =1, Partially =0.5)	Deployment Tech Progress	Deployment Non Tech Progress	2.1.1 Non Technical	2.1.2 Non Technical	2.2.1 Technical	2.2.2 Non Technical	2.3.1 Non Technical	2.3.2 Technical	2.4.1 Technical	2.4.2 Technical	2.5.1 Technical	2.6.1 Technical	2.7.1 Technical	2.8.1 Technical	2.9.1 Technical
1	no	Operational	Belgium	Onboarding	TBD	31%	6%	38%	Partially	Partially	Partially	Partially	No	No	No	No	No	No	No	No	No
2	yes	Operational	Czech Republic	Onboarding	TBD	19%	0%	25%	Partially			Partially			No						
3	yes	Operational	Denmark	TBD	TBD	44%	11%	75%	Partially	Yes	No	Partially	Yes	Partially	Partially	No	No	No	No	No	No
4	yes	Operational	Estonia	TBD	TBD	19%	6%	0%	No	No	No	No	No	No	Partially	No	No	No	No	No	No
5	yes	Operational	Finland	Deployment	TBD	41%	17%	75%	Yes	Yes	Yes	Partially	Partially		Partially	No	No	No	No	No	No
6	no	Operational	France	Onboarding	TBD	26%	0%	50%	Partially	Partially		Partially	Partially		No						
7	yes	Operational	Germany	Onboarding	TBD	31%	17%	38%	Partially	Partially	Partially	Partially		Partially	No		Partially			
8	yes	Operational	Italy	Onboarding	TBD	34%	17%	63%	Partially	Yes	Partially	Partially	Partially		Partially	No	Partially			
9	yes	Operational	Luxembourg	Onboarding	TBD	24%	11%	0%	No	No	Partially	No	No	No	No	No	No	No	Partially	No	No
10	no	Operational	Portugal	Onboarding	TBD	46%	50%	50%	Yes	Partially	Partially	No	Partially	Yes	Partially	Partially	Partially	Partially	Yes	No	No
11	yes	Operational	Slovenia	Onboarding	TBD	34%	17%	50%	Yes	Partially	Partially	Partially	No	Yes	No	No	No	No	No	No	No
12	no	Operational	Spain	Onboarding nboardi		44%	22%	75%	Yes	Yes	Partially	Partially	Partially	Partially	No	No	Partially	No	Partially	No	No
13	yes	Operational	Sweden	Onboarding nboardi		47%	28%	88%	Yes	Yes	Partially	Partially	Yes	Partially	Partially	No	Partially	Partially	No	No	No
14	yes	Operational	The Netherlands	Onboarding	TBD	25%	11%	50%	Partially	Yes	No	Partially	No	No	Partially	No	No	No	Partially	No	No
15	yes	Operational	Norway	Onboarding	TBD	32%	17%	38%	Partially	Partially	Partially	No	Partially	No	Partially	No	No	Partially	No	No	No
16	yes	Deployment	Bulgaria	TBD	TBD	10%	0%	13%	Partially	No	No	No	No	No	No	No	No	No	No	No	No
17	yes	Deployment	Latvia	TBD	TBD	15%	0%	13%	Partially	No	No	No	No	No	No	No	No	No	No	No	No
18	yes	Deployment	Lithuania	TBD	TBD	15%	0%	25%	Partially	No	No	Partially	No	No	No	No	No	No	No	No	No
19	yes	Onboarding	Croatia	TBD	TBD	10%	0%	0%	No	No	No	No	No	No	No	No	No	No	No	No	No
20	yes	Onboarding	Ireland	TBD	TBD	15%	0%	0%							No						
21	no	Onboarding	Cyprus	TBD	TBD	3%	0%	0%							No						
22	no	Onboarding	Hungary	TBD	TBD	0%	0%	0%													
23	yes	Onboarding	Malta	TBD	TBD	6%	0%	0%							No						
24	no	Onboarding	Romania	TBD	TBD	0%	0%	0%													
80%					Yes		11%	38%	21%	25%	4%	0%	8%	8%	0%	0%	0%	0%	4%	0%	0%
					No				33%	50%	58%	50%	67%	75%	67%	96%	79%	88%	83%	100%	100%
					Partial				46%	25%	38%	50%	25%	17%	33%	4%	21%	13%	13%	0%	0%

Indicator descriptions:
- 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 — Compliance and stress tests drafted and refined in context of requirements
- 2.4.2 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

#	M21 Reporting Complete	Operational Phase (2026)	GDI Node	Expected Phase	Current Phase	Progress indicator: (Yes =1, Partially =0.5)	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.?.? Operational Non Technical — Continuous Capacity building at European level	3.?.? Operational Non Technical — Continuous support to EU users via node helpdesk (ELSI, data quality, data standards, technical infrastructure functions)
1	no	Operational	Belgium	Onboarding	TBD	31%	0%	0%	No	No	No	No	No	No	No	No	No	No	No
2	yes	Operational	Czech Republic	Onboarding	TBD	19%	0%	0%											
3	yes	Operational	Denmark	TBD	TBD	44%	33%	0%	Yes	Partially	Partially	No	Partially	Partially	No	No	No	No	No
4	yes	Operational	Estonia	TBD	TBD	19%	0%	0%	No	No	No	No	No	No	No	No	No	No	No
5	yes	Operational	Finland	Deployment	TBD	41%	0%	0%											
6	no	Operational	France	Onboarding	TBD	26%	0%	0%											
7	yes	Operational	Germany	Onboarding	TBD	31%	0%	0%											
8	yes	Operational	Italy	Onboarding	TBD	34%	0%	0%											
9	yes	Operational	Luxembourg	Onboarding	TBD	24%	0%	0%	No	No	No	No	No	No	No	No	No	No	No
10	no	Operational	Portugal	Onboarding	TBD	46%	0%	0%	No	No	No	No	No	No	No	No	No	No	No
11	yes	Operational	Slovenia	Onboarding	TBD	34%	0%	0%	No	No	No	No	No	No	No	No	No	No	No
12	no	Operational	Spain	Onboarding	nboardir	44%	0%	0%	No	No	No	No	No	No	No	No	No	No	No
13	yes	Operational	Sweden	Onboarding	nboardir	47%	0%	0%											
14	yes	Operational	The Netherlands	Onboarding	TBD	25%	0%	0%											
15	yes	Operational	Norway	Onboarding	TBD	32%	0%	0%											
16	yes	Deployment	Bulgaria	TBD	TBD	10%	0%	0%											
17	yes	Deployment	Latvia	TBD	TBD	15%	0%	0%											
18	yes	Deployment	Lithuania	TBD	TBD	15%	0%	0%	No	No	No	No	No	No	No	No	No	No	No
19	yes	Onboarding	Croatia	TBD	TBD	10%	0%	0%	No	No	No	No	No	No	No	No	No	No	No
20	yes	Onboarding	Ireland	TBD	TBD	15%	0%	0%											
21	no	Onboarding	Cyprus	TBD	TBD	3%	0%	0%											
22	no	Onboarding	Hungary	TBD	TBD	0%	0%	0%											
23	yes	Onboarding	Malta	TBD	TBD	6%	0%	0%											
24	no	Onboarding	Romania	TBD	TBD	0%	0%	0%											
80%					Yes	2%	0%		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%

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

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

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