

# ANNUAL REPORT 2023

Here you will find the summary of Centre  
for Digital Life Norway from 2023

# About Centre for Digital Life Norway

The Centre for Digital Life Norway (DLN) is a national centre for biotechnology research, education and innovation. The centre facilitates transdisciplinary collaboration across institutions, fields of research and the research projects in the centre.

The centre is a collaborative project between the Norwegian University of Science and Technology (NTNU), the University of Oslo (UiO), the University of Bergen (UiB), the Norwegian University of Life Sciences (NMBU), Oslo University Hospital (OUS), SINTEF and UiT The Arctic University of Norway.

The centre is run by a competence hub and includes a research school and research projects. The competence hub is funded by the Research Council of Norway, and the second funding period DLN 2.0 started in February 2021.

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## Comment from the centre director

It is a privilege to once again present the Digital Life Norway (DLN) annual report—2023 is our eighth one!

In 2023 our Centre onboarded several new research projects within different biotechnology fields and disciplines including toxicology, nanotechnology, synthetic biology, bacterial genetics, integrative neuroscience, microscopy, cell biology and biochemistry. Our research projects continue to combine biotechnology with digital technology in health, aquaculture, agriculture and industrial biotechnology.

Collaboration across disciplines is a trademark for DLN, and some of our new research projects jumped right into cross-project activities. For example, project [Marma-detox](#) has initiated cooperation with [CCBIO](#), while project [SiD](#) collaborated with [CellFit](#). Seasoned research projects [3DLife](#) and [CCBIO](#) also received a grant to facilitate cross-project activities. These opportunities to cooperate across fields, projects and institutions is a valuable part of being a member project of DLN.



Trygve Brautaset  
Scientific director DLN 2.0

The Innovation Roadmap (IR) project geared up its activities in 2023 with new competent senior advisors hired, and formally this project was fully implemented under the DLN umbrella. The IR team did a thorough analysis of all DLN research projects to target how different projects can be considered for different types of IR support. This mapping has provided a solid foundation for further work already started in 2024. IR will be one major activity for our Centre in our last 2 years. In line with this; the 2023 annual DLN conference was titled “The DNA of Innovation,” and there we debated and discussed how we can create a more holistic and effective approach to improve research and innovation in Norwegian Biotechnology.

In DLN we support our projects on data management and data management plans (DMP). We also aim to shape Norwegian policy on this important topic and had a successful event at Arendalsuka 2023 with this aim in mind, in close cooperation with Elixir and NTNU Biotechnology. Representatives from the Directorate of Health, Norwegian Environment Agency, the University of Bergen, University of Oslo, NRKBeta and EFN discussed the critical theme of balancing openness, protection, and use of research data in society.

Responsible research and innovation (RRI) is an important crosscutting discipline in our Centre, guiding us to also always consider the social consequences of biotechnology research and innovation. In 2023 we held a course on Science, Technology and Society, as well as several talks and workshops. We also organized an Impact funding call and have now selected two winners who aim to transcend their disciplines with work in precision medicine and arctic farming.

Our fourth year of the popular PhD industry internship program provided excellent candidates and life-changing experiences, and we are happy to continue this excellent work also in 2024. Our DLN Research school, which has been a major arena for attaching various DLN arrangements and events continues to grow and in 2023 it reached 581 members (PhDs and postdocs).

Finally, after eight years of running this Centre, we gradually see on the horizon the ending of DLN as we know it. Together with our Board we are discussing possibilities for how best practices from this national collaboration can potentially be taken further into a continued collaboration relevant for our DLN members in the future. Hopefully, we can say more about this in our 2024 annual report.

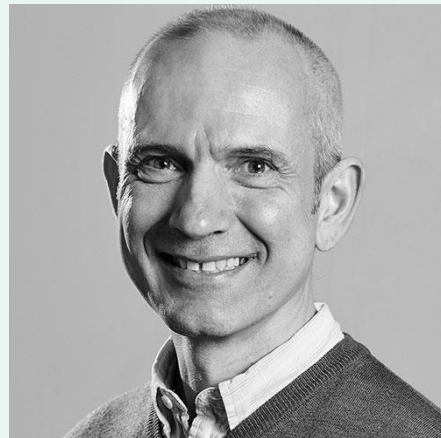
Trygve Brautaset  
Scientific director DLN 2.0



## Comment from the board chairperson

More than halfway into DLN2.0, I think it is becoming ever clearer how all the different activities initiated and operated by the center are pulling in the same direction, towards the core of our mission –convergence for innovation. The Innovation Roadmap project has become the largest effort of DLN and a main topic in board meetings. It is a testament to the impact of DLN that we were able to recruit two new senior advisers for innovation and industry involvement, which both have an amazing track record in converting ground-breaking basic research in our domain into innovations.

To rig the board better for steering the IR project, we expanded the board with an additional industry member already in 2022. The external members Ola Engkvist, Emilie Lassen and Tom Pike are crucial, and together with the institutional representatives function as a collegial body to support and guide all aspects of the center.



Finn-Eirik Johansen  
Board chairperson

Innovation Roadmap is not just more money thrown at researchers who hope to cross the “valley of death”, but a research project in its own right, aimed to determine which kind of measures are most effective for successful innovation. The board therefore anticipates that the impact will be significant, also beyond DLN.

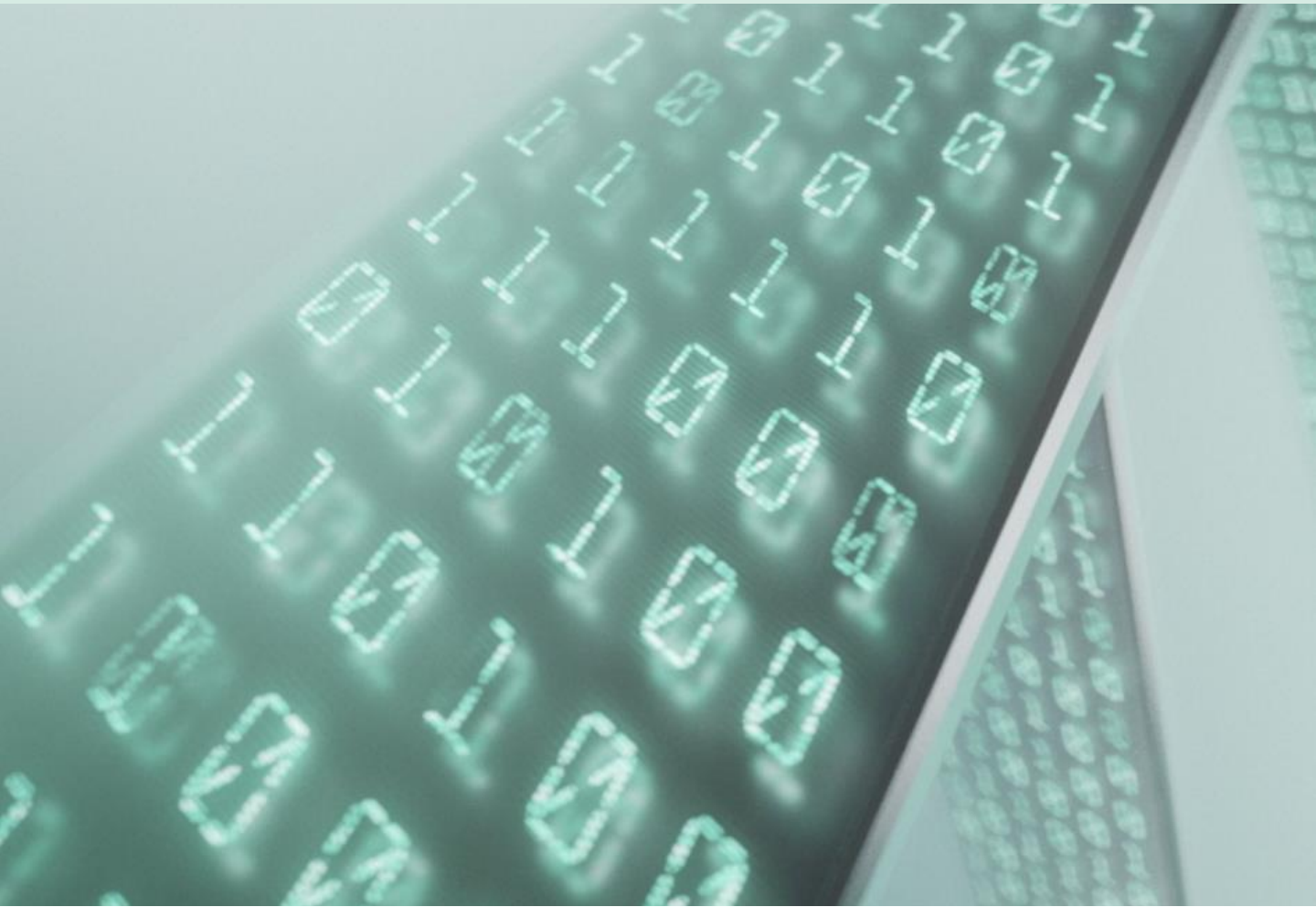
Other established activities of DLN are also running with continued success and popularity. The industry internship program completed its fourth year in 2023 and has had a profound effect on the participating PhD candidates.

DLN presents a unique platform for collaboration between the different institutional partners. Board meetings are a venue for constructive dialog and cooperation particularly in areas where each institution may come up short if they were to do it alone. In 2023, all board meetings were digital, which is both efficient and environmentally friendly. Nevertheless, I am looking forward to a physical meeting of the board in 2024.

In the following pages, you can read more about the various activities undertaken in 2023.

Finn-Eirik Johansen  
Board chairperson

**The Centre for Digital Life Norway transforms Norwegian biotechnology research and education to increase innovation and value creation for society. The Centre has research projects all over the country. Transdisciplinary collaboration is our trademark.**



**UNIVERSITY  
OF OSLO**



**UNIVERSITY OF BERGEN**



**Norwegian University  
of Life Sciences**



**UIT The Arctic University of Norway**

[www.digitallifenorway.org](http://www.digitallifenorway.org)



# Centre highlights

DLN 2.0 includes seven partner institutions and a strong competence hub centered around an Operational Management Team (OMT), an Expert Task Force (ETF) and a Junior Resource Group (JRG). The seven partner institutions are NTNU, UiO, UiB, UiT, NMBU, SINTEF, and OUS.



UNIVERSITY  
OF OSLO



UNIVERSITY OF BERGEN



Norwegian University  
of Life Sciences



UiT The Arctic University of Norway

The overall goal of Digital Life Norway is to transform research, innovation and training in digital biotechnology to foster transdisciplinary collaboration and contribute to responsible and sustainable value creation in Norway. In this report, you will find a summary of Digital Life Norway's activities during 2023 towards this goal, in collaboration with our communities of researchers and other partners and stakeholders

**COLLABORATION ACROSS DISCIPLINES AND PROJECTS**

**INNOVATION AND INDUSTRY COLLABORATION**

**DATA MANAGEMENT**

**RESPONSIBLE RESEARCH AND INNOVATION (RRI)**

**TRAINING AND CAREER DEVELOPMENT**

**DIGITAL LIFE NORWAY RESEARCH SCHOOL**

**COMMUNICATION AND THE DIGITAL LIFE NORWAY COMMUNITY**

# Communicating science in uncertainty

March 10, 2023  
9:00 AM–10:30 AM  
Free Zoom registration

Anne Spurkland (UiO)  
Thomas Evensen (RCN)  
Andrea Saltelli (UiB)  
Kam Sripada (DLN)



CENTRE FOR  
DIGITAL LIFE  
NORWAY

## COLLABORATION ACROSS DISCIPLINES AND PROJECTS

The possibility of harvesting synergies between projects and competence exchange is one of the benefits of being part of the Centre for Digital Life Norway. We encourage projects in the centre to collaborate across disciplines and projects.

### Funded cross-project activities

The cross-project activity call is an incentive that several of our projects are utilizing to expand collaboration between the projects at different institutions and across different research fields. In the 2023 call, we funded three cross-project activities:

- A collaborative workshop between [Marma-detox](#) and [CCBIO](#) with iPSC research as the topic
- A pilot project to establish T-cell killing assay in microfluidic systems between [SiD](#) and [CellFit](#)
- An experimental PoP: Extension of a bone-marrow 3D-model for incorporation of macrophages, to enable evaluation of substances that target the immune system in combinatory therapies, between [3DLife](#) and [CCBIO](#)

As in previous years, we see that the DLN cross-project initiative provides an opportunity for closer collaboration between projects within DLN across different institutions and fields.

## Digital Frukost seminar series

The Digital Frukost series has gone fully digital in 2023. This year we have organized three seminars, all in the spring semester.

**Digital frukost webinar  
on the future of meat**  
with  
Rob Burton, Ruralis  
Sophia Efstathiou, NTNU

# DEEP FAKES & FUTURE STEAKS

28 April 2023  
9-10am CET  
digitallifenorway.org

**CENTRE FOR  
DIGITAL LIFE  
NORWAY**

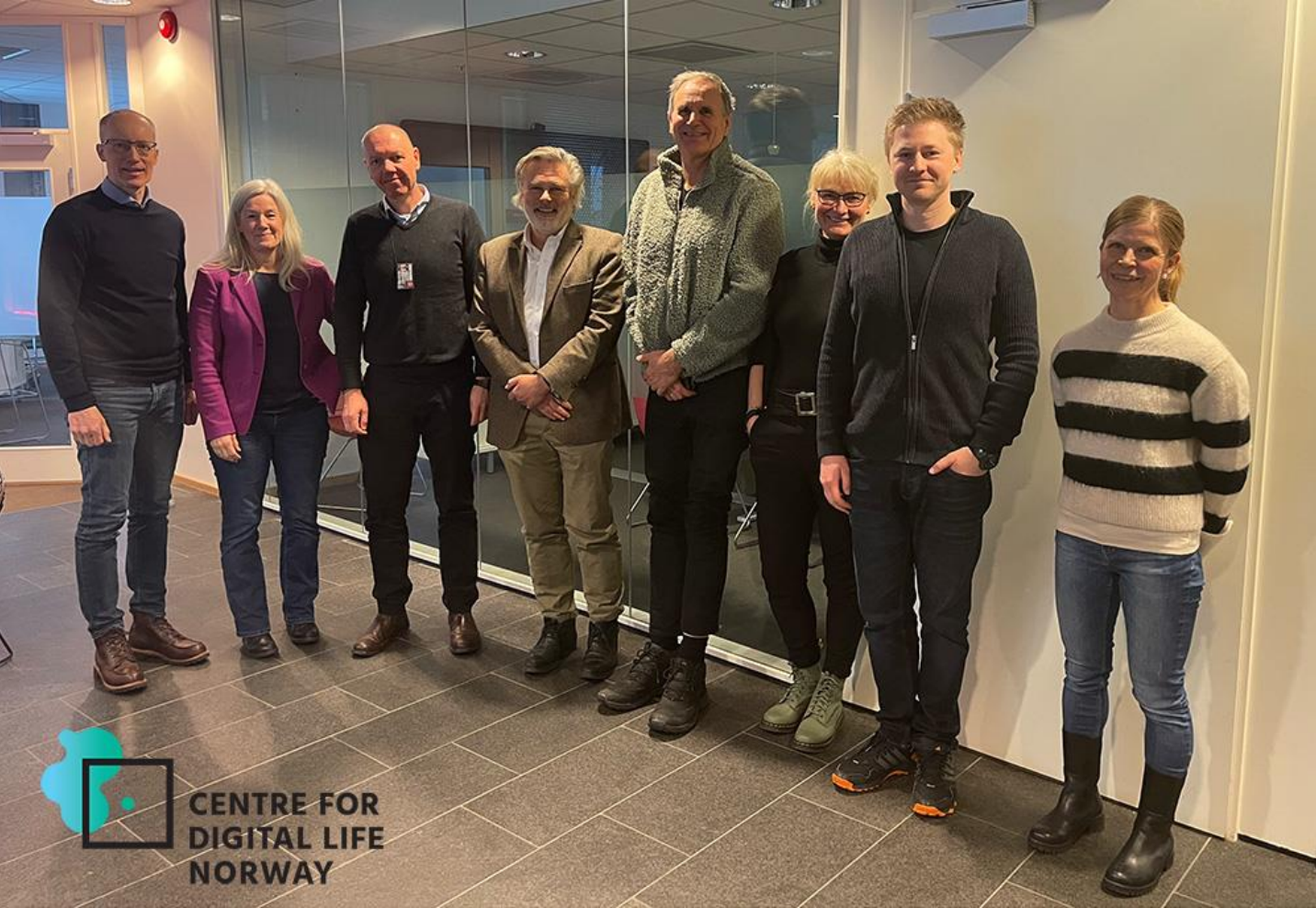
Metabolt images:  
The Center for Genomic Gastronomy, 2023

Topics for the seminars were:

- How biotechnology contributes to a sustainable solution for the future, Jan. 27, 2023
- Communicating science in uncertainty, Mar. 10, 2023
- Deep Fakes & Future Steaks, Apr. 28, 2023

[You can find recordings from the events on our YouTube channel.](#)





Innovation pilot kick-off with the Calinhib project, March 2023, Oslo: Ivar Bergland, Beate Rygg Johnsen, Morten Egeberg, Tom Pike, Henrik Lund, Randi Elisabeth Taxt, Arsenii Zabornyk, Alexandra Patriksson

## INNOVATION AND INDUSTRY COLLABORATION

The DLN centre competence area for innovation supports research projects to drive innovation that responds to society's grand challenges.

## **A Roadmap for academic research-intensive innovation**

Since 2019, the Centre has run “A roadmap for academic research-intensive innovation” the groundbreaking 6-year innovation project financed by the Research Council of Norway (30 MNOK). The objective of the project is to design and initiate a change process in the Norwegian innovation system with the aim of increasing innovation from academic research within transdisciplinary digital biotechnology.

2023 was the first full year of phase II of the Innovation Roadmap project. The focus has been to execute pilots on how to test different ways of conducting innovation and commercialisation activities in DLN. Two experienced senior advisors were recruited to DLN in 2023, to both replace open positions as well as to strengthen innovation and commercialisation work in the centre.

[Read more about Innovation Roadmap here.](#)

## **The Innovation Roadmap project – Activities in 2023**

During Phase II, Innovation Roadmap was formally integrated into the DLN Centre, with projects reporting to RCN included in the Annual Report alongside other centre activities and under the DLN Board. In 2023, all DLN partners were officially recognised as partners in the Innovation Roadmap. Since the commencement of Phase II in 2022, there have been activities across 17 pilots, encompassing both pre- and subpilots (See figure on next page for a comprehensive overview). Below are the activities in 2023 listed for the individual pilots.



# Action Plan 2022-2025 – Status pr 31. December 2023

DLN Innovation Academy		Pre-project	Planning	Implementation	Evaluation
IA1	Lean Innovation in Life Sciences – Innovation in the Age of disruption				
IA2	DLN Industry Internship Postdocs				
IA4	BII Summer Business School				
IA5	DLN Mini MBA				
DLN Innovation Accelerator					
AC4.1	Academic Business Developer – PROVIZ (NTNU)				
AC4.2	Academic Business Developer – Innofree - Oxymod (NMBU)				
AC4.3	Academic Business Developer – MUSICAL - nanoRIP+DigiBiotics/NanoAI (UiT)				
AC4.4	Academic Business Developer – Calinhib (OUS/UiO)		PA6		
AC1 + AC14	Design thinking/Lean innovation to facilitate innovation and business development Sandpit for idea generation	On hold			
AC9	Not for profit business models for data driven ideas – DigiSal (NMBU)				
DLN Innovation Funding					
FU4	Overview of funding instruments for innovation and commercialization (pre-project for FU1)				
FU1	Project funding Proof of Principle DLN project	FU4			
DLN Transdisciplinary Actions					
TA1	"Value your Data" Team				
TA2	Trans-/interdisciplinary workshops				
DLN Entrepreneurial and Spin-Out Actions					
ES1	Impact investment*				
DLN Policy Actions					
PA6	Value creation without TTO support		Terminated (see AC4.4)		

Ongoing action plan 2022-2025 - as per 31.12.23

## Academic Business Developer: several pilots

The [AS IS](#) and [TO BE](#) reports identified the opportunity for early-stage innovation to be spearheaded by entrepreneurial individuals within research groups. This series of pilots provided funding to DLN research projects, enabling them to support a designated "champion" for 6-12 months, tasked with focusing on the business development of specific ideas arising from the projects. The aim was to upskill the champion and research team, attract post-pilot funding, and embed the principle of researcher-driven innovation in participating universities.

The AC4 pilot program was structured into four sub-pilots implemented across partnering institutions:

- AC4-1, PROVIZ at NTNU, was successfully concluded in 2022, serving as a precursor for the subsequent three pilots;
- AC4-2, Innofree, was established at NMBU in conjunction with the DLN project OXYMOD;
- AC4-3, MUSICAL, was initiated at UiT alongside the DLN project nanoRIP; and
- AC4-4, Calinhib, was integrated into the DLN Calinhib project at UiO/OUS.

Each of these pilots underscored the imperative to cultivate competence and foster an innovative culture within both the research groups and the institutions themselves. Moreover, they illuminated the time-intensive nature of innovation and commercialisation endeavors, emphasising the necessity for close collaboration among all stakeholders to facilitate project progression. The findings and insights obtained from these pilots will be synthesized into an overarching final report for the AC4 pilot(s) in 2024.

## **Not-for-profit business models for data driven ideas**

Several projects in DLN are working in the field of systems modelling. Such models have a potential for value creation within health, aquaculture, industry, and agriculture. However, a prerequisite to exploiting these models is that they need to be widely shared and maintained. This relies on sustainable sources of funding and contributors who are prepared to share their data. A business model to generate such funding also needs to balance the values of open science with the interests of industrial actors. This pilot will thus explore how a not-for-profit business model could be developed to ensure a sustainable funding source to maintain computational models developed in academic research.

In 2023, this pilot was kicked off with a workshop between a DLN project 'DigiSal', [ARD Innovation](#) (TTO NMBU), and [NCE Seafood innovation](#) from Bergen. The workshop was used as a test bed to explore transdisciplinary ways of working in the Norwegian salmon community. The specific goal of the workshop was to identify the needs and roadblocks that should define this type of business model.

### **Project Funding - Proof of Principle DLN project (FU1/FU4)**

The AS IS and TO BE reports noted that the Norwegian system lacks adaptable soft funding mechanisms to bridge the crucial initial "valley of death" encountered by many research projects as they transition from pure research to innovation. Consequently, the objective of this pilot is to establish flexible, milestone-based grants tailored for DLN research projects. The aim is to facilitate their progression from concept to a more refined stage suitable for further funding opportunities. The grants must complement existing RCN funding and TTO support, enhancing project readiness for securing additional funding and TTO assistance. As part of the planning phase for the FU1 pilot, a pre-pilot initiative, FU4 Overview of Funding Instruments for Innovation and Commercialisation, was completed in 2023. Its primary goal is to compile an exhaustive overview of existing funding instruments for innovation and commercialisation, with the intent of identifying gaps inadequately addressed by other available funding sources. To find suitable projects for proof of principle funding, the DLN Innovation team then conducted a review of projects in DLN portfolio. Several potential projects were identified and the Innovation Team will work with the project PIs in 2024 to develop pilots that provide insight into opportunities for impactful funding interventions.

## Transdisciplinary workshops

A core objective of DLN is to facilitate the transformation of the Norwegian biotechnology landscape and one of the ways in which they are doing so is by creating spaces i.e. a transdisciplinary setting where academic, as well as non-academic stakeholders can collaborate towards a common goal. The goal of the pilot is to facilitate the convergence of digital sciences and life sciences by bringing together top-tier researchers in Norway to convene and collaborate on targeted challenges. By addressing industry-related issues, these workshops aim to enhance researchers' comprehension of demand-side problems and requirements.

In 2023, two transdisciplinary workshops were held as part of this pilot.

The first workshop brought together key experts working with CytOF data to explore how transdisciplinary forms of working can streamline the uptake and reuse of CyTOF data. The workshop was aimed at enabling knowledge-exchange between two DLN projects - [CellFit](#) and [AML-PM](#), as well as other relevant experts on scientific methods, tools and techniques, as well as practices of data management and sharing around working with CytOF data.

The second workshop under this pilot was organised in collaboration with AC9 where members of the Norwegian salmon community were brought together to exchange experiences and share ideas on a not-for-profit business model for a computational model 'Digital Salmon' developed by the DLN project [DigiSal](#).

# INNOVATION IN THE AGE OF DISRUPTION



WEBINAR  
& PANEL  
DISCUSSION

Jerome Engel, *UC Berkeley*  
Natsai Audrey Chieza, *Faber Futures*  
Anita Patel Jusnes, *Genetic Analysis*  
Jeanette Hammer Andersen, *UiT*

Wednesday 22 March 2023  
16.00 to 17.15 (CET)  
Register free: <https://t.ly/vFrFS>

Hosted by



## Innovation in the Age of Disruption (IA4)

Biotechnology innovations seem to emerge at lightning speed. At the same time, countless grand societal challenges demand resources and cultural shifts. What does 21st century innovation look like in the context of ongoing crises such as climate change, as well as short-term shocks like covid, macroeconomic constriction, and war in Europe? In such times, big companies shrink their ambitions; what about emerging ventures? The Centre for Digital Life Norway and The Life Science Cluster co-hosted a webinar on the topic "Innovation in the Age of Disruption" as part of the Innovation Roadmap project. Jerome S. Engel (Adjunct Professor Emeritus at the Haas School of Business at Berkeley), an internationally recognized expert on innovation, entrepreneurship, and venture capital, lecturing and advising business and government leaders, presented on how the biotechnology ecosystem responds to shocks and challenges. Professor Engel was joined for a expert panel discussion with Natsai Audrey Chieza (founder and CEO at Faber Futures), Anita Patel Jusnes (Patient Journey Chapter Lead at Roche) and Professor Jeanette Hammer Andersen (head of Marbio and Professor in Marine Bioprospecting at the University of Tromsø – the Arctic University of Norway). [Learn more here.](#)





## REGLER FOR ÅPEN DELING AV DATA - TIL HJELP ELLER HINDER?

### DATA MANAGEMENT

As in previous years, The Data & Models competence area of the Centre for Digital Life Norway (DLN) focused on building competencies, developing infrastructure and engaging in policy work. These three pillars have helped to further advance DLN's mission to promote responsible and sustainable use of data in life sciences research.

#### Policy Engagement

In 2023, The Centre for Digital Life Norway (DLN) hosted a pivotal event during Arendalsuka, titled "[Regler for åpen deling av data - til hjelp eller hinder?](#)" on the critical theme of balancing openness, protection, and utilization of research data in society. Followed by an introduction from Margareth Hagen, Rector of the University of Bergen. Ingeborg Winge, node coordinator of ELIXIR Norway, elaborated on the complexities surrounding research data infrastructure.



During the debate moderated by Martin Gundersen of NRKbeta, the distinguished panelists including Sunniva Aagaard (Senior Advisor at the Norwegian Environment Agency), Ana Delgado (Associate Professor in Science and Technology Studies, University of Oslo), Bjørn Remseth (Vice President of Electronic Frontier Norway), Benedicte Løseth (Area Director for the Research System and Internationalization at the Research Council of Norway), Ragnhild Holst (Senior Advisor in the Department of Health Law and Biotechnology at the Norwegian Directorate of Health), and Ole Kristian Tørresen (Researcher at the Centre for Ecological and Evolutionary Synthesis, University of Oslo) explored how Norway can ensure a proper degree of transparency in data sharing to benefit society at large, while also considering the implications for the environment, health, technology, and bioeconomy.

## FAIR Data Award 2023

Also, this year DLN will reward the effort of providing scientific data in as FAIR a way possible. As the third award of its kind, we received much positive feedback on the lighthouse effect of recognizing research outputs beyond classical journal publication. This year's deadline for applications will end 31st of March, 2024

[Read more about the award here.](#)



## Competence workshops

After several virtual workshops, DLN held another [in-person software carpentry workshop in September in Bergen](#) together with ELIXIR Norway, NRIS and the UiB library. This workshop aimed to provide attendees with hands-on training in open-source software development and data visualization, thereby improving their competencies in these areas. In addition, DLN organized a [data management planning workshop](#) and the first [extensive data management course over several dates with practical exercises](#) together with the institutions and ELIXIR Norway. The Data & models team also contributed to two PhD courses with lectures on Research Data Management (RDM) aspects. These initiatives have helped to build the competencies of the wider life science research community, enabling them to handle and manage their data more effectively.

## Infrastructure development

DLN has again enabled further development of the use of Norwegian e-infrastructure for Life Sciences through the SEEK platform user interface and generating projects in SEEK from machine actionable data management planning documents, thus boosting the efficacy for researchers and service providers.

## Data management events

Below is a list of DLN Data management events in 2023:

- [Webinar: Open Data requirements for Life Science Projects](#)
- [FAIRDOM User Meeting](#)
- [Bring Your Own Data workshop](#)
- [Arendalsuka 2023 - Regler for åpen deling av data - til hjelp eller hinder?](#)
- [Life Science Data Management: Planning workshop](#)
- [Software Carpentry course in research computing skills: Shell, R or Python for reproducible analysis, Git](#)
- [Life Science RDM course](#)

# RESPONSIBLE RESEARCH AND INNOVATION



*From the course KULT8880 with course leader Prof. Roger Strand (DLN); Naz Karadag, Phd UiO; Anna Mikelsen Kollstrøm, PhD NTNU; Fei Song, PhD NTNU; Emily Maria Denny, PhD UiB; Photo credit: Anamika Chatterjee (DLN).*

In 2023, the efforts of the RRI competence area have focused on exploring the concept in three contexts of the Norwegian biotechnology landscape: training and competence building; innovation; and research policy.

## Training

Science, Technology, and Society: RRI Course Digital Life Norway (KULT8880)

This year, DLN and DLNRS organised the course on Science, Technology, and Society for doctoral candidates and early-career researchers in biotechnology, life science, and related scientific domains. Prof. Roger Strand led 15 participants from microbial ecology, molecular biology, neuroscience, biomechanics, and computational biology through the academic foundations supporting the concept of RRI. Participants indulged in engaging discussions of research, policy, and reflected on routine practices from a distinct perspective. As one participant explained,

*“Previously I thought that RRI meant that I’m honest and I didn’t lie in my data, or that I have safety guarantee from my lab.. that’s what I thought ‘responsible’ was.. but this is the first time I realised that it also means that we have to be aware of the social consequences of our research. Research does not only exist in the PC, it can be used in reality and how you view your research where do you stand when it comes to the social responsibility.”*

Read more about the course [here](#).

## Competence Building

### Think-a-thon at the DLN Conference 2023

In collaboration with the AFINO network, we conducted a scenario building workshop. The workshop aimed to help attendees envision how their innovative research could transform both themselves and their environment, fostering critical introspection in the context of biotechnological advancement.

Read more about it [here](#).

## The Impact funding call 2023

This year, we challenged members of the DLN Research school to step out of the ivory tower and think transdisciplinary. Biotechnology is increasingly aimed at tackling the so-called "grand challenges" such as climate change and healthy communities. These challenges are complex and difficult to solve from within the halls of academia. We invited applicants to depart from 'business as usual' and propose their ideas to engage with academic and non-academic communities relevant to their research.

We have now selected two winners: Viviam Bermúdez' activity SPARK (NTNU) and Komal Agarwal's activity Farm-a-see (UiT). They will receive 30 000 NOK each to carry out their planned activities within 2024. You can read more about the call [here](#).



*Impact Call winners Komal Agarwal and Viviam Bermúdez*



## RRI and the Innovation Roadmap

Keeping with the remit of Responsible Innovation (RI), as part of the Innovation Roadmap, we organised two workshops with the aim to disrupt traditional modes of collaboration. We did this by creating spaces and facilitating dialogue between members from the same community where this dialogue was lacking.

### Research Policy: Evening talk at the DLN Conference

A panel of key researchers working with CRISPR explored how the potential future use of gene editing might have altered the trajectory of the aquaculture and agricultural industries, alongside considerations of potential use, possible risks, and ethical questions in medical treatment and research.



*Evening talk (from the left): Acting Centre manager for DLN, Anders Braarud Hanssen; Senior Researcher Dorothy Dankel (SINTEF); Professor Virginijus Šikšnys (Vilnius University); Professor Marianne Fyhn (UiO); Professor Trygve Brautaset (NTNU).*

## Engagement on RRI

### **DLN at the Annual Contact meeting for the Norwegian Biochemical Society (NBS)**

DLN talked about E-RRI-ing on the side of caution: Responsible Research and Innovation (RRI) in translational biomedical research at the NBS 2024 Annual meeting.

### **DLN at the Green Data Lab conference**

In June, DLN co-organised the Green Data Lab Conference held at the NMBU Campus, Ås. We invited Kelly Rijswijk from the Wageningen University, Netherlands to add a flavour of RRI to the conference. She talked about the promise of digital transformation and its role in addressing concerns of sustainable food production and other practices.

### **DLN at the AFINO annual meeting 2023 – Responsibility for Transformative Futures**

In June, DLN joined the annual meeting held by AFINO along with members from the broad AFINO network. The meeting was organised as a collaborative exercise to explore the desirability of the possible futures that are enabled by AI and other new and emerging technologies.

### **DLN at the AFINO autumn school**

In September, DLN was part of the teaching team at the annual AFINO school at Jondal. Surrounded by the serene Hardanger fjord on one side and majestic mountains on the other, 20 participants gathered to *Reinvent RRI*.



*Anna Bergan Dahl, who had her internship at Testa Center.*

## TRAINING AND CAREER DEVELOPMENT - INDUSTRY INTERNSHIP

2023 was the fourth year of DLN's successful and highly popular Industry Internship programme. This programme gives PhD students an opportunity to explore biotechnology outside the academic setting. This year there were nine internships.

## **Nine internships at eight different companies**

A total of 11 companies, both Norwegian and international, showed their interest in the programme by sending in 19 different project proposals. Eight companies were lucky to host an intern over three months, and one company hosted two interns in separate divisions. The Industry Internship programme is run as a collaboration between the DLN research school and DLN Innovation, and all PhD students who are members of the research school can apply. DLN received 31 applications from eligible students. DLN covered eight stipends, in addition to one collaborative NTNU-stipend financed by NTNU Biotechnology. The host organizations are recruited through the DLN industry network and other relevant organizations.

The participating companies for 2023 were: Acies Bio, AstraZeneca, Bioinnovation Institute Fonden, Cealtech AS, Testa Center, DNV AS, GreinDX and Vectron Biosolutions.

## **Feedback from the participating companies**

As in previous years, feedback from the companies was overall very positive. They reported back that having a DLN intern was valuable for them, because the DLN interns were highly qualified and brought much competence with them. In general, the companies thought it was important to give the students insight into what it is like to work in industry, and to promote cooperation between industry and academia.

There were several other important motivations for participating in the program: Company representatives appreciated the opportunity to contribute to increased recruitment to their industries. This internship also let the participating companies allocate a person to a project otherwise not prioritized due to lack of resources. They also commented on the value in challenging the students to step a bit outside of their comfort zones. In this way they contributed to raising the students' self-esteem and helped them acquire a better insight into their own competences gained through academic training, and how this can be useful in other settings as well. A general comment from several hosts is that they think that there should be more programs like this to train people more for the working world outside academia. Overall, they are grateful for contributing to the program with their projects, both for the students' sakes and for the benefit of having the students' skills available at their company for the internship project.



## DLN Industry Internship Experiences

When the interns are finished with their internship, they are required to write a blog post or other publishable text to communicate their experience of working outside of academia. Currently six blog posts are out, and as the students finish their internships more will become available. The students also present the program and their experiences to different institutional boards and committees to establish the importance of such internships as an integral part of a PhD educational path.

Read about the interns' experiences and feedback below:

- [Parveen Gartan: Computational drug design at AstraZeneca](#)
- [Marion Berrocal: My experience in the DLN industry internship program at GreinDX](#)
- [Anna Bergan Dahl was at Testa Center, a testbed for both academia and businesses with a project on the purification of adeno-associated virus](#)
- [Elisa Márquez Zavala was fascinated by AciesBio's multifaceted approach to microbial technology development](#)
- [Belén García Pascual had one of the best experiences during her PhD at DNV](#)
- [Clizia Russotto had a transformative journey at Vectron BioSolutions](#)



*Poster design workshop at Nidelven*

## TRAINING AND CAREER DEVELOPMENT - DIGITAL LIFE NORWAY RESEARCH SCHOOL

Science based on convergence in line with the Digital Life mission is challenging, intellectually as well as culturally. It requires that talented young researchers are given opportunities to explore new horizons and embark on challenging scientific and societal problems, perhaps at the risk of failure. In addition, they will meet the intellectual challenge of scientific work in true transdisciplinary research groups, integrating knowledge across boundaries. Excellent researcher training and networking through the research school is a main success factor for the entire Digital Life mission.

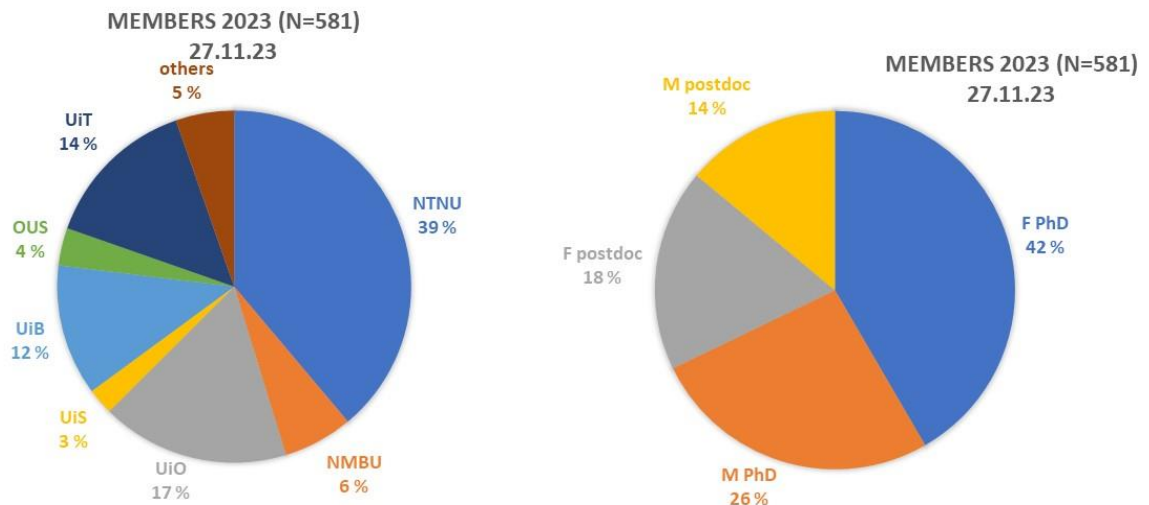
## Promoting transdisciplinary integration

The main goals of the research school are to promote transdisciplinary integration, build a culture for innovation, and create a new collective team spirit among all younger scientists who are connected to digital biotechnology. An important challenge for the research school is to create a distinct scientific profile and a feeling of belonging and commitment in a large and highly transdisciplinary group of PhD-students, postdocs, and their supervisors. The most important networking activities are PhD-courses, generic courses, and the annual 2-day conference for members. Trying to bring together young researchers with such diverse and transdisciplinary backgrounds is challenging, but in many ways, we have already succeeded in creating fora where PhD-students and post doctors can broaden their horizons and networks. There are good reasons to be optimistic of the Digital Life-concept among young researchers.

### Memberships

The research school opened for memberships December 2016, and currently has 581 members and >400 alumni. The research school offers an arena for networking and career development to 395 PhD-students and 186 post doctors, whereof 349 females and 232 males. Our network also includes PhD-supervisors and newsletter subscribers. The members come from a wide variety of scientific fields, from humanities, medical physics, and computer science to more classic disciplines of biotechnology.

### MEMBERS OF THE DLN RESEARCH SCHOOL 2023



## Events

The primary objective of the research school is to foster a community for PhD students and postdoctoral researchers within the Digital Life Norway disciplines. This is primarily achieved through physical gatherings where young scientists can network and build relationships, supplemented by a range of digital courses. In 2023, we coordinated and supported over 20 events, with approximately 335 participants benefiting from these opportunities. Additionally, we distributed around 19 travel grants to facilitate attendance. A comprehensive overview of the events held in 2023 can be found on our website. Furthermore, we allocated seats for nine events to various research institutions, including TNNN, NORBIS, NRSN, NRSNGH, and SPARK.

[A complete overview of the 2023 events can be found on our website.](#)

### The 6th Annual Research School Conference

The annual conference for and by the members of the research school was held at [Voksenåsen Hotel in Oslo from June 13-15th](#). The aim with this conference is to bring together scientists from different backgrounds and places to mingle, learn from each other's experiences, ideas, and aspirations. After troubling corona years, the participants were given a chance to reconnect, make new friends and build future dreams. This year's topics focused on how to establish contacts and a professional network; where to apply for the most suitable funding for our research projects; and how to envision a transition from academia to work in



*Participants at the 7th Annual Research School Conference*





*Professor Virginijus Šikšnys at the 2023 Digital Life conference*

## COMMUNICATION AND THE DIGITAL LIFE NORWAY COMMUNITY

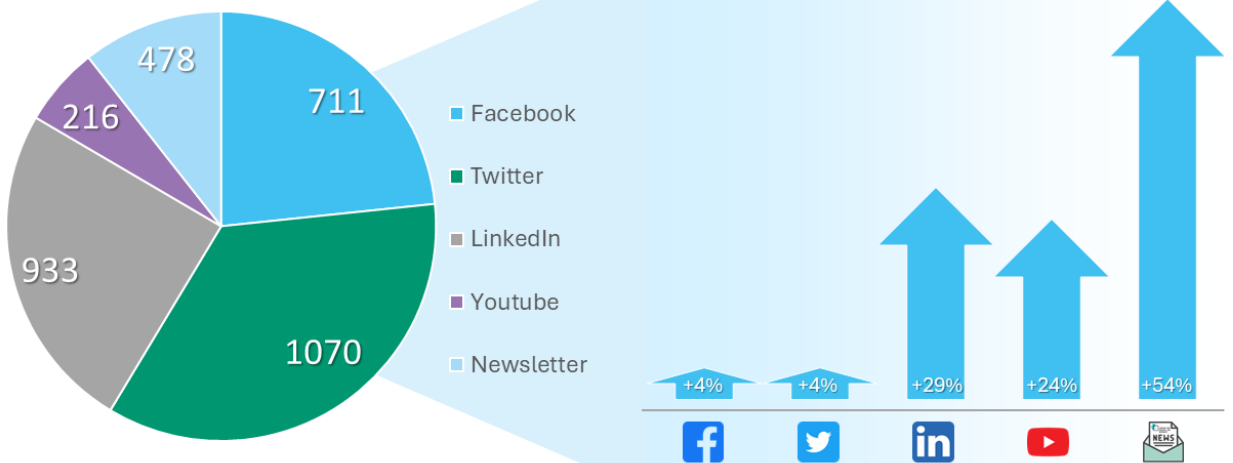
In order to reach the goals of Centre for Digital Life Norway, effective internal and external communication is crucial. This includes communication between and across the competence hub, the projects, owner institutions and other stakeholders. The Centre also encourage member projects to communicate across disciplines and to make their research accessible to the public through popular science communication..

## Monthly newsletters & social media

Information about the centre's activities are published on our website [digitallifenorway.org](http://digitallifenorway.org) and shared through [monthly newsletters](#) and on [Twitter](#), [Facebook](#), [LinkedIn](#) and [YouTube](#).

In 2023 we saw an increase in followers and subscribers on all platforms.

### SUBSCRIBERS



## Digital Life Conference 2023

Centre for Digital Life Norway would like to thank all participants and contributors to the annual Digital Life 2023 conference at Solstrand outside Bergen. Under the heading "The DNA of Innovation," the conference grappled with the innovation theory that identifies five actors - governments, industry, academia, civil society, and citizens/individuals. If these collaborate we can create a more holistic and effective approach to research and innovation and foster the development of new ideas and solutions that can benefit society. The first presentation of the conference was held by Virginijus Šikšnys who is widely known for his contribution to the development of CRISPR-Cas genome editing technology.



[You can find a summary of the conference and videos of selected presentations here](#)

## Poster & Scientific Image competition session

More than 45 posters and 15 images were part of the Poster & Image competition session. At the conference, all participants were encouraged to present a poster showcasing their research, whether it was completed results or planned work.



The winner of the poster award was Viviam Bermúdez (NTNU) with the poster “The bumpy road towards a digital-twin drug-prediction platform”.



## Public event at University Museum in Bergen

[Popular science](#) helps to increase the participation of more people in society in research and allows them to contribute with their own perspectives.

Centre for Digital Life Norway encourages our member projects to share their research widely and make it understandable for other disciplines and the public in general. This is an important part of working towards the Centre's overall goal to [foster transdisciplinary collaboration and contribute to responsible and sustainable creation of value for Norwegian society](#).

On the evening before the Digital Life 2023 conference, the Centre organised a [science challenge at a public event in Bergen](#). The challenge was tackled head-on by young researchers from Digital Life Norway-affiliated projects, who are working on improving antibiotics and aquaculture.



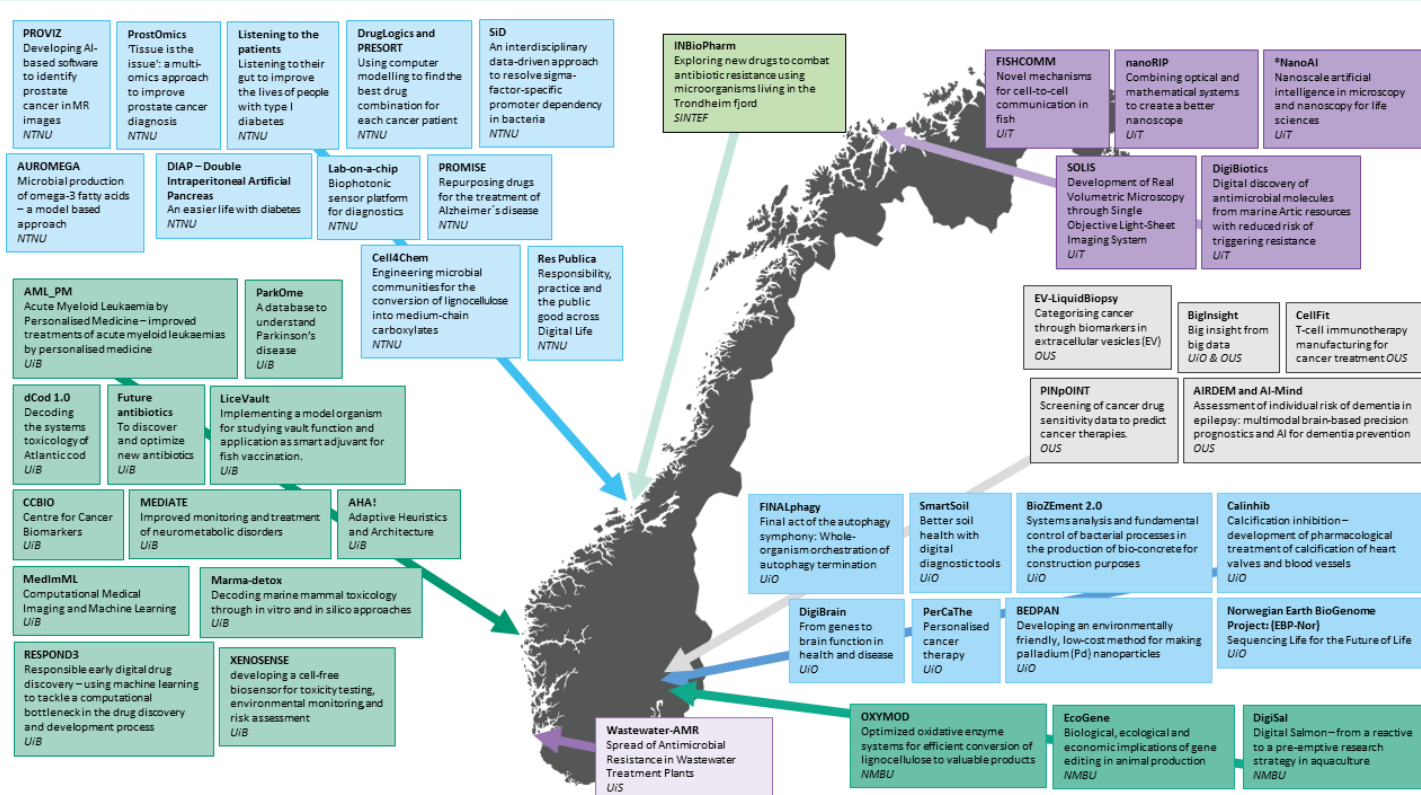
From the left: Hannah Winther (NTNU), Ludvik Olai Espeland (UiB) Illimar Rekind (UiB) og Thomas Völker (SEAS postdoktor).

# Projects' highlights

The centre has more than 45 transdisciplinary biotechnology projects led by universities and research institutes all over the country. The projects combine biotechnology with digital technology in health, aquaculture, agriculture, and industrial biotechnology.

Map includes projects added in early 2023. Projects that have passed their completion date remain in the DLN network and are now called "alumni projects." Both active and alumni projects are shown on this map.

[Click here to get a full overview of all projects](#)



## New projects in 2023

We welcomed six new projects in 2023:

**PROMISE** - Repurposing drugs for the treatment of Alzheimer's disease (Project lead: Ioanna Sandvig, NTNU)

**Marma-detox** - Whales and polar bear in a petri dish: decoding marine mammal toxicology through in vitro and in silico approaches (Project lead: Anders Goksøyr, UiB)

**SiD** - An interdisciplinary data-driven approach to resolve sigma-factor-specific promoter dependency in bacteria (Project lead: Rahmi Lale, NTNU)

**FISHCOMM** - Novel mechanisms for cell-to-cell communication in fish (Project lead: Roy Ambli Dalmo, UiT)

**ENIGMA** - Enabling natural photonics through genetic manipulation of diatoms (Project lead: Tore Brembu, NTNU)

**XENOSENSE** - Developing a cell-free biosensor for toxicity testing, environmental monitoring, and risk assessment (Project lead: Odd André Karlsen, UiB)



## PhD defences

Several PhD candidates in the research projects in the Centre for Digital Life Norway defended their theses in 2023. Click on the name of their theses to download from the host universities of the candidates.

### **DIAP - Double Intraperitoneal Artificial Pancreas**

Ingrid Anna Teigen, NTNU

[The Bihormonal Artificial Pancreas: New Perspectives on the Pharmacokinetics and Pharmacodynamics of Glucagon](#)

### **DIAP - Double Intraperitoneal Artificial Pancreas**

Karim Davari Benam, NTNU

[Design and Implementation of the Dual-Hormone Artificial Pancreas in Animal Studies](#)

### **DigiBrain - From genes to brain function in health and disease**

Sverre Grødem, UiO

[Brain Plasticity, Extracellular Matrix Molecules, and Advancements in Calcium Imaging of Neural Activity](#)

### **nanoRIP - Combining optical and mathematical systems to create a better nanoscope.**

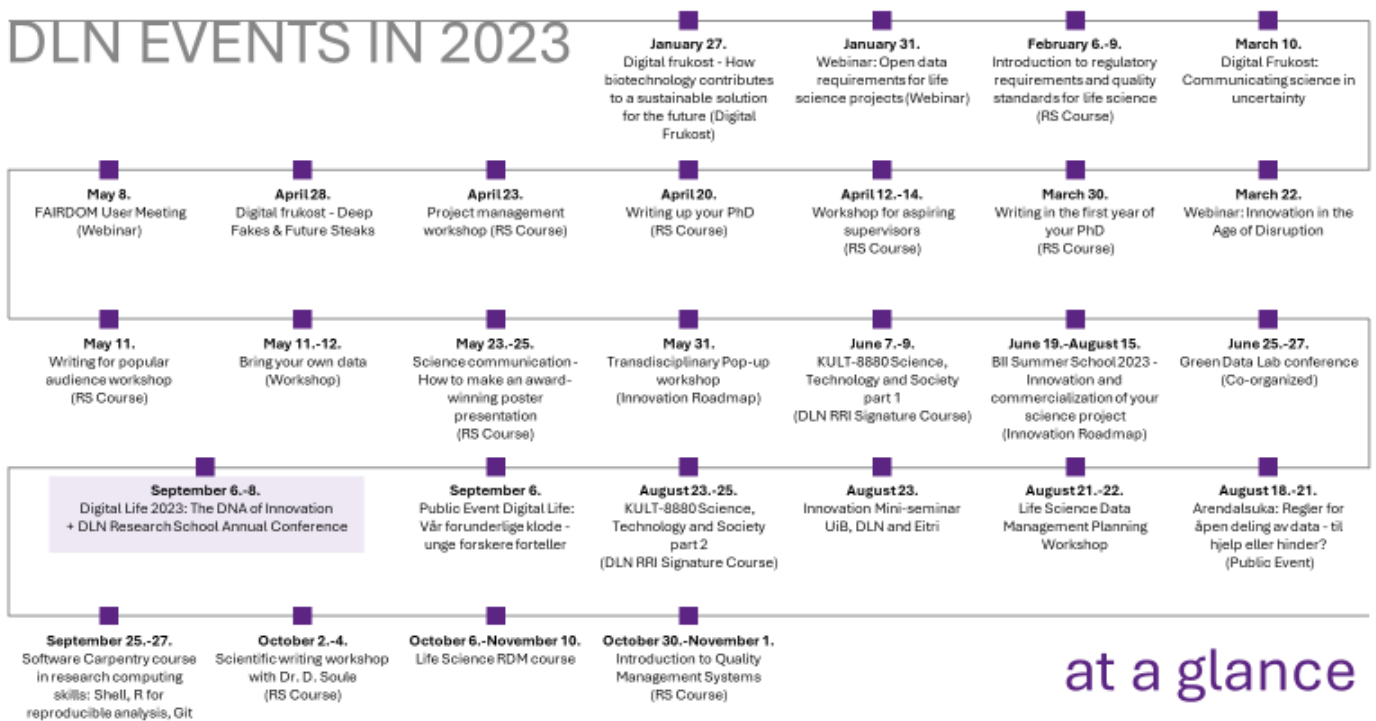
Sebastian Acuña, UiT

[Multiple Signal Classification Algorithm: A computational microscopy tool for fluorescence microscopy](#)



# 2023 AT A GLANCE

## DLN EVENTS IN 2023



at a glance

# The People

The Board: Members from the seven host institutions, NTNU, UiO, UiB, NMBU, OUS, SINTEF and UiT, in addition to industry representation and the Research Council of Norway.

## DLN Board



**Finn-Eirik Johansen**  
Chairman of the Board  
UiO



**Øyvind Weiby Gregersen**  
Board Member  
NTNU



**Marit Bakke**  
Board Member  
UiB



**Sigrid Gåseidnes**  
Board Member  
NMBU



**Eli Aamot**  
Board Member  
SINTEF



**Arne Smalås**  
Board Member  
UiT



**Emilie Lasson**  
Board Member  
NorthSea Therapeutics B.V.



**Tom Pike**  
Board Member  
Life Science  
Industry Professional



**Ola Engkvist**  
Board Member  
AstraZeneca



**Vidar Skagestad**  
Board Observer  
Research Council  
of Norway



**Inderjit Singh Marjara**  
Board Observer  
Research Council  
of Norway



The Expert Task Force is part of the The Centre for Digital Life Norway (DLN) competence hub.

## Expert Task Force



**Trygve Brautaset**  
Scientific Director  
Professor NTNU



**Kam Sripada**  
Centre Manager  
NTNU



**Olav Haraldseth**  
Professor  
NTNU



**Roger Strand**  
Professor  
UiB



**Hanne Haslene-Hox**  
Research Scientist  
SINTEF



**Kjetill S. Jakobsen**  
Professor  
UiO



**Marianne Fyhn**  
Professor  
UiO



**Janna Saarela**  
Director NCMM  
UiO



**Vessela N. Kristensen**  
Professor  
UiO



**Arnoldo Frigessi**  
Professor  
UiO



**Inge Jonassen**  
Professor  
UiB



**Camilla Krakstad**  
Professor  
UiB



**Susanna Röblitz**  
Professor  
UiB



**Phillip Pope**  
Ass. Professor  
NMBU













**Jeanette H. Andersen**  
Professor  
UiT



**The DLN Junior Resource Group (JRG)** serves as the representative voice of young researchers in Digital Life Norway. Its members, including PhD candidates and postdocs from the center's host institutions, offer insights and advice that contribute to shaping DLN's activities, reaching out to their fellow PhDs, postdocs, and other early career researchers.

In 2023, Maria Bårdsen Hesjedal and Emil Karlsen advanced in their careers, and we express our gratitude for their contributions to JRG. During the fall, we opened applications for new members to join the JRG and were delighted to welcome three enthusiastic early career researchers from various institutions across Norway. Rohit Agarwal, Dipendra Pant, and Gustavo Agudelo Cantero have joined the JRG team. Alongside continuing JRG members Nancy Saana Banono, Olga Mikhailova, Chidimma Phoebe Echebiri and Arsenii Zabornyk, the JRG members bring expertise in diverse research topics, ranging from zebrafish models of pediatric brain cancer, pharmacological treatment of heart valve calcification, online learning, time series data, clinical informatics, calcification to the evolution of animal venoms and Responsible Research and Innovation in biotech projects. All of them have been active participants in DLN and the DLN Research School. Young researchers are encouraged to reach out to the JRG with any questions or feedback.

### Junior Resource Group

 <p><b>Maria Hesjedal</b> Postdoc NTNU</p>	 <p><b>Emil Karlsen</b> PhD Student NTNU</p>	 <p><b>Arsenii Zabornyk</b> Postdoc OUS/UiO</p>	 <p><b>Olga Mikhailova</b> Postdoc NMBU</p>	 <p><b>Nancy Saana Banono</b> Postdoc UiO</p>
 <p><b>Chidimma P. Echebiri</b> PhD Student INN</p>	 <p><b>Gustavo Adolfo Agudelo-Canterol</b> Postdoc UiO</p>	 <p><b>Dipendra Pant</b> PhD Student NTNU</p>	 <p><b>Rohit Agarwal</b> PhD Student UiT</p>	 <p><b>CENTRE FOR DIGITAL LIFE NORWAY</b></p>

**The Digital Life Norway (DLN) International Advisory Committee (IAC)** is a stakeholder panel consisting of internationally renowned experts in fields of high relevance to the DLN mission, with a proven track record in managing large and complex academic structures. The IAC serves as consultants and advisors to the DLN competence hub by reviewing the progress of DLN 2.0 with an international lens. In addition, the IAC contributes independent recommendations on academic matters, DLN's internal operations, and DLN's role as a national network.

## International Advisory Committee



**Dr. Dominique Chu**  
University of Kent

















**Professor Ulrike Felt**  
University of Vienna



## The operational management team of the Centre for Digital Life Norway (DLN).

The team is part of the [centre's competence hub](#) and consists of a centre manager and senior advisers employed at NTNU, UiO and UiB.

### Operational Management Team

						
<b>Kam Sripada</b> <i>Centre Manager</i> Center Management NTNU	<b>Elisabeth Hyldbakk</b> <i>Adm. Coordinator</i> Center Management NTNU	<b>Korbinian Bösl</b> <i>Senior Engineer</i> Data and Models UiB	<b>Marta Eide</b> <i>Senior Adviser</i> Data and Models UiB	<b>Ragna Breines</b> <i>Senior Adviser</i> Data and Models UiB	<b>Christoffer Hals</b> <i>Senior Adviser</i> Communications UiO	<b>Rosalie Zwigelaar</b> <i>Senior Adviser</i> Training and Career Development NTNU
						
<b>Alexandra Patriksson</b> <i>Senior Adviser</i> Innovation and Industry Involvement UiO	<b>Randi Elisabeth Taxt</b> <i>Senior Adviser</i> Innovation and Industry Involvement UiO	<b>Henrik Lund</b> <i>Senior Adviser</i> Innovation and Industry Involvement UiO	<b>Andy Boyce</b> <i>Senior Adviser</i> Innovation and Industry Involvement UiO	<b>Anders Braarud Hanssen</b> <i>Senior Adviser</i> Responsible Research and Innovation NTNU	<b>Anamika Chatterjee</b> <i>Senior Adviser</i> Responsible Research and Innovation NTNU	

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UNIVERSITY  
OF OSLO



UNIVERSITY OF BERGEN



Norwegian University  
of Life Sciences



UiT The Arctic University of Norway