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First Year Achievements: NCC Iceland

Prof. Dr. – Ing. Morris Riedel (UoIceland)
EuroHPC JU GB Member Iceland

Short overview on status at start

Prof. Dr. – Ing. Morris Riedel (UoIceland)

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IHPC

In operation ⌄ Support Community History Acknowledgements Hafðu samband – Contact us

Community

To get information regarding upgrades, downtime or some other important issues then we will send those information to users with em
get those information then please sign up. This is not used very regularly so don't worry about getting spammed through this list and or
mailing list can send to it.

IHPC mailing list ← **Community essentially only visible via 'anonymous' mailing list**

To get information to HPC admins, then please send an email to help@hi.is and include HPC in the subject.

This page is managed by RHnet and RHÍ

Short overview on status at start

Prof. Dr. – Ing. Morris Riedel (UoIceland)

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- Icelandic HPC (IHPC) Community existed
  - ~17 scientific groups & experts, community is growing exponentially
  - Majority of HPC users from UoIceland (~1-2 Met Office, UoReykjavik, etc.)
  - Not as a whole organized (only in ad-hoc grant submission, no roadmap)
  - No involvement of SMEs or companies in a systematic fashion
  - Lack of HPC management resources & community building events

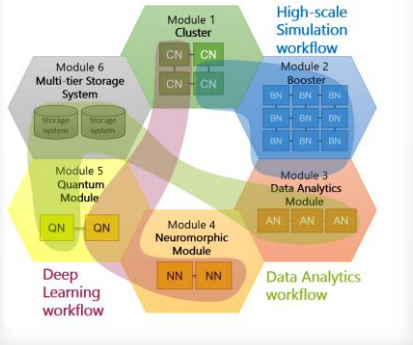
[1] DEEP Series of Projects Web Page

DEEP Projects

- Strong collaboration in HPC/Cloud
  - Nordic countries, e.g. EOSC-Nordic
  - Germany: Juelich Supercomputing Centre, e.g. joint professorships & PhDs & Projects

UNIVERSITY OF ICELAND
SCHOOL OF ENGINEERING AND NATURAL SCIENCES
FACULTY OF INDUSTRIAL ENGINEERING, MECHANICAL ENGINEERING AND COMPUTER SCIENCE

JÜLICH Forschungszentrum | JÜLICH SUPERCOMPUTING CENTRE



[2] JSC Simulation Labs Web Page

- Other collaborations
  - E.g. Prof. Hannes Jonsson (computational chemistry) & Brown University (USA)

What has happened

Prof. Dr. – Ing. Morris Riedel (UoIceland)

Icelandic National Infrastructure for HPC

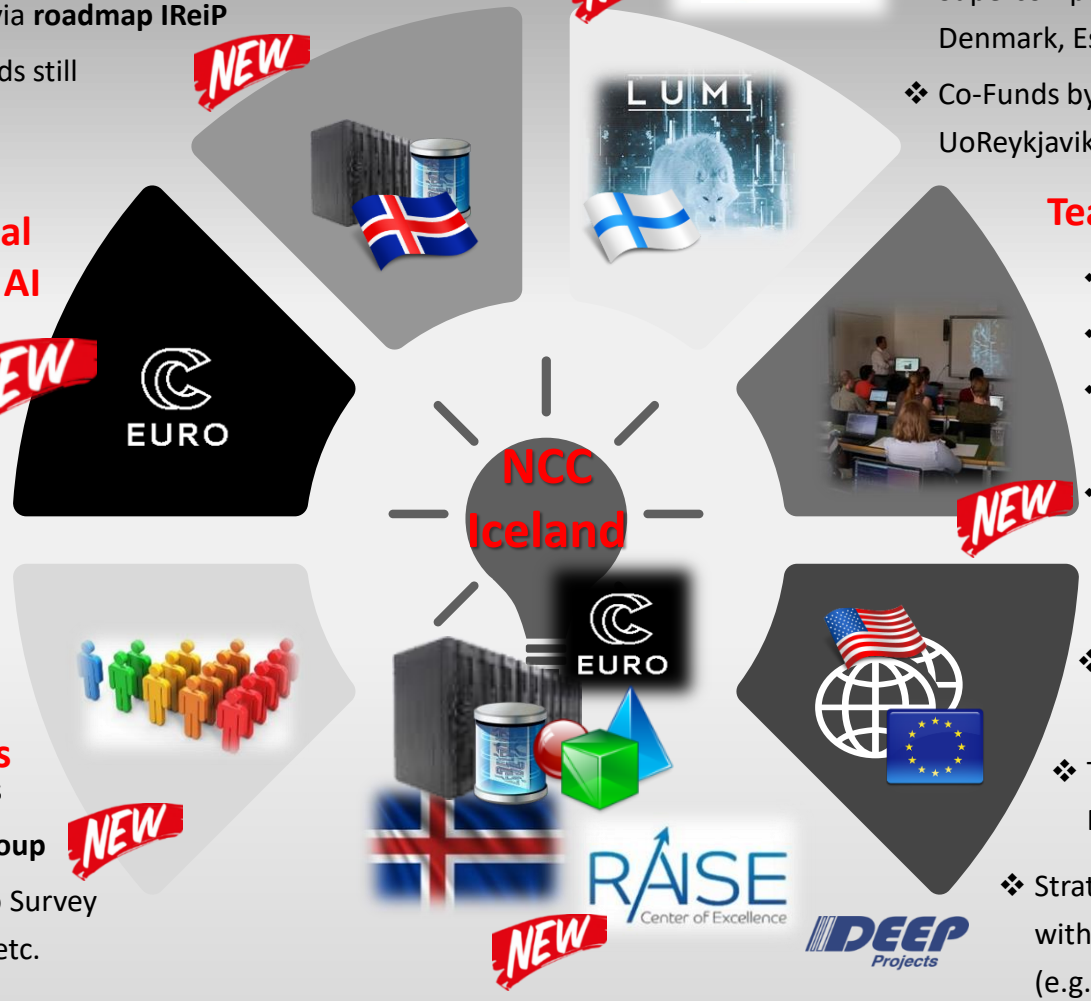
- **HPC hardware funds** by RANNIS; now via **roadmap IReiP**
- Proposals yearly required to obtain funds still
- Joint proposal from IHPC community

EuroHPC EuroCC National Competence Center for HPC & AI

- EU Project (09/2020-08/2021), 2 years
- Building **Simulation and Data Labs (SDLs)** of the IHPC Community of Users
- Supports industry engagement in HPC

IHPC Community of Users

- Organized around RANNIS proposals
- **~53 scientific experts & research group**
- UoIceland/UoReykjavik, Iceland Geo Survey ÍSOR, Met Office & industry: Matis, etc.



EuroHPC LUMI Supercomputer in Finland

- Supercomputer funded by Finland, Belgium, Czech Republic, Denmark, Estonia, Iceland, Norway, Poland, Sweden, Switzerland
- Co-Funds by EC and Iceland participation funds from: UoIceland, UoReykjavik, and Hannes Jonsson & Egill Skulason

Teaching & Education in HPC & AI

- University of Reykjavik
- University of Iceland
- Arctic Webinar Series (with US partners)
- Digital/Horizon Europe MSc in HPC

International Cooperations

- Tactical: ~4 Joint PhDs with **Juelich Supercomputing Centre** in Germany (#1 HPC System in Europe)
- Tactical**: EC Projects** like DEEP-EST, EOSC-Nordic, RAISE Center of Excellence (CoE)
- Strategic: Plans of building an **Icelandic National Lab** with international cooperation together with Industry (e.g. Kaiser Global, other investors)

What has happened

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- Increased community building
  - Many small meetings & discussions with academics and industry/SMEs to create Simulation & Data Labs
- 1st Icelandic HPC Community Workshop
  - Held on 2021-08-11 at the University of Iceland
  - ~25 participants (academia, government, industry, SMEs) with six presentations & discussions topics

[5] 1st Workshop Event

NEW

IHPC National Competence Center for HPC & AI in Iceland

EuroHPC Joint Undertaking

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1st Icelandic HPC Community Workshop
Endurmenntun HI, Dunhaga 7, 107 Reykjavik – Room Náma
11th August 2021 – 5:00 – 7:00 p.m. GMT

Background

The Icelandic High-Performance Computing (IHPC) activities are increasing in academia and industry that also includes related areas such as Artificial Intelligence (AI), Machine Learning (ML), Data Analytics, and Data Sciences. As a result, the IHPC community members created Icelandic Simulation and Data Labs (SDLs)[1], including academic and industrial partners. They form together in a bottom-up fashion the IHPC National Competence Center for HPC & AI in Iceland partly funded by the EuroHPC Joint Undertaking EuroCC project. The IHPC community seeks more collaborations and new members.

Objectives

This workshop aims to bring together a diverse group of Icelandic and international stakeholders to discuss the role of HPC and related areas within Iceland without losing sight of its international links. The specific objectives of the workshop are to:

- **Document competencies, achievements, activities, and lessons learnt** from participating stakeholders of Icelandic HPC efforts and associated international activities.
- **Perform community building** in developing new successful joint activities between academia and industry, potentially creating new joint Simulation and Data Labs or collaborations.
- **Identify best practices and core principles with a set of recommendations** for developing the future Icelandic HPC ecosystem, including necessary skills, funding opportunities, applications, Centre of Excellences, community events, and sustainable infrastructure developments.

Participants

Approximately 20-25 participants from Iceland, Germany, and the USA. Participants will include:

- Selected Icelandic companies and SMEs from different sectors with interest in HPC & AI
- Academic representatives from the University of Iceland and Simulation and Data Labs
- The Icelandic Centre for Research (Rannís), Startup Iceland, and Icelandic Technology Clusters
- US company that forms government, industry, and academic cooperative research coalitions

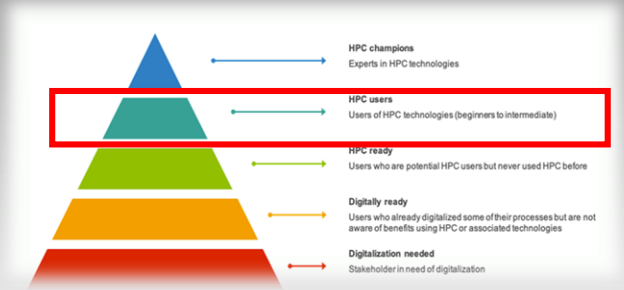
Output

The following outputs are expected:

- A short synthesis paper that documents Icelandic competencies, field experiences and achievements in using and/or offerings HPC & AI solutions and consideration of 'best practices'
- A short strategy paper responding to HPC & AI issues and challenges identified during the workshop, including potential options for jointly engaging in EuroHPC funding opportunities
- Strengthened informal networks and transfer of experiences and lessons learnt

Brief overview of main achievements

Prof. Dr. – Ing. Morris Riedel (UoIceland)



[3] NCC Iceland - Icelandic HPC Community Web page

- Icelandic & bridge to EU HPC ecosystem
  → HPC Users (CASTIEL competence system)
  - Experience in **establishing Simulation & Data Labs (SimDataLabs)** for Community Building (Based on experience over 15 years)
  - **Participate in CASTIEL Quantum Group**

[2] JSC Simulation Labs Web Page

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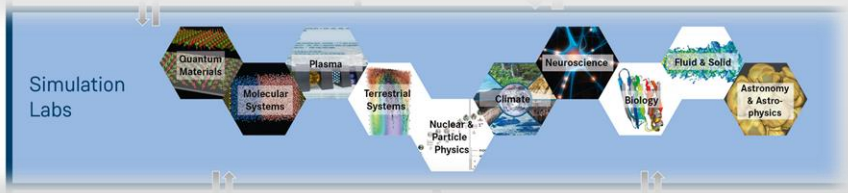

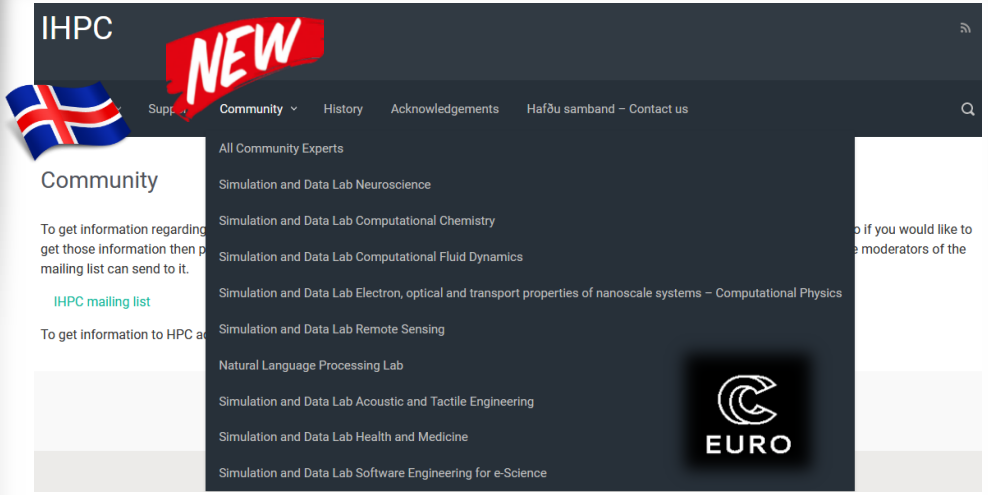

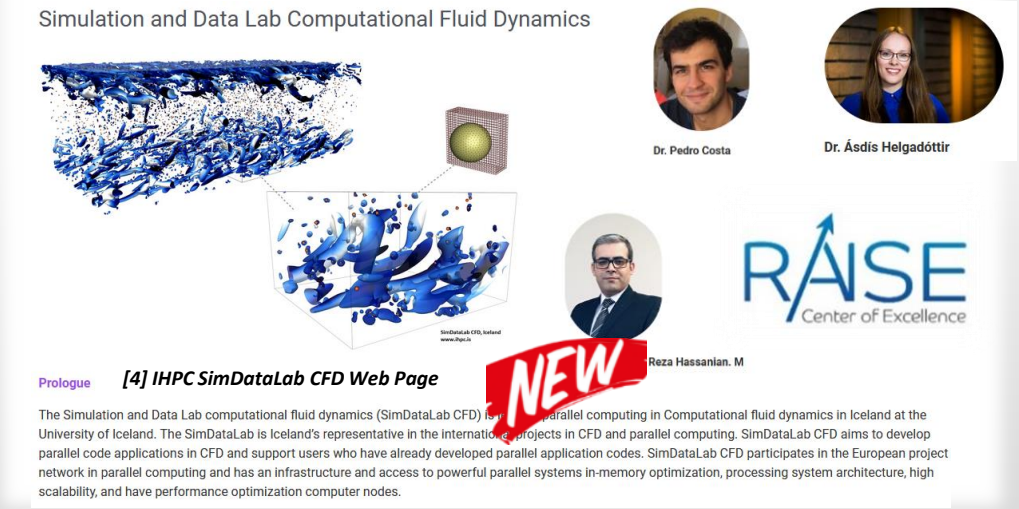

[4] IHPC SimDataLab CFD Web Page

How did it work – SME Examples

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Simulation and Data Lab Acoustic and Tactile Engineering

Acoustic and Tactile Engineering

General information

The focus of the Acoustic and Tactile Engineering (ACUTE) lab is both on research and product development. For the last few years, our main focus has been on the development of wearable assistive devices for visually impaired persons and cochlear implant recipients. We are also working on other projects, such as solutions for delivering virtual acoustics (i.e., sounds generated by computers) as realistically as possible and on multi-channel recording/playback.

Some of our current collaborations include; Oticon Medical, DTU (Technical University of Denmark), University of Southampton and Treble technologies.

Members

[6] IHPC SimDataLab Accoustic & Tactile Engineering Web Page

Prof. Dr. Ing Rúnar Unnþórsson

Dr. Runar Unnthorsson is a Professor (100%) at the faculty of Industrial engineering, Mechanical engineering, and Computer Science at the University of Iceland. Rúnar's main research interests are in performance engineering and the engineering application of acoustics / vibrations for sensory substitution, non-destructive evaluations, tactile/acoustic displays and product design.

Prof. Runar Unnthorsson, coordinated the 4M€ H2020 RIA project Sound of Vision (no. 643636) which was carried out in the years 2015-2017. The project received the EC's 2018 Innovation Radar Prize in the category Tech for Society for the development of an assistive device for the visually impaired. In 2017, the lab was awarded the 2nd prize for its tactile display at the University of Iceland's Science and Innovation Awards. The ACUTE lab is currently working on the development of the tactile display – with support from the Technology Development Fund (tths.is)

Dr. Ing. Finnur Pind

Dr. Finnur Pind received his MSc in acoustical engineering in 2013 from the Technical University of Denmark (DTU), and his PhD from the same institution in 2020. His PhD research was centered on virtual acoustics and was done in collaboration with the architectural studio Henning Larsen. Between his MSc and PhD studies, Finnur was an acoustic consultant in the building industry for some three years, and before entering the world of acoustics he was a software engineer in the telecom industry. His research interests include wave-based (numerical) acoustic simulations, acoustic virtual reality, room surface modeling, high-performance computing and spatial audio. He is currently a postdoctoral researcher at the ACUTE (Acoustics and Tactile Engineering) group at the University of Iceland and co-founder / CEO of Treble Technologies, which develops state-of-the-art virtual acoustics software.

Elvar Atli Ævarsson worked as an electronics technician for many years, specialising in professional sound system installation. He completed his MSc degree in electrical and computer engineering at the University of Iceland in 2020, having spent time as an exchange student at the Technical University of Denmark (DTU) taking acoustical engineering courses. He is currently a PhD student in industrial engineering at the University of Iceland, working with the ACUTE group and focusing on audio-tactile integration.

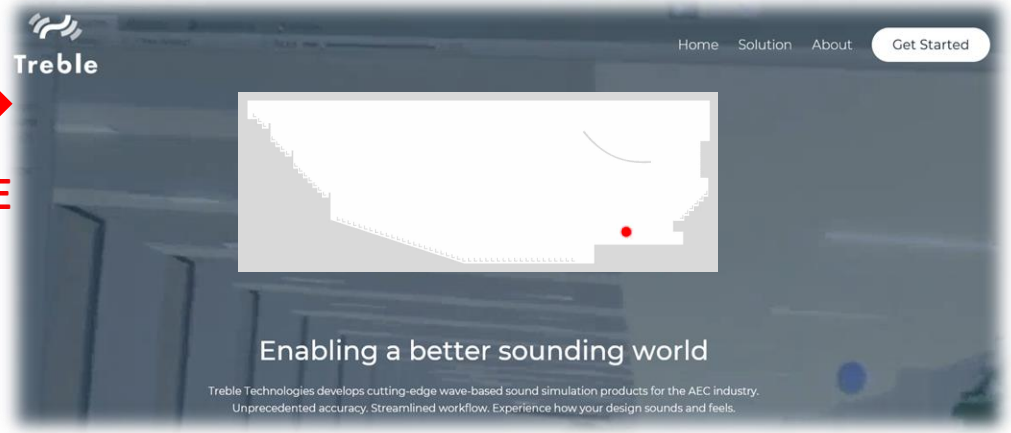
[3] NCC Iceland - Icelandic HPC Community Web page

NEW

RAISE Center of Excellence

[7] RAISE Center of Excellence Web Page

SME



[8] Treble Technologies

Natural Language Processing Lab *[10] IHPC NLP Lab*

General information

The Natural Language Processing Lab (NLP Lab) connects a community of researchers in NLP. The main focus is on large language models that require high-performance distributed computing environments to train efficiently.

The NLP Lab is based at the University of Iceland and works together with startups and companies on research projects and innovation. Currently, the lab is working with Nordverse and Miðeind. The NLP Lab disseminates information and knowledge through educational events, special sessions, and tutorials at conferences and publication activities.

Members

Prof. Dr. Hafsteinn Einarsson

Hafsteinn is an assistant professor at the School of Engineering and Natural Sciences of the University of Iceland. He received his Ph.D. in Computer Science from ETH in 2018. He has worked on applied ML solutions for startups and in the Icelandic banking sector. He is currently focused on natural language processing, interpretable ML methods and optimization problems.

Vésteinn Snæbjarnarson

Vésteinn is a researcher at language technology co[illegible]f and an MSc student at the School of Engineering and Natural Sciences of the University of Iceland. He works in machine translation, language mod[illegible] question answering.

SME

We create software that simplifies complex health information to empower valuable human care.

Nordverse is a Nordic based health tech startup created in 2019 by two medical doctors and a PhD computer scientist. Nordverse has received numerous grants and awards as well as having built a strong team to deliver high-quality software originating from clinical experience and aimed to deliver real clinical value.

nordverse

Our Partners

[9] Nordverse

How did it work – European Activities

Prof. Dr. – Ing. Morris Riedel (UoIceland)

EduHPC – MSc in HPC Proposal (12 EU partners)

Proposal full title:	EduHPC - Pan-European Graduate Educational Programme in HPC
Proposal acronym:	EduHPC[1]
Call Identifier:	H2020-JTI-EuroHPC-2020-03
Topic Identifier:	EuroHPC-2020-03
Type of action:	EuroHPC-CSA
Coordinator:	School of Engineering & Natural Sciences (SENS) of the University of Iceland (UICE) in collaboration with EuroCC IHPC National Competence Center (NCC) for HPC & AI in Iceland
Person in charge of the proposal:	Prof. Dr. - Ing. Morris Riedel, The University of Iceland & Juelich Supercomputing Centre (JSC) of Forschungszentrum Juelich (Germany) EuroHPC JU GB Member of Iceland & EuroCC NCC Iceland Head (contact: morris@hi.is)

European Digital Innovation Hub Proposal (1 in Iceland only)

The benefits of EuroCC and CASTIEL

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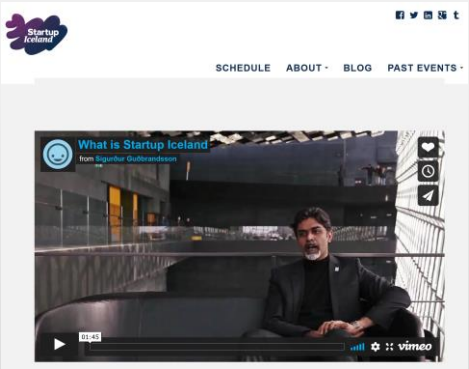
- CASTIEL Competence Mapping
  - Needs understood with more systematic requirement analysis
  - Useful to better understand Icelands unique competencies in comparison to whole Europe
- Sustained Efforts
  - Plan to engage in EuroCC & NCC Iceland with different phases enables trust in industry & SMEs to join activities
  - E.g. industry: deCode Genetics, Ossur, Matis, Nordverse, Mideind, Treble, atNorth, etc..
  - E.g. technology transfer office Audna, Startup Iceland

NEW

Competence category	Level of HPC readiness of users				
	Digitalization needed	Digitally ready	HPC ready	HPC users	HPC champions
Awareness creation					
Expert technical consultancy			Experience in teaching technical topics like HPC & HPDA systems (1)	Experience in Modular Supercomputing Architecture Technologies (2)	Experience in parallel & distributed training of HPDA / AI models (3)
Services and products				Application Experience in HPDA & Remote Sensing (#6 in the world) (4)	
Business & project consultancy					
Technological assessment and PoCs					Experience in Quantum Computing (i.e., quantum annealing) (5) NEW
Mastering the EU HPC ecosystem				Experience in forming Simulation & Data Labs (science & industry partners) (6)	



[11] Audna Technology Transfer Office *[12] Startup Iceland*

Outlook, next step

Prof. Dr. – Ing. Morris Riedel (UoIceland)

- KPIs
  - Updated in D33.2 from D33.1
  - IHPC Steering Committee is very pleased with progress
  - RANNIS (funding authority) is positive about NCC Iceland & discusses strategic EuroHPC plans
- Selected Challenges
  - Staff in-kind contributions (50%)
  - Integrations of traditional IHPC community elements takes time (e.g., old Web page, old mailing lists, new procedures, etc.)

#	KPI Short Description	Task	Current Value M12	Target Value M24
01	Performed training events for HPC, AI, and Big Data users to improve skills	33.2	4	8
02	Performed technology transfer events with specific topics addressed for SMEs	33.3	3	6
03	Number of industrial partners / SMEs interacted with	33.4	7	8
04	Number of companies (incl. SMEs) who ran pilots	33.4	0	2
05	Number of established Simulation and Data Labs	33.5	9 NEW 10	>10
06	Created coordination plans for sharing courses, content & best practices per year	33.2	1	2
07	Number of national HPC, AI, and HPDA infrastructure & NCC competence users	33.6	**80**	>75
08	Number of LUMI HPC, AI, and HPDA infrastructure & NCC competence users	33.6	2	>25
09	Number of completed surveys of collaborating academic & commercial partners	33.7	9	>10
10	Number of events attended to raise awareness of the NCC Iceland	33.7	5	>10
11	Number of Web page posts & social media posts from the NCC Iceland	33.7	30	>100
12	Number of best practices guides, NCC Iceland testimonials, and success stories	33.6	8	>25

Outlook, next step

Prof. Dr. – Ing. Morris Riedel (UoIceland)

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- Increase Community Building
  - Establish more NCC Simulation and Data Labs with key scientists (e.g., geothermal, etc.) & industry/commercial partners (~20 in 08/2022)
  - Continue HPC Workshop Series with special emphasis on industry & commercial involvement (bi-monthly), hackathons with Startup Iceland, etc.
- Intensify Raising Awareness
  - Improvements of Web pages IHPC.IS & running analytics of unique visitors, etc.
  - Dedicated social media Web presence (i.e., Twitter, LinkedIn, Facebook)
  - Increased collaboration with Technology transfer office Audna & Startup Iceland
  - Renew mailing list of IHPC.IS & Exploit contacts with Clusters (Ocean, Energy, etc.)
- Explore funding possibility in Horizon Europe & Digital Europe with RANNIS
  - E.g., EuroCC Phase 2 Options, Centre of Excellences & NCC Iceland involvement

Staff M1-12

Prof. Dr. – Ing. Morris Riedel (UoIceland)

Category	#	Male	Female	Non-Binary	# of part time	# of full time	comments
Administrative staff/ legal staff							
Technical assistant							
Graduate student							
Ph.D. student		2				2	
PostDoc							
Senior Researcher							
Professor		1	1		2		
Other (please specify)							

Number of new hired staff	Number of already available staff
2	2

Total Personnel Costs M1-M12
113,530.46 EURO

References (1)

Prof. Dr. – Ing. Morris Riedel (UoIceland)

[1] DEEP Series of Projects Web page, Online:
http://www.deep-projects.eu/
[2] Juelich Supercomputing Centre, Simulation Labs Web Page, Online:
https://www.fz-juelich.de/ias/jsc/EN/Expertise/SimLab/simlab_node.html
[3] NCC Iceland – Icelandic HPC Community Web Page, Online:
https://ihpc.is/community/
[4] Icelandic HPC Simulation and Data Lab Computational Fluid Dynamics, Online:
https://ihpc.is/simulation-and-data-lab-computational-fluid-dynamics/
[5] 1st Icelandic HPC Community Workshop organized by NCC Iceland & EuroCC, Online:
https://ihpc.is/events
[6] Icelandic HPC Simulation and Data Lab Accoustic & Tactile Engineering, Online:
https://ihpc.is/simulation-and-data-lab-acoustic-and-tactile-engineering/
[7] RAISE Center of Excellence Web Page, Online:
https://www.coe-raise.eu/
[8] Treble Technologies, Online:
www.treble.ac
[9] Nordverse, Online:
https://nordverse.com/
[10] Icelandic HPC Natural Language Processing Lab, Online:
https://ihpc.is/simulation-and-data-lab-natural-language-processing/

References (2)

Prof. Dr. – Ing. Morris Riedel (UoIceland)

[11] Icelandic Technology Transfer Office Audna, Online:
https://ttoiceland.is/
[12] Startup Iceland, Online:
https://startupiceland.com/

Thanks – www.ihpc.is/community

EuroHPC
Joint Undertaking

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