

Risks and Challenges in Digitisation

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Andreas Aßmuth

Technical University of Applied Sciences OTH Amberg-Weiden

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- Digital Skills
- Infrastructure and Equipment
- Innovation and Digital Transformation
- Society in Digital Change
- Modern State
- The Verdict and Expectations

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- Energy and Resources
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- Society, Education and Employment
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- Security

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Digitisation

Digitisation is the transformation from analog to digital or digital representation of a physical item with the goal to digitise and automate processes or workflows.

Digitalisation

Digitalisation means the use of digital technologies and of data in order to create revenue, improve business, replace/transform business processes and create an environment for digital business, whereby digital information is at the core.

Digital Transformation

Digital Transformation is the novel use of digital technology to solve traditional problems. These digital solutions enable inherently new types of innovation and creativity, rather than simply enhance and support traditional methods.

Source:

<https://www.i-scoop.eu/digitization-digitalization-digital-transformation-disruption>

https://en.wikipedia.org/wiki/Digital_transformation



Digital Skills




Infrastructure and Equipment



Innovation & Digital Transformation



Society in Digital Change



Modern State

Source: The Federal Government, "The Digital Strategy of the German Government"



Digital Skills

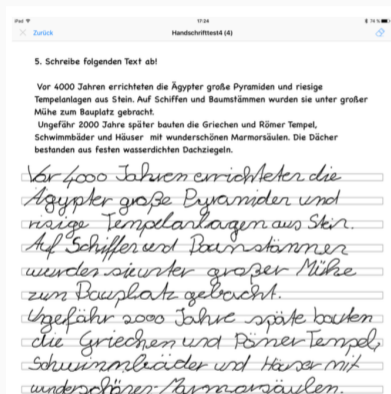
The German government wants everybody to be able to make use of the opportunities afforded by digitalisation. They are to play an active and self-reliant part in shaping digital change and are to be enabled to deal responsibly with the risks involved. To this end more services are to be made available across the boards and the **education system is to be geared even more to digital technology in everyday life**, to the **digital working** and economic world and to the **digital knowledge society**.

Source: The Federal Government, "The Digital Strategy of the German Government"

Teacher creates handwriting exercises, storytelling or exercises to support a more fluent writing style

Scientific Goals:

- Statistical analysis of writing speed, angle pressure
- **Longterm goal:** Digital support system for diagnosis and treatment of reading/writing disabilities



Contact: Prof. Dr. Gerald Pirkl, OTH Amberg-Weiden, Email: g.pirkl@oth-aw.de



Medical Training – Basic CPR

(Cardiopulmonary resuscitation) training for nurses using smartwatch or mixed reality systems (Hololens)



Gather deeper insights in physical experiments: how does a resistor influence voltage and current (Ohm's law)?



Contact: Prof. Dr. Gerald Pirkl, OTH Amberg-Weiden, Email: g.pirkl@oth-aw.de

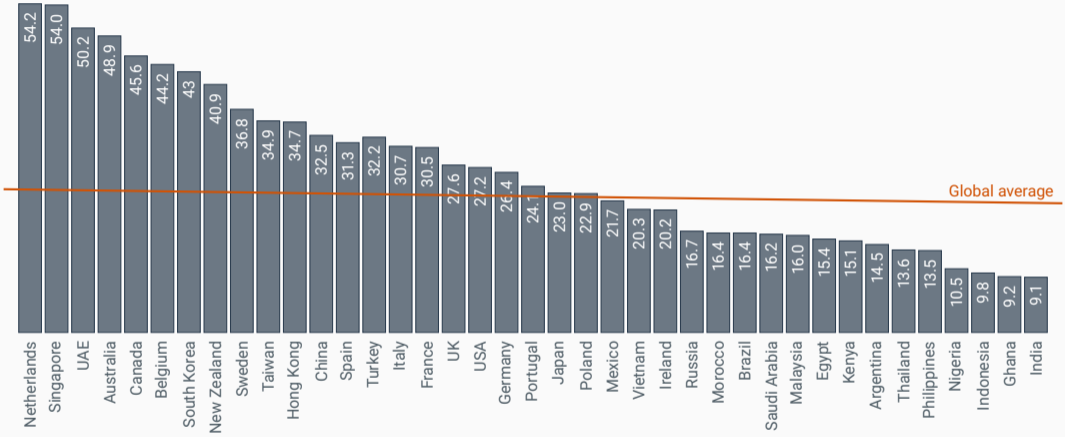


Effective infrastructure is the lifeblood of our society, particularly **digital networks**. Without them the people, private companies and public authorities will not be able to use the advantages of digital change – and they are needed in urban and in rural areas. **The aim is for everyone to have a connection – everywhere at all times**. The special importance and the **vulnerability** of digital infrastructure calls for **security and special protection**.

Source: The Federal Government, "The Digital Strategy of the German Government"



Average Mobile Internet Connection Speeds Average Speeds in Mbps



Sources:
Ookla Speedtest, December 2017. Notes: Figures represent average download speeds.
We are Social and Hootsuite, "Digital in 2018", published on Jan 29, 2018.



1992:
100 GB per day

1997:
100 GB per hour

2002:
100 GB per second

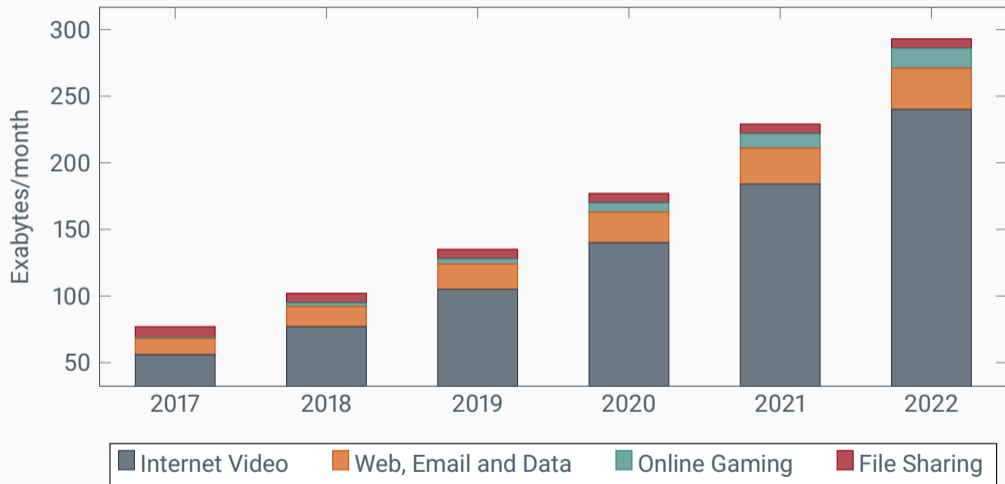
2007:
2,000 GB per second

2017:
46,600 GB per second

2022:
**150,700 GB
per second**



Source: Cisco VNI, 2018.



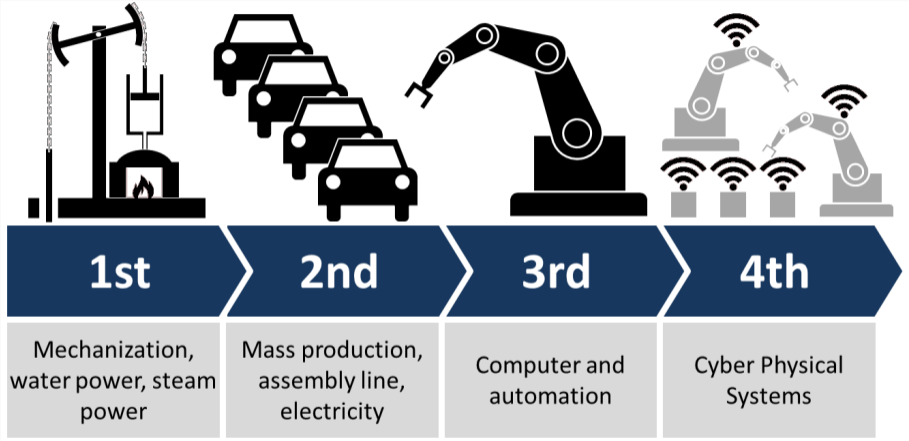
Source: Cisco VNI, 2018.



Innovation & Digital Trans- formation

The force to shape change and create something new is a precondition for underpinning **sustainable prosperity and social cohesion** in Germany, Europe and the world in the long-term. The German government aims to ensure that **technology and innovations are in line with the legal framework** and the values of Germany and Europe. We want to become better at taking excellent technical research and using it to make and market excellent technological products in Germany and in Europe, and to **set international standards** with these.

Source: The Federal Government, "The Digital Strategy of the German Government"



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INDUSTRIE 4.0



AUTOMATION



VERNETZUNG



CLOUD COMPUTING



IOT



BIG DATA



SYSTEM INTEGRATION

Networks

Source: <https://industrie.de/top/6637/>, Image created by IFF Meisterschule.

The Internet of Things: making the most of the Second Digital Revolution

A report by the UK Government Chief Scientific Adviser

Source: The Government Office for Science, December 2014.







Source: Jan Kleinert, "Cebit 2014: App steuert Küchengeräte", Linux Magazin, 2014-03-14.

Further information: EBRU TV – Folge 46: Youtube Video (German)
mobilegeeks.de, "Kochbot - Cooking App & Automated Kitchen": Youtube Video (English)

Contact: Prof. Dr. Ulrich Schäfer, OTH Amberg-Weiden, Email: u.schaefer@oth-aw.de



Contact: Prof. Dr. Alfred Höß, OTH Amberg-Weiden, Email: a.hoess@oth-aw.de

Auto Drive





Created by Michael KR, Wikimedia Commons, CC BY-SA 4.0



Digitalisation needs values. People must be at the heart of all of the government's considerations and projects – even in the digital era. Whether people are open to digitalisation, or have concerns and fears, or whether they have to date been entirely indifferent to the digital world: **digital transformation is to improve the lives of the people.** The government aims to bring the country together and move it forward, safely and securely.

Source: The Federal Government, "The Digital Strategy of the German Government"

Total population



7.593
Billion

Internet users



4.021
Billion
(+7 %)

Active social
media users



3.196
Billion
(+13 %)

Unique
mobile users



5.135
Billion
(+4 %)

Active mobile
social users



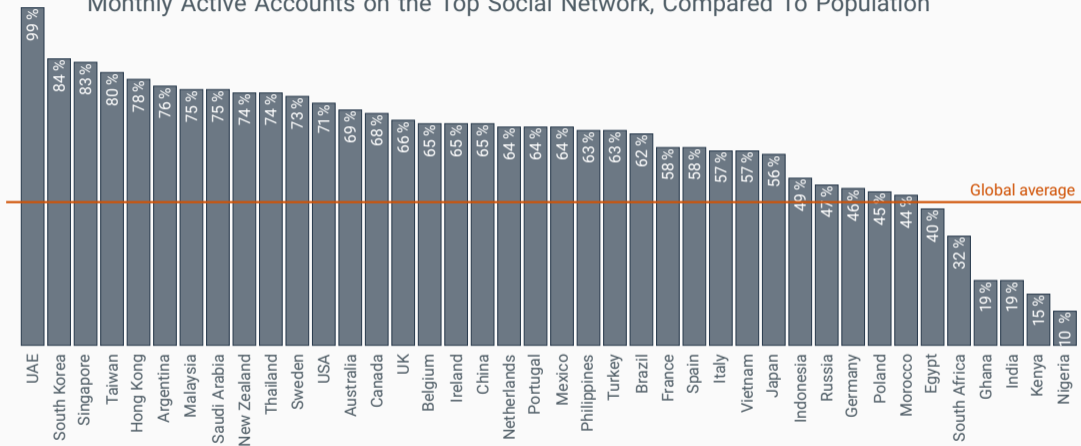
2.958
Billion
(+14 %)

Sources: Population: United Nations; US Census Bureau; Internet: Internet Worldstats; ITU; Eurostat; InternetLiveStats; CIA World Factbook; Mideastmedia.org; Facebook; Government officials; Regulatory Authorities; Reputable Media. Social Media and Mobile Social Media: Facebook, Tencent, Vkontakte, Kakao, Naver, Ding, Techrasa, Similarweb, Kepios Analysis. Mobile: GSMA Intelligence; Google; Ericsson; Kepios Analysis. Note: Penetration figures are for total population (all ages). We are Social and Hootsuite, "Digital in 2018", published on Jan 29, 2018.

Icons (LTR): people by Untashable from the Noun Project, Globe by il Capitano from the Noun Project, chat by cathy moser from the Noun Project, Smartphone by Guilhem from the Noun Project, chat by Benny Forsberg from the Noun Project, CC BY 3.0

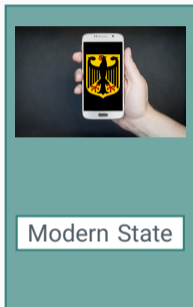


Monthly Active Accounts on the Top Social Network, Compared To Population



Sources:

Facebook, Tencent, Vkontakte, Kakao, Naver, Ding, Techrasa, Similarweb, Kepios Analysis.
We are Social and Hootsuite, "Digital in 2018", published on Jan 29, 2018.



Authorities should make people and company's lives easier not more complicated. That is why the German government wants to make dialogue with the authorities, and requests for **services simple and secure for everyone.** To this end, by the end of 2022, all of the services offered by authorities will be offered online.

Source: The Federal Government, "The Digital Strategy of the German Government"



1. **Connectivity** – building world-class digital infrastructure for the UK
2. **Digital skills and inclusion** – giving everyone access to the digital skills they need
3. **The digital sectors** – making the UK the best place to start and grow a digital business
4. **The wider economy** – helping every British business become a digital business
5. **A safe and secure cyberspace** – making the UK the safest place in the world to live and work online
6. **Digital government** – maintaining the UK government as a world leader in serving its citizens online
7. **Data** – unlocking the power of data in the UK economy and improving public confidence in its use

Source: Department for Digital, Culture, Media & Sport and The Rt Hon Karen Bradley MP, "UK Digital Strategy"

The Digitalisation of the UK Automotive Industry - SMMT - Mozilla Firefox

https://www.smmt.co.uk/reports/the-digitalisation-of-the-uk-automotive-industry/

SMMT REPORTS

The Digitalisation of the UK Automotive Industry

The digital revolution of the automotive industry is already underway. As a result of digitalisation, vehicle manufacturers and suppliers will benefit from increased productivity, greater flexibility and shorter times to market. Customers will also benefit from personalised, higher-quality vehicles.

Metric	Value
Reduces Parts Inventory by up to	30%
Increased Productivity by up to	5%
Machine Downtime Reduced by up to	40%
Time to Market Reduced by up to	30%
Benefit to Suppliers	£2.6 billion
Benefit to Vehicle Manufacturers	£4.3 billion
Benefit to Wider Economy	£1.7 billion
Total Cumulative Economic Benefit by 2025	£74 billion

SMMT Reports

- LCVS: DELIVERING FOR THE UK ECONOMY
- CAYS: THE GLOBAL RACE TO MARKET
- SMMT MOTOR INDUSTRY FACTS 2018
- UK AUTOMOTIVE SUSTAINABILITY 2018
- NEW CAR CO2 2017
- HYDROGEN FUEL CELL ELECTRIC VEHICLES GUIDE
- THINKING OF BUYING A NEW CAR?
- UK SPECIALIST CAR MANUFACTURERS 2017
- DIGITAL MANUFACTURING
- CAYS: REVOLUTIONISING MOBILITY IN SOCIETY

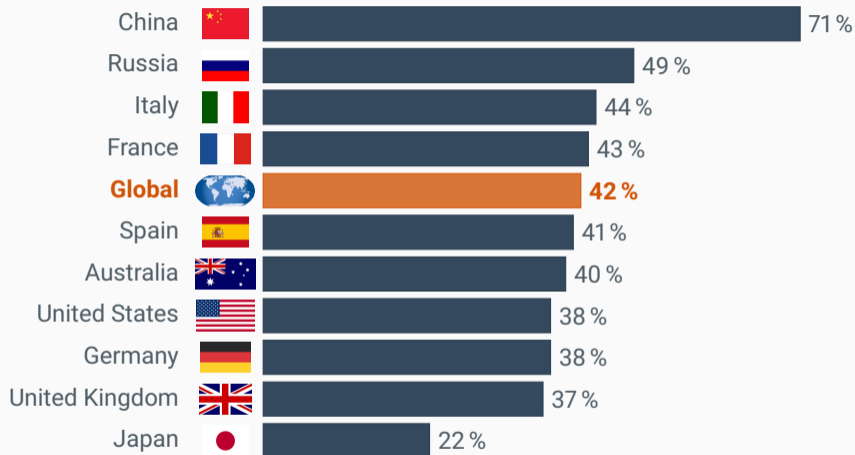
Source: <https://www.smmt.co.uk/reports/the-digitalisation-of-the-uk-automotive-industry/>



	... more advantages	... more disadvantages	... both
Total	45 %	8 %	46 %
Men	49 %	8 %	41 %
Women	41 %	8 %	50 %
18 to 29 years	67 %	5 %	29 %
30 to 44 years	51 %	5 %	43 %
45 to 59 years	37 %	6 %	55 %
60 years and older	37 %	12 %	48 %
General secondary school	33 %	8 %	56 %
Intermediate secondary school	46 %	9 %	44 %
High school or university	55 %	7 %	38 %

Source: forsa Politik- und Sozialforschung GmbH, "Digitalisierung in Deutschland", p. 4, 2018-07-27.

Can Digital Technology Make the World a Better Place?

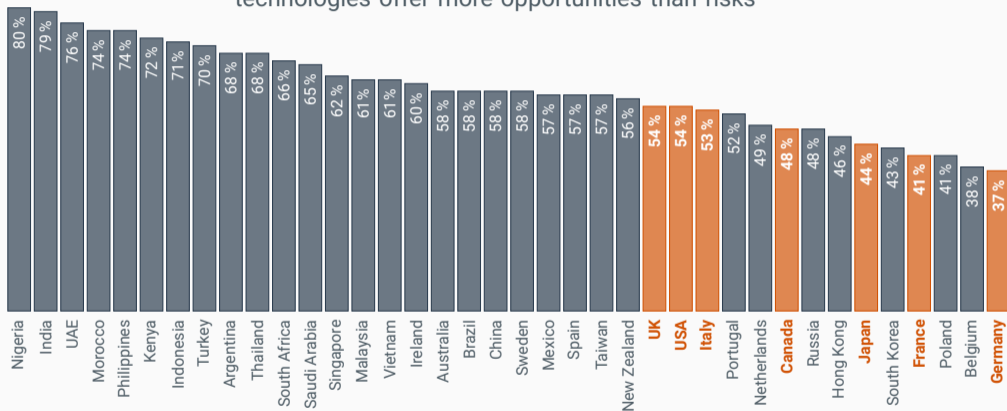


Based on a survey of 20,000 people from 10 countries conducted in the summer of 2017.

Source: www.statista.com, Dentsu Aegis Network



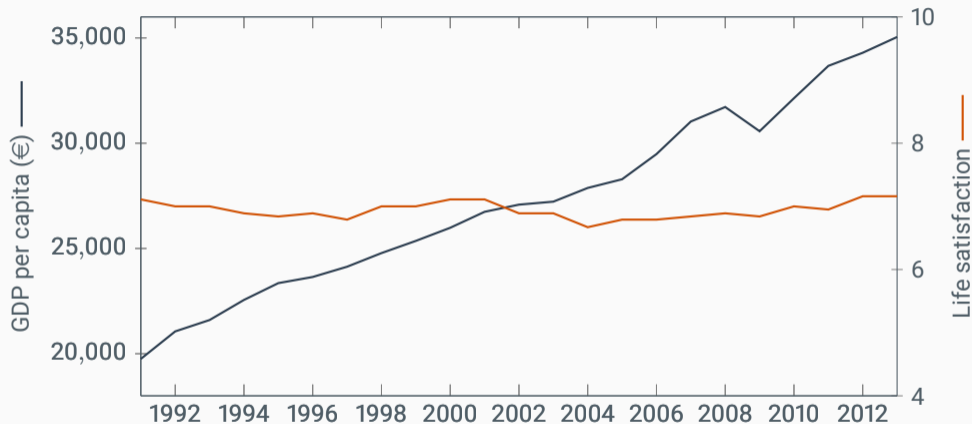
Percentage of the population that believes that new technologies offer more opportunities than risks



Sources:

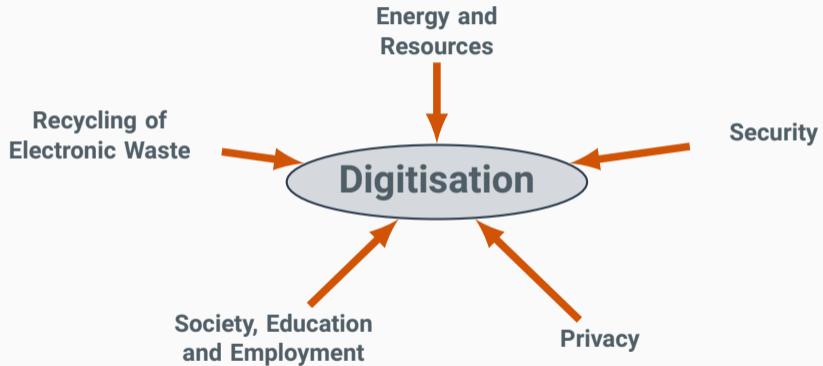
Google Consumer Barometer, January 2018.

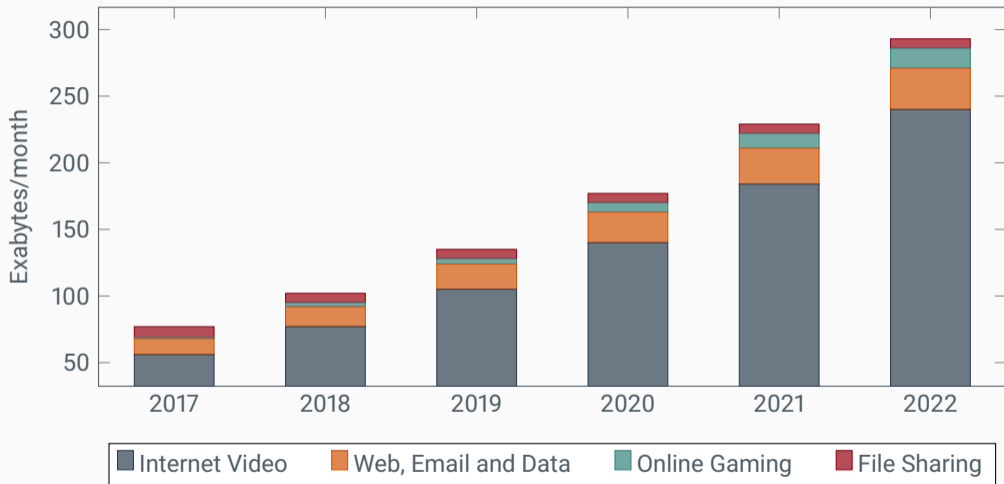
We are Social and Hootsuite, "Digital in 2018", published on Jan 29, 2018.



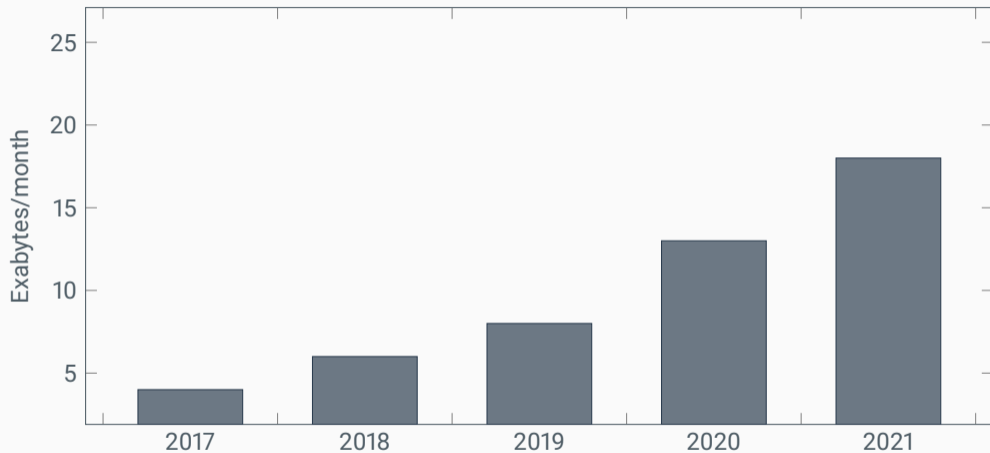
Data:

Life satisfaction index – S. Lange and T. Santarius, "Smarte grüne Welt? Digitalisierung zwischen Überwachung, Konsum und Nachhaltigkeit", p. 138, Oekom, Munich, 2018.
GDP per capita – Federal Statistical Office of Germany (Statistisches Bundesamt)





Source: Cisco VNI, 2018.



Source: Cisco VNI, 2018.

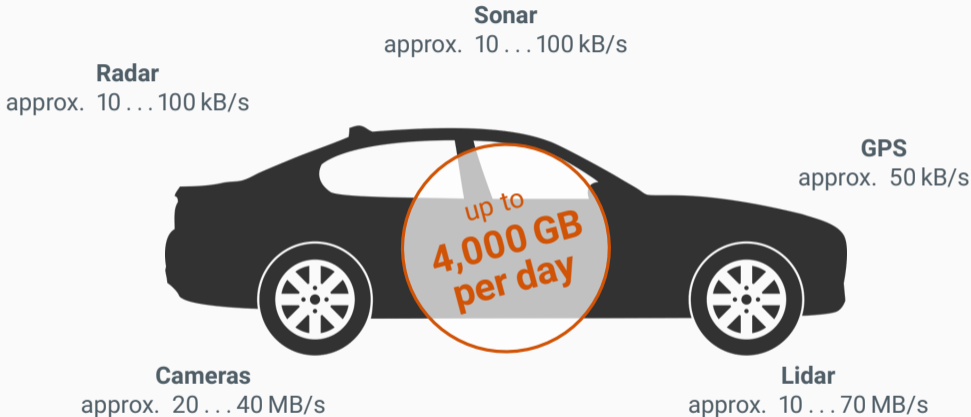
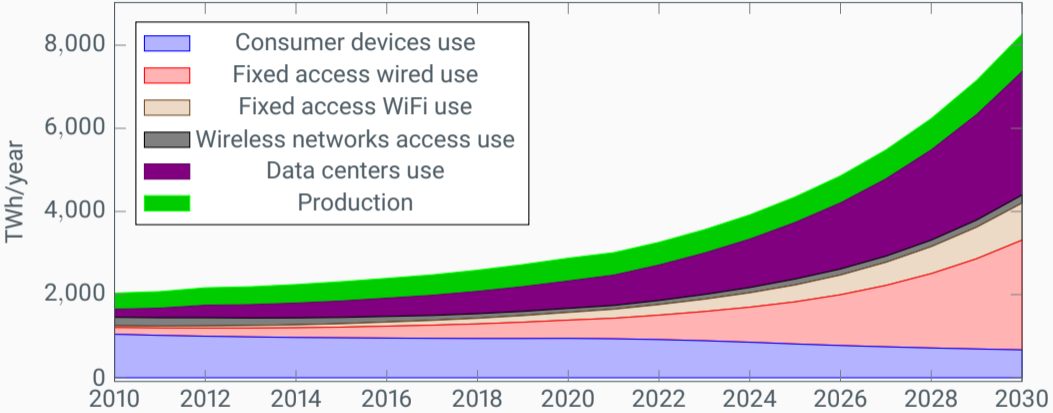
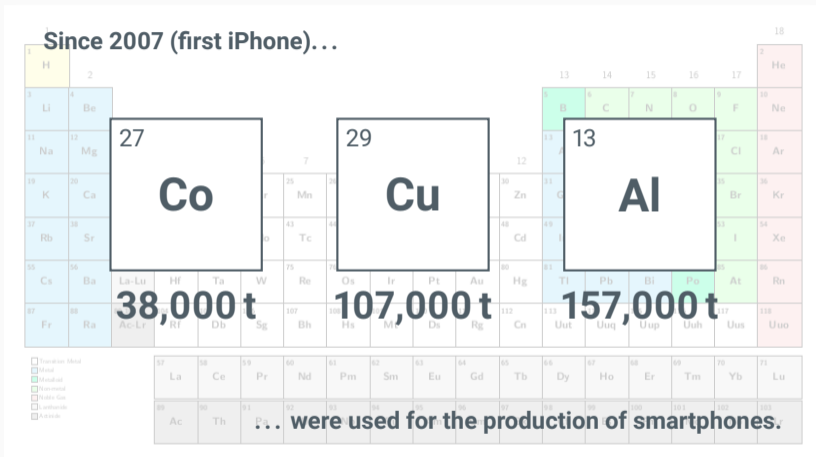


Figure adapted from S. Lange and T. Santarius, "Smarte grüne Welt? Digitalisierung zwischen Überwachung, Konsum und Nachhaltigkeit", p. 69, Oekom, Munich, 2018.



Data:
A. S. G. Andrae and T. Edler, "On Global Electricity Usage of Communication Technology: Trends to 2030". *Challenges* 2015, 6, 117-157.

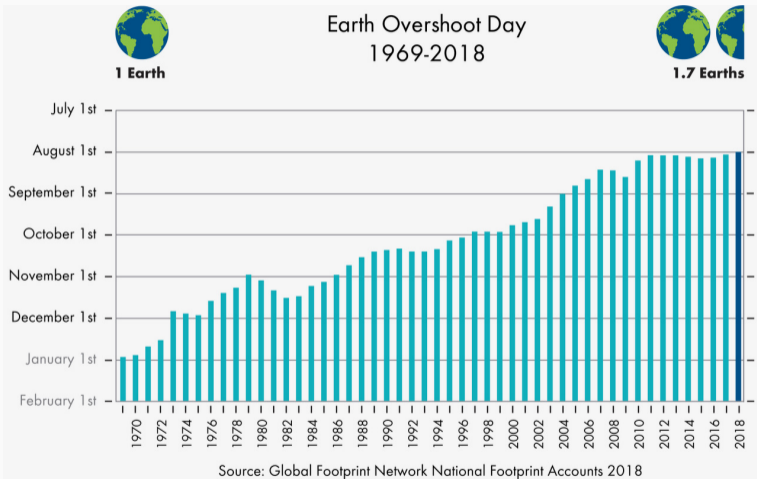


Source: Tilman Santarius, "Runter von der Überholspur", tagesspiegel.de, 2018-05-14.

Periodic table of elements created by Siyavula Education, Flickr, CC BY 2.0

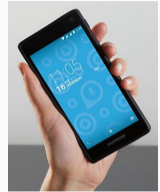


Images (LTR): George Hotelling, Wikimedia Commons, CC BY-SA 2.0; Ondřej Martin Mach, Wikimedia Commons, CC BY-SA 3.0; BRS MEAS, Flickr, CC BY-NC-SA 2.0; pxhere.com, CC Public Domain



Created by Footprint123, Wikimedia Commons, CC BY-SA 4.0

- Energy???
- Use of digitisation technologies to achieve sustainability
- Modular design of devices
- Circular economy for recyclable materials
- Ecological mining and production techniques
- Fair trade and participation



Fairphone 2 (top): Created by Fairphone, Wikimedia Commons, CC BY-SA 2.0

Shift 6m (bottom): Created by Joschka Althoff, Wikimedia Commons, CC BY-SA 4.0



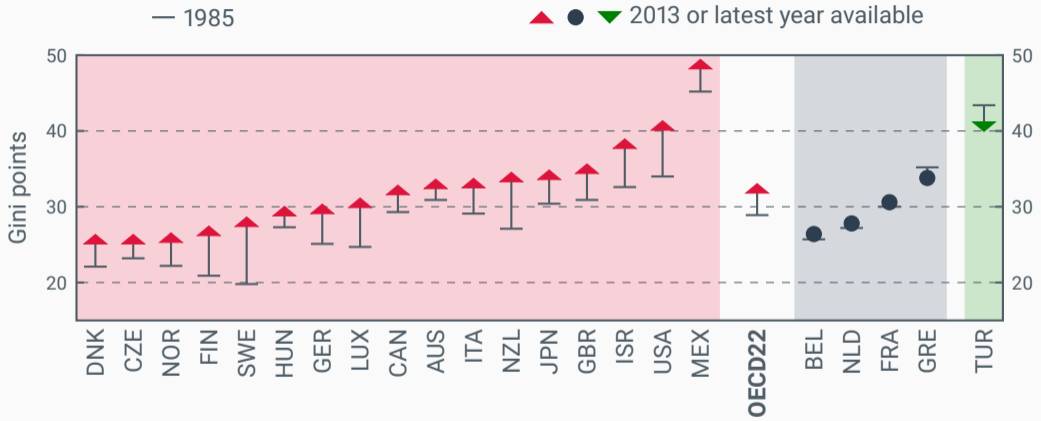
Find the solutions of the following equation:

$$x^2 - x - 2 = 0 .$$

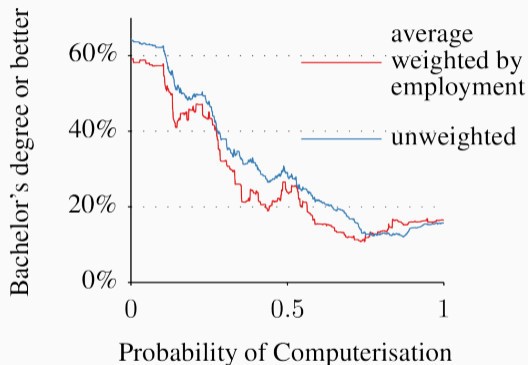
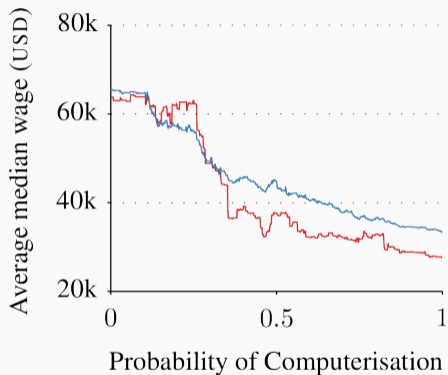
- $x = 1$
- $x = -1$
- $x = 2$
- $x = 5$
- There are no real solutions for this quadratic equation.



There is no royal way to knowledge!



Data: Brian Keeley, "Income Inequality. The Gap between Rich and Poor", OECD Insights, OECD Publishing, Paris, 2015.

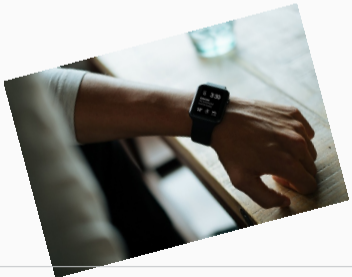


C. F. Frey and M. A. Osborne, "The Future of Employment: How Susceptible are Jobs to Computerisation?", p. 41, University of Oxford, 2013.

Surveillance ... some years ago...



Sources: Federal Commissioner for the Records of the State Security Service of the former German Democratic Republic, BStU, MfS, HAIII, Fo, Nr. 313, Bild 4 and BStU, MfS, HAIII, Fo, Nr. 313, Bild 78.



... and many more!



"We also need to start a social debate about data being the resource of the future and that the principle of data economy, which was once imposed by the Federal Constitutional Court, no longer meets the demands of today's businesses. Data must be processed to new products. Those, who don't participate in this type of business, will not be able to create new jobs of the future."

Source and original statement (German): Dietmar Neuerer, "Datensparsamkeit gefährdet unseren Wohlstand", handelsblatt.com, 2016-11-02.

Photo by Sandro Halank, Wikimedia Commons, CC BY-SA 3.0

Human rights laws will be changed “if they get in the way” of the country’s fight against terror.



Source: James Griffiths, “Theresa May: UK will change human rights laws if needed for terror fight”, CNN, 2017-06-07.

Photo by UK Home Office, Wikimedia Commons, CC BY-SA 2.0

You should have the right:

- (1) To have access to and knowledge of all collection and uses of personal data by companies;
- (2) To opt-in consent to the collection of personal data by any party and to the sharing of personal data with a third party;
- (3) Where context appropriate and with a fair process, to obtain, correct, or delete personal data controlled by any company and to have those requests honored by third parties;
- ...
- (9) Not to be unfairly discriminated against or exploited based on your personal data; and
- (10) To have an entity that collects your personal data have reasonable business practices and accountability to protect your privacy.



Congressman **Ro Khanna**
California's 17th Congressional District

Source: <https://khanna.house.gov/media/press-releases/release-rep-khanna-releases-internet-bill-rights-principles-endorsed-sir-tim>



Article 1 Human dignity shall remain inviolable in the digital age. Human dignity must be respected and safeguarded. No technological development may be allowed to encroach upon it.

Article 2 Every person has the right to freedom of information and communication. This includes the personal right not to know.

...

Article 7 (1) Every person has the right to the protection of his or her data and the right to privacy.

...

(5) Every person has the right to a home life free from surveillance.

(6) Every person has the right to take suitable measures to protect his or her data and communications from third-party access.

(7) There may be no acts of unjustified and unauthorized surveillance.

...

...

Further information: <https://digitalcharta.eu/>



2019: 37 % 2018: 42 %	●	1 Business interruption
2019: 37 % 2018: 40 %	●	2 Cyber incidents
2019: 28 % 2018: 30 %	●	3 Natural catastrophes
2019: 27 % 2018: 21 %	▲	4 Changes in legislation and regulation
2019: 23 % 2018: 22 %	▼	5 Market developments
2019: 19 % 2018: 20 %	●	6 Fire, explosion
2019: 19 % 2018: 15 %	●	7 New technologies
2019: 13 % 2018: 10 %	▲	8 Climate change/increasing volatility of weather
2019: 13 % 2018: 13 %	▼	9 Loss of reputation or brand value
2019: 9 % NEW	▲	10 Shortage of skilled workforce

Source: Allianz Risk Barometer, Top Business Risks for 2019.

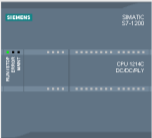


SIEMENS SIMATIC 1200 station_1/PLC_1 08:21:34 am 11.04.2016

Name: Password: [Login](#)

PLC_1 [Off](#) [On](#)

- Start Page
- Identification
- Diagnostic Buffer
- Module Information
- Communication
- Variable Status
- Data Logs
- User Pages
- Introduction



General:
Station name: SIMATIC 1200 station_1
Module name: PLC_1
Module type: CPU 1214C DCDCRly
IP Address:

Status:
Operating Mode: RUN
Status: OK

SIEMENS S7-1200 station_1 / PLC_1 08:45:01 am 4/11/2016 UTC English


Username: Password: [Login](#)

Communication [Off](#) [On](#)

- Start Page
- Identification
- Diagnostic Buffer
- Module Information
- Communication**
- Variable Status
- File Browser
- User Pages
- Introduction

Network connection:
MAC address: 28-63-36-
Name:

IP parameter:
IP Address:
Subnet mask:
Default router:
IP settings: Retained IP address is set inside of project





Remote Control - Mozilla Firefox

Remote Control

SIEMENS SIMATIC HMI Miniweb on HMI_Panel

Name
Password last update 17:16:00 12.04.2016


Remote Maintenance over the Internet Explorer

Internet Explorer V5.0 SP1 or higher is required for remote maintenance. For further information, refer to the service downloads.
Start Sm@rtClient

Service Downloads

Java Update
Remote maintenance of SIMATIC HMI systems is possible using the Internet Explorer. This requires a Java-based applet that is loaded automatically by the relevant HMI system and started in the Internet Explorer.
For optimum access to the HMI systems, we recommend that you install the latest **Java Runtime Environment (JRE™)** from Sun Microsystems. The **Java Runtime Environment (JRE™)** includes the Java plug-in components necessary to run Java applets in your Internet Explorer.
The current version can be downloaded at www.java.com.

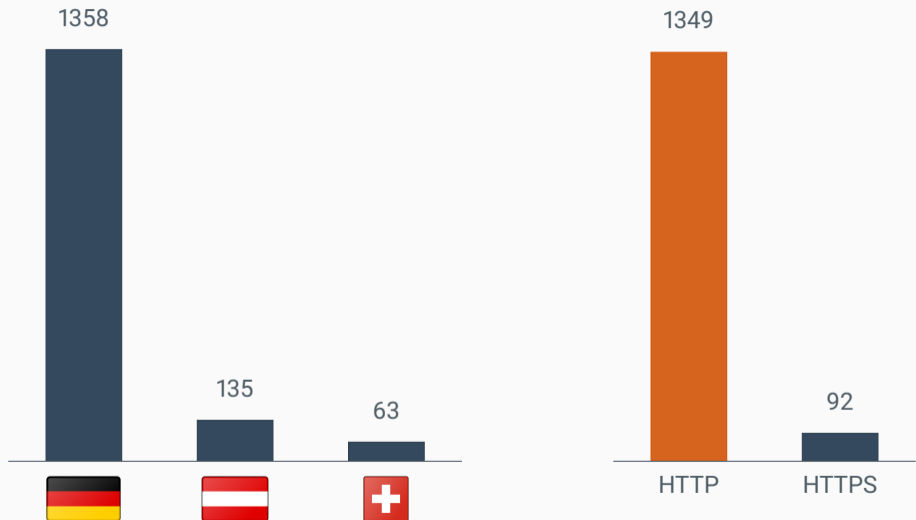
Sm@rtClient Application
This program allows enhanced functionality for "remote maintenance over the Internet Explorer". The program is available on WinCC flexible (GD2 SupportSmartClient) and can be run as a separate application on your computer.
In addition to the screen contents, this application also displays the layout of the HMI system requiring maintenance. The advantage here is the additional access to the locally available softkeys and function keys of the SIMATIC Panel.



This site contains hyperlinks to the web pages of third parties. Siemens shall have no liability for the contents of such web pages and does not make representations about or endorse such web pages or their contents as its own, as Siemens does not control the information on such web pages and is not responsible for the contents and information given thereon. The use of such web pages shall be at the sole risk of the User.

Mozilla Firefox scheint langsam... zu... starten.





Admin
Startseite > Status und Bedienung > Räume

Alarmmeldungen (0) Abmelden
Servicemeldungen (7)










Startseite Status und Bedienung Programme und Verknüpfungen Einstellungen Geräte anlernen Hilfe

Name	Gewerk	Letzte Änderung	Control		
Filter	Filter				
Brandmelder EG 01:1	Sicherheit		O.K.	Gefahr	
Fenster Flur EG	Verschluss	06.08.2017 14:58:39	Offen	Kippstellung	Verriegelt
Fenster Flur Eingang:1	Verschluss	03.08.2017 15:12:31	Offen	Kippstellung	Verriegelt
Licht Flur EG:1	Wasser	21.08.2016	Kurzer Tastendruck	Langer Tastendruck	

status of windows shutter contacts

Zurück Filter zurücksetzen

Flur Keller 2	
Flur OG	
Garage	
Hauseingang	
Heizungsraum	

Name	Gewerk	Letzte Änderung	Control			
Filter	Filter					
HM-Sec-Key KEQ0856561:1	Verschluss	10.08.2017 05:41:58	 Zu	 Auf	 Tür öffnen	Zustand unbestimmt
Klingel:1	Sicherheit	11.10.2017	 Aus	 Ein		
Klingeltaster:1	Taster	09.08.2017 11:18:09	 Offen		 Verschlossen	
Taster Haustür schließen	Taster		 Kurzer Tastendruck	 Langer Tastendruck		

lock, unlock or open entrance door



admin password not set,
automatic login

Benutzername	Kennwort	Button für Anmeldung	Berechtigung	E-Mail	Telefonnummer	Automatisches Anmelden	Aktion
Admin	nicht gesetzt	<input type="checkbox"/>	Administrator			aktiv	<input type="button" value="Bearbeiten"/>
Katrin	nicht gesetzt	<input type="checkbox"/>	Benutzer	██████████	██████████		<input type="button" value="Bearbeiten"/> <input type="button" value="Löschen"/>

personal details





wireless switch actuator



central control unit



wireless motion detector



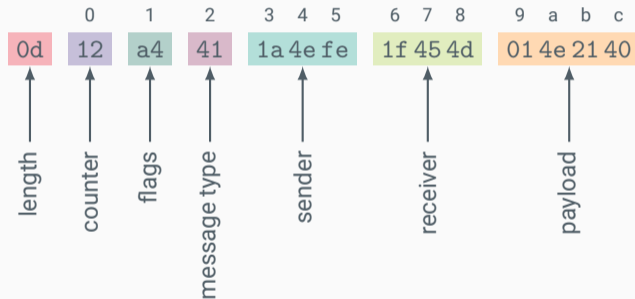
wireless door lock actuator



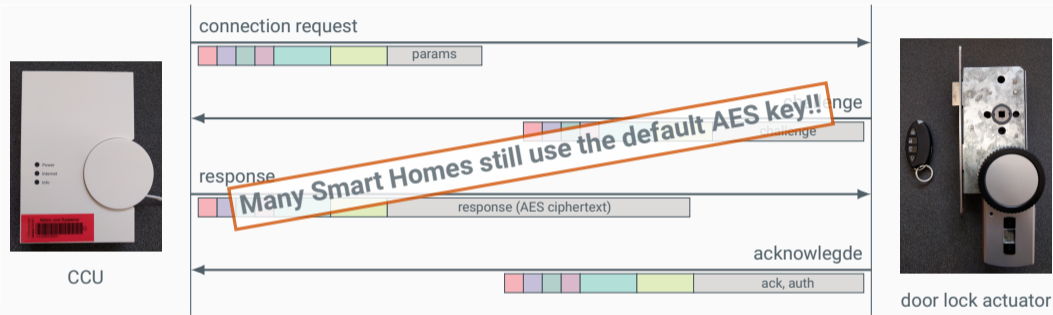
wireless siren with signal light



BidCoS = **B**idirectional **C**ommunication **S**tandard



Further reading: http://www.uni-saarland.de/fileadmin/user_upload/Professoren/fr11_ProfSorge/Paper-Downloads/WiSec-2014.pdf



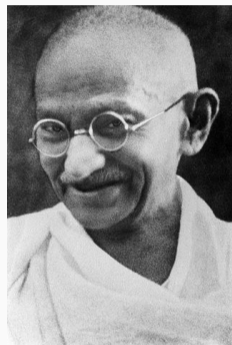
Further details: <https://blog.ploetzli.ch/2015/on-the-security-of-aes-.../>
<https://git.zerfleddert.de/hmcfusb/AES/>



Technology is great!! (I know.)

There needs to be more than just technology to tackle these risks and challenges!

The future depends on what we do in the present.



Mahatma Gandhi

