DIGITAL HEALTH
An innovation domain of the canton of Vaud
DEVELOPING THE HEALTHCARE OF THE FUTURE

Experts in digital and microprecision industries are joining forces with companies located in Switzerland’s “Health Valley” to invent digital products aimed not only at improving our physical health but also preventing and treating illness.

Digital health (also known as e-health) lies at the crossroads of multiple industries. It is generally defined rather broadly as the use of information and communication technologies to improve health and health systems. In Switzerland, the concept includes actors from both the digital sector (entrepreneurs, educational and research institutions) and the medical one (patients, medical staff and nurses, manufacturers, healthcare institutions, insurance companies, university centers, etc.). Many Swiss companies, including giants La Poste and Swisscom and startups Ava and MindMaze, are now breaking into this fast-growing market.

Situated in Health Valley, the canton of Vaud has everything it needs to become a world-class site for digital health. Its public hospitals, including the Lausanne University Hospital (CHUV) and private clinics like those in the Swiss Medical Network, are known for their cutting-edge medicine and have long attracted patients from around the globe. To continue improving their services, these establishments are working closely with local life science engineers and researchers from institutions of higher education, the University of Lausanne (UNIL), and the École polytechnique fédérale de Lausanne (EPFL). Partnerships have also been formed with major corporations and startups alike in the Lake Geneva region. Such cooperation has proven fruitful, attracting around CHF 500 million from business angels and venture capital organizations in 2016.

The canton is not to be outdone in digital industries, either. The region is home to ultra-secure data centers and companies like Kudelski Group, known for decades of digital innovation, while its engineering schools operate on the frontier of blockchain technology and cryptography. This cluster of cybersecurity brainpower has led major US firms such as Snapchat to invest in the region.

Finally, Vaud’s extensive experience in microprecision and its long history of Swiss watchmaking have spawned a number of young enterprises in the field of sensors and probes – both tools capable of gathering a wide variety of data that play an essential role in digital health.

There are industry health professionals, innovators, and entrepreneurs working for a total of 30 research labs and 40 corporations working in digital health to prevent illness and treat patients.

“The canton of Vaud possesses an ecosystem that is particularly favorable to the development of the digital health sector. EPFL is driving innovation and taking Switzerland to a new level in the industry. Innovation in the assisted housing sector for the elderly is especially promising, since it is currently underdeveloped in Switzerland.”

ALEXANDRE GRUTMAN
Co-founder and CEO of Inno-Fuel
A MULTITUDE OF RESEARCH FIELDS
Swiss innovators are outdoing one another to meet the needs of healthcare professionals and the general public.

Health costs are exploding across OECD countries, with a steady average annual growth of 2.5% in recent years. At the same time, life expectancies are rising, exceeding 80 years of age. In the face of these new challenges, the healthcare industry requires an overhaul to incorporate the use of ICT in its organization, support systems, and its network of partners and processes. Such methods of treating and monitoring patients are often more economical, comfortable and less invasive for the sick.

Here are a few domains of interest:

Genomics
As a branch of modern biology, genomics analyzes how an organism, organ, or even a tumor works at the genome level. Genomics isn’t limited to the study of a single gene; for example, in medicine, genomics is used to identify, diagnose and potentially find treatments for a range of genetic disorders and viruses. The canton of Vaud is an excellent location for R&D in this discipline thanks to the EPFL Institute of Bioengineering and UNIL’s Center for Integrative Genomics (CIG). One of Switzerland’s crown jewels in the industry is SOPHIA GENETICS, which uses artificial intelligence to analyze patients’ genomic information.

Wearables and biosensors
Wearables – small, wearable objects equipped with miniature sensors – are useful for monitoring patients remotely and measuring a variety of physiological data (body temperature, heart rate, etc.). Engineers in the canton of Vaud are conducting numerous R&D projects with local financial partners, which has resulted in the many successful spin-offs. One example is the Vaud startup DomoSafety, which addresses issues of an aging population. Using sensors and software, the company’s product analyzes in real-time the behavior of at-risk patients who wish to remain living at home (e.g., the elderly or people with chronic illnesses). It then transmits relevant information to family members and healthcare professionals. Investors persuaded by its potential have already invested CHF 2.6 million into the concept.

Telemedicine
Telemedicine is a fast-growing way of using ICT to practice medicine remotely. By reducing the need for doctors to travel – for example, by allowing for virtual visits – this technology aims to lower healthcare costs and offer faster, more comfortable medical services to patients with mobility issues. EPFL is a pioneer in this area. Early on, its signal processing laboratory, working in conjunction with Vaud-based company Atracsys, developed a system that transforms traditional echography equipment into telemedicine machines that can be used for diagnostics.

Digital medical devices
Today, with the rise of tablets, cellular phones and internet-ready machines, medical devices are more communicative than ever and able to collect all sorts of health data for processing. The Health, Engineering and Economics group at the Haute École d’Ingénierie et de Gestion in the canton of Vaud is constantly churning out innovations in this field. The group includes professors and researchers from a range of disciplines – from microtechnology, to computer science and business development – and designs customized solutions that use sensors, interfaces, and onboard systems for hospitals and the economy.

Big data and analytics
Collected health data is increasingly shared, analyzed and sometimes even entered directly into hospital and medical practice information systems. Switching to a digital process often leads to financial savings and improved healthcare. The canton of Vaud has developed a number of security technologies for fintech and continues to innovate in the areas of gathering, processing and sharing health data. In the canton of Vaud, big data is characterized by reliability and security. Homegrown company ELCA was the first to implement an electronic record-keeping system for Swiss patients nationwide.

252.6 million
the amount in million invested in 2018 in the biotech sector (CHF).

Sources: Swiss Venture Capital Report 2018
A FAVORABLE ECOSYSTEM

The canton of Vaud offers an ecosystem favorable to companies working in digital health.

Vaud is home to many incubators, including EPFL’s Innovation Park (EIP), a leader of its kind, and many other important actors in the digital health industry, such as the Y-PARC technology park, and Biopôle a campus dedicated to hosting companies active in biotechnology and medical techniques.

Former startup SOPHIA GENETICS is a prime example of the vitality of the digital health sector in the canton of Vaud. The company, which is based in Saint-Sulpice near Lausanne, specializes in medical data analysis. The team works with a network of 850 hospitals around the world and manages an immense database of anonymized DNA, analyzing about 10’000 patients data per month. The company is listed in the prestigious MIT Tech Review as one of the “Top 50 smartest companies”, as well as in the Top 10 of the most innovative biotechnology companies according to the American business magazine Fast Company.

Another illustrative case is Pryv, a rapidly growing startup. An expert in data confidentiality solutions, the Lausanne-based EPFL spinoff has been offering partners a novel approach to processing of personal medical data since 2012. The solution allows owners of medical data to share information with people of their choosing, either directly or via an intermediary.

The rich diversity and wealth of academic and economic environments in the canton of Vaud make it fertile ground for revolutionary innovations in digital health. The region also has access to an exceptional convergence of expertise in engineering, microtechnology, algorithms, communication science, molecular biology and fundamental cellular science.

1.6 billion
the capital raised by Swiss startups in the biotechnology in 2018 (CHF).

THE TECHTOUR HEALTHTECH SUMMIT: WHERE STARTUPS AND INVESTORS MEET

Each year, the canton of Vaud hosts and supports the TechTour HealthTech Summit in Lausanne, an event dedicated to digital health innovations. The HealthTech Summit is an international conference that showcases the 20 largest medtech companies and the top 20 digital health companies in Europe. The event also serves as a place for startups to meet a variety of investors and is a unique opportunity to see the latest e-health business and technology trends.

Pierre Chauvineau, vice president of Boston Scientific and president of HealthTech Summit 2017, underlined the importance of this meeting of minds: “Over the next 20 years, the number of people in Europe older than 65 will rise by 45%. At the same time, funding for large health systems will level off or fall. The HealthTech Summit is the ideal forum where MedTech, digital health and diagnostics companies, corporations, startups, venture capitalists and investors can meet to learn about, discuss, and openly debate market trends and examine how the ecosystem is evolving so that we can address these fast-moving trends.”

techtour.com/events/2019/6/event-health-tech-summit-2019
A SHARED DESIRE TO SUPPORT INNOVATION

The public sector is geared up to support healthcare innovations across the region.

The Office for Economic Affairs and Innovation (SPEI) supports companies based in the canton of Vaud, in particular those working in the advanced technology and industrial sectors. SPEI advises entrepreneurs and puts them in contact with organizations that can assist them according to their specific needs. It also offers direct financial support.

The Swiss Institute of Bioinformatics (SIB) provides support to 65 research and service groups in the field, educated by 800 scientists from top Swiss schools of higher learning and research institutions. The independent, non-profit foundation offers world-class bioinformatics infrastructure, expertise and services.

SIB’s ExPASy portal offers worldwide access to scientific databases and software in a variety of life science domains including proteomics, genomics, phylogenetics, systems biology, population genetics and transcriptomics. SIB’s decentralized yet consolidated organizational structure serves as a model for other countries wishing to build their own bioinformatics infrastructure, such as the European ELIXIR program, which adopted the hub-and-spoke model. Thanks to SIB’s level of excellence in bioinformatics, it is playing an important role in shaping the future of life sciences, in particular by supplying scientists and industrialists with first-class bioinformatics resources and services. SIB is also in charge of directing and coordinating the domain in Switzerland.

Launched in 2017, Health 2030 is a multicentric, multidisciplinary initiative whose members include the Universities of Geneva, Lausanne and Bern, as well as and the university hospitals of Geneva, Lausanne and Bern (HUGs, CHUV and Inselspital). This initiative promotes research, education, and services for the advent of personalized, digital health services in French-speaking Switzerland. Health 2030 also encourages the use of new biomedical and information technologies through the mobilization of all stakeholders, including primary healthcare providers. Furthermore, the program serves as a meeting place for discussions between academic, clinical, financial, industry and political partners. Health 2030 focuses on digital epidemiology, bioinformatics, big data, biobanks, genomics, digital medical records, medical consulting and other technologies.

Moreover, the Digital Health Hub of the Biopôle brings together companies active in the digital health domain. This new platform aims at accelerating the development of innovative solutions for patients.

“"We guide companies through every stage of development, from conception to R&D, production and funding, all the way to the end product. And we are able to utilize the necessary expertise from our network. The trend is skyrocketing.”"
### MAIN ACTORS OF DIGITAL HEALTH ECOSYSTEM

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“We are proud to have come from EPFL. Many of our team members developed their expertise right here, and it’s been fundamental to our success.”

PIERRE-EMMANUEL MEYER  
CFO of MindMaze
RESEARCH AND DEVELOPMENT

Center for Integrative Genomics (CIG)
Research at CIG focuses on the structure and function of the genome in a variety of experimental systems and techniques. CIG brings the international scientific community together in a single integrated research center that facilitates both formal and informal interactions.
unil.ch/cig/en/home

Digital Health Hub
A strong collaborative network, the Digital Health Hub brings together innovative companies and minds to foster the integration of digital technologies in the life sciences sector. Based at Biopôle, its mission is to drive the future of health for better patient care.
dh2.ch

EPFL – Data Analysis, Theory, and Applications Laboratory
DATA Lab concentrates its research and teaching on the intersection of systems, programming languages, and theory. It creates and studies database systems and large-scale data analysis systems (big data).
data.epfl.ch

EPFL – Laboratory of Digital Epidemiology (UPSalathe)
UPSalathe concentrates its research and teaching on digital epidemiology, network epidemiology, and social media analysis.
salathelab.epfl.ch
EPFL – Laboratory of Movement Analysis and Measurement (LMAM)
The goal of LMAM’s multidisciplinary research is to translate bioengineering results into clinical applications. LMAM has a special interest in characterizing athletic performance and pathologies that affect motor function, such as arthritis, frailty, pain, and movement disorders, by studying movement abilities.
lmam.epfl.ch

EPFL – Nanoelectronic Devices Laboratory (Nanolab)
Nanolab conducts research into silicon micro- and nanoelectronics. In particular, the lab focuses on the technology, design, and modeling of nanoscale devices, radiofrequency MEMs devices for in- and above-IC, and integrated optoelectronic devices.
nanolab.epfl.ch

HEIG – Health, Engineering and Economics
The Health, Engineering & Economics (HE&E) group is a multidisciplinary group that promotes synergy between various health fields, engineering, and management.
hee.heig-vd.ch/presentation

NeuroTech Platform – Department of Clinical Neuroscience
The Department of Clinical Neuroscience offers clinical research infrastructure dedicated to evaluating new technology – in particular mobile and smart devices and caregiving robots – in patients suffering from neurological disorders.
chuv.ch/neurosciences

Swiss Institute of Bioinformatics (SIB)
A leading data specialist, SIB supports advancements in biological and health research.
sib.swiss

1.028 billion
the amount of funds raised to support startups in the canton of Vaud from 2016 to 2018 (CHF).

Source: Swiss Venture Capital Report 2017
**Established Businesses and Startups**

**ActLight**
ActLight offers revolutionary light sensor technology that, when installed in a connected watch, measures heartbeat while consuming five times less energy than conventional sensors.

[act-light.com](http://act-light.com)

**Arkimed**
Arkimed offers movement detection software that reduces a surgeon’s back-and-forth between the operating table and screens displaying essential information during surgeries.

[arkimed.org](http://arkimed.org)

**Bioinnovation Solutions**
Bioinnovation has developed a targeted sequencing technology that meets the pressing needs of clinical diagnostics and biosurveillance, thus offering a rapid, low-cost way of identifying pathogens and drug- and toxin-resistance genes in patient biological samples in hospital settings.


**Biophos**
Biophos develops premium ergonomic applications for the specific needs of reproductive medicine.

[biophos.com](http://biophos.com)

**BrainGenetics**
Patrick Segu and his team have created secure infrastructure that includes a biobank, genetics laboratory, and data center to ensure digital continuity between patients and health professionals.

[b-genetics.com](http://b-genetics.com)

**Cassiopee Applied Solutions**
Cassiopee Applied Solutions offers software that detects stress and mental disorders in sports and medicine.

[cassiopee.org](http://cassiopee.org)

**Crisalix**
Crisalix is a virtual reality imaging solution used in plastic surgery. It shows patients a simulation of the results before the surgery actually takes place.

[crisalix.com](http://crisalix.com)

**DermoSafe**
DermoSafe sells a medical device supported by a web service that connects caregivers, patients, and specialists.

[dermosafe.com](http://dermosafe.com)

**DomoSafety**
DomoSafety analyzes behavioral and medical data in real-time to provide proactive, preventative services to health professionals.

[domo-safety.com](http://domo-safety.com)

**EP Solutions**
EP Solutions offers a non-invasive electrocardiographic imaging for pre-operation diagnoses of complex cardiac rhythm disorders.

[ep-solutions.ch](http://ep-solutions.ch)

**Extrapolation**
The company’s goals are academic development and the realization of protocols on enriched and specific data analysis from physiological and environmental sensors, particularly in textiles.

**Gait Up**
Gait Up provides simple accurate software and methods for gait and move assessment for the field of diagnostics, sport, clinics and neurological disorders.

[gaitup.com](http://gaitup.com)

**Gene Predictis**
Gene Predictis offers a series of genetic tests that allow medical treatments to be adapted to the needs of each individual.

[genepredictis.com](http://genepredictis.com)
Genohm/Agilent Technologies
Genohm is a digital platform that gives laboratories a seamless, integrated Laboratory Information Management System and Electronic Laboratory Notebook environment that meets the needs of a wide range of facilities, from research labs to sequencing labs to biobanks and quality control labs.
genohm.com

GenomSys
GenomSys develops technology that has propelled a new generation of tools and devices for the efficient compression, storage, transport, and handling of genomic data.
genomsys.com

IBM Watson Health
IBM Watson Health’s research focuses on artificial intelligence and machine learning for life sciences, oncology, and value-based care.
ibm.com/watson/health

Lambda Health System
Lambda Health System has developed a rehabilitation device that combines virtual reality and robotics for use by the legs.
lhs-sa.ch

Leman Micro Devices
Leman Micro Devices offers a smartphone solution that measures blood pressure and other vitals with certified medical precision.
leman-micro.com

Liris Tech
Liris Tech offers ophthalmological firms management software that handles administrative tasks ranging from making appointments to billing.
liris.ch

Lucentix
Lucentix makes biosensor technology that allows patients to measure analyte concentrations in a single drop of blood or saliva using a low-cost, portable device that offers the same results as a laboratory.
lucentix.ch/

Med-eBox
Med-eBox offers a solution that reminds patients to take their medicine and remotely tracks whether they have done so. It includes an electronic pill, reminders in the form of alarms, SMS notifications, and adherence tracking.
med-ebox.ch

MindMaze
A spinoff of EPFL, MindMaze has revolutionized neurological treatment. Its technology facilitates and accelerates rehabilitation for stroke victims through the use of virtual reality.
mindmaze.com

My Vitality
My Vitality develops algorithms for sport, well-being and health by applying machine learning to pulse wave analysis.
mypulses.com

Nestlé Institute of Health Sciences
Nestlé Institute of Health Sciences offers scientific expertise in digital technology to help improve the health, nutrition, and welfare of consumers and companies.
nestleinstitutehealthsciences.com/scienceandtechnology/digitalnutrition

5.2% of total Swiss exports are linked with life sciences sector.

Source: GGBa
NetUnion
NetUnion offers digital solutions to help individuals manage their physical and mental health.
netunion.com

PhenoSystems
PhenoSystems develops software for molecular biology with an emphasis on DNA sequence analysis using capillary sequencers and NGS, from the capture design stage to full genome analysis.
phenosystems.com

Pryv
Pryv offers compliant data management software solutions for digital health needs.
pryv.com

Saphetor
Saphetor offers data analysis and interpretation on a genomic scale using next-generation sequencing (NGS).
saphetor.com

SimplicityBio/Precision for Medicine
SimplicityBio is a biomarker discovery company. It provides its clients with services and products based on robust signatures using multiple biomarkers.
simplicitybio.com

SmartCardia
SmartCardia is the developer of INYU, a wearable device that tracks a patient’s physiological parameters, records them, and transmits data (heartbeat, respiratory rate, body fat, hydration level) continually to medical staff via smartphone.
smartcardia.com

SmartGene Services
SmartGene’s core business is the analysis and management of complex genetic data.
smartgene.com

SOPHiA GENETICS
SOPHiA GENETICS analyzes patient molecular information to help doctors make diagnoses and offer personalized treatment. Founded in 2011 at EPFL’s Innovation Park, the company now offers technology in over 47 countries and 270 hospitals. In 2015, it opened an office in Saint-Sulpice, where 62 of the company’s 130 employees now work.
sophiagenetics.com

SWISS MEDBANK
SWISS MEDBANK offers technology and services to facilitate access to an individual’s health information by doctors around the world, as safely and quickly as possible.
swissmedbank.com

Sylex
Sylex develops data processing software specialized in the search for solutions for the implementation and exploitation of digital health for policy makers.
sylextech.com

Ubisim
Ubisim presents an immersive virtual reality training platform dedicated to nursing care.
ubisimvr.com

Volv Global
AI solutions and social listening applications for identifying patients with rare diseases and reducing the impact on patients from adverse events and non-adherence.
volv.global

Xsensio
Xsensio develops wearable, new-generation “lab-on-skin” devices that make unique use of biochemical information on the skin’s surface, providing information in real-time on an individual’s health and wellbeing in a non-invasive way.
xsensio.com
NETWORK OF SUPPORTING PARTNERS

**CLUSTER** Alp ICT
Alp ICT’s mission is to connect industries to Swiss digital innovation.
alpict.com

**CLUSTER** BioAlps
BioAlps promotes French-speaking Switzerland as a world-class site for life sciences and facilitates the industry’s growth.
bioalps.org

**CLUSTER** Biopôle – Digital Health Hub
Collaborative network that brings together companies and innovative minds to promote the integration of digital technologies in the life sciences sector.
dh2.ch

**CLUSTER** digitalswitzerland
An inter-professional, non-profit organization created out of its members’ shared vision of strengthening Switzerland’s position as a digital platform and projecting its benefits onto all Swiss industries (FinTech, life sciences, fashion, MedTech, etc.).
digitalswitzerland.com

**Economic Development – Canton of Vaud (DEV)**
The DEV is a private association funded by the canton of Vaud and its members. It acts as the official partner of the Vaud Economic Promotion Department to welcome and assist foreign companies who establish their activities in the region.
dev.ch
EPFL Innovation Park
EPFL Innovation Park hosts companies focusing on technology in a rich environment, with access to state-of-the-art research, a wide network of dynamic entrepreneurs, and long-established companies.
epfl-innovationpark.ch

Health 2030
Health 2030 is an initiative launched by the Universities of Lausanne, Geneva, and Bern and by CHUV, HUGs, the University Hospital of Berne, and EPFL. It promotes research, education, and services for the growth of personalized, digital health services in French-speaking Switzerland.
health-2030.ch

Innovaud
Innovaud offers assistance to Vaud startups and small businesses. Whether they are in need of an office location, funding, or coaching, Innovaud puts them in touch rapidly with the right contacts to help them realize their potential.
innovaud.ch

Office for Economic Affairs and Innovation (SPEI)
The SPEI is a public institution that deals with the creation, development and establishment of companies in the canton of Vaud.
invest-vaud.swiss

Swiss Digital Health
Swiss Digital Health is the Swiss platform for digital health matters.
swissdigitalhealth.com

Y-PARC
Built on 50 hectares, Y-PARC is one of the largest technology parks in Switzerland. It features an incubator and guidance services tailored to both startups and more mature companies.
y-parc.ch

300 laboratories are located in EPFL Innovation Park.