

Deliverable D1.13

1st GDI quarterly implementation report

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Date	Mvm	Who	Description	
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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 layed out in $\underline{D^11.12}$ 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.

These monitoring processes and tools are aiming 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 objectives, as well as the 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 two more Nodes reaching onboarding.

A summary of the information collected every quarter will be presented to the 1+MG Group (in addition to be 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 corresponded to the initial gathering of information from the GDI Nodes which is mainly meant to provide feedback to improve the processes and assets that have been built to gather the information and support them in their journey.

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.

¹ https://zenodo.org/record/7576210#.ZEYoBuzMJgs





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 application of appropriate secure multi-party and/or high-end computing, Al 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	No





Sustained coordination mechanism for the GDI and for the GoE multi-country project launched in the context of the 1+MG initiative.	
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 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 $\underline{\mathbb{D}^2}$ 1.12. In this report we will present and analyse the data initially collected as part of the first reporting exercise.

² https://zenodo.org/record/7576210#.ZEYoBuzMJqs





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 the technical expertise deployment - Q1 results

4.1.1.1 Deployment of technical expertise at the GDI Node Level - Q1

The Q1 results are influenced by the initial ramp up of the project and the use of in kind resources by pillar II participants (not captured by the report) which is not completely uncommon in the initial phases of EC projects. As a result, the data show that only **15**% of the expected technical expertise to be in place on average during the duration of the project was deployed in the first quarter of the project. This number is also affected by the fact that only **55**% of the Nodes were reporting utilisation of project resources during Q1.

Project participants have reported delays on recruitment which is expected to have still an effect in the forthcoming reports while the technical experts get fully deployed across all GDI Nodes.

Table 1 Deployment of technical expertise across GDI Nodes

Technical expertise deployment Pillar II						
GDI Node	Operational Readiness (target)	Baseline FTEs	Actuals FTEs	Actuals / Baseline		
Belgium	Operational	4.0	0.0	0%		
Czech Republic	Operational	4.0	0.2	4%		
Denmark	Operational	4.0	0.2	4%		
Estonia	Operational	4.0	0.8	19%		
Finland	Operational	4.7	0.5	11%		
France	Operational	4.0	0.0	0%		
Germany	Operational	4.0	0.1	2%		
Italy	Operational	3.9	2.3	58%		
Luxembourg	Operational	4.3	0.0	0%		
Portugal	Operational	4.0	1.9	46%		
Slovenia	Operational	4.0	0.8	21%		
Spain	Operational	5.0	0.0	0%		
Sweden	Operational	5.0	4.0	80%		





The Netherlands	Operational	5.0	0.4	9%
Norway	Operational	4.0	0.0	0%
Bulgaria	Deployment	1.8	0.0	0%
Latvia	Deployment	2.0	0.0	0%
Lithuania	Deployment	2.0	0.0	0%
Croatia	Onboarding	1.0	0.0	3%
Ireland	Onboarding	1.0	0.0	0%
		71.6	11.1	15.5%

4.2 Monitoring the evolution of the European Genomic Data Infrastructure Nodes - Q1 results

The main purpose of the GDI Nodes Operational Readiness gathering of data in this initial quarter was to make GDI Nodes familiar with the process and assets, and work towards building a common understanding of the criterias and how GDI Nodes can be better supported.

Due to the absence of a defined individual roadmap for Nodes until later this year, the monitoring results should be understood as only indicative.

There are two different views provided from the collected data, detailed in the following sections.

4.2.1 GDI Node Operational Readiness level - Q1 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.

As expected, for the first few iterations of this monitoring, there is no Node that has fulfilled the steps required to reach any of the defined phases.

Table 2 GDI Nodes Operational Readiness level by Mo3

	Start date	2022-11		Overall status:	Initial data gathering
GDI Node Operational	Duration	48			
Readiness	By Month	3	2023-1		
Operational		Vanguard	Expected		Management Board comments and
Phase (2026)	GDI Node	Node?	Phase	Current Phase	recommendations





Operational	Belgium	Yes	TBD	TBD	N/A
	Czech				
Operational	Republic		TBD	TBD	N/A
Operational	Denmark		TBD	TBD	N/A
Operational	Estonia		TBD	TBD	N/A
Operational	Finland	Yes	TBD	TBD	N/A
Operational	France		TBD	TBD	N/A
Operational	Germany		TBD	TBD	N/A
Operational	Italy		TBD	TBD	N/A
Operational	Luxembourg	Yes	TBD	TBD	N/A
Operational	Portugal		TBD	TBD	N/A
Operational	Slovenia		TBD	TBD	N/A
Operational	Spain	Yes	TBD	TBD	N/A
Operational	Sweden	Yes	TBD	TBD	N/A
	The				
Operational	Netherlands	Yes	TBD	TBD	N/A
Operational	Norway	Yes	TBD	TBD	N/A
Deployment	Bulgaria		TBD	TBD	N/A
Deployment	Latvia		TBD	TBD	N/A
Deployment	Lithuania		TBD	TBD	N/A
Onboarding	Croatia		TBD	TBD	N/A
Onboarding	Ireland		TBD	TBD	N/A
		Phases (Metrics)	Plan	Actual	
		Onboarding	0	0	
		Deployment	0	0	
		Operational	0	0	
		TBD	20	20	

Note: Data is based on a preliminary roadmap, pending Pillar II definition of the final roadmap for each GDI Node which should be available by the end of the first year.

4.2.3. GDI Node general progress indicator - Q1 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

Operational Phase (2026)	GDI Node / Step	Vanguard Node	Current Phase	Progress indicator: (Yes =1, Partially =0.5)
Operational	Belgium	Yes	TBD	10%
Operational	Czech Republic		TBD	0%
Operational	Denmark		TBD	13%
Operational	Estonia		TBD	6%
Operational	Finland	Yes	TBD	16%
Operational	France		TBD	0%
Operational	Germany		TBD	18%
Operational	Italy		TBD	0%
Operational	Luxembourg	Yes	TBD	7%
Operational	Portugal		TBD	15%
Operational	Slovenia		TBD	0%
Operational	Spain	Yes	TBD	0%
Operational	Sweden	Yes	TBD	40%
Operational	The Netherlands	Yes	TBD	24%
Operational	Norway	Yes	TBD	16%
Deployment	Bulgaria		TBD	0%
Deployment	Latvia		TBD	0%
Deployment	Lithuania		TBD	0%
Onboarding	Croatia		TBD	0%
Onboarding	Ireland		TBD	3%

In the summary view (<u>Table 3</u>) we can see that Vanguard Nodes are more advanced than non-Vanguard Nodes (in general) with some exceptions (e.g. Denmark, Germany, Portugal) where Nodes not identified as Vanguard could be on a trajectory to join them, maybe earlier than we could have anticipated. This would have to be confirmed in the following iterations of the monitoring and should reflect on their demonstrable technical progress.

This indicator can also be used to look across all GDI Nodes, identifying strengths and weaknesses that could be used to tailor outreach or capacity building activities within WP5. As shown in <u>Table 4</u>,





for the first two steps of the Onboarding Phase we can identify GDI Nodes that still have to meet the steps criteria, as well as others that have already taken that step and could share their approach, strategy and implementation to speed up the overall implementation.

Table 4 GDI Node general progress indicator, responses by GDI Node

GDI Node				Step	1.1.1	1.1.2
Operational				Phase	Onboarding	Onboarding
Readiness				Type	Technical	Non Technical
Operartional Phase (2026) =	GDI Node / Step ≕	Vanguard Node ·∣	Current Phase ·∣	Progress indicator: (Yes =1, Partially =0.5)	API use cases considered, specifications drafted and implementation in progress	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.
Operational	Belgium	Yes	TBD	10%	Partially	Partially
Operational	Czech Republic		TBD	0%		
Operational	Denmark		TBD	13%	No	Yes
Operational	Estonia		TBD	6%	No	Partially
Operational	Finland	Yes	TBD	16%	Yes	Yes
Operational	France		TBD	0%		
Operational	Germany		TBD	18%	Partially	Yes
Operational	Italy		TBD	0%		
Operational	Luxembourg	Yes	TBD	7%	Partially	Partially
Operational	Portugal		TBD	15%	No	Partially
Operational	Slovenia		TBD	0%		
Operational	Spain	Yes	TBD	0%		
Operational	Sweden	Yes	TBD	40%	Yes	Yes
Operational	The Netherlands	Yes	TBD	24%	Partially	Yes
Operational	Norway	Yes	TBD	16%	Yes	Partially
Deployment	Bulgaria		TBD	0%		
Deployment	Latvia		TBD	7%	Partially	Partially
Deployment	Lithuania		TBD	0%		
Onboarding	Croatia		TBD	0%		
Onboarding	Ireland		TBD	3%	No	Partially
				Yes	15%	25%
				No	60%	40%
				Partially	25%	35%



5. Results

Initial gathering of information has taken place socialising the process and the assets, however no all nodes have response to the request to provide information.

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 as a stage of the model that would prompt internal discussion within in the GDI Nodes, not only at the technical level, but at the strategic level too, which is crucial to ensure the infrastructure can be deployed and operated in the long term.

7. Conclusions & Impact

The initial objectives of the first monitoring report have been attained as the concept has been socialised with the Nodes, which has also triggered internal discussion and questions that will be addressed in the next iteration.

To increase the level of replies from GDI Nodes to both monitoring processes the ELIXIR Project Management Office will chase individually to promote that all project participants and GDI Nodes replies are incorporated into the next monitoring report providing a better view or where the project stands.

8. Next steps

The next gathering of information from Nodes will take place in June 2023.



Annexe I. GDI Node general progress indicator table - Onboarding

						-		+	-	+	-	-	+	-	-
GDI Node				Step	1.1.1	1.1.2	1.1.3	1.1.4	1.2.1	1.2.2	1.3.1	1.4.1	1.5.1	1.6.1	1.7.1
Operational Readiness				Phase	Onboarding	Onboarding	Onboarding	Onboarding	Onboarding	Onboarding	Onboarding	Onboarding	Onboarding	Onboarding	Onboarding
Readiness				Туре	Technical	Non Technical	Non Technical	Non Technical	Technical	Technical	Technical	Technical	Technical	Technical	Technical
Operartional Phase (2026)	GDI Node / Step −	Vanguard Node ·∥	Current Phase ·∥	Progress indicator: (Yes =1, Partially =0.5)	API use cases considered, specifications — drafted and implementation in progress	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.	Have developed the 1+MG NMG or equivalent structure to contribute to the 1+MG Initiative.	Have developed a national genomic plan or similar that secures long-term funding that matches the target implementation level.	Decision on services and components utilised	Software development best practises identified and implemented at the node	Security mitigation, management, and reporting system being drafted.	Compliance and stress tests drafted and refined in context of 1+MG requirements	Have deployed or made available the initial physical infrastructure for the evaluation of the current PoC, or an upgraded version incorporating	Have deployed and validated an instance or PoC or an upgraded version incorporating additional use cases	Load of synthetic data, functionalities emonstrated in development environment
Operational	Belgium	Yes	TBD	10%	Partially	Partially	Yes	No	Partially	Partially	No	No	Partially	No	No
Operational	Czech Republic		TBD	0%											
Operational	Denmark		TBD	13%	No	Yes	Yes	Partially	No	Partially	Yes	Partially	No	No	No
Operational	Estonia		TBD	6%	No	Partially	Yes	No	No	No	No	No	No	No	No
Operational	Finland	Yes	TBD	16%	Yes	Yes	Yes	Partially	Yes	Partially	Partially	No	No	No	No
Operational	France		TBD	0%											
Operational	Germany		TBD	18%	Partially	Yes	Yes	Partially	Partially	Yes	Partially	No	Yes	No	No
Operational	Italy		TBD	0%											
Operational	Luxembourg	Yes	TBD	7%	Partially	Partially	Yes	No	No	No	No	No	Partially	No	No
Operational	Portugal		TBD	15%	No	Partially	Yes	No	Partially	Partially	Partially	No	Yes	Partially	Partially
Operational	Slovenia		TBD	0%											
Operational	Spain	Yes	TBD	0%											
Operational	Sweden	Yes	TBD	40%	Yes	Yes	Yes	Partially	Yes	Yes	Yes	Partially	Yes	Yes	No
Operational	The Netherlands	Yes	TBD	24%	Partially	Yes	No	No	Partially	Partially	Yes	Partially	Yes	Partially	No
Operational	Norway	Yes	TBD	16%	Yes	Partially	Yes	Partially	Yes	Partially	Partially	No	Partially	No	No
Deployment	Bulgaria		TBD	0%											
Deployment	Latvia		TBD	7%	Partially	Partially	Yes	Partially	No	No	No	No	No	No	No
Deployment	Lithuania		TBD	0%											
Onboarding	Croatia		TBD	0%											
Onboarding	Ireland		TBD	3%	No	Partially	Partially	No	No	No	No	No	No	No	No
				Yes	15%	25%	50%	0%	15%	10%	15%	0%	20%	5%	0%
				No	60%	40%	45%	70%	65%	60%	65%	85%	65%	85%	95%
				Partially	25%	35%	5%	30%	20%	30%	20%	15%	15%	10%	5%





Annexe I. GDI Node general progress indicator table - Deployment

	,							 					 		· ·	-
GDI Node				Step	2.1.1	2.1.2	2.2.1	2.2.2	2.3.1	2.3.2	2.4.1	2.5.1	2.6.1	2.7.1	2.8.1	2.9.1
Operational Readiness				Phase	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment
Reaumess				Туре	Non Technical	Non Technical	Technical	Non Technical	Non Technical	Technical	Technical	Technical	Technical	Technical	Technical	Technical
Operartional Phase (2026) =	GDI Node / Step =	Vanguard Node ·∣	Current Phase ·∣	Progress indicator: (Yes =1, Partially =0.5)	Storage and network capacity needs achieved = ad hoc by hosting institution	Common software development best practises employed	Minimal set of APIs for the five — functionalities	Have built national capacity (ELS), data quality, data standards, technical infrastructure functions) for the deployment of the 1+MG node	Network and storage meets reliability, robustness, performance, security, and capacity requirements	Deployment of 1+MG national node for connection to the staging environment with synthetic data loaded	Implementation & successful performance of compliance and stress tests of node in isolation	Have completed the initial data load of synthetic data and linking to staging version of 1+MG European Infrastructure	Deployment of 1+MG national node but it is not yet connected to the 1+MG Infrastructure	Communication established with user portal and — 1+MG Infrastructure	Have finalised the initial deployment of national 1+MG production node enabling data access across borders in a staging environment	Production version ready to be deployed into production within the wider GDI
Operational	Belgium	Yes	TBD	10%												
Operational	Czech Republic		TBD	0%												
Operational	Denmark		TBD	13%												
Operational	Estonia		TBD	6%	Partially	No	No	No	No	No	No	No	No	No	No	No
Operational	Finland	Yes	TBD	16%												
Operational	France		TBD	0%												
Operational	Germany		TBD	18%												
Operational	Italy		TBD	0%												
Operational	Luxembourg	Yes	TBD	7%	No	No	No	No	No	No	No	No	No	No	No	No
Operational	Portugal		TBD	15%	No	No	No	No	No	No	No	No	No	No	No	No
Operational	Slovenia		TBD	0%												
Operational	Spain	Yes	TBD	0%												
Operational	Sweden	Yes	TBD	40%	Yes	Yes	Partially	Partially	Yes	No	No	No	Partially	No	No	No
Operational	The Netherlands	Yes	TBD	24%	Yes	Yes	No	Partially	No	No	No	No	No	No	No	No
Operational	Norway	Yes	TBD	16%												
Deployment	Bulgaria		TBD	0%												
Deployment	Latvia		TBD	7%	No	No	No	No	No	No	No	No	No	No	No	No
Deployment	Lithuania		TBD	0%												
Onboarding	Croatia		TBD	0%												
Onboarding	Ireland		TBD	3%												
				Yes	10%	10%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%
				No	85%	90%	95%	90%	95%	100%	100%	100%	95%	100%	100%	100%
				Partially	5%	0%	5%	10%	0%	0%	0%	0%	5%	0%	0%	0%





Annexe I. GDI Node general progress indicator table - Operational

					I 					1					1
GDI Node				Step	3.1.1	3.2.1	3.3.1	3.4.1	3.5.1	3.6.1	3.7.1	3.8.1	3.9.1	3.?.?	3.?.?
Operational Readiness				Phase	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
readiness				Туре	Technical	Technical	Technical	Technical	Technical	Technical	Technical	Technical	Technical	Non Technical	Non Technical
Operartional Phase (2026) =	GDI Node / Step ≂	Vanguard Node ·∣	Current Phase ·∣	Progress indicator: (Yes =1, Partially =0.5)	Periodic review of security of existing infrastructure to make sure it complies with current best practice	APIs assessed against users needs and feedback, updates scheduled	Periodic auditing and revision of network and storage capacity to ensure stakeholders needs are met	Compliance and stress tests regularly reviewed to ensure correspond to updated requirements and use cases	Deployment of national 1+MG Infrastructure node (production) enabling data access across borders when agreement allowing it are in place	Continuous support to Node interoperability, development, and security	Continuous 1+MG infrastructure developments to meet use cases needs	Evaluate and support technical solutions tested and and proposed by pillar III based on explicit use cases requirements	Node meets technical KPIs	Continuous Capacity building at European level	Continuous support to EU users via node helpdesk (ELSI, data quality, data standards, technical infrastructure functions)
Operational	Belgium	Yes	TBD	10%											
Operational	Czech Republic		TBD	0%											
Operational	Denmark		TBD	13%											
Operational	Estonia		TBD	6%	No	No	No	No	No	No	No	No	No	No	No
Operational	Finland	Yes	TBD	16%											
Operational	France		TBD	0%											
Operational	Germany		TBD	18%											
Operational	Italy		TBD	0%											
Operational	Luxembourg	Yes	TBD	7%											
Operational	Portugal		TBD	15%	No	No	No	No	No	No	No	No	No	No	No
Operational	Slovenia		TBD	0%											
Operational	Spain	Yes	TBD	0%											
Operational	Sweden	Yes	TBD	40%											
Operational	The Netherlands	Yes	TBD	24%											
Operational	Norway	Yes	TBD	16%											
Deployment	Bulgaria		TBD	0%											
Deployment	Latvia		TBD	7%											
Deployment	Lithuania		TBD	0%											
Onboarding	Croatia		TBD	0%											
Onboarding	Ireland		TBD	3%											
				Yes	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
				No	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
				Partially	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%