

Annual Report — 2018

# simula

Simula Research Laboratory conducts basic and applied research and provides education in selected fields within scientific computing, software engineering, machine learning, communication systems and cybersecurity, thereby contributing to innovation in society. Simula is organised as a limited company and is owned by the Ministry of Research and Education.

The annual report includes the director's report, financial statements, publications lists, as well as the report on social responsibility and work environment. More information can be found at [simula.no](http://simula.no).

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# A joyous year –



Professor Aslak Tveito  
Managing Director

## but what was our finest moment?

Those of you with good memories may recall that I have pondered this question before: What has been our finest moment? An amazing stream of good things has come our way over the last few years, many of which could be nominated as our finest moment.

Our researchers have stepped up and received the best possible evaluation by the Research Council of Norway; their results in terms of international publications have laid the foundation for renewed and significantly increased funding – also from sources that were previously closed to us. Young researchers have received international recognition and more experienced researchers have initiated collaborations with international elite institutions. In terms of education, we have supervised master students and doctoral candidates at a rate that compares favorably with several small universities in Norway. Innovation is flourishing at Simula; we are presently the proud co-owner of 22 tech companies with approximately 170 employees, and our garages have a record 36 projects running.

Furthermore, our collaborations with the University of Bergen and Oslo Metropolitan University are running at full speed. The troublesome toddler-period, though anticipated, never materialized and both Simula UiB and SimulaMet are doing exceptionally well. Internationally, our long-term collaboration with the University of California, San Diego is blossoming and expanding to related fields and other universities in the UC system. Our efforts to establish a similar collaboration with TU-Berlin in the field of communication technology have gained momentum, and we are looking for partners for Software Engineering as well.

This is a long list of achievements and includes many fine moments. And still more could be added: the minister of Research and Higher Education visited us four times in 2018 and even the Prime Minister honored us with a visit. Great moments indeed. But not our finest moment.

A researcher's finest moment is, in my view, superbly explained by none other than Dustin Hoffman in his acceptance speech when he received the Lifetime Achievement Award at the Golden Globe Awards (January 1997):

*I remember being in a hotel in 1967 in San Francisco one night and I'm flipping the dials after doing all this promoting all day long. There's this little old guy with a bald head sitting at a piano and he's being interviewed. And I suddenly realize I'm looking at Igor Stravinsky the great Russian-American composer. The interviewer is saying to him...*

*"So Mr. Stravinsky, what is the greatest moment for you? Is it when you finally write the symphony? And he says..."No, No, No..."*

*The interviewer goes on: "Is it when you've heard it played the first time by a symphony?" And Stravinsky says..."No, no, no..."*

*"What about opening night when they premier it and herald it as being one of the greatest works of the 20th century?"*

*And Stravinsky says..."No, no no..."*

*Finally the interview asks: "So what IS the greatest moment for you?"*

*Stravinsky was sitting at the piano with music on the thing there and he says: "I'm sitting here at the piano and for 3, 4 hours I'm trying to find a note. I can't find the note and I'm going 'bum, bum!...'bum, bum!...'bum, bum' for three hours. Finally after 3 hours I FIND the note. That's the moment. There is nothing like it. That's everything"\**

Finding that note is every researcher's greatest moment.

● \* I found this at the website of Eitan Tadmor – a brilliant mathematician; see [www.cscamm.umd.edu/people/faculty/tadmor](http://www.cscamm.umd.edu/people/faculty/tadmor)

# Report of the Board of Directors 2018

**Simula Research Laboratory AS conducts fundamental long-term research on selected aspects of information and communication technologies, thereby contributing to innovation in the business sector.**

**In its 17th operating year, Simula Research Laboratory AS and Simula Group achieved a turnover of NOK 175 million and NOK 247 million, and net results of NOK 4.9 million and NOK 16.8 million, respectively.**

## • Administration and Organisation

Simula is organised as a limited company under the ownership of the Norwegian Ministry of Education and Research. The company combines academic traditions with recognised business management models. Simula Research Laboratory AS (SRL) is the parent company and has five subsidiaries. Simula Innovation AS is a wholly-owned subsidiary, which manages Simula's investment portfolio including the shares in Kalkulo (Kalkulo remains a part of the Simula Group accounts). Simula School of Research and Innovation AS is owned by SRL (58 %), Equinor ASA (21 %), the municipality of Bærum (14 %), Telenor ASA (7 %) and Sintef (1 %). The limited company Simula UiB AS was established in 2016, with SRL and the University of Bergen owning 51 % and 49 % respectively. Simula Metropolitan Center for Digital Engineering AS (short name "SimulaMet") was established in 2018, with SRL and Oslo Metropolitan University owning 51 % and 49 %, respectively.

The parent company and its subsidiaries cooperate closely. The majority of Simula's companies are located in the Municipality of Bærum, with the exceptions of Simula UiB, which is located in Bergen, and SimulaMet which is located in Oslo (Bislett).

## • Activities

Simula conducts fundamental long-term research on networks and communication systems, scientific computing, software engineering, machine intelligence and cyber security. Our research focuses on fundamental challenges that combine technological development with utility value for industry and society as a whole.

Simula's research is published in international scientific journals and by leading scientific publishing companies. In 2018, Simula's research featured in 86 articles in international journals, 2 books, 2 chapters in books and 85 peer reviewed conference proceedings.

Over the course of 2018, Simula's scientific employees supervised 8 doctoral candidates and 27 Master's students to the successful completion of their degrees. From 2001 to the end of 2018, 124 doctoral candidates and 426 master's students have been supervised at Simula.

The University of Oslo, which is an important partner, granted the majority of these degrees. Degrees have also been awarded from University of Bergen, Ludwig-Maximilian Universität München, Beihang University Beijing, and University of Montpellier.

## • Personnel and HSE

At the end of 2018, Simula Group had a total of 155 employees, with 140 in full-time positions and 15 in part-time positions. Of these, 111 were men and 44 were women, with 80 Norwegians and 75 foreign nationals. 55 people were employed as research fellows, with 17 postdoctoral positions and 38 PhD students. In addition, there were 14 external PhD students who are supervised by Simula's researchers.

At the end of 2018, Simula Research Laboratory had a total of 59 employees, with 54 in full-time positions and 5 in part-time positions. Of these, 38 were men and 21 were women.

Simula aims to continue its focus on HSE for the long-term. Absence due to illness was 1.8 % for the Group and 1.5 % for SRL in 2018. The Group will be working actively to keep sick leave at continued low levels. There were no reports of occupational diseases or accidents during the year. HSE incidents are reported at each board meeting.

Simula's business activities do not pollute the external environment, beyond what is expected from a typical office business.

## • Equal Opportunity and Integration

The boards of SRL and SSRI have earlier adopted an action plan that aimed to increase

the proportion of female employees in scientific positions to 30 % by 2017. By the end of 2018 the portion of female scientific researchers, meaning the average of PhD students, post-doctoral fellows and researchers in permanent positions, was 26 %. The proportion of female researchers in permanent positions was 19 %, and among PhD students and postdoctoral fellows, the portion was respectively 29 % and 35 %. Simula's strategy for the period 2018-2028 sets the goal of increasing the female proportion of the staff to 40 % across the group by 2028 (as of the end of 2018, 30 % of the entire staff were female).

Simula continues to work actively to improve the gender balance in the group through goal-oriented planning. In order to meet the target of 40 % female employees by 2028, Simula will continue to focus on initiatives for both recruiting new and talented female candidates, and developing and adapting work situations for qualified women already employed by Simula.

The Group is also working to promote the objectives of the Anti-Discrimination Act, to promote equality, ensure equal opportunities and rights and to prevent discrimination in the workplace. There are 35 different nationalities represented in Simula Group, and 49 % of the Group's employees come from outside Norway. Simula offers courses in Norwegian, social events and assistance with regard to visas, taxes, living accommodations and other administrative issues.

- **Ethics**

Simula follows ethical guidelines as described in "The Simula Code of Ethics", which also comprises research ethics, based on the fact that Simula is an institution dedicated to truth and the pursuit of truth. The institution'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.

For questions regarding research ethics, Simula's researchers are to adhere to the guidelines set by the National Committee for Research Ethics in 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 stock investments. The value of the stock portfolio is continually assessed, and if there is considerable insecurity connected to the value of the investments, a write-down is performed. There is also some currency risk in connection with the EU projects in which Simula participates. In total, the Board nevertheless considers the financial risk as low. The credit risk and liquidity risk are also low, and the Board concludes that risks to the organisation are generally low.

- **Financial performance**

In its 17th operating year, the Group had a turnover of NOK 247 million, an increase of 15 % from the previous year. Operating results were NOK 18.5 million, with a net result of NOK 16.8 million.

Simula Research Laboratory AS had a total revenue of NOK 175 million in 2018. External project funding was a total of NOK 120 million. The net profit for the year was NOK 4.9 million, which was transferred to other equity. Equity in Simula Research Laboratory AS constitutes NOK 52 million, corresponding to an equity ratio of 51 % of total assets.

Simula School of Research and Innovation AS had a total operating revenue of NOK 37.8 million in 2018, with a net result of NOK 0.9 million.

Simula Innovation AS had a total operating revenue of NOK 2.5 million, with a net result after tax of NOK -3,6 million in 2018.

In 2018, Kalkulo's total operating revenues amounted to NOK 27.6 million, with a net profit after tax of NOK 1.4 million.

The operating revenue of Simula UiB AS was NOK 17.8 million, with a net profit after tax of NOK 5.1 million in 2018.

The operating revenue of Simula Metropolitan Center for Digital Engineering AS (SimulaMet) was NOK 32.4 million, with a net profit after tax of NOK 6.1 million in 2018.

- **Future Development**

The board believes that our annual accounts provide a correct picture of Simula Research Laboratory AS and the Group. The Group is in a healthy economic and financial position.

At the end of 2018, Simula was participating in 8 projects funded by the EU.

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**

Simula's board had four meetings and a seminar in 2018. The board would like to thank all employees for their strong contributions throughout the year.

Fornebu, 6 March 2019



• **From left:** Rachel Thomas (Director of Corporate Development), Aslak Tveito (Managing Director), Joakim Sundnes (Employee representative), Mats Lundqvist (Board member), Sverre Gotaas (Board member), Yngvild Wasteson (Board member), Jan Helgesen (Deputy Member for Ingolf Søreide), Annik Myhre (Board member), Valeriya Naumova (Employee representative), Pinar Heggernes (Board member), Ingvild Myhre (Chair of the Board)  
**Not pictured:** Silviija Seres (Board member)

# Company overview 2018

## Research

### Simula Research Laboratory (SRL)

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- **Deputy Managing Director: Kyrre Lekve**  
Location: Fornebu

The departments at the mother company primarily perform research and education of students within the ICT fields of software engineering and scientific computing. Innovation activities, including the Simula Garages at both Fornebu and downtown Oslo, are also run out of SRL. SRL is fully owned by The Ministry of Education and Research.

#### Research departments:

Dept. of Advanced Computing & System Performance (CASPER) *Dept. Head: David Ros*

Dept. of Computational Physiology (ComPhy) *Dept. Head: Samuel Wall*

Dept. of Engineering Complex Software Systems (ComplexSE) *Dept. Head: Tao Yue*

Dept. of Numerical Analysis & Scientific Computing (SCAN) *Dept. Head: Simon Funke*

Certus Center for Software Validation & Verification (CERTUS) *Center leader: Arnaud Gottlieb*

### Simula UiB

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- **Director: Kjell Jørgen Hole**  
Location: Bergen

Simula UiB is specialized in cybersecurity, and conducts research and education of graduate students within cryptography and information theory. Simula UiB is owned by SRL and the University of Bergen (UiB), and stationed at the Department of Informatics at UiB.

#### Research Sections:

Cryptography section  
*Section Head: Håvard Raddum*

Information Theory section  
*Section Head: Eirik Rosnes*

Simula Research Laboratory was established in 2001. Simula has since grown and now includes a mother company (SRL) and several specialized subsidiaries. The Simula group is headed by managing director Professor Aslak Tveito.

### Simula Metropolitan Center for Digital Engineering (SimulaMet)

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- **Director: Olav Lysne**  
**Deputy Director: Marianne Sundet**  
Location: Oslo

SimulaMet opened in 2018 and is now the home of Simula's research activities on networks and communications, machine learning and IT management. In addition to performing research, SimulaMet will educate and supervise PhD- and Master students at OsloMet and contribute to innovation in society through collaboration, startup-companies and licensing of research results. SimulaMet is owned by SRL and Oslo Metropolitan University.

#### Research departments:

IT Management (ITMan)  
*Dept. Head: Magne Jørgensen*

Mobile Systems and Analytics (MOSAIC)  
*Dept. Head: Özgü Alay*

Machine Intelligence Department (MIND)  
*Dept. Head: Valeriya Naumova*

Center for Resilient Networks & Applications (CRNA)  
*Center leader: Ahmed Elmokashfi*

## Education & Innovation

### Simula School of Research and Innovation (SSRI)

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- **Director: Marianne Aasen**  
Location: Fornebu

The Simula School educates tomorrow's ICT researchers and specialists in collaboration with both domestic and international academic institutions. SSRI is also engaged in outreach and educational activities for both students and teachers in Bærum and Oslo.

### Simula Innovation (SI)

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- **Director: Ottar Hovind**  
Location: Fornebu

This is where research meets the practical demands of society – SI manages Simula's investment portfolio and supports entrepreneurs in the start-up phase through investments.

### Kalkulo

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- **Director: Are Magnus Bruaset**  
Location: Fornebu

Kalkulo is a commercial company that provides cutting edge software solutions for the energy sector. Their specialties are visualization, data analysis and numerical modeling.

# Income statement

SRL		Simula Group			
2017	2018	Note	2018	2017	
<b>Operating revenues</b>					
161 473 395	175 124 295	Operating revenues	6	247 466 892	215 073 465
<b>161 473 395</b>	<b>175 124 295</b>	<b>Total operating revenues</b>		<b>247 466 892</b>	<b>215 073 465</b>
<b>Operating expenses</b>					
90 481 341	82 134 704	Salary and social costs	5	137 894 188	130 725 364
2 132 344	2 223 784	Depreciation	3	2 420 064	2 240 649
62 102 562	85 528 613	Other operating expenses		88 668 657	69 653 970
<b>154 716 247</b>	<b>169 887 101</b>	<b>Total operating expenses</b>		<b>228 982 909</b>	<b>202 619 983</b>
<b>6 757 149</b>	<b>5 237 194</b>	<b>Operating profit</b>		<b>18 483 983</b>	<b>12 453 482</b>
<b>Financial items</b>					
133 903	94 559	Other interest income		218 701	223 487
754 290	79 551	Other financial income		1 887 100	1 437 863
0	0	Write-down of shares	12	2 598 557	2 489 038
297 376	93 744	Other interest expenses		106 552	387 947
1 198 638	453 975	Other financial expenses		504 342	1 227 222
<b>-607 821</b>	<b>-373 608</b>	<b>Net financial items</b>		<b>-1 103 649</b>	<b>-2 442 858</b>
<b>6 149 327</b>	<b>4 863 586</b>	<b>Profit before tax</b>		<b>17 380 334</b>	<b>10 010 624</b>
0	0	Tax	13	596 360	563 817
<b>6 149 327</b>	<b>4 863 586</b>	<b>Net profit</b>		<b>16 783 974</b>	<b>9 446 807</b>
0	0	Minority interests		5 876 724	2 178 700
6 149 327	4 863 586	Profit after minority interest		10 907 250	7 268 107
<b>Allocation of the year's net profit</b>					
6 149 327	4 863 586	Transferred to other equity			
<b>6 149 327</b>	<b>4 863 586</b>	<b>Total allocated</b>			

# Balance sheet

SRL		Simula Group			
2017	2018	Note	2018	2017	
<b>Assets</b>					
<b>Fixed assets</b>					
0	0	Deferred tax asset		5 425	0
<b>0</b>	<b>0</b>	<b>Total intangible assets</b>		<b>5 425</b>	<b>0</b>
<b>Tangible fixed assets</b>					
5 126 174	4 100 359	Furniture, fixtures, equipment	3	4 861 315	5 225 222
<b>5 126 174</b>	<b>4 100 359</b>	<b>Total tangible fixed assets</b>		<b>4 861 315</b>	<b>5 225 222</b>
<b>Financial fixed assets</b>					
21 967 350	30 032 351	Investments in subsidiaries	10	423 650	1 868 650
0	0	Loans to group companies		2 588 044	4 512 663
0	0	Investments in shares	12	25 685 717	17 323 198
0	0	Other receivables		0	800 000
<b>21 967 350</b>	<b>30 032 351</b>	<b>Total financial fixed assets</b>		<b>28 697 410</b>	<b>24 504 511</b>
<b>27 093 524</b>	<b>34 132 709</b>	<b>Total fixed assets</b>		<b>33 564 150</b>	<b>29 729 734</b>
<b>Current assets</b>					
<b>Receivables</b>					
11 344 129	12 490 211	Account receivables		13 605 063	15 645 735
14 729 211	26 453 644	Other receivables		51 877 185	20 983 451
<b>26 073 340</b>	<b>38 943 856</b>	<b>Total receivables</b>		<b>65 482 247</b>	<b>36 629 187</b>
<b>Investments</b>					
0	17 837 022	Market-based funds		17 837 022	0
<b>0</b>	<b>17 837 022</b>	<b>Total investments</b>		<b>17 837 022</b>	<b>0</b>
<b>57 796 972</b>	<b>11 270 739</b>	<b>Bank deposits</b>	9	<b>58 336 579</b>	<b>86 420 307</b>
<b>83 870 312</b>	<b>68 051 617</b>	<b>Total current assets</b>		<b>141 655 848</b>	<b>123 049 494</b>
<b>110 963 836</b>	<b>102 184 326</b>	<b>Total assets</b>		<b>175 219 998</b>	<b>152 779 228</b>

# Balance sheet

SRL			Simula Group	
2017	2018	Note	2018	2017
<b>Equity and Liabilities</b>				
<b>Equity</b>				
<b>Paid-in equity</b>				
1 200 000	1 200 000	7,8	1 200 000	1 200 000
1 200 000	1 200 000		1 200 000	1 200 000
<b>Retained earnings</b>				
45 984 777	50 848 363	8	76 742 663	65 835 412
0	0	8	13 380 866	6 589 062
45 984 777	50 848 363		90 123 529	72 424 474
<b>47 184 777</b>	<b>52 048 363</b>		<b>91 323 529</b>	<b>73 624 474</b>
<b>Liabilities</b>				
<b>Provisions</b>				
0	0	13	0	15 439
0	0		0	15 439
<b>Other long term debt</b>				
3 166 674	0	15	10 000 000	10 166 674
3 166 674	0		10 000 000	10 166 674
<b>Current liabilities</b>				
19 634 577	14 813 681		8 897 725	13 450 764
0	0	13	617 224	624 984
4 613 495	3 867 743		9 939 014	10 130 557
36 364 313	31 454 539		54 442 506	44 766 335
60 612 385	50 135 963		73 896 469	68 972 640
<b>63 779 059</b>	<b>50 135 963</b>		<b>83 896 469</b>	<b>79 154 753</b>
<b>110 963 836</b>	<b>102 184 326</b>		<b>175 219 998</b>	<b>152 779 228</b>

## FORNEBU, 31.12.2018 / 06.03.2019

### The Board of Directors of Simula - Group

Ingvald R. Myhre Chair of the Board	Aslak Tveito Managing Director	Mats A. Lundqvist Board member	Pinar Heggernes Board member	Ingolf Søreide Board member	Joakim Sundnes Employee representative
Yngvild Wasteson Board member	Silvija Seres Board member	Annik M. Myhre Board member	Sverre Gotaas Board member	Valeriya Naumova Employee representative	

# Notes to the financial statements

## Note 1 Accounting principles

The financial statement have 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 criterias have been applied to the classification of current and long-term liabilities.

Fixed assets are valued at aquisition 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 translated into Norwegian kroner at the mid-rates quoted by Norway´s National Bank on the balance sheet reporting day.

### • 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.

### • 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 has not recognised tax expenses in the parent company's financial statements, since the operation is not considered to be liable for tax.

### • Revenue recognition

Revenues are recognised when delivery has taken place.

### • The Group

The consolidated financial statement comprise the parent company Simula Research Laboratory AS (SRL) and the subsidiaries Simula School of Research and Innovation AS (SSRI), Simula Innovation AS (SI), Kalkulo AS, Simula Metropolitan Center for Digital Engineering AS (SimulaMet) and Simula UIB AS. Rebasin Technology AS is owned with 85 % and Simula Research Incorporated 100 %. The latter is not included in the consolidated financial statements. RebasinTechnology AS had limited activity in 2018, and is therefore not included in the consolidated financial statement. The consolidated financial statements are prepared as if the Group were one economic entity. Transactions and balances between group companies are eliminated.



## Note 2 Financial market risk and currency risk

The company is to a certain extent exposed to financial market risks, by investing in start-up companies. The currency risk the company is exposed to is mainly due to EU-funded research, and the collaboration with universities in the United States.

## Note 3 Fixed assets

SRL			
Fixed assets	Computer equipment	Furnishings, equipment, etc	Total
Acquisition cost as of 01.01	3 283 773	18 963 883	22 247 656
Additions	768 251	429 718	1 197 969
Disposals	-	-	-
Acquisition cost as of 31.12	4 052 024	19 393 601	23 445 625
Cumulative depreciation as of 31.12	-3 015 876	-16 329 390	-19 345 266
<b>Book value as of 31.12</b>	<b>1 036 148</b>	<b>3 064 211</b>	<b>4 100 359</b>
Year's depreciation	508 487	1 715 297	2 223 784

SRL Group			
Fixed assets	Computer equipment	Furnishings, equipment, etc	Total
Acquisition cost as of 01.01	3 899 226	19 082 439	22 981 665
Additions	1 513 057	543 100	2 056 157
Disposals	192 456	-	192 456
Acquisition cost as of 31.12	5 219 827	19 625 539	24 845 366
Cumulative depreciation as of 31.12	-3 552 675	-16 431 376	-19 984 051
<b>Book value as of 31.12</b>	<b>1 667 152</b>	<b>3 194 163</b>	<b>4 861 315</b>
Year's depreciation	654 924	1 765 140	2 420 064

The economic life of operating assets is calculated as::

- Computer equipment 2-5 years
- Furnishings, fixtures & equipment 3-5 years

## Note 4 Pensions

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.

The Group has a pension scheme which covers all employees. The scheme entitles members

to defined future benefits. These are primarily dependent on the number of years of pension accrual, salary level at retirement and the size of the pension benefits received from the Norwegian National Insurance Scheme. The occupational pension scheme is financed through the build-up of funds in the Norwegian Public Service Pension Fund.

## Note 5 Payroll costs, number of employees, remunerations, employee loans and auditor's fees

Salary and social costs	SRL		Simula Group	
	2018	2017	2018	2017
Salary	48 800 784	54 643 030	104 909 156	101 037 913
Social security	7 338 687	8 044 567	16 147 800	15 422 886
Pension costs	5 656 966	5 460 875	11 127 087	9 201 061
Other benefits	4 011 405	3 156 827	5 710 145	5 063 504
Contribution to cover cost of labour at SSRI	16 326 862	19 176 042	-	-
<b>Total</b>	<b>82 134 704</b>	<b>90 481 341</b>	<b>137 894 188</b>	<b>130 725 364</b>
<b>Number of full-time equivalents</b>	<b>62,4</b>	<b>60</b>	<b>142</b>	<b>138</b>

Remuneration paid to senior company officers	Managing Director	Board of Directors
Salary	2 692 734	580 600
Pension expenses	131 456	-
Other remuneration	119 654	-
<b>Total remuneration</b>	<b>2 943 844</b>	<b>580 600</b>

No loans have been granted to, nor any guarantees made on behalf of, the Managing Director, the Board Chair or any other related parties. No loans or guarantees account for more than 5% of the company's share capital.

### Auditor

The auditor's fees break down as follows:

Parent company:		Subsidiaries	
Statutory auditing services	88 000	Statutory auditing services	114 700
Other services	96 000	Other services	43 900
<b>Total auditor's fees</b>	<b>184 000</b>	<b>Total auditor's fees</b>	<b>158 600</b>

The auditor's fee is stated exclusive of VAT

## Note 6 Operating revenue

	SRL		Simula Group	
	2018	2017	2018	2017
Research funding	54 595 000	54 675 000	69 595 000	59 675 000
Subsidies from the Research Council of Norway, EU, tec.	120 102 588	106 562 395	147 797 262	130 976 612
Other income	426 707	236 000	26 474 630	24 421 853
<b>Total</b>	<b>175 124 295</b>	<b>161 473 395</b>	<b>243 866 892</b>	<b>215 073 465</b>

## Note 7 Share capital and shareholders

SRL			
Share capital:	Quantity	Face value	Book value
Ordinary shares	800	1 500	1 200 000
<b>Total</b>	<b>800</b>	<b>-</b>	<b>1 200 000</b>

The company's shareholders as of 31.12	Quantity	Shareholding
The Norwegian state represented by the Ministry of Education and Research	800	100,0 %
<b>Total no. of shares</b>	<b>800</b>	<b>100,0 %</b>

## Note 8 Equity

SRL			
	Share capital	Other equity	Total
Equity as of 01.01	1 200 000	45 984 777	47 184 777
Profit/loss for the year	-	4 863 586	4 863 586
<b>Equity as of 31.12</b>	<b>1 200 000</b>	<b>50 848 363</b>	<b>52 048 363</b>

Simula Group				
	Share capital	Other equity	Minority interests	Total
Equity as of 01.01	1 200 000	65 835 413	6 589 062	73 624 475
Injected equity	-	-	980 080	980 080
Other changes	-	-	-65 000	-65 000
Profit/loss of the year	-	10 907 250	5 876 724	16 783 974
<b>Equity as of 31.12</b>	<b>1 200 000</b>	<b>76 742 663</b>	<b>13 380 866</b>	<b>91 323 529</b>

## Note 9 Bank deposits

	SRL	Simula Group
Restricted tax withholdings total:	2 032 232	4 926 776
Restricted bank deposit relating to leasing contracts total:	3 061 382	3 061 382

## Note 10 Subsidiaries, associates, etc.

	Acquired	Office	Country	Shareholding
Simula Innovation AS	04.05.2004	Fornebu	Norge	100 %
Simula School of Research and Innovation AS	08.05.2007	Fornebu	Norge	56,45 %
Simula UIB AS	17.12.2015	Bergen	Norge	51 %
Simula Metropolitan CDE AS	21.11.2017	Oslo	Norge	51 %

	Result	Equity 31/12
Simula Innovation AS	-3 597 640	35 315 182
Simula School of Research and Innovation AS	883 363	9 648 307
Simula UIB AS	5 102 947	10 634 080
Simula Metropolitan CDE AS	6 106 157	8 106 238

Non-consolidated subsidiaries:	Cost	Result	Equity 31/12
Rebasin Technology AS, owned 85% av Kalkulo AS	425 000	-2 398 649	-1 910 328
Simula Research Laboratory Inc , owned 100% av SRL	423 650	0	USD 50 000
<b>Total investments non-consolidated subsidiaries</b>	<b>848 650</b>	<b>0</b>	<b>0</b>

The company Kalkulo AS, which is wholly owned by Simula Innovation AS, shows a profit in 2018 of NOK. 1,425,560,-. Equity per 31/12-18 is NOK. 5,586,060,-.

## Note 11 Balances and transactions between group companies and associates

	2018	2017
Receivable from SI AS	1 990 409	3 031 215
Receivable from Kalkulo AS	191 202	16 756
Receivable from SSRI AS	764 008	317 830
Receivable from Simula UiB AS	31 250	-
Receivable from Simula Metropolitan CDE AS	819 579	-
Payable to SI AS	164 140	931 950
Payable to Kalkulo AS	128 770	274 798
Payable to SSRI AS	6 216 916	8 126 201
Payable to Simula UiB AS	3 921 333	-
Payable to Simula Metropolitan CDE AS	8 129 623	-
Salary costs refunded from SSRI AS	-	713 305
Salary costs refunded to SSRI AS	16 240 602	19 742 275
Sale of services, etc to SI AS	223 874	400 000
Sale of services, etc to Kalkulo AS	1 812 386	1 100 000
Sale of services, etc to SSRI AS	1 256 939	400 000
Sale of services, etc to Simula UiB AS	300 000	300 000
Sale of services, etc to Simula Metropolitan CDE AS	4 679 582	-
Purchases of services, etc from SI AS	2 385 935	2 915 600
Purchases of services, etc from Kalkulo AS	1 043 183	1 119 988
Purchases of services, etc from SSRI AS	3 734 150	3 000 000
Purchases of services, etc from Simula UiB AS	1 000 000	-
Purchases of services, etc from Simula Metropolitan CDE AS	13 548 854	-

## Note 12 Securities and shares in other enterprises, etc

Other share investments	Quantity	Face value per share	Shareholding	Cost price
ABCBAS	333	1	25,0 %	1 498 500
AlphaEntrance AS	13 400	1	8,0 %	999 975
Augere Medical AS	8 930	1	30,0 %	8 930
Celerway Communications AS	22 500	1	49,3 %	3 017 745
Edgefolio UK Limited	40 763	GBP 1,00	8,9 %	1 633 454
Expert Analytics AS	5 294	1	15,0 %	600 000
EYR Medical AS	20 839	0,3	6,5 %	2 033 314
Fabriscale Technologies AS	17 565	1	26,8 %	2 510 100
Facil AS	13 888	0,3	11,6 %	1 299 948
Forzasys AS	32 991	0,34	30,0 %	1 528 075
Imerso AS	891	10	10,9 %	1 615 925
Insilicomed Inc, USA	131 945	USD 1,8	-	1 220 755
Prisolve AS	102	79,79	18,8 %	1 533 333
MemoScale AS	7 812	1	5,2 %	1 249 920
Quine AS	5 534	1	13,3 %	450 017
SmartBob AS	102	79,79	18,8 %	18 785
sPerformance AS	4 000 000	0,01	10,0 %	500 000
Testify AS	44 433	1	30,0 %	1 427 117
Tipio AS	90 498	0,1	8,0 %	1 000 000
Truegroups AS	76 923	13	1,3 %	999 999
Unloc AS	1 875	1	5,2 %	999 994
Write-down of shares				5 959 791
<b>Total investment in associates</b>				<b>20 186 095</b>

### Pre-seed investments on behalf of Innovasjon Norge AS

Truegroups AS	76 923	13	1,3 %	999 999
Facil AS	2 778	0,3	2,3 %	500 000
Memoscale AS	3 125	1	2,1 %	500 000
EYR Medical AS	6 521	0,3	2,0 %	1 499 830
Fabriscale Technologies AS	3 223	1	4,9 %	1 999 793
<b>Total pre-seed investments</b>				<b>5 499 622</b>
<b>Total investment in associates</b>				<b>25 685 717</b>

## Note 13 Tax

The activities of Simula Research Laboratory AS and its subsidiary Simula School of Research and Innovation AS are not considered taxable. The subsidiaries Simula Innovation AS og Kalkulo AS are liable for tax. The subsidiaries Simula UiB AS and Simula Metropolitan Center for Digital Engineering AS are liable to taxation from contract research.

	Simula Group			Simula Group	
	2018	2017		2018	2017
<b>Taxation for the year consists of:</b>			<b>Temporary differences:</b>		
Tax payable	617 224	624 984	Other differences	-11 470	2 370
Change in deferred tax	-20 864	-61 167	Fixed assets	10 779	91 337
<b>Total tax expense</b>	<b>596 360</b>	<b>563 817</b>	Loss carryforward	-483 183	-
			Write-down of shares	-1 220 754	-1 220 754
			Total basis for deferred tax asset	-1 704 628	-1 127 047
<b>Tax payable for the year is calculated as follows:</b>	<b>2018</b>	<b>2017</b>	Deferred tax liability/asset	-375 018	-281 762
Profit before tax	2 105 233	3 522 806	Unrecognised deferred tax asset	-369 590	-298 541
Permanent differences	486 563	-1 058 498	<b>Recognised deferred tax liability</b>	<b>-5 425</b>	<b>15 439</b>
Change in temporary differences	91 790	139 790			
<b>Taxable income</b>	<b>2 683 586</b>	<b>2 604 098</b>			

## Note 14 Rental and leasing contracts

The company has entered into 3 leasing agreements with respect to photocopiers and coffee machines that expires in 2021. This year's cost is kr. 246 984.

## Note 15 Receivables and liabilities

	SRL		Simula Group	
	2018	2017	2018	2017
<b>Non-current liabilities maturing more than 5 years hence</b>				
Debt to credit institutions	-	3 166 674	-	3 166 674
Pre-seed funds from Innovasjon Norge AS	-	-	10 000 000	7 000 000
<b>Total</b>	<b>-</b>	<b>3 166 674</b>	<b>10 000 000</b>	<b>10 166 674</b>
Secured debt	-	3 166 674	-	3 166 674
<b>Assets pledged as sureties</b>				
Accounts receivables	-	5 000 000	-	5 000 000
Operating assets	-	2 500 000	-	2 500 000
<b>Total</b>	<b>-</b>	<b>7 500 000</b>	<b>-</b>	<b>7 500 000</b>

# Cash flow statement

SRL			Simula Group	
2017	2018		2018	2017
		<b>Cash flow from operating activities</b>		
6 149 327	4 863 586	Net profit for the year	16 783 974	9 446 807
2 132 344	2 223 784	Depreciation and write-downs	2 420 064	2 240 649
-	-	Change in value of shares	2 598 557	2 489 038
4 648 361	-12 810 120	Change in receivables	-28 128 441	-21 465 899
22 615 613	-10 536 818	Change in current liabilities	4 923 832	19 117 024
<b>35 545 645</b>	<b>-16 259 568</b>	<b>Net cash flow from operating activities</b>	<b>-1 402 014</b>	<b>11 827 619</b>
		<b>Cash flow from investing activities</b>		
-796 011	-1 197 967	Net investments in operating assets	-2 056 157	-790 733
-16 443 650	-25 902 022	Net investments in/sale of shares	-25 418 100	-5 316 166
<b>-17 239 661</b>	<b>-27 099 989</b>	<b>Net cash flow from investing activities</b>	<b>-27 474 257</b>	<b>-6 106 899</b>
		<b>Cash flow from financing activities</b>		
-333 322	-3 166 674	Repayment of loans	-166 674	6 666 668
-	-	Injected equity	980 081	-
-	-	Change in deferred tax	-20 864	-61 167
<b>-333 322</b>	<b>-3 166 674</b>	<b>Net cash flow from financing activities</b>	<b>792 543</b>	<b>6 605 501</b>
17 972 662	-46 526 231	Net cash flow for the year	-28 083 728	12 326 221
49 121 041	57 796 972	Cash holdings 01/01	86 420 307	74 094 086
<b>57 796 972</b>	<b>11 270 739</b>	<b>Cash holdings 31/12</b>	<b>58 336 579</b>	<b>86 420 307</b>

Til generalforsamlingen i  
SIMULA RESEARCH LABORATORY AS

## UAVHENGIG REVISORS BERETNING

### Uttalelse om revisjonen av årsregnskapet

#### Konklusjon

Vi har revidert SIMULA RESEARCH LABORATORY AS' årsregnskap som viser et overskudd for selskapsregnskapet på kr. 4.863.586,- og et overskudd for konsernregnskapet på kr. 10.907.250,-, og etter vår mening:

- er årsregnskapet avgitt i samsvar med lov og forskrifter
- gir selskapsregnskapet et rettviseende bilde av den finansielle stilling til SIMULA RESEARCH LABORATORY AS per 31. desember 2018 og av selskapets resultater og kontantstrømmer for regnskapsåret som ble avsluttet per denne datoen i samsvar med regnskapslovens regler og god regnskapsskikk i Norge.
- gir konsernregnskapet et rettviseende bilde av den finansielle stilling til konsernet SIMULA RESEARCH LABORATORY AS per 31. desember 2018 og av konsernets resultater og kontantstrømmer for det avsluttede regnskapsåret i samsvar med regnskapslovens regler og god regnskapsskikk i Norge.

Årsregnskapet består av:

- selskapsregnskapet, som består av balanse per 31. desember 2018, resultatregnskap og kontantstrømoppstilling for regnskapsåret avsluttet per denne datoen og noter, herunder et sammendrag av viktige regnskapsprinsipper, og
- konsernregnskapet som består av balanse per 31. desember 2018, resultatregnskap og kontantstrømoppstilling for regnskapsåret avsluttet per denne datoen og noter, herunder et sammendrag av viktige regnskapsprinsipper.

#### Grunnlag for konklusjonen

Vi har gjennomført revisjonen i samsvar med lov, forskrift og god revisjonsskikk i Norge, herunder de internasjonale revisjonsstandardene (ISA-ene). Våre oppgaver og plikter i henhold til disse standardene er beskrevet i Revisors oppgaver og plikter ved revisjon av årsregnskapet. Vi er uavhengige av selskapet slik det kreves i lov og forskrift, og har overholdt våre øvrige etiske forpliktelser i samsvar med disse kravene. Etter vår oppfatning er innhentet revisjonsbevis tilstrekkelig og hensiktsmessig som grunnlag for vår konklusjon.

#### Øvrig informasjon

Ledelsen er ansvarlig for øvrig informasjon. Øvrig informasjon består av årsberetningen, men inkluderer ikke årsregnskapet og revisjonsberetningen.

Vår uttalelse om revisjonen av årsregnskapet dekker ikke øvrig informasjon, og vi attesterer ikke den øvrige informasjonen.

I forbindelse med revisjonen av årsregnskapet er det vår oppgave å lese øvrig informasjon med det formål å vurdere hvorvidt det foreligger vesentlig inkonsistens mellom øvrig informasjon og årsregnskapet, kunnskap vi har opparbeidet oss under revisjonen, eller hvorvidt den tilsynelatende

inneholder vesentlig feilinformasjon. Dersom vi hadde konkludert med at den øvrige informasjonen inneholder vesentlig feilinformasjon er vi pålagt å rapportere det. Vi har ingenting å rapportere i så henseende.

#### Styrets og daglig leders ansvar for årsregnskapet

Styret og daglig leder er ansvarlig for å utarbeide årsregnskapet i samsvar med lov og forskrifter, herunder for at det gir et rettviseende 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 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 avvirket.

#### 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 lov, forskrift og god revisjonsskikk i Norge, herunder ISA-ene, alltid vil avdekke vesentlig feilinformasjon som eksisterer. Feilinformasjon kan oppstå som følge av misligheter eller utilsiktede feil. Feilinformasjon blir vurdert som vesentlig dersom den enkeltvis eller samlet med rimelighet kan forventes å påvirke økonomiske beslutninger som brukerne foretar basert på årsregnskapet.

For videre beskrivelse av revisors oppgaver og plikter vises det til

<https://revisorforeningen.no/revisjonsberetninger>

#### Uttalelse om øvrige lovmessige krav

#### Konklusjon om årsberetningen

Basert på vår revisjon av årsregnskapet som beskrevet ovenfor, mener vi at opplysningene i årsberetningen om årsregnskapet og forutsetningen om fortsatt drift er konsistente med årsregnskapet og i samsvar med lov og forskrifter.

#### Konklusjon om registrering og dokumentasjon

Basert på vår revisjon av årsregnskapet som beskrevet ovenfor, og kontrollhandlinger vi har funnet nødvendig i henhold til internasjonal standard for attestasjonsoppdrag (ISAE) 3000 «Attestasjonsoppdrag som ikke er revisjon eller forenklet revisorkontroll av historisk finansiell informasjon», mener vi at ledelsen har oppfylt sin plikt til å sørge for ordentlig og oversiktlig registrering og dokumentasjon av selskapets regnskapsopplysninger i samsvar med lov og god bokføringsskikk i Norge.

Oslo, den 6. mars 2019



Erik A. Bell  
Statsautorisert revisor

# Social responsibility and workplace environment

**Simula Research Laboratory (Simula) is a non-profit enterprise for the benefit of the public. The company contributes to society by conducting basic and applied research within the scientific fields of communication systems, scientific computing, machine intelligence, software engineering, and cybersecurity. Education and outreach are integrated components of the research carried out at Simula, as are the innovation and commercialization activities that help bring the results of this research into society. To achieve all this, Simula has prioritized a number of successful initiatives.**

Simula is continuously working to ensure good working conditions. The following summary highlights some of the topics Simula address in order to maintain and develop its standards within ethics, gender balance, and general working conditions.

- **Ethics**

Maintaining high ethical standards has a value in itself for both Simula and each individual employee. Simula's code of ethics has been developed to increase awareness of, and compliance with, the high ethical standards required of the employees. The code of ethics includes topics such as research ethics; the working environment and inclusion; gifts, enticements and corruption; confidentiality; and conflicts of interest. Adhering to these ethical standards creates

a foundation of trustworthiness for collaborating with partners in research as well as Norwegian society in general.

- **Equality and diversity**

It is important for Simula to be a workplace where everyone has equal opportunities for professional and personal development, regardless of gender or ethnic background. Simula's diverse workforce represents 35 different nationalities, with half of the employees coming from outside of Norway (see figure 1). Simula takes several measures to make the transition to a Norwegian workplace effective and positive, including administrative support and Norwegian language training.

Currently, 30 % of Simula's employees are female (26 % of scientific staff) (see figure 2). Simula has an ambitious goal of increasing the female proportion of the staff to 40 % within the next ten years. The continued focus on recruiting new and talented female candidates, and on developing and adapting working conditions for qualified women, are important factors in achieving this goal.

- **Working environment**

Simula prioritizes providing an excellent workplace for its employees. This is ensured through an internal inspection system that addresses health, safety and the working environment. The Working Environment Committee at Simula endeavors to develop and maintain the quality of the working environment, and follows up questions concerning the safety, health and welfare of the employees.

Absence due to illness is in general low at Simula, and the sickness absence rate per 31.12.2018 was 1.8 % in Simula Research Laboratory, Simula School of Research and Innovation, Simula Innovation, SimulaMet, Simula UiB, and Kalkulo combined.

The results of a working environment survey conducted in October 2018 were overall very

good and showed improvements in almost all categories as compared to the 2014 survey at Simula and to the Norwegian research institute sector in general. Although these results confirm that the working environment at Simula is in good condition and that employees are thriving, efforts continue to follow up these results in the individual units and in Simula as a whole.

Simula has an agreement with NAV (the Norwegian Labour and Welfare Organisation) concerning “the inclusive workplace”. The purpose of the agreement is to prevent and reduce absence related to illness, improve job attendance and the working environment, and avert exclusion and withdrawal from working life. An action plan with focus on how Simula addresses these matters is discussed with NAV annually. Several administrative placements at Simula were offered to candidates from NAV in 2018, one of which has resulted in a permanent employment.

• **Competence development and recruitment**

Simula is dependent on competent and motivated employees with specific expertise in order to reach its targets and works continuously to attract, develop and retain talented employees with varied backgrounds. Simula facilitates professional and personal development to enhance expertise, and in 2018 more than 30 of Simula’s scientific employees participated in a full-day supervisor retreat that was arranged by the Simula School of Research and Innovation.

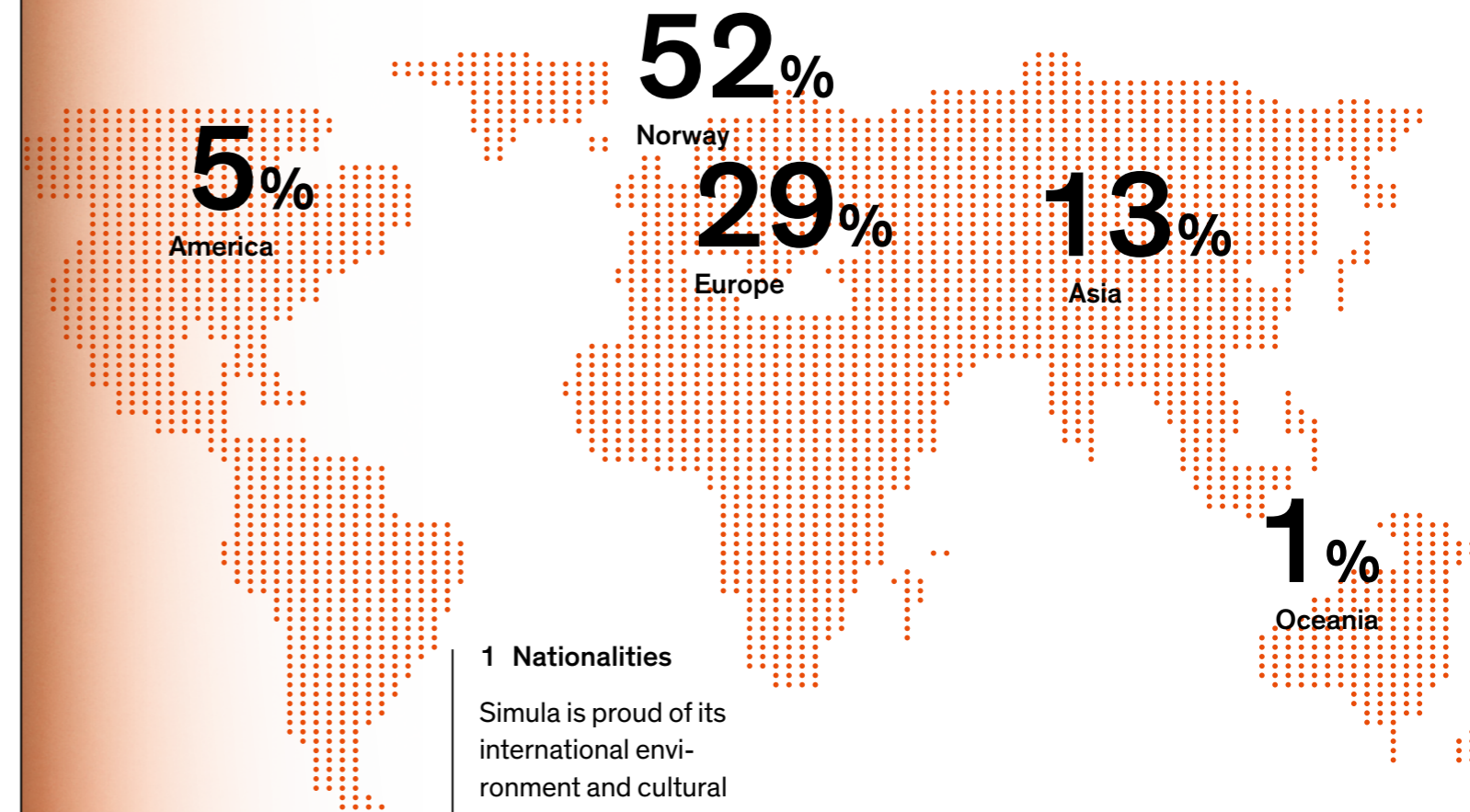
Simula’s leaders play a key role with respect to Simula’s results. In 2018, several of Simula’s project leaders took part in leadership training programs at internationally renowned institutions, such as the Wharton School, University of Pennsylvania, and the London Business School.

• **Conflict resolution and notification of censurable conditions**

Simula will ensure a safe and secure working environment in accordance with the company’s principles on workplace culture. Simula has developed guidelines for conflict resolution and notification, meeting all the requirements in the personnel guidelines and the Working Environment Act. These guidelines encourage employees to take an active role in creating a working environment in which conflict is handled in an open, honest and constructive way, and in trying to prevent destructive forms of conflict from arising.

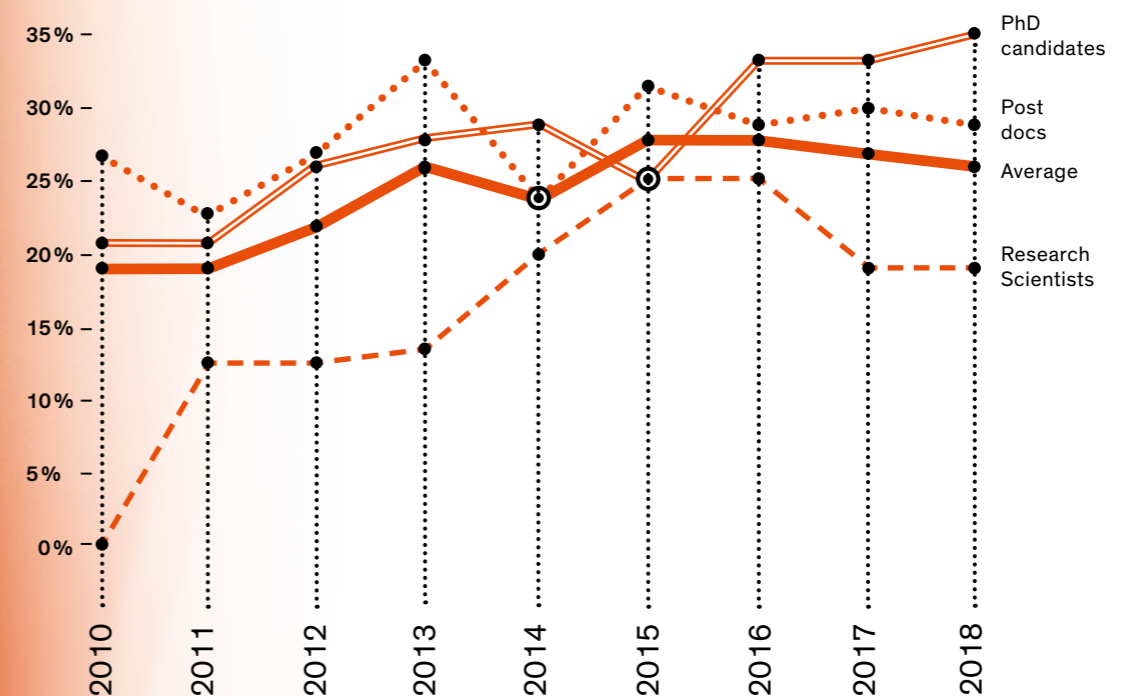
• **External environment**

Simula’s activities do not pollute the external environment. In addition, Simula encourages environmentally responsible behavior through the way the company is run. To encourage employees to commute to work via public transport rather than by car, Simula developed a program to subsidize the cost of monthly public transport tickets; 56 % of employees took part in this program in 2018. In addition, Simula continues to promote paper-free processes and has digitized administrative process, greatly reduced paper consumption and increased awareness among employees since the initiative began in 2010.



**1 Nationalities**

Simula is proud of its international environment and cultural diversity, employing 155 exceptional minds of 35 different nationalities.



**2 Gender balance**

The proportion of female researchers has increased from 2010–2018. Simula aims to increase the proportion of female staff to 40% within the next 9 years.

\* All numbers as of 31.12.2018

# Education and outreach activities

Simula's educational and outreach activities are organized at the Simula School of Research and Innovation (SSRI).

A core activity of SSRI has been to provide educational opportunities from Master to the post-doctoral level. Although the majority of these opportunities target students and research fellows affiliated with Simula, many are open to participants from around the world, such as the annual Summer School in Computational Physiology.

SSRI's outreach activities aim to inspire local pupils to see the exciting possibilities in science and technology subjects, as well as to provide relevant training for teachers.

A summary of SSRI's activities in 2018 is presented in the following pages.

Participants at the 2018 Joint Summer School in Computational Physiology



- **The Joint Summer School in Computational Physiology**

Together with the University of California, San Diego (UCSD) and the University of Oslo, SSRI arranges an intensive summer school in Computational Physiology for late Masters- and early Doctoral students. The four-week long summer school is divided into two segments; the first two weeks take place at Simula (Fornebu, Norway) and the second two weeks take place at UCSD (La Jolla, USA).

In 2018, 25 international students completed both segments of the course, while 27 additional Ph.D. students joined the Oslo segment from two EU-projects: 15 from the PIC project hosted by King's College London and 12 from the Afib TrainNet project hosted by the University of Copenhagen.

- **Prepare**

SSRI's initial outreach program is called Prepare, where part-time employed Bachelor and Master students act as ambassadors for technology and science subjects. SSRI trains the student ambassadors to present scientifically complicated topics in an easy and appealing way.

The ambassadors visit local schools to inspire students' interest in technology and science.

In 2018 Prepare had 17 ambassadors that together held 70 science talks, divided amongst 10 different schools.

The Prepare program also includes school visits, either to Simula's premises or to schools. In 2018, lectures were held on Simula and what we do, as well as programming courses and tasks in Python for 10 local science classes in middle and high school.

- **Collaboration with NAROM**

In 2018 SSRI signed a collaboration agreement with the National Centre for Space-related Education (NAROM).

Together, NAROM and SSRI have organized the "Andøya Mission Control" program for four middle school classes in 2018.

The program provides pupils with the opportunity to communicate with a Mission Commander (NAROM) via Skype. The pupils solve realistic tasks to assist an astronaut in fixing



a satellite. The purpose is to combine general science and space science to inspire a greater interest in science amongst pupils.

- **Code School**

SSRI's latest priority project is Kodeskolen («Code School»). Code School was arranged for the first time last summer. Science teachers receive education and exercises in text-based programming adapted to the subjects they teach.

The target group in 2018 has been middle school teachers as programming will become part of the school curriculum from 2020. This project has been developed in close collaboration with Bærum municipality.

In addition to courses with Bærum municipality, SSRI has arranged courses with approximately 20 mathematics teachers organized in The Norwegian Society of Graduate Technical and Scientific Professionals (TEKNA) division East-Norway, and SINTEF Oslo. The teaching was held by Ph.D. students and senior researchers from Simula.

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# 25

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teachers have participated in Code School's in-depth programming course

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# 10

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science classes in middle and high school have participated in programming courses through Prepare

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# 40

---

teachers have participated in The Code School's crash course on programming

The Prepare ambassadors have held

---

# 70

---

science talks

Up to a

---

# 10000

---

university students reached at career events at Norwegian universities



Our newest Prepare ambassadors

# Doctorates and Master's Degrees

This list presents PhD and MSc degrees awarded by degree awarding institutions in Norway and abroad in 2018. The degrees are obtained by candidates that are supervised throughout their projects by Simula researchers.

As of December 31, 2018

## Doctorates

Student	Title of thesis	Supervisors	Co-supervisor(s)	Institution
Henrik Finsberg	Patient-Specific Computational Modeling of Cardiac Mechanics	Joakim Sundnes	Sam Wall, Hans Henrik Odland	University of Oslo (UiO) - Department of Informatics
Yulia Vibe	Vertical plate motions in the West Siberian Basin and Northern Europe as indicators of mantle-induced dynamic topography	Hans-Peter Bunge	Stuart Clark	Ludwig-Maximilians-Universität München (LMU), Germany
Yan Li	Requirements Support for Enabling Automated Reuse and Configuration for Product Line	Li Zhang	Tao Yue, Shaukat Ali	Beihang University, Beijing, China
Man Zhang	Uncertainty-wise Cyber-Physical Systems Testing	Tao Yue	Shaukat Ali	University of Oslo (UiO) - Department of Informatics
Carlo Ieva	Unveiling Source Code Latent Knowledge. Discovering Program Topoi	Souhila Kaci	Arnaud Gotlieb, Nadjib Lazaar	LIRMM, University of Montpellier, France
Tetiana Yarygina	Exploring Microservice Security	Kjell Jørgen Hole, Anya Bagge	Jaakko Järvi	University of Bergen (UiB) - Department of Informatics
Siddhartha Kumar	Privacy, Security, and Repair in Distributed Storage Systems	Eirik Rosnes	Øyvind Ytrehus, Alexandre Graell i Amat	University of Bergen (UiB) - Department of Informatics
Bjørn Møller Greve	Systems of Boolean equations, elimination theory, and applications to cryptography	Øyvind Ytrehus	Håvard Raddum	University of Bergen (UiB) - Department of Informatics

## Master's Degrees

Student	Title of thesis	Supervisors	Co-supervisor(s)	Institution
Christian Bjørland	Explicit time stepping schemes for the bidomain model	Joakim Sundnes	Kent-André Mardal	University of Oslo (UiO) - Department of Mathematics
Edvard Johannesen Bakken	The empire strikes back	Michael Riegler	Pål Halvorsen	University of Oslo (UiO) - Department of Informatics
Eirik Tveterås	Evaluating Loss and Latency Mitigation Techniques in a Tick-Based Game Server	Andreas Petlund	Carsten Griwodz	University of Oslo (UiO) - Department of Informatics
Emilie Eliseussen Ødegaard	A posteriori error estimation for multiple network poroelasticity	Marie Elisabeth Rognes	Kent-André Mardal	University of Oslo (UiO) - Department of Mathematics
Espen Johnsen	Reliable Asynchronous Communication in Distributed Systems	Kjell Jørgen Hole	-	University of Bergen (UiB) - Department of Informatics
Henrik Aasen Kjeldsberg	Investigating the Interaction Between Morphology of the Anterior Bend and Aneurysm Initiation	Kristian Valen-Sendstad	Aslak Wigdahl Bergersen, Mikael Mortensen	University of Oslo (UiO) - Department of Mathematics
Hugo Wallenburg	Libdalbe: A library for developing Deadline-Aware Less-than Best Effort transport services	David Hayes	David Ros, Andreas Petlund	University of Oslo (UiO) - Department of Informatics
Håkon Gjeraker Østerhus	Code-based cryptography: A superficial introduction	Øyvind Ytrehus	-	University of Bergen (UiB) - Department of Informatics

## Master's Degrees

Student	Title of thesis	Supervisors	Co-supervisor(s)	Institution
Isabel Thevari Francis	Efficient implementation of LowMC in HElib	Håvard Raddum	-	University of Bergen (UiB) - Department of Informatics
Joakim Skjelbred Misund	Rapid Acceleration in TCP Prague	Bob Briscoe	Andreas Petlund, David Hayes	University of Oslo (UiO) - Department of Informatics
John-Petter Indrøy	Algebraic Attack on Small Scale Variants of AES using Compressed Right Hand Sides	Håvard Raddum	-	University of Bergen (UiB) - Department of Informatics
Kjetil Justnes	Subdivision Surfaces for use in Cut Finite Element Methods	August Johansson	Michael S. Floater	University of Oslo (UiO) - Department of Informatics
Lars Erik Storbukås	Implementing Less than Best Effort with Deadlines - One LBE to rule them all and to the deadline bind them	David Hayes	David Ros, Andreas Petlund	University of Oslo (UiO) - Department of Informatics
Lu Liu	Big data for PV systems real-time monitoring	Yan Zhang	Ernst Gunnar Gran	University of Oslo (UiO) - Department of Informatics
Matias Snellingen	Implementation of an Object Recognition and Alignment Pipeline	Carsten Griwodz	Pål Halvorsen	University of Oslo (UiO) - Department of Informatics
Nithusha Tharmanathan	Investigating the Advantages of Having a Tensor Product Finite Element Software	Kent-André Mardal	Espen Sande	University of Oslo (UiO) - Department of Mathematics
Per Magne Florvaag	A pipeline for extracting patient specific geometries with machine learning	Kristian Valen-Sendstad	Valeriya Naumova, Aslak Wigdahl Bergersen	University of Oslo (UiO) - Department of Mathematics
Rune Johan Borgli	Hyperparameter optimization using Bayesian optimization on transfer learning for medical image classification	Michael Riegler	Carsten Griwodz, Pål Halvorsen	University of Oslo (UiO) - Department of Informatics
Sebastian Kenji Mitusch	An Algorithmic Differentiation Tool for FEniCS	Simon Funke	Kent-André Mardal	University of Oslo (UiO) - Department of Mathematics
Simen Fonnes	Reducing Packet Loss in Real-Time Wireless Multicast Video Streams with Forward Error Correction	Carsten Griwodz	Pål Halvorsen	University of Oslo (UiO) - Department of Informatics
Steven Hicks	Mimir: An Automatic Reporting and Reasoning System for Screening of the Gastrointestinal Tract Using Deep Neural Networks	Michael Riegler	Carsten Griwodz, Pål Halvorsen	University of Oslo (UiO) - Department of Informatics
Susinthiran Sithamparanathan	High Throughout Virtualization	Evangelos Tasoulas	Tor Skeie	University of Oslo (UiO) - Department of Informatics
Thomas Parmer	An evaluation of SIFT feature matching strategies for CPU and GPU	Carsten Griwodz	Pål Halvorsen	University of Oslo (UiO) - Department of Informatics
Tor Jan Derek Berstad	Trade-offs of Adapting Binary Neural Network Ensembles for Multiclass Problems	Michael Riegler	Pål Halvorsen, Konstantin Pogorelov	University of Oslo (UiO) - Department of Informatics
Torkil Ravem	An evaluation of SIFT feature matching strategies for CPU and GPU	Carsten Griwodz	Pål Halvorsen	University of Oslo (UiO) - Department of Informatics
Valentyna Pysarieva	A posteriori modelling error estimation for linear elasticity and poroelasticity	Marie Elisabeth Rognes	Kent-André Mardal	University of Oslo (UiO) - Department of Mathematics
Vilde Nyrønning Strøm	Using Personalized Virtual Hearts to Assess Arrhythmia Risk in Acute Infarction Patients	Hermenegild Arevalo	Joakim Sundnes	University of Oslo (UiO) - Department of Mathematics



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## Articles in international journals

- 01 **A case study on semiautomatic seismic interpretation of unconformities and faults in the southwestern Barents Sea**  
Aina Bugge, Stuart Clark, Jan Erik Lie, Jan Inge Faleide, Interpretation, vol. 6, issue 2, p. SD29–SD40
- 02 **A Centerline-Based Model Morphing Algorithm for Patient-Specific Finite Element Modeling of the Left Ventricle**  
Sareh Behdadfar, Laurent Navarro, Joakim Sundnes, Mary Maleckar, Stian Ross, Hans Henrik Odland, Stephane Avril, IEEE Transactions on Biomedical Engineering, vol. 65, p. 1391–1398
- 03 **A control mechanism for intra-mural peri-arterial drainage via astrocytes: How neuronal activity could improve waste clearance from the brain.**  
Alexandra K. Diem, Roxana O. Carare, Roy O. Weller, Neil W. Bressloff, Journal, vol. 13, issue 10, p. e0205276
- 04 **A Kirchhoff-Nernst-Planck framework for modeling large scale extracellular electrodiffusion surrounding morphologically detailed neurons**  
Andreas Solbrå, Aslak Bergersen, Jonas van den Brink, Anders Malthe-Sørensen, Gaute T. Einevoll, Geir Halnes, PLOS Computational Biology, vol. 14
- 05 **A Self-Adaptive Network for HPC Clouds: Architecture, Framework, and Implementation**  
Feroz Zahid, Amir Taherkordi, Ernst Gunnar Gran, Tor Skeie, Bjørn Dag Johnsen, IEEE Transactions on Parallel and Distributed Systems, vol. 29, issue 12, p. 2658–2671
- 06 **A stepwise neuron model fitting procedure designed for recordings with high spatial resolution: Application to layer 5 pyramidal cells**  
Tuomo Mäki-Marttunen, Anna Devor, Christoph Metzner, Anders M. Dale, Ole A. Andreassen, Gaute T. Einevoll, Journal of neuroscience methods, vol. 293, p. 264–283
- 07 **Adaptive multi-penalty regularization based on a generalized Lasso path**  
Markus Grasmair, Timo Klock, Valeriya Naumova, Applied and Computational Harmonic Analysis
- 08 **Aggregating Association Rules to Improve Change Recommendation**  
Thomas Gramstad Rolfsnes, Leon Moonen, Stefano Di Alesio, Razieh Behjati, David Binkley, Journal of Empirical Software Engineering (EMSE), vol. 23, issue 2, p. 987–1035
- 09 **Agile Uncertainty Assessment – for Benefit Points and Story Points**  
Jo Erskine Hannay, Hans Christian Benestad, Kjetil Strand, IEEE Software
- 10 **An interview with Miriam Redi**  
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- 11 **An interview with Prof. Alan Smeaton**  
Alan Smeaton, Michael Riegler, ACM SIGMultimedia Records, vol. 9, issue 3, p. 1 – 1
- 12 **Artery.FE: An implementation of the 1D blood flow equations in FEniCS**  
Syver D. Agdestein, Kristian Valen-Sendstad, Alexandra K. Diem, Journal of Open Source Software, vol. 3, issue 32
- 13 **Artificial Intelligence Inspired Transmission Scheduling in Cognitive Vehicular Communications and Networks**  
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- 14 **Asymptotic analysis and spatial coupling of counter braids**  
Eirik Rosnes, Alexandre Graell i. Amat, IEEE Transactions on Information Theory, vol. 64, issue 11, p. 7242–7263
- 15 **Block-diagonal and LT codes for distributed computing with straggling servers**  
Albin Severinson, Alexandre Graell i. Amat, Eirik Rosnes, IEEE Transactions Communications
- 16 **Blockchain for Secure and Efficient Data Sharing in Vehicular Edge Computing and Networks**  
J. Kang, R. Yu, X. Huang, M. Yu, Sabita Maharjan, S. Xie, Yan Zhang, IEEE Internet of Things Journal
- 17 **Brain-wide glymphatic enhancement and clearance in humans assessed with MRI**  
Geir Ringstad, Lars M. Valnes, Anders M. Dale, Are H. Pripp, Svein-Are S. Vatnehol, Kyrre E. Emblem, Kent-Andre Mardal, Per K. Eide, JCI insight, vol. 3
- 18 **“Bucket” cerebrospinal fluid bulk flow: when the terrain disagrees with the map**  
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- 39 **Fine-grained LTE radio link estimation for mobile phones**  
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- 45 **It can become 5 °C warmer: The extremity effect in climate forecasts**  
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- 02 **Time predictions: Understanding and avoiding unrealism in project planning and everyday life**  
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- 02 **Fifth International Workshop on Software Engineering Research and Industrial Practice**  
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## Technical reports

- 01 **Shared Bottleneck Detection for Coupled Congestion Control for RTP Media**  
David Andrew Hayes, Simone Ferlin, Michael Welzl, Kristian Hiorth, *Simula Research Laboratory*
- 02 **Employing Rule Mining and Multi-Objective Search for Dynamic Test Case Prioritization**  
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- 03 **Norske mobilnett i 2017**  
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- 04 **Automated Test Case Implantation to Test Untested Configurations: A Cost-Effective Search-Based Approach**  
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- 05 **SUnMBT4CPS: Security-related Uncertainty Model-Based Testing for Cyber-Physical Systems**  
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Man Zhang, *The University of Oslo*
- 02 **Patient-Specific Computational Modeling of Cardiac Mechanics**  
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Erik Løhre, Agata Sobkow, Sigrid Møyner Hohle,

- 07 **Privacy, Security, and Repair in Distributed Storage Systems**  
Siddhartha Kumar, University of Bergen
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## Talks

- 01 **A distributed - memory parallel approximation of maximum weight perfect bipartite matching**  
Johannes Langguth, Ariful Azad, Aydin Buluc, Xiaoye Li, Xinliang Wang, Sparse Days 2018, Toulouse, France
- 02 **A distributed - memory parallel approximation of maximum weight perfect bipartite matching**  
Johannes Langguth, Ariful Azad, Aydin Buluc, Xiaoye Li, Xinliang Wang, Pacific Northwest National Laboratory, Richland, WA, USA
- 03 **A machine learning approach for adaptive parameter selection**  
Valeriya Naumova, Zeljko Kereta, University of Oslo, Norway
- 04 **A machine learning approach to optimal regularization**  
Valeriya Naumova, Zeljko Kereta, European Women in Mathematics, Graz, Austria
- 05 **A machine learning approach to optimal regularization: Affine Manifolds**  
Valeriya Naumova, Zeljko Kereta, NTNU, Norway
- 06 **A Robust 3-Field formulation for Generalized Poroelasticity**  
Travis Thompson, Marie E. Rognes, FEniCS 18, Oxford, United Kingdom
- 07 **A robust mixed finite element method for generalized poroelasticity**  
Marie E. Rognes, Travis Thompson, Glasgow, UK
- 08 **A Stokes-Biot Stable H(div)-based mixed method for generalized poroelasticity**  
Travis Thompson, Marie E. Rognes, SIAM Life Sciences 2018, Minneapolis, Minnesota, USA
- 09 **Adjoint Based Data Assimilation for Quantification of Dynamic Mechanical Behavior of the Heart**  
Samuel Wall, Henrik Finsberg, Gabriel Balaban, Joakim Sundnes, Lik Chuan Lee, World Congress of Biomechanics, New York, USA
- 10 **Adjoint based data assimilation for quantifying mechanical properties in clinical cardiac mechanics**  
Samuel Wall, Henrik Finsberg, Gabriel Balaban, Lik Chuan Lee, Computer Methods

- in Biomechanics and Bioengineering, Lisbon, Portugal
- 11 **Agile software development and benefits management: A perfect match**  
Magne Jørgensen, PMI/Prosjekt Norge Workshop, Oslo, Norway
- 12 **AI-Powered Testing of Industrial Robots**  
Arnaud Gotlieb, ALTEN TalentCamp, Paris, France
- 13 **Algorithmic differentiation for mixed FEniCS-Tensorflow models**  
Simon W. Funke, Sebastian Mitusch, Oxford, UK
- 14 **Algorithmic differentiation for shape optimization problems in the High Level Finite Element Framework FEniCS**  
Jørgen S. Dokken, University of Würzburg, Germany
- 15 **Algorithmic Differentiation for Shape Optimization problems with overlapping meshes**  
Jørgen Schartum Dokken, Siam Annual Meeting, Portland, USA
- 16 **Alltid smidig når du går?**  
Magne Jørgensen, Smidig-konferansen: Smidig i offentlig sektor, Oslo, Norway
- 17 **Artificial Intelligence and Next Generation Networks**  
Sabita Maharjan, First Nepal AI Winter School, Kathmandu, Nepal
- 18 **Artificial Intelligence in Software Testing: An Overview. Application to Industrial Robotics**  
Arnaud Gotlieb, French Days on Software Testing (JFTL'18), Paris, France
- 19 **Automated adjoints for finite element models**  
Simon W. Funke, EUCCO 2018, Trier, Germany
- 20 **Automated Refactoring of OCL Constraints with Search**  
Tao Yue, ICSE 2018, Gothenburg, Sweden
- 21 **Automatic Detection of Angiectasia: Evaluation of Deep Learning and Handcrafted Approaches**  
Konstantin Pogorelov, Olga Ostroukhova, Andreas Petlund, Pål Halvorsen, Håvard Espeland, Tomas Kupka, Thomas de Lange, Carsten Griwodz, Michael Riegler, IEEE Conference on Biomedical and Health Informatics (BHI) 2018
- 22 **Binder 2.0: Next Gen of Reproducible Scientific Environments w/ repo2docker & BinderHub**  
Chris Holdgraf, Benjamin Ragan-Kelley, SciPy, USA
- 23 **Boundary Estimation: Learning Boundaries for Constraint Optimization Problems**  
Arnaud Gotlieb, Helge Spieker, International Symposium on Mathematical Optimization (ISMP'18), Bordeaux, France

- 24 **Cost and benefits of software development in a uncertain, skewed world**  
Magne Jørgensen, Software Analytics and its Impact on Industry Delft Data Science Seminar, Delft, The Netherlands
- 25 **Data Fusion based on Coupled Matrix and Tensor Factorizations**  
Evrin Acar Ataman, 5th Conference on Constraint-Based Reconstruction and Analysis (COBRA 2018), Seattle, USA
- 26 **Demand Response Management in Vehicle-to-grid Systems**  
Sabita Maharjan, SINTEF, Oslo, Norway
- 27 **Deploying a cloud-based JupyterHub for students and researchers**  
Carol Willing, Benjamin Ragan-Kelley, Erik Sundell, JupyterCon, New York, NY, USA
- 28 **Digital Vulnerability and International Interdependency**  
Olav Lysne, 17th European Conference on Cyber Warfare and Security, Oslo, Norway
- 29 **Digitalt Grenseforsvar**  
Olav Lysne, Student-UGA i Agder, Norge
- 30 **Education in HPC and Data Science at Simula Research Lab and UIO**  
Xing Cai, SUPERDATA Workshop on curriculum development, Yunan, China
- 31 **Energy Market and Game Theory**  
Sabita Maharjan, LUCS Summer School, Fornebu, Norway
- 32 **Estimating Objective Boundaries for Constraint Optimization Problems**  
Helge Spieker, Arnaud Gotlieb, NordConsNet Workshop, Gothenburg, Sweden
- 33 **fling: A Flexible Ping for Middlebox Measurements**  
Ahmed Elmokashfi, AIMS 2018: Workshop on Active Internet Measurements, CAIDA, UCSD, California, USA
- 34 **Fluid dynamics in syringomyelia cavities**  
Vegard Vinje, Justin Brucker, Marie E. Rognes, Kent-Andre Mardal, Victor Haughton, Vancouver, Canada
- 35 **From myths and fashions to evidence-based software engineering**  
Magne Jørgensen, ICSIE, Cairo, Egypt
- 36 **Future Energy Information Networks**  
Sabita Maharjan, Einstein Center for Digital Future, Berlin, Germany
- 37 **Heterogeneous Computing: Programming, Performance and Applications**  
Xing Cai, CoSaS 2018 Symposium, Erlangen, Germany
- 38 **Heterogeneous HPC Computations in Cardiac Electrophysiology**  
Johannes Langguth, 19th IEEE International Workshop on Parallel and Distributed Scientific and Engineering Computing (PDSEC 2018), Vancouver, Canada
- 39 **Hva kjennetegner IT-prosjekter som lykkes?**  
Magne Jørgensen, Seminar Forsvaret, Kolsås, Norway

- 40 **Hvordan få tak i reell usikkerhet av kost-nytte i en skjev verden?**  
Magne Jørgensen, Prosjekt Norges årlige prosjektlederkonferanse, Norway
- 41 **Hvordan kontrollere digitale hemmelige tjenester**  
Olav Lysne, EOS-utvalgets årskonferanse, Norge
- 42 **Ideas on how to combine machine learning with physical simulations**  
Simon W. Funke, Oslo, Norway
- 43 **In Silico Modeling of Cardiac Micro-physiological Systems for Evaluating Drug Side Effects**  
Samuel Wall, Aslak Tveito, Karoline Horgmo Jæger, Andy Edwards, Kevin Healy, Nathaniel Huebsch, Bérénice Charrez, Heart By Numbers Conference, Berlin, Germany
- 44 **Internet of Vehicles towards Smart Cities**  
Sabita Maharjan, Kathmandu University, Nepal
- 45 **Internet of Vehicles: Resource Optimization and Vehicle Safety Enhancement**  
Sabita Maharjan, Nepal Engineers Association, Lalitpur, Nepal
- 46 **JupyterLab: the evolution of the Jupyter notebook**  
Vidar Tonaas Fauske, PyHEP conference, Sofia, Bulgaria
- 47 **JupyterLab: the evolution of the Jupyter notebook**  
Vidar Tonaas Fauske, University of Antwerp, Belgium
- 48 **Lawful interception of Internet Traffic, and national autonomy in cyberspace**  
Olav Lysne, Luftmaktseminaret, Trondheim, Norway
- 49 **Lawful interception of Internet Traffic, and National Autonomy in Cyberspace**  
Olav Lysne, Sikkerhetskonferansen, Norge
- 50 **Lawful interception of Internet Traffic, and national autonomy in cyberspace**  
Olav Lysne, Norges Forsvarsforening - åpent seminar, Norge
- 51 **Mathematical modeling of the glymphatic system – the physics of Alzheimer's disease?**  
Kent-Andre Mardal, Mathematical models in health sciences, Nantes, France
- 52 **Mathematical modeling of the glymphatic system – the physics of Alzheimer's disease?**  
Kent-Andre Mardal, INdAM, Rome, Italy
- 53 **Milliardinvesteringer i digitalisering. Hva gir det oss?**  
Magne Jørgensen, Software 2018, DnD, Norway
- 54 **MiniBiz: Can we combine machine learning and physical simulations?**  
Simon W. Funke, StartupLab, Oslo, Norway
- 55 **Mixed-dimensional coupled finite elements in FEniCS**  
Cécile Daversin-Catty, Marie E. Rognes, FEniCS18, Oxford, UK

- 56 **Mixed-dimensional modeling of the brain's waterscape**  
Cécile Daversin-Catty, Marie E. Rognes, Workshop on solvers for materials with high-aspect-ratio inclusions, Finse, Norway
- 57 **Model-based Testing**  
Tao Yue, Norwegian University of Science and Technology, Norway
- 58 **Model-Based Testing of Cyber-Physical Systems with Machine Learning and Search Algorithms**  
Shaukat Ali, International Conference on Model-Driven Engineering and Software Development, MODELSWARD 2018
- 59 **Model-Based Testing of Cyber-Physical Systems with Machine Learning and Search Algorithms**  
Shaukat Ali, DNV-GL, Trondheim, Norway
- 60 **Modeling Next Generation Networks**  
Sabita Maharjan, NECSO, Oslo, Norway
- 61 **Modeling of intracranial pressure during infusion test**  
Vegard Vinje, Vancouver, Canada
- 62 **Multi-parameter regularization for solving inverse problems of unmixing type**  
Valeriya Naumova, Timo Klock, University of Cambridge, UK
- 63 **Parameter-robust discretization and preconditioning of multiple-network poroelasticity equations**  
Eleonora Piersanti, Jeonghun J. Lee, Kent-Andre Mardal, Marie E. Rognes, University of Oxford, UK
- 64 **Parameter-robust discretization and preconditioning of multiple-network poroelasticity equations**  
Eleonora Piersanti, Jeonghun J. Lee, Kent-Andre Mardal, Marie E. Rognes, Glasgow, UK
- 65 **Practical Cyber-Physical Systems Testing: Results and Future Directions**  
Shaukat Ali, The 7th Workshop of Advanced Software Engineering, Gold Coast, Australia
- 66 **Practical selective regression testing with effective redundancy in interleaved tests**  
Dusica Marijan, International Conference on Software Engineering (ICSE), Gothenburg, Sweden
- 67 **Preconditioners for PDE constrained optimization problems (coarse observations, boundary control)**  
Kent-Andre Mardal, SIAM ALA, Hong Kong, China
- 68 **Presentation on Symposium on Search-Based Software Engineering (SSBSE 2019)**  
Shaukat Ali, Symposium on Search-Based Software Engineering (SSBSE 2018), Montpellier, France
- 69 **Reinforcement Learning for Automatic Test Case Prioritization and Selection in Continuous Integration**

- Helge Spieker, Arnaud Gotlieb, Dusica Marijan, Morten Mossige, Gesellschaft für Informatik Software Engineering Conference 2018 (SE18), Ulm, Germany
- 70 **REMAP: Using Rule Mining and Multi-Objective Search for Dynamic Test Case Prioritization**  
Dipesh Pradhan, Shuai Wang, Shaukat Ali, Tao Yue, Marius Liaaen, IEEE Conference on Software Testing, Validation and Verification (ICST), Västerås, Sweden
- 71 **Search-based Test Optimization for Software Systems**  
Shaukat Ali, Tao Yue, GECCO 2018, Kyoto, Japan
- 72 **Search-based Test Optimization: A Very Short Introduction**  
Shaukat Ali, ERATO MMSD Summer Camp, National Institute of Informatics, Japan
- 73 **Smart vehicles for smart cities: Vehicle-to-grid, mobile edge computing and vehicle safety**  
Sabita Maharjan, University of Oulu, Oulu, Finland
- 74 **SmartIO: Dynamic Sharing of GPUs and IO in a PCIe Cluster**  
Håkon Kvale Stensland, GPU Technology Conference, San Jose, CA, USA
- 75 **Structure-Revealing Data Fusion Models based on Coupled Matrix and Tensor Factorizations and Their Applications**  
Evrin Acar Ataman, Three-way Methods in Chemistry and Psychology (TRICAP), New Mexico, USA
- 76 **SW Testing: Can ML save us?**  
Carl Martin Rosenberg, Marius Liaaen, NDC TechTown 2018, Kongsberg, Norway
- 77 **Testing Cyber-Physical Systems with Machine Learning and Search Algorithms**  
Shaukat Ali, National Institute of Informatics, Tokyo, Japan
- 78 **The Influence of Breathing on Cerebrospinal Fluid Movement in the Brain**  
Vegard Vinje, Geir Andre Ringstad, Marie E. Rognes, Per Kristian Eide, Kent-Andre Mardal, Glasgow, United Kingdom
- 79 **Tutorial on Tensor Factorizations, Data Fusion & Applications**  
Evrin Acar Ataman, 14th International Conference on Latent Variable Analysis and Signal Separation, Guildford, UK
- 80 **Unstructured mesh partitioning in the presence of strong coefficient heterogeneity**  
Andreas Thune, Xing Cai, PDESoft 2018 Conference, Bergen, Norway
- 81 **Usikkerhetsanalyse**  
Magne Jørgensen, HIT-seminar, Oslo, Norway
- 82 **Usikkerhetsvurdering for nyttepoeng og kostpoeng**  
Jo Erskine Hannay, Hovedstadsområdet netværk for IT-ledelse og styring (HIT), Norway



- 83 **Using intervals to communicate uncertainty**  
Erik Løhre, SWPS University of Social Sciences and Humanities, Wroclaw, Poland
- 84 **Using porous media to bridge multiple scales and guide clinical experiments**  
Alexandra K. Diem, SIAM Life Sciences, Minneapolis, MN, USA
- 85 **Waterscape of the Brain: Mathematics and Scientific Computing Enabling Clinical Simulation**  
Travis Thompson, Cécile Daversin-Catty, Simula Research Conference, Son, Norway
- 86 **What can - and should - empirical software engineering learn from empirical studies in psychology?**  
Magne Jørgensen, 12th International Symposium on Empirical Software Engineering and Measurement, Oulu, Finland
- 87 **What makes software projects successful?**  
Magne Jørgensen, ICSSE, Prague, Czech Republic
- 88 **What makes software projects successful?**  
Magne Jørgensen, Workshop with Government of Bangladesh Delegation (ECNEC), Oslo, Norway
- 89 **When is agile better? How the use of agile and autonomous teams affect success differently in different contexts (and other results)**  
Magne Jørgensen, A-teams (First International Workshop on Autonomous Agile Teams), XP-workshop, Porto, Portugal
- 90 **When SDN, Edge Computing and Big Data Meet Intelligent Transport Systems**  
Yan Zhang, Sabita Maharjan, Z. Zhou, IEEE VTC Spring 2018, Porto, Portugal

## Posters

- 01 **A Novel Computational Model of the Rabbit Atrial Myocyte Offers Insight into Calcium Wave Propagation Failure**  
Marcia R. Vagos, Jordi Heijman, Hermenegild Arevalo, Mary M. Maleckar, Bernardo Lino de Oliveira, Ulrich Schotten, Joakim Sundnes, Cambridge, USA
- 02 **Adjoint Based Personalization of Mechanical Models for Quantification of Right Ventricular Failure in Pulmonary Hypertension**  
Henrik Finsberg, Ce Xi, Zhao Xiaodan, Ju Le Tan, Martin Genet, Joakim Sundnes, Lik Chuan Lee, Liang Zhong, Samuel Wall, Heart by Numbers Conference, Berlin, Germany
- 03 **Constraint-Based Generation of Trajectories for single-Arm Robots**  
Mathieu Collet, CP2018, Lille, France

- 04 **Different Cycle, Different Assignment: Diversity in Assignment Problems with Multiple Cycles**  
Helge Spieker, Arnaud Gotlieb, Morten Mossige, AAAI-18, New Orleans, Louisiana, USA
- 05 **In Silico - Augmented Cardiac Microphysiological Systems for Evaluating Cardiac Drug Effects**  
Samuel Wall, Karoline Horgmo Jæger, Nathaniel Huebsch, Bérénice Charrez, Kevin Healy, Aslak Tveito, BMES Conference, Atlanta, USA
- 06 **In Silico - Augmented Cardiac Microphysiological Systems for Evaluating Cardiac Drug Effects**  
Samuel Wall, Karoline Horgmo Jæger, Nathaniel Huebsch, Bérénice Charrez, Kevin Healy, Aslak Tveito, Keystone Organ on Chip Symposium, Montana, USA
- 07 **Modelling drug delivery via nanoparticle deposition in the myocardium of the left ventricle**  
Alexandra K. Diem, Kristian Valen-Sendstad, Berlin
- 08 **Quantifying data traffic of sparse matrix-vector multiplication in a multi-level memory hierarchy**  
James D. Trotter, Johannes Langguth, Xing Cai, London, UK
- 09 **Respiratory influence on intracranial pressure gradients and aqueductal flow in normal pressure hydrocephalus**  
Vegard Vinje, Geir Ringstad, Marie E. Rognes, Per Kristian Eide, Kent-Andre Mardal, Dublin, Ireland
- 10 **Stokes-Biot stability and a mixed formulation for generalized proelasticity**  
Travis Thompson, Marie E. Rognes, Lorentz Center, Leiden, Netherlands
- 11 **Towards Algorithmic Differentiation of shape optimization problems with time-dependent PDE-constraints**  
Jørgen Schartum Dokken, FEniCS 18, Oxford, UK,
- 12 **Towards Detailed Organ-Scale Simulations in Cardiac Electrophysiology**  
Johannes Langguth, Hermenegild Arevalo, Chad Jarvis, Xing Cai, International Symposium on Computational Science at Scale (CoSaS), Erlangen, Germany
- 13 **Turning the Azimuthal Motions of Adjacent Tropomyosins into a Coupled N-body Problem in a Brownian Model of Cardiac Thin Filament Activation**  
Yasser Aboelkassam, Kimberly J. McCabe, Gary Huber, Joakim Sundnes, Andrew D. McCulloch, San Francisco, California/ U.S.A.

## Public outreach

- 01 **Alltid smidig når du går! Men hva med oppstartsfasen og forretningsiden?**  
Magne Jørgensen, Computerworld (Norge), IDG
- 02 **Breaking the code of schizophrenia**  
Tuomo Mäki-Marttunen, Center for Digital Life Norway
- 03 **Breath, breathing and the sensing of breathing.**  
Alexander Refsum Jensenius, Njål Sparbo, Sagar Sen, Elisabeth. Edvardsen, MusicLab vol. 2; 2018-04-09 - 2018-04-09, University of Oslo (UiO)
- 04 **De som vet lite vet også lite om hvor lite de vet**  
Magne Jørgensen, Computerworld (Norge), IDG
- 05 **Digitalisering = produktivitetsvekst?**  
Magne Jørgensen, Computerworld (Norge), IDG
- 06 **Digitalt Grenseforsvar**  
Olav Lysne, NRK TV
- 07 **ExaGraph Collaboration with STRUMPACK/SuperLU: Factorization-Based Sparse Solvers and Preconditioners for Exascale**  
XiaoYe Li, Ariful Azad, Aydin Buluc, Pieter Ghysels, Johannes Langguth, Xinliang Wang, Exascale Computing Project (ECP)
- 08 **Hvordan velge å velge - og litt om duer**  
Magne Jørgensen, Computerworld (Norge), IDG
- 09 **Nasjonal strategi for IKT-sikkerhet**  
Olav Lysne, Justisdepartementet
- 10 **Sannheten om uærlighet**  
Magne Jørgensen, Computerworld (Norge), IDG

## Data sets

- 01 **Data for "High-Frequency Fluctuations in Post-Stenotic Patient Specific Carotid Stenosis Fluid Dynamics: A Computational Fluid Dynamics Strategy Study"**  
Viviana Mancini, Aslak Bergersen, Jan Vierendeels, Patrick Segers, Kristian Valen-Sendstad, FigShare
- 02 **Data for "The 2015 International Aneurysm CFD Challenge"**  
Kristian Valen-Sendstad, Aslak Bergersen, Kenichi Kono, David A. Steinmam, FigShare
- 03 **Data set for the paper What are the Effects of History Length and Age on Mining Software Change Impact?**  
Leon Moonen, Thomas Gramstad Rolfsnes, David Binkley, Stefano Di Alesio, Zenodo

# Board and Management

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## Organisational structure





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