Annual Report | 2022

simula

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After 20 years of challenges, new ones are coming

Managing director's report

Last summer I was in California, looking out over the endless Pacific Ocean and thinking about life, as I often do at that time of year. But unlike previous years, I had a decision to make. While it had been building for a while, the time had come to decide if I should step down as CEO of Simula after 20 years.

Professor Aslak Tveito
Simula Fellow
Managing Director from 2002 to 2022.

I actually stumbled into this job for reasons that are no longer of interest to anyone – it was never my plan to become CEO; I wanted to be a researcher. But sometimes circumstances decide for you, so in 2002 I became CEO of Simula and over the next 20 years I tried to combine the job of CEO with being a researcher. Eventually, I found a balance that I enjoyed. But over the past year I have realised that Simula has become too big and complex to be led by a part-time CEO, so I decided to talk to the chair of the board about a change of leadership. The reception that decision received in Simula, in the board and not least in the Ministry of Education and Research has been very moving. I feel valued and I appreciate that very much. Now I will be a full-time researcher, as was the intention all along. And so I will continue working full-time but with some other tasks, focused on equations. Differential equations.

I will not list everything that has gone well over the last 20 years, but rather emphasise that what I have always tried to do is to create a research lab run on a solid set of values. Simula must be a reliable partner in all contexts, we must treat all employees fairly and well, and we must always remember who pays for Simula - the taxpayers. We will solve problems that can be important for society. We will not chase low-hanging fruit, but rather tackle major societal challenges that require a concerted team effort over a long period of time. These ideals may be demanding, but I believe they are necessary.

One of my ideals has also been to keep our finances in good order. In the early days, our economy was often concerning, with weak equity and very low liquidity. We often had to borrow money from the bank to pay December salaries. But for the last ten years I have reported a profit at every general meeting. Eventually these profits became quite solid and it was strictly emphasised by the owner that capital must not build up. Time and time again, the Office of the Auditor General (Riksrevisjonen) required explanations as to why it is necessary, and actually required by law, to have what is called sound equity. Every year I made gloomy predictions at the general meeting that the next year would be much worse and we would have large deficits; if you keep at this long enough, you will be right one day. And this year it happened. The year 2022 was a dark year in the financial sense for Simula. We were running a huge deficit and put on the brakes. We

have started to cut back on what is not perceived as the core of Simula. It is unfortunate because we are cutting back on high-value activities, but necessary because the economy demands it. Why did this happen? This is due to a combination of sharp increases in expenses at the same time as an almost complete stop in new income. A demanding mix. Have we done something wrong? Yes, we were too optimistic with new initiatives, and we did not see early enough that costs would not increase just a little, as they usually do, but would increase dramatically. We should have discovered this earlier and it happened on my watch.

> 66 *I will not list everything that has gone well over the last 20 years, but rather emphasise that what I have always tried to do is to create a research lab run on a solid set of values.*

At the same time, I see that the financial difficulties Simula is facing now seem to affect the entire university sector as well, and for the first time in a very long time, it seems to be moving towards a real reduction in activities. This probably means even tougher competition for research funds both in Norway and in the EU. The next few years will be demanding for Simula and for the new CEO, but Simula has fundamentally solid finances, and we have sound equity and large, long-term income. In addition, we have a professional administration and highly skilled researchers who are well-positioned to obtain new grants. That must be our main focus now; new income for important research. I hope everyone participates and I will try my best to do my part. And we must remember that it is not always wise to run after the most difficult funding; FriPro and ERC are extremely competitive. There are other sources that may require a shift in focus, but which nevertheless can contribute towards major scientific challenges.

Good luck and *takk for meg*,
Aslak

Report of the Board of Directors

Simula's mission is to conduct fundamental long-term research in selected aspects of information and communication technologies, thereby contributing to lasting innovation in the business sector.

In its 21st year of operations, Simula Research Laboratory AS (SRL) and the Simula Group achieved a turnover of NOK 185 million and NOK 292 million, respectively, in 2022, and a net result of NOK -5.4 million and NOK -28.2 million.

From the left: Håkon Kvale Stensland, Maria Korkunc, Ingolf Søreide, Mari G. Løchen, Kyrre Lekve (Deputy Managing Director), Ingvild Myhre (Chair of the Board), Aslak Tveito (managing director), Hilde Brunvand Nordvik, Pinar Heggernes. **Not attending:** Petter Nielsen, Mats Lundqvist

Administration and organisation

SRL is registered as a limited company under 100% ownership of the Norwegian Ministry of Education and Research. The company combines academic traditions with recognised business management models. In 2022, SRL as the parent company had five subsidiaries. Simula Innovation AS (SI) is wholly owned and manages SRL's investment portfolio. Simula Learning AS is owned jointly by SRL (91%) and the Municipality of Bærum (9%). Simula UiB AS is owned by SRL (51%) and the University of Bergen (49%). Simula Metropolitan Center for Digital Engineering AS (SimulaMet) is owned by SRL (51%) and Oslo Metropolitan University (49%). Simula Consulting AS, established on January 1st 2020, was transferred to SRL (100%) in 2022. As a consequence of the strained financial situation (see below), the board decided to close down Simula Learning during 2023.

The parent company and its subsidiaries cooperate closely. The majority of the companies are based in downtown Oslo (Tullinløkka and Bislett), except for Simula UiB, which is located in Bergen.

Activities

Simula conducts basic and long-term research in networks and communication systems, scientific computing, software engineering, machine intelligence and cybersecurity. The research focuses on core challenges that combine technological development with utility value for the industry, business, and society at large.

The activities in 2022 were affected by significant changes in external conditions, both national and international. At the beginning of the year, Simula's employees were once again required to work from home as a result of the COVID-19 pandemic and in February war broke out in Europe. Simula has collaborations and employees from affected countries in this war and it has been important to take a clear stance in opposition of the invasion that simultaneously takes care of the individuals in our organisation, regardless of their nationality. In the spring of 2022, the board of the Research Council was dismissed, citing a lack of financial control. As a consequence of the subsequent financial changes, several of the calls in which Simula would typically participate were cancelled, and the ongoing FRIPRO call was greatly reduced. This has had a significant impact on Simula's finances in 2022 and is expected to have ripple effects in 2023 as well.

In the spring of 2022, Simula celebrated its 20th anniversary and invited many of our closest partners to join the celebrations in the "Hans Petter Langtangen's Lecture Hall" on the 8th floor of our premises. The event was a great success and marked an important achievement for Simula as a research institute and workplace. In October, Aslak Tveito chose to step down from his position as managing director. The board has asked deputy managing director Kyrre Lekve to step in as acting director until a new managing director could take office. The recruitment process for a new managing director is expected to be completed in the spring of 2023.

In 2022, 117 articles were published in international journals, 3 books, 3 edited books, 16 book chapters and 99 peer-reviewed conference papers.

During 2022, Simula's scientific staff supervised 12 candidates to complete their doctorate and 30 students to complete their master's degree. From 2001 to and including 2022, a total of 168 candidates have been supervised to a doctorate and 539 students to a master's degree at Simula. In addition, Simula employed 57 students on various project-based internships during the summer and autumn of 2022.

The University of Oslo has been an important partner granting just over half of the degrees obtained at Simula. In addition, Simula-supervised candidates have completed their degrees at the University of Bergen, Oslo Metropolitan University, Kristiania University College, the Norwegian Life Sciences University, the Norwegian University of Science and Technology, the University of Stavanger, and UiT Norway's Arctic University, as well as the Technical University Berlin and the Technical University Darmstadt in Germany.

At the end of 2022, Simula Innovation was a co-owner of 40 start-up companies with a total of 450 employees. In its third year of operations, Simula Consulting had a strong development, growing from seven to 13 employees and an increase in income of 45% compared to 2021.

Personnel and Health, Safety & Environment

At the end of 2022, the Simula Group had 236 employees, with 207 in full-time positions and 29 working in part-time positions. Of these, 159 were men and 77 were women, comprising 108 Norwegians and 128 foreign nationals. 99 were employed as research fellows, with 45 postdoctoral positions and 54 PhD students. In addition, there were 33 external PhD students under the supervision of Simula researchers. Beyond the recruitment positions, Simula does not practice temporary employment for researchers with their main position at Simula. A doctorate is required to obtain a permanent research position at Simula.

SRL had 131 employees at the end of the year, with 116 engaged in full-time positions and 15 part-time positions. Of these, 88 were men and 43 women.

Simula will maintain its strong focus on HSE (health, safety and environment). Absence due to illness was 2.2% for the Group and 1.4% for SRL in 2022. The Group will work actively to keep

sick leave at continued low levels. This applies to particularly close follow-up for both the physical working environment and mental health linked to home office work during the pandemic. No work-related illnesses or accidents were reported during the year.

The COVID-19 pandemic brought about completely new challenges for the work with HR and HSE for Simula. Simula was quick to facilitate home office setups for the employees. Now that the pandemic is over, Simula has made arrangements for employees to have greater flexibility than previously with regard to where they work. In 2022, Simula has implemented a 3:2 model where all employees are expected to be physically present at the workplace three days a week, with common core hours.

IT security and corresponding routines for training have been an important focus in 2022, and employees have received trained in the routines for digital security and GDPR. Simula has also initiated an extensive mapping procedure to ensure that Simula complies with the procedures and requirements that follow from the Export Control Act.

In the autumn of 2022, Simula carried out a working environment survey for the entire Group, using the same provider (LEAD AS) as in previous surveys. Lead conducts the survey 'Arbeidsmiljøundersøkelse for Instituttsektoren' (AMIS; in English: 'Working Environment Survey for the Institute Sector'). Lead was chosen in order to be able to compare historical figures from the past and to be able to compare with the institute sector in Norway. Overall, Simula had very good results in this survey and it has been closely followed up within Simula's companies and the various departments.

HSE-related incidents and absences are reported at every board meeting, including regular updates on employee welfare, employee surveys and implemented measures.

Simula's business activities do not pollute the external environment beyond what is expected from a typical office business. Simula is in the process of preparing a climate report to highlight Simula's actual climate footprint.

Equal Opportunities and Integration

The Group works to promote the purpose of the Equity and Anti-Discrimination Act by promoting

gender equality, ensuring equal opportunities and rights and preventing discrimination in the business. As of the financial year 2020, Norwegian employers and public authorities have a duty to work with equality and non-discrimination and account for this work and the actual situation. The statement is published in Simula's annual report and can be found in the section, "Gender equality report, social responsibility and working environment".

The Simula Group represents 44 different nations, and 54% of the Group's employees come from countries outside Norway. Simula offers Norwegian courses, social events, and support related to visas, taxes, housing, and other administrative matters.

situations for qualified women who are already employed at Simula.

Ethics

Simula follows the ethical guidelines as described in "The Simula Code of Ethics" document. This also addresses research ethics, based on the fact that Simula is an institution dedicated to truth and the pursuit of truth. Simula's reputation is dependent on others being able to trust that research results are correct and have been produced in a verifiable and ethically responsible manner. In the event of questions regarding research ethics, Simula's researchers are required to adhere to the guidelines set by the National Committee for Research Ethics in

By the end of 2022, the proportion of women researchers - meaning the average of PhD students, postdoctoral fellows and researchers in permanent positions - was 26%. The proportion of women researchers in permanent positions in particular was 22%, and among PhD students and postdoctoral fellows, the proportion of women was 30%. In order to reach the target of 40% female employees by 2028, Simula will continue to focus on measures for both the recruitment of new, talented female candidates and the development and adaptation of working

Science and Technology (NENT). In addition, all employees must follow Simula's internal guidelines for scientific publishing, which are based on the Vancouver Convention.

Financial Risk

Simula is exposed to a certain amount of financial risk in connection with the Group's equity investments. The value of the portfolio of shares is assessed continually, and should there be considerable insecurity connected to the value

of assets, a write-down is performed. There is also some currency risk related to EU projects in which Simula participates. In total, the Board nevertheless considers the financial risk as low. Credit risk and liquidity risk are also low. The Board concludes that risks to the organisation are generally low.

Financial Performance

The financial situation in the Group has been weakened during 2022. This is primarily due to three factors: a strong increase in costs, negative developments in financial investments, and a sharp decrease in income.

In its 21st year of operation, the Group had a turnover of NOK 292 million, an increase of 9% from the previous year. The budgeted income for the Group was NOK 326 million. The reason why revenues are lower than budgeted is mainly due to a failure to secure sufficient new project funding and postponements of planned activities due to delays in hiring. The operating deficit was NOK 19.4 million against a budgeted operating deficit of NOK 6 million. The annual result was a deficit of NOK 14.3 million in 2022. The combined cash flow in the Group was -14.3 million and for SRL 2.7 million in 2022.

SRL AS had total revenue of NOK 185 million in 2022. External project funding totalled NOK 114.5 million. The result for the year was a deficit of NOK 5.4 million, which is covered by other equity. Equity in SRL constitutes NOK 78.4 million, corresponding to 50% of the total assets equity ratio.

Simula Learning AS (SL, previously SSRI) had total operating revenue of NOK 2.1 million in 2022, and the annual result was a deficit of NOK 5.5 million. The company is being liquidated.

Simula Innovation AS (SI) had total operating revenue of NOK 1.2 million, total financial items were negative NOK 2.3 million, with a net deficit after tax of NOK 6 million in 2022.

The total operating revenue of Simula UiB AS was NOK 31.7 million, with a net deficit of NOK 4.3 million in 2022.

Operating revenue of Simula Metropolitan Centre for Digital Engineering AS (SimulaMet) was NOK 75.1 million, with a deficit of NOK 5.1 million in 2022.

Simula Consulting AS's operating revenues were NOK 22.4 million, with a net profit after tax of NOK 0.8 million in 2022.

Future Development

The Board believes that our annual accounts provide a correct picture of SRL AS and the Group. Equity in the individual companies and in the Group is good even though most companies have had a financial deficit in 2022.

By the end of 2022, Simula is active in the management of or in the role of research partner in 13 EU-funded projects. Simula has a generally good supply of projects from the EU and this is also the case with regard to commissioned research within our research areas, but in the last year we have experienced a significant decrease in NFR-funded projects.

In accordance with section 3, paragraph 3a, of the Norwegian Accounting Act, conditions for continuing operations are confirmed present, and the annual accounts are prepared accordingly.

The Work of the Board of Directors

The Board has been informed that Simula has taken out liability insurance for the Board, with an upper limit of NOK 20 million. Information on the main features of the insurance coverage has been provided to all board members.

Simula's Board had five meetings in 2022. The Board would like to thank all employees for their strong contribution throughout the year.

Oslo, 8. March 2023

Income statement 2022

2021	2022		Note	2022	2021
SRL				**Simula Group**	
		OPERATING REVENUES			
152 832 102	185 238 305	Operating revenues	2	291 891 747	266 996 520
152 832 102	**185 238 305**	**TOTAL OPERATING REVENUES**		**291 891 747**	**266 996 520**
		OPERATING EXPENSES			
90 170 436	119 977 686	Salary and social costs	3,4	214 268 649	178 411 148
553 681	1 691 794	Depreciation	5	2 715 171	1 757 202
51 936 260	68 159 286	Other operating expenses	6	94 306 718	74 851 130
142 660 377	**189 828 765**	**TOTAL OPERATING EXPENSES**		**311 290 538**	**255 019 480**
10 171 726	**−4 590 460**	**OPERATING PROFIT**		**−19 398 790**	**11 977 040**
		FINANCIAL ITEMS			
3 799	428 239	Other interest income		593 833	623 094
1 494 491	1 079 930	Other financial income		3 381 275	9 276 890
	0	Write-down of shares		5 541 209	2 749 871
95 305	22 604	Other interest expenses		50 013	101 245
743 538	2 171 518	Other financial expenses		7 125 500	1 135 108
659 446	**−685 953**	**NET FINANCIAL ITEMS**		**−8 741 614**	**5 913 760**
10 831 172	**−5 276 412**	**PROFIT BEFORE TAX**		**−28 140 404**	**17 890 800**
132 063	94 681	Tax	7	94 681	540 075
10 699 109	**−5 371 093**	**NET PROFIT**		**−28 235 085**	**17 350 725**
	0	Minority interest		−5 118 716	2 257 656
10 699 109	−5 371 093	Profit after minority interest		−23 116 369	15 093 069
		ALLOCATION OF THE YEAR'S NET PROFIT			
10 699 109	−5 371 093	Transferred to other equity			
10 699 109	**−5 371 093**	**TOTAL ALLOCATED**			

Balance sheet - assets

SRL			Simula Group	
2021	2022	ASSETS	Note	2022	2021
		FIXED ASSETS			
		Immaterielle eiendeler			
0	1 113 535	Web site	5	1 113 535	0
94 681	0	Deferred tax assets		0	94 681
94 681	**1 113 535**	**Total intangible assets**		**1 113 535**	**94 681**
		TANGIBLE FIXED ASSETS			
8 231 040	10 382 264	Furniture, fixtures, equipment	5	12 214 695	10 694 128
8 231 040	**10 382 264**	**Total tangible fixed assets**		**12 214 695**	**10 694 128**
		FINANCIAL FIXED ASSETS			
37 020 109	43 305 709	Investments in subsidiaries	8	1 316 075	1 316 075
0	0	Investments in shares	9	56 450 286	56 430 822
810 047	62 012	Other		175 661	1 051 559
37 830 156	**43 367 721**	**Total financial fixed assets**		**57 942 022**	**58 798 456**
46 155 877	**54 863 519**	**TOTAL FIXED ASSETS**		**71 270 252**	**69 587 265**
		CURRENT ASSETS			
		Receivables			
13 118 488	10 355 356	Account receivables		18 892 877	30 393 030
12 799 231	31 597 042	Other receivables		43 481 641	27 877 622
25 917 719	**41 952 398**	**TOTAL RECEIVABLES**		**62 374 517**	**58 270 652**
		INVESTMENTS			
28 981 548	27 083 251	Market-based funds	10	55 231 038	59 122 200
0	0	Market-based bonds	10	1 635 430	17 139 808
28 981 548	**27 083 251**	**Total investments**		**56 866 468**	**76 262 008**
27 784 802	**32 418 191**	**Bank deposits**	11	**73 806 730**	**68 761 301**
82 684 068	**101 453 840**	**TOTAL CURRENT ASSETS**		**193 047 715**	**203 293 962**
128 839 945	**156 317 358**	**TOTAL ASSETS**		**264 317 967**	**272 881 226**

Balance sheet - equity and liabilities

SRL				Simula Group	
2021	2022	EQUITY AND LIABILITIES	Note	2022	2021
		EQUITY			
		Paid-in equity			
1 200 000	1 200 000	Share capital	12,13	1 200 000	1 200 000
1 200 000	**1 200 000**	**TOTAL PAID-IN EQUITY**		**1 200 000**	**1 200 000**
		RETAINED EARNINGS			
82 619 618	77 248 524	Other equity	13	119 519 210	140 664 086
		Minority interests	13	18 176 530	25 552 338
82 619 618	77 248 524	Total retained equity		137 695 740	166 216 425
83 819 618	**78 448 524**	**TOTAL EQUITY**		**138 895 740**	**167 416 425**
		LIABILITIES			
0	0	Other long term debt	15	12 001 485	13 528 868
0	**0**	**TOTAL LONG TERM DEBT**		**12 001 485**	**13 528 868**
		CURRENT LIABILITIES			
6 082 048	15 843 000	Accounts payable		19 237 168	8 628 210
0	0	Tax payable	7	0	39 286
6 488 720	8 091 822	Public duties payable		15 814 793	13 408 380
32 449 560	53 934 013	Other current liabilities	16	78 368 780	69 860 057
45 020 327	**77 868 834**	**Total current liabilities**		**113 420 742**	**91 935 934**
45 020 327	**77 868 834**	**TOTAL LIABILITIES**		**125 422 227**	**105 464 802**
128 839 945	**156 317 358**	**TOTAL EQUITY AND LIABILITIES**		**264 317 967**	**272 881 226**

Oslo, 31.12.2022– 08.03.2023, The Board of Directors

Ingvild R. Myhre Chair of the board	Petter Nielsen Board member	Ingolf Søreide Board member	Hilde B. Nordvik Board member
Pinar Heggernes Board member	Håkon Kvale Stensland Board member	Maria Korkunc Board member	Mari Garaas Løchen Board member
	Kyrre Lekve Managing director	Mats A. Lundqvist Board member	

Notes to the financial statements

Note 1 Accounting principles

The financial statement has been prepared in accordance with the regulations of the Norwegian Accounting Act of 1998 and generally accepted accounting principles

General rule for valuation and classification of assets and liabilities
The financial statement has been prepared in accordance with the regulations of the Norwegian Accounting Act of 1998 and generally accepted accounting principles

General rule for valuation and classification of assets and liabilities

Assets intended for permanent ownership or long-term use have been classified as fixed assets. Other assets have been classified as current assets. Receivables to be repaid within one year are classified as current assets. Similar criteria have been applied to the classification of current and long-term liabilities.

Fixed assets are valued at acquisition cost but written down to fair value for any impairments that are not expected to be temporary. Fixed assets with a limited economic life are depreciated over the useful life of the asset. Long-term liabilities are recognised at nominal value in the balance sheet on the date they are incurred. Long-term liabilities are not revalued to fair value as a result of changes in interest rates.

Current assets are valued at the lower of cost and fair value. Current liabilities are recognised at nominal value in the balance sheet on the date they are incurred. Current liabilities are not appreciated to fair value as a result of changes in interest rates.

Certain items are valued according to other principles, as explained below.

Foreign Currency transactions
Assets and liabilities in foreign currency are converted at the exchange-rates on the balance sheet reporting date.

Tangible fixed assets
Tangible fixed assets are depreciated over the expected useful life of the asset. Depreciation is generally performed in a straight line over the expected useful life of the asset. As a general rule, the depreciation is distributed linearly over the assumed economic life.

Pensions
Pension obligations are financed through operations. The pension premium is considered a pension cost and is classified together with salary costs. All employees are included in the company's pension scheme.

Receivables
Accounts receivables and other receivables are recognised at nominal value less provisions for anticipated losses from bad debt. Provisions for losses are based on an individual assessment of each receivable. In addition, if necessary, a general provision is made to cover expected losses on other receivables.

Tax
The company is liable for tax on the proportion of turnover that falls under commissioned research.

Principles for revenue recognition
Revenues are recognised when delivery has taken place. Advances on grants and subsidies are entered as Other short-term liabilities and are entered as income in line with the delivery of the services.

The Group
The consolidated financial statement comprises the parent company Simula Research Laboratory AS (SRL) and the subsidiaries Simula Learning (SL), Simula Innovation (SI), Simula Metropolitan Center for Digital Engineering AS (SimulaMet), Simula Consulting AS and Simula UiB. Simula Research Incorporated is owned with 100% but is not included in the consolidated financial statements. The consolidated financial statements are prepared as if the Group were one economic entity. Transactions and balances between group companies are eliminated.

Note 2 Operating revenue

	SRL		SRL Group	
	2022	**2021**	**2022**	**2021**
Research funding	61 975 000	56 452 000	72 297 000	71 646 000
Subsidies from the Research Council of Norway, EU, etc.	114 468 896	89 710 796	208 357 623	171 077 085
Other income	8 794 409	6 669 306	11 237 124	24 273 435
Total	**185 238 305**	**152 832 102**	**291 891 747**	**266 996 520**

The projects generally have a duration of between one and five years. All income is mainly earned in Norway.

Note 3　Payroll costs, number of employees, remunerations, employee loans and auditor's fees

	SRL		SRL Group	
Salary and social costs	**2022**	**2021**	**2022**	**2021**
Salary	89 915 985	69 928 439	165 262 074	139 117 305
Social security	13 422 483	10 191 041	24 981 815	21 017 466
Pension costs	8 845 906	6 560 136	16 615 863	13 532 809
Other benefits	5 661 339	2 443 331	7 408 897	4 743 568
Personnel costs re-invoiced group	2 131 973	1 047 489		-
Total	**119 977 686**	**90 170 436**	**214 268 649**	**178 411 148**
Number of full-time equivalents	109	89	201	176

Remuneration paid to senior company officers	**Managing director**	**Board of directors**
Salary	3 061 458	598 350
Pension expenses	188 882	-
Other remuneration	347 714	-
Total remuneration	**3 598 054**	**598 350**

Stated benefits for the general manager apply to the manager who held the position in the financial year 2022.

Acting general manager was employed on 1 January 2023.

No loans or guarantees have been granted to the general manager, chairman of the board or other related parties. No loans or guarantees amount to more than 5% of the company's share capital.

Auditor

The auditor's fees break down as follows:

Parent company:	**2022**	**2021**	**Subsidiaries:**	**2022**	**2021**
Statutory auditing services	128 000	118 000	Statutory auditing services	212 300	195 600
Other services	60 300	127 800	Other services	69 200	46 500
Total auditor's fees	**188 300**	**245 800**	**Total auditor's fees**	**281 500**	**242 100**

The auditor's fee is stated exclusive of VAT

Note 4　Pension

The Group has a duty to maintain an occupational pension scheme in accordance with the Mandatory Occupational Pension Schemes Act. The company's pension schemes fulfil the requirements of this legislation.

Note 5 Fixed assets

SRL

Fixed assets	Website	Computer equipment	Furnishings, equipment, etc	Total fixed
Acquisition costs as of 01.01	-	5 141 328	4 124 661	9 265 989
Additions	1 319 304	504 152	3 133 096	4 956 552
Disposals				-
Acquisiton costs as of 31.12	**1 319 304**	**5 645 480**	**7 257 757**	**14 222 541**
Culmulative depreciation as of 31.12	-205 770	-1 958 739	-562 233	-2 726 742
Disposals				-
Book value as of 31.12	1 113 534	3 686 741	6 695 524	11 495 799
Year's depreciation	**205 770**	**1 047 187**	**438 837**	**1 691 794**

SRL Group

Fixed assets	Website	Computer equipment	Furnishings, equipment, etc	Total fixed
Acquisition costs as of 01.01	-	5 298 866	10 387 535	15 686 401
Additions	1 319 304	896 873	3 133 096	5 349 273
Disposals	-	-	-	-
Acquisiton costs as of 31.12	**1 319 304**	**6 195 739**	**13 520 631**	**21 035 674**
Culmulative depreciation as of 31.12	-205 770	-2 068 558	-5 433 116	-7 707 444
Disposals	-	-	-	-
Book value as of 31.12	1 113 534	4 127 181	8 087 515	13 328 230
Year's depreciation	**205 770**	**1 316 375**	**1 193 026**	**2 715 171**

The economic life of operating assets is calculated as:

• Computer equipment   2-5 years
• Furnishings, fixtures and equipment   3-5 years

Note 6 Rental and leasing contracts

The company has entered into two leasing agreements concerning photocopiers and coffee machines. This year's cost is NOK 253 425.

The company relocated from Fornebu to Kristian Augusts gate 23 in downtown Oslo in 2021. The lease is for 15 years.

Note 7 Tax

Simula Research Laboratory AS is liable to tax for the part of the business that concerns commissioned research. The subsidiaries Simula Learning AS, Simula Innovation AS and Simula Consulting AS are liable for tax. The subsidiaries Simula Metropolitan Center for Digital Engineering AS and Simula UiB AS are liable to tax for income from commissioned research.

	SRL		SRL Group	
Taxation of the year consists of:	**2022**	**2021**	**2022**	**2021**
Tax payable	-	60 507	-	468 519
Change in deferred tax	94 681	71 556	94 681	71 556
Total tax expense	**94 681**	**132 063**	**94 681**	**540 075**
Tax payable for the year is calculated as follows:				
Profit before tax expense*	-5 276 412	10 831 172	-25 140 404	21 718 132
Permanent differences	6 374 446	-7 303 566	18 631 638	-19 109 151
Change in temporary differences	-1 315 058	-3 252 573	-1 166 703	-3 134 336
Deficits to carry forward	-	-	-	-
Deficits and differences that are not included in the basis	-	-	-	2 654 987
Basis for taxable contract research	-217 024	275 033	-7 675 469	2 129 632
Taxable income	**-217 024**	**275 033**	**-7 675 469**	**2 129 632**
Temporary differences:				
Other differences	-1 650 000	-1 650 000	-2 207 808	-1 628 010
Fixed assets	-1 338 617	-2 653 675	-1 906 355	-3 077 456
Loss carryforward	-217 024	-	-13 295 833	-5 620 363
Write-down of shares	-	-	-1 201 610	-1 220 754
Total basis for deferred tax assets	-3 205 641	-4 303 675	-18 611 606	-11 546 583
Deferred tax liability/asset	-705 241	-946 809	-4 094 553	-2 540 248
Unrecognised deferred tax liability	-705 241	-852 128	-4 094 553	-2 445 567
Recognized tax liability	**-**	**-94 681**	**-**	**-94 681**
Tax payable in the balance sheet:				
Tax payable on the profit of the year	-	60 507	234 462	468 519
Tax payable on the Group contributions paid	-	-60 507	-234 462	-429 233
Total tax payable in the balance sheet	**-**	**-**	**-**	**39 286**

In 2022, the company will have had income from commissioned research corresponding to 4.8% of turnover.

* The line "Profit before tax expense" contains only profit from taxable entities.

Note 8   Subsidiaries, associates, etc.

	Acquired	Office	Country	Share	Stake
Simula Innovation AS	4.5.04	Oslo	Norge	100 %	100 %
Simula Learning AS - under avvikling	8.5.07	Oslo	Norge	90,76 %	55,74 %
Simula UIB AS	17.12.15	Bergen	Norge	51 %	
Simula Metropolitan CDE AS	21.11.17	Oslo	Norge	51 %	
Simula Consulting AS	7.11.19	Oslo	Norge	100 %	

	Result	Equity 31.12
Simula Innovation AS	-6 010 838	56 193 041
Simula Learning AS - under liquidation	-5 499 260	8 319 941
Simula UIB AS	-4 342 939	13 585 155
Simula Metropolitan Center for Digital Engineering AS	-5 066 420	21 940 903
Simula Consulting AS	821 033	2 397 809

Non-consolidated subsidiaries:	Cost	Result	Equity 31.12
Simula Research Laboratory Inc., owned 100% by SRL	1 316 075	0	USD 150 000

Note 9   Securities and shares in other enterprises, etc

Investment in subsidiaries	Quantity	Face value per share	Shareholding	Cost price
24SevenOffice Group AB	50 923			848 549
Adline Professional AS	5 244	1	5.7 %	1 587 320
AlphaEntrance AS	13 400	1	6.9 %	999 975
Augere Medical AS	19 430	1	22.8 %	2 258 930
Blueware corp.	334 319	USD 0.0001	1.4 %	7 000 000
Caplist AS	1 215	1	3.4 %	499 790
Celerway Communications AS	15 250	1	18.2 %	3 009 168
Coupler AS	882	1	2.9 %	1 000 000
Edgefolio UK Limited	5 771	GBP 1.00	5.2 %	1 451 243
Entire Body AS	111 111	15	9.8 %	3 000 025

Other share investments	Quantity	Face value per share	Shareholding	Cost price
EYR Medical AS	22 744	0.3	4.5 %	3 033 440
Fabriscale Technologies AS	19 983	1	26,6 %	4 010 410
Forzasys AS	33 000	0.34	30.0 %	1 528 065
Future Ready AS	1 875	1	4.0 %	500 000
Futureworks AS	3 351	1	10.0 %	1 000 000
Imerso AS	891	10	10.7 %	1 615 925
Insilicomed Inc. USA	131 945	USD 1,8		1 220 755
Investory Onlineplattform GmbH	3 318	EUR 1	4.0 %	1 104 440
KVM AS	1 137	3	11.4 %	3 412
LeadX AS	6 757 605	0.001	13.9 %	2 250 000
Leid AS	8 737	1	9.1 %	1 500 000
MemoScale AS	50 669	1	22.8 %	2 749 895
N-Abel AS	15 675	1	32.8 %	2 090 000
Organos Inc.	510 000		10.0 %	22 048
Qbee AS	934	1	17.4 %	2 998 618
Quine AS	5 809	1	10.1 %	700 267
Spoortz Holding AS	76 923	13.00	0.7 %	999 999
StalkIt AS	69	1000	2.8 %	1 001 209
Storeshop AS	67 286	1.75	10.1 %	1 849 760
Testify AS	44 433	1	30.0 %	1 427 117
Tipio AS	90 498	0.1	7.1 %	1 000 000
Unloc AS	2 504	1	3.8 %	1 499 754
Vendu AS	473 188	0.01	5.8 %	1 500 000
Volur AS	160	15	4.0 %	1 000 000
Write-down of shares				14 583 534
Total investment in associated companies				**43 676 580**

	Quantity	Face value per share	Shareholding	Cost price
Adline Professional AS	2 839	1	3.7 %	752 534
AlphaEntrance AS	9 999	1	5.2 %	1 500 000
Arribatech Group AS	277 800			500 000
Entire Body AS	33 334	15	2.9 %	500 010
EYR Medical AS	6 521	0.3	1.5 %	1 499 830
Fabriscale Technologies AS	3 223	1	4.3 %	1 999 793
Future Ready AS	638	1	1.4 %	250 000
LeadX AS	1 698 446	0.001	3.5 %	750 000
Leid AS	609	1	1.7 %	750 357
Memoscale AS	17 410	1	7.8 %	1 000 000
Quine AS	825	1	1.4 %	750 750
Spoortz Holding AS	76 923	13	0.7 %	999 999
StalkIt AS	69	1000	2.8 %	1 001 209
Unloc AS	630	1	1.0 %	499 760
Total pre-seed investment				**12 754 242**
Total investments in associates				**56 430 822**

Note 10   Financial instruments

The company has surplus liquidity in mutual funds. The placements are recorded at fair value as of 31 December.

SRL			
Type of placement	Accounted value	Share	Cost
Interest fond	20 046 344	74 %	19 800 000
Equity fond	7 036 906	26 %	6 077 136
Total	**27 083 250**	**100 %**	**25 877 136**

The year's negative value adjustment of NOK 1 898 297 is accounted for as other financial cost in the financial statement.

SRL Group			
Type of placement	Accounted value	Share	Cost
Interest fund	39 869 897	74 %	40 847 900
Equity fund	13 853 419	26 %	13 286 032
SUM	**53 723 316**	**100 %**	**54 133 932**

The year's negative value adjustment of NOK 3 760 100 is accounted for as other financial cost i in the financial statement.

Note 11   Bank deposits

	SRL	SRL Group
Restricted tax withholdings total::	4 263 945	7 892 882

Note 12   Share capital and shareholders

Share capital:	Quantity	Face value	Capitalised
Ordinary shares	800	1 500	1 200 000
Total	**800**		**1 200 000**

The company's shareholders as of 31.12:	Quantity	Stake
The Norwegian state represented by the Ministry of Education and Research	800	100%
Total no. of shares	**800**	**100 %**

Note 13 Equity

SRL	Share capital	Other Equity	Total
Equity as of 1.1.2023	1 200 000	82 619 618	83 819 618
Profit/loss for the year		-5 371 093	-5 371 093
Equity as of 31.12	**1 200 000**	**77 248 524**	**78 448 524**

SRL Group	Share capital	Other equity	Minority	Total
Equity as of 1.1	1 200 000	140 664 087	25 552 338	167 416 425
Other changes	-	1 971 492	-2 257 092	-285 600
Profit/loss of the year	-	-23 116 369	-5 118 716	-28 235 085
Equity as of 31.12	**1 200 000**	**119 519 210**	**18 176 530**	**138 895 740**

Note 14 Balances and transactions between group companies

	2022	2021
Receivable from SL	293 263	208 287
Receivable from SimulaMet	23 581	73 247
Receivable from SC	690 340	1 131 745
Payable to SI	4 050	855 757
Payable to SL	0	174 213
Payable to Simula UIB	0	12 736
Payable to SC	0	9 520
Payable to SimulaMet	0	353 612
Salary costs refunded to SL	0	2 292 218
Sale of services, etc to SI	559 210	653 610
Sale of services, etc to SL	950 009	3 325 179
Sale of services, etc to Simula UIB	2 097 186	1 648 735
Sale of services, etc to SimulaMet	4 854 698	3 290 884
Sale of services, etc to SC	6 987 770	5 040 467
Purchases of services, etc from SI	585 940	1 520 189
Purchases of services, etc from SL	1 105 500	328 488
Purchases of services, etc from Simula UIB	144 900	12 736
Purchases of services, etc from SimulaMet	13 420 510	13 893 437
Purchases of services, etc from SC	422 609	247 338

Note 15 Receivables and liabilities

Long-term debt due in more than five years	SRL		SRL Group	
	2022	2021	2022	2021
Pre-seed funds from Innovasjon Norge AS	-	-	12 007 110	13 528 868
Total	**-**	**-**	**12 007 110**	**13 528 868**

Note 16 Advance payments of grants and research funding

SRL	2022	2021
Grants received, not earned by 31.12.	41 608 885	21 979 525

SRL Group	2022	2021
Grants received, not earned by 31.12.	53 368 997	36 608 696

Grants received, not earned are accounted for as "other short term liabilities" in the balance sheet.
Received pre-financing in connection with an EU project where SRL is the coordinator, booked with net amount in the balance sheet.

Note 17 Financial market risk and currency risk

The Group is to a certain extent exposed to financial market risk by investing in start-up companies, and by the fact that surplus liquidity in certain subsidiaries is placed in equity and fixed income funds.

The currency risk the company is exposed to is mainly due to EU-funded research and collaboration with universities in the United States.

Cash flow statement

SRL			SRL Group	
2021	2022		2022	2021
		CASH FLOW FROM OPERATING ACTIVITIES		
10 699 109	-5 371 093	Net profit for the year	-28 235 085	17 350 725
553 681	1 691 794	Depreciations and write-downs	2 715 171	1 757 202
-	-	Change in value of shares	5 541 209	2 749 871
-6 449 984	-15 286 645	Change in receivables	-3 227 967	-10 664 014
-31 894	32 848 507	Change in current liabilities	21 484 808	3 383 087
4 770 912	**13 882 563**	**NET CASH FLOW FROM OPERATING ACTIVITIES**	**-1 721 864**	**14 576 871**
		CASH FLOW FROM INVESTING ACTIVITIES:		
-	-6 285 600	Changes in connection with arrival/disposal of subsidiary	-285 600	-
-8 555 037	-4 956 552	Net investments in operating assets	-5 349 273	-8 703 199
-214 526	-	Net investments in/sale of shares	-5 560 673	-10 984 674
-8 769 563	**-11 242 152**	**NET CASH FLOW FROM INVESTING ACTIVITIES**	**-11 195 546**	**-19 687 873**
		CASH FLOW FROM FINANCING ACTIVITIES:		
-	-	Repayment of loans	-1 527 383	-471 132
-	-	Paid-in equity	-	429 234
71 556	94 681	Change in deferred tax/tax benefit	94 681	71 556
71 556	**94 681**	**Net cash flow from financing activities**	**-1 432 702**	**29 658**
-3 927 095	**2 735 092**	**Net cash flow for the year**	**-14 350 112**	**-5 081 344**
60 693 445	56 766 350	Cash holdings 1.1	145 023 310	150 104 654
56 766 350	59 501 442	Cash holdings 31.12	130 673 198	145 023 310
		THIS CONSISTS OF:		
-11 301 241	4 633 389	Change bank deposits	5 045 428	-8 388 553
7 374 146	-1 898 297	Changing financial current assets	-19 395 540	3 307 209
-3 927 095	**2 735 092**	**SUM TOTAL**	**-14 350 112**	**-5 081 344**

INSIGNIS

Til generalforsamlingen i Simula Research Laboratory AS

Uavhengig revisors beretning

Konklusjon

Vi har revidert årsregnskapet for Simula Research Laboratory AS som består av:

- selskapsregnskapet, som består av balanse per 31. desember 2022, resultatregnskap og kontantstrømoppstilling for regnskapsåret avsluttet per denne datoen og noter til årsregnskapet, herunder et sammendrag av viktige regnskapsprinsipper, og
- konsernregnskapet, som består av balanse per 31. desember 2022, resultatregnskap og kontantstrømoppstilling for regnskapsåret avsluttet per denne datoen og noter til årsregnskapet, herunder et sammendrag av viktige regnskapsprinsipper.

Etter vår mening

- oppfyller årsregnskapet gjeldende lovkrav,
- gir selskapsregnskapet et rettvisende bilde av selskapets finansielle stilling per 31. desember 2022 og av dets resultat og kontantstrømmer for regnskapsåret avsluttet per denne datoen i samsvar med regnskapslovens regler og god regnskapsskikk i Norge, og
- gir konsernregnskapet et rettvisende bilde av konsernets finansielle stilling per 31. desember 2022 og av dets resultater og kontantstrømmer for regnskapsåret avsluttet per denne datoen i samsvar med regnskapslovens regler og god regnskapsskikk i Norge.

Grunnlag for konklusjonen

Vi har gjennomført revisjonen i samsvar med International Standards on Auditing (ISA-ene). Våre oppgaver og plikter i henhold til disse standardene er beskrevet nedenfor under "Revisors oppgaver og plikter ved revisjonen av årsregnskapet". Vi er uavhengige av selskapet og konsernet i samsvar med kravene i relevante lover og forskrifter i Norge og International Code of Ethics for Professional Accountants (inkludert internasjonale uavhengighetsstandarder) utstedt av International Ethics Standards Board for Accountants (IESBA-reglene), og vi har overholdt våre øvrige etiske forpliktelser i samsvar med disse kravene. Innhentet revisjonsbevis er etter vår vurdering tilstrekkelig og hensiktsmessig som grunnlag for vår konklusjon.

Øvrig informasjon

Styret og daglig leder (ledelsen) er ansvarlige for informasjonen i årsberetningen. Vår konklusjon om årsregnskapet ovenfor dekker ikke informasjonen i årsberetningen.

I forbindelse med revisjonen av årsregnskapet er det vår oppgave å lese årsberetningen. Formålet er å vurdere hvorvidt det foreligger vesentlig inkonsistens mellom årsberetningen og årsregnskapet og den kunnskap vi har opparbeidet oss under revisjonen av årsregnskapet, eller hvorvidt informasjon i årsberetningen ellers fremstår som vesentlig feil. Vi har plikt til å rapportere dersom årsberetningen fremstår som vesentlig feil. Vi har ingenting å rapportere i så henseende.

Basert på kunnskapen vi har opparbeidet oss i revisjonen, mener vi at årsberetningen

- er konsistent med årsregnskapet og
- inneholder de opplysninger som skal gis i henhold til gjeldende lovkrav.

INSIGNIS AS
Besøksadresse: Sandakerveien 138, 0484 Oslo
Postadresse: Postboks 4618, Nydalen, 0421 Oslo
Org.nr. 917 835 810 MVA, Foretaksregisteret

www.insignis.no

INSIGNIS

Ledelsens ansvar for årsregnskapet

Ledelsen er ansvarlig for å utarbeide årsregnskapet og for at det gir et rettvisende bilde i samsvar med regnskapslovens regler og god regnskapsskikk i Norge. Ledelsen er også ansvarlig for slik intern kontroll som den finner nødvendig for å kunne utarbeide et årsregnskap som ikke inneholder vesentlig feilinformasjon, verken som følge av misligheter eller utilsiktede feil.

Ved utarbeidelsen av årsregnskapet må ledelsen ta standpunkt til selskapets og konsernets evne til fortsatt drift og opplyse om forhold av betydning for fortsatt drift. Forutsetningen om fortsatt drift skal legges til grunn for årsregnskapet så lenge det ikke er sannsynlig at virksomheten vil bli avviklet.

Revisors oppgaver og plikter ved revisjonen av årsregnskapet

Vårt mål er å oppnå betryggende sikkerhet for at årsregnskapet som helhet ikke inneholder vesentlig feilinformasjon, verken som følge av misligheter eller utilsiktede feil, og å avgi en revisjonsberetning som inneholder vår konklusjon. Betryggende sikkerhet er en høy grad av sikkerhet, men ingen garanti for at en revisjon utført i samsvar med ISA-ene, alltid vil avdekke vesentlig feilinformasjon. Feilinformasjon kan oppstå som følge av misligheter eller utilsiktede feil. Feilinformasjon er å anse som vesentlig dersom den enkeltvis eller samlet med rimelighet kan forventes å påvirke økonomiske beslutninger som brukerne foretar på grunnlag av årsregnskapet.

For videre beskrivelse av revisors oppgaver og plikter vises det til:
https://revisorforeningen.no/revisjonsberetninger

Oslo, 8. mars 2023
Insignis AS

_____
Kristoffer Langva
statsautorisert revisor

Side 2 av 2

25

Gender equality, social responsibility and working environment

Gender balance at Simula

As of the 31st of December 2022, the Simula group consisted of a total of six companies in Norway: Simula Research Laboratory (SRL), Simula Metropolitan Center for Digital Engineering (SimulaMet), Simula UiB, Simula Learning (SL), Simula Innovation and Simula Consulting. Additionally, Simula has established a subsidiary in the US, Simula Inc., to handle employment in the US. The Group has a total of 236 employees, of whom 207 have Simula as their main position. SRL has a total of 131 employees, of whom 116 have SRL as their main employer. The gender balance in both the Simula Group and in SRL specifically is shown in Table 1 as the number of male and female employees with main positions in Simula, while Table 2 shows the gender

balance according to other working conditions. To preserve the anonymity of the employees, several positions have been grouped so that each category has at least five men and five women at the Group level.

Due to the nature of Simula's work, many employees are hired in temporary or part-time positions. For example, a large part of the workforce is in temporary recruitment positions (PhDs and postdocs), and the position category 'adjunct research scientist' comprises part-time employees who have a main position with another employer. Although the exact number of employees in these positions will vary somewhat from year to year, in line with the number of externally funded projects, the total number is relatively stable over time.

Table 1: Gender balance amongst employees that have Simula as their main employer. Job categories with less than five women and five men are not reported and are marked with a dash (-).

Job categories at Simula	Simula Group		SRL	
	Women	Men	Women	Men
Total	77	159	43	88
Research positions	18	64	11	31
Recruitment positions	30	71	17	45
Administrative positions	35	26	14	7
Group management	7	8	-	-

Job categories in Table 1:

- Research positions: includes researcher I, II and III positions (not including adjunct research scientists), and engineers.

- Recruitment positions: trainees, PhDs, post-docs.

- Administrative positions: HR, finance, communication, IT operations, management

- Group management: includes the CEO, company directors and managers who are part of the management group. Members of group management have their main position within either administration or research and have thus also been counted in those job categories.

The groupings in Table 2 are defined as follows:

- Temporary staff: mainly recruitment positions (PhDs and postdocs), adjunct professor positions, interns and assistants/substitutes. Stated in the number of employees.

- Actual part-time: includes both research and administrative employees at Simula. The majority of the employees in this category have positions with other employers that are relevant to the work they perform at Simula (e.g., these are mainly adjunct research scientist positions). Stated in the number of employees.

- Involuntary part-time: we have no employees in part-time positions that wish to work more.

- Parental leave: stated in the number of weeks. The total number of weeks per gender is then divided by the number of women or men who have taken parental leave to show the average withdrawal per person of that gender.

Table 2: Gender balance in terms of other employment variables:

	Temporary staff		Actual part-time		Involuntary part-time		Parental leave	
	Women	Men	Women	Men	Women	Men	Women	Men
Simula Group	36	92	6	23	-	-	11	6
SRL	20	54	-	11	-	-	11	4

Simula's work for equality and non-discrimination

Simula relies on the competence and motivation of skilled employees to achieve its goals. By recruiting highly qualified researchers from all over the world, Simula has become an increasingly diverse workplace. Simula's employees currently represent 44 different nationalities and 54% of the employees come from countries other than Norway (see Figure 1). In total, 33% of Simula's employees are women (26% of Simula's academic staff, see Figure 2).

General principles for gender equality and anti-discrimination

Working towards gender equality is firmly anchored in Simula's management approach and in various strategies and guidelines:

■ Simula has worked purposefully to recruit and cultivate female research talent for over 10 years. Simula's initial goal to increase the proportion of women in research positions to 25% was achieved in 2013. Simula's aim is to achieve a total proportion of women of 40% of all employees by 2028.

■ Extensive work in health, safety and environment (HSE) is carried out regularly. This involves health and safety representatives, the working environment committee, PhD forum, HR and the welfare committee. In addition, employee well-being surveys and broader working environment surveys are conducted regularly.

■ The boards of directors in Simula companies receive regular reports on employee welfare, both routinely (for example, HSE reports for each board meeting) and regarding significant issues that may affect employees.

■ Simula's culture document clearly describes our core values and expectations for a good and inclusive workplace; this document is published on the company website.

■ Simula has clear guidelines to prevent all forms of harassment, with a corresponding notification system in place.

Practical procedures for equality and anti-discrimination

Simula works actively and deliberately with equality and non-discrimination, which are essential components of Simula's efforts to ensure good working conditions in practice. Responsibility for this work is shared across several functions, including health and safety representatives, the working environment committee, HR, managers at all levels, the management group and the boards of directors. Measures that are decided are implemented by the administration, and in many cases it is done in cooperation with representatives of the employees (working environment and safety representatives, or trade union representatives). Information flow is ensured via regular meetings between department heads and selected administration functions. In addition, all employees at Simula have an independent responsibility for safeguarding the Simula culture and contributing to an inclusive working environment. Employees also have a duty to make it known if they discover any form of harassment at work.

As a result of this extensive work over many years, Simula has implemented measures that contribute to equality and anti-discrimination. The current measures are described below.

Working environment

Quality assurance and continuous workplace development at Simula is facilitated by means of an internal inspection system that embraces health, safety and the working environment. The working environment committee strives to develop and maintain the quality of the working environment and to follow up on questions related to employee safety, health and welfare. In the autumn of 2022, Simula carried out a new working environment survey across all companies in the Group. The results once again showed that Simula has a very good working environment both compared to previous surveys at Simula and in comparison with the research institute sector in general. Following the survey, we have continued the work of following up in the individual units and in Simula as a whole. We consider this work to be a continuous process and our ambition is to carry out the working environment surveys every two years.
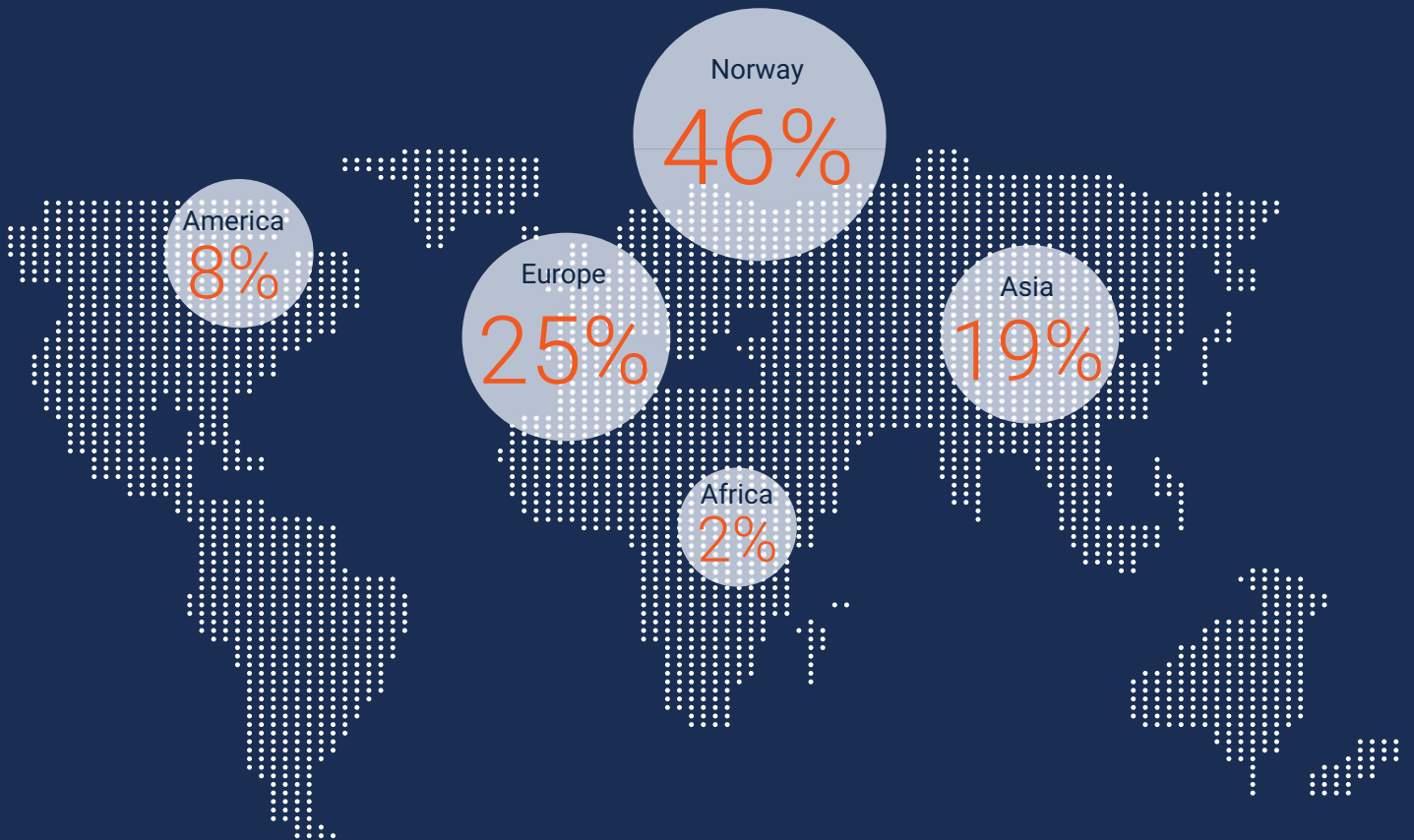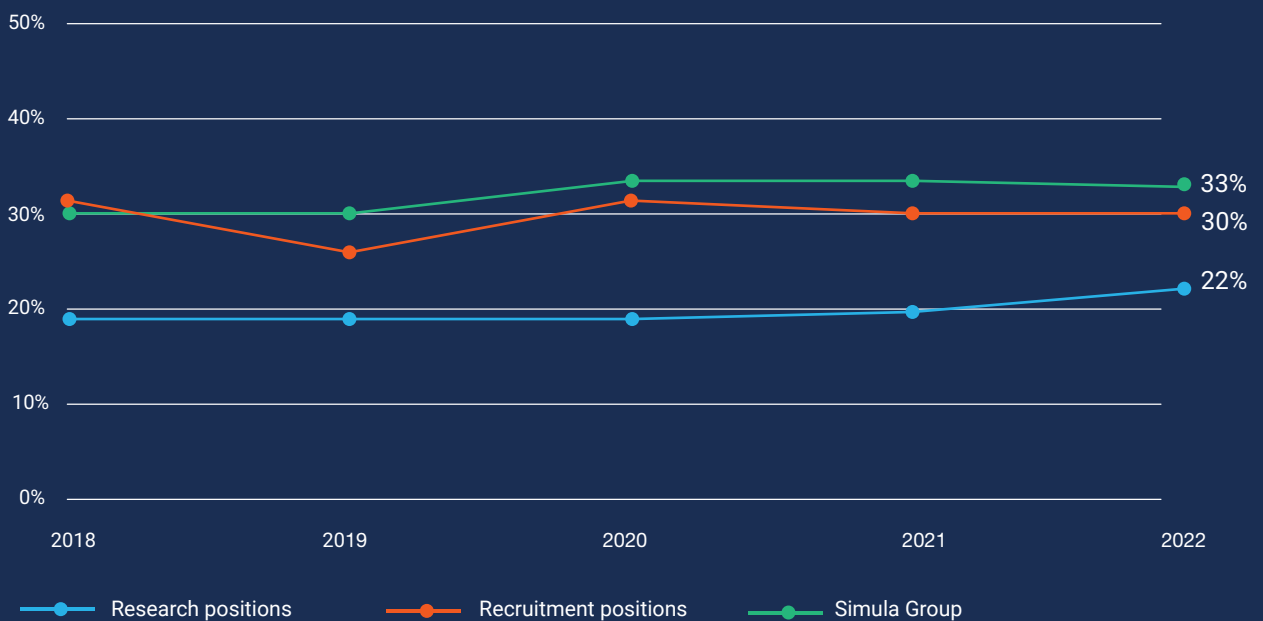
Figure 1: Simula is a diverse workplace. The figure shows the proportion of employees from different continents.

Figure 2: Proportion of scientific positions at Simula held by women.

Research positions   Recruitment positions   Simula Group

Facilitation of and opportunities to combine work and family life

Simula has several initiatives in place to facilitate a good work-life balance, including family life. With flexible working hours, employees can combine a demanding career with activities and responsibilities outside work. Employees in recruitment positions (PhDs and postdocs) can get a four-month extension of their employment contract when they have a child. Simula has also established a sponsorship programme, where employees can apply for support for organised leisure activities outside of work.

In September, a Simula-wide retreat was held for all employees. An important part of this seminar was inclusive working life, both with regard to diversity and work-life balance. A lecture was given on work-life balance followed by group discussions on the topic, and employees were also presented with a lecture on collaboration in multicultural organisations. With these measures, Simula wants to contribute to being a good workplace for all its employees, regardless of the background and life situation of the individual.

Recruitment and professional development

Simula continuously works to attract, develop and retain talented researchers of diverse backgrounds. Simula's recruitment guidelines require qualified candidates of both genders to be called in for an interview. The guidelines are regularly communicated to employees responsible for recruiting new researchers at project manager seminars among other occasions. For those recruited from abroad, Simula facilitates a quick and positive transition to the Norwegian workplace through administrative support, social activities and Norwegian language training. Language training is also offered to the spouses/partners of new employees relocating to Norway.

Simula promotes career development by providing access to the professional and administrative resources necessary to establish oneself as a researcher. All employees are encouraged to sign up for courses and training opportunities that can contribute to their development as experts and leaders. Since 2016, several project managers have attended intensive leadership training programmes at internationally recognised institutions such as Stanford University, Harvard, the

Wharton School and London Business School. Simula also arranges seminars for supervisors with a focus on relevant and challenging topics and offers courses for PhD students and post-docs to develop their understanding and skills required as a supervisor. Simula Academy, which works with researcher training and professional development at Simula, organised a wide range of courses and activities for Simula's employees that have direct relevance for a career in research, as well as contribute to an inclusive working environment. In 2022, these activities included career guidance and planning for postdocs and recently hired permanent researchers (Postdoc Career Success Program), an intensive PhD course called Communicating Scientific Research, tailored workshops, and coaching in scientific communication. In addition, the Academy hosted seminars and workshops on leadership development (situation-based management, how to give feedback, and supervision), and a seminar for new employees to clarify expectations and highlight opportunities available to Simula's employees.

Salary structure

Every second year, Simula conducts an evaluation of salary conditions in the organisation. This was most recently conducted in 2021. The goal is twofold: to assess whether salary levels at Simula are competitive (external perspective) and if they reflect the individual's responsibilities and job category (internal perspective). In this evaluation, we consider similar positions (e.g., PhD students) and work of similar administrative contribution (e.g., human resources and communications staff). Additionally, individual assessments related to such variables as education, experience and individual contribution are conducted, as are any differences according to gender. Deviations that are identified are processed and corrected. The next review will be carried out during 2023.

Promotion

Each year, Simula carries out a process where the scientific staff are assessed according to established job criteria for promotion. Those who meet the requirements are promoted to a higher scientific position.

Absence due to illness

Sick leave is generally low at Simula. In 2022, absence due to illness was 2.2% across the Group (1.4 % for SRL). Simula has an agreement with NAV (the Norwegian Labour and Welfare Administration) concerning "the inclusive workplace". Its purpose is to prevent and reduce absence related to illness, improve job attendance and the working environment, and minimise exclusion and withdrawal from working life. An action plan that focuses on how Simula addresses these matters is discussed with NAV on an annual basis.

Conflict management and work against harassment

Simula aims to ensure a safe and secure working environment in accordance with the Group's principles on culture in the workplace. As such, Simula shows consideration for employees' individual needs and does not accept or tolerate any form of harassment, expulsion or discrimination based on religion, gender, sexual orientation, age, nationality, disability or political views. Simula's guidelines for conflict resolution and notification encourage employees to take an active role in creating a working environment where conflict is handled in an open, honest and constructive way, and in efforts to prevent destructive forms of conflict from arising in the first place.

Ethics

Maintaining high ethical standards is of great importance to Simula as an organisation and to our employees. Simula's ethical guidelines have been drawn up to raise awareness of and to comply with the high ethical standards required of each individual employee. The ethical guidelines contain points such as research ethics; working environment and inclusion; gifts, bribes and corruption; confidentiality; and conflicts of interest. Compliance with the guidelines helps to create credibility in cooperation with partners. The guidelines are available to all employees on Simula's intranet.

How Simula works for equality and non-discrimination

Simula's work for gender equality and anti-discrimination is a continuous interaction between several key players in the Group, including the management, the board, the administration, employees

and employee representatives. Simula's administration already bases much of its work on a 4-step working cycle:

1. Examine the risk of discrimination and obstacles to equality
2. Analyse causes
3. Implement measures
4. Evaluate results

In recent years, Simula has carried out a targeted process to identify discrimination and gender equality risks and to develop corresponding measures. Several of the recruitment measures established in the process of this review, such as always interviewing at least one qualified candidate of each gender for a position, are now established practice.

In 2022, Simula has continued to work for equality and anti-discrimination. Selected examples from this work can be found in Table 4.

According to the requirements from the Activity and Reporting Duty (ARP), the work for equality and anti-discrimination must be carried out in more active cooperation with union representatives according to the statutory working method. A structure that more clearly reflects this has begun and will be continued in 2023.

Additional measures for equality and anti-discrimination

In 2022, we conducted a joint working environment survey for the entire Group. The survey itself and the preparation of reports were carried out by LEAD AS. The response rate was 79% of 193 questionnaires sent out. The main results from the survey show that employees are generally satisfied with their workplace, they are motivated and feel proud to work at Simula, experience great self-determination and professional development. We see that most employees report low perceived discrimination, both in terms of gender and position.

The results of the survey have been presented to several target groups in the organisation, including to the board, the management of the various companies, general meetings for all employees, and individual meetings with department heads. With support from the administration and HR, the department heads have held follow up meetings

with their respective departments and prepared action lists at department level. The survey results are considered to be 'snapshots' and are used as a starting point for discussion rather than conclusions on a given situation or experience. This has been a positive approach that has led to many good and informative discussions. In 2023, we will continue to follow up on these results.

Some of the measures planned for 2023 will be further developments of earlier initiatives. Many of these were organised under Simula's "HiddenFigures" project, which was part of the Research Council of Norway's "BalanseHub" programme and was active from January 2021 to January 2023. HiddenFigures aimed to achieve long-term gender balance and diversity by creating a management culture across Simula that is inclusive in view of the researchers' different backgrounds and life situations. The measures, which included tailored leadership development and mentoring, have contributed to increased awareness and more open dialogue across the organisation around inclusive and supportive working environments. Although it is too early to assess the long-term effect of these measures, the benefits are sufficiently recognizable that they will be continued in 2023.

A significant part of the recruitment for new positions in Simula is led by employees who are new to the recruitment role. Recently, we have become increasingly aware of the need to assist individual hiring managers when recruiting. We intend to start a project that can establish a common routine for the recruitment process across units and departments. The outcome of such a project will give us a common understanding of recruitment as a professional field and provide support for both experienced and inexperienced hiring managers. A common routine can contain elements such as courses, training materials, checklists or short films. We plan to start this work in 2023.

Table 4: Selected examples of work with risk identification and initiative development

	Potential risks	Possible causes	Corresponding measures	Effect of measures
1.	Possible risk of slower professional advancement among female researchers.	Female researchers publish less and apply for fewer externally funded projects.	Simula has developed a quality assurance process that supports researchers in preparing project applications. This offer is available to all employees.	Applications have received better evaluation scores; the gender dimension is not yet clear.
2.	Possible risk of the "leaky pipeline" known in academia - do we have good enough measures to ensure that we retain talented female researchers at senior levels in the organisation?	Parts of the working environment are not sufficiently adapted to attract and retain the best researchers – regardless of gender, background or life situation.	Simula participates in the Research Council's BalanseHub network with a separate project that supports measures to develop a more inclusive working environment.	The project "Hidden Figures" was a part of the BalanseHub network lasted from 1.1.2021 to 31.01.2023 (see below for details).
3.	Possible risk of an incomplete overall picture of the need for competence-developing courses and offers in Simula.	Constantly changing needs and lack of comprehensive overview available in Simula.	A working group assesses which competence-developing courses are to be offered, what exists today, and what is needed in the short and long term.	We will have to assess the effect of this at a later date.
4.	Possible risk that employees returning from leave find it difficult to get back on track in their work. Are there unresolved effects of the new home office policy on the working environment and productivity?	After extended leave such as parental leave, employees will need an update on what has happened both professionally and organisationally since the leave started.	Introduced a fixed routine for a conversation between the immediate superior and employee returning from leave. This should facilitate a smoother transition ("re-boarding"). The initiative was launched in autumn 2021.	We plan to evaluate this initiative in 2023.
5.	Possible risk that less contact between colleagues could be problematic for certain employee groups.	Increased flexibility as a result of the new home office policy may lead to less professional contact.	After the Covid-19 pandemic, a test period was carried out to try out different home office models (e.g. how many days in the office per week). This was done to assess which model is best for our working environment and for professional development. After the end of the test period, a 3:2 model was introduced, in which three days a week are in the office and two days are flexible. The new model was implemented in September 2022.	We will assess the effects of this model continuously over the next few years. This can, for example, be done in a survey or in connection with employee interviews.
6.	Possible risk that employees underestimate their own competence and that this has a negative effect on career progression.	Uncertainty about one's own competence and how to make it visible.	Introduced CV review to highlight and emphasise the experience and competence of the individual employee. The review has also been used to identify areas where employees can further develop their own skills. The initiative is intended to help each individual highlight their strengths and relevant experience.	Although it is difficult to measure the effect of this initiative, we have received positive feedback that this raised awareness.

Company overview 2022

Simula has been led by Professor Aslak Tveito since 2002 and comprises six companies spread over three locations in Norway. Since Simula Research Laboratory AS (SRL) was established in 2001, several daughter companies have been established under SRL to expand research, education, and innovation activities.

Simula Research Laboratory (SRL)

Deputy Managing Director: Kyrre Lekve
Location: Oslo (Tullinløkka)
Ownership: 100% Norwegian Ministry of Education and Research

The departments of the mother company concentrate primarily on research and the education of graduate students within the ICT fields of software engineering and scientific computing. SRL also manages the innovation activities (Simula Garage) and researcher training (Academy).

Research Directors: Are Magnus Bruaset and Vegard Vinje

Research Departments:
- Dept. of Computational Physiology (ComPhy) Dept. Head: Hermenegild Arevalo
- Data-Driven Software Engineering Dept. (DataSED) Dept. Head: Leon Moonen
- Dept. of Engineering Complex Software Systems (ComplexSE) Dept. Head: Shaukat Ali
- Dept. of High-Performance Computing (HPC) Dept. Head: Xing Cai
- Dept. of Numerical Analysis & Scientific Computing (SCAN) Dept. Head: Ada Johanne Ellingsrud
- Dept. of Validation Intelligence for Autonomous Software Systems (VIAS) Dept. Head: Arnaud Gotlieb

Other departments:
- Simula Academy, **Director:** Rachel Thomas
- Simula Garage, **Director:** Ranveig Strøm

Simula UiB

Director: Carlos Cid
Deputy director: Mari G. Løchen
Location: Bergen
Ownership: 51% Simula Research Laboratory, 49% University of Bergen (UiB)

Simula UiB specialises in cybersecurity, with an emphasis on cryptography and information theory. In addition to conducting research, Simula UiB also supervises PhD and masters' students at the University of Bergen. Simula UiB is based at the Department of Informatics at UiB.

Research Director: Øyvind Ytrehus

Research Departments:
- Cryptography Department Dept. Head: Håvard Raddum
- Information Theory Department Dept. Head: Eirik Rosnes

Simula Learning (SL)

Director: Marianne Aasen
Location: Oslo (Tullinløkka)
Ownership: 91% Simula Research Laboratory, 9% Bærum Municipality

Simula Learning provides training in digital skills, particularly for teachers in the Bærum and Oslo municipalities. Towards the end of 2022 Simula Research Laboratory's board of directors decided to close SL in order to preserve resources for Simula's core activities, and SL will be liquidated in the first quarter of 2023.

Simula Metropolitan Center for Digital Engineering (SimulaMet)

Director: Olav Lysne
Deputy director: Marianne Sundet
Location: Oslo (Bislett)
Ownership: 51% Simula Research Laboratory, 49% Oslo Metropolitan University

SimulaMet's research activities are focused in networks and communications, machine learning and IT management. In addition to conducting research, SimulaMet also educates and supervises PhD and masters' students at Oslo Metropolitan University and contributes to innovation in society through collaboration projects, startup companies and licensing of research results. SimulaMet is located at Oslo Metropolitan University.

Research Director: Sven-Arne Reinemo

Research Departments:
- IT Management/EDOS - Effektiv Digitalisering av Offentlig Sektor,
  Dept. Head: Magne Jørgensen
- Data Science and Knowledge Discovergy (DataSci), Dept. Head: Evrim Ataman
- Centre for Resilient Networks & Applications (CRNA), Centre leader: Ahmed Elmokashfi
- Holistic Systems Department (HOST),
  Dept. Head: Pål Halvorsen
- Signal and Information Processing for Intelligent Systems (SIGIPRO),
  Dept. Head: Baltasar Beferull-Lozano

Simula Innovation (SI)

Director: Ottar Hovind
Location: Oslo (Tullinløkka)
Ownership: 100% Simula Research Laboratory

SI manages Simula's investment portfolio and supports entrepreneurs from the start-up phase.

Simula Consulting (SC)

Director: Valeriya Naumova
Location: Oslo (Tullinløkka)
Ownership: 100 % Simula Innovation

Simula Consulting provides high-quality R&D consulting services in the core competence areas of Simula.

Research

The bulk of Simula's research is conducted within five main ICT areas: Communication Systems, Software Engineering, Scientific Computing, Machine Learning and Cryptography. Our research is conducted at Simula Research Laboratory, SimulaMet, and Simula UiB, in close collaboration with both national and international partners.

Simula Research Laboratory (SRL)

SRL's research is specialised in Scientific Computing and Software Engineering.

The researchers who work within scientific computing are developing efficient and user-friendly tools that will make supercomputing more accessible and flexible for researchers in a range of areas, with a particular focus on applications in biomedical science. Our main interest is to model the processes and conditions of the heart and brain, including heart failure, stroke, and dementia.

In order to strengthen our collaboration with UiO and improve our environment in neuroscience, we started the bioAI project in 2022. The goal is to develop theory and models within artificial intelligence that are inspired by how a human brain works.

In recent years, Simula has taken part in organising the Oslo Glymphatics Symposium, an annual meeting where researchers gather to present their work and discuss how the brain gets rid of waste substances. Researchers came from the USA, Finland, Denmark and Sweden to Simula to participate in discussions across disciplines

such as physiology, neuroscience, biomechanics and numerical calculations, and at the same time opened up for international collaboration partners who are at the forefront of research in their respective fields.

Simula is a partner in the new ESFRI infrastructure SLICES (Scientific LargeScale Infrastructure for Computing/Communication Experimental Studies), which is in its preparatory phase. The national infrastructure for experimental research on high performance computing that Simula hosts, eX3, is intended to play the role of Norwegian node in SLICES.

Within software engineering, our researchers also use methods and tools to design, develop, maintain, test and validate complex software systems. The aim is to ensure that the software we rely on is robust, reliable, safe and secure, both for today's systems and for the quantum systems of the future.

Chief Research Scientist, Shaukat Ali, together with Hadi Hemmati and Lionel Briand, received the award for the previous decade's most influential article from the Springer International Journal on Software and Systems Modelling for "Modelling robustness behaviour using aspect-oriented modelling to support robustness testing of industrial systems" published in 2012. This article was a central part of Ali's doctoral work at Simula.

Simula was at the forefront of the national workshop "QCNorway - Towards a Norwegian Quantum Computing Strategy", which was held on the 7th & 8th of November 2022 at Simula. The event brought together 23 international experts and an audience of more than 150 people to discuss education, research and innovation related to quantum computers. Such computers represent a fundamentally new way of thinking, and Simula has already become heavily involved in the software challenges that arise as a result. Simula is also a partner in the Nordic research project NordiQuEst and in the recently awarded EuroHPC project LUMI-Q, which will establish one of the EU's first six quantum computers.

Simula is the coordinator for the recently awarded EU project AI4CCAM which addresses reliable artificial intelligence in the context of vulnerable road users in urban traffic.

Simula Metropolitan Centre for Digital Engineering (SimulaMet)

SimulaMet's research is primarily specialised within Communication Systems and Machine Learning, as well as IT Management.

Within communication systems, our researchers explore methods for taking advantage of the opportunities while reducing the risks associated with modern communication systems. Our goal is to make digital infrastructure more robust, resilient, and secure, and to develop advanced applications for now and the future. We also study interactions between these systems and society to help inform government policy.

Every year, a report on the state of Norwegian mobile networks is published as part of a mandate from the Ministry of Local Government and Regional Affairs. The report is based on long-term measurements from 147 stationary measuring points spread over large parts of Norway. Last year's report describes the state in 2021. Stability in the connection, the data plane and in performance, as well as early experiences with 5G, satellite and mobile coverage on trains were reported.

Within machine learning and data science, our researchers are focused on the mathematical foundations of machine learning, the experimental study of machine learning algorithms, and the application of machine learning in real-life applications including sports, human health and software engineering. While machine learning is an integrated part of most of the research throughout Simula, the development of methods and mathematical foundations of machine learning takes place at SimulaMet.

For many years, researchers at SimulaMet have been working on developing data sets consisting of images and videos from colonoscopy, and at the same time developing machine learning models that are trained on this data. During 2022, we see an increasing interest in these tools. Among other things, they were used by the Nvidia Clara Holoscan, and mentioned in the 2022 AI Index from Stanford University.

Within IT management, our researchers are focused on the planning and implementation of large-scale IT projects and input on how to improve processes and methods for developing digital solutions. EDOS also contributes research-supported advice to the Ministry of Local Government and Regional Development and other parts of the public sector.

Every ten years, Simula awards the researcher of the decade prize. For 2011 – 2021 the prize was awarded during the company's 20th anniversary in 2022 to Professor Olav Lysne, Director of SimulaMet. The reason was to recognise that Lysne has been crucial in the development of Simula during this period.

Simula UiB

Simula UiB's research focuses on cryptography and information theory.

Within cryptography and information theory, our researchers design and analyse future systems for data communication, data storage and calculation, with regard to security, privacy, reliability, low energy consumption and short delay. The results of this research will make it possible to create new applications within IoT, data storage, machine learning, and collaboration between parties who do not fully trust each other. At the same time, it will be possible to maintain security and privacy even if a full-scale quantum computer becomes available.

On the 1st of May 2022, Professor Carlos Cid took over as Director of Simula UiB. Cid comes from a position as Professor of Information Security at the Royal Holloway University of London, where he was, among other things, founder and Director of Royal Holloway's Center for Doctoral Training in Cyber Security. In April 2022, he started in a 20% professorship at the Okinawa Institute of Science and Technology in Japan.

In 2018, Simula UiB received funding for 12 recruitment positions from the Ministry of Education and Research. The first candidates have now completed and have secured professionally relevant positions within academia, government institutions and business, including at the National Security Authority, NTNU and Equinor.

In autumn 2022, Simula UiB, together with Norges Bank and UiB, organised a conference and a hackathon on Central Bank Digital Currencies, which gathered a large audience from business and academia. In addition, Simula UiB gave a lecture on quantum computers at Arendalsuka, with a full house.

Simula UiB has also contributed to the development of the standardisation of post-quantum cryptography. Carlos Cid is part of a research team that is helping to propose new quantum-safe digits for a standardisation competition organised by the American National Institute of Standards and Technology. In 2022, the team qualified for the fourth round of the recognised competition and the associated standardisation process.

Education

Simula believes that educating and training tomorrow's scientists and technology experts is an integral part of conducting excellent research. In addition to running several intensive graduate-level courses, Simula supervises Master's and PhD students on their thesis work, and provides shorter paid internships that are embedded in the research groups. As education doesn't stop at graduation, Simula also organises a range of continuing education and training opportunities for employees and customers alike.

Simula's educational activities were previously organised by the Simula School of Research and Innovation (SSRI). From 01.01.2022, our educational activities were organised into two units: Simula Learning, which focuses on outreach and continuing education, and Simula Academy, which is responsible for research training and professional development activities, as well as coordinating students and internships at Simula.
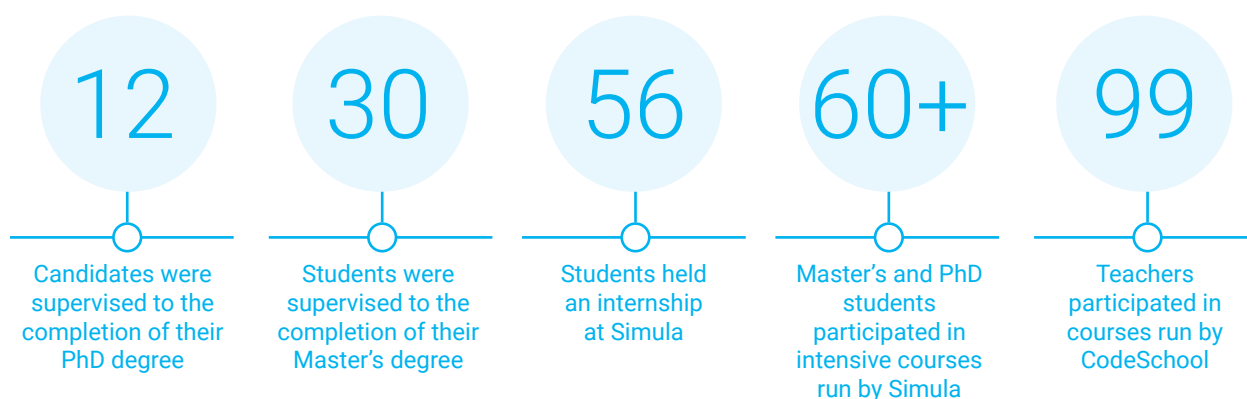
Simula Learning (SL)

For five years Simula Learning (formerly SSRI) worked to establish a financially sustainable model for delivering courses to customers. SL's main activity was to provide programming skills to teachers (CodeSchool), in order to meet increased needs that arose once programming became a prominent component in Norwegian school curricula. SL's activities have been beneficial to society, and approximately 2 000 participants have attended courses in SL since CodeSchool was launched in 2018.

The pandemic and subsequent strikes in schools resulted in a significant loss of teaching time, and both pupils and teachers had a lot to catch up on academically. There was little free time for continuing education in programming. Although the courses SL delivered were of high quality, it was difficult to make enough money from course sales to make CodeSchool sustainable. Towards the end of 2022, Simula ran into a large deficit and the board of Simula Research Laboratory decided to close down SL in order to focus resources on core activities. Liquidation of SL was carried out in the first quarter of 2023.

Simula Academy

Simula Academy is Simula's unit that organises researcher training and professional development activities, as well as coordination of master's students and internships at Simula.

Highlights from 2022 include the Communicating Scientific Research course, Summer School in Computational Physiology, supervisor seminar, career development program for postdocs, internships (24 summer jobs; 32 throughout the rest of the year), two-day PhD seminar, company presentations at Norwegian universities and student visits at Simula. Individual workshops are held regularly throughout the year with the overall aim of offering competence-enhancing and career-promoting activities at all levels. Some of the topics were Make Better Posters, Applying for Academic Positions, Critical Appraisal of Scientific Articles, Leadership workshop: Leading teams in academia, and Getting Things Done.

In 2022, we piloted a career program for post-doctoral fellows. 38 employees participated in the 8-month program consisting of 15 modules in career planning, time and self-management, publishing, project management and networking. This year's PhD seminar was held at Holmen Fjordhotell with 26 PhD candidates and focused on communication, including critical assessment of scientific articles, authorship, and how to communicate research to groups outside the research field ("popular science texts").

For more senior researchers, we have offered supervisor seminars and management courses. The 2022 supervisor seminar was led by Moment Consulting and focused on stress management, coaching, the art of giving and receiving feedback, and the difficult conversation. The leadership development course was held by Dr. Margaret Ormiston from the London Business School's executive education team and focused both on the individual leader as well as how to lead teams in research.

In 2022, the Summer School in Computational Biology was held in person again for the first time since 2019, with 29 students from 13 countries. Simula Academy has worked to create closer ties with students via student associations at Norwegian universities and actively uses these channels to advertise courses, master's theses at Simula, and internship opportunities. These represent important recruitment channels for Simula and a valuable way of attracting talented students to Simula.

Education by the numbers

12	30	56	60+	99
Candidates were supervised to the completion of their PhD degree	Students were supervised to the completion of their Master's degree	Students held an internship at Simula	Master's and PhD students participated in intensive courses run by Simula	Teachers participated in courses run by CodeSchool

Innovation

Innovation activities are an inherent part of technology research. Simula has multiple complementary approaches to innovation in ICT, including a deep-tech consultancy that solves customers' problems, a tech incubator and an investor that gets early start-ups to market, and conducting contract research in our core competence areas.
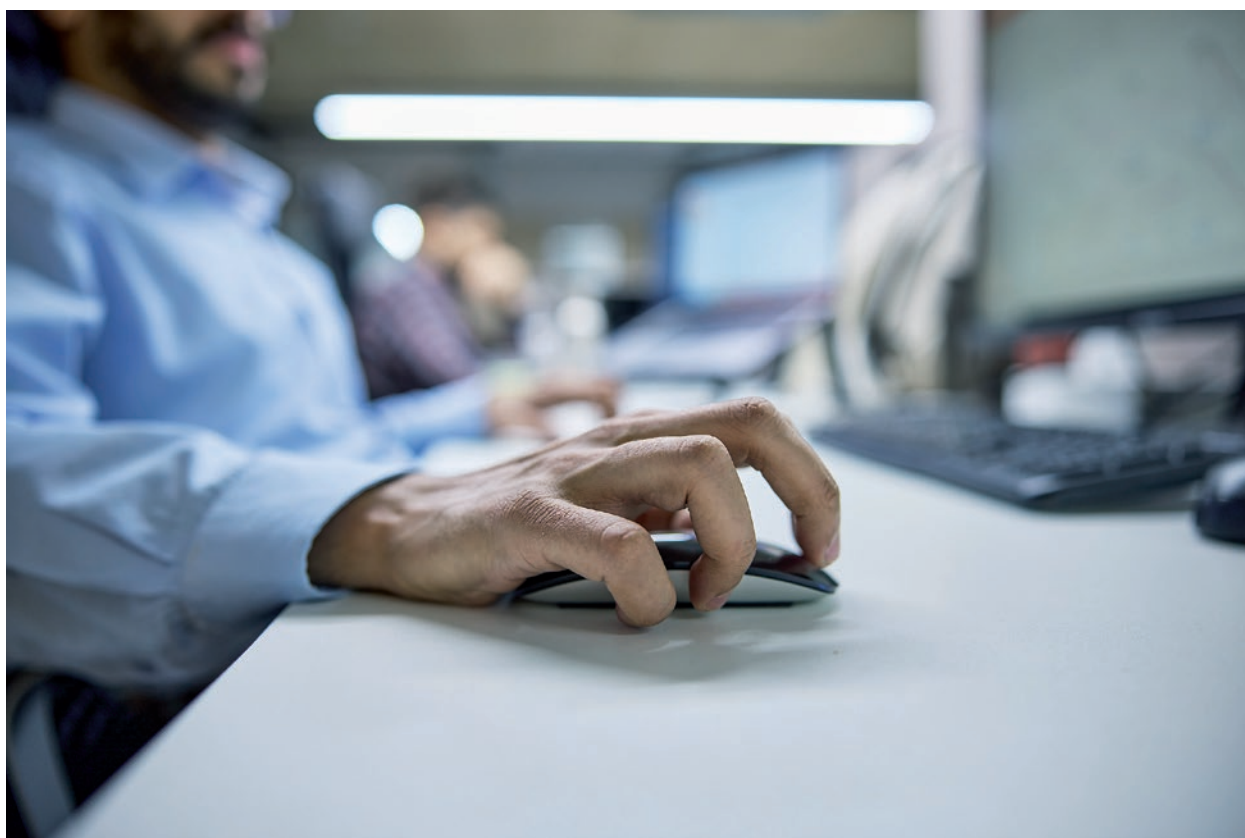
Simula Consulting

Simula Consulting's (SC) mission is to bridge the gap between academic discoveries and real-world challenges by providing high-quality consulting in deep tech. This is achieved through a strong collaboration between Simula Consulting's team and researchers from Simula Research Laboratory.

Since its launch in 2020, SC's primary focus has been developing tailored technological solutions and providing technology assessments for large and small companies like Equinor, Statens Vegvesen and Huawei. In 2022, SC delivered more than 30 projects, mainly in the machine learning and artificial intelligence domain. There has been a large growth in the delivery of technical due diligence.

During 2022, Simula Consulting has experienced significant growth, the team has gone from seven to thirteen people and the annual income has increased by 45% (from 15 million NOK to 22 million NOK). The goal for 2023 is continued growth while maintaining quality and expertise.

The Simula Garage

The Simula Garage (Gründergarasjen) is an incubator for technology-intensive start-up companies in the early phase, which gives selected companies free membership for 12 months. The incubator makes a number of valuable resources, expertise, networks and communities available to companies. Since 2013, 772 members have gone through the incubator across 230 companies, and approximately one-third of Simula Innovation's investment portfolio consists of companies that have also been part of Gründergarasjen. Gründergarasjen has always worked to create a close link between start-ups and academia.

Since 2018, Gründergarasjen has been located with OsloMet on the Bislett campus, and has actively contributed to developing and contributing to the implementation of innovation and entrepreneurship education. As an incubator, it has facilitated over 250 credit-bearing collaborations between startups and students. In 2022, the first version of the Gründergarasjen Bootcamp course was carried out, where 30 participants across 11 projects were developed by researchers and students. Most of the projects are still alive today, and analyses from questionnaires before and after the program indicate that the Bootcamp resulted in an increased entrepreneurial mindset, qualifications and interest among the participants.

Simula Innovation

Simula Innovation (SI) focuses on building up a portfolio of companies that are spun out of Simula Research Laboratory's research projects, the Gründergarasjen or investments in other promising companies that link their business to new technology.

Since 2019, SI has experienced significant growth both in terms of new investments and exits. The latter occurs through the sale of parts or the entire share portfolio in a company.

During 2022, SI had three exits and invested in six new companies. At the end of 2022, SI's investment portfolio included 40 companies with a total turnover of over NOK 420 million and 450 employees. The 40 companies are grouped into the following eight categories: software, networks, SalesTech, PropTech, FinTech, MedTech, media and sports.

Contract Research

Contract research plays an important role in fulfilling Simula's ambition to conduct research that contributes to lasting innovation in society, in both the private and public sectors. By drawing on the expertise of over 150 researchers within our five core research areas within information and communication technology, Simula creates a specialised team with the expertise a given project requires.

Doctorates

PhD candidate	Title of thesis	Supervisor	Co-supervisor(s)	University affiliation*
Arne Tobias Ødegaard	Assumptions, Efficiency and Trust in Non-Interactive Zero-Knowledge Proofs	Helger Lipmaa	Øyvind Ytrehus	UiB
Åshild Telle	Modeling cardiac mechanics on a microscale; Mechanical modeling and analysis of cardiomyocytes and cardiac micromuscles	Samuel Wall	Aslak Tveito; Mary M. Maleckar	UiO
Cise Midoglu	Empirical Analysis of QoS and QoE in Mobile Broadband Networks	Özgü Alay	Carsten Griwodz	UiO
Daniel Thilo Schröder	Explaining News Spreading Phenomena in Social Networks	Pål Halvorsen	Johannes Langguth	Technische Universität Berlin
Debesh Jha	Machine Learning-based Classification, Detection, and Segmentation of Medical Images	Håvard D. Johansen	Pål Halvorsen; Dag Johansen; Michael Riegler	UiT
Hongjia Wu	Adaptive Multipath Scheduling for 5G Networks and Beyond: A Learning Perspective	Özgü Alay	Anna Brunstrom	UiO
Jakob Schreiner	Patient Specific Computational Models of the Brain and Electroconvulsive Therapy	Kent-Andre Mardal	Leif Oltedal; Aslak Tveito; Ola Skavhaug	UiO
Jonas Markussen	SmartIO: Device sharing and memory disaggregation in PCIe clusters using non-transparent bridging	Håkon Kvale Stensland	Pål Halvorsen	UiO
Lars Albin Severinson	Straggler-Resilient Distributed Computing	Eirik Rosnes	Alexandre Graell; Øyvind Ytrehus	UiB
Martha Norberg Hovd	Studies on the Security of Selected Advanced Asymmetric Cryptographic Primitives	Håvard Raddum	Martijn Stam; Øyvind Ytrehus	UiB
Nicolas Boulle	Data-driven discovery of Green's functions	Patrick Farrell	Marie Eisabeth Rognes; Alex Townsend	University of Oxford
Steven Hicks	Transparency in Medical Artificial Intelligence	Michael Riegler	Pål Halvorsen; Hugo Hammer	OsloMet

*) UiB = University of Bergen, UiO = University of Oslo, OsloMet = Oslo Metropolitan University, UiS = University of Stavanger, NMBU = Norwegian University of Life Sciences, NTNU = Norwegian University of Science and Technology, UiT = UiT The Arctic University of Norway

Master's degrees

Master's Student	Title of thesis	Supervisor	Co-supervisor	University affiliation
Alexander William Ingvarsson Hals	Impact of different type of Child Avatar Interactions on user Quality of Experience	Pål Halvorsen	Saeed Sabet; Pegah Salehi	OsloMet
Alireza Hossein Zadeh Nik	The Generation of Synthetic Healthcare Data Using Deep Neural Networks	Michael Riegler	Andrea Storås	UiS
Anders Mølmen Høst	Constructing a Vulnerability Knowledge Graph	Guru Prasad Bhandari	Leon Moonen; Hans Ekkehard Plesser	NMBU
Åsmund Aamodt Resell	Intracranial Pulsatility - A Novel Computational MPET Framework	Marie Elisabeth Rognes	Vegard Vinje	NTNU
Bendik Steinsvåg Dalen	Characterization of cardiac cellular dynamics using Physics-informed Neural Networks	Henrik Nicolay Finsberg	Nickolas Forsch	UiO
Birk Torpmann-Hagen	On the Generalizability of Deep Learning-based Medical Image Segmentation Methods	Michael Riegler	Pål Halvorsen; Kyrre Glette	UiO
Brynjard Buvarp Misvær	Connecting the unseen dots: Combining machine learning models to better predict off-screen events in soccer broadcasts	Pål Halvorsen	Michael Riegler	UiO
Felicia Ly Jacobsen	Estimating Predictive Uncertainty in Gastrointestinal Image Segmentation	Pål Halvorsen	Michael Riegler; Steven Hicks	UiO
Håkon Hernes	Connecting the unseen dots: Combining machine learning models to better predict off-screen events in soccer broadcasts	Pål Halvorsen	Michael Riegler	UiO
Henry Faltin Våge	Finding shared RSA factors in the Certificate Transparency logs	Håvard Raddum		UiB
Jakob Skrede	MPI Over PCI Express Networks	Håkon Kvale Stensland		UiO
Joakim Algrøy	Secure, reliable, and efficient communication over the wiretap channel	Øyvind Ytrehus		UiB
Joakim Foss Johansen	Heterogeneous system-on-chip for AI computing	Håkon Kvale Stensland	Carsten Griwodz	UiO
Johannes Østenby Moe	Accelerator Performance Analysis on Spatio-Temporal Graph Convolutional Networks Machine learning in PCIe	Johannes Langguth	Konstantin Pogorelov; Xing Cai	UiO

Master's Student	Title of thesis	Supervisor	Co-supervisor	University affiliation
Kai Jeu Chiem	Machine learning in PCIe	Håkon Kvale Stensland	Michael Riegler	UiO
Kaspara Skovli Gåsvær	Towards predicting Harmful Conspiracies through Phase Transitions in Complex Interaction Networks	Johannes Langguth	Daniel Thilo Schroeder; Morten Hjorth-Jensen	UiO
Katharina Rückert	Generation of synthetic human embryo data using GANs	Michael Riegler	Hugo Hammer	Technical University of Darmstadt
Kei Yamamoto	Numerical Investigation of Turbulent Flow in Helically Coiled Pipes	Kristian Valen-Sendstad	Mikael Mortensen	UiO
Lars Willas Dreyer	Normal Pressure with Abnormal Geometry: A biomechanical model of Normal Pressure Hydrocephalus during infusion tests.	Marie Elisabeth Rognes	Kent-Andre Mardal	UiO
Manoj Regmi	Data analytics for fish cage data from Norway	Shaukat Ali	Moutaz Haddara	Kristiania University College
Mattias Tsegaye Gebrie	Digital Twin for UAV Anomaly Detection	Shaukat Ali	Tao Yue	UiO
Mattias Xu	Learning to Model a Driving Simulator	Shaukat Ali	Ferhat Ozgur Catak	UiO
Nasir Abdi Awed	Towards integrating static code analysis and hybrid fuzzing for more efficient bug detection	Leon Moonen	Laszlo Erdodi	UiO
Nora Alexandra Cordasevschi Marcoux	Cartography and evolution of the Reddit landscape using graph-based methods	Daniel Thilo Schroeder	Johannes Langguth; Pedro Lind	OsloMet
Siarhei Kulakou	Exploration of time-series models on time series data	Pål Halvorsen	Michael Riegler	UiO
Sigurd Sonne	MPI Over PCI Express Networks	Håkon Kvale Stensland		UiO
Sondre Eide Omland	Deep Reinforcement Learning for Computation Offloading in Mobile Edge Computing	Eirik Rosnes		UiB
Stian Johannesen Husum	Side Channel Analysis on Bitsliced AES	Martijn Stam	Øyvind Ytrehus	UiB
Tine Margretha Vister	Path Management for Consistent Reliable Communication in a Multipath mmWave Proxy	Özgü Alay	David Hayes; David Ros	UiO
Vladimir Monakhov	Hierarchical Temporal Memory for Anomaly Detection in Videos	Pål Halvorsen	Michael Riegler	UiO

Publications

Articles in international journals

A scalable solver for a stochastic, hybrid cellular automaton model of personalized breast cancer therapy
Xiaoran Lai, Håkon A. Taskén, Torgeir Mo, Simon W. Funke, Arnoldo Frigessi, Marie E. Rognes, Alvaro Kohn-Luque
International Journal for Numerical Methods in Biomedical Engineering, vol. 38, issue 1, p.e3542. Wiley

Validating a computational framework for ionic electrodiffusion with cortical spreading depression as a case study
Ada Johanne Ellingsrud, Didrik B. Dukefoss, Rune Enger, Geir Halnes, Klas Pettersen, Marie E. Rognes
eNeuro, vol. 9. Society for Neuroscience

Baseline oxygen consumption decreases with cortical depth
Philipp Mächler, Natalie Fomin-Thunemann, Martin Thunemann, Marte J. Sætra, Michèle Desjardins, Kıvılcım Kılıç, Layth N. Amra, Emily A. Martin, Ichun Anderson Chen, Ikbal Şencan-Eğilmez, Baoqiang Li, Payam Saisan, John X. Jiang, Qun Cheng, Kimberly L. Weldy, David A. Boas, Richard B. Buxton, Gaute T. Einevoll, Anders M. Dale, Sava Sakadžić, Anna Devor
PLoS Biology, vol. 20, issue 10, p.e3001440. PLOS

Exploring Dynamic Metabolomics Data With Multiway Data Analysis: a Simulation Study
Lu Li, Huub Hoefsloot, Albert A. de Graaf, Evrim Acar Ataman, Age K. Smilde
BMC Bioinformatics, vol. 23. Springer

An AO-ADMM approach to constraining PARAFAC2 on all modes
Marie Roald, Carla Schenker, Vince D. Calhoun, Tülay Adali, Rasmus Bro, Jeremy E. Cohen, Evrim Acar Ataman
SIAM Journal on Mathematics of Data Science, vol. 4, p.1191-1222. SIAM

When 2 + 2 should be 5: The summation fallacy in time prediction
Torleif Halkjelsvik, Magne Jørgensen
Journal of Behavioral Decision Making, vol. 35, issue 3, p.E2265. Wiley

When should we (not) use the mean magnitude of relative error (MMRE) as an error measure in software development effort estimation?
Magne Jørgensen, Torleif Halkjelsvik, Knut Liestøl
Information and Software Technology, vol. 143, p.106784. Elsevier

Relative estimates of software development effort: Are they more accurate or less time-consuming to produce than absolute estimates, and to what extent are they person-independent?
Magne Jørgensen, Eban Escott
Information and Software Technology, vol. 143, p.106782. Wiley

A new symmetric linearly implicit exponential integrator preserving polynomial invariants or Lyapunov functions for conservative or dissipative systems
Lu Li
Journal of Computational Physics, vol. 449, p.110800. Elsevier

Geometrically reduced modelling of pulsatile flow in perivascular networks
Cécile Daversin-Catty, Ingeborg Gjerde, Marie E. Rognes
Frontiers in Physics, vol. 10. Frontiers

Artificial intelligence in dry eye disease
Andrea Storås, Inga Strümke, Michael Riegler, Jakob Grauslund, Hugo Lewi Hammer, Anis Yazidi, Pål Halvorsen, Kjell G. Gundersen, Tor P. Utheim, Catherine J. Jackson
The Ocular Surface, vol. 23, p.74 - 86. Elsevier

When Software Engineering Meets Quantum Computing
Shaukat Ali, Tao Yue, Rui Abreu
Communications of ACM, vol. 65, issue 4, p.84-88. ACM

Quantum Software Testing: Challenges, Early Achievements, and Opportunities
Tao Yue, Paolo Arcaini, Shaukat Ali
the European Research Consortium for Informatics and Mathematics News. ERCIM

On memory traffic and optimisations for low-order finite element assembly algorithms on multi-core CPUs
James D. Trotter, Xing Cai, Simon W. Funke
ACM Transactions on Mathematical Software, vol. 48, issue 2, p.1-31. ACM

TCRPower: Quantifying the detection power of T-cell receptor sequencing with a novel computational pipeline calibrated by spike-in sequences
Shiva Dahal-Koirala, Gabriel Balaban, Ralf Stefan Neumann, Lonneke Scheffer, Knut Erik Aslak Lundin, Victor Greiff, Ludvig Magne Sollid, Shuo-Wang Qiao, Geir-Kjetil Sandve
Briefings in Bioinformatics, vol. 23, issue 2, p.Bbab566. Oxford Academic

Visual Sentiment Analysis from Disaster Images in Social Media
Syed Zohaib Hassan, Kashif Ahmad, Steven Hicks, Pål Halvorsen, Ala Al-Fuqaha, Nicola Conci, Michael Riegler
Sensors, vol. 22, p.3628. MDPI

Estimating tukey depth using incremental quantile estimators
Hugo Lewi Hammer, Anis Yazidi, Håvard Rue
Pattern Recognition, vol. 122, p.108339. Elsevier

Complexity and Variability Analyses of Motor Activity Distinguish Mood States in Bipolar Disorder
Petter Jakobsen, Andrea Stautland, Michael Riegler, Ulysse Côté-Allard, Zahra Sepasdar, Tine Nordgreen, Jim Torresen, Ole Bernt Fasmer, Ketil J. Oedegaard
PLOS ONE, vol. 17, p.e0262232. PLOS ONE

Multi-server weakly-private information retrieval
Hsuan-Yin Lin, Siddhartha Kumar, Eirik Rosnes, Alexandre Graell i. Amat, Eitan Yaakobi
IEEE Transactions on Information Theory, vol. 68, issue 2, p.1197-1219. IEEE

Privacy-preserving coded mobile edge computing for low-latency distributed inference
Reent Schlegel, Siddhartha Kumar, Eirik Rosnes, Alexandre Graell i. Amat
IEEE Journal on Selected Areas in Communications (IEEE JSAC), vol. 40, issue March, p.788-799. IEEE

Private linear computation for noncolluding coded databases
Sarah A. Obead, Hsuan-Yin Lin, Eirik Rosnes, Joerg Kliewer
IEEE Journal on Selected Areas in Communications (IEEE JSAC), vol. 40, issue March, p.847-861. IEEE

Optimal rate-distortion-leakage tradeoff for single-server information retrieval
Yauhen Yakimenka, Hsuan-Yin Lin, Eirik Rosnes, Joerg Kliewer
IEEE Journal on Selected Areas in Communications (IEEE JSAC), vol. 40, issue March, p.832-846. IEEE

Robust approximation of generalized Biot-Brinkman problems
Q. Hong, J. Kraus, Miroslav Kuchta, M. Lymbery, Kent-Andre Mardal, Marie E. Rognes
Journal on Scientific Computing, vol. 93, issue 3, p.77. Springer

Deriving the Bidomain Model of Cardiac Electrophysiology From a Cell-Based Model; Properties and Comparisons
Karoline Horgmo Jæger, Aslak Tveito
Frontiers in Physiology, vol. 12, p.811029. Frontiers

Featherweight Assisted Vulnerability Discovery
David Binkley, Leon Moonen, Sibren Isaacman
Information and Software Technology, vol. 146, p.106844. Elsevier

Realizing benefits in public IT projects: A multiple case study
Kjetil Holgeid, Magne Jørgensen, Gro Holst Volden, Helene Berg
IET Software. IET

Uncertainty-Aware Prediction Validator in Deep Learning Models for Cyber-Physical System Data
Ferhat Ozgur Catak, Tao Yue, Shaukat Ali
ACM Transactions on Software Engineering and Methodology (TOSEM), vol. 31, p.1-31. ACM

On the Preferences of Quality Indicators for Multi-Objective Search Algorithms in Search-Based Software Engineering
Jiahui Wu, Paolo Arcaini, Tao Yue, Shaukat Ali, Huihui Zhang
The Empirical Software Engineering Journal (EMSE), vol. 27, issue 6, p.144. Springer

Robust Sum-Rate Maximization for Underlay Device-to-Device Communications on Multiple Channels
Mohamed Elnourani, Siddharth Deshmukh, Baltasar Beferull-Lozano, Daniel Romero
IEEE Transactions on Vehicular Technology, vol. 73. p.3075-3091. IEEE

High-Fidelity Fluid Structure Interaction Simulations of Turbulent-Like Aneurysm Flows Reveals High-Frequency Narrowband Wall Vibrations: A Stimulus of Mechanobiological Relevance?
Alban Souche, Kristian Valen-Sendstad
Journal of Biomechanics, vol. 145, p.111369. Elsevier

Learning Configurations of Operating Environment of Autonomous Vehicles to Maximize their Collisions
Chengjie Lu, Yize Shi, Huihui Zhang, Man Zhang, Tiexin Wang, Tao Yue, Shaukat Ali
IEEE Transactions on Software Engineering, vol. 49, issue 1, p.384-402

Robust Preconditioning and Error Estimates for Optimal Control of the Convection--Diffusion--Reaction Equation with Limited Observation in Isogeometric Analysis
Kent-Andre Mardal, Jarle Sogn, Stefan Takacs
SIAM Journal on Numerical Analysis, vol. 60, issue 1, p.195 - 221. SIAM

Tracing Evolving Networks using Tensor Factorizations vs. ICA-based Approaches
Evrim Acar Ataman, Marie Roald, Khondoker M. Hossain, Vince D. Calhoun, Tülay Adali
Frontiers in Neuroscience, vol. 16. Frontiers

The connectivity network underlying the German's Twittersphere: a testbed for investigating information spreading phenomena
Daniel Thilo Schroeder, Johannes Langguth, Luk Burchard, Konstantin Pogorelov, Pedro G. Lind
Scientific Reports, vol. 12, issue 1. Nature Publishing Group

Artificial intelligence for the detection, prediction, and management of atrial fibrillation
Jonas L. Isaksen, Mathias Baumert, Astrid NL Hermans, Molly Maleckar, Dominik Linz
Herzschrittmachertherapie+ Elektrophysiologie, vol. 33, issue 1, p.34-41. Springer Medizin

A deep generative model of 3D single-cell organization
Rory M. Donovan-Maiye, Jackson M. Brown, Caleb K. Chan, Liya Ding, Calysta Yan, Nathalie Gaudreault, Julie A. Theriot, Molly Maleckar, Theo A. Knijnenburg, Gregory R. Johnson
PLOS Computational Biology, vol.18, p.e1009155. Public Library of Science

Artificial Intelligence for Colonoscopy: Past, Present, and Future
Wallapak Tavanapong, Junghwan Oh, Michael Riegler, Mohammed I. Khaleel, Bhuvan Mitta, Piet C. De Groen
IEEE Journal of Biomedical and Health Informatics, vol. 26, p.3950-3965. IEEE

Enhancing seismic calving event identification in Svalbard through empirical matched field processing and machine learning
A. Köhler, E. B. Myklebust, Steffen Mæland
Geophysical Journal International, vol. 230, issue 2, p.1305–1317. Oxford University Press

MSRF-Net: A Multi-Scale Residual Fusion Network for Biomedical Image Segmentation
Abhishek Srivastava, Debesh Jha, Sukalpa Chanda, Umapada Pal, Havard Johansen, Dag Johansen, Michael Riegler, Sharib Ali, Pål Halvorsen
IEEE Journal of Biomedical and Health Informatics, vol. 26, issue 5, p.2252-2263. IEEE

Meta-learning with implicit gradients in a few-shot setting for medical image segmentation
Rabindra Khadka, Debesh Jha, Steven Hicks, Vajira Thambawita, Michael Riegler, Sharib Ali, Pål Halvorsen
Computers in Biology and Medicine, vol. 143, p.105227. Elsevier

FANet: A Feedback Attention Network for Improved Biomedical Image Segmentation
Nikhil Kumar Tomar, Debesh Jha, Michael Riegler, Håvard D. Johansen, Dag Johansen, Jens Rittscher, Pål Halvorsen, Sharib Ali
IEEE Transactions on Neural Networks and Learning Systems, p.1-14. IEEE

Private polynomial function computation for noncolluding coded databases
Sarah A. Obead, Hsuan-Yin Lin, Eirik Rosnes, Joerg Kliewer
IEEE Transactions on Information Forensics and Security, vol. 17, p.1800-1813. IEEE

Deep Tower Networks for Efficient Temperature Forecasting from Multiple Data Sources
Siri S. Eide, Michael Riegler, Hugo Lewi Hammer, John Bjørnar Bremnes
Sensors, vol.22, issue 7, p.2802. MPDI

Reproducibility in Matrix and Tensor Decompositions: Focus on Model Match, Interpretability, and Uniqueness
T. Adali, Furkan Kantar, Mohammad Abu Bak Si Akhonda, Stephen Strother, Vince D. Calhoun, Evrim Acar Ataman
IEEE Signal Processing Magazine, vol. 39, issue 4, p.8-24. IEEE

Nitsche's method for Navier–Stokes equations with slip boundary conditions
Ingeborg Gjerde, Ridgway Scott
Mathematics of Computation, vol. 91, p.597-622. American Mathematical Society

Industry-Academia Research Collaboration and Knowledge Co-creation: Patterns and Antipatterns
Dusica Marijan, Sagar Sen
ACM Transactions on Software Engineering and Methodology, vol. 31, issue 3, p.1-52. ACM

Arrhythmogenic influence of mutations in a myocyte-based computational model of the pulmonary vein sleeve
Karoline Horgmo Jæger, Andrew G. Edwards, Wayne R. Giles, Aslak Tveito
Nature Scientific Reports, vol.12, p.7040. Springer Nature

CSF circulation and dispersion yield rapid clearance from intracranial compartments
Martin Hornkjøl, Lars Magnus Valnes, Geir A. Ringstad, Marie E. Rognes, Per Kristian Eide, Kent-Andre Mardal, Vegard Vinje
Frontiers in Bioengineering and Biotechnology, vol. 12. Frontiers

Quantifying means-end reasoning skills in simulation-based training: a logic-based approach
Audun Stolpe, Jo Erskine Hannay
SIMULATION, vol. 98, issue 10, p.933-957. SAGE journals

Influence of the Linear Layer on the Algebraic Degree in SP-Networks
Carlos Cid, Lorenzo Grassi, Aldo Gunsing, Reinhard Lüftenegger, Christian Rechberger, Markus Schofnegger
IACR Transactions on Symmetric Cryptology, vol. 2022, issue 1, p.110-137. Ruhr University Bochum

Cell exclusion during human embryo development result in altered morphokinetic patterns up to morula formation
Kakulavarapu Radhika, Delbarre Erwan, Stensen Mette, Haugen B. Trine, Michael Riegler
Human Reproduction.

On evaluation metrics for medical applications of artificial intelligence
Steven Hicks, Inga Strümke, Vajira Thambawita, Malek Hammou, Michael Riegler, Pål Halvorsen, Sravanthi Parasa
Scientific Reports, vol. 12, p.1-9. Nature Publishing Group

Efficient quantile tracking using an oracle
Hugo Lewi Hammer, Anis Yazidi, Michael Riegler, Håvard Rue
Applied Intelligence, vol. 53, p.289–300. Springer

Building Stock Classification Using Machine Learning: A Case Study for Oslo, Norway
Federica Ghione, Steffen Mæland, Abdelghani Meslem, Volker Oye
Frontiers in Earth Science, vol. 10. Frontiers

SinGAN-Seg: Synthetic training data generation for medical image segmentation
Vajira Thambawita, Pegah Salehi, Sajad Amouei Sheshkal, Steven Hicks, Hugo Lewi Hammer, Sravanthi Parasa, Thomas de Lange, Pål Halvorsen, Michael Riegler
PLOS ONE, vol. 17, issue 5, p.e0267976. PLOS

Bias og kvantitativ analyse innen velferd
Andrea Storås, Robindra Prabhu, Hugo Lewi Hammer, Inga Strümke
Tidsskrift for velferdsforsk-ning, vol. 24, issue 3, p.1-24. Universitetsforlaget

Fish AI: Sustainable Commercial Fishing
Tor-Arne Schmidt Nordmo, Ove Kvalsvik, Svein Ove Kvalsund, Birte Hansen, Michael Riegler
Nordic Machine Intelligence, vol. 2, p.1-3. NMI

Resource-efficient use of modern processor architectures for numerically solving cardiac ionic cell models
Kristian Gregorius Hustad, Xing Cai
Frontiers in Physiology, vol. 13. Frontiers

COVID-19 and 5G conspiracy theories: Long term observation of a digital wildfire
Johannes Langguth, Petra Filkukova, Stefan Brenner, Daniel Thilo Schroeder, Konstantin Pogorelov
International Journal of Data Science and Analytics. Springer

Investigating Predictive Model-Based Control to Achieve Reliable Consistent Multipath mmWave Communication
David Andrew Hayes, David Ros, Özgü Alay, Peyman Teymoori, Tine Margretha Vister
Computer Communications, vol. 194, p.29-43. Elsevier

Resource Allocation for Underlay Interfering D2D Networks with Multi-antenna and Imperfect CSI
Mohamed Elnourani, Siddharth Deskmukh, Baltasar Beferull-Lozano
IEEE Transactions on Communications, vol. 70, issue 9, p.6066-6082. IEEE

ICRAN: Intelligent Control for Self-driving RAN based on Deep Reinforcement Learning
Azza Hassan Moh Ahmed, Ahmed Elmokashfi
IEEE Transactions on Network and Service Management, vol. 19, issue 3, p.2751 - 2766. IEEE

Simulating epileptic seizures using the bidomain model
Jakob Schreiner, Kent-Andre Mardal
Scientific Reports, vol. 12, issue 1. Springer nature

Parameter-robust methods for the Biot−Stokes interfacial coupling without Lagrange multipliers
Wietse M. Boon, Martin Hornkjøl, Miroslav Kuchta, Kent-Andre Mardal, Ricardo Ruiz-Baier
Journal of Computational Physics, vol. 467, p.111464. Elsevier

Journal of Computational Physics Online Edge Flow Imputation on Networks
Rohan Money, Joshin Krishnan, Baltasar Beferull-Lozano, Elvin Isufi
IEEE Signal Processing Letters. IEEE

Blockchain verification and validation: Techniques, challenges, and research directions
Dusica Marijan, Chhagan Lal
Computer Science Review, vol. 45, p.100492. Elsevier

Regional Left Ventricular Fiber Stress Analysis for Cardiac Resynchronization Therapy Response
Mohammad Albatat, Henrik Finsberg, Hermenegild Arevalo, Joakim Sundnes, Jacob Bergsland, Ilangko Balasingham, Hans Henrik Odland
Annals of Biomedical Engineering, vol. 51, p.343−351. Springer

Prolonged β-adrenergic stimulation disperses ryanodine receptor clusters in cardiomyocytes
Xin Shen, Jonas van den Brink, Anna Bergan-Dahl, Terje R. Kolstad, Einar Sjaastad Norden, Yufeng Hou, Martin Laasmaa, Yuriana Aguilar-Sanchez, Ann Pepper Quick, Emil Knut Stene Espe, Ivar Sjaastad, Xander HT Wehrens, Andrew G. Edwards, Christian Soeller, William Edward Louch.
eLife, vol. 11. eLife

Nanoscale organization of ryanodine receptor distribution and phosphorylation pattern determines the dynamics of calcium sparks
María Hernández Mesa, Jonas van den Brink, William E. Louch, Kimberly J. McCabe, Padmini Rangamani, Jeffrey J. Saucerman
PLOS Computational Biology, vol.18, issue 6, p.e1010126. PLOS

AI Anomaly Detection for Cloudified Mobile Core Architectures
Foivos Ioannis Michelinakis, Joan Sebastià Pujol-Roig, Sara Malacarne, Min Xie, Thomas Dreibholz, Sayantini Majumdar, Wint Yi Poe, Georgios Patounas, Carmen Guerrero, Ahmed Elmokashfi, Vasileios Theodorou
Transactions on Network and Service Management. IEEE

The glymphatic system: Current understanding and modeling
Tomas Bohr, Poul G. Hjorth, Sebastian C. Holst, Sabina Hrabětová, Vesa Kiviniemi, Tuomas Lilius, Iben Lundgaard, Kent-Andre Mardal, Erik A. Martens, Yuki Mori, Valentin Nägerl, Charles Nicholson, Allen Tannenbaum, John H. Thomas, Jeffrey Tithof, Helene Benveniste, Jeffrey J. Iliff, Douglas H. Kelley, Maiken Nedergaard
iScience, issue 9. Cell Press

Computational cardiac physiology for new modelers: origins, foundations, and future
Jussi T. Koivumäki, Johan Hoffman, Molly Maleckar, Gaute T. Einevoll, Joakim Sundnes
Acta Physiologica, vol. 236, p.e13865. Wiley

Computational models of ventricular mechanics and adaptation in response to right-ventricular pressure overload
Oscar O. Odeigah, Daniela Valdez-Jasso, Samuel Wall, Joakim Sundnes
Frontiers in Physiology, p.1774. Frontiers

Impacts of Covid-19 on Norwegian salmon exports: A firm-level analysis
Hans-Martin Straume, Frank Asche, Atle Oglend, Eirik B. Abrahamsen, Anna M. Birkenbach, Johannes Langguth, Guillaume Lanquepin, Kristin H. Roll
Aquaculture, vol. 561, p.738678. Elsevier

Service-based Analytics for 5G open experimentation platforms
Erik Aumayr, Giuseppe Caso, Anne-Marie Bosneag, Almudena Diaz Zayas, Özgü Alay, Bruno Garcia, Konstantinos Kousias, Anna Brunström, Pedro Merino Gomez, Harilaos Koumaras
Computer Networks, vol. 205, p.108740. Elsevier

In-Depth Study of Rnti Management in Mobile Networks: Allocation Strategies and Implications on Data Trace Analysis
Giulia Attanasio, Claudio Fiandrino, Marco Fiore, Joerg Widmer, Norbert Ludant, Bastian Bloessl, Konstantinos Kousias, Özgü Alay, Lise Jacquot, Razvan Stanica
Computer Networks, vol. 219, p.109428. Elsevier

Energy-Saving Solutions for Cellular Internet of Things−A Survey
Muhammad Tahir Abbas, Karl-Johan Grinnemo, Johan Eklund, Stefan Alfredsson, Mohammad Rajiullah, Anna Brunström, Giuseppe Caso, Konstantinos Kousias, Özgü Alay
IEEE Access, vol. 10, issue 96, p.62073-62096. IEEE

Data-Driven Analysis of Outdoor-to-Indoor Propagation for 5G Mid-Band Operational Networks
Usman Ali, Giuseppe Caso, Luca De Nardis, Konstantinos Kousias, Mohammad Rajiullah, Özgü Alay, Marco Neri, Anna Brunström, Maria-Gabriella Di Benedetto
Future Internet, vol. 14, issue 8, p.239. Multidisciplinary Digital Publishing Institute

Large-Scale Dataset for the Analysis of Outdoor-to-Indoor Propagation for 5G Mid-Band Operational Networks
Usman Ali, Giuseppe Caso, Luca De Nardis, Konstantinos Kousias, Mohammad Rajiullah, Özgü Alay, Marco Neri, Anna Brunström, Maria-Gabriella Di Benedetto
Data, vol. 7, issue 3, p.34. MDPI

Prediction of Schizophrenia from Activity Data using Hidden Markov Model Parameters
Matthias Boeker, Michael Riegler, Hugo Lewi Hammer, Petter Jakobsen, Pål Halvorsen
Neural Computing and Applications. Springer

Metabolically driven maturation of human-induced-pluripotent-stem-cell-derived cardiac microtissues on microfluidic chips
Nathaniel Huebsch, Berenice Charrez, Gabriel Neiman, Brian Siemons, Steven C. Boggess, Samuel Wall, Verena Charwat, Karoline Horgmo Jæger, David Cleres, Åshild Telle, Felipe T. Lee-Montiel, Nicholas C. Jeffreys, Nikhil Deveshwar, Andrew G. Edwards, Jonathan Serrano, Matija Snuderl, Andreas Stahl, Aslak Tveito, Evan W. Miller, Kevin E. Healy
Nature Biomedical Engineering, vol. 6, issue 4, p.372 - 388. Nature Publishing Group

Real-time deep learning based multi object tracking of spermatozoa in fresh samples
Vajira Thambawita, Steven Hicks, Andrea Storås, Oliwia Witczak, Jorunn M. Andersen, Hugo Lewi Hammer, Pål Halvorsen, Michael Riegler, Haugen B. Trine
Human Reproduction, vol. 37. Oxford University Press

Automatic Tracking of the ICSI procedure using Deep Learning
Steven Hicks, Vajira Thambawita, Andrea Storås, Trine B. Haugen, Hugo Lewi Hammer, Pål Halvorsen, Michael Riegler, Mette Haug Stensen
Human Reproduction, vol. 37. Oxford University Press

To explain or not to explain?—Artificial intelligence explainability in clinical decision support systems
Julia Amann, Dennis Vetter, Stig Nikolaj Blomberg, Helle Collatz Christensen, Megan Coffee, Sara Gerke, Thomas K. Gilbert, Thilo Hagendorff, Sune Holm, Michelle Livne, Andy Spezzatti, Inga Strümke, Roberto V. Zicari, Vince Istvan Madai, Henry Horng-Shin Lu
PLOS Digital Health, vol. 1, issue 2, p.e0000016

Investigating molecular transport in the human brain from MRI with physics-informed neural networks
Bastian Zapf, Johannes Haubner, Miroslav Kuchta, Geir Ringstad, Per Kristian Eide, Kent-Andre Mardal
Scientific Reports, vol. 12, issue 1, p.15475. Springer Nature

Robust Monolithic Solvers for the Stokes--Darcy Problem with the Darcy Equation in Primal Form
Wietse M. Boon, Timo Koch, Miroslav Kuchta, Kent-Andre Mardal
SIAM Journal on Scientific Computing, vol. 4426, issue 4, p.B1148 - B1174. SIAM

Exploration of Different Time Series Models for Soccer Athlete Performance Prediction
Siarhei Kulakou, Nourhan Ragab, Cise Midoglu, Matthias Boeker, Dag Johansen, Michael Riegler, Pål Halvorsen
MDPI Engineering Proceedings, vol. 18, issue 1, p.37. MDPI

Áika: A Distributed Edge System for AI Inference
Joakim Aalstad Alslie, Aril Bernhard Ovesen, Tor-Arne Schmidt Nordmo, Håvard Dagenborg Johansen, Pål Halvorsen, Michael Riegler, Dag Johansen
Big Data and Cognitive Computing, vol. 6, issue, p.68. MDPI

Towards the Neuroevolution of Lowlevel artificial general intelligence
Sidney Pontes-Filho, Kristoffer Olsen, Anis Yazidi, Michael Riegler, Pål Halvorsen, Stefano Nichele
Frontiers in Robotics and AI, vol. 9. Frontiers

Human intracranial pulsatility during the cardiac cycle: a computational modelling framework
Marius Causemann, Vegard Vinje, Marie E. Rognes
Fluids and Barriers of the Central Nervous System, vol. 19, p.1-17. Springer

Using Microbenchmark Suites to Detect Application Performance Changes
Martin Grambow, Denis Kovalev, Christoph Laaber, Philipp Leitner, David Bermbach
IEEE Transactions on Cloud Computing, p.1-18. IEEE

Scalable and Privacy-aware Online Learning of Nonlinear Structural Equation Models
Rohan Money, Joshin Krishnan, Baltasar Beferull-Lozano, Elvin Isufi
IEEE Open Journal of Signal Processing. IEEE

Secure Embedded Living: Towards a Self-contained User Data Preserving Framework
Somnath Mazumdar, Thomas Dreibholz
IEEE Communications Magazine, vol. 60, issue 11, p.74–80. IEEE

Uncertainty-aware Robustness Assessment of Industrial Elevator Systems
Liping Han, Shaukat Ali, Tao Yue, Aitor Arrieta, Maite Arratibel, Mauro Pezze
ACM Transactions on Software Engineering and Methodology. ACM

A Survey on Blockchain for Healthcare: Challenges, Benefits, and Future Directions
Mohammad Salar Arbabi, Chhagan Lal, Narasimha Raghavan Veeraragavan, Dusica Marijan, Jan F. Nygård, Roman Vitenberg
IEEE Communications Surveys & Tutorials. IEEE

NEIL3-deficient bone marrow displays decreased hematopoietic capacity and reduced telomere length
Tom Rune Karlsen, Maria B. Olsen, Xiang Y. Kong, Kuan Yang, Ana Quiles-Jiménez, Penelope Kroustallaki, Sverre Holm, Glenn T. Lines, Pål Aukrust, Tonje Skarpengland, Magnar Bjørås, Tuva B. Dahl, Hilde Nilsen, Ida Gregersen, Bente Halvorsen
Biochemistry and Biophysics Reports, vol. 29, p.101211. Elsevier

Image-Driven Modeling of Nanoscopic Cardiac Function: Where Have We Come From, and Where Are We Going?
William E. Louch, Harmonie Perdreau-Dahl, Andrew G. Edwards
Frontiers in Physiology, vol. 13. Frontiers

Mechanisms of spontaneous Ca2+ release-mediated arrhythmia in a novel 3D human atrial myocyte model: I. Transverse-axial tubule variation
Xianwei Zhang, Haibo Ni, Stefano Morotti, Charlotte E. R. Smith, Daisuke Sato, William E. Louch, Andrew G. Edwards, Eleonora Grandi
The Journal of Physiology. The Physiological Society

Mechanisms of spontaneous Ca2+ release-mediated arrhythmia in a novel 3D human atrial myocyte model: II Ca2+-handling protein variation
Xianwei Zhang, Charlotte E. R. Smith, Stefano Morotti, Andrew G. Edwards, Daisuke Sato, William E. Louch, Haibo Ni, Eleonora Grandi
The Journal of Physiolog, vol. 116. The Physiological Society

Encoder−decoder neural networks for predicting future
Miroslav Kuchta, Sileshi Gizachew Wubshet, Nils Kristian Afseth, Kent-Andre Mardal, Kristian Hovde Liland
Journal of Biophotonics, vol.15, issue 9, p.e202200097. Wiley

Generative adversarial user privacy in lossy single-server information retrieval
Chung-Wei Weng, Yauhen Yakimenka, Hsuan-Yin Lin, Eirik Rosnes, Joerg Kliewer
IEEE Transactions on Information Forensics and Security, vol.17, p.3495-3510. IEEE

Synthesizing a Talking Child Avatar to Train Interviewers Working with Maltreated Children
Pegah Salehi, Syed Zohaib Hassan, Myrthe Lammerse, Saeed Shafiee Sabet, Ingvild Riiser, Ragnhild Klingenber Røed, Miriam S. Johnson, Vajira Thambawita, Steven Hicks, Martine Powell, Michael E. Lamb, Gunn Astrid Baugerud, Pål Halvorsen, Michael Riegler
Big Data and Cognitive Computing, vol.6, issue 2, p.62. MDPI

Machine learning and ontology in eCoaching for personalized activity level monitoring and recommendation generation
Ayan Chatterjee, Nibedita Pahari, Andreas Prinz, Michael Riegler
Scientific Reports, vol.12, issue 1, p.19825. Nature

Automating tracking of cell division for human embryo development in time lapse videos
Akriti Sharma, R. Kakulavarapu, Vajira Thambawita, M. Siddiqui, E. Delbarre, Michael Riegler, Hugo Lewi Hammer, M. Stensen
Human Reproduction, vol. 37. Oxford University Press

NeuroAI - A strategic opportunity for Norway and Europe
Stefano Nichele, Solve Sæbø, Klas Pettersen, Mikkel Lepperød
Nordic Machine Intelligence, vol. 2, issue 1. Nordic Machine Intelligence

Modeling Variation in Mobile Download Speed in Presence of Missing Samples
Mah-rukh Fida, Marie Roald, Evrim Acar Ataman, Ahmed Elmokashfi
IEEE Transactions on Mobile Computing, p.1-16. IEEE

Kinetic-Energy Instability of Flows With Slip Boundary Conditions
Ingeborg Gjerde, Ridgway Scott
Journal of Mathematical Fluid Mechanics, vol. 24, issue 1, p.97. Springer

Editorial: Cerebrospinal fluid dynamics and intracranial pressure elevation − Novel insights on molecular and physiological mechanisms, and implications for neurological disease
Ajanie Patabendige, Vegard Vinje, Marcus Stoodley
Frontiers in Molecular Neuroscience, vol.15. Frontiers

TLViz: Visualising and analysing tensor decomposition models with Python
Marie Roald, Yngve Mardal Moe
Journal of Open Source Software, vol. 7, issue 79, p.4754. The Open Journal

Sectors, Beams and Environmental Impact on the Performance of Commercial 5G mmWave Cells: An Empirical Study
Salman Moheb, Foivos Ioannis Michelinakis, Ahmed Elmokashfi, Ole Grøndalen, Kashif Mahmood, Andrea Zanella
IEEE Access, vol. 10, p.133309-133323. IEEE

State of Gender Equality in and by Artificial Intelligence
Jose David Patón-Romero, Ricardo Vinuesa, Letizia Jaccheri, Maria Teresa Baldassarre
IADIS International Journal on Computer Science & Information Systems, vol. 17, p.31-48, IADIS

Validating the Arrhythmogenic Potential of High-, Intermediate-, and Low-Risk Drugs in a Human-Induced Pluripotent Stem Cell-Derived Cardiac Microphysiological System
Verena Charwat, Bérénice Charrez, Brian A. Siemons, Henrik Finsberg, Karoline Horgmo Jæger, Andrew G. Edwards, Nathaniel Huebsch, Samuel Wall, Evan Miller, Aslak Tveito, Kevin E. Healy
ACS Pharmacology & Translational Science, vol.5, issue 8, p.652−667. American Chemical Society

Predicting an unstable tear film through artificial intelligence
Fredrik Fineide, Andrea Storås, Xiangjun Chen, Morten S. Magnø, Anis Yazidi, Michael Riegler, Tor Paaske Utheim
Scientific Reports, vol12, issue 1, p.21416. Springer Nature

A teamwork effectiveness model for agile software development
Diane Strode, T. Dingsøyr, Yngve Lindsjorn
Empirical Software Engineering, vol. 27, issue 2. Springer Nature

On the IND-CCA1 Security of FHE Schemes
Martha Norberg Hovd, Håvard Raddum, Prastudy Fauzi
MDPI Cryptography
Deep learning to predict power output from respiratory inductive plethysmography data
Erik Johannes Husom, Pierre Bernabé, Sagar Sen
Applied AI Letters, vol. 3, issue 2, e65. Wiley

Enabling Autonomous Teams and Continuous Deployment at Scale
T. Dingsøyr, Magne Jørgensen, Frode Odde Carlsen, Lena Carlström, Jens Engelsrud, Kine Hansvold, Mari Heibø-Bagheri, Kjetil Røe, Karl Ove Vika Sørensen
IT Professional, vol. 24, issue 6, p.47-53. IEEE Computer Society

Books

Mathematical modeling of the human brain: from magnetic resonance images to finite element simulation
Kent-Andre Mardal, Marie E. Rognes, Travis B. Thompson, Lars Magnus Valnes. Cham, Switzerland. Springer.

The Influence of Delay on Cloud Gaming Quality of Experience
Saeed Shafiee Sabet. Cham, Switzerland. Springer.

Multiblock Data Fusion in Statistics and Machine Learning: Applications in the Natural and Life Sciences
Age K. Smilde, Tormod Naes, Kristian Hovde Liland. Chichester, UK. John Wiley & Sons.

Edited books

Quantum Computing - Introduction to the special theme
Shaukat Ali, Sølve Selstø. ERCIM

Smittestopp – A Case Study on Digital Contact Tracing
Ahmed Elmokashfi, Olav Lysne, Valeriya Naumova. Cham, Switzerland. Springer Nature

Computational Physiology: Simula Summer School 2021.
Kimberly McCabe. Cham, Switzerland. Springer

Chapters in books

5G-sikkerhet: Norge mellom stormaktene
Karsten Friis, Olav Lysne. Digitalisering og internasjonal politikk.

Human-in-the-Loop Enhanced COVID-19 Detection in Transfer Learning-Based CNN Models
Ferhat Ozgur Catak, Kevser Sahinbas. Computational Intelligence for COVID-19 and Future Pandemics, p.71-87. Singapore. Springer.

Conduction Velocity in Cardiac Tissue as Function of Ion Channel Conductance and Distribution
Kristian Gregorius Hustad, Ena Ivanovic, Adrian Llop Recha, Abinaya Abbi Sakthivel. Computational Physiology - Simula Summer School 2021 – Student Reports, p.41-50. Cham, Switzerland. Springer International Publishing.

3D Simulations of Fetal and Maternal Ventricular Excitation for Investigating the Abdominal ECG
Julie Johanne Uv, Lena Myklebust, Hamid Khoshfekr Rudsari, Hannes Welle, Hermenegild Arevalo. l. Computational Physiology: Simula Summer School 2021 – Student Reports, p.13-24. Cham, Switzerland. Springer International Publishing.

Stakeholder Perceptions on Requirements for Accessible Technical Condition Information in Residential Real Estate Transactions
Jo Erskine Hannay, Kristin Skeide Fuglerud, Bjarte M. Østvold. Universal Access in Human-Computer Interaction. Novel Design Approaches and Technologies, p.242-259. Cham, Switzerland. Springer International Publishing.

Scenario Design for Healthcare Collaboration Training under Suboptimal Conditions
Jo Erskine Hannay, Kristin Skeide Fuglerud, Wolfgang Leister, Trenton Schulz. Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management. Health, Operations Management, and Design, p.197-214. Cham, Switzerland. Springer International Publishing.

Eliciting and Prioritizing Services for Accessible Information - for Residential Real Estate Transactions
Jo Erskine Hannay, Bjarte M. Østvold, Kristin Skeide Fuglerud. HCI for Health, Well-being, Universal Access and Healthy Aging, p.378-395. Cham, Switzerland. Springer International Publishing.

Identifying Ionic Channel Block in a Virtual Cardiomyocyte Population Using Machine Learning Classifiers
Bjørn-Jostein Singstad, Bendik Steinsvåg Dalen, Sandhya Sihra, Nickolas Forsch, Samuel Wall. Computational Physiology - Simula Summer School 2021 - Student Reports, p.91 - 109. Cham, Switzerland. Springer International Publishing.

Ordinary Differential Equationbased Modeling of Cells in Human Cartilage
Kei Yamamoto, Sophie Fischer-Holzhausen, Maria Perona Fjelstad, Molly Maleckar. Computational Physiology: Simula Summer School 2021 - Student Reports, p.25-39. Cham, Switzerland. Springer International Publishing.

Smittestopp analytics: Analysis of position data
Vajira Thambawita, Steven Hicks, Ewan Jaouen, Pål Halvorsen, Michael Riegler. Smittestopp – A Case Study on Digital Contact Tracing, p.63-79. Cham, Switzerland. Springer International Publishing.

Smittestopp Backend
Cise Midoglu, Benjamin Ragan-Kelley, Sven-Arne Reinemo, Jon Jahren, Pål Halvorsen. Smittestopp – A Case Study on Digital Contact Tracing, p.29-62. Cham, Switzerland. Springer International Publishing.

Data aggregation and anonymization for mathematical modeling and epidemiological studies
Are Magnus Bruaset, Glenn T. Lines, Joakim Sundnes. Smittestopp – A Case Study on Digital Contact Tracing, p.121-141. Cham, Switzerland. Springer International Publishing.

A Bayesian Approach to Parameter Estimation in Cardiac Mechanics
Joakim Sundnes, Rocío Rodríguez-Cantano. Solid (Bio) mechanics: Challenges of the Next Decade, p.245–256. Cham, Switzerland. Springer.

Digital tracing, validation, and reporting
Ahmed Elmokashfi, Simon W. Funke, Timo Klock, Miroslav Kuchta, Valeriya Naumova, Julie Johanne Uv. Smittestopp – A Case Study on Digital Contact Tracing, p.99-120. Cham, Switzerland. Springer International Publishing.

Smittestopp for Android and iOS
Per Magne Florvaag, Henrik Kjeldsberg, Sebastian Kenji Mitusch. Smittestopp – A Case Study on Digital Contact Tracing, p.11-27. Cham, Switzerland. Springer International Publishing.

A Computational Study of Flow Instabilities in Aneurysms
Nanna Berre, Gabriela Castro, Henrik Kjeldsberg, Rami Masri, Ingeborg Gjerde. Computational Physiology: Simula Summer School 2021 - Student Reports, p.63-75. Cham, Switzerland. Springer International Publishing.

Refereed proceedings

GEQCA: Generic Qualitative Constraint Acquisition
Mohamed Bachir Belaid, Nassim Belmecheri, Arnaud Gotlieb, Nadjib Lazaar, Helge Spieker.
Proceedings of the AAAI Conference on Artificial Intelligence, p.3690-3697, AAAI.

Measurement of software development effort estimation bias: Avoiding biased measures of estimation bias
Magne Jørgensen.
11th International Conference on Software Engineering and Applications (SEA 2022), SEA.

Investigative Interviews using a Multimodal Virtual Avatar
Gunn Astrid Baugerud, Martine Powell, Michael Riegler, Pål Halvorsen, Michael E. Lamb, Saeed Shafiee Sabet, Syed Zohaib Hassan, Pegah Salehi, Ragnhild K. Røed, Miriam S. Johnson.
American Psychology-Law Society Conference 2022, American Psychology-Law Society.

FASTA – a stream cipher for fast FHE evaluation
Carlos Cid, John Petter Indrøy, Håvard Raddum.
Topics in Cryptology - CT-RSA 2022 - Cryptographers' Track at the RSA Conference 2022, p.451-483, Springer.

Unequal Covariance Awareness for Fisher Discriminant Analysis and Its Variants in Classification
Thu Nguyen, Quang Le, Son Tu, Binh Thanh Nguyen.
2022 International Joint Conference on Neural Networks (IJCNN), p.1-8, IEEE.

Multimedia streaming analytics: quo vadis?
Cise Midoglu, Mariana Avelino, Shri Hari Gopalakrishnan, Stefan Pham, Pål Halvorsen.
MHV '22: Mile-High Video Conference, p.62-69, ACM.

Unsupervised Image Segmentation via Self-Supervised Learning Image Classification
Andrea Storås.
MediaEval 2021, CEUR Workshop Proceedings.

The Secrecy Gain of Formally Unimodular Lattices on the Gaussian Wiretap Channel
Maiara Bollauf, Hsuan-Yin Lin, Øyvind Ytrehus.
International Zurich Seminar on Information and Communication, ETH Zurich.

Coding for straggler mitigation in federated learning
Siddhartha Kumar, Reent Schlegel, Eirik Rosnes, Alexandre Graell i. Amat.
IEEE International Conference on Communications (ICC), p.4962-4967, IEEE.

Load Distribution for Mobile Edge Computing with Reliable Server Pooling
Thomas Dreibholz, Somnath Mazumdar.
Proceedings of the 4th International Workshop on Recent Advances for Multi-Clouds and Mobile Edge Computing (M2EC) in conjunction with the 36th International Conference on Advanced Information Networking and Applications (AINA), Springer.

On Evaluating Anonymity of Onion Routing
Alessandro Melloni, Martijn Stam, Øyvind Ytrehus.
Selected Areas in Cryptography (28th International Conference, Virtual Event, September 29 – October 1, 2021, Revised Selected Papers), p.3-24, Springer.

Automating Test Oracle Generation in DevOps for Industrial Elevators
Aitor Arrieta, Maialen Otaegi, Liping Han, Goiuria Sagardui, Shaukat Ali, Maite Arratibel.
29th IEEE International Conference on Software Analysis, Evolution and Reengineering, p.284-288, IEEE.

Transfer Learning Based Joint Resource Allocation for Underlay D2D Communications
Rahul K. Jaiswal, Siddharth Deshmukh, Mohamed Elnourani, Baltasar Beferull-Lozano.
IEEE Wireless Communications and Networking Conference (WCNC), IEEE

Turbulent-like arteriovenous fistula flows cause wall vibrations: a specific stimulus for stenosis formation?
Michela Bozzetto, Johannes Ring, Andrea Remuzzi, Kristian Valen-Sendstad.
9th World Congress of Biomechanics

Multi-task FMRI Data Fusion using IVA and PARAFAC2
Isabell Lehmann, Evrim Acar Ataman, Tanuj Hasija, M.A.B.S. Akhonda, Vince D. Calhoun, Peter J. Schreier, Tülay Adali.
IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), p.1466-1470, IEEE.

Testing Deep Learning Models: A First Comparative Study of Multiple Testing Techniques
Mohit Kumar Ahuja, Arnaud Gotlieb, Helge Spieker.
The 22nd IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing, IEEE.

Adaptive Routing in InfiniBand Hardware
Jose Rocher-Gonzalez, Ernst Gunnar Gran, Sven-Arne Reinemo, Tor Skeie, Jesús Escudero-Sahuquillo, Pedro Javier García, Francisco José Quiles.
26th International Conference on Pattern Recognition, p.463-472, IEEE.

GMSRF-Net: An Improved generalizability with Global Multi-Scale Residual Fusion Network for Polyp Segmentation
Abhishek Srivastava, Sukalpa Chanda, Debesh Jha, Umapada Pal, Sharib Ali.
26th International Conference on Pattern Recognition, IEEE.

HOST-ATS: Automatic Thumbnail Selection with Dashboard-Controlled ML Pipeline and Dynamic User Survey
Andreas Husa, Cise Midoglu, Malek Hammou, Pål Halvorsen, Michael Riegler.
Proceedings of the 13th ACM Multimedia Systems Conference (MMSys '22), p.334-340, ACM.

Huldra: A Framework for Collecting Crowdsourced Feedback on Multimedia Assets
Malek Hammou, Cise Midoglu, Steven Hicks, Andrea Storås, Saeed Shafiee Sabet, Inga Strümke, Michael Riegler, Pål Halvorsen.
Proceedings of the 13th ACM Multimedia Systems Conference (MMSys '22), p.203-209, ACM.

Automatic Thumbnail Selection for Soccer Videos using Machine Learning
Andreas Husa, Cise Midoglu, Malek Hammou, Steven Hicks, Dag Johansen, Tomas Kupka, Michael Riegler, Pål Halvorsen.
Proceedings of the 13th ACM Multimedia Systems Conference (MMSys '22), p.73-85, ACM.

Automated Program Analysis: Revisiting Precondition Inference through Constraint Acquisition
Grégoire Menguy, Sebastien Bardin, Nadjib Lazaar, Arnaud Gotlieb.
31st International Joint Conference on Artificial Intelligence and the 25th European Conference on Artificial Intelligence (IJCAI-ECAI 22), IJCAI.

Discovering Gateway Ports in Maritime Using Temporal Graph Neural Network Port Classification
Dogan Altan, Mohammad Etemad, Dusica Marijan, Tetyana Kholodna.
35th Canadian Conference on Artificial Intelligence, Canadian Artificial Intelligence Association.

Explainability methods for machine learning systems for multimodal medical datasets: research proposal
Andrea Storås, Inga Strümke, Michael Riegler, Pål Halvorsen.
ACM Multimedia Systems (MMSys) Conference, p.347-351, ACM.

Research Incentives in Academia Leading to Unethical Behavior
Jefferson Seide Molléri.
Research Challenges in Information Science, p.744-751, Springer International Publishing.

Investigating Quantum Cause-Effect Graphs
Noah Oldfield, Tao Yue, Shaukat Ali.
2022 IEEE/ACM 3rd International Workshop on Quantum Software Engineering (Q-SE), p.8-15, IEEE.

Straggler-resilient secure aggregation for federated learning
Reent Schlegel, Siddhartha Kumar, Eirik Rosnes, Alexandre Graell i. Amat.
2022 30th European Signal Processing Conference (EUSIPCO), p.712-716, IEEE.

RCAD:Real-time Collaborative Anomaly Detection System for Mobile Broadband Networks
Azza Hassan Moh Ahmed, Michael Riegler, Steven Hicks, Ahmed Elmokashfi.
ACM SIGKDD Conference on Knowledge Discovery and Data Mining, p.2682-2691, ACM.

Perceived Challenges in Benefits Management - A Study of Public Sector Information Systems Engineering Projects
Sinan Sigurd Tanilkan, Jo Erskine Hannay.
Conference on Business Informatics (CBI), p.156-165, IEEE Computer Society Digital Library.

Enabling Automatic Repair of Source Code Vulnerabilities Using Data-Driven Methods
Anastasiia Grishina.
44th International Conference on Software Engineering Companion (ICSE '22 Companion), Doctoral Symposium, p.275-277, Association for Computing Machinery.

Metrics Reloaded - A new recommendation framework for biomedical image analysis validation
Annika Reinke, Evangelia Christodoulou, Ben Glocker, Patrick Scholz, Fabian Isensee, Jens Kleesiek, Michal Kozubek, Mauricio Reyes, Michael Riegler.
Medical Imaging with Deep Learning, MIDL 2022.

Prediction Modeling in Activity eCoaching for Tailored Recommendation Generation: A Conceptualization
Ayan Chatterjee, Andreas Prinz, Michael Riegler
International Symposium on Medical Measurements and Applications (MeMeA), IEEE.

Crosslayer Network Outage Classification Using Machine Learning
Jan Marius Evang, Azza Hassan Moh Ahmed, Ahmed Elmokashfi, Haakon Bryhni
Applied Networking Research Workshop (ANRW), p.1-7, ACM.

Phenotyping of cervical cancer risk groups via generalized low-rank models using medical questionnaires
Florian Becker, Mari Nygård, Jan Nygård, Age K. Smilde, Evrim Acar Ataman.
Norwegian AI Symposium, Springer.

Méthodologie d'anonymisation dès la conception d'un jeu de données en imagerie médicale
Jérémy Clech, Arnaud Gotlieb, Florence Sève, Frédérique Didout, Patrick Malléa.
Applications Pratiques de l'Intelligence Artificielle (APIA), AFIA.

Automatic Unsupervised Clustering of Videos of the Intracytoplasmic Sperm Injection (ICSI) Procedure
Andrea Storås, Michael Riegler, Trine B. Haugen, Vajira Thambawita, Steven Hicks, Hugo Lewi Hammer, Radhika Kakulavarapu, Pål Halvorsen, Mette Stensen.
NAIS: Symposium of the Norwegian AI Society, p.1-11, NAIS 2022.

Predicting Tacrolimus Exposure in Kidney Transplanted Patients Using Machine Learning
Andrea Storås, Anders Åsberg, Pål Halvorsen, Michael Riegler, Inga Strümke.
35th IEEE CBMS International Symposium on Computer-Based Medical Systems, p.38-43, IEEE.

ICDAR'22: Intelligent Cross-Data Analysis and Retrieval
Minh-Son Dao, Michael Riegler, Duc-Tien Dang-Nguyen, Cathal Gurrin, Yuta Nakashima, Mianxiong Dong.
2022 International Conference on Multimedia Retrieval, ACM.

Population of Computational Cell and Tissue Cardiac Electromechanical Models for functional analysis
Ilse van Herck, Henrik Finsberg, Cécile Daversin-Catty, Maite Mora, Beatriz Trenor, Hermenegild Arevalo, Samuel Wall.
World Congress of Biomechanics, 9th World Congress of Biomechanics 2022.

Online Joint Nonlinear Topology Identification and Missing Data Imputation over Dynamic Graphs
Rohan Money, Joshin Krishnan, Baltasar Beferull-Lozano.
IEEE International Conference on Signal Processing Advances in Wireless Communications (SPAWC), IEEE.

Neighborhood Graph Neural Networks under Random Perturbations and Quantization Errors
Leila Ben Saad, Ajay Nagendra Nama, Baltasar Beferull-Lozano.
IEEE International Conference on Signal Processing Advances in Wireless Communications (SPAWC), IEEE.

Deep Transfer Learning Based Radio Map Estimation for Indoor Wireless Communications
Rahul K. Jaiswal, Mohamed Elnourani, Siddharth Deshmukh, Baltasar Beferull-Lozano.
IEEE International Conference on Signal Processing Advances in Wireless Communications (SPAWC), IEEE.

Joint Signal Estimation and Nonlinear Topology Identification from Noisy Data with Missing Entries
Kevin Roy, Luis Miguel Lopez-Ramos, Baltasar Beferull-Lozano.
IEEE Asilomar Conference on Signals, Systems, and Computers, IEEE.

Risk-Aware Particle-Filtering for State Estimation in Recirculating Aquaculture Systems
Juan Diego Cardenas-Cartagena, Mohamed Elnourani, Baltasar Beferull-Lozano, Daniel Romero.
IEEE Asilomar Conference on Signals, Systems, and Computers, IEEE.

A Unified Framework for Nonuniversal SNARKs
Helger Lipmaa.
Public-Key Cryptography – PKC 2022, p.553-583, Springer International Publishing.

Towards an AI-driven talking avatar in virtual reality for investigative interviews of children
Syed Zohaib Hassan, Pegah Salehi, Ragnhild Klingenber Røed, Pål Halvorsen, Gunn Astrid Baugerud, Miriam Sinkerud Johnson, Pierre Lison, Michael Riegler, Michael E. Lamb, Carsten Griwodz, Saeed Shafiee Sabet.
GameSys '22: Proceedings of the 2nd Workshop on Games Systems, p.9-15, ACM.

On Evaluating Self-Adaptive and Self-Healing Systems using Chaos Engineering
Moeen Ali Naqvi, Sehrish Malik, Merve Astekin, Leon Moonen
IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS), p.1-10, IEEE.

A Live Demonstration of In-Band Telemetry in OSM-Orchestrated Core Networks
Thomas Dreibholz, Mah-rukh Fida, Azza Hassan Moh Ahmed, Andrés Felipe Ocampo, Foivos Ioannis Michelinakis.
Proceedings of the 47th IEEE Conference on Local Computer Networks (LCN), p.245–247, IEEE.

Find Out: How Do Your Data Packets Travel?
Thomas Dreibholz, Somnath Mazumdar.
Proceedings of the 18th IEEE International Conference on Network and Service Management (CNSM), IEEE.

Adversarial Deep Reinforcement Learning for Improving the Robustness of Multi-agent Autonomous Driving Policies
Aizaz Sharif, Dusica Marijan.
29th Asia-Pacific Software Engineering Conference (APSEC), IEEE.

Uncertainty-Aware Transfer Learning to Evolve Digital Twins for Industrial Elevators
Qinghua Xu, Shaukat Ali, Tao Yue, Maite Arratibel.
The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), ACM.

Are Elevator Software Robust Against Uncertainties? Results and Experiences from an Industrial Case Study
Liping Han, Tao Yue, Shaukat Ali, Aitor Arrieta, Maite Arratibel.
FoCA: Failure-oriented Class
The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), p.1331-1342, ACM.

Augmentation for Robust Image Classification
Mohit Kumar Ahuja, Sahil Sahil, Helge Spieker.
The 34th IEEE International Conference on Tools with Artificial Intelligence (ICTAI), IEEE.

A Streaming System for Large-scale Temporal Graph Mining of Reddit Data
Andreas Huber, Daniel Thilo Schroeder, Konstantin Pogorelov, Carsten Griwodz, Johannes Langguth.
2022 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), p.1153-1162, IEEE.

Video Analytics in Elite Soccer: A Distributed Computing Perspective
Debesh Jha, Ashish Rauniyar, Håvard D. Johansen, Dag Johansen, Michael Riegler, Pål Halvorsen, Ulas Bagci.
IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), p.221-225, IEEE.

On the Energy-efficient Use of Discontinuous Reception and Release Assistance in NB-IoT
Mohammad Tahir Abbas, Johan Eklund, Anna Brunström, Stefan Alfredsson, Mohammad Rajiullah, Karl-Johan Grinnemo, Giuseppe Caso, Konstantinos Kousias, Özgü Alay.
The IEEE 8th World Forum on Internet of Things (IEEE WFIoT) 2022, IEEE Communications Society.

Implications of handover events in commercial 5G non-standalone deployments in Rome
Konstantinos Kousias, Mohammad Rajiullah, Giuseppe Caso, Özgü Alay, Anna Brunström, Luca De Nardis, Marco Neri, Usman Ali, Maria-Gabriella Di Benedetto.
ACM SIGCOMM Workshop on 5G and Beyond Network Measurements, Modeling, and Use Cases, p.22-27, ACM.

Coverage and Performance Analysis of 5G Non-Standalone Deployments
Konstantinos Kousias, Mohammad Rajiullah, Giuseppe Caso, Özgü Alay, Anna Brunström, Luca De Nardis, Marco Neri, Usman Ali, Maria-Gabriella Di Benedetto.
Proceedings of the 16th ACM Workshop on Wireless Network Testbeds, Experimental evaluation & CHaracterization, p.61-68, ACM.

Is More Realistic Better? A Comparison of Game Engine and GAN-based Avatars for Investigative Interviews of Children
Pegah Salehi, Syed Zohaib Hassan, Saeed Shafiee Sabet, Gunn Astrid Baugerud, Miriam Sinkerud Johnson, Pål Halvorsen, Michael Riegler Minh-Son Dao, Duc-Tien Dang-Nguyen, Michael Riegler.
ICDAR '22: Proceedings of the 3rd ACM Workshop on Intelligent Cross-Data Analysis and Retrieval, p.41-49, ACM.

Comparison of Crowdsourced and Remote Subjective User Studies: A Case Study of Investigative Child Interviews
Saeed Shafiee Sabet, Cise Midoglu, Syed Zohaib Hassan, Pegah Salehi, Michael Riegler, Carsten Griwodz, Pål Halvorsen.
The 14th International Conference on Quality of Multimedia Experience, IEEE.

Virtual Reality Talking Avatar for Investigative Interviews of Maltreat Children
Syed Zohaib Hassan, Pegah Salehi, Michael Riegler, Miriam Sinkerud Johnson, Gunn Astrid Baugerud, Pål Halvorsen, Saeed Shafiee Sabet.
19th International Conference on Content-based Multimedia Indexing, p.201-204, Association for Computing Machinery (ACM).

Human vs. GPT-3: The challenges of extracting emotions from child responses
Myrthe Lammerse, Syed Zohaib Hassan, Saeed Shafiee Sabet, Michael Riegler, Pål Halvorsen.
The 14th International Conference on Quality of Multimedia Experience, IEEE.

When Every Millisecond Counts: The Impact of Delay in VR Gaming
Saeed Shafiee Sabet, Ragnhild Eg, Kjetil Raaen, Muhammed Qasim, Michael Riegler, Pål Halvorsen.
The 14th International Conference on Quality of Multimedia Experience, IEEE.

PolypConnect: Image inpainting for generating realistic gastrointestinal tract images with polyps
Jan Andre Fageren, Vajira Thambawita, Andrea Storås, Sravanthi Parasa, Thomas de Lange, Pål Halvorsen, Michael Riegler.
IEEE 35th International Symposium on Computer-Based Medical Systems (CBMS), p.66-71, IEEE.

Estimating Predictive Uncertainty in Gastrointestinal Polyp Segmentation
Felicia Jacobsen, Steven Hicks, Pål Halvorsen, Michael Riegler.
2022 IEEE 35th International Symposium on Computer-Based Medical Systems (CBMS), p.44-49, IEEE.

LSTM Step Prediction and Ontology-Based Recommendation Generation in Activity eCoaching
Ayan Chatterjee, Nibedita Pahari, Michael Riegler, Andreas Prinz.
2022 18th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob), p.13-18, IEEE.

Parallel feature selection based on the trace ratio criterion
Thu Nguyen, Thanh Nhan Phan, Van Nhuong Nguyen, Thanh Binh Nguyen, Pål Halvorsen, Michael Riegler.
International Joint Conference on Neural Networks (IJCNN), IEEE.

Network Path Integrity Verification using Deterministic Delay Measurements
Alfred Arouna, Steinar Bjørnstad, S. J. Ryan, Thomas Dreibholz, Rind Sobia, Ahmed Elmokashfi.
TMA Conference 2022, IEEE/IFIP.

Joint Learning of Topology and Invertible Nonlinearities from Multiple Time Series
Kevin Roy, Luis Miguel Lopez-Ramos, Baltasar Beferull-Lozano.
IEEE International Conference on Machine Learning, Optimization, and Data Science (ISMODE).

Soccer Game Summarization using Audio Commentary, Metadata, and Captions
Sushant Gautam, Cise Midoglu, Saeed Shafiee Sabet, Dinesh Baniya Kshatri, Pål Halvorsen.
NarSUM '22: Proceedings of the 1st Workshop on User-centric Narrative Summarization of Long Videos, p.13-22, ACM.

Benefit Considerations in Project Decisions
Sinan Sigurd Tanilkan, Jo Erskine Hannay.
International Conference on Product-Focused Software Process Improvement. PROFES 2022, p.217-234, Springer.

Deep reinforcement learning-based control framework for radio access networks
Azza Hassan Moh Ahmed, Ahmed Elmokashfi.
MobiCom '22: Proceedings of the 28th Annual International Conference on Mobile Computing And Networking, p.897-899, ACM.

Njord: a fishing trawler dataset
Tor-Arne Schmidt Nordmo, Aril Bernhard Ovesen, Bjørn Aslak Juliussen, Steven Hicks, Vajira Thambawita, Håvard Dagenborg Johansen, Pål Halvorsen, Michael Riegler, Dag Johansen.
Proceedings of the 13th ACM Multimedia Systems Conference (MMSYS), ACM.

Towards a Blockchain anzd Fog-Based Proactive Data Distribution Framework for ICN
Somnath Mazumdar, Thomas Dreibholz.
Proceedings of the International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT), The 23rd International Conference on Parallel and Distributed Computing, Applications and Technologies 2022.

Towards a Privacy Preserving Data Flow Control via Packet Header Marking
Somnath Mazumdar, Thomas Dreibholz.
Proceedings of the 24th International Conference on High Performance Computing, Data, and Analytics (HPCC), IEEE.

Evaluating the Robustness of Deep Reinforcement Learning for Autonomous Policies in a Multiagent Urban Driving Environment
Aizaz Sharif, Dusica Marijan.
22nd IEEE International Conference on Software Quality, Reliability, and Security (QRS), IEEE.

Towards Requirements Engineering for Digital Twins of Cyber-Physical Systems
Tao Yue, Shaukat Ali, Paolo Arcaini, Fuyuki Ishikawa, Cláudio Ângelo Go Gomes.
11th International Symposium On Leveraging Applications of Formal Methods, Verification and Validation, LNCS.

Enhancing the realism of autonomous driving simulation with real-time co-simulation
Qiwei Chen, Tiexin Wang, Chengjie Lu, Tao Yue, Shaukat Ali.
4th International Workshop on Multi-Paradigm Modelling for Cyber-Physical Systems (MPM4CPS'22), IEEE/ACM.

QuSBT: Search-Based Testing of Quantum Programs
Xinyi Wang, Paolo Arcaini, Tao Yue, Shaukat Ali.
2022 IEEE/ACM 44th International Conference on Software Engineering: Companion Proceedings (ICSE-Companion), IEEE.

Mutation-Based Test Generation for Quantum Programs with Multi-Objective Search
Xinyi Wang, Tongxuan Yu, Paolo Arcaini, Tao Yue, Shaukat Ali.
GECCO '22: Proceedings of the Genetic and Evolutionary Computation Conference, p.1345-1353, ACM.

Generating Failing Test Suites for Quantum Programs with Search (hot off the press track at GECCO 2022)
Xinyi Wang, Paolo Arcaini, Tao Yue, Shaukat Ali.
GECCO '22: Proceedings of the Genetic and Evolutionary Computation Conference, p.47-48, ACM.

Automating tracking of cell division for human embryo development in time lapse videos
A. Sharma, R. Kakulavarapu, Vajira Thambawita, M. Siddiqui, E. Delbarre, Michael Riegler, Hugo Lewi Hammer, M. Stensen.
Human Reproduction, p.I305–I306, Oxford University Press.

Explainable Artificial Intelligence for Human Embryo Cell Cleavage Stages Analysis
Akriti Sharma, Mette H. Stensen, Erwan Delbarre, Trine B. Haugen, Hugo Lewi Hammer.
Proceedings of the 3rd ACM Workshop on Intelligent Cross-Data Analysis and Retrieval, p.1–8, ACM.

ISO27001 as a Tool for Availability Management
Jan Marius Evang.
2nd International Workshop on Information Management (WSIM 2022).

Rational approximation preconditioners for multiphysics problems
Ana Budisa, Xiaozhe Hu, Miroslav Kuchta, Kent-Andre Mardal, Ludmil Tomov Zikatanov.
10th International Conference on Numerical Methods and Applications, arXiv preprint arXiv:2209.11659.

Assessing the Impact of Execution Environment on Observation-Based Slicing
David Binkley, Leon Moonen.
IEEE Working Conference on Source Code Analysis and Manipulation, p.40-44, IEEE.

Implementing Spatio-Temporal Graph Convolutional Networks on Graphcore IPUs
Johannes Moe, Konstantin Pogorelov, Daniel Thilo Schroeder, Johannes Langguth.
2022 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), p.45-54, IEEE.

Efficient Minimum Weight Vertex Cover Heuristics Using Graph Neural Networks
Kenneth Langedal, Johannes Langguth, Fredrik Manne, Daniel Thilo Schroeder.
20th International Symposium on Experimental Algorithms (SEA 2022), p.12:1–12:17, Schloss Dagstuhl – Leibniz-Zentrum für Informatik.

Towards Extending the Range of Bugs That Automated Program Repair Can Handle
Omar I. Al-Bataineh, Leon Moonen.
IEEE International Conference on Software Quality, Reliability and Security (QRS), p.1-12, IEEE.

Straggler-resilient differentially-private decentralized learning
Yauhen Yakimenka, Chung-Wei Weng, Hsuan-Yin Lin, Eirik Rosnes, Joerg Kliewer.
IEEE Information Theory Workshop (ITW), p.708-713, IEEE.

Computational code-based privacy in coded federated learning
Marvin Xhemrishi, Alexandre Graell i. Amat, Eirik Rosnes, Antonia Wachter-Zeh.
IEEE International Symposium on Information Theory (ISIT), p.2034-2039, IEEE.

Segmentation Consistency Training: Out-of-Distribution Generalization for Medical Image Segmentation
Birk Torpmann-Hagen, Vajira Thambawita, Kyrre Glette, Pål Halvorsen, Michael Riegler.
2022 IEEE International Symposium on Multimedia (ISM), p.504-507, IEEE.

Characterization of Vessel Wall Vibrations of an Arteriovenous Fistula Over the Maturation Period
Luca Soliveri, Michela Bozzetto, Alberto Redaelli, Andrea Remuzzi, Kristian Valen-Sendstad.
7th International Conference on Computational and Mathematical Biomedical Engineering (CMBE2022), p.504-507, CMBE Proceedings.

A Comparative Study of Normal and High-Fidelity Approaches to Predict Flow Physics of Left Atrium
Ehsan Khalili, Cécile Daversin-Catty, Kristian Valen-Sendstad.
Computing in Cardiology, CinC 2022, IEEE.

On the Secrecy Gain of Formally Unimodular Construction A4 Lattices
Maiara Bollauf, Hsuan-Yin Lin, Øyvind Ytrehus.
2022 IEEE International Symposium on Information Theory (ISIT), p.3226-3231, IEEE.

A Comparative Study of Interactive Environments for Investigative Interview of A Virtual Child Avatar
Syed Zohaib Hassan, Saeed Shafiee Sabet, Pegah Salehi, Hayley Ko, Ingvild Riiser, Miriam Sinkerud Johnson, Gunn Astrid Baugerud, Michael Riegler, Pål Halvorsen.
IEEE international symposium on multimedia (ISM), p.194-201, IEEE.

Determining the equivocation in coded transmission over a noisy channel
Joakim Algrøy, Angela Barbero, Øyvind Ytrehus.
2022 IEEE International Symposium on Information Theory (ISIT), p.1253-1258, IEEE.

NIWI and New Notions of Extraction for Algebraic Languages
Chaya Ganesh, Hamidreza Khoshakhlagh, Roberto Parisella.
SCN 2022: Security and Cryptography for Networks), p.687-710, Springer.

Experiences and Lessons Learned from a Crowdsourced-Remote Hybrid User Survey Framework
Cise Midoglu, Andrea Storås, Saeed Shafiee Sabet, Malek Hammou, Steven Hicks, Inga Strümke, Michael Riegler, Carsten Griwodz, Pål Halvorsen.
2022 IEEE International Symposium on Multimedia (ISM)), p.161-162, IEEE.

Technical reports

Enabling Automatic Repair of Source Code Vulnerabilities Using Data-Driven Methods
Anastasiia Grishina. arXiv.

Classifying Uncertainties in an Industrial Elevator with the Cynefin Framework
Liping Han, Tao Yue, Shaukat Ali, Aitor Arrieta. Simula Research Laboratory.

Uncertainty-aware Robustness Assessment of Industrial Elevator Systems
Liping Han, Shaukat Ali, Tao Yue, Aitor Arrieta, Maite Arratibel. Simula Research Laboratory.

Digital Twin-based Anomaly Detection with Curriculum Learning in Cyber-physical Systems
Qinghua Xu, Shaukat Ali, Tao Yue Assessing the Impact of Execution. Simula Research Laboratory.

Environment on Observation-Based Slicing
David Binkley, Leon Moonen. arXiv.

Featherweight Assisted Vulnerability Discovery
David Binkley, Leon Moonen, Sibren Isaacman. arXiv.

Norske mobilnett i 2021 – Tilstandsrapport fra Centre for Resilient Networks and Applications
Ahmed Elmokashfi, Amund Kvalbein, Anas Saeed Al-Selwi, Foivos Ioannis Michelinakis, Thomas Dreibholz. Simula Research Laboratory.

On Evaluating Self-Adaptive and Self-Healing Systems using Chaos Engineering
Moeen Ali Naqvi, Sehrish Malik, Merve Astekin, Leon Moonen. arXiv.

Towards Extending the Range of Bugs That Automated Program Repair Can Handle
Omar I. Al-Bataineh, Leon Moonen. arXiv.

PhD theses

Straggler-Resilient Distributed Computing
Lars Albin Severinson, Universitetet i Bergen.

Assumptions, Efficiency and Trust in Non-Interactive Zero-Knowledge Proofs
Arne Tobias Ødegaard, Universitetet i Oslo.

Modeling cardiac mechanics on a microscale; Mechanical modeling and analysis of cardiomyocytes and cardiac micromuscles
Åshild Telle, Universitetet i Oslo.

Empirical Analysis of QoS and QoE in Mobile Broadband Networks
Cise Midoglu, Universitetet i Oslo.

Explaining News Spreading Phenomena in Social Networks
Daniel Thilo Schroeder, Technische Universität Berlin.

Machine Learning-based Classification, Detection, and Segmentation of Medical Images
Debesh Jha, UiT-Norges Arktiske Universitet.

Adaptive Multipath Scheduling for 5G Networks and Beyond: A Learning Perspective
Hongjia Wu, Universitetet i Oslo.

Patient Specific Computational Models of the Brain and Electroconvulsive Therapy
Jakob Schreiner, Universitetet i Oslo.

SmartIO: Device sharing and memory disaggregation in PCIe clusters using non-transparent bridging
Jonas Markussen, Universitetet i Oslo.

Studies on the Security of Selected Advanced Asymmetric Cryptographic Primitives
Martha Norberg Hovd, Universitetet i Bergen.

Data-driven discovery of Green's functions
Nicolas Boulle, University of Oxford.

Transparency in Medical Artificial Intelligence
Steven Hicks, OsloMet.

Talks

NorNet – A Linux- and Open-Source-Software-based International Platform for Networking Research
Thomas Dreibholz, Linux Conference Australia, Virtual.

An Operator-Splitting Approach to Solving Cell-Based Mathematical Models of Cardiac Tissue using Modern CPU Architectures
Kristian Gregorius Hustad, SIAM Conference on Parallel Processing for Scientific Computing.

Kommentarer til "Målbilder for Robuste ekomnett mot 2030"
Olav Lysne, Nasjonal Kommunikasjonsmyndighet sin offentliggjøring av målbilder mot 2030.

AutoCSP - Self-Supervised Neuro-Symbolic Solvers for Constraint Satisfaction
Helge Spieker, Machine Learning and Artificial Intelligence Lab, University of Bonn, Germany.

Soccer Athlete Performance Prediction using Time Series Analysis
Nourhan Ragab, Cise Midoglu, Pål Halvorsen, NORA Annual Conference.

AI-Based Video Production for Soccer
Cise Midoglu, FOKUS Media Web Symposium.

Mathematical modelling of human brain transport: from medical images to biophysical simulation
Marie E. Rognes, Pretty Porous Science Seminar, University of Stuttgart, Stuttgart, Germany.

Mathematical modelling of human brain transport: from medical images to biophysical simulation
Marie E. Rognes, Laboratoire Mechnique des Solides, École Polytechnique, Paris, France.

Software Engineering: The Next 20 Years
Helge Spieker, Simula 20th Anniversary Celebration.

Detecting Issues with In-Band Telemetry in OSM-Orchestrated Core Networks
Thomas Dreibholz, Azza Hassan Moh Ahmed, Mah-rukh Fida, Andrés Felipe Ocampo, Foivos Ioannis Michelinakis, ETSI, Virtual.

The interplay of AI and software testing for resilient software systems
Helge Spieker, Inria Rennes - Bretagne Atlantique, France.

A Flexible Framework for Coupled Matrix/Tensor Factorizations
Evrim Acar Ataman, TRICAP: Three-way methods In Chemistry And Psychology.

Functional Analysis of Healthy and Heart Failure Tissue Populations using 3D Cardiac Electromechanical Models
Ilsbeth Gerarda Ma van Herck, Henrik Finsberg, Cécile Daversin-Catty, Maria Mora, Beatriz Trenor, Hermenegild Arevalo, Samuel Wall, 15th World Congress on Computational Mechanics (virtual).

A cell-based framework for modeling cardiac mechanics
Joakim Sundnes, Åshild Telle, Samuel Wall, International Symposium in honor of Professor Gerhard A. Holzapfel's 60th birthday, Graz, Austria.

GEQCA: Generic Qualitative Constraint Acquisition
Mohamed Bachir Belaid, Nassim Belmecheri, Arnaud Gotlieb, Nadjib Lazaar, Helge Spieker, Lernen. Wissen. Daten. Analysen. (LWDA) - KDML Track.

Analyzing postprandial metabolomics data using multiway models: A simulation study
Lu Li, Shi Yan, Barbara M. Bakker, Huub Hoefsloot, Bo Chawes, Morten A. Rasmussen, Age K. Smilde, Evrim Acar Ataman, NuGOweek 2022 in Spain.

Computational modeling of ion concentration dynamics in brain tissue
Marte J. Sætra, Mathbio seminar, University of Pennsylvania, PA, USA.

Learning Digital Twin Models Shaukat Ali, Model-Driven
Engineering of Digital Twins Seminar at Dagstuhl, Germany.

Computational modeling of ion concentration dynamics in brain tissue
Marte J. Sætra, Math graduate seminar, University of Pennsylvania, PA, USA.

Such stuff as dreams are made on: a finite element tale of optimal transport and brain clearance
Marie E. Rognes, Acta Numerica 30th Birthday Conference, Banach Centre at Bedlewo, Poland.

Mathematical modelling of human brain transport: from medical images to biophysical simulation
Marie E. Rognes, ECCOMAS Conference, Oslo, Norway.

Analyzing postprandial metabolomics data using multiway models: A simulation study
Lu Li, Shi Yan, Barbara M. Bakker, Huub Hoefsloot, David Horner, Bo Chawes, Morten A. Rasmussen, Age K. Smilde, Evrim Acar Ataman, Nordic Metabolomics 2022, Copenhagen, Denmark.

Explainable Artificial Intelligence in Medicine
Andrea Storås, Inga Strümke, Michael Riegler, Pål Halvorsen, Nordic AI Meet 2022.

From a need, to an idea, to a complete system: a perspective based on real-world applications
Pål Halvorsen, IEEE/ACM International Symposium on Quality of Service (virtual).

Modeling cardiac mechanics using a cell-based framework
Åshild Telle, James D. Trotter, Xing Cai, Miroslav Kuchta, Henrik Finsberg, Joakim Sundnes, Samuel Wall, 15th World Congress on Computational Mechanics (WCCM-XV), Yokohama, Japan.

Tilrettelagt innhenting
Olav Lysne, Oslo Tingrett, Norway.

Digital risiko – hva er de sentrale utfordringene? Hva er mulige løsninger?
Olav Lysne, Totalberedskaps-kommisjonen, Oslo, Norway.

Teknologiutvikling, sikkerhet og kriminalitet
Olav Lysne, Politiavdelingen, Justisdepartementet, Oslo, Norway.

Cyber Warfare: Supply- and Service Chains
Olav Lysne, Multi-Modal Warfare, Safe House Global, Washington, DC, USA.

Vi må tenke sikkerhet på nytt
Olav Lysne, Inside telecom.

Analyzing postprandial metabolomics data using multiway models: A simulation study
Lu Li, Shi Yan, Barbara M. Bakker, Huub Hoefsloot, David Horner, Bo Chawes, Morten A. Rasmussen, Age K. Smilde, Evrim Acar Ataman, Norwegian Bioinformatics Days, Sundvolden, Norway.

Constrained Multi-Modal Data Mining Using Coupled Matrix and Tensor Factorizations
Carla Schenker, Marie Roald, Xiulin Wang, Jeremy E. Cohen, Evrim Acar Ataman, SIAM Conference on Mathematics of Data Science.

7 Things They Don't Tell You About Streaming Analytics
Cise Midoglu, Demuxed.

Spatially resolved estimation of CMRO2
Marte J. Sætra, Neurovsascular Imaging Laboratory, Boston University, MA, USA.

ML Accelerator Hardware: A Model for Parallel Sparse Computations?
Johannes Langguth, Luk Burchard, Siam ACDA, Aussois, France.

Finite element adaptivity for human brain mechanics
Marie E. Rognes, FEniCS'22, University of California San Diego, La Jolla, US.

Mathematical modelling of human brain transport: from medical images to biophysical simulation
Marie E. Rognes, UCSD Institute for Neural Computation seminar series, La Jolla, USA.

ML Accelerator Hardware: A Model for Parallel Sparse Computations?
Johannes Langguth, Luk Burchard, University of Vienna, Austria.

Efficient Minimum Weight Vertex Cover Heuristics using Graph Neural Networks
Johannes Langguth, Kenneth Langedal, University of Vienna, Austria.

Characterizing postprandial metabo-lomics response using multi-way data analysis
Shi Yan, Lu Li, David Horner, Bo Chawes, Morten A. Rasmussen, Age K. Smilde, Evrim Acar Ataman, Annual NORBIS Conference.

Predicting Unstable Software Benchmarks using Static Source Code Features
Christoph Laaber, International Conference on Software Engineering (ICSE).

Computational 3D cardiac electro-mechanical models for functional and pharmacological analysis
Ilsbeth Gerarda Ma van Herck, Jordi Llopis-Lorente, Henrik Finsberg, Cécile Daversin-Catty, Maria Mora, Javier Saiz, Beatriz Trenor, Hermenegild Arevalo, Samuel Wall, 9th International Workshop on Cardiac Mechano-Electric Coupling and Arrhythmias.

Omecamtiv Mecarbil Improves Contraction Behaviour in a 3D Electromechanical Tissue Model of Heart Failure
Ilsbeth Gerarda Ma van Herck, Maria Mora, Henrik Finsberg, Cécile Daversin-Catty, Beatriz Trenor, Hermenegild Arevalo, Samuel Wall, 49th Computing in Cardiology Conference.

Testing Self-Healing Cyber-Physical Systems under Uncertainty with Reinforcement Learning: An Empirical Study
Tao Yue, The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2022).

Identifying and Classifying Uncertainties to support Testing of Industrial Elevators
Tao Yue, 9th UCAAT - User Conference on Advanced Automated Testing.

Building Complex Software Systems in Classical and Quantum Computing Domains
Shaukat Ali, Connecting Education and Research Communities for an Innovative Resource Aware Society, Meeting Denmark.

When Software Engineering Meets Quantum Computing
Tao Yue, Tekna's event on: The quantum revolution is moving closer.

Quantum Software Analysis, Evolution and Reengineering
Tao Yue, ICSA-LITE.

Enhancing the realism of autonomous driving simulation with real-time co-simulation
Qiwei Chen, 4th International Workshop on Multi-Paradigm Modelling for Cyber-Physical Systems (MPM4CPS'22).

Are Elevator Software Robust against Uncertainties? Results and Experiences from an Industrial Case Study
Liping Han, Singapore.

Enhancing the Dependability of Cyber-physical Systems with AI-enabled Digital Twin
Qinghua Xu, NORA Annual Conference 2022.

Generating and Optimizing of Test Scenarios for Autonomous Driving Systems
Chengjie Lu, Simula Research Laboratory, Norway.

Design Time and Operation Time Uncertainty Generation and Detection
Liping Han, Simula Research Laboratory, Norway.

Learning Configurations of Operating Environment of Autonomous Vehicles to Maximize their Collisions
Chengjie Lu, , NASA Jet Propulsion Laboratory (JPL).

Uncertainty-aware transfer learning to evolve digital twins for industrial elevators
Qinghua Xu, The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE).

Enhancing the Dependability of Cyber-physical Systems with AI-enabled Digital Twin
Qinghua Xu, Simula Research Laboratory, Norway.

WTT4Oslo: Improving Quality of IoTbased Welfare Technology Solutions in the City of Oslo
Konstantinos Kousias, Shaukat Ali, Tao Yue, Simula Research Laboratory, Norway.

Enhancing simulation-based testing of cyber-physical systems: past, present and future
Aitor Arrieta, Simula Research Laboratory, Norway.

Uncertainty in Deep Learning
Shaukat Ali, Simula Research Laboratory, Norway.

Trustworthy Machine Learningenabled Systems
Lionel Briand, Simula Research Laboratory, Norway.

openCAESAR: A Next Generation Platform for Systems Engineering
Maged Elaasar, Simula Research Laboratory, Norway.

Quantum Software Engineering
Shaukat Ali, Simula Research Laboratory, Norway.

Digital Twin for Elevators Use Case
Shaukat Ali, ETSI Event, Berlin, Germany.

Automating Test Oracle Generation in DevOps for Industrial Elevators
Shaukat Ali, 19th IEEE International Conference on Software Architecture (ICSA 2022).

Assuring the Quality of Quantum Programs with Automated Testing
Shaukat Ali, University of Lisbon, Portugal.

Towards Requirements Engineering for Digital Twins of Cyber-Physical Systems
Shaukat Ali, In 11th International Symposium On Leveraging Applications of Formal Methods, Verification and Validation.

AI-enabled Digital Twins for Cyber-Physical Systems
Shaukat Ali, EDT Community: Engineering Digital Twins – Seminar Series.

Modeling robustness behavior using aspect-oriented modeling to support robustness testing of industrial systems
Shaukat Ali, ACM / IEEE 25th International Conference on Model Driven Engineering Languages and Systems (MODELS).

Time for new Simula!
Shaukat Ali, Towards a Norwegian Quantum Computing Strategy, Simula Research Laboratory, Norway.

Digital Twins for Cyber-Physical Systems: From AI to Quantum Computing
Shaukat Ali, COEMS Forsterk Seminar.

Quantum Software Testing Tutorial
Shaukat Ali, Xinyi Wang, NordIQuEst-ENCCS online HPC-QC workshop.

Quantum Software Testing Work in ComplexSE
Xinyi Wang, Noah Oldfield, Eñaut Mendiluze, Simula Research Laboratory, Norway.

Constrained Multimodal Data Mining
Evrim Acar Ataman, BigInsight Seminar, University of Oslo, Norway.

Robust ICT infrastructure during Hybrid Warfare
Haakon Bryhni, Teknologirådet, Stortinget, Oslo, Norway.

Reliability and security in future telecommunication networks
Haakon Bryhni, Inside Telecom conference, Fornebu, Norway.

Research-based Innovation
Haakon Bryhni, Grundergarasjen at SimulaMet, Oslo, Norway.

Cell-based modelling and simulation of excitable tissue
Marie E. Rognes, Simula Research Laboratory, Oslo, Norway.

Computational brainphatics: coupled models of mechanics and electrophysiology in brain tissue
Ada Johanne Ellingsrud, Marie E. Rognes, Simula Research Laboratory, Oslo, Norway.

Finite element simulation of ionic electrodiffusion in cellular geometries
Ada Johanne Ellingsrud, University of Pennsylvania, Philadelphia, USA.

Numerical simulation of electrodiffusion and osmosis in brain tissue
Ada Johanne Ellingsrud, 9th World Congress of Biomechanics, online.

Finite element simulation of ionic electrodiffusion in cellular geometries
Ada Johanne Ellingsrud, CAIMS/SCMAI 2022, Kelowna, Canada.

Preconditioners for multiphysics systems and the ubiquitous fractional Laplacian
Miroslav Kuchta, Finite Element Circus UF 2022.

Fractional operators in coupled multiphysics problems with implicit coupling
Miroslav Kuchta, LSSC'22.

The pulsating brain: an interface-coupled fluid-poroelastic model of the cranial cavity
Marius Causemann, Vegard Vinje, Marie E. Rognes, ECCOMAS Congress 2022, Oslo, Norway.

Extracting Insights from Complex Data: Data Mining using Tensor Factorizations
Evrim Acar Ataman, SILS (Swammerdam Institute for Life Sciences) Data Science Symposium, University of Amsterdam, Netherlands.

Under-resolved DNS of turbulent flow in straight and helically coiled pipes
Kei Yamamoto, Kristian Valen-Sendstad, FEniCS 2022, San Diego, USA.

SimCardioTest Open Source Software – Demo on OASIS: Computational fluid dynamics solver & SOFA: Simulation Open Framework Architecture
Kei Yamamoto, Kristian Valen-Sendstad, VPH2022, Porto, Portugal.

Parameter-robust monolithic solvers for Stokes-Darcy/Biot systems
Miroslav Kuchta, Wietse M. Boon, Karl Erik Holter, Martin Hornkjøl, Timo Koch, Kent-Andre Mardal, Ricardo Ruiz-Baier, The 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS), Oslo, Norway.

Fractional operators in coupled multiphysics problems with implicit coupling
Miroslav Kuchta, Wietse M. Boon, Karl Erik Holter, Martin Hornkjøl, Timo Koch, Kent-Andre Mardal, Ricardo Ruiz-Baier, Numerical Solution of Fractional Differential Equations and Applications NSFDE&A'22.

Parameter-robust monolithic solvers for coupled Biot/Darcy-Stokes models
Miroslav Kuchta, Wietse M. Boon, Timo Koch, Kent-Andre Mardal, Ricardo Ruiz-Baier, 27th International Domain Decomposition Conference, DD27.

Parameter-robust Methods for Biot-Stokes and Darcy-Stokes Interfacial Coupling without Lagrange Multipliers
Miroslav Kuchta, Wietse M. Boon, Martin Hornkjøl, Timo Koch, Kent-Andre Mardal, Ricardo Ruiz-Baier, 15th World Congress on Computation Mechanics.

Fractional Laplacians and Hybridized DG
Miroslav Kuchta, Ana Budisa, Xiaozhe Hu, Ludmil Tomov Zikatanov, Kent-Andre Mardal, Simula's Workshop on computational mechanics models on domains of heterogeneous dimensionality, Split, Croatia.

Dependable and Noise-Aware Quantum Software Engineering
Shaukat Ali, CREST Center, The University of Adelaide, Australia.

When Software Engineering Meets Quantum Computing
Tao Yue, The 1st Working Symposium on Quantum Software Engineering, Innsbruck, Austria.

Quantum Software Engineering: What, Why, and Where are we now?
Shaukat Ali, Quantum Leap and Mathematics, Soria Moria, Oslo, Norway.

Uncertainty-aware Testing of Complex Software Systems
Tao Yue, COEMS Forsterk Seminar 2022.

Estimating active tension in cardiac micromuscles
Åshild Telle, Bérénice Charrez, Verena Charwat, Henrik Finsberg, Kevin E. Healy, Samuel Wall, World Congress on Biomechanics (WCB), Taipei, Taiwan (Virtual).

Computational Fluid Dynamics Approaches to Predict Flow Physics of Left Atrium
Ehsan Khalili, Henrik Kjeldsberg, Sergio Nabil Gadur, Cécile Daversin-Catty, Kristian Valen-Sendstad, Universitat Pompeu Fabra - Barcelona, Spain.

A mechanistic approach towards personalized treatment in patients with atrial fibrillation
Henrik Kjeldsberg, Joakim Sundnes, Kristian Valen-Sendstad, University Heart & Vascular Center Hamburg - UKE.

Krig i Ukraina: Hva har vi lært, og hva bør vi gjøre?
Olav Lysne, IKT-Norge.

Refleksjoner om Telenors kjerne-infrastruktur
Olav Lysne, Kommunal- og distrikts-departementet, Oslo, Norway.

A Comparative Study of Normal and High-Fidelity Computational Fluid Dynamics Approaches to Predict Flow Physics of Left Atrium
Ehsan Khalili, Cécile Daversin-Catty, Kristian Valen-Sendstad, Computing in Cardiology, Tampere, Finland.

An AO-ADMM approach to constrained PARAFAC2
Marie Roald, Carla Schenker, Vince D. Calhoun, Tülay Adali, Rasmus Bro, Jeremy E. Cohen, Evrim Acar Ataman, Nordic AI Meet.

Fully Constrained PARAFAC2 with AO-ADMM
Marie Roald, Carla Schenker, Rasmus Bro, Jeremy E. Cohen, Evrim Acar Ataman, SIAM Conference on Parallel Processing for Scientific Computing.

An image-based 3D electrophysio-logical torso model for simulating maternal and fetal ECG
Lena Myklebust, Julie Johanne Uv, Hannes Welle, Hamid Khoshfekr Rudsari, Hermenegild Arevalo, Virtual Physiological Human Conference - VPH.

XP 2022: It's all about the benefits: How to successfully implement benefits management in agile software development
Magne Jørgensen, XP 2022, Copenhagen, Denmark.

Relative estimates of software development effort: Are they more accurate or less time-consuming to produce than absolute estimates, and to what extent are they person-independent?
Magne Jørgensen, Eban Escott, ESEM 2022, Helsinki, Finland (Journal first publication).

Digitaliseringen av offentlig sektor i et fremtidsperspektiv
Magne Jørgensen, Statsministerens kontor (SMK), Oslo, Norway.

How to Succeed with Digitalization? A Study of Benefit Management in Public IT Projects
Magne Jørgensen, Helene Berg, CONCEPT seminar, Oslo, Norway.

How Norwegian companies successfully combines benefits management and agile software development processes
Magne Jørgensen, SENOBR Industry day, Trondheim, Norway.

Digitalisering av offentlig sektor: Utvalgte utviklingstrekk og trender
Magne Jørgensen, Brukerrådet, Oslo, Norway.

Smidig utvikling og nyttestyring – som hånd i hanske?
Magne Jørgensen, NAV-fagdag, Oslo, Norway.

Understanding our own role in scientific predictions: (Over-) confidence
Magne Jørgensen, Seminar for FluidFlower (UiB), Bergen, Norway.

Using the Fiber Cables as Sensors, Detecting Security Threats and Earthquakes
Steinar Bjørnstad, Netnod Technical Meeting, Sweden.

Development of a Biventricular Coordinate System with Representation of an Anatomically Detailed Base
Lisa Pankewitz, Sachin Govil, Kristian Gregorius Hustad, James C. Perry, Sanjeet Hedge, Renxiang Tang, Andrew D. McCulloch, Hermenegild Arevalo, Tampere.

Mono- and multi-infection patterns of HPV and the risk of cervical intraepithelial neoplasia
Florian Becker, ANCR Symposium, the Faroe Islands.

Posters

Automatic Thumbnail Selection for Soccer using Machine Learning
Andreas Husa, Cise Midoglu, Pål Halvorsen, NORA Annual Conference, Stavanger, Norway.

Predicting drug exposure in kidney transplanted patients using machine learning
Andrea Storås, Michael Riegler, Pål Halvorsen, Anders Åsberg, Inga Strümke, NORA Annual Conference, Stavanger, Norway.

A computational model of right ven-tricular remodelling in the presence of pulmonary arterial hypertension
Oscar Odeigah, Joakim Sundnes, Michael Bennington, Daniela Valdez-Jasso, Biophysical Society Annual Meeting, San Francisco, California, USA.

Revealing dynamic changes in metabolism through the analysis of postprandial metabolomics data: A simulation study
Lu Li, Shi Yan, Barbara M. Bakker, Huub Hoefsloot, Bo Chawes, Morten A. Rasmussen, Age K. Smilde, Evrim Acar Ataman, Metabolomics 2022, Valencia, Spain.

T-Largo: Testing of Learning Robots
Arnaud Gotlieb, Mohit Kumar Ahuja, Mohamed Bachir Belaid, Simula Research Laboratory, Oslo, Norway.

Characterizing postprandial meta-bolic response using multi-way data analysis
Shi Yan, Lu Li, David Horner, Bo Chawes, Morten A. Rasmussen, Age K. Smilde, Evrim Acar Ataman, Norwegian Bioinformatics Days.

Modeling electrodiffusive, osmotic, and hydrostatic interplay in astrocyte networks
Marte J. Sætra, Ada Johanne Ellingsrud, Marie E. Rognes, Neuroscience 2022.

Turbulent-like flow as a cause of cerebral aneurysm initiation: Can flow instability promote patho-physiological wall remodeling?
Kei Yamamoto, Kristian Valen-Sendstad, Blood-Tissue Interface conference, Montpellier, France.

Model-based meta reinforcement learning for alchemy
Homa Priya Targopula, Anders Malthe-Sørenssen, Mikkel Lepperød, Federation of European Neuroscience Societies.

Manifold Propagation Through Neural Networks
Constantin Bechkov, Jonas Verhellen, Mikkel Lepperød, Federation of European Neuroscience Societies.

Emergent Place Cells and Remapping in a Recurrent Neural Network Model
Markus Borud Pettersen, Vemund Schøyen, Anders Malthe-Sørenssen, Mikkel Lepperød, From Neuroscience to Artificially Intelligent Systems.

On the Structural Sensitivity of the Successor Representation
Frederik Rogge, Anders Malthe-Sørenssen, Marianne Fyhn, Mikkel Lepperød, From Neuroscience to Artificially Intelligent Systems.

Manifold propagation through recurrent neural networks
Constantin Bechkov, Jonas Verhellen, Mikkel Lepperød, From Neuroscience to Artificially Intelligent Systems.

Place and grid cell navigation in multiple environments
Vemund Schøyen, Markus Borud Pettersen, Konstantin Holzhausen, Anders Malthe-Sørenssen, Mikkel Lepperød, Federation of European Neuroscience Societies.

Navigating Multiple Environments with Emergent Grid Cell Remapping
Vemund Schøyen, Markus Borud Pettersen, Konstantin Holzhausen, Anders Malthe-Sørenssen, Mikkel Lepperød, From Neuroscience to Artificially Intelligent Systems.

Robustness of neural networks trained with biologically inspired local learning rules
Konstantin Holzhausen, Mikkel Lepperød, Anders Malthe-Sørenssen, From Neuroscience to Artificially Intelligent Systems.

Impact of Rigid Versus Dynamic Boundaries on Computational Fluid Dynamics Predictor of Left Atrial Appendage Thrombus Formation
Henrik Kjeldsberg, Computing in Cardiology.

Public Outreach

Chinese Cyberwarfare - interview in French TV-program
Olav Lysne. arte.tv.

Cybersikkerhet med Olav Lysne
Olav Lysne. Lørntech.

Hvorfor er vi redde for Huawei?
Karsten Friis, Olav Lysne. NUPI.

Min virtuelle verden
Marte J. Sætra. Realfagsdagene, NTNU.

Gjest i podkasten Jøss!?, Episode 67
Marte J. Sætra. Plingplong.

Gjest i podkasten Jøss!?, Episode 70
Marte J. Sætra. plingplong.

Data samlet fra åpne kilder er ikke ufarlig
Olav Lysne, Inga Strümke, Michael Riegler. Aftenposten.

Hvor ble det av cyberkrigen?
Olav Lysne, Haakon Bryhni. Aftenposten.

Hjerneprat med Marte Julie Sætra og Gaute Einevoll
Marte J. Sætra. YouTube, Simula.

Overvåkning i Norge i Perspektiv av Ukraina-krigen
Olav Lysne. Arendalsuka.

Henger Internett i en tynn tråd?
Olav Lysne. Arendalsuka.

Tilrettelagt Innhenting fra utredning til kontroll
Olav Lysne. Årskonferansen, EOS-utvalget.

Democratic oversight of Norway's intelligence and security services
Olav Lysne. Nordic Surveillance Control Conference.

Waterscales: Mathematical and computational foundations for modelling cerebral fluid flow
Marie E. Rognes. European Mathematical Society.

What happened to the cyberwar
Olav Lysne, Haakon Bryhni. Aftenposten.

Hvorfor venter vi «skandale» hver gang it-sikkerheten sjekkes i staten?
Olav Lysne, Haakon Bryhni. Dagens Næringsliv.

Hvordan kan konflikten i Afrikas regionale internettregister påvirke stabiliteten til internett?
Jan Marius Evang. digi.no, Teknisk Ukeblad Media AS.

Hjerneforskningens matematiske verktøy
Marie Roald. Realfagsdagene.

The mathematical tools of brain imaging analysis
Marie Roald. Pint of Science.

Right Thoughts & Right Action: How to Make Agile Teamwork Effective
T. Dingsøyr, Diane Strode, Yngve Lindsjørn. Cutter Consortium, Arlington, MA, USA.

Miscellaneous

MMSys'22 Grand Challenge on AI-based Video Production for Soccer
Cise Midoglu, Steven Hicks, Vajira Thambawita, Tomas Kupka, Pål Halvorsen. arXiv.

Replication package for the paper Featherweight Assisted Vulnerability Discovery
David Binkley, Leon Moonen, Sibren Isaacman. Zenodo.

Common Limitations of Image Processing Metrics: A Picture Story
Annika Reinke, Minu D. Tizabi, Carole H. Sudre, Matthias Eisenmann, Tim Rädsch, Michael Baumgartner, Laura Acion, Michela Antonelli, Tal Arbel, Spyridon Bakas, Peter Bankhead, Arriel Benis, Jorge Cardoso, Veronika Cheplygina, Beth Cimini, Gary S. Collins, Keyvan Farahani, Ben Glocker, Patrick Godau, Fred Hamprecht, Daniel A. Hashimoto, Doreen Heckmann-Nötzel, Michael M. Hoffmann, Merel Huisman, Fabian Isensee, Pierre Jannin, Charles E. Kahn, Alexandros Karargyris, Alan Karthikesalingam, Bernhard Kainz, Emre Kavur, Hannes Kenngott, Jens Kleesiek, Thijs Kooi, Michal Kozubek, Anna Kreshuk, Tahsin Kurc, Bennett A. Landman, Geert Litjens, Amin Madani, Klaus Maier-Hein, Anne L. Martel, Peter Mattson, Erik Meijering, Bjoern Menze, David Moher, Karel G. M. Moons, Henning Müller, Felix Nickel, Jens Petersen, Gorkem Polat, Nasir Rajpoot, Mauricio Reyes, Nicola Rieke, Michael Riegler, Hassan Rivaz, Julio Saez-Rodriguez, Clarisa Sanchez Gutierrez, Julien Schroeter, Anindo Saha, Shravya Shetty, Bram Stieltjes, Ronald M. Summers, Abdel A. Taha, Sotirios A. Tsaftaris, Bram " van Ginneken, Gaël Varoquaux, Manuel Wiesenfarth, Ziv R. Yaniv, Annette Kopp-Schneider, Paul Jäger, Lena Maier-Hein. arXiv.

ACM Multimedia Grand Challenge on Detecting Cheapfakes
Shivangi Aneja, Cise Midoglu, Duc-Tien Dang-Nguyen, Sohail Khan, Michael Riegler, Pål Halvorsen, Chris Bregler, Balu Adsumilli. ACM.

Replication package for the paper On Evaluating Self-Adaptive and Self-Healing Systems using Chaos Engineering
Sehrish Malik, Leon Moonen. Zenodo.

CVEfixes Dataset v1.0.7: Automatically Collected Vulnerabilities and Their Fixes from Open-Source Software
Leon Moonen, Linas Vidziunas. Zenodo.

Visual explanations for polyp detection: How medical doctors assess intrinsic versus extrinsic explanations
Steven Hicks, Andrea Storås, Michael Riegler, Cise Midoglu, Malek Hammou, Thomas "de Lange", Sravanthi Parasa, Pål Halvorsen, Inga Strümke. arXiv.

Software and Data for "Human intracranial pulsatility during the cardiac cycle: a computational modelling framework"
Marius Causemann, Vegard Vinje, Marie E. Rognes. Zenodo.

What is happening to the Internet in Ukraine and Russia?
Jan Marius Evang. CRNA blog.

Africa and the Internet
Jan Marius Evang. CRNA blog.

Board and management

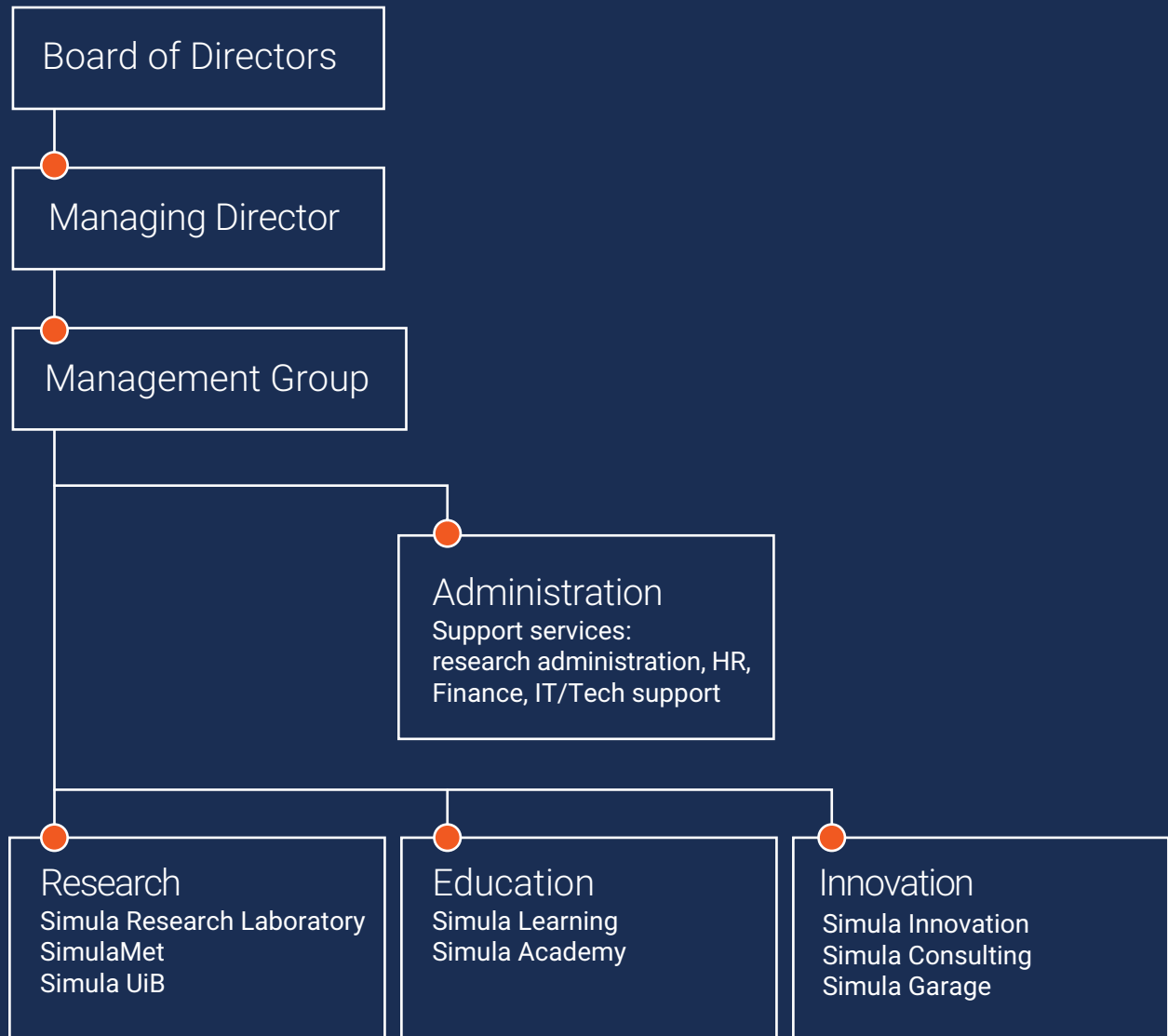## Board of Directors

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Organisational structure

Board of Directors

Managing Director

Management Group

Administration
Support services:
research administration, HR,
Finance, IT/Tech support

Research
Simula Research Laboratory
SimulaMet
Simula UiB

Education
Simula Learning
Simula Academy

Innovation
Simula Innovation
Simula Consulting
Simula Garage