SWITZERLAND GLOBAL ENTERPRISE

KEY FIGURES

1st Place – Global Innovation Index (WIPO)

1st Place – Global Competitiveness Index (INSEAD)

1st Place – Global Talent Competitiveness Index (INSEAD)

3rd Place – Global robotics patents in relation to number of inhabitants

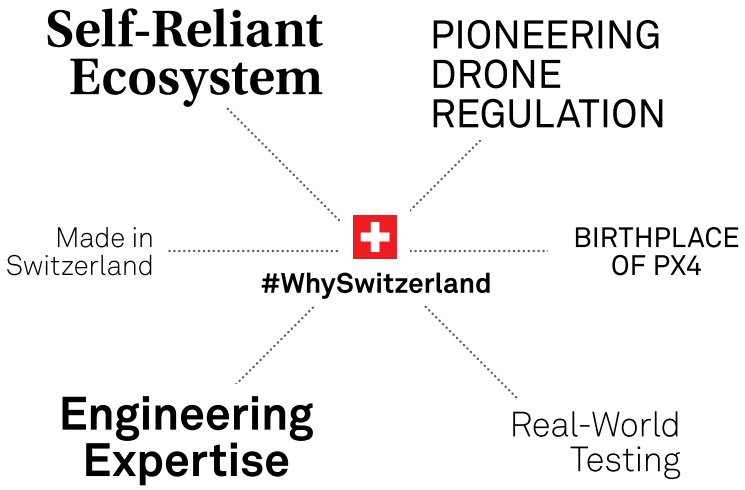
Sources: WIPO; INSEAD; 2020; BAK Economics, 2018

SWITZERLAND – A GLOBAL HUB FOR DRONE TECHNOLOGY AND ROBOTICS

INTRODUCTION

Switzerland has the best hand when it comes to profiting from the fourth industrial revolution that will be driven by new developments in the technological sector. Its traditional strength in the field of mechanical engineering and precision manufacturing has formed the basis for top-notch research in the field of robotics, attracting tech giants like Google, Facebook and industrial players who draw on the large pool of experts and talent. Because of its excellent technical universities, dynamic talent pool and experienced ecosystem, Switzerland has built a reputation as the "Silicon Valley of Robotics."

Thanks to the innovation-friendly and pragmatic approach of Swiss regulators, Switzerland has been leading the way in shaping regulations for Unmanned Traffic Management (UTM). It is the first country in the world to have implemented a nationwide U-space, which was tested live in Geneva in 2017. It is also the birthplace of SORA (Specific Operation Risk Assessment), a risk-based, non-prescriptive drone regulation that is on its way to becoming a global standard. Because of a unique collaboration between industry and regulators, Switzerland offers companies an ideal setting to innovate, test and deploy their products in a real-world environment.



THE ADVANTAGES OF SWITZERLAND

1. Strong Research and Innovation Output

Thanks to its long tradition in watchmaking and mechanical engineering, Switzerland has developed unique know-how in related fields such as robotics, precision manufacturing, or microelectronics. Because of its **leading research** and strong innovative capacities, Switzerland is often referred to as the "Silicon Valley of Robotics".

Why Switzerland:

- Switzerland is the world's leading location for the development of core technology for drones and commercial applications. Ranked among the world's best technological universities, the Swiss Federal Institutes of Technology in Lausanne **(EPFL)** and Zurich **(ETH Zurich)** as well as the **University of Zurich** are at the forefront of flying robotics and unmanned systems. They work closely with an active developer industry to bring new products quickly to the market.

- The **Autonomous Systems Lab (ASL)** at ETH Zurich has produced various successful spin-offs over the last twenty years, such as AtlantikSolar, Wingtra, or Auterion.

- The **Laboratory of Intelligent Systems (LIS)** at EPFL is where globally recognized drone companies such as Sensefly, Flyability and Dronistics were born.

- The Lugano-based **IDSIA** was founded in 1988 and has received international attention thanks to the development of the long-short-term memory (LSTM), upon which Google's speech recognition is based. It focuses on machine learning, operations research, data mining, and robotics.

- Based in Martigny, Canton of Valais, **IDIAP** has been among the leading research institutes in artificial and cognitive intelligence since 1991. Voice and visual recognition, machine learning, human-machine interaction, robotics, language analysis, or bio-imaging are some of its research fields.

- Since 2010, robotics has been a national research focal point of the Swiss National Research Fund: The **National Centre of Competence in Research (NCCR) Robotics** brings together leading experts from the EPFL, ETH Zurich, University of Zurich, Dalle Molle Institute for Artifical Intelligence Research, and the University of Bern. It supports startups, spin-offs and SMEs in the field of robotics.

- Switzerland is the **birthplace of the open-source solution PX4 (Pixhawk).** It was developed at ETH Zurich and has now become the gold standard for drone management.

2. Pioneering Drone Flight Regulations

Swiss regulators are innovation-friendly, progressive and pragmatic. The country is playing an **active role in defining future regulations** that will permit the successful integration of drones in airspace.

Why Switzerland:

- The approach of the Swiss Federal Office of Civil Aviation (FOCA) is **pragmatic, risk-based and non-prescriptive**. It allows startups to enter the market with low costs as long as safety can be guaranteed. This unique Swiss method, the so-called **Specific Operation Risk Assessment (SORA)**, has made complex operations and world premieres possible, such as using high altitude weather drones or the commercial drone delivery of blood samples between hospitals and labs over cities. SORA is now an **emerging global standard** of drone regulation.

- Switzerland is the **first country in the world to have implemented a nationwide U-Space**, which was demonstrated in **Geneva** in 2017 as the **first live trial** of U-Space capacities in Europe. The **Swiss U-Space Implementation (SUSI)** is a public-private partnership between FOCA, the Swiss air navigation service provider skyguide and a large array of industry stakeholders. This groundbreaking step has helped shape European drone regulations that will enter into force in Europe and Switzerland as of 2021.

- In March 2017, Swiss Post became one of the first companies in the world to operate delivery drones to transport lab samples between two hospitals in Lugano, in conjunction with drone manufacturer Matternet. They received **the world's first authorization to fly beyond visual line of sight (BVLOS) over a city and in a controlled area of airspace**. This "real-world" testing is unique for Switzerland and has led to facilitated approvals of similar operations in other countries.

"Coupled with the ease of doing business in Switzerland and the specialized knowledge in aero-space systems, this made it a no-brainer for us to establish our European engineering office in Lucerne."

TIM DAWSON-TOWNSEND
CEO Aurora Swiss Aerospace GmbH

SWISS AEROPOLE

swiss aeropole is responsible for the operation and oversight of Payerne Airport in the Canton of Vaud. It is developing the first business and technology park in Switzerland for companies in aerospace and related industries, attracting a growing community of pioneers, entrepreneurs, and established industrial players. It is the birthplace of the solar-powered aircrafts Solar Impulse and SolarStratos, and is the ideal place to develop and test the flying vehicles of the future such as autonomous drones or electric planes. swissaeropole.com

- Switzerland is **highly connected** on an international level and influential in setting up global policies and regulations such as SORA.

- FOCA has recently signed a Declaration of Intent to cooperate closely with the US Federal Aviation Administration (FAA). The cooperation will facilitate significant progress, such as the implementation of **remote identification**.

- The EPFL Innovation Park in Lausanne houses the **headquarters of the Global UTM Association (GUTMA).** The association represents the drone industry worldwide, including in the debate on flight and regulatory standards.

- Companies can try out their innovations in **"real-world" settings**: on the outskirts of cities, in innovation parks, and on military and civilian airfields. Drone testing sites are offered by swiss aeropole in Payerne (Canton of Vaud), Switzerland Innovation Park Zurich or the Lodrino military airfield in the Canton of Ticino. Furthermore, the Swiss Drone and Robotics Center (SDRZ) of armasuisse in cooperation with the Swiss Army offers a **unique expertise and infrastructure for testing** and evaluating unmanned systems and robots respectively, especially for their use in the field of security and defense.

3. Progressive Technology Ecosystem

Switzerland offers a flourishing and **self-reliant technology ecosystem** that comprises established companies, startups, suppliers, leading research, an experienced talent pool and a pragmatic regulatory framework.

Why Switzerland:

- Between the two Federal Institutes of Technology ETH Zurich and EPFL, an active ecosystem has emerged, often referred to as **"Drone Valley"**, comprising more than one hundred start-ups. The **collaboration** between the local ecosystem, word-class research and progressive regulators is exemplary and unique in the world. It offers a fertile ground for the foundation of new companies and the development of innovative products.

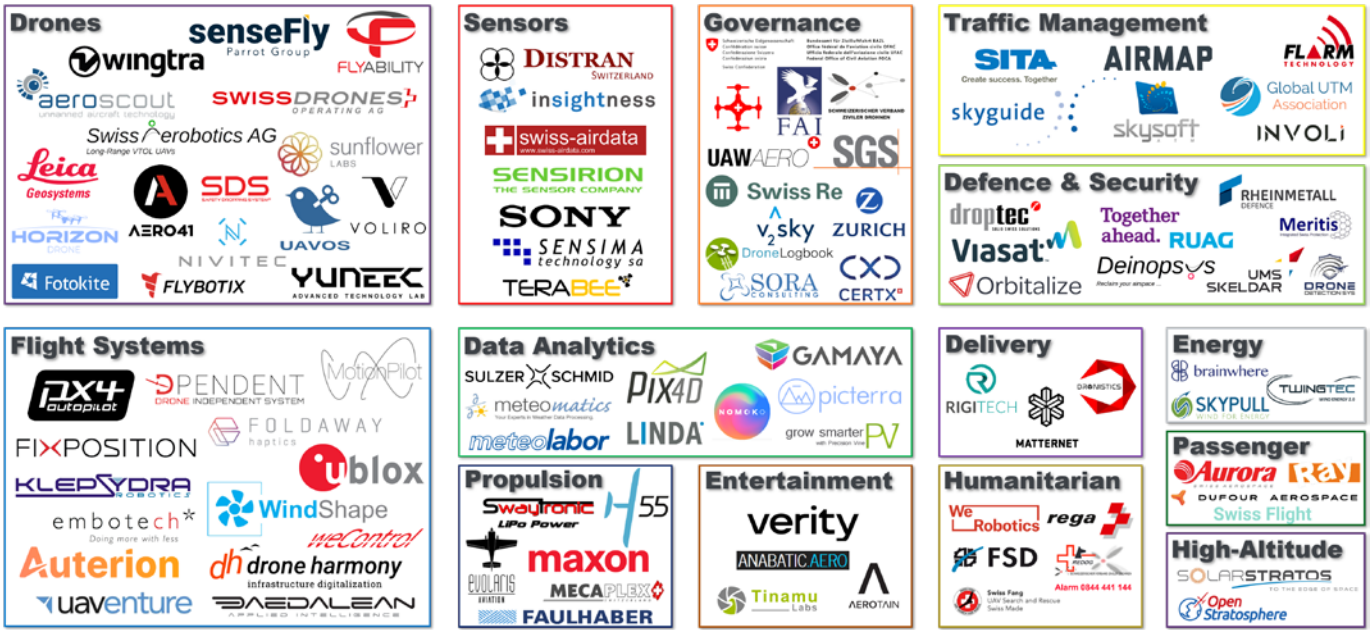
- Multinationals, SMEs and startups appreciate the vast pool of experienced and **highly qualified talent** they find here thanks to world-leading research institutes in the field of robotics and drones. Furthermore, companies profit from graduates from several universities of applied sciences who are renowned for their practical orientation and strength in training engineers.

- Switzerland is a **global innovation leader** that provides a competitive environment to do business and develop new products in. It has consistently been ranked in first place with regard to innovative force (Global Innovation Index, WIPO 2020), ability to recruit and retain talent (Global Talent Competitiveness Ranking, INSEAD 2020) as well as overall competitiveness (Global Competitiveness Ranking, WEF 2020).

- Over the years, an infrastructure has grown to encourage innovative projects and **support founders**. With Lakestar and Index Ventures, Switzerland is home to two of Europe's most successful VCs. Other startup supporters include the NCCR Robotics Spin Fund Grant, Innosuisse, swiss aeropole, and many others**.**

- The Swiss legal system, being both stable and liberal, offers both **significant protection for intellectual property** and a high degree of investment security for R+D activities.

Swiss Digital Aviation Industry Map



Source: Drone Industry Association Switzerland, 2020

Case Studies

- Swiss global player **ABB** presented its new dual arm robot solution called **YuMi** in April 2015. It is specifically designed to address the needs of small parts assembly. A unique feature and key attribute of YuMi is its "inherently safe" rating, meaning it can work alongside humans without posing any risk to their safety. YuMi was invented, developed and designed in Switzerland.

- US-based **Auterion**, the largest open source drone software company, operates its European R+D headquarters from Zurich. Their story began with the revolutionary **PX4** software that was developed at ETH Zurich. PX4 is now the most widely used open-source drone autopilot operating system and the core of a global community of around 400 active developers.

- Yuneec is a world-leading drone manufacturer headquartered in Hong Kong. In 2017, **Yuneec** set up a technology center in the Canton of Zurich to work on state-of-the-art technology for future drones. The innovative environment and the active drone developer community in the area were the decisive factors in Yuneec's site selection process.

- **senseFly** is the flagship of the Swiss drone industry. The company was created in 2009 at the Swiss Federal Institute of Technology (EPFL) in Lausanne and employs over one hundred people. Its ultra-light drones have been successfully used in the Zanzibar Mapping Initiative, the most ambitious drone-driven mapping project in the world. senseFly is now the commercial drone subsidiary of Parrot Group – the leading European group in the drone industry.

- **Bestmile** was born when the co-founders were tasked with managing one of the first demonstration of autonomous vehicles in Europe. Today, Bestmile enables vehicles of any brand or type to work together as intelligent fleets. The company was founded in Lausanne in 2014 and has offices in San Francisco, London and Dubai.

- **Skypull** is an autonomous tethered drone that climbs to high altitudes. By reaching higher altitudes and by avoiding heavy and cumbersome infrastructure, Skypull is less costly and more easily deployable than current wind energy technologies. Its development started in 2013 in Lugano, in the Canton of Ticino. The core team set up a partnership network with multiple companies and suppliers in order to successfully manufacture and bring Skypull to the market.

CONTACTS AND FURTHER INFORMATION

Authorities and Regulators
Federal Office of Civil Aviation
FOCA
bazl.admin.ch

Swiss Air Navigation Services
skyguide.ch

Innosuisse – Swiss
Innovation Agency
innosuisse.ch

Associations and Networks
droneindustry.ch
gutma.org
homeofdrones.org
swiss-aerospace-cluster.ch
swissroboticsindustry.ch

Innovation and
Startup Promotion
asl.etzh.ch
cybathlon.ethz.ch
epfl-innovationpark.ch
fhgr.ch/photonics-lab
grstiftung.ch
idsia.ch
ifj.ch
investiere.ch
lis.epfl.ch
nccr-robotics.ch
rewired.com
sipbb.ch
swissaeropole.com
swissparks.ch
switzerland-innovation.com
venturekick.ch
venturelab.ch

S-GE Resources
Tech Location Switzerland
s-ge.com/tech

Handbook for Investors
s-ge.com/handbookforinvestors

More factsheets on
Switzerland as a business location
s-ge.com/factsheets

Title image: ©Alain Herzog / EPFL