Organisation for Economic Co-operation and Development

DSTI/STP/GSF(2023)5/ANN/FINAL

Unclassified

English - Or. English

15 June 2023

DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INNOVATION
COMMITTEE FOR SCIENTIFIC AND TECHNOLOGICAL POLICY

OECD Global Science Forum

ANNEX TO THE POLICY PAPER ON VERY LARGE RESEARCH INFRASTRUCTURES: POLICY ISSUES AND OPTIONS

This document is an annex to the Policy Paper on Very Large Research Infrastructures: Issues and Options [**DSTI/STP/GSF(2023)5/FINAL]**. It was declassified by written procedure by the Committee on Scientific and Technological Policy along with its parent document on 9 June 2023.
This annex document summarises the decision-making processes and strategic instruments used by countries surveyed during the Global Science Forum activity on very large research infrastructures (VLRIs) for their investment policy into VLRIs and provides some information on their characteristics and limitations.

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JT03522045

Summary of current decision-making approaches and strategic tools used by surveyed countries

Country/Funder	Main strategic tools/community input	Top-down/bottom up? All domains?	Specific to large RI/use of Threshold?	National vs international	Lifecycle funding?	Particularities	Challenges/Improvements sought
Research Council of Norway	-National RI strategy since 2010 - National RI roadmap renewed at each funding call - Long-term plan for research and higher education - Alignment with ESFRI roadmap	All domains but some targeted calls/Bottom-up approach	Within same mechanism for all RIs/Minimum threshold investment to qualify is 180k€ up to 18M€; investments above this, or with long timespans, are rare and need ministerial approval with allocation in national budget	Same process but International investments mainly to purchase memberships/access to VLRI	Planning phase (exceptionally), construction and upgrades, limited direct operational funding (mostly via research projects using the facility)	Mainly targets renewal of Norwegian RI but allows for new RIs Call for proposal for funding is same process to be on roadmap (*roadmap includes good but not funded projects for lack of budget*)	Remain flexible, maintain budget Realistic costs
Swedish Research Council	A four-year cycle that starts with a Bi-annual Needs inventory (our roadmapping process) and then publication of our Roadmap, called the Guide to Research Infrastructures. ESFRI Roadmap	All domains / Bottom-up *(really domain agnostic)*	Some calls may be specific to larger RIs but typically no thresholds , there can also be a special process for certain singular RI's (i.e. our national synchrotron)	Same process (with some exceptions)	construction, operation, upgrades and decommissioning	Prequalification process to be included in the needs inventory before applying for funding Some ad-hoc funding decisions to VLRI (e.g. convention bound) outside regular processes with its own budget appropriation	Timing mismatches between international partners funding decisions Difficulty reconciliating with partners using a top-down approaches Difficult to ensure long-term engagement/sustainability with short-term funding commitments

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						University Co-funding at 50% normally applies for national RI´s	Reconciliating different approaches regarding societal impact Challenging to prioritize within the budget the support to different RI needs (weigh up the benefit of a long-term engagement against the need to renew Sweden's research infrastructure) Difficult to make long-term budget plans, particularly for international partnerships, due to yearly allocation from the government (e.g. it does not take into account exchange rates variations)
Germany's Federal Ministry of Education and Research	- The National Roadmap for RIs (2011-2013 as pilot and 2015-2019) -ESFRI roadmap -Other plans such as Leibniz & Helmholtz Roadmaps - Community plans	All domains / Bottom -up	Specific to VLRI linked to roadmap/Threshold of 50M€ (20M€ for social sciences and humanities)	Same process	Planning phase (exceptionally), construction and upgrades, limited direct operational funding (mostly via science organisations)	Pact for Research and Innovation with Länder for shared costs	Operational funding for participation in international research infrastructures/Particular budget line

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USA – National Science Foundation	Decadal plans in various disciplines	Generally bottom-up/All domains	Major facilities program for investments above US$100M	Same process	Research costs and all RI phases: planning, development, construction, operations, decommissioning. Different Congressional appropriations for planning, development and operations than for construction	Elaborate stage-gate review process for decision-making Conducts portfolio reviews on specific topics	Roadmap or similar cross-disciplinary planning process; Separation of RI operations funds from general agency research funds (right now all come from one account and each discipline must determine balance between operations funding for its RI and grant funding to researchers)
USA – Department of Energy (*Fusion Energy Sciences Program)*	-Fusion Energy Sciences Advisory Committee (FESAC) as an independent body of US experts FESAC leads the long-range strategic planning (decadal plan for fusion)	Top-down with community input/Targeted programs	Specific to large RIs with decision matrix based on $ threshold. (Decisions on VLRI investments over US$400M fall to Office of Science or DOE leadership)	Same process	Research costs and all RI phases: planning, development, construction, operations, decommissioning. Different Congressional appropriations for pre- and post operations	FES program is sole funder of fusion R&D No external funding is applied to US scope of projects Elaborate stage-gate review process for decision-making and project management (critical decisions points) Direct involvement in project management and delivery	TBD

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Canadian Space Agency	-Use of decadal plans for astronomy and particle physics - CSA strategy, alignment with partners' plans (e.g., NASA, European Space Agency, as a member)	Mix of top down/bottom-up	No open calls for large VLRIs/direct negotiations	Both types but most projects are Int'l	All phases included in space projects	Direct involvement in project management, funding and research as both funder and research organisation	-Limited budget to lead initiatives -As a minor partner, vulnerable to decisions made by major partners
Canada foundation for Innovation	- Use of decadal plans for astronomy and particle physics - Pan-Canadian Genomics and Artificial Intelligence Strategies (on-going), and a National Quantum Strategy	Bottom-up/domain agnostic	No dedicated program for VLRI planning and construction but program for operations funds of large national RIs	Same process	Not yet integrated RI lifecycle funding mechanisms	-Decisions independent from government – strictly by independent merit-review - Rarely covers 100% of costs as it requires matching funding from other partners although some int'l projects may be funded at 100% Large National RIs (e.g., TRIUMF) owned by universities	-RI funding distinct from research funding - Limited flexibility to adjust for budget fluctuations on large RIs and for funding major upgrades -Need coherent decision-making framework for large national and Int'l RIs with more guidance from strategic tools/committees
France - Ministry for Higher Education and Research	-National RI roadmap well coordinated in parallel with ESFRI Roadmap	Combination /all domains	Covered but specificities for VLRI / > 20M€ additional SEI review; >100M€ counter-expertise SEI	Same process – the roadmap includes opportunities at	- Construction, operations, upgrades or divestment	- Good governance important criterion to qualify for roadmap	-Lack of agility in adjusting individual VLRI budgets

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	- National R&D strategy (loi de programmation de la recherche) - Decadal plans (probably)		review by top Gov before qualifying on roadmap	national, EU, and int'l levels			Risk assessment found to be insufficient following recent crises - Requires involvement of several ministries for large investments
Korea - Ministry of Science and ICT/ National Research Facilities Equipment Center (NFEC)	- National R&D vision -National roadmap with distinct VLRI category - Annual landscape analysis with input from facilities - long term investment strategy, portfolio approach reviewed every 3 years	Centralized top-down with input from communities/all domains	Covered but specificities for / Above 37M€ (15M€) additional Investment feasibility review	Same process but operating business model different (i.e. central vs joint fund)	-Planning, construction and operations (while termination is owner's responsibility) - Mechanism for budget adjustments	New approach implemented in 2019 Direct involvement in project management and delivery Most RIs owned by research institutions, not government.	-Extensive process involving parallel decisions from up to 50 ministries - Need better coordination of national roadmap and linkages to international roadmaps - Accurate estimates of operation costs and HR needs
UK Research and Innovation	National R&D Roadmap RI Landscape analysis leading to national RI roadmap Community plans (e.g. Light source vision report)	Mix of bottom up and down All domains – UKRI comprises 9 domain specific councils	Covered (Infrastructure Fund & Digital RI) but specificities for VLRI	Same process	New infrastructure •Major Upgrades •Repurposing •Transformative developments •Decommissioning	- Funding decisions independent from government (Haldane principle) - Portfolio approach	

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South Africa - National Research Foundation	National Development Plan: Vision 2030 Science Engagement Strategy Human Capital Development Strategy for Research, Innovation and Scholarship Higher Education Science and Innovation Landscape review	Top-down / All domains	VLRI funding and access to global RIs on case-by-case basis/ Thresholds apply (but not specified)	Same process	Assumed to be the case	Ecosystems view: Decisions strongly tied to regional development (e.g, economic, skills) and leveraging past investments Mandate to broker agreements for Int'l VLRI Ratification of SKA treaty approved by both house of parliament	Competing priorities for limited funding Lack of optimal co-investment Global economic outlook and ability of partners remain engaged
Netherlands	National Roadmap since 2008, Permanent Committee and strategic framework for National RI roadmap since 2016 - National RI roadmap renewed periodically, each four (five) years - Long-term policy (cabinet's vision and policy letter) for research and higher education	All domains Bottom up within a given framework: the Dutch research field (9 groups within the 3 domains) is responsible for the strategic choices: formulating the LRI plans for the investment agenda for	Threshold of M€ 10 = minimum investment budget	Same process	Investments in new VLRI or upgrades of existing VLRI. The funds for roadmap-projects will be allocated on a competitive basis and are aimed at a capital investment for the construction of the VLRI and for the initial phase of the exploitation. A strategy for the full lifespan is required.	Projects on the National Roadmap can apply for Roadmap funding via a separate call each two years; proposals for funding are assessed by a separate assessment committee	It is impossible for universities and national research institutes to cover the costs for LRI from their basic funding. There is a dire need for new investments in LRI in all research areas. Ambitions exceeds the regular budget for LRI. The current Cabinet has announced additional budget for LRI for the coming 10 years.

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	- Alignment with ESFRI roadmap: LRI that request Roadmap funding at the European level, should connect wherever possible with the relevant infrastructure that is part of the ESFRI Roadmap	most needed LRI.			A contribution in the exploitation cost of the requested Support can be requested for a maximum period of five years. This is a one-off contribution restricted to half of the project duration. Co-investment of 25% required		