idiap
RESEARCH INSTITUTE

ANNUAL REPORT 2019

MASTER IN AI: ONLINE EXAM
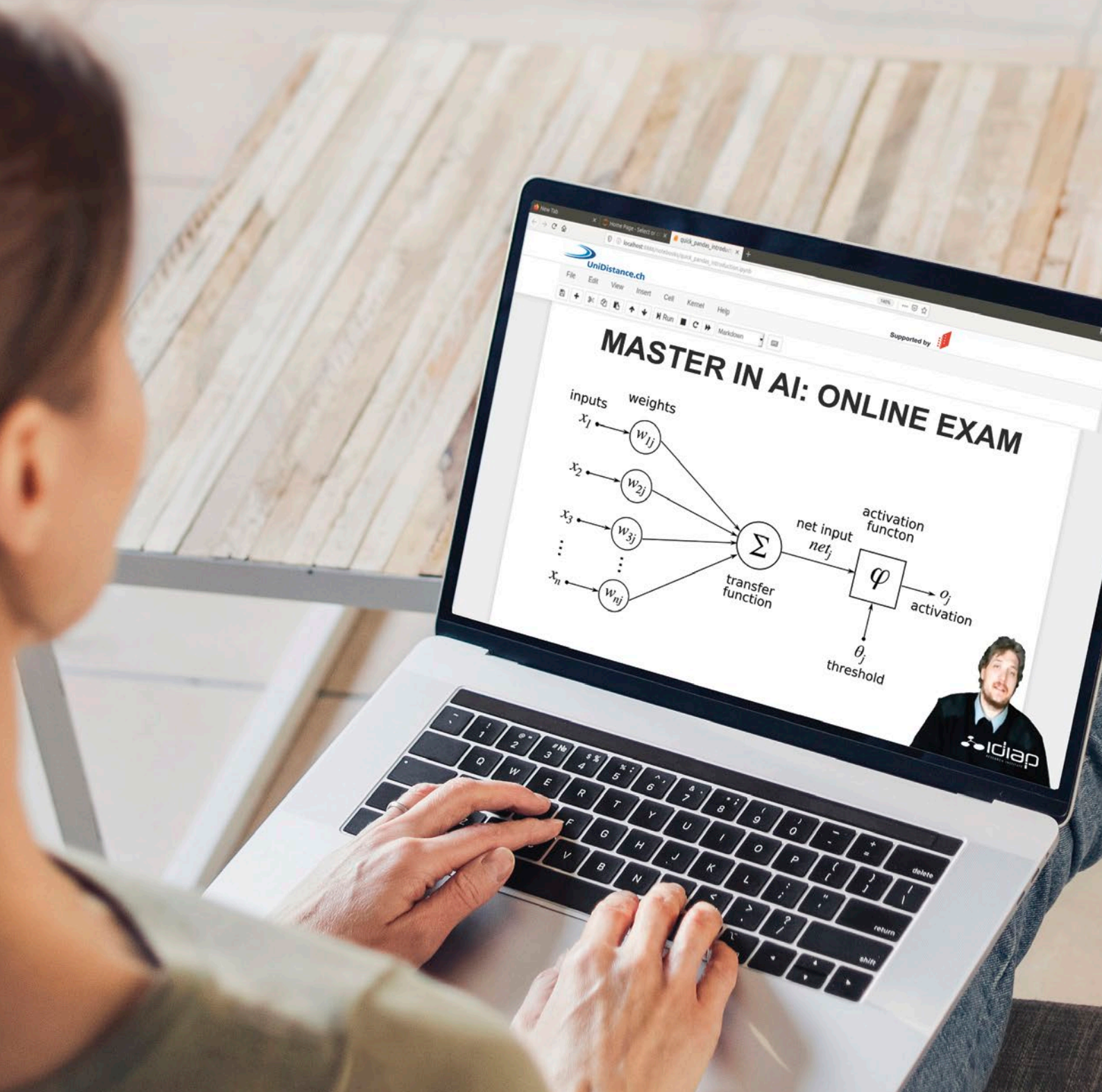
The cover page shows distance-learning courses in the applied Master's in Artificial Intelligence.
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Idiap thanks

the authorities and its founding members

www.martigny.ch

www.vs.ch
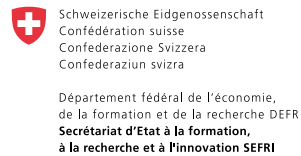
www.sbfi.admin.ch

www.dallemolle.ch

www.swisscom.ch

www.epfl.ch

www.unige.ch

as well as its partners for their support

www.loro.ch

www.theark.ch

www.ideark.ch

www.snf.ch

www.innosuisse.ch

www.haslerstiftung.ch

www.unidistance.ch

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Olivier Dumas
President of the Foundation Council

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"Swiss positioning for global challenges"

The arrival at Idiap—from London—of a researcher from Valais tells us much about where research currently finds itself: bridging borders, astride the local and the global. Renowned throughout the world for its competences, and operating in an increasingly competitive environment, the Idiap Research Institute is strengthening its positioning in Valais and in Switzerland so as to be able to benefit from the wealth of resources our country has to offer. And this strategy is also an excellent mechanism via which to increase Idiap's own contribution to society.

At a time when our very way of life is being shaken by a pandemic, Idiap's choices have proven not only visionary, but also necessary. For example, the applied Master's in Artificial Intelligence has suffered almost no disruption, thanks to the fact that distance learning has been—from the start—at the heart of its design. And in a similar vein, the research group in Genomics & Health Informatics, created in 2019, illustrates both the importance of and the will to adopt an approach to health issues that applies the tools of artificial intelligence.

Idiap must maintain and develop its vanguard role, in terms of both scientific research and technology transfer. With this firmly in mind, the Institute intends to create new research groups, to not only strengthen its current skills, but also further develop its vision of artificial intelligence at the service of society.

Thus, the support of the Confederation, Valais' cantonal authorities, the city of Martigny, and all of our partners sends out a strong message regarding Switzerland's place on the world stage: our vision, like our assets, is without equal.

The Foundation Council is delighted to share with you an appraisal of our 2019 activities, and thanks the Institute's supporters and partners for their commitment.

Hervé Bourlard
Director, Idiap; Professor, EPFL

"There's less intelligence in artificial intelligence than one might think. But more talent"

Machine learning, deep learning, neural networks, big data—today, these terms are on everyone's lips. Many appear to believe that these tools are a panacea for our changing society. But without a vision, without voracious efforts to meet concrete needs, and without team spirit, each of these tools will prove useless. At Idiap, we don't pretend to solve every problem, but we do wish to share our skills and know-how, to help move the world forward, and in the right direction. And that, I think, is ambitious in itself.

As director of the Institute, I am proud to see our teams mobilizing in every respect. Whether that means helping a talented researcher to create her own research group, involving our students in innovative projects, welcoming a colleague from the other side of the world, or even creating an escape game to interest the canton's young people in research—so much talent is at work.

Our colleagues' intelligence also goes to places where we least expect to find it—including, for example, when our researchers program a robot so that it can learn, by imitation, to make a raclette. The subsequent media coverage gave us an opportunity to emphasize the importance of having to hand tools that can be used by all. This is the Idiap spirit, and I thank my colleagues for bringing it to life every day.

I, along with all Idiap's teams, am happy to share with you a little of this energy in the form of this 2019 overview of our Institute. We look forward to continuing working with you, to help our society advance.

overview

06—09

Research at the service of society

Raphaëlle Luisier
Head of the Genomics &
Health Informatics group

"I always keep patients' needs as the goal of my research, even if it's in the long term"

Originally from Valais, Raphaëlle returned from London to create her own research group at Idiap. Its goal, to use artificial intelligence to harness the potential of genomics for health. A promising, long-term aim.

→ *More on page 24*

Sébastien Marcel
Head of the Biometric
Security & Privacy group

"With Idiap becoming the first CITeR site outside the US, the biometrics lab has positioned itself as a key technology transfer partner"

Also head of the Swiss Center for Biometrics, Sébastien is often the link between science and business. As a key player in our Institute's integration into the unique research and development environment that is CITeR, he has demonstrated Idiap's crucial role in technology dissemination.

→ *More on page 30*

Colombine Verzat
Master's in Artificial
Intelligence student

"I put what I learn into practice in the framework of a project that uses machine learning to detect side effects during medical therapies"

During her training and studies, Colombine is using her developer skills on a research project linked with latent tuberculosis: research and development work that perfectly illustrates the assets of the course curriculum.

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Idiap, at a glance

Idiap's vision is to promote quality of life through scientific progress in the field of artificial intelligence.

3 missions

Idiap is recognized by the Confederation as part of the strategic domain of the Federal Institutes of Technology and is supported under the Federal Law on the Promotion of Research and Innovation (LERI), art. Al. 3b.
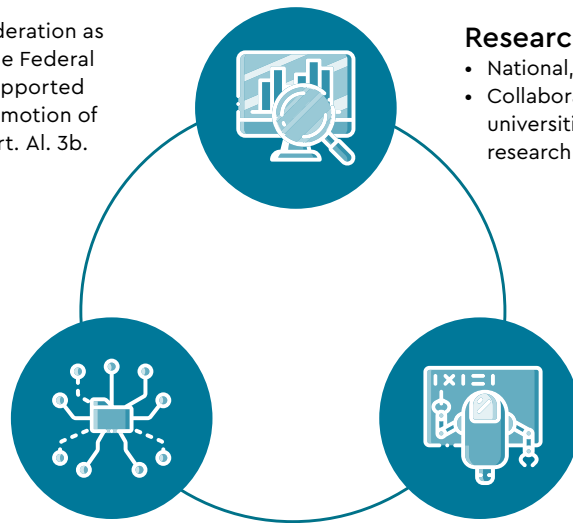
Research
- National, European, and worldwide
- Collaborations with prestigious universities and public and private research bodies

Innovation
- Technology transfer
- Start-up creation
- Dedicated incubator—IdeArk
- Patents, licenses, and open source

Training
- Numerous courses at EPFL and internally
- Master's in Artificial Intelligence incorporating guaranteed work experience
- Encouraging the next generation of young researchers

31 nationalities are represented at Idiap

Stateless
4 robots

Switzerland
40%

Asia
19%

Middle East
9%

Americas
7%

Australia
1%
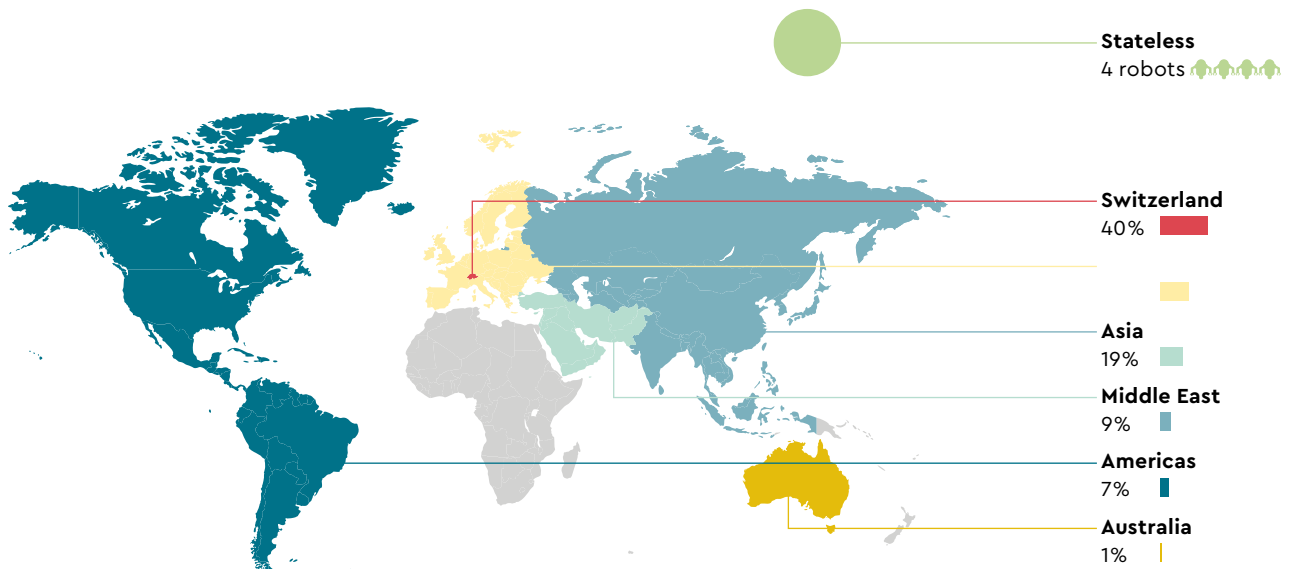
Human resources
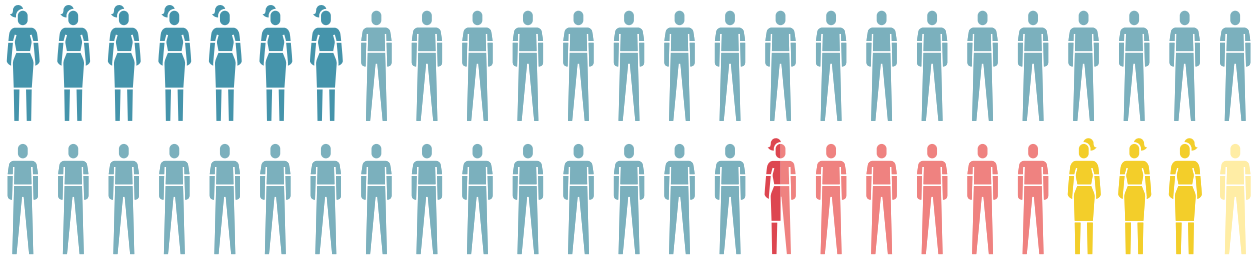
172 **individuals in total
and more than** 50 **posts in the start-up ecosystem**

● Scientists

5 professors
1 senior scientist (MER)
14 permanent senior researchers
28 postdocs
48 research assistants
14 students
27 trainees/visitors

17.7% women

● Engineers

15 research and development engineers
7 system engineers

9.1% women

● Administrative staff

13 administrative staff

61.5% women

20.3% of Idiap
employees are women,
79.7% are men
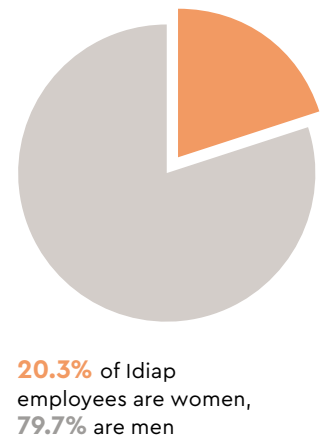
Publications in 2019, and patents

Contributions to 131 peer-review publications

76
conference articles

6
theses completed

38
scientific articles

3
recognized patents

11
book chapters

7
further patents filed

3,051
LinkedIn
followers
↗ 39% in 2019

1,134
Twitter
followers
↗ 63% in 2019

1,200
visitors

Financing

3%
other

54%
research
projects

43%
public
funds
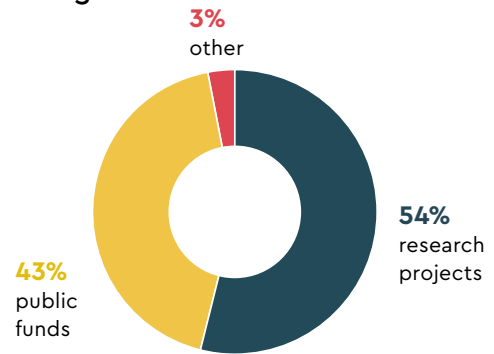
Submission and financing of research projects in 2019

61 projects
submitted in 2019

67 active
projects in 2019

CH: Switzerland   EU: European Union
IND: industrial   INT: international
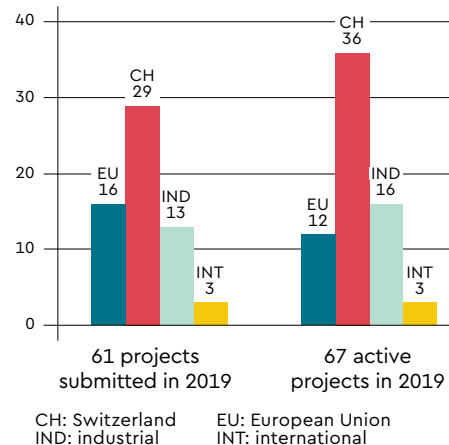
organization

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Organization chart

Foundation Council

International Advisory Board

Director
Hervé Bourlard

Deputy Director
François Foglia

Scientific College
F. Fleuret, D. Gatica-Perez, J.-M. Odobez

Admin. Committee

Data & Research Ethics Committee

Research Committee

Director, Finance & Human Resources
Christophe Rossa

System & Infrastructure
Frank Formaz

Biosignal Processing
André Anjos

Perception & Activity Understanding
Jean-Marc Odobez

Legal
Marie-Constance Landelle

Research & Development Engineers
Olivier Bornet

Biometric Security & Privacy
Sébastien Marcel

Robot Learning & Interaction
Sylvain Calinon

Program Managers
Barbara Huguenin
Justine Darioly

Technology Transfer
Joël Dumoulin

Computational Bio Imaging
Michael Liebling

Social Computing
Daniel Gatica-Perez

Communications, Marketing & Public Relations
Nicolas Filippov

Energy Informatics
Jérôme Kämpf

Speech & Audio Processing
Hervé Bourlard
Phil Garner
Mathew Magimai
Petr Motlicek

Genomics & Health Informatics
Raphaëlle Luisier

Machine Learning
François Fleuret

Uncertainty Quantification & Optimal Design
David Ginsbourger

Natural Language Understanding
James Henderson

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12 research groups

Speech & Audio Processing

Prof. Hervé Bourlard (third from left),
Dr. Phil Garner, Dr. Petr Motlicek, Dr. Mathew Magimai-Doss
H-index: PG: 26, PM: 22, HB: 66, MMD: 27

Speech processing has, for many years, been one of Idiap's major research themes.

Statistical automatic speech recognition; voice synthesis and the generic processing of audio information (source localization; microphone networks; speaker segmentation; information indexing; very-low-bit-rate speech coding; background noise analysis).

Biometric Security & Privacy

Dr. Sébastien Marcel
H-index: 51

The automatic recognition of individuals through the use of behavioral and biological characteristics is the foundation stone of computer biometrics.

Development of image processing and pattern recognition algorithms for face recognition (2D, 3D, and near infrared); speaker recognition; antispoofing; study of emerging biometrics modalities (electrophysiology and veins); open science thanks to our own open source library.

Biosignal Processing

Dr. André Anjos
H-index: 24

The analysis of biomedical sensor data for medical or research purposes lies at the heart of the research carried out by the Biosignal Processing group.

Analysis of e-health data; detection of human biological signals for medical and scientific applications; use of machine learning techniques; data acquisition and analysis; open science.

Computational Bio Imaging

Prof. Michael Liebling
H-index: 23

The technique of computational imaging and biomedical image analysis lies at the heart of the group's imaging research.

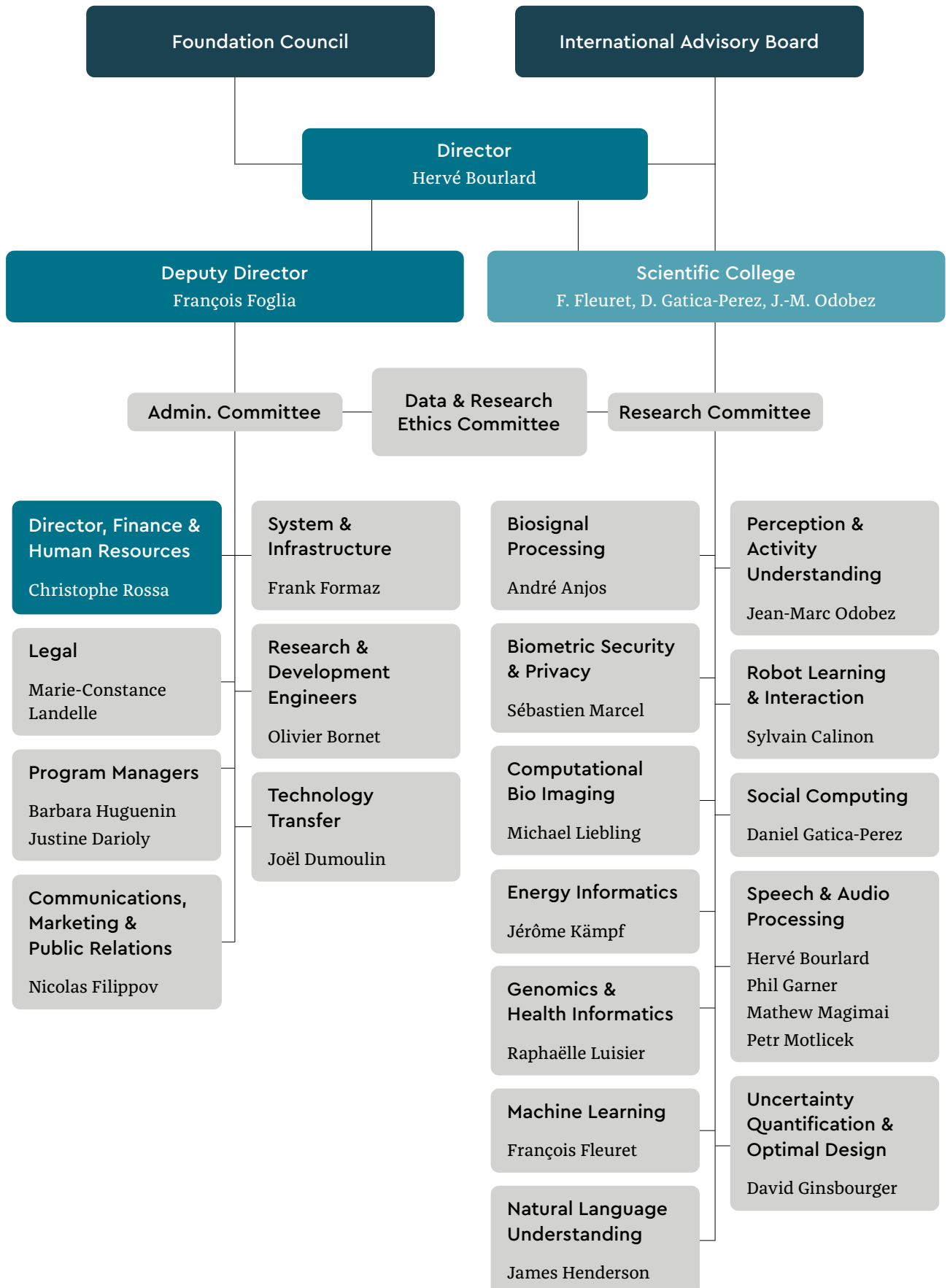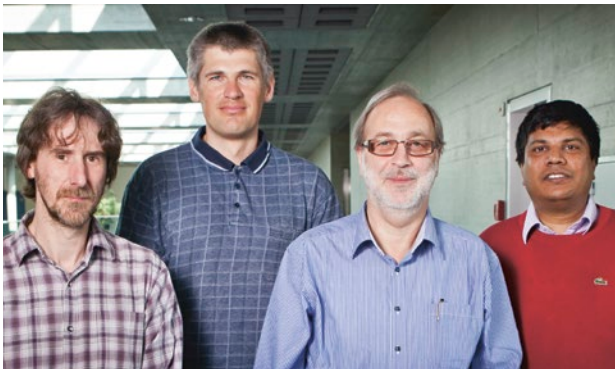Development of algorithms for deconvolution and super-resolution in optical microscopy; three-dimensional tomographic reconstruction; more generally, combination of unusual detection methods and devices with computational software to produce images ideally suited to the observation and quantification of complex, living biological systems.

Energy Informatics

Dr. Jérôme Kämpf
H-index: 23

Information and communication technologies help us to fight climate change and to increase the proportion of renewable energy and the number of distributed energy sources.

Creation of smarter energy systems; global optimization of energy efficiency; scenarios of energy transition including intelligent control and adjustment mechanisms for building retrofitting; production and storage of renewable energies in the context of climate change.

Genomics & Health Informatics
Dr. Raphaëlle Luisier
H-index: 10

Artificial intelligence technologies such as statistics, machine learning, and data visualization could further unlock the potential of genetics for health.

Genomics; bioinformatics; RNA biology; neuroscience; data science; and data visualization, all related to cellular imaging, genomic data, and neurodegenerative diseases, and studied in collaboration with molecular neuroscience and bioengineering experts.

Machine Learning
Dr. François Fleuret
H-index: 34

The development of new statistical learning techniques, principally for computer vision, is the basis of the group's work.

Computational properties of statistical learning; automatic image analysis, particularly the automatic extraction of significance; object detection; tracking of people and biological structures.

Natural Language Understanding
Dr. James Henderson
H-index: 25

Deep learning models of the syntax and meaning of text are used for machine translation, natural language inference, and summarization.

Neural machine translation; summarization; information retrieval and extraction; text classification; attention-based deep learning models of language understanding; representation learning for modeling abstraction and natural language inference.

Perception & Activity Understanding
Dr. Jean-Marc Odobez
H-index: 44

The analysis of human activities from multimodal data is useful for surveillance, behavior analysis, human–robot interfaces, and multimedia content analysis.

Development of algorithms based on computer vision and learning and data fusion methods in order to detect and track objects and people, to represent and characterize their state, and to model sequential data and interpret them in the form of gestures, behaviors, and social relations.

Robot Learning & Interaction
Dr. Sylvain Calinon
H-index: 43

Human-centric robotic applications exploit multimodal sensory information and develop intuitive learning interfaces.

Develop statistical approaches for encoding movements and behaviors in robots evolving in unconstrained environments; models with multiple roles (recognition, prediction, reproduction); learning strategies (imitation, emulation, incremental correction, or exploration).

Social Computing
Prof. Daniel Gatica-Perez
H-index: 63

The integration of theories and models from informatics and the social sciences makes it possible to detect, analyze, and interpret human and social behavior.

Behavioral analysis of face-to-face interactions; crowd-sourcing and the large-scale treatment of urban data; smartphones and social networks.

Uncertainty Quantification & Optimal Design
Prof. David Ginsbourger
H-index: 27

Quantifying and reducing uncertainties in the context of high-fidelity models is central to this group's research interests.

Gaussian process methods; the planning of numerical experiments for optimization, inversion, and other related problems. Areas of application include energy and geosciences, with collaborations ranging from safety engineering to hydrology and climate sciences.

* **The h-Index** attempts to quantify both the productivity and the impact of scientists based on the number of citations that they have received in other publications (citation level). The higher the number, the more the researcher has been cited. H-index as of February 28, 2019 (source: Google Scholar).

Foundation Council

The Foundation Council is responsible for the economic and financial management of Idiap. It defines the Institute's structure, appoints its director, and—more generally—ensures Idiap's development and defends its interests.

Olivier Dumas, President
Independent manager and business consultant

Jordi Montserrat
Regional Manager Venturelab

Anne-Laure Couchepin Vouilloz, Vice-President
President of the city of Martigny

Prof. Stéphane Marchand-Maillet
Associate professor at the Department of Computer Science of the University of Geneva

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Marc-André Berclaz
Valais–Wallis Cluster

Dominique Perruchoud
President of the Board of Cimark SA

Stefan Bumann
Head of the Service des Hautes Ecoles (SHE)

Prof. Pierre Vandergheynst
Professor and Vice-President for Education at EPFL

Patrick Furrer
Scientific collaborator at swissuniversities

Dr. Michael Baeriswyl
Executive Vice-President of Data, Analytics & AI, Swisscom

International Advisory Board

The Advisory Board is composed of members of the scientific community selected by Idiap's management for their exceptional skills and avant-garde vision. Although their role is strictly advisory, their support is frequently sought and proves valuable when making decisions regarding research, training, and technology transfer.

Dr. Alex Acero

Senior Director at Apple, Cupertino, CA, USA

Prof. Klaus-Robert Müller

Professor of Computer Science, TU Berlin; Director, Bernstein Focus on Neurotechnology, Berlin, DE

Dr. Alessandro Curioni

IBM Fellow, Vice President Europe and Director at IBM Research, Zurich, CH

Dr. Prem Natarajan

Director of the Information Sciences Institute, affiliated with the Viterbi School of the University of Southern California, USA

Prof. Anil K. Jain

Distinguished Professor, Department of Computer Science & Engineering, Michigan State University, USA

Prof. Bernt Schiele

Director, MPI Informatics, Max Planck Institute; Professor at Saarland University, Saarbrücken, DE

Prof. Johanna Moore

Head of the School of Informatics, University of Edinburgh; Director of the Human Communication Research Centre, UK

Prof. Neil Lawrence

DeepMind Professor of Machine Learning at the University of Cambridge, UK

Employees

First name, last name, position, country of origin, year of arrival

Scientists

Bozorgmehr Aminian, research assistant, Switzerland, 2018

Niccolò Antonello, postdoc, Italy, 2019

Deepak Baby, postdoc, India, 2019

Léonard Barras, trainee, Switzerland, 2019

Chantal Basurto Davila, visitor, Australia, 2019

Melika Behjati, trainee, Iran, 2019

Sushil K Bhattacharjee, research associate, Switzerland, 2015

Roberto Boghetti, trainee, Italy, 2019

Hervé Bourlard, director, Belgium/Switzerland, 1997

Poompol Buathong, trainee, Thailand, 2019

Sylvain Calinon, researcher, Switzerland, 2014

Yuanzhougan Cao, postdoc, China, 2017

Daniel Carron, AI Master's student, Switzerland, 2019

Sapana Chaudhary, trainee, India, 2019

Tatjana Chavdarova, research assistant, Macedonia, 2014

Evann Courdier, research assistant, France, 2019

Yannick Dayer, AI Master's student, Switzerland, 2019

Tiago de Freitas Pereira, research assistant, Spain, 2014

Nicolas Desprès, research assistant, France, 2019

Subhadeep Dey, research assistant, India, 2014

Anthony Di Blasi, trainee, Switzerland, 2019

Pavankumar Dubagunta, research assistant, India, 2017

Marco Ewerton, postdoc, Germany, 2019

François Fleuret, senior researcher, France/Switzerland, 2007

Lea Friedli, visitor, Switzerland, 2019

Julian Fritsch, research assistant, Germany, 2018

Xiao Gao, research intern, China, 2019

Philip Garner, senior researcher, UK, 2007

Daniel Gatica-Perez, senior researcher, EPFL Adjunct Professor, Mexico, 2002

Athénaïs Gautier, research assistant, France, 2018

David Geissbuhler, research associate, Switzerland, 2019

Anjith George, postdoc, India, 2017

David Ginsbourger, senior researcher, France, 2017

Hakan Girgin, research assistant, Turkey, 2018

Alejandro Gomez Alanis, trainee, Spain, 2019

Mahdi Hajibabaei, Research Assistant, Iran, 2019

Michael Halstead, postdoc, Australia, 2018

Weipeng He, research assistant, China, 2016

James Henderson, senior researcher, USA/Switzerland, 2017

Enno Hermann, research assistant, Germany, 2019

Guillaume Heusch, research associate, Switzerland, 2015

David Imseng, research associate, Switzerland, 2017

Parvaneh Janbakhshi, research assistant, India, 2018

Christian Jaques, research assistant, Switzerland, 2016

Noémie Jaquier, research assistant, Switzerland, 2016

Loïc Jeanningros, trainee, France, 2019

Selen Hande Kabil, research assistant, Turkey, 2017

Jérôme Kämpf, senior researcher, Switzerland, 2018

Rabeeh Karimi Mahabadi, research assistant, Iran, 2018

Angelos Katharopoulos, research assistant, Greece, 2017

Banriskhem Kayang Khonglah, postdoc, India, 2018

Ina Kodrasi, postdoc, Albania, 2017

Pavel Korshubov, research associate, Estonia, 2015

Ketan Kotwal, postdoc, India, 2018

Vedrana Krivokuca, postdoc, New Zealand/Croatia, 2017

Thibaut Kulak, research assistant, France, 2017

Florian Labhart, research associate, Switzerland, 2017

Tim Laibacher, trainee, Germany, 2019

Do Hoang Nam Le, research assistant, Vietnam, 2015

Taguh Lembono, research assistant, Indonesia, 2018

Michael Liebling, senior researcher, Switzerland, 2015

Jaroslaw Lokietko, research intern, Poland, 2019

Raphaëlle Luisier, researcher, Switzerland, 2019

Eliane Maalouf, visitor, Lebanon, 2019

Jérémy Maceiras, AI Master's student, Switzerland, 2019

Srikanth Madikeri, research associate, India, 2013

Mathew Magimai Doss, senior researcher, India, 2007

Florian Mai, research assistant, Germany, 2018

Sébastien Marcel, senior researcher, France/Switzerland, 2000

François Marelli, research assistant, Belgium, 2018

Andreas Marfurt, research assistant, Switzerland, 2018

Olivia Mariani, research assistant, Switzerland, 2016

Angel Martinez-Gonzalez, research assistant, Mexico, 2016

Benoit Massé, postdoc, France, 2019

Kyle Matoba, trainee, USA, 2019

Iakmal Meegahapola, research assistant, Sri Lanka, 2019

Viviana Mendoza, visitor, Cuba, 2019

Lesly Miculicich, research assistant, Peru, 2016

Amir Mohammadi, research assistant, Iran, 2016

Alireza Mohammadshahi, research assistant, Iran, 2019

Zohreh Mostaani, trainee, Iran, 2019

Petr Motlicek, senior researcher, Czech Republic, 2005

Hanna Muckenhirn, research assistant, Germany, 2015

Skanda Muralidhar, postdoc, India, 2014

Huy Nguyen, research intern, Vietnam, 2019

Laurent Nguyen, postdoc, Switzerland, 2011

Olegs Nikisins, postdoc, Lithuania, 2016

Peguy Njoyim Tchoubith, trainee, Switzerland, 2019

Jean-Marc Odobez, senior researcher, Switzerland/France, 2001

Giulia Orrù, trainee, Italy, 2019

Matteo Pagliardini, trainee, France, 2019

Antonio Paolillo, postdoc, Italy, 2018

Nicolaos Pappas, postdoc, Greece, 2016

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Shantipriya Parida, postdoc, India, 2019

Kumar Patel, trainee, India, 2019

Rui Pereira De Oliveira, trainee, Portugal, 2019

Thanh Trung Phan, research assistant, Vietnam, 2014

Emmanuel Pignat, research assistant, Switzerland, 2015

Kin Ho Poon, trainee, UK, 2019

Ada Laura Pozo Perez, visitor, Spain, 2019

Amrutha Prasad, AI Master's student, India, 2019

Ravi Shankar Prasad, postdoc, India, 2018

André Rabello Dos Anjos, researcher, Brazil/Switzerland, 2010

Dhananjay Ram, postdoc, India, 2014

Navid Rekabsaz, postdoc, Iran, 2018

Hardik Sailor, postdoc, India, 2019

Santiago Saint-Supery, trainee, France, 2019

Sina Sajadmanesh, research assistant, Iran, 2019

Seyyed Saeed Sarfjoo, postdoc, Iran, 2018

Bastian Schnell, research assistant, Germany, 2017

Adrian Shajkofci, research assistant, Switzerland, 2016

Shivam Sharma, trainee, India, 2019

Suhan Shetty, research assistant, India, 2019

Rémy Siegfried, research assistant, Switzerland, 2017

João Silverio, postdoc, Portugal, 2019

Prabhu Teja Sivaprasad, research assistant, India, 2018

Suraj Srinivas, research assistant, India, 2017

Sibo Tong, research assistant, China, 2016

Sandrine Tornay, research assistant, Switzerland, 2016

Cédric Travelletti, research assistant, Switzerland, 2018

Martin Troussard, research assistant, France, 2019

Clément Vaes, visitor, Belgium, 2019

Colombine Verzat, AI Master's student, France, 2019

Michael Villamizar, postdoc, Spain, 2016

Esaú Villatoro Tello, sabbatical academic visitor, Mexico, 2019

Radovan Vitek, trainee, Czech Republic, 2019

Jules Voisin, student, France, 2019

Apoorv Vyas, research assistant, India, 2018

Lei Wang, trainee, China, 2019

Patric WYSS, visitor, Switzerland, 2019

Jenny Paola Yela Bello, Master's student, Colombia, 2019

Yu Yu, research assistant, China, 2015

Qingran Zhan, research assistant, China, 2018

Research & development engineers

Philip Abbet, senior R&D engineer, Switzerland, 2006

Olivier Bornet, head of R&D team, Switzerland, 2004

Olivier Canévet, R&D engineer, France, 2012

Guillaume Clivaz, R&D engineer, Switzerland, 2017

William Droz, R&D engineer, Switzerland, 2018

Samuel Gaist, R&D engineer, Switzerland, 2013

Théophile Gentilhomme, R&D engineer, France, 2018

Mélanie Huck, R&D engineer, Switzerland, 2017

Salim Kayal, senior R&D engineer, Switzerland, 2011

Christine Marcel, R&D engineer, France/Switzerland, 2007

Alexandre Nanchen, senior R&D engineer, Switzerland, 2008

Danick Panchard, R&D engineer, Switzerland, 2019

Vincent Pollet, R&D engineer, France, 2019

Flavio Tarsetti, senior R&D engineer, Switzerland, 2008

Administrative staff

Elisa Bovio, program manager, Switzerland, 2015

Laura Coppey, secretary, Switzerland, 2019

Justine Darioly, junior program manager, Switzerland, 2018

Joël Dumoulin, technology transfer officer, Switzerland, 2018

Martina Fellay, program manager, Austria/Switzerland, 2012

Nicolas Filippov, communications, marketing & public relations, Switzerland/Poland, 2018

François Foglia, deputy director, Switzerland, 2006

Edward-Lee Gregg, financial director, USA, 2004

Barbara Huguenin-Landl, program manager, Austria, 2018

Marie-Constance Kaifflin Landelle, legal adviser, Switzerland, 2017

Sylvie Meier, secretary, Switzerland, 2019

Aurélie Rosemberg, visitor, Switzerland, 2019

Christophe Rossa, financial manager, Switzerland, 2019

Nadine Rousseau, admin. assistant, Belgium/Switzerland, 1998

System engineers

Samuel Aymon, system engineer, Switzerland, 2019

Bastien Crettol, system administrator, Switzerland, 2005

Cédric Dufour, system engineer, Switzerland, 2007

Frank Formaz, system manager, Switzerland, 1998

Louis-Marie Plumel, senior system administrator, France, 2011

Vincent Spano, webmaster, Switzerland, 2004

Laurent Thomas, senior system administrator, Switzerland, 2017

Thank you to all our employees for their support and all the best to those who have left our institute to pursue their professional paths elsewhere.

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finances

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Balance sheet (CHF)

ASSETS	31.12.2019	31.12.2018
Cash	7 511 323.42	6 177 495.28
Accounts receivable	104 425.05	277 533.00
Accrued income and other	638 216.31	1 109 667.08
TOTAL CURRENT ASSETS	**8 253 964.78**	**7 564 695.36**
Equipment	558 228.55	542 966.99
Other assets	1 142 246.10	536 590.85
Patents and licenses	6.00	536 590.85
Financial assets	10 000.00	6.00
TOTAL NON-CURRENT ASSETS	**1 710 480.65**	**1 089 557.84**
TOTAL ASSETS	**9 964 445.43**	**8 654 253.20**

LIABILITIES	31.12.2019	31.12.2018
Accounts payable	311 534.59	280 745.51
Accrued expenses	4 988 883.91	3 908 573.83
Provisions	1 268 538.40	1 158 288.44
TOTAL FOREIGN FUNDS	**6 568 956.90**	**5 347 607.78**
Share capital	40 000.00	40 000.00
Research funds reserve	1 400 000.00	1 400 000.00
Special reserve	1 600 000.00	1 600 000.00
Retained earnings	266 645.42	226 392.37
Net income	88 843.11	40 253.05
TOTAL OWN FUNDS	**3 395 488.53**	**3 306 645.42**
TOTAL LIABILITIES	**9 964 445.43**	**8 654 253.20**

Profit and loss statement (CHF)

INCOME	2019	%	2018	%
Swiss Confederation Art. 15	2 420 100	19.7	2 334 100	19.50
Canton of Valais	2 000 000	16.3	2 000 000	16.70
City of Martigny	700 000	5.7	700 000	5.80
Capital and donations	161 951	1.3	207 000	1.70
Competitive funding	**5 282 051**	**43.1**	**5 241 100**	**43.70**
Swiss National Science Foundation	2 431 685	19.8	1 851 130	15.50
EU	1 103 182	9.0	2 036 927	17.00
CTI/Innosuise	736 080	6.0	956 368	8.00
Others	2 398 913	19.6	1 632 606	13.60
Third-party contributions (non-competitive)	**6 669 860**	**54.4**	**6 477 031**	**54.10**
Interest	10 453	0.1	7 074	0.10
Subletting	163 225	1.3	170 150	1.40
Other incomes	124 197	1.0	95 413	0.80
Profit/exchange loss	10 506	0.1	-10 006	-0.10
Divers incomes	**308 381**	**2.5**	**262 631**	**2.20**
TOTAL INCOME	**12 260 292**	**100.0**	**11 980 762**	**100.00**

CHARGES	2019	%	2018	%
Personnel (including social deductions)	10 000 132	82.2	9 300 657	77.90
Operational costs	2 061 067	16.9	2 013 052	16.90
Provisions	110 250	0.9	626 800	5.20
Expenditure	**12 171 449**	**100.0**	**11 940 509**	**100.00**
TOTAL EXPENDITURES	**12 171 449**	**100.0**	**11 940 509**	**100.00**
OPERATING PROFIT/LOSS	88 843		40 253	

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Accounting analysis 2019

diap's stable growth is confirmed in the balance sheet for its 2019 financial year. The 12 million income mark has been crossed and profits have risen to just over CHF 88,000. The balance between different sources of funding for the Institute, as well as its sources of income, contributes to this stability and should promise a similar year for 2020.

Federal, cantonal, and municipal subsidies

(In thousands of Swiss francs)

YEAR	2016	2017	2018	2019
Confederation	2 424	2 418	2 334	2 420
Canton	1 720	2 000	2 000	2 000
Municipality	700	700	700	700

Distribution of funding sources

- Swiss Confederation
- Canton of Valais
- City of Martigny
- Capital and donations
- Swiss National Science Foundation
- EU
- CTI/Innosuisse
- Others (The Ark, Hasler, industrials, biometrics lab, Valais Ambition)
- Other incomes
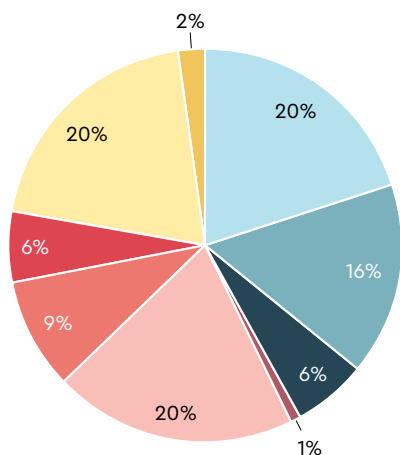
Distribution of costs

- Personnel expenses
- Operating expenses
- Provisions
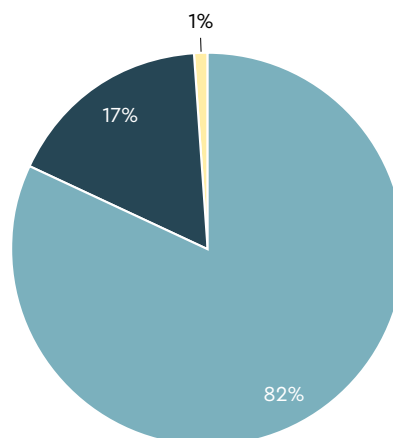
research

22—27

Police forces plan to use artificial intelligence to speed up their investigations

Coordinated by the Idiap Research Institute, the European project Roxanne brings together a range of national and international police forces, including INTERPOL, along with scientists, large industrials, and private companies. Its aim is to create a computer program able to help investigators link divers evidence and uncover the activities of criminal networks.

Sometimes, even with a cell phone bugged, nicknames and encrypted apps mean that police offices can't identify all the members of the criminal network they are investigating. Investigators' experience and "flair" can help to uncover the link between various clues that appear to be unrelated to one another. But in a globalized and hyper-connected world, the amount of data that needs to be considered is growing too fast. Criminal networks are also cross-border in nature, making it difficult for police forces to do their job without their foreign colleagues' help. Given the variation between evidence gathered by different individuals and agencies, creating a computer program that can "read and understand" all the data is a real challenge.

Funded by the H2020 European Commission program in the framework of the "technologies to enhance the fight against crime and terrorism" call, the Roxanne project's goal is to boost collaboration between actors at the European level in order to produce a useful tool for police services. The consortium includes 24 international partners and the project is planned to last three years.

Cold cases and sensitive data
In order to create a form of artificial policing "flair", scientists must teach a computer to identify the meaningful links between the data sources (audio, video, and text) collected by investigators. To do so, they use machine learning approaches. One of the main challenges is to test this flair. Due to the sensitive nature of criminal cases, as well as to the fact that classified information may be involved, researchers working on Roxanne need to think in novel ways. For example, they can create fictitious cases or use cold cases provided by police investigators, while respecting strict ethical

and legal requirements. Another option is to install a test version of the program on police premises so officers can run it themselves and provide feedback on its efficiency and eventual bugs.

Connecting the various data gathered during an investigation is another challenge. The aim here is to combine the strengths of speech and language technologies, visual analysis, and network analysis. The meta-analysis of these elements can provide more accurate information about a suspect, such as gender, age, or origin. Even though such computer programs already exist, they are not adapted to the specific needs of criminal investigation. And they often lack transparency with regard to how they work, which doesn't allow end-users to properly evaluate the results the computer provides.

A tool to speed up investigations
The analysis of data related to an investigation is often tedious and expensive, involving several human investigators. Bringing the power of computing to bear on investigations would not only lead to financial savings, it would also save time, speeding up investigations and—in the process—preventing further, related crimes being committed, helping victims obtain closure. As a criminal investigation might lead to a prosecution and a trial, there are also ethical and legal questions to consider. And the tools developed will therefore be used predominantly by police forces during investigations' analysis phase. The decision-making process will remain in human hands. And while not covered specifically in Roxanne, the extraction of evidence to be used in court will be a next step.

www.roxanne-euproject.org

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A new research group to explore the potential of machine learning for genomics

Artificial intelligence technologies could further unlock genetics' potential to improve human health. Raphaëlle Luisier has launched a new research group with that very aim in mind.

G enetic processes dictate both healthy and disease-associated cell behavior. By analyzing how the more or less 20,000 known human genes function in the context of various conditions, researchers have the opportunity to identify the indicators of a specific disease or the effects of a drug. To do so, scientists must analyze very large amounts of data—thousands of genes across many conditions. This is where artificial intelligence tools, such as machine learning or statistics, can provide significant help. Arriving at Idiap from the Francis Crick Institute, an institution dedicated to understanding the biology underlying health and disease, Raphaëlle Luisier launched a new research group at Idiap to deepen the link between health and genomics by using informatics and math. We met up, looking to learn more.

Are you a biologist or a computer engineer, and what led you to this field?

I'm a computational biologist. During my undergraduate studies in Bioengineering at EPFL, I quickly developed a strong interest in math as a tool for tackling biological problems. Since then I've been developing computational models and statistical methods for interpreting complex data sets to address various biological questions related to human disorders. During my Master's project at the Queensland University of Technology in Australia, I developed mathematical models from imaging data to study how different cellular behavior can lead to specific tissue morphology. I then shifted my research focus during my PhD, in Basel, to study the internal cell processes underlying changes in cell behavior; in that project I developed statistical models to interpret the behavior of human genes at the early stage of liver cancer. Finally, in London, at the Francis Crick Institute, I further studied the complex gene regulation in developing neural cells from patients suffering neurodegenerative disorders, using RNA sequencing analysis (editor's note: RNA, for ribonucleic acid, plays an important role in coding and decoding genes). I was really lucky to collaborate with a renowned neuroscientist, Rickie Patani, who shared with me his very rich data, and with Andrea Serio a specialist in neural tissue engineering.

"The Idiap female fellowship program was a great opportunity, not only to come back to Switzerland, but also to further my career by creating a brand new research group"

What kind of application could result from such research?

I always keep patients' needs as the goal of my research, even if it's in the long term. For example, by analyzing cell cultures at regular intervals you can observe emerging properties linked with internal cell
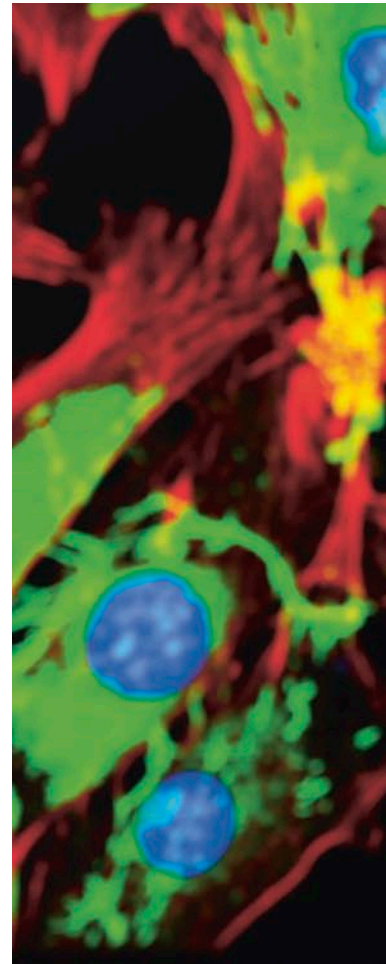
Raphaëlle Luisier, head of the Genomics & Health Informatics group.

processes and identify the timing of disease development. Thanks to this, you can develop better tools for an early diagnosis or you can observe the effects of a drug at various stages of a disease. This approach can reveal early biomarkers related to diseases, which can help to identify relevant drugs for a specific treatment, especially for neurodegenerative diseases for which no treatment exists. Indeed, my collaboration with Rickie Patani at the Francis Crick Institute led to the breakthrough discovery of the earliest detectable molecular activity associated with amyotrophic lateral sclerosis (ALS), a rapidly progressive and fatal neurodegenerative disorder. This particular degenerative process is typical of processes that can be tackled by drug development. Beyond this fundamental research aspect, data mining can also be applied to other fields related to health, and can provide patients with useful insights to feed into their health-management strategies.

In which direction do you plan to continue your research at Idiap?

The Idiap female fellowship program was a great opportunity, not only to come back to Switzerland, but also to further my career by creating a brand new research group. Until now, I've been using cell population-level based imaging or genomic data. But fundamental biological processes including disease development occur at the single-cell level. The so-called time-lapse fluorescence live-cell imaging technique generates rich data that can be used to detect and track individual cell's changes, such as size, morphology, and movement in space and time. Combining cell imaging with genomic data through collaboration with the Patani and Serio laboratories will allow us to study how molecular biology shapes cellular morphology at an early stage of amyotrophic lateral sclerosis disease. As Idiap has a strong track record in image processing and machine learning, the Institute is a great place for me. The dedicated developers team and multidisciplinary groups are also an important asset. The mindset I found at Idiap was exactly the kind of spirit I was looking for: challenging, open-minded, and collaborative. I look forward to bringing new skills in genomics and data visualization to Idiap, in order to create new and unexpected collaborations.

When a robot learns how to make a traditional Swiss raclette, thanks to AI

It took the know-how of the "Cheese Master" Eddy Baillifard, founder of Raclett'House, and the expertise of the Robot Learning & Interaction group of the Idiap Research Institute to bring about the first raclette made by a robot. Beyond the technical challenge, the project shows the potential of learning-from-demonstration techniques and the possibilities of better human–robot collaboration.

The Cheese Master's hand is quick and smooth: he applies precisely controlled pressure on the melting cheese surface to have it land on the plate. Et voilà, the famous Swiss raclette! The gesture seems easy, but the know-how behind it is crucial. Every raclette enthusiast can testify how hard it is to master this apparently simple skill. "Depending on the type of raclette cheese, the surface can vary in terms of softness and can be more, or less, fluid," says Eddy Baillifard, Cheese Master and ambassador for raclette cheese. Having a robot mimic this skill isn't easy. To rise to this challenge, Emmanuel Pignat, a PhD candidate from Idiap's robotics group, used a novel approach: Eddy guided the robot's arm so it could record the movements and various forces needed to perform the task. This learning technique allows us to transfer skills from the human to the robot in an intuitive manner. And the range of applications is wide, including industrial, service, and assistive robots. It relieves professionals of their most repetitive, dangerous, or uncomfortable duties, allowing them to spend more time using their human skills, such as supervision, evaluation, or decisionmaking.

A smart raclette

If learning from demonstration—the scientific term for copying a gesture—seems an obvious task to us humans, the challenge is much harder for robots. They are usually programmed for a specific task, which is repeated accurately in a loop. "Thanks to artificial intelligence algorithms, the robotic arm can generate movements that can adapt to new situations. In this specific case, the cheese can be in slightly different positions and orientations, and there can be more or less cheese

left in the oven," says Sylvain Calinon, head of Idiap's Robot Learning & Interaction group. "This ability to adapt is the key to allowing efficient human–robot collaboration. The Cheese Master shows slightly different ways to scrape the raclette cheese onto the plate. The underlying learning algorithms allow the robot to integrate these nuances, and so to recreate a meaningful gesture in a new situation."

When tradition meets innovation

This collaboration between the Cheese Master and the researchers was made possible by the whole Canton of Valais. The local authorities brought their financial support to bear on this scientific research. The company TTM created a special oven that includes a handle that the robot can use to hold the cheese. Nicolas Fontaine, a young local entrepreneur, facilitated contact between TTM and Raclett'House, and Valais/Wallis Promotion, which made a short movie about the project. "When Nicolas Fontaine asked us for help, we immediately decided to get involved," says Alessandro Marcolin, Marketing Director of Valais/Wallis Promotion. "This project highlights our strong belief about Valais: it's a unique territory mixing tradition and innovation. And in Valais, we have the best people and the best skills in both these domains, as illustrated by our short film," says Marcolin.

Eddy Baillifard teaching a robot the right movements.

A year to reinforce ties between Idiap and Mexico

Full-time professor in Mexico, Esau Villatoro is on sabbatical at Idiap. He aims to develop a project in the field of natural language understanding, with various researchers from the Idiap Research Institute.

W elcoming a visitor from abroad is not only a chance to strengthen our network, it's also a unique opportunity to gain new insights into some of our specific research fields, and into some of the particularities of our Institute. We spoke to Esaú Villatoro after his first month at Idiap.

What is your background and why did you decided to collaborate with the Idiap Research Institute?

I met Petr Motlicek from the Speech & Audio Processing Group during a conference, but we never got the chance to work together. In Mexico scientists are allowed to take extended leave every six years, so I had never done this. My sabbatical was the perfect opportunity to submit and start a project together. My research interests lie in the identification of psychological cues in language that can predict a mental disorder. I am a full professor, member of the Language and Reasoning research group at the Universidad Autónoma Metropolitana in Mexico City, and an external member of the Laboratory of Language Technologies (LabTL) of the National Institute of Astrophysics, Optics and Electronics, located in Puebla. But here at Idiap, not only is the Speech Processing group really big, there's research going on in a great variety of fields that are of potential interest for our project.

What kind of collaborations are you expecting here?

The use of a multimodal methodology—incorporating, for example, methods such as statistics, semantics, and speech rate—allows one to create a link between the natural language understanding field and behavioral approaches. For example, based on a written text you can detect the gender of a person or if that person suffers from depression. With this approach, you can imagine incorporating text analysis into the analysis of images and videos. The challenge is to be able to detect topics

Esaú Villatoro, from the Universidad Autónoma Metropolitana in Mexico City.

and to categorize them in a meaningful way. We're using linguistic models and working with Swiss companies active in these technologies to develop and tune our own model. In addition to these networking opportunities, I hope to be able to maintain certain collaborations even after the project has come to a close, but it's difficult to set up projects between Europe and Mexico.

Setting the scientific complementarities aside, what cultural and work differences have you observed at Idiap compared to how things work in Mexico?

Right away I noticed some unusual things, such as the process for submitting papers to big conferences. It's a synchronized task that involves everybody in a group, from students to senior scientists. That's quite unusual for me and I find it very interesting. The number of applied projects run in collaboration with private companies is also new for me. It offers a lot of financing opportunities, but also seems to come at a price and to put more pressure on postdocs. On a more personal note, I'm enjoying meeting so many people with diverse cultural backgrounds and am finding it amusing to see how food can be a big deal. Fortunately, I love cheese.

commitment

28—32

"At my company, I specialize in artificial intelligence"

Artificial intelligence is going back to school: On Monday, February 4, 2019, 13 students—having successfully passed the selection process—started their new applied Master's degree course, each integrated into a host company. In their new role of employee–student, they will enable their employers to acquire cutting-edge skills, thanks to Idiap.

"We use 5–10% of all the data we produce. That's not enough. To improve our industrial processes, we need artificial intelligence engineers," says Pascal Bugnon, AI manufacturing manager at Syngenta. With that need firmly in mind, the company, in collaboration with Idiap, chose a student who had joined the Institute's applied Master's in Artificial Intelligence program. This means that the company will be able to acquire the most advanced skills in this field.

"It's better and faster and most importantly it allows us to internalize our needs regarding artificial intelligence thanks to this integrated concept"

Jean-Luc Affaticati, CEO of DigitArena

"If you don't want to fall behind, you have to be able to be a visionary," explains Hervé Bourlard, director of the Idiap Research Institute and head of the Master's program. "It's as much a challenge as it is an opportunity, for students learning on the job, the companies hiring the person who will become their artificial intelligence specialist, and for the entire collaboration between Idiap and the Swiss Distance University, both for researchers and teachers."

From start-ups to multinationals, that challenge is motivating many companies. For the first intake of students, no fewer than eight companies have partnered Idiap in the Master's program. Several others have pushed their participation out until the next intake, having not

identified a student that fully fits their requirements. Only the very best candidates get to follow this applied Master's. The students come from Switzerland, France, or even the US. Each will occupy a high value-added position at the heart of their host company's strategy, while being directly employed by the company at which they are training. A unique opportunity.

Education and the economy: Valais is doing great

Why would a company partner a Master's degree in artificial intelligence? "It's better and faster, and most importantly it allows us to internalize our needs regarding artificial intelligence thanks to this integrated concept," says Jean-Luc Affaticati, CEO of DigitArena. "We knew the value of Idiap's know-how, so we didn't even hesitate," he adds. This new model of academic training inspired by the Swiss apprenticeship system was born in Valais, not only thanks to the presence of Idiap, but also thanks to the support of UniDistance, the only Swiss university to deliver all its diploma courses online, and to the support provided by the State of Valais, which saw the potential of the program for the canton's industrial base.

The concept appealed to student–employee Neil Clarke. With an American Bachelor's degree in Computer Science, he wanted to specialize further with a Master's. Despite considering various options, including in the US, the Idiap Artificial Intelligence Master's was the option that most closely met his needs, and—happily—those of his host company: "At my company, I specialize in artificial intelligence."

www.master-ai.ch

Idiap becomes first non-US site of the Center for Identification Technology Research (CITeR)

The CITeR—a US National Science Foundation initiative—invites industry players to join forces in a cooperative effort to support and drive high-quality research in biometrics. In return, they enjoy privileged access to the technologies developed by the Center. Idiap hosts the first site outside the US.

In today's fast changing industrial environment, the design and development of new technologies is crucial. Companies must keep pace with the continuous evolution and development of technology and customer preference variability. To this end, companies have to invest in research and development activities. Unfortunately, these activities mostly do not yield immediate profit or improvement, and they involve higher uncertainty than companies' other activities. This is even worse for industrial fields driven by cutting-edge technology, such as biometrics business. The Center for Identification Technology Research (CITeR) initiative of the American National Science Foundation aims to overcome these issues. And has succeeded bringing together companies and organizations such as Qualcomm, Infineon, Integrated Biometrics, Precise Biometrics, the FBI, and Defense Research and Development Canada.

A Swiss site for a US initiative

Already involved with various US labs, the Swiss Center for Biometrics Research and Testing decided to strengthen its relationship with CITeR by hosting the first non-US site of the initiative. Within the Idiap Research Institute, its biometrics center offers biometrics and security companies the means to build strong ties with talented researchers and engineers in the field and to make recommendations and influence the course of research projects by becoming an affiliate. The process is quite simple—companies wishing to become an affiliate only have to pay an annual administrative fee and sign a standard agreement.

Affiliates have the right to delegate representatives to the Affiliate Advisory Board. This board meets on an annual basis and makes recommendations regarding the research projects to be carried out within CITeR and regarding the allocation of resources to research proposals. Additionally, the affiliates can obtain a worldwide, royalty-free, non-exclusive, perpetual license to the results obtained within the projects funded by CITeR. Last but not least, affiliates have the right to review requests to publish papers and presentations containing results in case publication would reveal patentable results or requires additional protection for confidentiality reasons.

Already two affiliates

The Swiss site is already creating interest from major players located in Europe. The two first affiliates are SICPA and Idemia. The first is a Swiss company and is among the leaders in the provision of secured identification, traceability, and authentication solutions. The second is a French multinational specializing in security and identity solutions. Several other companies are currently in discussions with the Swiss Center for Biometrics.
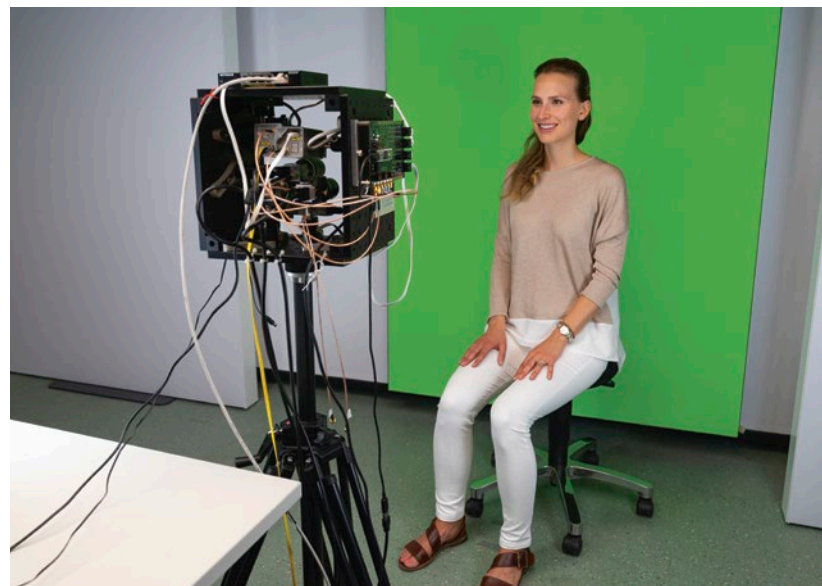
How to transfer a futuristic technology to a working application

Idiap held its traditional Innovation Day on August 28, 2019. Its researchers presented how cutting-edge technologies such as artificial intelligence, biometrics, or robotics can be transferred to the business world.

To speak to a computer and to get an answer seems quite everyday, even if it was science fiction only a few years ago. Today, any average smartphone can handle this challenge. To achieve this result, it was necessary to adapt technologies to business needs, as these technologies were developed in labs, which have different economic constraints to those imposed on business. Despite its relatively discrete profile, Idiap has become a master of technology transfer. Start-up creation, made-to-measure development, joint patents, and even the training of companies' future internal experts—just some of the tools that Idiap uses to share its knowledge.

Custom-made answers for specific needs

The projects presented during the Innovation Day perfectly illustrate the variety of tools available when it comes to technology transfer. For example, the

EPFL start-up Global ID came to Idiap looking for the Institute's expertise in biometrics in order to validate its identification system based on the vein pattern of the hand. Zurich's University of Applied Sciences in Special Needs Education (Hochschule für Heilpädagogik) is collaborating with the Institute to create a learning device for sign language based on the visual recognition of movements. The device uses a video game sensor and the accuracy of each of the user's movements. Each collaboration, then, is unique.

It's in the Institute's DNA

This tradition of dialogue with the entrepreneurial world is deeply rooted in Idiap's history. The Italian manufacturer Angello Dalle Molle created the Institute around 30 years ago. Following the same tradition, Idiap is also innovating, by creating new tech transfer tools. To address the growing need for experts in artificial intelligence, in collaboration with the Canton of Valais and the Swiss Distance University the Institute created a unique training approach. This program allows companies to develop a specific project and to simultaneously train one or more employees. The program's success was immediate, and a second group of students will begin their training early in 2020.

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faces

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Christophe Rossa,
new Financial Manager.

How to manage the finances of an AI research institute

Idiap's new Financial Manager, Christophe Rossa, explains the challenges and specificities of the Institute's finances. Discover how his 10 years' experience managing a casino's finances is an asset for Idiap.

C hanging your work environment from slot machines and gaming tables to scientific research seems quite a challenge. For the Institute's new Financial Manager, however, it was a challenge with a certain appeal. We met up a few weeks into his new role to learn more about his work at Idiap.

What is specific to financial management in a research institute like ours?

We have the opportunity to be involved in a lot of scientific projects. Each of them is like a small business, with its own budget and financial rules. As they are independent of each other, these projects' budgets can't be used as a single, undifferentiated resource for the Institute. This means that I not only have to manage Idiap as a whole, but also as a group of about 60 independent projects per year, keeping financial track of each of them. From national to international projects, the main challenge is to be aware of what is going on in the Institute and in the projects. The aim is to ensure that all the various deadlines are respected. You have to be very careful in such a role, especially as researchers depend on my work.

Why did you decide to join us from the private sector and what was your impression of Idiap prior to joining us?

After working in my father's company and then in a French casino group, I was looking for a new challenge. The professional environment here is not only new for me, it's also very stimulating. I am proud to be part of a high-tech institute where teams are eager to move forward. I like the working atmosphere here. It feels like a big company with a very multicultural environment, but on a smaller and more human scale.

I am from Martigny myself and I lived not far from Idiap's Villa Tissières (editor's note: Idiap's first location in Martigny, and until 2007). The Institute always had a new, exciting aura in our town, looking particularly active and interesting from the outside.

What are the main challenges for the future from a financial management point of view?

The Institute's rate of growth implies that we will have more and more projects to manage. To be able to maintain the quality of our financial management, for example for quarterly reports, I will have to establish new processes. The aim will be to optimize our resources and be more efficient, while still being able to respond to our own needs as an institution.

"Working with scientists and coaching basketball players aren't that different"

Ed Gregg, stepping down as CFO, has been an actor in and a witness to Idiap's evolution over the last 15 years. Beyond his managerial role, known for his rigor, he knew how to discreetly bring his personal touch to the institute.

T he tall figure of the former basketball player conceals a man as modest as he is rigorous. Before handing over the reins of the Institute's finances, Ed agreed to share his Idiap story and some observations on his role.

How does an American professional basketball player become CFO of a research institute in the Swiss Alps?

You have to learn continually. As a player, then professional coach, I visited 22 countries and lived in six of them. In 2003, I was looking for another job and more stability and my American degree wasn't recognized in Switzerland. It was Pierre Dal Pont, CFO at the

"Be aware of how lucky you are to work at the institute, and have fun in your professional activities"

Ed Gregg, departing CFO

time, who gave me my chance at Idiap. With the FP6 European projects, they needed the help of an English speaker, able to handle numbers with ease. From two mornings a week, I gradually increased my activity rate to half-time, so I was still able to continue as a sports coach. At the time, the Institute had only 50 employees. compared to 129 today. No one would

have been able to predict this growth, or our present status as a globally respected research center in artificial intelligence. After the retirement of Pierre Dal Pont, then the departure of the person who succeeded him, François Foglia pushed me to run for the job. I hadn't even thought about it. It was such a challenge. And I was right... I sweated a lot the first year. Since we're financed by public funds, our management of Idiap needs to be all the more cautious and rigorous.

What have been the main challenges of the past 15 years?

When I took over the financial management of Idiap, the Institute was growing fast. For the immediate future, the challenge was to manage all the partners of the National Centre of Competence in Research IM2. Not all researchers speak the language of finance. Coordinating all the partners was not an easy task and I spent a lot

From left to right:
Herve Bourlard, director,
Ed Gregg, former CFO, and
Francois Foglia, deputy director.

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of time with the Swiss National Science Foundation in Bern to finalize the project's final report. This coordination exercise made me realize that researchers are not so different from professional basketball players: everyone has their own personality and their understanding of things. We must work with them, not against them. My coaching experience proved valuable. It also took a lot of patience to implement some new tools necessary for the growth of the Institute, such as the timesheets. And it was in this way that I realized how much freedom we have here: thanks to our in-house expertise—which brings with it great opportunities—we have developed our own customized financial software.

What vision, what wish do you have for Idiap?

The Institute should retain its independence and creativity. The spirit of Idiap is its strength and it's what allowed me to integrate in Switzerland, especially by building an extraordinary network. This is an opportunity I would never have had elsewhere. I thank Hervé, Jean-Albert, Pierre, Olivier, and François* for this wonderful teamwork and for their trust. Thanks to them and to all at Idiap, I have always enjoyed to coming to work. Just as I once did for my players, I would give the following advice to all my colleagues: be aware of how lucky you are to work at the Institute, and have fun in your professional activities.

* Herve Bourlard, director, Pierre Dal Pont, former CFO, Jean-Albert Ferrez, former deputy director, Olivier Dumas, Chairman of the Foundation Council, and Francois Foglia, deputy director.

A new blade for Idiap's Swiss army knife

The System & Infrastructure team is Idiap's "Swiss army knife". It works on optical cable installation, it manages computer hardware, it plans our energy supply… Samuel Aymon joined the team in 2019.

I diap is constantly welcoming new people. This implies planning and organizing new workflows. Getting to know our new colleagues is part of the process, especially when it comes to the crucial System & Infrastructure team. So we met with the team's new recruit, Samuel Aymon, for a short interview.

Why did you decide to join Idiap and what is your background?

I always loved computers, electronics, and science. But my main interest is IT networks. After my diploma at the School of Engineering in Sion, I stayed with the private company where I had completed my apprenticeship. I worked as an electrical engineer and took care of the programming of home automation. After a few years, it was time for a new challenge. Not only was this Idiap job opening a bit like a dream come true, I was very impressed, during the job interview, with the whole System & Infrastructure team. The team members were very open, and I felt that sparkle.

"My colleagues have really impressive knowledge to share"

Samuel Aymon, member the System & Infrastructure team

How is your integration into the team going?

Very well! The team has been very welcoming. I'm still discovering the scope of our activities and learning about Idiap's infrastructure. For example, we had to change a switch in the data center and, unexpectedly, it ended up taking a whole day to get it to function properly. It was a good learning opportunity. I like to keep my mind open to new skills. And my colleagues have really impressive knowledge to share. We usually sit around the table and discuss the problem we have, and find the best answer together, using all our skills. It's pretty unique.

Have you noticed any differences between everyday clients of IT service providers and our "Idiapers"?

Researchers are obviously much more aware of what they want and what they expect from us. And it is interesting to offer my services in an environment like this. And of course, even researchers' needs can differ, as we see when we compare, say, ensuring that our services are working properly for highly demanding computing requests with daily, more routine needs. But we also have small, but important, issues to fix, such as a computer improperly wired to the local network.

## 7.8 km of wires for a 10-times-faster connection

T o keep the pace with its research, our Institute needs a particularly fast Internet connection. In 2019, Idiap massively upgraded its network. Thanks to fiber optics and new wires the network's speed increased by a factor ten.

Data storage and calculation power are often considered as being the key numbers for a high-performance research center. But without adequate network infrastructure to support those numbers, scientific research can be significantly slowed. With this concern in mind, Idiap upgraded its internal network to allow high-speed connection between its computers and servers. During several months, the System & Infrastructure team worked to install 7.8 km of new wires in the building—3.8 km of fiber optics and 4 km of copper wires. The aim was to increase the 100 Mb/s connection speed by a factor of ten, to make a speed of 1 Gb/s available to each computer. A connection of this kind means that the equivalent of a DVD worth of data can be transferred in just a few seconds.

Distributed computing and hard work

Idiap's network is also configured to take advantage of the resources available in desktop computers. By using the so-called distributed computing method,
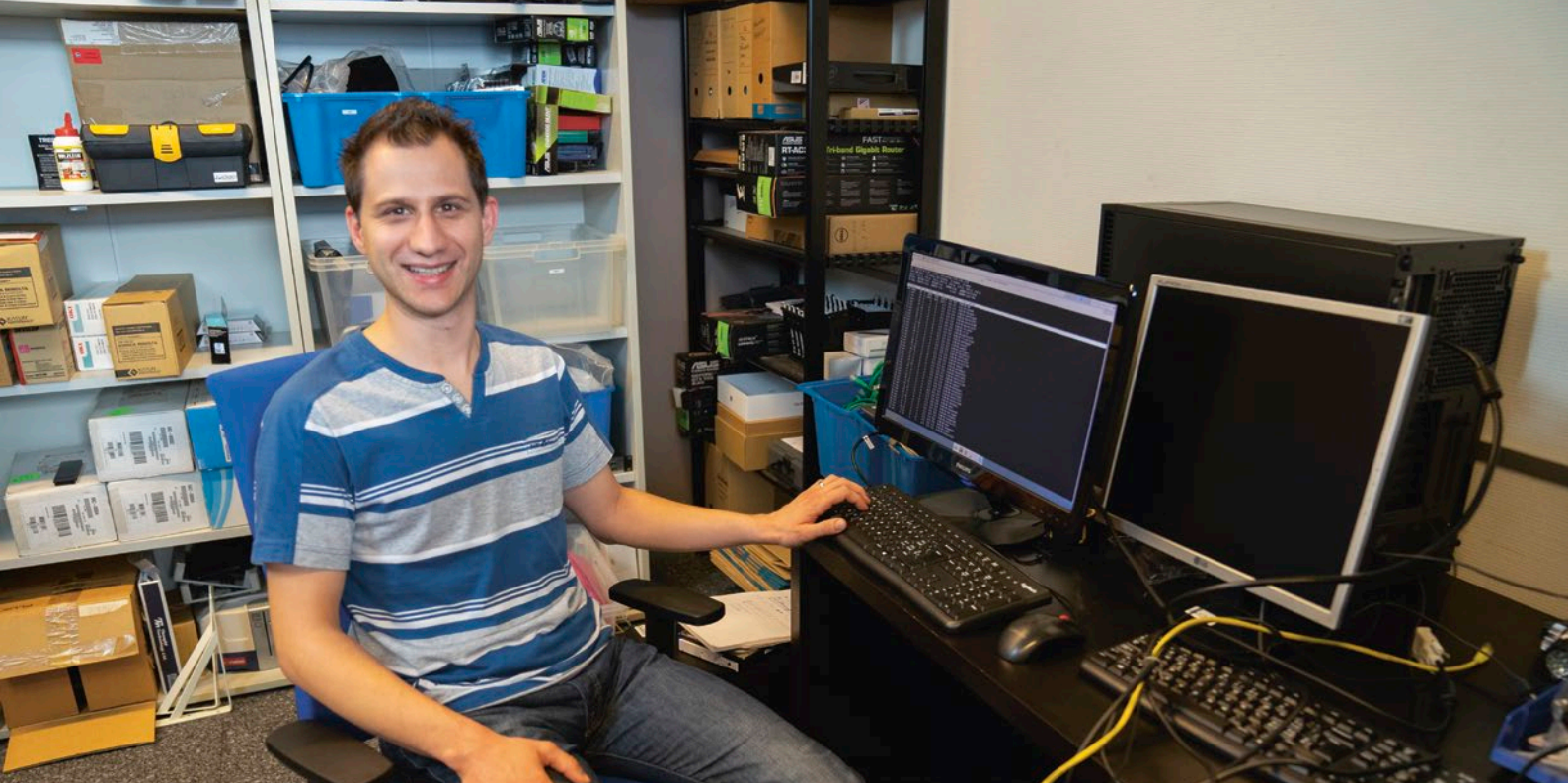
Samuel Aymon joined the System & Infrastructure team.

computing tasks needing a big amount of resources can be cut into smaller tasks and then dispatched to regular desktop computers rather than to a supercomputer. And thanks to the new, upgraded network speed, this process is even more efficient.

To upgrade the network, most of its active elements had to be replaced. Elements at the core of the network now have a switching capacity of 10 Tb/s (1 Tb/s previously), distribution per floor skyrocketed from 2 Gb/s to 80 Gb/s, and—finally—each user has a 1 Gb/s connection available. Wi-Fi access points were also upgraded. In total, 40 switches, 20 access points, and 1,600 network ports to be changed.

This gigantic task was spread over several months, but only a tiny part of it was visible to the network's users. Some inevitable perturbations occurred, even though the whole operation was planned with the aim of diminishing as far as possible any impact on workflow.

Louis-Marie Plumel ↑ and Cédric Dufour ↓, members of the System & Infrastructure team.
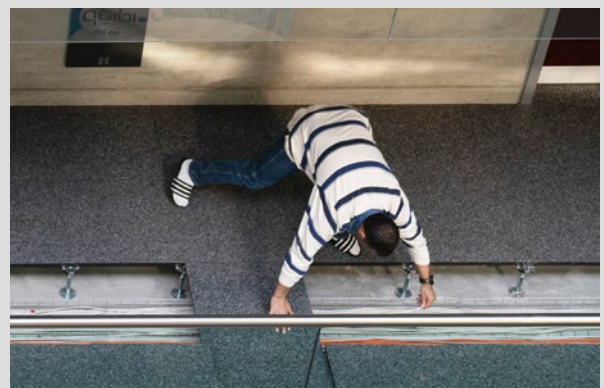
Prizes and distinctions

At the end of each year, the Institute awards two honors: the Research Prize and the Publication Prize. For 2019 these awards go to Noemie Jaquier and Angelos Katharopoulos.

Noémie Jaquier received the Idiap Research Prize. Her work focuses on extending learning and control methods in robotics. She started her PhD in 2016 and will submit her thesis in 2020. Her work has attracted attention outside the field of robotics too. She carried out a six-month internship at the Bosch Center for Artificial Intelligence (BCAI) in Renningen, Germany, has given nine invited talks, and also excels at supervising students.

Angelos Katharopoulos received the Idiap Publication Prize for his paper at ICML 2019, on using an attention-sampling mechanism to handle very large signal size. This has fantastic potential in the field, since memory footprint and computational cost is the main bottleneck when dealing with the gigapixel signals generated in microscopy, astronomy, or high-energy physics.

Other Idiap researchers were also recognized:

ITG 2019 Award for outstanding publications in information technology, November 2019
Ina Kodrasi and Simon Doclo

Conference on Robot Learning (CoRL) Best Presentation Award, November 2019
Noémie Jaquier

European Association for Biometrics Research Award, September 2019
Tiago de Freitas Pereira

International Conference on Machine Learning (ICML) Best Paper Award, June 2019
Pavel Korshunov

International Conference on Pervasive Computing Technologies for Healthcare Honorable Mention Paper Award, May 2019
**Thanh-Trung Phan, Skanda Muralidhar, Daniel Gatica-Perez**

International Association for Pattern Recognition Best Paper Award, May 2019
Raghavendra Ramachandra, Sushma Venkatesh, Kiran Raja, Sushil Bhattacharjee, Pankaj S Wasnik, Sébastien Marcel, Christoph Busch

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IEEE International Symposium on Biomedical Imaging Best Paper Award, April 2019
Christian Jaques

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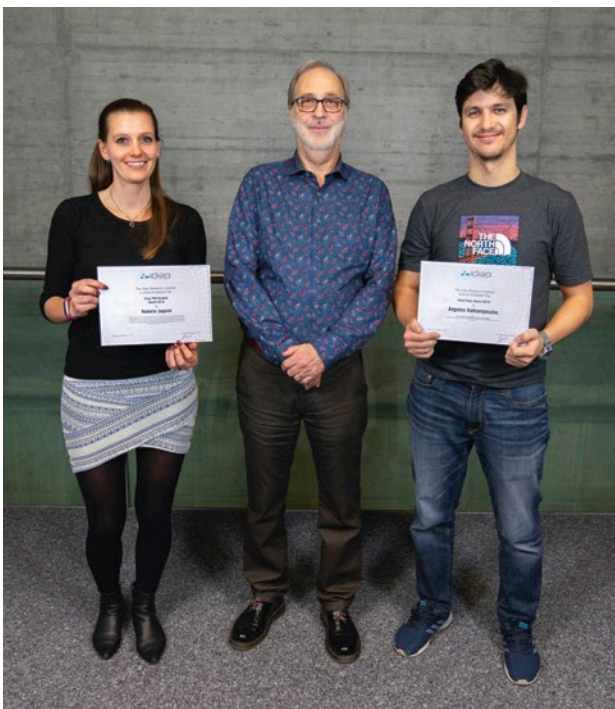
From left to right: Noémie Jaquier, Hervé Bourlard, Angelos Katharopoulos.

Theses completed

**Six students completed and
presented their theses en 2018.**

Language independent query by example spoken term detection

Dhananjay RAM
June 2019

*Thesis director: Prof. Hervé Bourlard
Members of the thesis committee: Prof. Jean-Philippe Thiran,
Dr. Jean-Marc Vesin, Prof. Jan Cernocký, Dr. Xavier Anguera*

Sparse and low-rank modeling for automatic speech recognition

Pranay DIGHE
March 2019

*Thesis director: Prof. H. Bourlard
Members of the thesis committee: Prof. J.-P. Thiran,
Prof. F. Metze, Dr. R. Schlüter, Prof. J.-M. Vesin*

Multimodal person recognition in audio-visual streams

Do Hoang Nam LE
March 2019

*Thesis director: Dr. Jean-Marc Odobez
Members of the thesis committee: Prof. Pascal Frossard,
Prof. Sylvain Meignier, Dr. Mathieu Salzmann, Dr. Dengxin Dai*

Social sensing methods for analysis of dyadic hospitality encounters

Skanda MURALIDHAR
March 2019

*Thesis director: Prof. Daniel Gatica-Perez
Members of the thesis committee: Prof. Denis Gillet,
Prof. Marianne Schmid-Mast, Prof. Catherine Pelachaud,
Prof. Pearl Pu*

Trustworthy speaker recognition with minimal prior knowledge using neural networks

Hannah MUCKENHIRN
November 2019

*Thesis directors: Prof. H. Bourlard, Dr. M. Magimai Doss
Members of the thesis committee: Prof. D. N. A. Van De Ville,
Prof. N. Evans, Dr. P. Bell, Prof. M. Jaggi*

Learning how to recognize faces in heterogeneous environments

Tiago De FREITAS PEREIRA
February 2019

*Thesis directors: Prof. Hervé Bourlard, Dr. Sébastien Marcel
Members of the thesis committee: Prof. Pascal Frossard,
Prof. Mark Nixon, Prof. Julian Fierrez, Prof. Jean-Philippe Thiran*

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Centre du Parc, rue Marconi 19,
CH – 1920 Martigny
Switzerland

T +41 27 721 77 11
F +41 27 721 77 12
M info@idiap.ch
www.idiap.ch
Twitter: Idiap_ch
LinkedIn: idiap-research-institute