Tillaga að verkefni
á nýjan vegvísi um rannsóknarinnviði
2025

Titill verkefnis:

IREI –Empowering Science with Secure Infrastructure

Heiti stofnunar: University of Iceland

Vinsamlegast hafið eftirfarandi atriði í huga við gerð tillögunnar

Umsækjandi þarf að svara öllum liðum hér að neðan. Þar sem stendur „Texti" er hægt að skrifa texta, setja inn myndir eða töflur.

Tillögum að innviðum á vegvísi um rannsóknarinnviði skal skilað á þar til gerðu eyðublaði. Ekki er leyfilegt að eiga við uppsetningu eyðublaðsins.

Skjalið „Tillaga að innviðum á vegvísi um rannsóknarinnviði" skal að hámarki vera þrjár blaðsíður, auk forsíðu, eða samtals fjórar blaðsíður. Nota skal leturgerð og leturstærð eins og stillt er í eyðublaðinu, þ.e. 11 punkta Calibri (body). Ekki er leyfilegt að breyta breidd spássíu eða beyta fyrirsögnum í eyðublaðinu. Umsókn skal senda inn sem PDF-skjal.

Festur til að skila inn tillögum er til 12. september 2024, kl. 15.00.

Nánari upplýsingar er að finna á [heimasíðu Innviðasjóðs](https://) og hjá sérfræðingum Innviðasjóðs hjá Rannís í gegnum tölvupóstfangið innvidasjodur@rannis.is

Lýsing á tillögu til birtingar á heimasíðu Innviðasjóðs

1. Samantekt: Stutt lýsing innviðum

IREI, Icelandic e-infrastructure, is a comprehensive e-infrastructure solution designed for universities and research institutions. We provide essential services to support research, including:

- Secure, robust and scalable storage for research data
- Secure data discovery and management tools
- High-performance computing resources
- Collaborative sharing platforms
- Expert consulting tailored to specific research needs

IREI offers a unified and accessible platform, that helps researchers efficiently manage, analyze, and share their data across various scientific disciplines.

IREI was included in the Rannís infrastructure roadmap for 2020-2024 and received approximately 450 million IKr in funding. These funds were used to procure equipment and build the foundation for IREI´s infrastructure.

Today, IREI offers a powerful national platform with 770 teraflops of computing power, 3 petabytes of storage for research data, and a comprehensive data workspace and sharing solution. IREI´s team of 4 employees provides IT consulting and support services.

The IREI user community has grown significantly, from 80 users in 2021 to 230 in 2024. Users come from diverse scientific fields, including health sciences, life sciences, physics, engineering, earth sciences, and more. They represent universities (University of Iceland, University of Reykjavík, University of Akureyri) and research institutes (Meteorological Office, Matís, Institute of Natural History, ÍSOR, etc.).

Regarding IREI usage, HPC usage grows annually about 30-40 % and usage of storage grows annually about 50 %. The number of service requests for IREI has increased significantly since 2022. Each year, there is 2-3 fold increase in ticket volume, indicating a rapid growth in IREI usage. A user group has been established to provide valuable feedback on service quality. During the grant period (2020-2024), IREI hosted a conference highlighting the importance of e-infrastructure for Icelandic research. Several scientists shared how IREI is supporting their research endeavours. An IREI conference is planned to occur every two years, as well as annual user community meetings.

To keep up with the pace of the advancing Icelandic scientific environment, IREI will continue to evolve in the coming years, with key areas of focus including high-performance computing (HPC), data storage, data services, artificial intelligence (AI), and cyber security:

HPC: Annual investment in HPC equipment is essential to meet the growing computational demand of our researchers. Due to rapid advancements in software and hardware, HPC infrastructure requires regular investment in computing power.

Data Storage: As more data is stored centrally in IREI's storage solution, the demand for additional storage capacity is increasing rapidly.

Data Services: Plans are being made for IREI to offer a comprehensive data service that includes assistance with data planning, gathering, data protection regulations (GDRP) routines (e.g. in human subjects research) and storage throughout the research project lifecycle.

Within limits of GDPR, assistance with creating public access of research data is also planned to be included in this data service. To provide these services, IREI may need to expand its team through external contracts or by hiring data specialists.

AI: Extensive data collections stored within IREI offer new opportunities for use of artificial intelligence and machine learning methods for discoveries of patterns or risk/protective factors of a studied outcomes (e.g. hazardous health outcomes). Artificial intelligence further offers innovative solutions to scientific problems, but there is often a gap between AI offerings and research project needs. IREI plans to bridge this gap by creating AI packages that connect researchers with external vendors offering AI consultancy. This service aims to establish AI as a valuable tool in future Icelandic research projects.

Cyber Security: As IREI's role in storing Icelandic research data grows, so does the importance of cyber security and meeting national and international regulations for GDPR, e.g. in health sciences. IREI is currently ISO27001 certified and has implemented various security measures which can be further improved through additional security solutions and external services.

2. Meginmarkmið með uppbyggingu innviða?

The main goal of IREI is to provide comprehensive and advanced IT services that meet the evolving needs of Icelandic research projects. IREI as an infrastructure, has been and will be open to all Icelandic researchers. The central and open infrastructure is to be cost effective as compared to decentral procurement in the past. An equally important goal of IREI is to reach all scientific disciplines with targeted outreach and support them with secure solutions such as HPC, storage, data services and IT consultancy. With the continued growth of IREI IT services become available to Icelandic research comparable to the services provided in neighboring countries. We are however still behind, for example the Technical University of Denmark which is compatible in size to the University of Iceland, hosts ten times more computing resources. With continued support we will further close this gap and modernize Icelandic research.

3. Hvernig mun innviðauppbyggingin stuðla að nýliðun og leiða til aukins samstarfs og betri nýtingar innviða?

The IREI´s infrastructure will assist in recruiting high level researcher in research fields that demand extensive IT resources. It will also be of invaluable assistance to new researchers as they can access from beginning an advanced infrastructure for the research needs.

IREI's ready-to-use services are also invaluable for new research projects that require significant computational power and can be quickly deployed. Our planned extended data services will offer researchers secure and efficient storage of extensive datasets that are necessary for the advancement of scientific work, particularly in health- and other natural sciences not the least were collaboration between difference research groups is essential, as platform provides efficient collaborative environment.

IREI is a centralized infrastructure accessible to all Icelandic researchers. Through grants from Rannís, we have consolidated resources like high-performance computing (HPC), secure data storage, and collaborative solutions. This consolidation has resulted in a more efficient and cost-effective approach. Prior to IREI, hardware, software, and IT services were procured in a decentralized manner. Expensive equipment was often limited to a few users and not practical

for many researchers. By expanding IREI's services, we can enhance cost-effectiveness and reduce the IT hurdles that science projects face.

4. Hverju munu innviðirnir breyta miðað við stöðuna í dag?

Today, IREI is an infrastructure which is up and running and available to the Icelandic research community. Further funding for IREI is of course essential so that it can be sustainable and developed further in order to keep up with demands of the continuously evolving scientific community.

5. Framtíðarsýn uppbyggingar og reksturs

IREI will continue to evolve as previously outlined. HPC capabilities will be enhanced through the acquisition of state-of-the-art CPU and GPU clusters. Our data storage and sharing platform will be further developed, following the Swedish Sunet solution (https://www.sunet.se/services/molnbaserade-tjanster/sunet-drive) based on NextCloud, which is widely used by the Swedish research community. We will implement various NextCloud services (setja ink) and integrate AI services and advanced cyber security solutions.

IREI is developed collaboratively by Reykjavik University, the Icelandic Meteorological Institute, Matís and the University of Iceland, with the leadership of the latter. These partnerships will continue, and it is probably that more partners will join, including Landspítali and Medical Directorate of Health (Embætti Landlæknis) that are responsible for extensive data sources in health sciences. All IREI services remain open to all Icelandic researchers. Users can actively contribute to IREI's development by participating in our events and user community meetings.

IREI is currently managed by the IREI team within the Information Technology division at the University of Iceland. Discussions have been ongoing with RHnet, the Icelandic research and education network, to explore the possibility of transforming RHnet into a similar IT service provider as found in Norway (SIKT), Denmark (DEIC), Sweden (Sunet), and Finland (CSC). IREI applied for funding from the "Samstarf Háskóla" ministerial fund to support RHnet's development in this direction. Unfortunately, the applications were unsuccessful, and RHnet's future remains uncertain. As a result, it is anticipated that IREI operation will continue to be based at the University of Iceland in the near future. If RHnet's future becomes more defined, we will strive to integrate IREI into its structure.

6. Áætluð fjármögnunarþörf næstu ár

The table below explains funds needed for the suggested development of IREI in the coming roadmap period:

IREI service	Type	Year 1	Year 2	Year 3	Year 4
HPC	Procurement of IT equipment	50	70	50	70
Data storage and sharing	Procurement of storage solutions				
	Procurement of services/temporary recruitment	50	30	30	30
Artificial intelligence	Procurment of services	25	40	10	
Information security	Procurement of security solutions				
	Procurement of services/temporary recruitment	40	20	40	20
		165	160	130	120