MASTER IN AI: ONLINE EXAM

inputs: \( x_1, x_2, \ldots, x_n \)
weights: \( W_{ij} \)
net input: \( \text{net}_j \)
transfer function: \( \sum \)
activation function: \( \varphi \)
threshold: \( \theta \)
activation: \( \theta_j \)
Idiap thanks

the authorities and its founding members

as well as its partners for their support

The cover page shows distance-learning courses in the applied Master’s in Artificial Intelligence.

→ More on page 29
## Messages
- "Swiss positioning for global challenges"
- "There’s less intelligence in artificial intelligence than one might think. But more talent"

## Overview
- Research at the service of society
- Idiap, at a glance

## Organization
- Organization chart
- 12 research groups
- Foundation Council
- International Advisory Board
- Employees

## Finances
- Balance sheet
- Profit and loss statement
- Accounting analysis 2019

## Research
- Police forces plan to use artificial intelligence to speed up their investigations
- A new research group to explore the potential of machine learning for genomics
- When a robot learns how to make a traditional Swiss raclette, thanks to AI
- A year to reinforce ties between Idiap and Mexico

## Commitment
- "At my company, I specialize in artificial intelligence"
- Idiap becomes first non-US site of the Center for Identification Technology Research (CITeR)
- How to transfer a futuristic technology to a working application

## Faces
- How to manage the finances of an AI research institute
- "Working with scientists and coaching basketball players aren’t that different"
- A new blade for Idiap’s Swiss army knife
- 7.8 km of wires for a 10-times-faster connection
- Prizes and distinctions
- Theses completed

## Scientific inserts
- Scientific Report
- Main projects in progress
- Publications
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.

"Swiss positioning for global challenges"

“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—as 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.”
Research at the service of society

“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

Raphaëlle Luisier
Head of the Genomics & Health Informatics 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

Sébastien Marcel
Head of the Biometric Security & Privacy group

“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.

→ More on page 29

Colombine Verzat
Master’s in Artificial Intelligence student
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.

31 nationalities are represented at Idiap

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

172 individuals in total and more than 50 posts in the start-up ecosystem

Scientists
- 5 professors
- 1 senior scientist (MER)
- 16 permanent senior researchers
- 28 postdocs
- 68 research assistants
- 15 students
- 27 trainees/visitors

17.7% women

Engineers
- 15 development and research engineers
- 7 system engineers

9.1% women

Administrative staff
- 13 administrative staff

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

Financing

3% other
54% research projects
43% public funds

Submission and financing of research projects in 2019

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

Switzerland 40%
Asia 19%
Middle East 9%
Americas 7%
Australia 1%

LinkedIn followers 39% in 2019
Twitter followers 63% in 2019

3,051 LinkedIn followers
1,134 Twitter followers
1,200 visitors
RESEARCH GROUPS

12 research groups

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.

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; anti-spoofing; study of emerging biometrics modalities (electrophysiology and veins); open science thanks to our own open source library.

Speech & Audio Processing
Prof. Hervé Bourlard (third from left), Dr. Phil Garner, Dr. Petr Motlicek, Dr. Mathew Magimai-Doss
H-index: PG: 26, PM: 52, 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).

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

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Energy Informatics
Dr. Jérôme Kampf
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. Raphaelle Lusier
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.

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.

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

Human-centric robotic applications exploit multimodal sensor 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, simulation, incremental correction, or exploration).

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.

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.

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Biometrics
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The h-Index
February 28, 2019 (source: Google Scholar).

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).

Dr. Jérôme Kämpf
H-index: 23

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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.

**Foundation Council**

- Olivier Dumas, President
  Independent manager and business consultant
- Anne-Laure Couchepin Vouilloz, Vice-President
  President of the city of Martigny
- Jordi Montserrat
  Regional Manager
  Venturelab
- 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)
- Patrick Furrer
  Scientific collaborator at swissuniversities
- Prof. Stéphane Marchand-Maillet
  Associate professor at the Department of Computer Science of the University of Geneva
- Prof. Pierre Vanderghynst
  Professor and Vice-President for Education at EPFL
- 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. Stéphane Marchand-Maillet
  Associate professor at the Department of Computer Science of the University of Geneva
- Prof. Pierre Vanderghynst
  Professor and Vice-President for Education at EPFL
- Dr. Michael Baeriswyl
  Executive Vice-President of Data, Analytics & AI, Swisscom
- Dr. Prem Natarajan
  Director of the Information Sciences Institute, affiliated with the Viterbi School of the University of Southern California, USA
- Prof. Klaus-Robert Müller
  Professor of Computer Science, TU Berlin; Director, Bernstein Focus on Neurotechnology, Berlin, DE
- Prof. Anil K. Jain
  Distinguished Professor, Department of Computer Science & Engineering, Michigan State University, USA
- 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
- Prof. Johanna Moore
  Head of the School of Informatics, University of Edinburgh; Director of the Human Communication Research Centre, UK
- Prof. Bernt Schiele
  Director, MPI Informatics, Max Planck Institute; Professor at Saarland University, Saarbrücken, DE
- Prof. Neil Lawrence
  DeepMind Professor of Machine Learning at the University of Cambridge, UK
- Prof. Johanna Moore
  Head of the School of Informatics, University of Edinburgh; Director of the Human Communication Research Centre, UK
- Prof. Bernt Schiele
  Director, MPI Informatics, Max Planck Institute; Professor at Saarland University, Saarbrücken, DE
- 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**
- Jonathan Assmann, Al Master’s student, 2019
- Boozorgmehr Amoin, research assistant, Switzerland, 2018
- Matthew Anderson, AI Master’s student, 2019
- Niccolò Antonello, postdoc, Italy, 2019
- Deepak Baby, postdoc, India, 2019
- Léonard Barra, trainee, Switzerland, 2019
- Chantal Basorito Davila, trainee, Australia, 2019
- Melanie Beljaji, trainee, Iran, 2016
- Sushil K Bhattacharjee, research associate, Switzerland, 2018
- Julian Fritsch, research assistant, Germany, 2018
- Yannick Dayer, AI Master’s student, Switzerland, 2019
- Roberto Boghetti, research intern, Switzerland, 2019
- Sushil K Bhattacharjee, research associate, Switzerland, 2018
- Nicholas Jallan, Al Master’s student, 2019
- Parvaneh Janbakhshi, research assistant, India, 2018
- Christian Jaques, research assistant, Switzerland, 2016
- Noémie Jaquier, research assistant, Switzerland, 2018
- Loïc Jeanningros, trainee, France, 2019
- Selan Hande Kabli, research assistant, Turkey, 2017
- Jérôme Kampf, senior researcher, Switzerland, 2016
- Rabeeb Karimi Mahbabi, research assistant, Iran, 2018
- Angelois Katharopoulos, research associate, Greece, 2017
- Banrirkhert Kamawongkhet, postdoc, India, 2018
- Edwin Kerouanton, Al Master’s student, 2019
- Ina Kodrasi, postdoc, Albania, 2017
- Pavel Korshubov, research associate, Estonia, 2015
- Katan Kotwal, postdoc, India, 2018
- Vedrana Krivokoca, postdoc, New Zealand/Croatia, 2017
- Thibaut Kulak, research assistant, France, 2017
- Florian Labhart, research associate, Switzerland, 2017
- Tim Labicher, trainee, Germany, 2019
- Do Hoang Nam Le, research assistant, Vietnam, 2015
- Do Huy Le Binh, research assistant, Vietnam, 2015
- Michael Leibling, senior researcher, Switzerland, 2015
- Jaroslav Lokietko, research intern, Poland, 2019
- Raphaëlle Lucas, researcher, Switzerland, 2019
- ElianeMaalouf, visitant, Lebanon, 2019
- Jérémy Macerais, Al Master’s student, Switzerland, 2019
- Srikanth Madhiker, research associate, India, 2013
- Mathew Magnum Moss, senior researcher, India, 2007
- Florian Mai, research assistant, Germany, 2018
- Elisa Marra, research assistant, Germany, 2018
- Francois Marrion, research assistant, Belgium, 2018
- Andreas Marturf, research assistant, Switzerland, 2018
- Olivia Mariani, research assistant, Switzerland, 2016
- Angel Martinez-Gonzalez, research assistant, Mexico, 2016
- Benoit Massi, postdoc, France, 2019
- Kyle Matoba, trainee, USA, 2019
- Ilamala Mwagahapala, research assistant, Sri Lanka, 2019
- Viviana Mendosa, postdoc, Cuba, 2019
- Leslie Miculicich, research assistant, Peru, 2016
- Amir Mohammad, research assistant, Iran, 2016
- Alireza Mohammadshahi, research assistant, Iran, 2019
- Zohreh Mostaani, trainee, Iran, 2019
- Petri Motticke, senior researcher, Czech Republic, 2005
- Hanna Mucukhenrin, research assistant, Germany, 2015
- Sakauna Munaidhabor, postdoc, India, 2016
- Hue Nguyen, research intern, Vietnam, 2019

**Employes 2019**

*Employees 2019*

*Employees 2019*

*Employees 2019*

*Employees 2019*

*Employees 2019*

*Employees 2019*

*Employees 2019*

*Employees 2019*

**Research & development engineers**
- Philip Abibet, senior R&D engineer, Switzerland, 2006
- Olivier Bornet, head of R&D team, Switzerland, 2004
- Olivier Caracat, R&D engineer, France, 2012
- Guillame Clivaz, R&D engineer, Switzerland, 2017
- William Draz, R&D engineer, Switzerland, 2018
- Samuel Gaust, R&D engineer, Switzerland, 2013
- Théophile Gentilhomme, R&D engineer, France, 2018
- Mélaine Huch, development engineer, Switzerland, 2017
- Salim Kayal, senior R&D engineer, Switzerland, 2011
- Christine Manic, development engineer, France, Switzerland, 2007
- Alexandre Nanchen, senior R&D engineer, Switzerland, 2008
- Peguy Njoum Tchoubith, trainee, Switzerland, 2019
- Danick Panchard, R&D engineer, Switzerland, 2019
- Vincent Pollet, R&D engineer, France, 2019
- Flavo Tarsetti, senior development engineer, Switzerland, 2008
- Jules Voisin, student, France, 2019

**Administrative staff**
- Elsa Bonvicini, program manager, Switzerland, 2015
- Laura Coppey, secretary, Switzerland, 2019
- Justine Darolyn, junior program manager, Switzerland, 2018
- Joel Dumoulin, technology transfer officer, Switzerland, 2018
- Martina Fallay, program manager, Austria/Switzerland, 2012
- Nicholas Filipov, communications, marketing & public relations, Switzerland/Poland, 2018
- Francois Foglia, deputy director, Switzerland, 2006
- Edward Lee Gregorio, financial director, USA, 2004
- Barbara Huguenin-Landl, program manager, Austria, 2018
- Marie-Constance Kallfaff Landelle, legal adviser, Switzerland, 2017
- Sylvie Meier, secretary, Switzerland, 2019
- Victor Marcencio, secretary, Switzerland, 2019
- Christophe Rossa, financial manager, Switzerland, 1998
- Nadine Rousseau, admin. assistant, Belgium/Switzerland, 1998

**System engineers**
- Samuel Ayim, system engineer, Switzerland, 2005
- Bastien Crettol, system administrator, Switzerland, 2005
- Cédric Dufour, system engineer, Switzerland, 2007
- Frank Formaz, system manager, Switzerland, 1998
- Louis-Marie Plomel, 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.
## Balance Sheet (CHF)

### Assets

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>7,511,323.42</td>
<td>6,177,495.28</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>104,625.05</td>
<td>277,533.00</td>
</tr>
<tr>
<td>Accrued income and other</td>
<td>638,216.31</td>
<td>1,109,667.08</td>
</tr>
<tr>
<td><strong>Total Current Assets</strong></td>
<td><strong>8,253,964.78</strong></td>
<td><strong>7,564,695.36</strong></td>
</tr>
<tr>
<td>Equipment</td>
<td>558,228.55</td>
<td>542,966.99</td>
</tr>
<tr>
<td>Other assets</td>
<td>1,142,246.10</td>
<td>536,590.85</td>
</tr>
<tr>
<td>Patents and licenses</td>
<td>6.00</td>
<td>536,590.85</td>
</tr>
<tr>
<td>Financial assets</td>
<td>10,000.00</td>
<td>6.00</td>
</tr>
<tr>
<td><strong>Total Non-Current Assets</strong></td>
<td><strong>1,710,480.65</strong></td>
<td><strong>1,089,557.84</strong></td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td><strong>9,964,445.43</strong></td>
<td><strong>8,654,253.20</strong></td>
</tr>
</tbody>
</table>

### Liabilities

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts payable</td>
<td>311,534.59</td>
<td>280,745.51</td>
</tr>
<tr>
<td>Accrued expenses</td>
<td>4,988,883.91</td>
<td>3,908,573.83</td>
</tr>
<tr>
<td>Provisions</td>
<td>1,260,538.40</td>
<td>1,158,288.44</td>
</tr>
<tr>
<td><strong>Total Foreign Funds</strong></td>
<td><strong>6,568,956.90</strong></td>
<td><strong>5,347,607.78</strong></td>
</tr>
<tr>
<td>Share capital</td>
<td>40,000.00</td>
<td>40,000.00</td>
</tr>
<tr>
<td>Research funds reserve</td>
<td>1,400,000.00</td>
<td>1,400,000.00</td>
</tr>
<tr>
<td>Special reserve</td>
<td>1,600,000.00</td>
<td>1,600,000.00</td>
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<tr>
<td>Retained earnings</td>
<td>266,645.42</td>
<td>226,392.37</td>
</tr>
<tr>
<td>Net income</td>
<td>88,843.11</td>
<td>40,253.05</td>
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<tr>
<td><strong>Total Own Funds</strong></td>
<td><strong>3,395,688.53</strong></td>
<td><strong>3,306,645.42</strong></td>
</tr>
<tr>
<td><strong>Total Liabilities</strong></td>
<td><strong>9,964,445.43</strong></td>
<td><strong>8,654,253.20</strong></td>
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</table>
### Profit and loss statement (CHF)

#### INCOME

<table>
<thead>
<tr>
<th>Source</th>
<th>2019</th>
<th>%</th>
<th>2018</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swiss Confederation Art. 15</td>
<td>2,420,100</td>
<td>19.7</td>
<td>2,334,100</td>
<td>19.5</td>
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<tr>
<td>Canton of Valais</td>
<td>2,000,000</td>
<td>16.3</td>
<td>2,000,000</td>
<td>16.7</td>
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<tr>
<td>City of Martigny</td>
<td>700,000</td>
<td>5.7</td>
<td>700,000</td>
<td>5.8</td>
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<td>Capital and donations</td>
<td>161,951</td>
<td>1.3</td>
<td>207,000</td>
<td>1.7</td>
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<td>Competitive funding</td>
<td>5,282,051</td>
<td>43.3</td>
<td>5,241,100</td>
<td>43.7</td>
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<td>Swiss National Science Foundation</td>
<td>2,431,685</td>
<td>19.8</td>
<td>1,851,130</td>
<td>15.5</td>
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<td>EU</td>
<td>1,103,182</td>
<td>9.0</td>
<td>2,036,927</td>
<td>17.0</td>
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<tr>
<td>CTI/Innosuisse</td>
<td>736,080</td>
<td>6.0</td>
<td>956,368</td>
<td>8.0</td>
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<tr>
<td>Others</td>
<td>2,398,913</td>
<td>19.6</td>
<td>1,632,606</td>
<td>13.6</td>
</tr>
<tr>
<td>Third-party contributions (non-competitive)</td>
<td>6,669,860</td>
<td>54.4</td>
<td>6,477,031</td>
<td>54.1</td>
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<tr>
<td>Interest</td>
<td>10,453</td>
<td>0.1</td>
<td>7,074</td>
<td>0.1</td>
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<tr>
<td>Subletting</td>
<td>1,656,225</td>
<td>13.9</td>
<td>1,410,150</td>
<td>11.9</td>
</tr>
<tr>
<td>Other incomes</td>
<td>6,248,170</td>
<td>50.8</td>
<td>951,368</td>
<td>0.8</td>
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<tr>
<td>Profit/exchange loss</td>
<td>11,006</td>
<td>0.1</td>
<td>-10,006</td>
<td>-0.1</td>
</tr>
<tr>
<td>Divers incomes</td>
<td>3,081</td>
<td>0.2</td>
<td>2,628,631</td>
<td>2.2</td>
</tr>
<tr>
<td><strong>TOTAL INCOME</strong></td>
<td>12,260,292</td>
<td>100.0</td>
<td>11,980,762</td>
<td>100.0</td>
</tr>
</tbody>
</table>

#### CHARGES

<table>
<thead>
<tr>
<th>Category</th>
<th>2019</th>
<th>%</th>
<th>2018</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel (including social deductions)</td>
<td>10,000,132</td>
<td>82.2</td>
<td>9,300,657</td>
<td>77.9</td>
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<tr>
<td>Operational costs</td>
<td>2,061,047</td>
<td>16.9</td>
<td>2,013,052</td>
<td>16.9</td>
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<td>Provisions</td>
<td>110,250</td>
<td>0.9</td>
<td>626,800</td>
<td>5.2</td>
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<td><strong>Expenditure</strong></td>
<td>12,171,449</td>
<td>100.0</td>
<td>11,940,509</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>TOTAL EXPENDITURES</strong></td>
<td>12,171,449</td>
<td>100.0</td>
<td>11,940,509</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>OPERATING PROFIT/LOSS</strong></td>
<td>88,843</td>
<td>0.7</td>
<td>40,253</td>
<td>0.4</td>
</tr>
</tbody>
</table>

### 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.**

**Sources of financing**

<table>
<thead>
<tr>
<th>Federal, cantonal, and municipal subsidies</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confederation</td>
<td>2,424</td>
<td>2,418</td>
<td>2,334</td>
<td>2,420</td>
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<tr>
<td>Canton</td>
<td>1,720</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Municipality</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
</tr>
</tbody>
</table>

**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)

**Distribution of costs**

- Personnel expenses
- Operating expenses
- Provisions
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
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.

Genetic 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 morphological changes. In that project I developed statistical models to interpret the behavior and function of 20,000 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 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 genomics 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. Eddy, 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. As illustrated by our short film, “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.

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.

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.

Welcoming 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 Esau Villatoro after his first month at Idiap.

What is your background and why did you decide 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 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.
“At my company, I specialize in artificial intelligence”

Artificial intelligence is going back to school: On Monday, February 4, 2020, 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.”
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, Infinion, 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 the allocation of resources to research proposals. Additionally, the affiliates can obtain a world-wide, 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.

So 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 Angelo 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.
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.

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 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.
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.

The 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 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 in 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 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 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.

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

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.

Idiap 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 vs. 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

To 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, 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.

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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 Noémie 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 Wanik, Sébastien Marcel, Christoph Busch

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

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. Ian Cumocký, Dr. Xavier Anguera

Multimodal person recognition in audio-visual streams
Do Hoang Nam Le
March 2019
Thesis director: Dr. Jean-Marc Odobez
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Trustworthy speaker recognition with minimal prior knowledge using neural networks
Hannah Huckenhirn
November 2019
Thesis directors: Prof. H. Bourlard, Dr. Sébastien Marcel
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Sparse and low-rank modeling for automatic speech recognition
Pranay Dighe
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Social sensing methods for analysis of dyadic hospitality encounters
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