



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Department of Defence,
Civil Protection and Sport DDPS
Federal Office for Defence Procurement armasuisse
Science and Technology

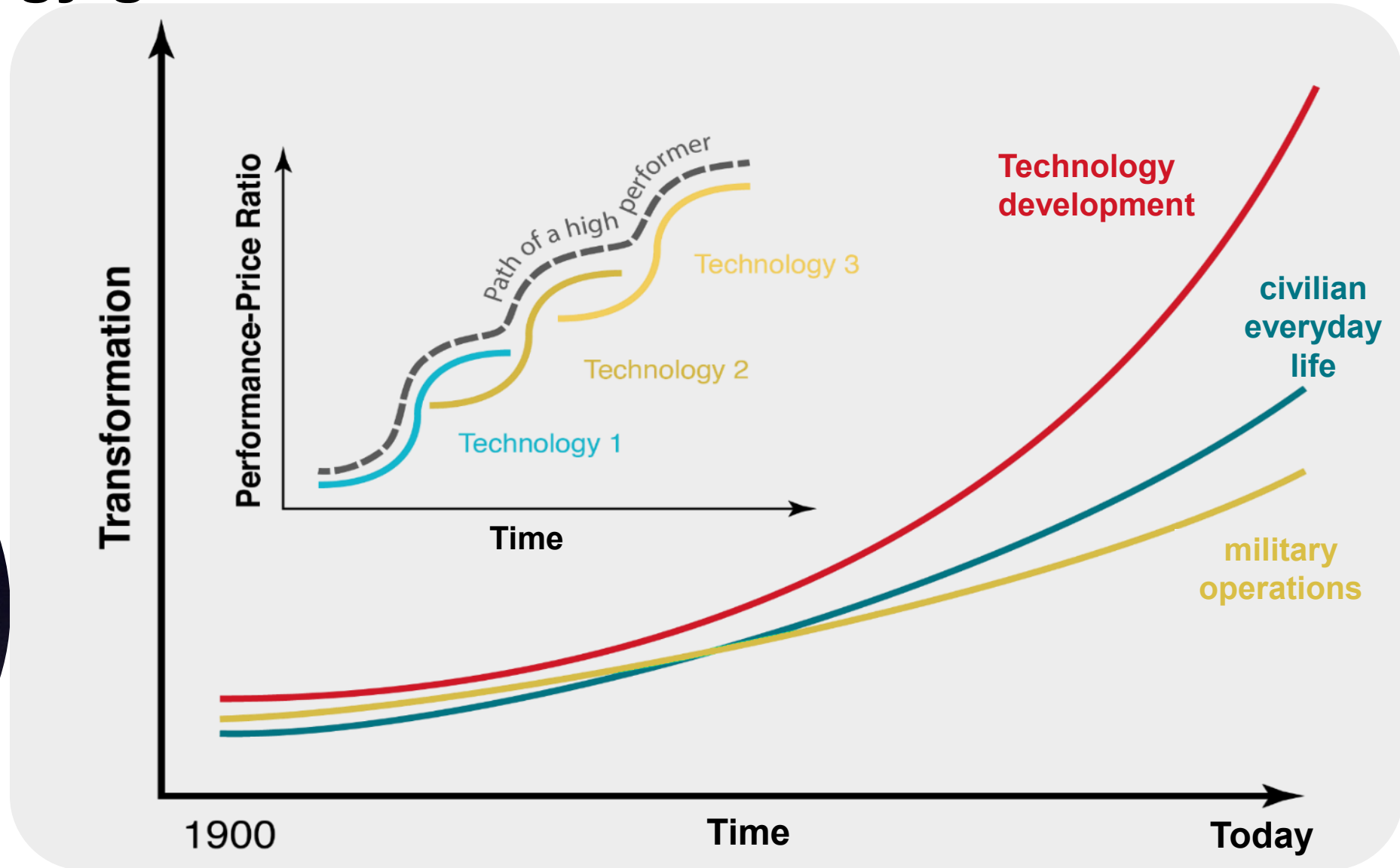
EPFL Swiss Federal Office Day 2024

«Technological responsibility for the security of Switzerland»

Dr. Thomas Rothacher, Head of armasuisse Science and Technology,
07.10.2024



Technology growth



ChatGPT Sprints to One Million Users

Time it took for selected online services to reach one million users



* one million backers ** one million nights booked *** one million downloads

Source: Company announcements via Business Insider/LinkedIn





Swiss DNA

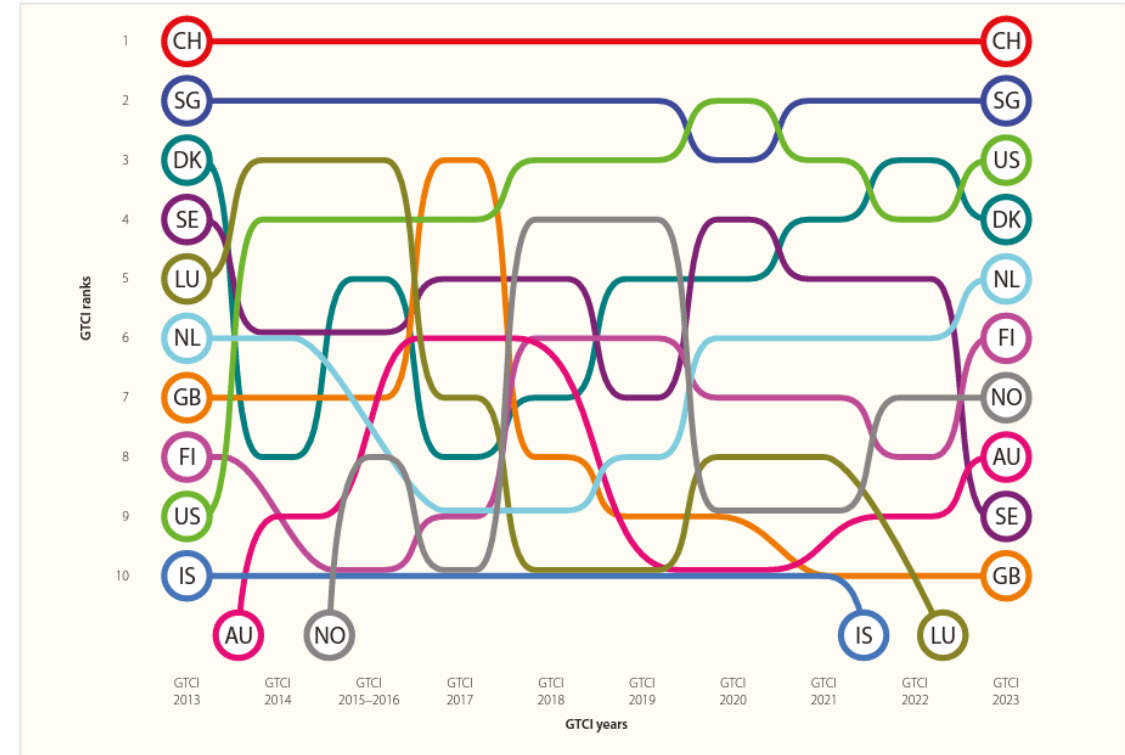
Best Countries

	2016	2017	2018	2019	2020	2021	2022	2023	Average rank 2016-2023*
CH	n/a	1.	1.	1.	1.	4.	1.	1.	1.4
CA	2.	2.	2.	3.	2.	1.	3.	2.	2.1
DE	1.	4.	3.	4.	4.	3.	2.	7.	3.5
JP	7.	5.	5.	2.	3.	2.	6.	6.	4.5
GB	3.	3.	4.	5.	6.	8.	8.	9.	5.8

Global Innovation

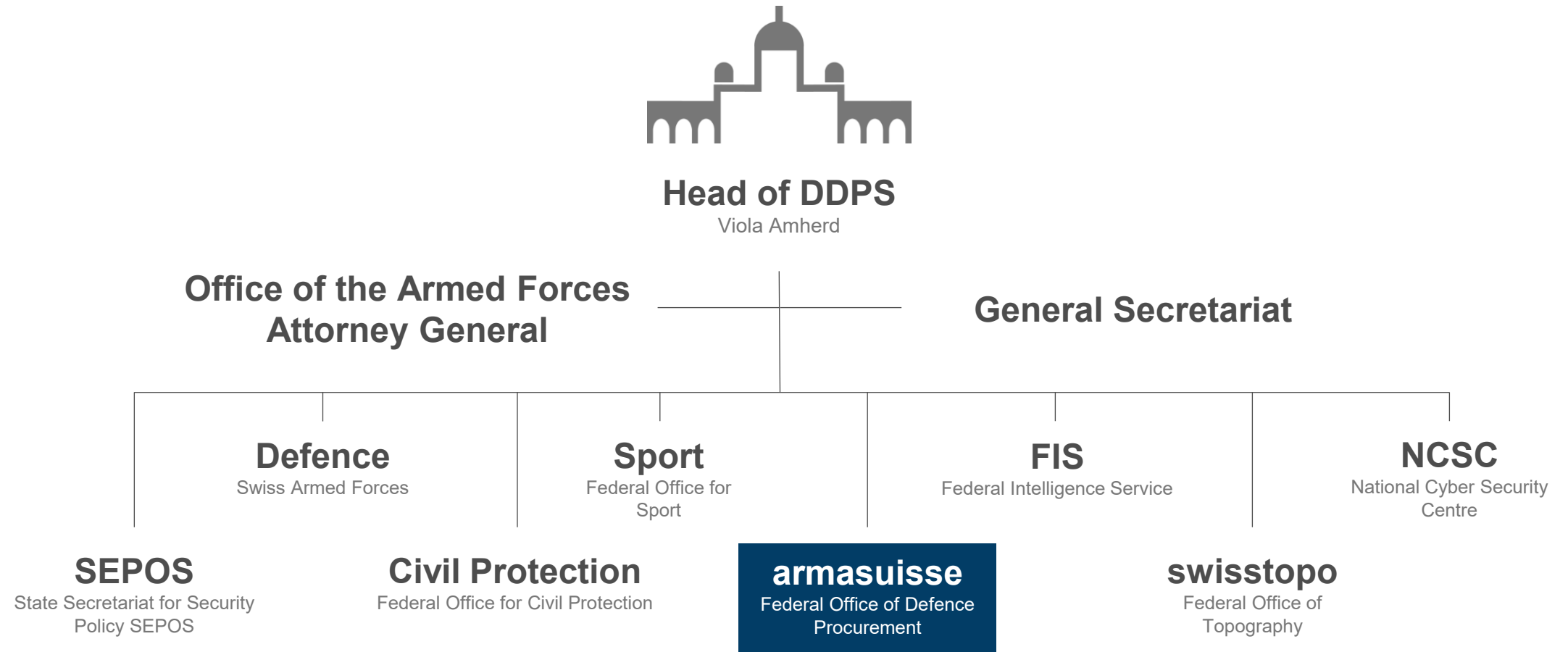


World Talent





Federal Department of Defence, Civil Protection and Sport (DDPS)





Sites





armasuisse S+T – technology centre of the DDPS

Research



Innovation



Testing



Technology readiness level

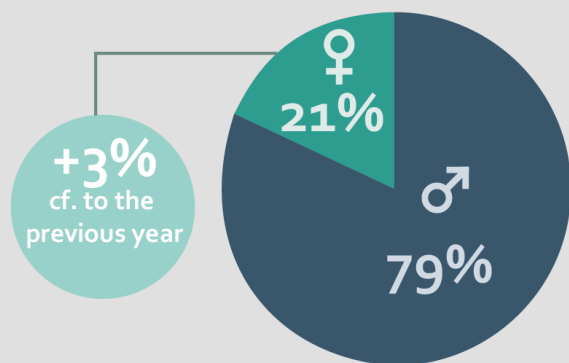
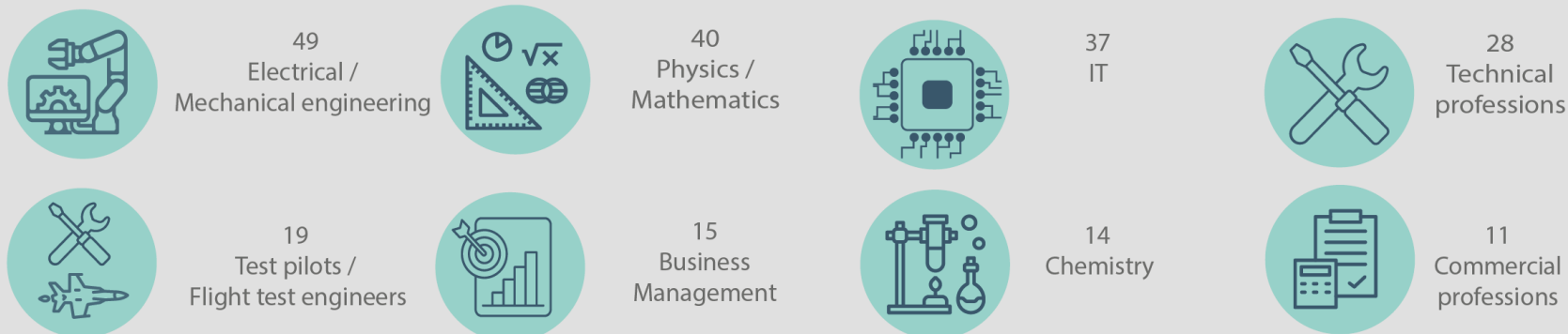


Personnel

213

Employees including **26** university interns and **10** apprentices

Different job groups (including number of employees)



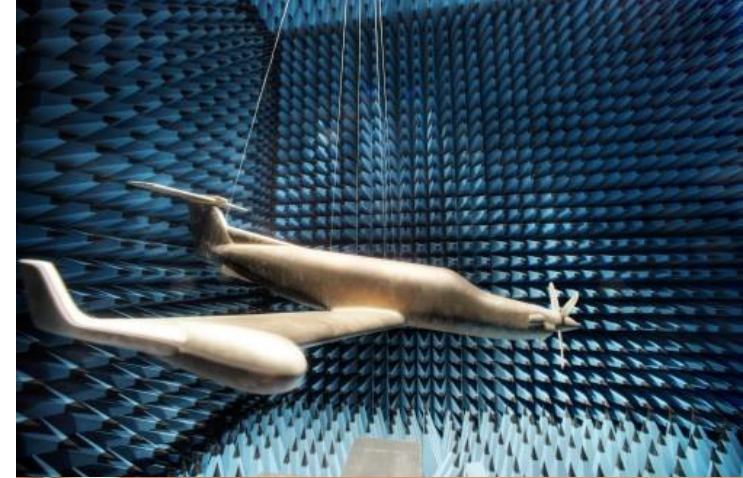
∅ **41** year
Average age

- 56x** Doctorate
- 40x** Master's degree
- 31x** Federal Diploma of Vocational Education and Training
- 26x** Bachelor's degree
- 24x** Professional Education



Infrastructure and laboratories

- anechoic chamber and millimetre wave hall
- EW and EMC laboratory
- optronics laboratory
- HPE laboratory
- firing ranges and underground firing range (200 m + 500 m)
- detonics laboratory
- explosives laboratory
- Thierachern facility (centre of competence for the safe disintegration of ammunition and explosives)
- Cyber security labs (Thun)
- Data Science Lab
- KomSys Lab
- NIS Competence Centre
- Flight Test Center
-





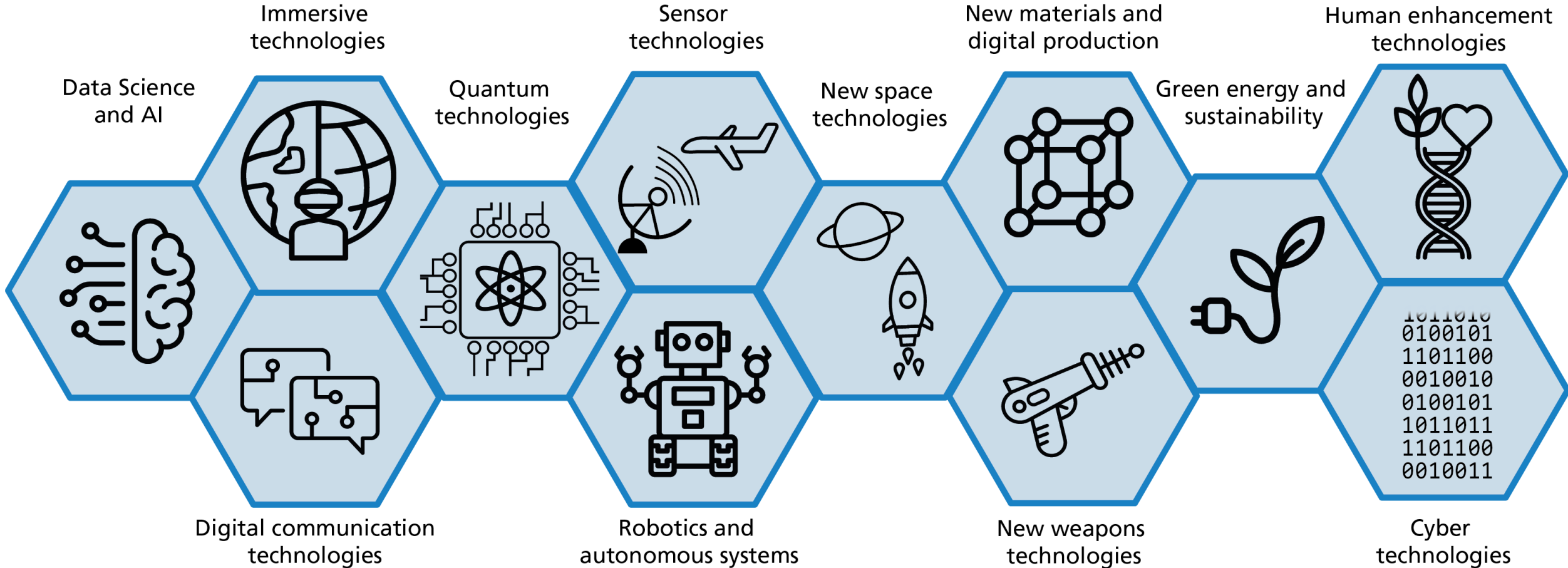
Innovation

007



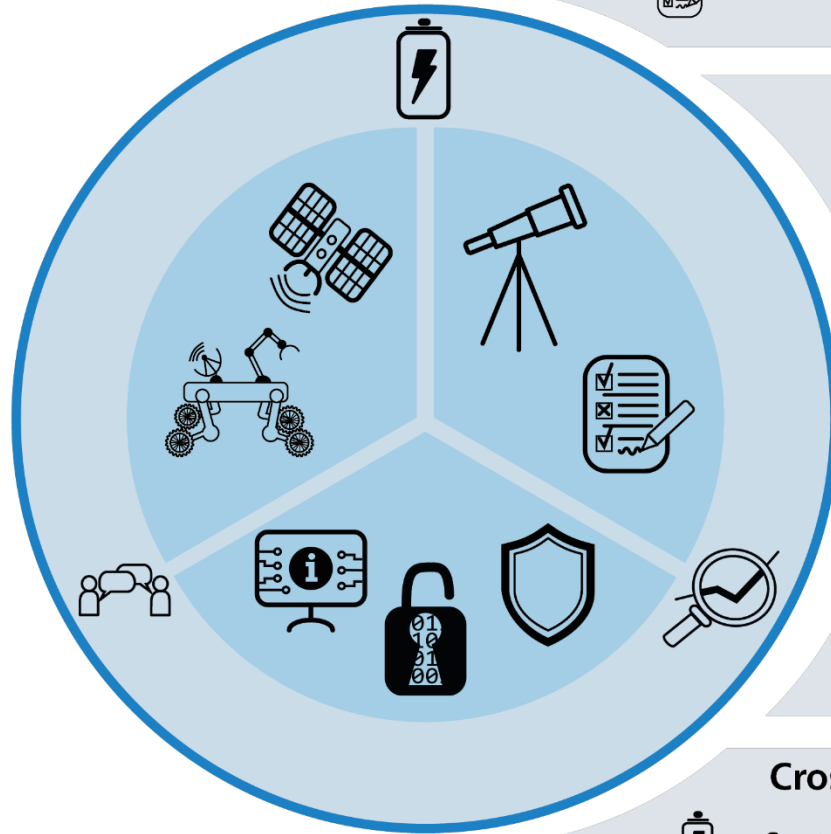


Technology megatrends





Research plan



Technology Foresight



Technology monitoring



Technology impact assessment

Technologies for operational capabilities



Impact and protection in physical space



Operations and protection in cyber and electromagnetic space



Technologies for generating information superiority

Technology integration into platforms



Autonomy and robotics



Space technologies and alternatives

Cross-cutting issues



Sustainable and self-sufficient energy supply



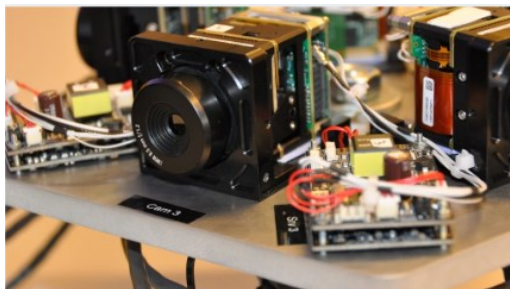
Simulation and analysis



Human Factors



Research programs



Reconnaissance & surveillance



Communication



Cyberspace



Data Science



Impact, Protection and Safety



Unmanned mobile systems



Technology foresight



Space



+





Network Switzerland



The map of Switzerland is populated with numerous blue location pins. Surrounding the map are logos of various Swiss companies and institutions, categorized into four quadrants by colored lines:

- Top-Left (Green border):** TOELT.AI, wingtra, Swiss Aerobotics, FLYABILITY, sarmap, ANYbotics, arktis, FLYBOTIX, ATELERIS, PALINDROME REMOTE SENSING, SWISSDRONES OPERATING AG, numerik games, ONI³, PrecisionWave AG, SKYSEC counter drone systems, Auterion, Picterra.
- Top-Right (White border):** OST Ostschweizer Fachhochschule, Empa Materials Science and Technology, Hes-so, SUPSI, HSLU Hochschule Luzern, Universität St. Gallen, Universität Zürich, EPFL (highlighted in a red box), heig-vd, idiap, zhaw.
- Bottom-Left (Yellow border):** CADFEM, IBM, PILATUS, Together ahead. RUAG, RHEINMETALL, enKOM, GENERAL DYNAMICS European Land Systems.
- Bottom-Right (White border):** adnovum, Schwarzwald Technologies & Consulting LLC, EMProtec, NOSER ENGINEERING, LOGOBJECT, MPS Europa, centredoc, RUEGGER ELEKTRONIK AG, Swiss TPH, SYD-RAL ELECTRONICS AND SOFTWARE, iau, DYNAMIC PHENOMENA, Helvétia G shop, SOLENIX, IMSD, AKTS, shoc, stürmsfs, v₂sky, basalt fibertec, AeroFEM, forventis, HEXAGON, effizienta, TECNOLUTION GmbH, aerospacelab, RAYZON TECHNOLOGIES, clever ways.





Collaboration with EPFL

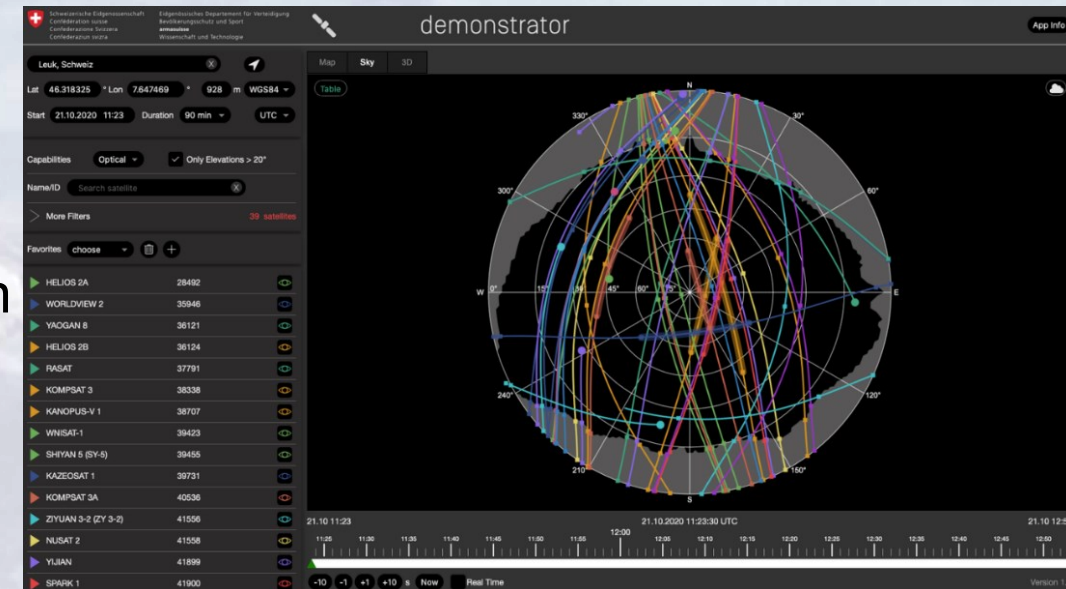
Signal Processing Laboratory 4	Prof Dr. Pascal Frossard	RAEL: Robustness Analysis of Foundation Models
Signal Processing Laboratory 4	Prof. Dr. Pascal Frossard	ANEMONE: Analysis and improvement of LLM robustness
Laboratory of Biomechanical Orthopedics	Prof. Dominique Pioletti	Development of combat helmet providing ballistic, blast and impact protection
STI IEM AQUA	Dr. Claudio Bruschini	Quantum LiDAR for non-line-of-sight application
LTS4	Prof. Dr. Pascal Frossard	ADAN: Anomaly detection in dynamic networks
Institute of Electrical & Micro Engineering (IEM)	Prof. Dr. Edoardo Charbon	SPAD Camera
Telecommunications Circuits Laboratory (TCL)	Prof. Dr. Andras Peter Burg	Passive weltraumgestützte Weltraumüberwachung
Distributed Information Systems Laboratory	Prof. Dr. Karl Aberer	Monitoring Swiss industrial and technological landscape
Lausanne - Institute of Electrical Engineering	Prof. Dr. Anja Skrivervik	Antennas for wideband direction finding: Phase 2
Lausanne - Institute of Electrical Engineering	Prof. Dr. Anja Skrivervik	Use of antenna characteristic modes for directional modulation
Laboratory of Intelligent Systems	Prof. Dr. Dario Floreano	Vision-based Aerial Swarms
Space Innovation Unit	Prof Jean-Paul Kneib	Space Campus
IC IINFCOM HEXHIVE	Mathias Payer	Automated Vulnerability Discovery and Prioritization
Innovation	Dr. Thomas Robinson	EPFL's emerging tech
EPFL		Cyber-Defence Research Fellowship



Example: Space Sector

- armasuisse S+T has several areas of expertise such as:
 - Technology monitoring Space;
 - Space applications and alternatives;
 - Operational picture of space;
 - Satellite technologies and competencies.

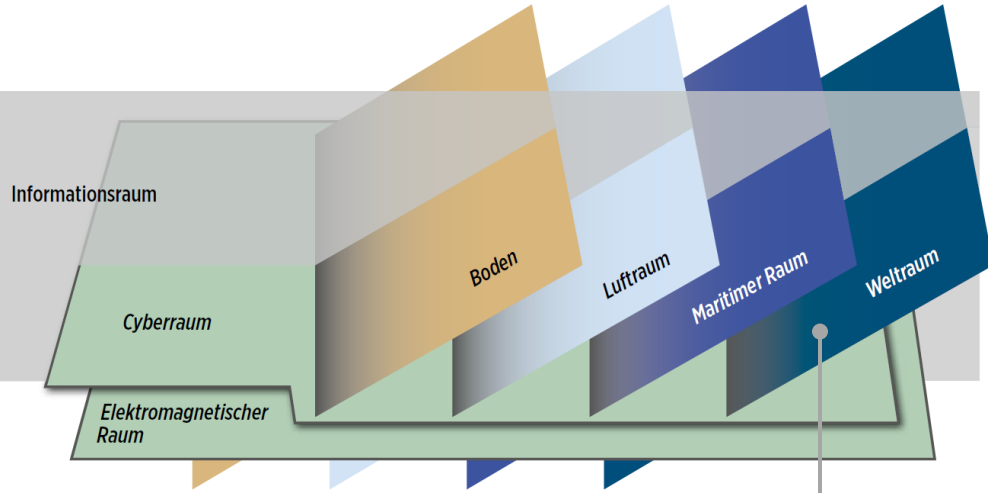
→ Example:
Technology demonstrator: Space visualization



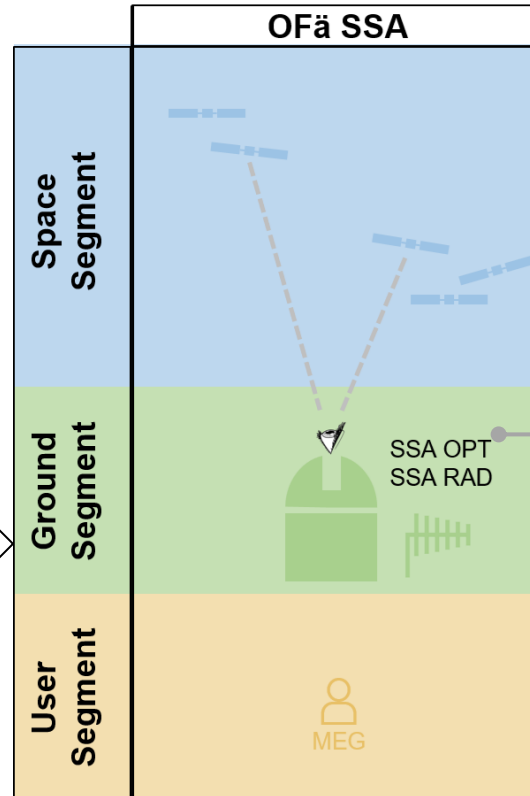
- Project with EPFL:
 - Space Campus @ EPFL: funded by Swiss Armed Forces/armasuisse
 - SPAD: single photon avalanche diode



Example: Operational Domain Space – SPAD project



Operational Capabilities (OFä)	
1	Information Gathering SIGINT, IMINT OPT/RAD («looking down»)
2	Situation Picture Space SSA/SDA («looking up»)
3	SATCOM Dezentrale und dauerhafte Verbindungen
4	PNT Integrity checks and GPS redundancy
5	DCS Self-protection, camouflage, deception



SSA OPT

What we already do:

Ground-based observations with optical telescopes and CCD/CMOS detector during night time.

Research project with EPFL

What we would like to do:

Ground-based observations with optical telescopes and SPAD* array detector during day time.

*single photon avalanche diode



Drones and robotics

The Swiss Drone and Robotics Centre

- Support for integration into military formations
- Competence network
- Robotics innovation for the Swiss Armed Forces

Advanced Robotic Capabilities for Hazardous Environments

- Military Utility Assessment, 1 week

- **Advanced Robotic Capabilities:**
Focus on technology/research, not on established products
- **Hazardous Environments:**
dangerous environment - genius/rescue/ABC



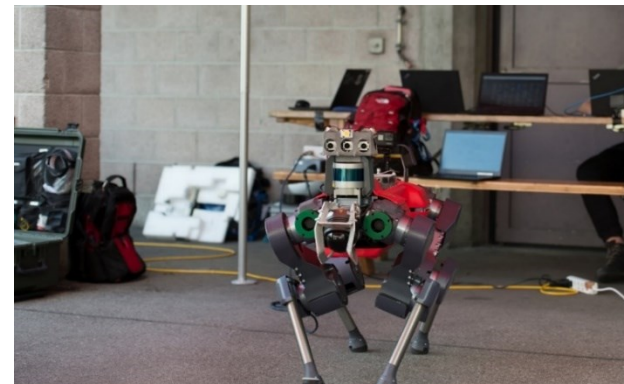
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

armasuisse
Wissenschaft + Technologie
Schweizer Drohnen- und
Robotik-Zentrum

ETH zürich



robotics+





Cyber-Defence Campus

- Foundation of the Cyber Defence (CYD) Campus as a federal cyber defence competence centre in 2019
- Locations in Thun, Lausanne and Zurich
- Objectives
 - Early detection of developments in the cyber area
 - Development and testing of cyber technologies
 - Training of cyber specialists
- CYD Campus is
 - central element of the Cyber DDPS 2021-2024 strategy
 - Link between the DDPS, industry and academia in research, development and training for cyber defence





Impact of the collaboration between EPFL and armasuisse S+T

- Impact on national security
- EPFL: Access to applied research projects, collaboration opportunities with key players in the defense sector
- armasuisse S+T: access to academic expertise to meet specific challenges
- Development of new technologies



Key messages

Technological change:

- The rapid change in technology is a fact and is already shaping us today
- Will change our culture and security environment

Environment:

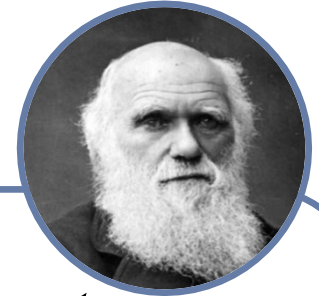
- Increasing importance of security
- Revolutions in warfare
- Nations are arming themselves more and more
- International co-operation is becoming increasingly important
- Political framework conditions influence the economy + security



*"Move forward,
make a difference –
shape the future!"*

*President of the Swiss Confederation
Viola Amherd*

*Head of the Federal Department of Defence, Civil Protection
and Sport DDPS*



*"It is not the strongest
species that survives, nor the
most intelligent, it is the one
that is best able to adapt to
change."*

Charles Darwin

British naturalist and father of the theory of evolution



Contact



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