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Switzerland's digital future

The economy and society
of tomorrow



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THINK TANK FOR BUSINESS, SCIENCE & SOCIETY

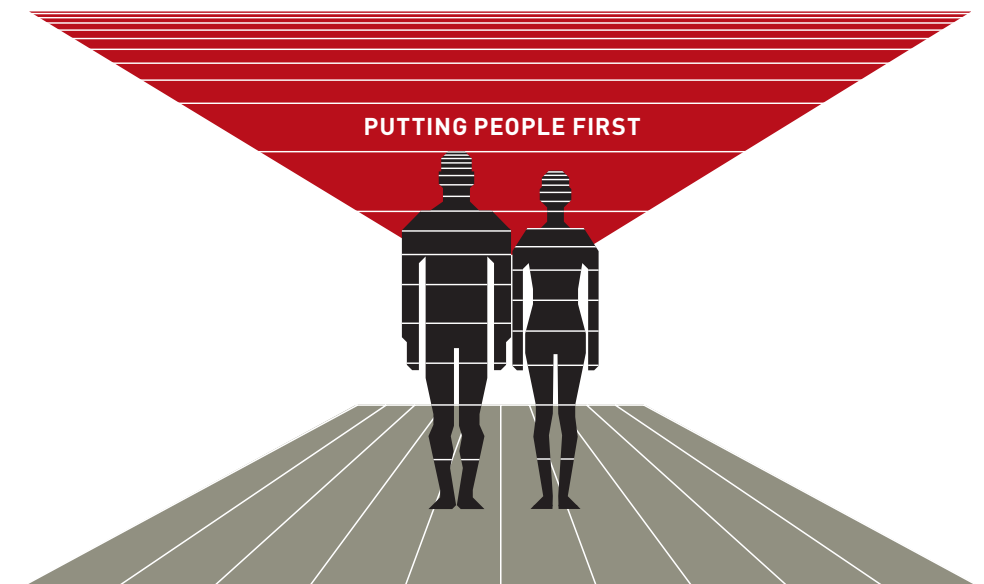
Towards a new digital world

Digitalisation promises opportunities for economic growth and a high quality of life. Switzerland stands to benefit. The first step is to understand the mechanisms, areas of application and long-term consequences. This brochure* is designed to give an overview. It describes the DNA of Switzerland as a business location and illustrates three scenarios for tomorrow's digital Switzerland.

*this is an abbreviated version of the digitalisation brochure
"Zukunft digitale Schweiz. Wirtschaft und Gesellschaft weiterdenken",
available in German, French and Italian.

Understanding digitalisation – and thinking ahead

Everybody is talking about digitalisation. Terms like block chain, big data, virtual reality, cybersecurity, machine learning and cloud computing represent the new basics of the data-based world. However, the more terms we invent to describe tomorrow's world, the blurrier our understanding becomes of what digitalisation actually means. These concepts cannot replace an in-depth discussion of the economic and social framework conditions that these new realities call for. Technology provides the foundation. At the centre, however, are people and the fields of application that digital infrastructure opens up for us.



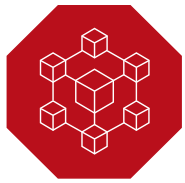
TECHNOLOGY AS FOUNDATION

In a holistic approach to digitalisation, technology is the foundation on which applications are built. Applications generate, process, store, and transmit data. They allow us to perform existing tasks more efficiently or better, they help us produce, build networks between people or machines, create experiences in virtual worlds, or outsource tasks to machines.

Wikipedia, the online encyclopedia and knowledge centre of the digital world, defines digitalisation as "the preparation of information for processing or storage in a system based on digital technology." The conversion of data from analogue to digital has numerous practical advantages and opens up a wide range of applications.

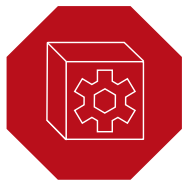
FIELDS OF APPLICATION

The true potential of digitalisation lies in the opportunities it presents for organisations and individuals. There are four main fields of application: automation, virtualisation, networking, and realisation. Sustainable innovation depends on understanding the opportunities and challenges within these fields and designing new business models, sales or communication channels based on them.



1. Building networks

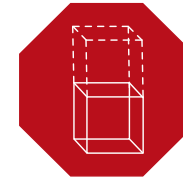
The internet is based on a global network of computers that makes it possible to exchange data in real-time. The digital social networks that have mushroomed in recent years reflect traditional social structures but also allow the formation of new communities. These platforms provide a space where knowledge and experiences are exchanged; joint projects across national borders and languages are developed, implemented, and financed; existing assets are shared and, as befits a so-called “sharing economy”, resources are used efficiently and sustainably and knowledge is developed jointly.



2. Automation

Digital tools enable businesses or individuals to out-source processes or activities to computer-based systems. Software based on more or less complex algorithms performs numerous functions from remotely controlling home temperatures to operating autonomous vehicles at some point in the future. Robots, for their part, already perform many household tasks and increasingly take the place of humans in manufacturing. Due to the rapid technological advances of recent years, more and more tasks can be automated today.

Just how soon artificial intelligence will be advanced enough to perform truly complex tasks that still require human expertise or exist only in the realm of imagination is a matter of debate. Current applications show that in certain fields of medical diagnosis, e.g. the identification of skin cancer, artificial systems already outperform doctors. On the other hand, artificial intelligence reaches its limits when it comes to diagnosing patients with multiple illnesses.

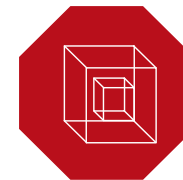


3. Virtualisation

Advances in the visual representation of content with smaller and more potent monitors and processors open up new possibilities for the development of augmented reality (AR) and virtual reality (VR). In contrast to virtual reality where the user is completely immersed in a virtual world, augmented reality is a technology that superimposes computer generated information on a user's view of the real world.

AR opens new ways of communicating by making the exchange between people possible anywhere – or it simplifies navigation by superimposing local information directly onto the user's environment. Relief workers call up information about targets and dangers into their field of vision as they advance through a disaster zone, while designers work on the same three-dimensional model with virtual colleagues from around the globe. In manufacturing, important machine parts are virtually labelled and the system provides the mechanic with instructions. In the medical field, augmented reality is used to make invisible elements visible.

Augmented reality can also be used to generate new experiences and new forms of entertainment and games in which real space is reconfigured. AR can also teach a person new skills – for instance, by providing instructions for activities in real time and superimposing them on the real world. In the kitchen, such instructions could help a person find the ingredients for a meal and show them how to prepare it.



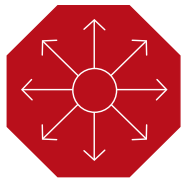
4. Realisation

Declining prices and miniaturisation have made digital devices widely available in recent years, ushering in a democratisation of technology and giving more and more people the ability to produce and offer goods or services – activities which previously required access to expensive infrastructure. This has led to an enormous proliferation of information sources unrelated to classical forms like newspapers where knowledge is independently produced and exchanged. Cheap, powerful software helped generate new fields of application and multiplied the productivity of individuals and small organisations: a laptop can be used to produce the kind of professional quality music which until recently depended on access to very expensive studio technology and to the distribution channels of music labels. This process continues, affecting all areas swept up by digital means of production.

The advent of 3D printing is transforming the manufacturing industry with a technology that makes it possible to produce one-offs of even the most complex objects. The ability to make a different product with each production run is undermining the economies of scale, which previously determined every aspect of industrial production, and over the years has led to the massive relocation of the labour-intensive manufacturing processes to low-wage countries.

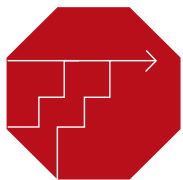
FURTHER RAMIFICATIONS

In the long term, the impact of digitalisation on the economy, on society and the individual opens up both opportunities and challenges. It will be necessary to make some important strategic decisions and identify the fundamental issues that need to be clarified. Accepting the challenges of the digital economy means thinking beyond the demands of the present without forgetting that the journey to the future starts now.



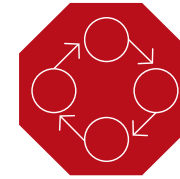
1. More design space – more complexity

The diverse aspects of digitalisation expand the design space of individuals and organisations. As the internet expands and everyday life is thoroughly mapped and recorded, we have access to more and more data and can make faster and more accurate decisions. We now have the possibility to receive custom-made data, network with others and exchange ideas in real time, soak up new experiences in virtual spaces, create products and services of our own without having to invest a fortune. A flood of new economic, scientific, and cultural goods will lead to a diversification of markets and opens niches of growth for small merchants that offer one-stop shopping online. The relentless monitoring of lifestyles and tracking of consumer behavior in the digital era generates an increasingly precise personalisation of information, services, and products. In medicine, finance, and media, online offerings are increasingly tailored to the tastes, interests, and behaviours of specific consumer groups or individuals. Data is the raw material of the digital economy. This is reflected in the success stories of Google and Facebook, which have become the world's most valuable companies by appropriating and managing our data. Still, the true potential of data needs to be examined more precisely.



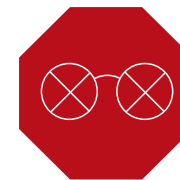
2. More efficiency – more convergence

More and more work is being performed by autonomous systems. This is true for all areas of life and work from mobility to shopping, health care, or the use of insurance. As a result, the world of work is also changing. Repetitive activities and tasks in industry, service professions and everyday life are delegated to algorithms or robots. Lower costs and higher quality increase business efficiency. And jobs are outsourced. In contrast to earlier industrial revolutions these changes affect not just one educational class, but people at all levels of education: manufacturing jobs as well as service and administrative jobs. Efficiency gains from automation result primarily from the fact that machines or algorithms now outperform people at tasks like maintaining databases or accounting programs – they are faster and make less mistakes.



3. More community – more fragmentation

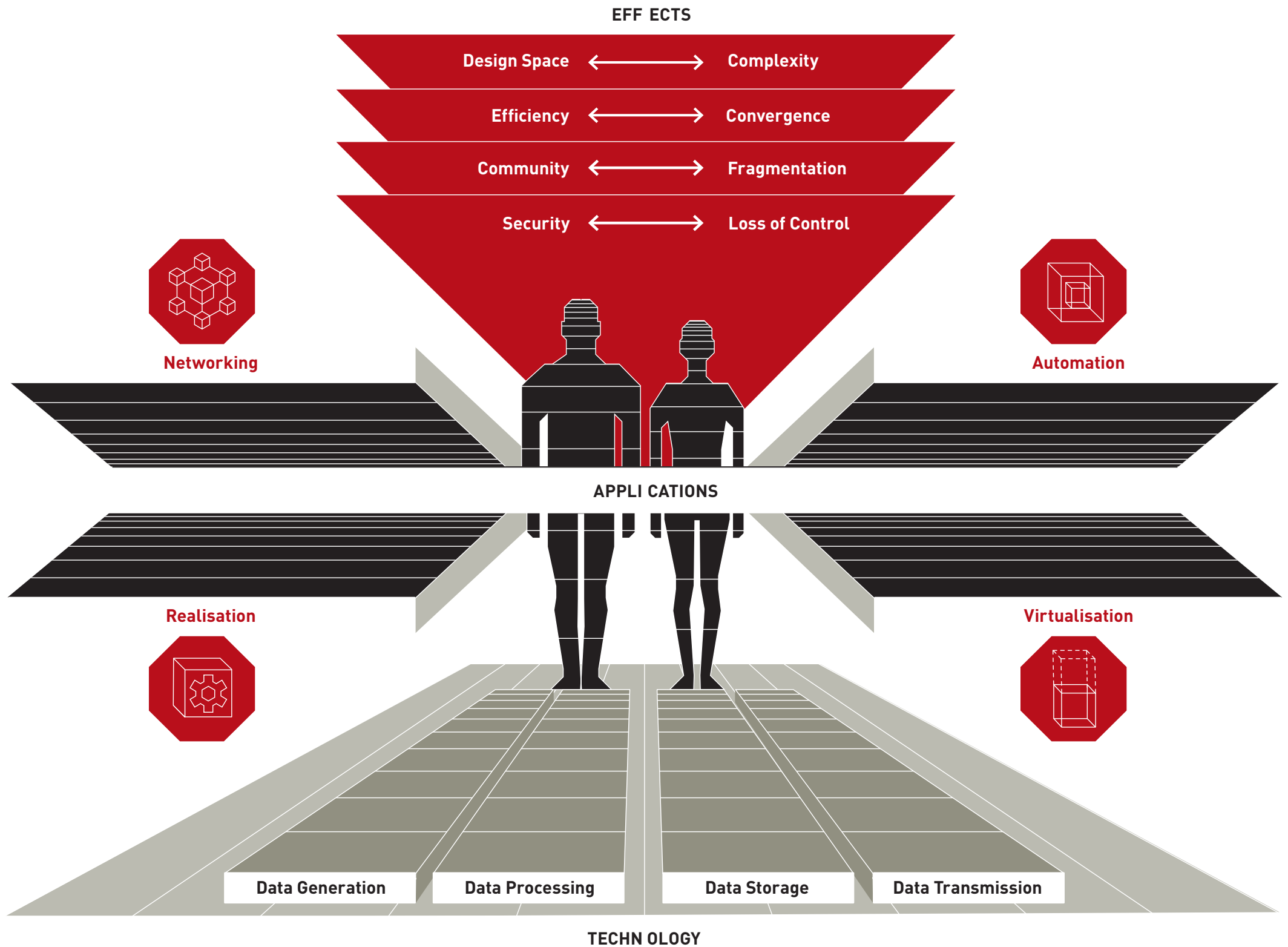
While digital networking brings people together, the mechanisms that shape these connections directly or indirectly control these exchanges. One of the key challenges posed by global connectivity is to make this vast number of links manageable. In an analogue environment the conscious or unconscious decisions of individuals – and also, at times, pure chance – determine which connections are made. The algorithms used to organise hundreds or thousands of connections prioritise certain connections and certain content. Intelligent programs that establish connections based on past behavior or common interests are widely used. People who share an interest in some topic or have similar political views are given preference. Such algorithm-based linking of profiles inevitably leads to a fragmentation of the public discourse and to the emergence of closed groups, filter bubbles, or echo chambers: people with the same interests receive the same information but are walled off from people with a different profile. This circular communication structure holds risks for the economy and for society. The resulting uniformity of opinion within social groups tends to undermine the ability to innovate, which depends on a variety of inputs and ideas to arrive at creative solutions. Closed groups are also a danger to the cohesion of the larger society since ideas are only ever exchanged within homogenous groups.



4. More security – more loss of control

Digitalisation increases the transparency of the mechanisms that shape business, society, politics, or medicine. We make better decisions and thus gain more control over our environment. The networking among machines and the emergence of the internet of things offer more convenience and simplicity for users and society. Our lives become more secure, simpler, and more efficient. Traffic jams can be reduced if vehicles communicate among themselves, parking spots in inner cities are easier to find, block chains allow homes to exchange energy among themselves. This increases our control over the real world.

As interests and habits of consumers and citizens are more closely tracked, the risk of data loss/theft and the resulting potential for abuse increase exponentially. Moreover, a fundamental ambiguity concerning the ownership of personal data persists: a person's genetic data might reveal a predisposition for a certain illness that might occur at some date in the future, thus calling into question existing insurance models. With the emergence of a digital infrastructure that touches on every aspect of a society's life comes the danger of cyber-attacks that threaten the integrity of the system. External powers could conceivably assume control over cars, homes, or hospitals.



The DNA of the business location Switzerland

From its founding days to the present, Switzerland has developed into one of the most competitive countries in the world. What are the deeper reasons behind this success story?



The main factors behind the success of the Swiss economy are reflected in the annual country rankings based on competitiveness and innovation potential, where Switzerland regularly occupies one of the top spots:

- macroeconomic stability
- functioning market economy
- free enterprise
- open access to world markets
- leading education and research location
- competitive finance and tax policies
- strong infrastructure
- free and open labour markets
- secure, competitive energy supply and efficient environmental protection

As fundamental changes driven by technological advances keep coming our way, it is worth taking a closer look: what are the deeper reasons for this success story?

OPENNESS



Smallness as a characteristic feature and advantage has shaped our country, our culture, our way of thinking, and our economic development. Switzerland is not only small but also situated on important trade routes and at the intersection of different cultures and mentalities. As a result, Switzerland has become an open country with extensive international connections. The lack of important natural resources has made it a necessity for Switzerland since the earliest days of international trade to import raw materials for its industry and export manufactured products with a high added value. Switzerland was an important investor in foreign countries early on. Faced with a small domestic market, Swiss companies like Nestlé or BBC built their own factories in foreign countries early on. Exposed to the rough winds of international competition, they specialised in the manufacture of high value products and services with an eye to the needs of buyers in other countries.

Openness as source of innovation

Switzerland's economic openness is reflected in its ability to adapt and innovate – a quality that has enabled it more than once to master structural change successfully. Many large and small businesses still testify to the innovative and competitive strength of the internationally oriented Swiss economy; their success often resulted from small innovations and improvements. The relentless technological development and globalisation of trade and politics in recent decades have, if anything, intensified the international outlook of Switzerland.

Switzerland's openness acted like a magnet on innovative foreign entrepreneurs and investors who often showed more taste for risk taking than the natives. Arriving in Switzerland for a variety of reasons, they quickly came to appreciate the country's advantages for their entrepreneurial activities. The skills and knowledge they brought with them, however, were not lost on their countrymen. Switzerland remains attractive for foreign businesses to this day. Google, to name just one recent example, opted for Switzerland when it was scouting for an important development location.

International law: Switzerland benefits

International integration also forced Switzerland to focus on foreign markets, which meant accepting certain limits to its self-determination. Switzerland is too much a part of the world to dodge global trends and developments. The country depends on open and free trade relations. But this is not a disadvantage. Thanks to technological progress and the institutionalisation of international relations – e.g. in the World Trade Organization or the United Nations – exchange between countries has

become more transparent and balanced. Small nations like Switzerland, in particular, benefit in the geopolitical concert of the major powers when military might counts for less than competitiveness and efficiency.

The curse and blessing of short distances

Smallness had its disadvantages, too. Sectors of industry which did not have to contend with international competition tended to form cartels. This made it easier for individual actors to safeguard their sinecures and acquired rights in the economic-political process. At the same time smallness helps the economy remain engaged in exchange and to respond quickly to changing needs. If Switzerland, one of the great beneficiaries of globalisation, wants to be among the winners of digitalisation as well, it must overcome the temptation of certain domestic-oriented sectors to protect their vested rights no matter what – ideally before larger circumstances force them to change.

SELF-RELIANCE



Self-reliance is an important pillar of Swiss identity: every person is accountable for his or her actions; no one can claim to be exempt because of class or origin. This is one reason why Switzerland succeeds like few other countries at integrating immigrants within a relatively short time. The fact that Switzerland has no parallel

social structures to speak of despite a very high proportion of foreign residents counts as no small achievement in an international comparison.

From an economic perspective, free enterprise and a liberal, open market are key features of a self-reliant society.

Federal freedoms

Switzerland has a strong liberal tradition. Important liberal concerns like universal suffrage, property rights, personal freedom, freedom of religion, trade and commerce as well as other basic rights were introduced early on. The republican conception of the state – meaning the building of the state from below with the participation of the people – was never in doubt. An important step for our country was the introduction of the Federal Constitution of 1848.

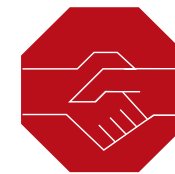
Aside from numerous basic human rights, it also guaranteed the freedom of trade and commerce throughout Switzerland.

Self-reliance is maintained by a well-developed education system. Only citizens with an adequate education are in a position to take responsibility for themselves.

Work instead of natural resources

Swiss prosperity is not the result of plentiful natural resources but of the work of self-reliant individuals in a society where diligence, accuracy, reliability, quality and entrepreneurship are held in high esteem. The culture of self-reliance is at the root of an attitude that encourages curiosity, trial and error and has fostered constant innovation.

PUBLIC SPIRIT



The success and prosperity of Switzerland are based on competition. In Switzerland, there is no case to be made for shirking risk. The Swiss protect themselves against failure. On the level playing field of equal opportunity, no one should be excluded from economic and social life. Progress is for everyone. This reduces the risk that minor-

ities will be left behind in the process of economic and social development.

Equal opportunity is also a hallmark of public education in Switzerland. The permeability of the education system offers everyone an opportunity for social advancement. Any person ready and willing to learn can go far in Switzerland – in our permeable and dynamic system of education there are no dead ends. This is why the Swiss population has been able to successfully navigate all structural upheavals to this day and why all strata of the population have been able to benefit from rising incomes.

Militia system vs. competition and meritocracy

The militia system of Swiss politics, the great willingness to engage in civic societies, the universal conscription and civil service are important expressions of the communal spirit. They encourage the entire population to contribute to the common good. But this public spirit is increasingly under pressure: the meritocratic society with its time constraints, long commutes, and new media is taking a toll on the volunteer spirit. In addition, growing demands on citizen-politicians at all levels are leading to an increasing professionalisation.

Liberal labour market sustained by generous safety net

Another feature of the Swiss sense of community is the safety net for those in need of help but supported by all. The most visible expressions of this spirit are a fair tax code and a generous social security system. Both provide for a measure of redistribution from high performers to low without stifling self-reliance, motivation or the spirit of enterprise.

Better than most countries, Switzerland also balances long-term competitiveness and innovation with social equity. Economic success ultimately provides the means to protect households and individuals from severe economic risks. A generous safety net takes the sting out of a

flexible and minimally regulated labour market: the economic fate of the individual does not depend on an individual job. The effectiveness of a comprehensive social safety net was evident in the recent financial and economic crisis. Crisis-related losses of income barely made a dent in disposable incomes across the board. Despite the crisis, income distribution has largely remained the same.

Community under pressure from growing individualism

A sense of community is the indispensable counterpart to personal responsibility. Community spirit requires that the members of a community share a sense of belonging together and look out for each other: even if everyone does their best, no one is immune to needing the support of others once in a while. Personal responsibility without sense of community degenerates into individualism and egotism – and community spirit without personal responsibility doesn't work, as history has shown.

VARIETY



Switzerland may be small and compact but in many ways the country is astonishingly decentralised. The identity of its citizens is strongly defined by their geographical origin – village, city, region, and canton. A Swiss is primarily a citizen of Geneva, of Ticino, of Grisons and only then a Swiss citizen. This cultural

and linguistic heterogeneity is the essence of Switzerland, made possible among other things by the country's location at the confluence of diverse cultural and political currents in the heart of Europe.

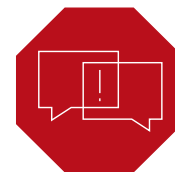
This led to a great diversity, which also developed because many parts of the country were relatively isolated for a long time. In the political process, such diversity means there are many minorities and no one is always the winner or loser. Moreover, having experienced diversity in their own country the Swiss are generally open to others and can appreciate viewpoints that differ from their own.

Recognising tensions quickly

As a rule, (political) problems in Switzerland are addressed at the level at which they appear (commune, canton, or federation). Subsidiarity and the rules of direct democracy make our political institutions quite responsive to the concerns and worries of the population. Social tensions are recognised in their early stages and channelled into politics. Often, in a kind of informal competition of ideas, each canton or community works out its own solution.

In the world of business, of course, ongoing competition of and for ideas is an excellent way to maintain an economy capable of innovation.

CULTURE OF CONSENSUS



A culture of consensus is the key to Switzerland's political and economic stability. A cooperative understanding of government and decentralised structures are the foundation of the Swiss political system. The system of part time citizen-politicians coupled with the principle of subsidiarity prevents the emergence of a caste of career politicians and allows all citizens to participate in politics or seek elected office.

The struggle for compromise solutions

The opinion forming process is designed to encourage a wide participation of the public. The views of minorities are included in the search for solutions. Majority dominance over minorities runs counter to Swiss political culture. The struggle for compromise solutions is a defining feature of Swiss political debate. The composition of governments at the different levels (confederation, cantons) also reflects this understanding of government.

Direct Democracy

The instruments of direct democracy like initiatives and referendums are an important corrective in a consensus-based democracy. Sizeable minorities can introduce their concerns into the political decision-making process. Sociopolitical trends are recognised early and can be addressed. This raises the social acceptance of political decisions, maintains political and social stability, and ensures legal certainty.

Consensus culture prevents rash decisions. Consensus-based decisions are time consuming – and the status quo often carries the day. In a rapidly changing world this can be a disadvantage.

Strengthening the political awareness of its citizens is one of the most important tasks for Switzerland if the country expects to maintain its current stability and its success.

Scenarios for digital Switzerland

The future of the digital economy opens up many exciting perspectives: opportunities abound across the economy to exploit the potential of digitalisation for new business models and added value. On the pages that follow three scenarios provide food for thought about the digital Switzerland of tomorrow. Some of these scenarios are already being traded as growth markets while others are still little known.

Public and individual modes of transport are converging. This reduces the pressure on public transport to concentrate exclusively on profitable main routes. Instead, thanks to autonomous vehicles, even peripheral regions can be accessed easily on demand, making small public transports competitive again. From the apartment in Hicktown to the grandparents in Centreville the way to travel is by shared taxi now. And from regional centres to cities trains are still the most efficient mode of transport. Autonomous vehicles erase the distinction between taxi services and public transport. Our work habits have changed as well, since commuter lines can now be used for work. Settlement patterns in Switzerland have softened; peripheral regions and the margins of urban agglomerations are appreciated as places to live and work. In order for these structural changes to come about sustainably, planners will need to think outside the usual boxes: mobility must be understood as a complex whole and not be reduced to a specific means of transport.

→ Sustainably developed peripheral regions

Autonomous vehicles individualise public transport and connect remote locations.



→ Comeback of the mountain farmer

Robots support small farmers
by doing the heavy lifting.

It is almost impossible to make a living anymore in traditional Swiss trades like mountain farming. But a new generation of intelligent agricultural technology is opening up fresh perspectives: robots and other automated farming machinery perform strenuous tasks. Sensors and weather monitoring software optimise planting and harvesting processes. The improved performance of mechatronics allows robots to be used in the most difficult circumstances – even where they come into contact with people, animals, or untamed nature. Other very small businesses might find such robot technology to be in their interest as well. This opens up opportunities for the revival of endangered trades. However, this will only happen if the new opportunities are recognised and the necessary skills acquired. This includes the profitable use of robots as well as guiding and maintaining the machines.





→ Vacations made to order

Digital navigation aids for individual and efficient tourism help to protect the environment.

The desire to travel into unspoiled nature is undiminished. Stuck in a mass of tourists, unique experiences are hard to come by and the pressure on scenic environments is growing. Individualised guidance systems provide tourist regions with new options: they can guide visitors to the right places based on their individual needs. Hikers plugged into an intelligent guidance system can avoid notorious bottlenecks and receive personalised recommendations for alternative routes. Tourism planners can make valuable environments accessible in a sustainable fashion and automatically protect them if necessary. The system relies on the real-time evaluation of various data sets such as the movement patterns of the networked hikers, preferences and interests on social networks, and weather data. If a local storm approaches, the system proposes alternative routes. At the same time, new social networks pair unusual requests with matching offers. Yoga lessons on Sunday morning at Bürgenstock? Check. Hornuss player needed? Check. This facilitates niche providers' access to their customers and specialised regional offerings get a boost.

SWITZERLAND'S DIGITAL FUTURE: The economy and society of tomorrow

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economiesuisse is the Swiss business federation that represents the interests of Swiss business – competitive, internationally networked and responsible. As a key link between politics, business, and society, the federation advocates and promotes optimal business conditions for Swiss companies large and small. economiesuisse represents some 100'000 businesses with 2 million employees. The rapid technological developments of the last few years are of concern to economiesuisse.

The federation is asking whether the trusted economic success factors that have allowed the Swiss economy and its businesses to flourish in a climate of global competition still apply in the digital world.

Several panels staffed by members have studied these questions under the direction of Prof. Dr. Rudolf Minsch, Kurt Lanz and Thomas Pletscher.

www.economiesuisse.ch

W.I.R.E. is an interdisciplinary think tank that has been studying global developments in business, science, and society for around ten years. The think tank focuses on the early recognition of new trends in digitalisation and their translation into strategies and fields of action for companies and public institutions. W.I.R.E. examines, among other things, potentials and risks associated with the data-based world and identifies opportunities and areas of application for the profitable use of these technologies. The main objective is to understand the influence of digitalisation on new markets, business models and society and to anticipate strategies for companies, public institutions and society.

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