



Deliverable D1.14

2nd GDI quarterly implementation report

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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.
 - **(New from this report) Identifying across Nodes capacity building actions required to target onboarding.** We acknowledge the different access to skills and resources each GDI Node has which imply 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 technical level and non-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 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.

¹ https://zenodo.org/records/7576210#_ZEYoBuzMJqs



The information presented here corresponded to the status by Mg (M8 for the operational readiness as no significant progress has happened over the holiday season).

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.

B1MG² is releasing the beta version of the 1+MG Framework <https://framework.onemilliongenomes.eu/> which will be a useful resource to build capacity and facilitate the dissemination of the 1+MG recommendations and guidelines coming from the project to support the implementation (B1MG, GDI, GoE, EHDS,...). The first official release will take place in October 2023 and should help GDI members to navigate recommendations and understand how the different components work together for GDI, and align with the EHDS. The framework maintenance will continue in GDI after the end of B1MG.

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
<p>Outcome 1</p> <p>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.</p>	Yes
<p>Outcome 2</p> <p>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, AI and simulation techniques and resources.</p>	Yes
<p>Outcome 3</p> <p>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.</p>	No
<p>Outcome 4</p> <p>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.</p>	No





<p>Outcome 5</p> <p>Sustained coordination mechanism for the GDI and for the GoE multi-country project launched in the context of the 1+MG initiative.</p>	<p>No</p>
<p>Outcome 6</p> <p>Communication strategy – to be designed and implemented at the European and national levels.</p>	<p>No</p>
<p>Outcome 7</p> <p>Capacity building measures necessary to ensure the establishment, sustainable operation, and successful uptake of the infrastructure.</p>	<p>Yes</p>
<p>Outcome 8</p> <p>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.</p>	<p>No</p>





3. Methods

The methods and processes to gather the monitoring information were established in [D³1.12](#). 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 the technical expertise deployment - Q2 results

4.1.1 Deployment of technical expertise at the GDI Node Level - Q2

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 **37%** of the expected technical expertise to be in place on average during the duration of the project was deployed up to month 9. 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 still have an effect in the forthcoming reports while the technical experts get fully deployed across all GDI Nodes.

IMPORTANT: Those institutions that have not completed the information please ask your financials/admin teams to complete the Use of Resources by Mo9 [here](#).

Note if the current trend of lack of deployment of resources is confirmed in the next two reports we will need to consider alternatives to address the situation, for example:

- Increase involvement ind WP6 to build data management capacity across all Nodes in order to accelerate flow of data once the data governance is agreed and in compliance with the 1+MG Framework (<https://framework.onemilliongenomes.eu/ehds-data-lifecycle>)
- Increase efforts for synthetic data generation
- Additional activities in order to accelerate Nodes deployment
- Others to be identified

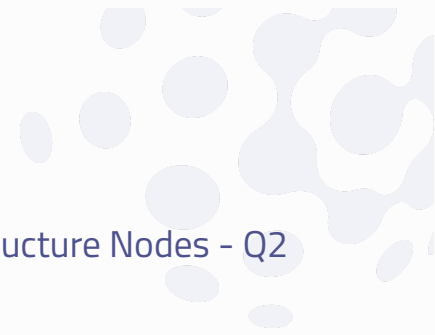
³ <https://zenodo.org/record/7576210#.ZEYoBuzMJqs>



Table 1 Deployment of technical expertise across GDI Nodes

Technical expertise deployment Pillar II		By M09		Based on inputs from 69.2%
GDI Node	Operational Readiness (target)	Baseline FTEs	Actuals FTEs	Actuals / Baseline
Belgium	Operational	4.0	0.0	0%
Czech Republic	Operational	4.0	0.7	16%
Denmark	Operational	4.0	1.0	25%
Estonia	Operational	4.0	1.8	46%
Finland	Operational	4.7	2.5	54%
France	Operational	4.0	0.0	0%
Germany	Operational	4.0	0.5	12%
Italy	Operational	3.9	1.9	48%
Luxembourg	Operational	4.3	0.8	18%
Portugal	Operational	4.0	2.5	64%
Slovenia	Operational	4.0	1.6	40%
Spain	Operational	5.0	0.1	2%
Sweden	Operational	4.5	4.8	106%
The Netherlands	Operational	5.0	2.1	43%
Norway	Operational	4.0	0.4	9%
Bulgaria	Deployment	1.8	1.4	78%
Latvia	Deployment	2.0	1.3	65%
Lithuania	Deployment	2.0	0.2	12%
Croatia	Onboarding	1.0	0.1	5%
Ireland	Onboarding	1.0	0.4	38%
Total:		71.1	24.0	33.7%





4.2 Monitoring the evolution of the European Genomic Data Infrastructure Nodes - Q2 results

- The main purpose of the GDI Nodes Operational Readiness gathering of data is to monitor the Nodes journey and to identify capacity building actions that will help Nodes to meet their targets by the end of the project
- Due to the absence of a defined individual roadmap for Nodes until later this year, the monitoring results should be understood as only indicative until then
- There are two different views provided from the collected data, detailed in the following sections.
- In this occasion a further analysis of the second one has been provided to identify capacity building action to be carried out in order to support Nodes on reaching the onboarding stage. This exercise will continue in the following reports.

4.2.1 GDI Node Operational Readiness level - Q2 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 Mog

GDI Node Operational Readiness	Start date Duration By Month	2022-11		Overall status: No expectations for nodes to reach onboarding yet	
		48			
		9 2023-7			
Operational Phase (2026)	GDI Node	Vanguard Node?	Expected Phase	Current Phase	Management Board comments and recommendations
Operational	Belgium	Yes	TBD	TBD	N/A
Operational	Czech 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
Operational	The 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.





4.2.2. GDI Node general progress indicator - Q2 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

Operational Phase (2026)	GDI Node / Step	Vanguard Node	Current Phase	Progress indicator: (Yes =1, Partially =0.5)	
Operational	Belgium	Yes	TBD	25%	10%
Operational	Czech Republic		TBD	0%	0%
Operational	Denmark		TBD	13%	13%
Operational	Estonia		TBD	6%	6%
Operational	Finland	Yes	TBD	16%	16%
Operational	France		TBD	0%	0%
Operational	Germany		TBD	22%	18%
Operational	Italy		TBD	16%	0%
Operational	Luxembourg	Yes	TBD	18%	7%
Operational	Portugal		TBD	15%	15%
Operational	Slovenia		TBD	0%	0%
Operational	Spain	Yes	TBD	0%	0%
Operational	Sweden	Yes	TBD	40%	40%
Operational	The Netherlands	Yes	TBD	25%	24%
Operational	Norway	Yes	TBD	24%	16%
Deployment	Bulgaria		TBD	0%	0%
Deployment	Latvia		TBD	7%	0%
Deployment	Lithuania		TBD	0%	0%
Onboarding	Croatia		TBD	0%	0%
Onboarding	Ireland		TBD	3%	3%

Progress has been made from the last report (M8) for Belgium, Italy, Luxembourg and Latvia



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4.2.3. GDI Node general progress indicator - Capacity building actions

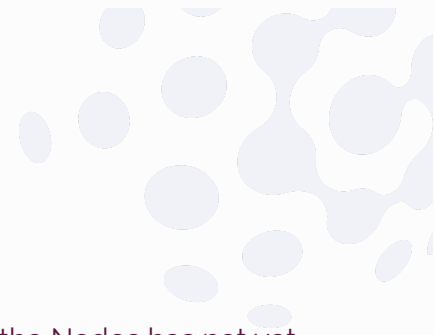
Looking at the information provided by the Nodes clear actions emerge to build capacity both across technical and non-technical requirements ([see Annexe I](#))

- Steps with 0% completion across all Nodes
 - **Have developed a national genomic plan or similar that secures long-term funding that matches the target implementation level.**
 - **Action:** GDI Coordination to call a workshop to share experiences before the end of the year, once new countries have joined, making use of task 1.6 National mirror groups support
 - **Compliance and stress tests drafted and refined in context of 1+MG requirements**
 - **Action:** To be tackled during the Pillar II technical workshop in Rome October 9-11

- Steps with 10% completion across all Nodes
 - **Have deployed and validated an instance or PoC or an upgraded version incorporating additional use cases**
 - **Action:** To be tackle during the Pillar II technical workshop in Rome October 9-11

- Steps with 20% completion across all Nodes
 - Load of synthetic data, functionalities demonstrated in development environment
 - **Action:** To be tackle during the Pillar II technical workshop in Rome October 9-11 - specific session on demonstrating starterkit to GDI Nodes which haven't been heavily involved in the starterkit release
 - Decision on services and components utilised
 - **Action:** To be tackle during the Pillar II technical workshop in Rome October 9-11 - specific session on demonstrating starterkit to GDI Nodes which haven't been heavily involved in the starterkit release
 - Software development best practises identified and implemented at the node
 - **Action:** To follow up with Nodes in next report
 - Security mitigation, management, and reporting system being drafted.
 - **Action:** To follow up with Nodes in next report
 - Load of synthetic data, functionalities demonstrated in development environment
 - **Action:** To be tackle during the Pillar II technical workshop in Rome October 9-11 - specific session on demonstrating starterkit to GDI Nodes which haven't been heavily involved in the starterkit release





5. Results

- Use of resources shows a negative trend that needs to be monitored
- Although no Node has reached the onboarding status, the roadmap for the Nodes has not yet been fixed
- 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 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

Use of resources trend 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 II 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 November 2023





Annexe I. GDI Node general progress indicator table - Onboarding

M09 - Q3					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 Phase (2026)	GDI Node / Step	Vanguard Node	Current Phase	Step Phase Type	Progress indicator: (Yes = 1, Partially = 0.5)	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
						Technical	Non Technical	Non Technical	Non Technical	Technical	Technical	Technical	Technical	Technical	Technical	Technical
						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 additional use cases	Have deployed and validated an instance or PoC or an upgraded version incorporating additional use cases	Load of synthetic data, functionalities demonstrated in development environment
Operational	Belgium	Yes	TBD		25%	Partially	Partially	Yes	Partially	Partially	Partially	Yes	No	Yes	Yes	Yes
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		22%	Partially	Yes	Yes	Partially	Partially	Yes	Partially	No	Yes	Partially	Yes
Operational	Italy		TBD		16%	Partially	Partially	Yes	Partially	Yes	No	No	No	Partially	No	Partially
Operational	Luxembourg	Yes	TBD		18%	Partially	Yes	Yes	Partially	Partially	No	No	No	Yes	Partially	Yes
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		25%	Partially	Yes	No	No	Partially	Partially	Yes	Partially	Yes	Partially	Partially
Operational	Norway	Yes	TBD		24%	Yes	Partially	Yes	Partially	Yes	Yes	Partially	No	Yes	Partially	Yes
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%	30%	55%	0%	20%	20%	20%	0%	35%	10%	20%
					No	55%	35%	40%	55%	55%	55%	60%	85%	60%	65%	65%
					Partially	30%	35%	5%	45%	25%	25%	20%	15%	5%	25%	15%



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Annexe II. GDI Node general progress indicator table - Deployment

M09 - Q3					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 Phase (2026)	GDI Node / Step	Vanguard Node	Current Phase	Step Phase Type	Progress indicator: (Yes =1, Partially =0.5)	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	Deployment	
						Non Technical	Non Technical	Technical	Non Technical	Non Technical	Technical	Technical	Technical	Technical	Technical	Technical	Technical
						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 (ELSI, 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 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	25%		Partially	No	Partially	No	No	No	No	No	No	No	No	No
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	22%													
Operational	Italy		TBD	16%													
Operational	Luxembourg	Yes	TBD	18%		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	25%		Yes	Yes	No	Partially	No	No	No	No	No	No	No	No
Operational	Norway	Yes	TBD	24%													
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		80%	90%	90%	90%	95%	100%	100%	100%	95%	100%	100%	100%
				Partially		10%	0%	10%	10%	0%	0%	0%	0%	5%	0%	0%	0%



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Annexe III. GDI Node general progress indicator table - Operational

M09 - Q3					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 Phase (2026)	GDI Node / Step	Vanguard Node	Current Phase	Step Phase Type	Progress indicator: (Yes = 1, Partially = 0.5)	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	
						Technical	Technical	Technical	Technical	Technical	Technical	Technical	Technical	Technical	Non Technical	Non Technical
						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 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	25%												
Operational	Czech Republic		TBD	0%												
Operational	Denmark		TBD	13%												
Operational	Estonia		TBD	6%	No	No	No	No	No	No	No	No	No	No	No	No
Operational	Finland	Yes	TBD	16%												
Operational	France		TBD	0%												
Operational	Germany		TBD	22%												
Operational	Italy		TBD	16%												
Operational	Luxembourg	Yes	TBD	18%	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%												
Operational	The Netherlands	Yes	TBD	25%												
Operational	Norway	Yes	TBD	24%												
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%



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