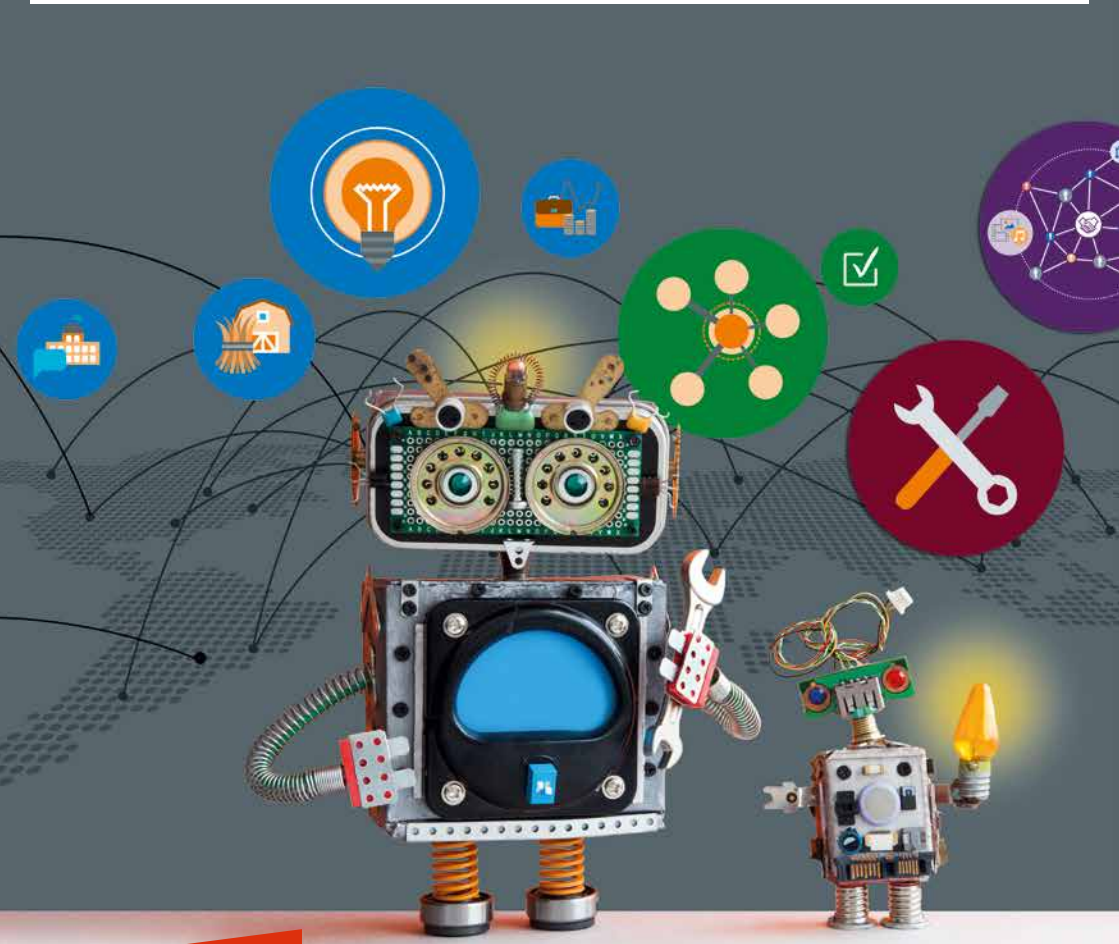
Federal Ministry
for Economic Cooperation
and Development

Glossary – Digitalisation in Development Cooperation

Terminology from the Digital World for Development Cooperation



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Introduction

As information technology evolves, new terms are created and existing ones modified. Innovative products, solutions and methods are emerging constantly, often with highly creative names. Even people driving these developments sometimes struggle to keep up.

While the use of terms like 'hackathon', 'open source', 'gamification' and 'big data' is becoming increasingly widespread, generally speaking only industry insiders really know what they mean. Other terms like 'smart cities', 'e payment' and 'internet freedom' are more self-explanatory, but even specialists often define them differently.

This glossary is designed to make it quicker and easier to understand the terminology of digital technologies and also the contexts and discussions in which they are used. Aimed at actors from development cooperation (DC) and international cooperation (IC) and their activities in education, culture and the media, it seeks to foster deeper mutual understanding and clarify areas of confusion. The glossary is worded simply, to offer an insight into the terms it defines. It explains how each term relates to specific DC/IC contexts and showcases one or more relevant examples from development projects to place the tools and methods in context and highlight their actual impact.

This glossary is merely an excerpt of the large volume of relevant terms. It does not claim to be exhaustive. The internet offers countless resources that can help to explain further expressions in context. Some links are provided at the end of the glossary.

Do you have any additions or feedback? If so, please contact us at:
toolkit-digitalisierung@giz.de

The Toolkit Team

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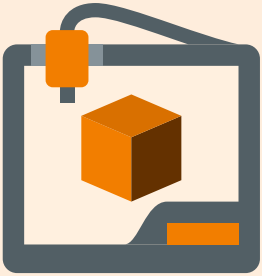
3D Printing



Short definition: The manufacturing of three-dimensional objects from different materials, e.g. plastics or metals, using a 3D printer.

Examples: Prostheses, specific spare parts, individual items like shoes, models, components such as screws and even human organs.

Relevance to DC/IC: 3D printing enables spare parts, which are often difficult to access in rural areas, or even customised products like prostheses to be manufactured as, where and when required.

The scope for 3D printing applications is vast, ranging from dental crowns, hearing aids and spare parts for classic cars to architectural models. Even the missing part of a toucan's beak has been 3D printed to save an injured bird from certain death. The printer works by manufacturing items layer by layer. For example, when using plastic (various materials are compatible with the technology) the printer works like a hot glue gun. The plastic is heated and, when soft, passed through a nozzle to build the desired product one layer at a time. The 3D printer is controlled by a computer that follows pre-programmed 3D models. Many such digital models, especially those for spare parts, can be downloaded free of charge or purchased online.

Although 3D printing technology has been in use since the 1980s to manufacture industrial prototypes and small series, only now is it becoming more widely by private individuals and in the retail sector.

RELEVANCE TO DC/IC

Long supply chains and lead times, high costs, lack of availability – if an important spare part is difficult or impossible to get hold of bicycles, wheelbarrows or even essential equipment such as water pumps or generators will become impossible to operate. Spare parts are often difficult to source, especially in remote regions, so the option of printing components on site is a major breakthrough. 3D printers can even make highly specialised, essential items like prostheses, which the system can customise to ensure a snug fit. 3D printing boasts other significant potential: used plastic bottles can be recycled as a printing material. This not only lowers production costs, but also creates a new market and potential source of income for bottle collectors. Carelessly discarded plastic litter can be reborn in innumerable useful guises. Local economies can also benefit from 3D printing – rather than relying on large, central factories, in the future manufacturing can be relocated to a greater degree decentralised locations.

Further information:
see Toolkit 2.7.3 – The 3D printing of prostheses, Jordan
see Toolkit 2.9.1 – 3D printing and computer-controlled milling: The industrial revolution in local production

‘Happy-Feet’
www.t1p.de/eluf

Access

Short definition: Technical access to more modern means of communication such as the internet or conventional mass media like radio.

Examples: DSL modems, wireless routers, fibre-optic networks, broadband connections, mobile radio systems, radios, desktop computers, mobile phones.

Relevance to DC/IC: Access to technical infrastructure also means access to knowledge and a broad array of services that can be essential for determining people's standard of living. Today, however, many people still lack access to these and therefore cannot reap its manifold benefits. Remedying this situation is therefore one of the key objectives of German development cooperation.

In Germany it is incredibly easy for people to access the World Wide Web. Using a desktop computer, →***smartphone*** or tablet, they can go online at home or, when out and about, via wireless networks (WiFi), →***mobile communications*** or cable connections. For most people this service is affordable – if not free via a public wireless network – and opens up countless digital opportunities that have become an essential part of our modern life. There is almost ubiquitous online access in Germany, but the quality, speed (bandwidth), costs and availability of this access vary considerably. Around the world, the internet tends to be less accessible and more expensive in rural areas than in towns

and cities. Socio-cultural parameters (e.g. gender, age, culture and income) play a role in determining whether a person is able to gain access to networks and devices (like smartphones or desktop computers in internet cafés). People in developing countries are at a particular disadvantage compared to those in the Global North. This schism is commonly referred to as the →***digital divide.***

RELEVANCE TO DC/IC

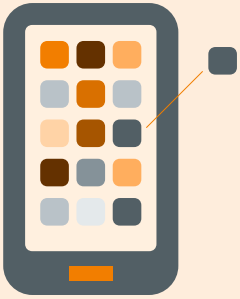
Goal 9c of the 2030 Agenda also highlights the significance of universal and affordable internet access, aiming to 'provide universal and affordable access to the internet in least developed countries' by 2020. Despite the strong growth in the number of internet users, especially in developing countries, still less than 50 % of the people are online there. In countries like Eritrea, it is slightly more than 1 % – compared with over 80% in Europe. Indeed, the ITU – the United Nations agency for information and communication technologies – is warning that the world is now at a crossroads, with one direction leading to internet access for all and the associated strengthening of democracy and equal opportunities, and the other leading to privileged internet access reserved for those with economic clout or political influence.

Bridging this digital divide and enabling people in developing countries to secure better access to information and means of communication is a major objective for development cooperation actors. Many commercial enterprises focus on this area, some of them offering innovative approaches. Balloons (Google's Loon), drones (Facebook Aquila) or low-flying satellites (OneWeb, Space X), for example, are geared to helping establish coverage and access.

Further information:

see Toolkit 2.6.1 – SupaBRCK: Reliable and affordable internet, Kenya
see Toolkit 2.6.2 – Internet access for rural communities, South Africa
see Toolkit 2.6.3 – Mobile communications for rural areas, Myanmar

Application | App



Short definition: An application (or 'app' for short) is an add-on program or piece of software for →***smartphones*** and tablets. They are now available for desktop computers too.

Examples: WhatsApp, Google Maps, Barcode Scanner, iTranslate (a translation and dictionary app for iPhone users), AccuWeather, Runtastic (coaching app for joggers).

Relevance to DC/IC: More and more people have →***access*** to a smartphone, enabling specialised apps to play a greater role in development policy. Examples include 'mHealth' apps, which turn smartphones into mobile diagnostic stations, or education apps that provide high-quality learning content free of charge or at very low cost. Apps can be used in all areas of development, ranging from politics and administration, economics, finance and rural development to resource protection.

Today, smartphone, tablet and desktop computer users have access to millions of applications. There is an app for virtually every function and service you can think of, from catching up on the latest news or weather to gaming, guides and even complex software packages for word processing or spreadsheets.

Since apps are simply add-on software packages, the concept behind them is nothing new, but the market for them has become so successful because they extend the functions and services available on devices simply and flexibly. Previously, software installation was often inconvenient and complicated, but now a few taps on the screen are all that is needed to select, install and use software. App sales are centralised in online shops like Google Play and Apple's App Store, which enable customers to immediately download and install apps either free of charge or for a small fee.

RELEVANCE TO DC/IC

These days more and more people have access to the internet and to devices like smartphones. In a development cooperation context, apps therefore offer exciting new ways of reaching large numbers of people. For example, they can deliver information, education and many essential health and safety services anywhere, which facilitates access for people who previously had none, e.g. because they live in remote areas. Another benefit is that development cooperation can use these tools to gather information, making it more responsive to the needs of its target groups. Apps and →***digital technologies*** also give people a more powerful voice, making it easier to participate in political processes (→***e-participation***), for example.

Further information:

see Toolkit 2.1.2 – Using smartphones as extension agents, Zimbabwe
see Toolkit 2.3.3 – SORMAS – Mobile app for early warning for epidemics, Nigeria
see Toolkit 2.7.2 – Arabia Felix – Gaming for peace, Yemen
see Toolkit 4.5 – App – An all-round solution?

More efficient value creation for cashew nut farmer cooperatives in Uganda
www.africancashewinitiative.org

Artificial Intelligence

Short definition: Artificial intelligence (AI) seeks to reproduce human thinking and human-like behaviour using →***digital technologies.***

Examples: Board game program 'AlphaGo' from Google, IBM's 'Watson' computer, Netflix's recommendation algorithm, product suggestions of the online retailer Amazon.

Relevance to DC/IC: The use of AI in development cooperation is still in its infancy. However, the technology does hold great potential. AI-based analyses of large amounts of data, from satellite images for example, could help German DC prevent large-scale disasters. In future, refined AI applications could help predict the spread of diseases, droughts, famines and even armed conflicts.

Artificial intelligence is considered to be one of the key technologies of the 21st century. The economy and labour markets are being reshaped. New digital applications are being created in all areas from the health sector to legislation.

How does a computer become 'intelligent'? Computers generally require detailed step-by-step instructions for each of their tasks. These instructions are called algorithms. A general distinction is made between weak and strong AI. Weak AI solves an assigned problem with self-optimising algorithms. Strong

AI has intellectual skills comparable to humans or even exceeding them. AI research and applications are currently at their strongest in the area of weak AI. A typical application in this area is machine learning. The algorithms optimise themselves by analysing and assessing large quantities of data (→***big data***). This helps the computer find solutions for problems autonomously. Deep learning is a special form of machine learning. It works with artificial neuronal networks that are based on the brain's structure and function.

RELEVANCE TO DC/IC

AI has a broad range of applications in DC including predicting the spread of diseases, droughts, famines and even armed conflicts. The key requirement is good data availability, which is often worse in developing countries than in industrialised nations. Nevertheless, this technology is being increasingly used in emerging economies and developing countries, usually in the form of weak AI. In Tunisia, the 'Plantix' app promoted by German development cooperation uses AI-supported image recognition to assist farmers in detecting plant diseases. The use of AI for diagnosing medical conditions and for managing hospital outbreaks seem to be particularly promising. Currently, an increasing number of applications are being tested. However, the risks must be clarified, as well as who bears the responsibility for the decisions that machines make or influence.

Further information:

KUDI – An AI-supported chatbot creates financial inclusion
www.kudi.ai

Big Data

Short definition: Large data sets and the analytical methods used to systematically evaluate the data they contain.

Examples: Google Flu, United Nations Global Pulse, Malaria Atlas Project.

Relevance to DC/IC: In development cooperation, data are a vital asset underpinning the planning of measures and the evaluation of outcomes. However, many partner countries tend to lack reliable data in many areas. As digitalisation and the use of →***digital technologies*** increase, more and more data (e.g. census results and health data) are becoming available for analysis, prompting new findings and facilitating decision-making.

The progressive digitalisation of almost all areas of modern life means that the quantity of digital data is constantly increasing. Every social media post, every email and photo uploaded to the internet, every online purchase and search engine query produces data sets. Companies, organisations, research institutes and authorities gather data on their activities, customers and users on a daily basis. Some 3.5 billion search queries are entered on Google alone every day. Micro devices and sensors also allow the collection of more data from our environment (→***Internet of Things***).

These large volumes of information and their processing are known as 'big data'.

These mountains of data contain masses of knowledge, which are retrieved using special computer programs that structure the information, identify patterns and reveal hidden encrypted connections. Algorithms (and especially the ethics underlying them) play an important role, because they enable data produced in one context to be taken and reinterpreted for use in another. The Google Flu project, for example, identifies outbreaks of influenza by mapping relevant search queries (e.g. 'How do I treat the flu?' or 'What is the best flu remedy?'). In this way, the world's vast data sets can be used to answer many new questions and create a wealth of knowledge. Yet critics warn that data are always open to abuse (→***data protection***) and that data analyses do not always give the big picture, because they only represent the information contained in the data.

RELEVANCE TO DC/IC

For decades, DC lacked much of the key information on partner countries that it needs to plan specific measures and make decisions. These data are now becoming available with the proliferation of digital technologies. For example, it is easier to plan better medical care when health data covering the target population are digitally stored in analysable form. People can access financial services more easily when algorithms enable lenders to immediately determine which borrowers have a good credit rating. Indeed, cutting-edge systems like →***smart cities*** depend entirely on big data.

Further information:

see Toolkit 2.8.1 – Drones against climate change in the Mekong Delta, Viet Nam
see Toolkit 2.8.2 – Digital management platform protects rain forest, Brazil
see Toolkit 2.8.3 – Satellite-supported fishing management, Mauritania

Surveillance and Outbreak Response Management System (SORMAS)
www.t1p.de/kp0o

Blockchain

Short definition: Blockchain technology is a decentralised and automated accounting system. It stores and processes data, distributed in an open and global network, while offering exceptional transparency and safety.

Examples: Transparent elections, sustainable and transparent supply chains, low-cost international financial transactions.

Relevance to DC/IC: The system's transparency and protection against manipulation offers great scope for application in DC.

What does a world look like in which the exchange of information is transparent and free from manipulation while privacy is simultaneously protected? A blockchain offers that very potential to many people. Simply put, a blockchain is a database. Its special feature is that the database is not saved centrally but distributed to computers worldwide and is accessible to everyone. Changes to the information (transactions) are only made once the majority of verifiers confirm it as correct and feasible. For open (public) blockchains, any person can be a verifier (miner). In private systems, miners are defined.

The manner in which the information is saved is special as well. Information is never overwritten. Instead, changes are added to a new data block. This creates a chain of blocks, hence the name 'blockchain'. As a consequence, changes remain verifiable and transparent. Every new block also includes a summary

(hash) of the preceding block, which makes it possible to see subsequent manipulations. Despite the focus on transparency, the blockchain protects its users' identities – for better or worse. Every transaction has a code in place of the name.

Blockchains are not perfect, however. The amount of data increases with every data block. Coordination processes are complex and therefore consume a lot of time and resources. Remember too that data stored in the blockchain are safe but not necessarily correct. Identities and login information can be stolen. The blockchain is able to show that a product was handled only by certified actors (e.g. Fairtrade). However, it cannot check the person's certifications.

RELEVANCE TO DC/IC

Blockchain technology offers significant potential to DC. For example, blockchain-based services already save time and money for international transactions (e.g. remittances) today. This technology will help protect elections against manipulation in the future. Blockchains also allow for transparent supply chains that reliably establish the provenance of medication or can prove that a food item was processed only by certified agricultural enterprises. In addition, the use of relief aid can be made more transparent and safer.

Blockchain technologies may also take on government duties in elections or in the land registry system, for example. They remove these duties from the government's sphere of influence to a certain degree. This may make sense in fragile contexts in particular but requires a sound rationale. A range of pilot projects are already under way in the above-mentioned areas. However, there still is a lack of implementations at a broad level that prove the technology's real-life applicability.

Further information:
see Toolkit 2.4.3 – TruBudget – Transparent and manipulation-proof transactions using blockchain technology
see Toolkit 2.7.3 – Blockchain technology assists in times of need, Jordan

Blog

Short definition: A regularly updated website in the style of a virtual diary. Posts are listed chronologically with the most recent article at the top, and readers are often given permission to comment on them.

Examples: Weblog or blog (containing mainly text entries), audioblog (music), photoblog (photography), vlog (videos).

Relevance to DC/IC: Blogs allow the rapid exchange of opinions and information. Above all, they enable individuals to publicise information and their points of view.

Thanks to blogs, communicating with the outside world has never been easier. The idea behind a blog (from 'weblog', which in turn is derived from 'web' and 'logbook') is that anyone can publish their thoughts and opinions in a diary-like format on the internet and discuss their blog entries with readers using the comments function. The user-friendly nature of blogging apps opens them up to a very wide circle of people. Blogs are usually written by individuals, known as bloggers.

The way blogs function, with interactive comments and links, means that reports on current events often circulate more quickly in the blogosphere (the combined network of blogs and bloggers) than in conventional media. Blogs cover as many topics as there are bloggers: culture, technology, music, eco-

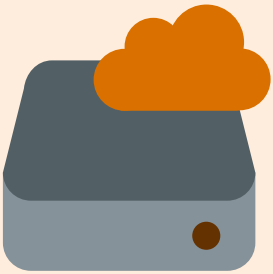
nomics, sport, politics – the list is endless. Some blogs simply document the lives of the bloggers themselves. Besides conventional text-and-image blogs, there are also blogs for specific media like music (audioblogs), photography (photoblogs) and video (vlogs). Microblogs set a character limit for each post. For example, no more than 280 characters can be entered for Tweets on Twitter.

RELEVANCE TO DC/IC

Blogs and →***social network*** sites (like Facebook and Twitter) are very easy for people and (development cooperation) institutions to set up and manage. They provide users with low-cost opportunities to broadcast and exchange ideas and to raise awareness about socio-political issues and influence public discourse. Opinions can be expressed and information actively disseminated, making blogs an important tool for sharing information, exchanging views, encouraging political participation and fostering freedom of opinion.

Further information:
see Toolkit 2.7.1 – Mobile reporting: Cross-border journalism for refugees, South Sudan/Uganda

Cloud (Computing)



Short definition: In cloud computing, data, services and programs are stored or run not on a computer, but rather on servers that can be located anywhere in the world. In extreme cases, end devices are used only for displaying cloud-based content.

Examples: Dropbox, Google Drive, YouTube, SAP Hana, email, Google Chrome OS.

Relevance to DC/IC: Data and programs no longer have to be installed on your computer or device, but can be stored and operated centrally on the internet. This means that complex services can be accessed using more cost-effective devices such as →***smartphones***.

Cloud computing frees data and programs from individual devices, enabling them to be stored or run on a remote server. Users access the cloud on the internet, so wherever there is network coverage there is →***access*** to cloud-based data and apps. A standard hand-held device like a tablet, smartphone or smartwatch is all a user needs to carry out complex tasks, because the hardware and software required to perform them are held by the cloud provider. Additional advantages are that users do not have to deal with program updates or data backups and that data are protected against loss.

Web-based email services, like Gmail, and calendar and office applications such as Google Docs or Microsoft Office OneDrive are well-known options

for personal cloud computing. Cloud-based data storage and sharing services like Dropbox are popular, as are Flickr and Picasa, online photo management tools. This makes the data accessible from anywhere with different devices and prevents data loss. →***Social networks*** like Facebook are also considered to be cloud applications. Major cloud computing providers include Amazon, Google, Microsoft and Salesforce.

However, while cloud services make things convenient, some data protection campaigners criticise them. They worry that users who upload data to off-site servers for cloud storage are relinquishing control over their information (→***data protection***). Gaps in the security of various cloud services have also been exposed from time to time. Since data protection laws vary from country to country, with some governments granting their authorities extensive access rights, cloud providers need to carefully consider where they locate their servers. Another issue is that cloud computing relies heavily on the internet to transmit data, which can be very expensive where there are no flat-rate internet services.

RELEVANCE TO DC/IC

Cloud-based applications enable cost-effective devices to use processor-intensive services. In addition, users require little prior knowledge (→***e-literacy,*** →***e-skills***) to operate the applications thanks to management by experts. For this reason, cloud computing opens up tremendous opportunities to provide services and tools that would otherwise not be available to people or even to DC/IC organisations themselves.

Further information:
see Toolkit 4.2.6 – Related discussion: Open knowledge in practice – Open source technologies K-Link and K-Box

TRIMS – a web service to fight corruption
www.trimsonline.org

Crowdsourcing

Short definition: Harnessing the capacities of any large crowd by issuing an open call on the internet.

Examples: Outsourcing, crowdcreation, crowdfunding, crowdmapping.

Relevance to DC/IC: Utilising the potential of a crowd – its knowledge, skills, financial means, etc. – can be immensely beneficial for DC/IC work and is now possible thanks to modern crowdsourcing tools.

A 'crowd' can be defined as a multitude or gathering of people and 'sourcing' as the process of obtaining items for specific purposes. In information technology, the two words are bolted together to describe a concept whereby large numbers of paid or unpaid participants develop and/or deliver solutions to a specific problem or task. The applications for crowdsourcing are countless. Not only can a crowd's collective workforce and financial capacity be leveraged in this way (outsourcing or crowdfunding), so too can their total knowledge (crowd intelligence). Indeed, the decisions reached and the more efficient and effective ways of working often surpass those of individual experts. Crowdsourcing enhances decision-making, makes work more efficient and effective and enables a wide variety of initiatives to take off. A huge range of web-based platforms now enables people and companies to participate in the relevant tasks.

The most widely known example of a crowdsourced resource is the online encyclopaedia Wikipedia, which anyone can contribute to and update. Collectively, its tens of thousands of authors are building a great wealth of knowledge. And whenever errors, inaccuracies or even manipulations occur, they are usually quickly corrected by the crowd. Crowdsourcing is also popular for funding Wikipedia and many other new ideas. Commercial and social entrepreneurs who have ideas, but no funding, can showcase their proposals on crowdfunding portals. If people like the idea, they can contribute their money or time to facilitate implementation. In many cases, investors in crowdfunded projects derive direct benefits. For example, in 2014 the ethical mobile phone start-up Fairphone only got off the ground thanks to the backing of 20,000 small investors who received a phone in return.

RELEVANCE TO DC/IC

Crowdsourcing is also beginning to feature in DC/IC initiatives, with NGOs in particular now looking at ways of crowdfunding their projects. Securing the knowledge and involvement of a crowd not only ensures better decision-making and higher rates of participation, but helps to provide guidance (e.g. spatial orientation) in crisis situations. For example, crowdmapping approaches can be used to identify and visualise danger zones during natural disasters or outbreaks of violence or to coordinate the resulting relief efforts (→***Ushahidi***). Outsourcing also has a role to play because work assignments can be distributed to local companies, which in turn supports their business and achieves better results.

Further information:

Crowdsourcing for early earthquake warning system in Indonesia
www.t1p.de/tu5i

Crowdsourcing for microloans, worldwide
www.kiva.org

Cyber Security

Short definition: The protection of computer hardware and software against damage, failure and abuse.

Examples: The German banking sector's Computer Emergency Response Team (S-CERT) combats IT abuse. It assesses security gaps, advises on security issues that arise and trains personnel. The Forum of Incident Response and Security Teams (FIRST) promotes the creation and expansion of emergency response teams.

Relevance to DC/IC: The failure or abuse of IT systems can have devastating consequences throughout the world. Therefore, every IT solution rolled out for development cooperation or partner countries must be cyber secure and staff must be trained in their safe use.

Cyber security is the protection of computer hardware and software against damage, failure and abuse. Ensuring such protection requires not only technical measures such as firewalls or anti-virus programs, but also organisational and educational measures, such as emergency plans and employee training, and the enactment of cyber security legislation in tandem with effective law enforcement. A distinction is drawn between decentralised and centralised cyber security measures. Decentralised measures cover systems that are actually under threat (e.g. the server rooms of banks which are protected by combination locks to prevent unauthorised access). Centralised measures, on the other

hand, are often taken at the national level and sometimes even interfere with telecommunications infrastructure. The problem here for example, is that a national filter installed to defend against cyber attacks, spam or malware can also be used for monitoring and censorship, which may violate human rights and curtail freedom of opinion. Decentralised measures, by contrast, are viewed less critically in this regard.

The capacity-building measures required to ensure cyber security are set out in Action Line C5 of the World Summit on the Information Society (WSIS) and in the framework of the Global Forum on Cyber Expertise (GFCE), for example.

RELEVANCE TO DC/IC

Banks, hospitals, electricity grids and public administrations in partner countries are increasingly reliant on information technology. The failure or abuse of IT systems can have devastating consequences. Every IT solution rolled out in DC/IC partner countries must be cyber secure. DC/IC can play a key role by supporting educational programmes that build cyber capacities.

Further information:
see Toolkit 3.3 – Digital responsibility: Secure handling of data
see Toolkit 2.4.3: TruBudget – Transparent and manipulation-proof transactions using blockchain technology

Data Protection | Digital Privacy

Short definition: Data protection is about individuals' entitlement to decide how their data are used, how to maintain their privacy and how to protect themselves against the misuse of their data (e.g. by companies or governments).

Examples: The privacy of correspondence, email encryption, privacy settings in Facebook, digital source protection in investigative journalism.

Relevance to DC/IC: Data protection is vital when working with journalists and whistleblowers on anti-corruption projects, for example. Health data are also sensitive. In fragile contexts, data economy and anonymity can even save lives – for example, preventing the systematic identification of targets in conflict or genocide situations. In international cooperation, data protection must be understood as an integral part of a human rights strategy.

In 1970, the German federal state of Hesse adopted the world's first data protection act. In 1983, the right to self-determination was embedded in Germany's Basic Law in response to lessons learned after the Third Reich and in a bid to protect citizens against totalitarianism. However, in the modern age of →***smartphones*** and Facebook, private companies are amassing more and more personal data, which governments around the world are increasingly able to access. Gaining such access usually requires compliance with set

law enforcement procedures, but data are also sometimes used with no such legal basis. For instance, they are appropriated by governments to repress opposition groups. Progress in the legal protection of data is being complemented by technological advances. Encryption and anonymising technologies enable whistleblowers to pass information to anti-corruption bodies without being identified; social movements can organise themselves on platforms like Riseup; and journalists can protect their communications. Individual citizens, too, are concerned about the digital trace they leave behind when they go online or use devices like iPhones, since this allows interested parties to monitor their activities and movements in recent weeks.

RELEVANCE TO DC/IC

Relevant projects include training journalists and other groups at risk how to use data protection tools. DC and IC projects themselves also tend to accumulate personal data, and if national legislation does not protect this information to an adequate degree, IC actors must be consistent in taking account of human rights and ethical values in a data protection context. The protection of data begins with their collection. Adopting the principle of data economy, we must ask which data are really needed to answer a particular question and what information actually needs to be gathered. How data are analysed is also important. While →***big data*** offers many important benefits, at the same time large quantities of data, even when anonymised, allow conclusions to be drawn about individuals. So technical and organisational precautions need to be taken to ensure that potentially sensitive data are stored properly and securely.

Further information:
See Toolkit 3.3 – Digital responsibility: Secure handling of data

Media, Human Rights & Good Governance
www.media-humanrights-governance.de

Digital Divide

Short definition: The divide between people with or without access to Information and Communication Technology such as the internet. This may be due to a lack of technical →***access*** or know-how or the unavailability of suitable services.

Examples: Differences in access to fast and cost-effective broadband internet connections or in the skill sets of users of digital devices and applications.

Relevance to DC/IC: The more digitalised societies become, the greater the disadvantage faced by people with no access to digital technologies. Bridging the →***digital divide*** is therefore a development cooperation priority.

Digital technologies are on the rise and are shaping more and more areas of life – from the world of work and business, through education and science, to the media, politics and administration. But what happens to someone with limited or no internet access who, for example, wants to apply for a passport at the district office in Berlin but first has to make an appointment online? This exclusion is even more troubling when it involves access to education, health care or job offers.

Fortunately, almost everyone in Germany now has internet access, though differences remain, for example, between urban and rural areas. The digital divide is not just limited to technical access to the internet. People's ability to use digital technologies (→***e-literacy***), the availability of suitable content (catering for different languages, levels and needs) and socio-economic factors such as income, age, education and gender all determine on which side of the digital divide somebody will stand. Consequently, far more people use the internet in industrialised nations than in developing countries. In the latter, most users are from wealthier segments of society and tend to be young, better educated and male (→***gender and the internet***). So a group that already boasts an advantage can now extend that lead even further.

RELEVANCE TO DC/IC

The digital divide is further exacerbating existing discrepancies in levels of overall education and knowledge. Overcoming this divide is thus a priority for German development cooperation, as stated in BMZ's 2013 strategy paper. For those with access to knowledge can use it to develop innovative products, processes and services that are essential for sustainable development. Conversely, as digitalisation spreads, those without access get left behind with dwindling opportunities to participate.

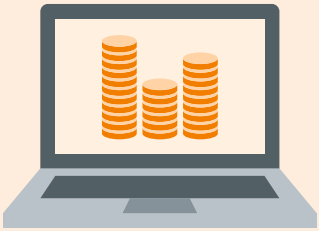
Further information:

see Toolkit 2.6.1 – SupaBRCK: Reliable and affordable internet, Kenya
see Toolkit 2.6.2 – Internet access for rural communities, South Africa
see Toolkit 2.6.3 – Mobile communications for rural regions, Myanmar

What has become of the digital divide?
www.t1p.de/oecr

Bridging the digital divide in India
www.grammarg.in

Digital Finance



Short definition: The use of digital technologies in the financial sector, e.g. for transferring money or offering credit or for savings and insurance products.

Examples: Mobile-based money transfer systems and savings accounts, loans that include alternative data like calling behaviour in credit ratings, or the sale of insurance through mobile technologies (see →***e-payment***).

Relevance to DC/IC: People living in rural areas in particular are often unable to access financial services. →***Digital technologies*** enable the delivery of cost-effective financial services without the need for conventional bank branches and allows services to be tailored to customers' needs.

The rapid development and widespread adoption of digital technologies are impacting financial systems, including – or rather especially – in developing countries. This has resulted in a growing, differentiated market that was previously reserved for the conventional banking and insurance sector. So we are now seeing different kinds of companies, like →***mobile communications*** or IT companies, starting to offer financial services. At the same time traditional actors, such as banks, are integrating digital solutions into their business models.

This is one reason why more people than ever can now be offered basic financial services. The internet can be used to access conventional banking services

(online banking) but thanks to mobile-phone-based systems, money transfers between relatives and social transfers are also possible (→***e-payment***). Insurance coverage can be taken out with and paid for through mobile telecoms companies.

Even creditworthiness can be checked on the basis of digitally generated data such as calling behaviour.

Instead of a bank, all that is needed these days is a mobile phone. Digital financial services are now being rolled out in such diverse sectors as agriculture, transport, social security, and water and energy supply.

RELEVANCE TO DC/IC

In rural areas in particular, the banking sector is often poorly developed due to the high costs and risks involved. To transfer money, take out loans or deposit savings, rural inhabitants in many parts of the world are forced to rely on informal channels or undertake long, expensive and risky journeys to their nearest available bank branch. Digital financial systems solve these problems, because financial transactions can be conducted directly or through agents using mobile phones or the internet. For the first time, rural and remote communities in the developing world are able to use official financial services that are tailored to their needs, increasing their options both economically and socially.

Further information:

see Toolkit 2.3.1 – Borderless money transfers for everyone, Jordan
see Toolkit 2.3.2 – Online portal for comparing financial products
see Toolkit 2.4.2 – Access to finance for smallholders, Uganda

Digital Inclusion

Short definition: →***Access*** to and use of mobile telephones, →***smartphones***, computers, the internet and →***digital technologies*** for and by people with disabilities and other marginalised groups (→***digital divide***).

Examples: Barrier-free websites and e-learning courses, read aloud apps, Braille screen protectors for smartphones, 3D-printable wheelchairs, programming schools for persons with disabilities, affordable mobile phone and internet connections, →***digital infrastructure.***

Relevance to DC/IC: Around the world, four out of five people with a disability live in developing countries and emerging economies. For these people, the digital transformation exacerbates economic and social discrimination, such as when websites or smartphones are not designed accessibly or when digital skills (→***e-literacy,*** →***e-skills***) are not taught or not taught in an inclusive way.

Public services (→***e-governance***), health services (→***e- health***), education (→***e-learning***), jobs and social interactions are increasingly moving to the internet. When digital offerings are not accessible, there is an increasing risk that people with disabilities will be left behind by digital transformation. Digital technologies such as smartphones or computers must be accessible for people with disabilities so that they can benefit from the opportunities afforded by the digital change. However, it is not just important to enable

access to the internet or →***mobile communications*** to people with disabilities. Digital technologies such as finger-mounted reading devices, which convert written text to audio using Bluetooth and earpieces, can also provide access to the physical world for people with visual impairments.

In addition to people with disabilities, digital inclusion of all marginalised and disadvantaged groups is important to prevent existing social inequality from being exacerbated by digital transformation. This includes women and girls, children and young people, indigenous groups as well as older people. For these groups, suitable digital infrastructure and affordable mobile communications and internet services are fundamental requirements for successful digital inclusion, as is basic digital knowledge.

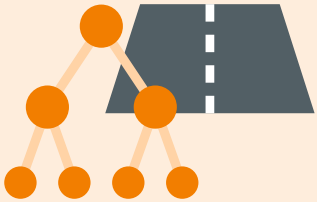
RELEVANCE TO DC/IC

One billion people around the world live with a disability; 800 million of them are in developing countries and emerging economies. They are impacted to a far greater degree by extreme poverty and illiteracy, which often means that they are unable to afford mobile and internet contracts or use corresponding devices. At the same time, digital technologies can reduce poverty, for example, through accessible e-learning courses for literacy skills.

Further information:

Observations on and tools for digital inclusion from the German Federal Agency for Civic Education
www.t1p.de/zdok

Digital Infrastructure



Short definition: Digital infrastructure is part of a country's infrastructure that makes digital services possible.

Examples: Aerial masts, cable networks, internet cafés for →***access*** to the internet.

Relevance to DC/IC: Without a sufficiently developed infrastructure, people do not have access to important information and communication services (→***digital divide***).

Digital infrastructure enables people to use mobile phones, listen to the radio or have their information read from their health insurance card at the doctor's office. It is part of the infrastructure used specifically for communication services. This infrastructure includes, for example, broadband infrastructure such as cables, radio systems and satellites for data transmission, IT centres and servers for data processing and phone booths, WiFi hotspots and internet cafés for access to communication services for people. In most cases, supporting infrastructure is required to operate this digital infrastructure. →***Digital technologies*** only works with electricity, radio systems require elevated positions (radio towers) and IT centres must be cooled. Above all, people are required to maintain and use these systems (→***e-skills***, →***e-literacy***).

This makes establishing and operating these infrastructures quite expensive. In rural areas in particular, where investment and operating costs are high but revenue is low, supply therefore often does not meet the demand. However, infrastructure is constantly growing as access to digital services becomes increasingly important. There are already over 74,000 mobile phone masts in Germany; and there will be even more after the next mobile communications standard (5G) is introduced. Countless kilometres of copper and fibre-optic cable around the world allow us to surf the web and talk on the phone. Over 400 fibre-optic cables on the bottom of the ocean connect the world's continents. →***Drones*** and balloons (Google's Loon) are already ensuring connectivity in pilot projects. Consortia such as SpaceX or OneWeb plan to put thousands of small satellites into low Earth orbit to bridge the digital divide.

RELEVANCE TO DC/IC

Digital technologies offer significant potential. When unavailable, individuals cannot benefit from the advantages, falling even further behind people or regions that are connected. The UN also considers internet access as a basic human right (→***digital rights***).

There is a lack of digital infrastructure in the rural regions of developing countries in particular, due to high costs and low local income. The market has failed to solve this problem so far. German development cooperation therefore strives to overcome this digital divide. To do so, it relies on better regulation and more competition and supports alternative forms of connectivity and pilot projects. Access to digital infrastructures remains an important step for overcoming this digital divide.

Further information:

see Toolkit 2.6.1 – SupaBRCK: Reliable and affordable internet, Kenya
see Toolkit 2.6.2 – Internet access for rural communities, South Africa
see Toolkit 2.6.3 – Mobile communications for rural regions, Myanmar

A national mobile communications network for Myanmar
www.t1p.de/maqa

Digital Readiness

Short definition: Digital readiness measures the breadth and speed of digital infrastructure and the penetration of technologies such as mobile phones, computers and internet connections in a country's population as well as capabilities for using them.

Examples: Number of mobile phone subscriptions and landline connections, internet speed per user (bits/s), percentage of households with a computer and internet access (→***access***).

Relevance to DC/IC: A variety of international indicators show for each country to what degree the population is able to use the internet and →***mobile communications.*** These indicators allow DC and IC to recognise challenges and meaningfully guide support.

Iceland and South Korea are world champions in digitalisation, as measured by the digital development index of the International Telecommunication Union (ITU) of the United Nations. The index measures the digital development of 176 countries. Advancements in digital development are monitored and compared over time. One category measures the intensity of use of the internet and mobile communications in each country, while another category measures the average digital education level. The third category measures the degree to which the technical skills for using mobile communications and landlines are in place in the local population. For this purpose, the index

measures the number of mobile and fixed landline users per 100 inhabitants, the percentage of households with a computer and internet access as well as the average data transmission speed. The analysis of the three categories produces a profile that illustrates the degree of readiness of the individual countries. This reveals the →***digital divide*** between countries and regions. For example, 91 % of German households have internet access compared with just 10 % in Angola and 15 % in Bangladesh.

Nevertheless, the digital development index does not answer all questions relating to digitalisation. The data are collected by country and do not provide any indications on particularly disadvantaged groups like women and girls, indigenous groups and people with disabilities (→***digital inclusion***).

RELEVANCE TO DC/IC

An app developed for a development project in a country where just 80 % of the population are able to use the internet does not have much chance of success. Therefore, projects using →***digital technologies*** must be adapted to local contexts. Digital readiness provides information on digital divides, the existing infrastructure, usage rates and digital skills (→***e-skills)*** of the local population, making it possible to identify potential hurdles early and develop appropriate solutions.

Further information:
see Toolkit 3.1.2 – Test your digital readiness: Is your target group ready?

ICT Development Index (2017)
www.t1p.de/s4yb

Global Open Data Index (2016)
www.t1p.de/4r6q

Networked Readiness Index (2016)
www.t1p.de/jitw

Digital Rights

Short definition: Human rights transferred to the digital world.

Examples: The rights to free →***access*** to the internet, freedom of expression on the internet and privacy on the internet.

Relevance to DC/IC: Wherever digital rights are not respected, the development cooperation goals of democratisation and freedom of expression cannot be achieved.

The many societal changes brought by digitalisation necessitate new legal frameworks. Digital rights provide the normative guiding principles required in this connection, drawing heavily on the Universal Declaration of Human Rights. The goal is to ensure that the same rights apply online as offline, so that people can communicate with the rest of the world, express their opinions and participate in education, knowledge sharing and commerce. The human rights strongly affected by digitalisation are freedom of expression and association, data protection and privacy, and the right to education, multilingualism and consumer protection. These need to be protected in a digital context, too. In addition, digitalisation also requires the definition of new rights, e.g. relating to internet access. A number of actors are therefore demanding the adoption of a separate *'Bill of Digital Rights'*.

At the 2005 World Summit on the Information Society (WSIS) in Tunis, UN member states adopted a declaration of human rights for internet use – the '10 Internet Rights and Principles'. These include, for example, equal rights to internet access and use for all, without censorship, and the right to privacy and data protection. Besides the UN, the Freedom Online Coalition (FOC) is another international body working to support a free and open internet.

As digitalisation continues apace, new problems arise that need to be debated publicly. In a number of countries, such as Costa Rica and Spain, the right to internet access has already been enshrined in legislation, meaning their governments have to ensure that every member of their population has internet access. The term 'digital rights' is closely related to →***internet freedom.***

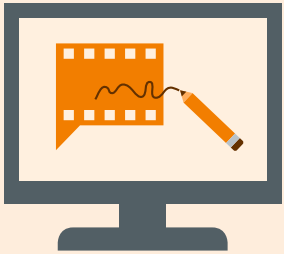
RELEVANCE TO DC/IC

Digital rights are in a precarious state in many countries. In China, for example, the internet is subject to strict censorship. In Egypt or Saudi Arabia a critical tweet can result in a prison sentence. Development cooperation can work to protect people's digital rights more effectively, for example by promoting initiatives for the legal establishment of digital rights or participating in the international debate on digital rights. Such measures can help to ensure that newly established digital infrastructures do not end up being misused by certain actors for the purposes of monitoring or exercising control. Technology is not neutral and can create totally new dependencies (the ethics of algorithms), and there is still a dearth of good examples of effective legal framework conditions for protecting and demanding digital rights.

Further information:
see Toolkit 1.3 – Digitalisation as a key to sustainable development

'Click Rights' – Campaign for
digital rights in the Middle East and in Africa
www.igmena.org

Digital Storytelling



Short definition: The telling and sharing of a story using digital media, such as video, audio and images, usually adopting a personal narrative perspective combined with interactive elements.

Examples: The ZEIT ONLINE special on the development of Karl-Marx-Allee ('Das neue Leben der Stalinallee'), or the online project by Doctors Without Borders for slum dwellers ('Urban Survivors').

Relevance to DC/IC: Many cultures have a strong storytelling tradition. Digital storytelling enables these narratives to be shared through digital media, resulting in highly accessible, interactive, multimedia content. The format of modern storytelling stimulates different senses, making listeners more eager to learn and boosting the chances of long-term retention and the perpetuation of knowledge.

Unlike technical data or sterile information, stories engage listeners on many levels. They grab your attention, linger in your memory and can even influence long-term values and decisions. The millennia-old practices of parents telling stories to their children or sharing them with other adults, or of authors writing them down, can now take place online via digital story-telling. All kinds of digital media – text, images, audio, video – can be used to create digital stories that are then distributed via websites, →***social networks,*** podcasts or even down telephone lines and by →***text messages***.

Digital storytelling is characterised by non-linear narratives that express personal standpoints. It also tends to offer a certain degree of interactivity. Consumers of digital storytelling no longer take a passive role. Instead, they answer questions at key points in the narrative, for example, and actively influence it, shaping how the plot unfolds, just like real life. The most popular format for digital storytelling is probably the story video, like those uploaded to YouTube by private individuals. An increasing number of organisations and companies are now following suit. The education sector, in particular, which is always on the lookout for playful and memorable ways to deliver learning content, is increasingly resorting to digital storytelling.

RELEVANCE TO DC/IC

Digital storytelling can be incorporated in development cooperation work in many ways. People around the world grow up with stories, memorise them and then retell them. A well-told story appeals to our emotions, triggers personal memories and is easier to remember than isolated facts and figures. Stories are simple to engage with, and the audience's desire to find out how things turn out motivates them to stay tuned right to the end. As such, stories are valuable tools for transferring knowledge and, when delivered using multimedia content, are particularly powerful in countries with low literacy levels. The format can also be used to gather information, because plunging the audience into a (fictional) context paves the way for asking questions and eliciting intuitive answers.

Further information:

Serengeti – Towards an Uncertain Future
from Deutsche Welle 'Global Ideas'
www.t1p.de/g3ja

The current situation in Yemen as a digital story
www.t1p.de/hutv

Digital Technologies

Short definition: Devices, infrastructure and programs for digitally processing, storing and/or transferring information.

Examples: Computers, the internet, email, mobile phones, radio, weather stations, but also technology for transferring information over copper wires, through fibre-optic cables and via radio signals.

Relevance to DC/IC: Digital technologies can promote development because they provide people with new ways of participating and gaining access to knowledge and key services. They also make work flows and information processes more effective and efficient

Digital technologies (also known as 'information and communication technology' (ICT)) describe the technologies used to collect, store, transfer and process data. The pivotal idea behind digital technologies is linking communication and information.

Modern digital technologies are permeating and changing society, business and politics. They are omnipresent. The number of internet users more than tripled within a decade (2005–2015) – from one billion in 2005 to an estimated 3.2 billion at the end of 2015. An estimated 8 billion mobile phones will be in circulation worldwide in 2021. And it is not just people who are becoming increasingly interconnected, but also the myriad devices we use (→***Internet of***

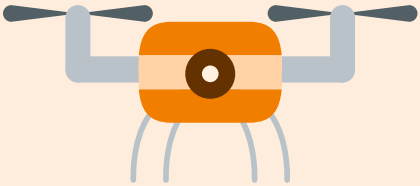
Things) and businesses (→***Industry 4.0,*** where products already communicate with the production devices during production). As a result, enormous quantities of data (→***big data***) are being generated, creating greater volumes of knowledge. Digital technologies are indispensable for analysing such gargantuan quantities of data. They have enabled more people than ever to participate in social developments and use a host of new services.

Economic processes are being optimised and participation in global markets is being enabled. At the same time, all these changes prompt numerous questions, such as: How do we ensure →***data protection***? How do we regulate these new international channels in light of governments' very different standpoints (→***e-governance***)?

RELEVANCE TO DC/IC

By giving people access to important services and information, digital technologies can significantly boost development, especially in rural areas, where they can provide basic services (→***digital finance,*** →***e-learning,*** →***e-health)*** and foster greater participation in society by disadvantaged groups (→***e-participation,*** →***gender and the internet***). One problem, however, is that it is always those most in need who lack →***access*** to the internet and digital technologies. A →***digital divide*** has arisen, and it is even exacerbating existing disparities. As the 2016 World Development Report points out, although digital technologies offer great development potential, this potential is often difficult to tap to its fullest extent.

Drones | Unmanned Aerial Vehicles (UAVs)



Short definition: Drones, or unmanned aerial vehicles (UAVs), are vehicles that fly either autonomously or by remote control.

Examples: UAVs fly either using rotors (like the four-rotor quadcopter), which is useful for hovering, or wings (fixed-wing UAV), which are better for covering greater distances.

Relevance to DC/IC: UAVs are currently used in development cooperation to take aerial photographs, for example to assess farming activities or in distaster zones. The use of UAVs to transport cargo (e.g. goods or aid supplies) to inaccessible areas is promising.

Drones are pilotless, crewless aircraft that are remotely controlled by people or computers. To operate some drones, like quadcopters, their controllers have to keep them within visible range, whereas other models are pre-programmed with a target location using GPS data and are automatically guided to their destination. Drones can be equipped with cameras for aerial photography or used to transport goods. Media coverage of drones has hitherto tended to focus on their use in military and security operations. As a result, the public often views them in a somewhat negative light. The increasing, beneficial use of drones for civilian purposes ('drones for good') will help to counter these negative perceptions.

RELEVANCE TO DC/IC

In a development cooperation context, drones could prove useful in obtaining aerial photographs. For example, in agricultural projects, drone-mounted cameras can photograph fields, detailing crop condition. In forest projects, aerial photographs can be used to create accurate forest inventories. Cargo drones are playing an increasingly valuable role in transporting certain goods for DC/IC. In many regions of Africa, logistics in the health sector, particularly medical supplies at rural hospitals and pharmacies, pose an enormous challenge. This is partly due to the poor infrastructure and difficult terrain. The use of package drones can not only solve the problem of medical supplies to rural regions: drones also have the potential to prevent worldwide crises. They may even prevent the spread of viral diseases, such as Ebola, early on.

Further information:

see Toolkit 2.8.1 – Drones against climate change in the Mekong Delta, Viet Nam
see Toolkit 4.1.2 – GIS: Collecting geodata and making them available

Use of drones for conflict-sensitive resource and asset management (COSERAM)
www.t1p.de/ykgm

Deliver Future – Medical care using drone supplies
www.t1p.de/r32i

E-Agriculture

Short definition: The use of →***digital technologies*** in agriculture.

Examples: GPS-controlled combine harvesters, weather →***apps,*** plant sensors.

Relevance to DC/IC: Digital technology can be used to modernise agriculture and make it more efficient and profitable, thus helping to safeguard food security.

The term 'e-agriculture' describes the use of digital technology in agriculture. Whether out in the fields or in pens and stables, ultra-modern devices cover almost all areas of production. There are now tractors and combine harvesters with GPS-guided steering systems that work their way through fields with centimetre precision, consuming less fuel and smaller quantities of sprays, and not missing a single plant of the farmer's crop. →***Drones*** can take aerial photographs that can then be used to analyse where fertilisers need to be applied. There are even sensors that can determine plants' exact nitrogen requirement and thus the actual amount of fertiliser they need. One app uses weather data to help farmers tailor their activities to weather conditions. Cows are fitted with tiny radio chips that store data on their pedigree, age, vaccination schedules, feed requirements and breed.

Armed with such high-tech equipment, farmers work faster and more efficiently and can thus maximise their yields. At the same time, these modern devices help them operate in a more environmentally friendly and sustainable manner. Developers are now increasingly focusing on the digital networking of agriculture, getting farm machines and devices to exchange data and thus optimise their work processes. For example, in the future a combine harvester should be able to automatically communicate its fill level to a tractor with a transfer trailer, so that the latter arrives at just the right time to take away the grain it has gathered.

In many cases, the most basic technologies can simplify farmers' work, increase yields and enable more sustainable practices. For example, broadcasting a specialised radio programme is enough to keep farmers clued in with new farming methods, key information on the weather or suitable windows for harvesting can be sent by →***text messages***.

RELEVANCE TO DC/IC

Improving agriculture in developing countries is a major concern for development cooperation. The use of digital technologies can make farms safer and more efficient, providing more people with food and creating long-term prospects for new generations of farmers. Often, elaborate high-tech equipment is not needed. Simple approaches, such as instructional videos on pruning techniques, text message weather services, online insurance to protect against crop failure and apps for ordering feed are all that is required to help modernise farming methods and production, safeguard harvests and increase yields.

Further information:
see Toolkit 2.1.2 – Using smartphones as extension agents, Zimbabwe

Climate Change Knowledge Network in Indian Agriculture, see Toolkit 2.1.1
www.t1p.de/q55m

Farmerline
www.farmerline.co

E-Governance

Short definition: The use of →***digital technologies*** in government and administration to effectively shape decision-making processes, procedures and interactions between public sector, civil society and private sector actors in a more transparent, demand-oriented and participatory manner.

Examples: Digitally supported applications or submission of official documents (e.g. identity cards, car registration, tax returns), the German Federal Government's Citizen Dialogue, online public consultation.

Relevance to DC/IC: E-governance promotes dialogue between government, civil society and private sector actors and can increase political participation and accountability mechanisms, improving government performance, making its activities more transparent and promoting development cooperation's goal of good governance.

In the past, 'e-government' effectively boiled down to using internet-based approaches to make public services and administration more efficient and user-friendly, and using digital media to improve government and administration processes (e-government). But today's digital technologies can also alter governance itself. Using the internet and new digital tools, non-governmental actors can participate more extensively and directly in political processes than ever before (→***e-participation***).

E-governance results in greater transparency, decentralisation and flexibility, transforming the relationships between the public sector, civil society and the private sector.

A good example of this comes from Brazil, where the world's first internet law was developed with the involvement of a wide range of actors, including private internet users, civil society organisations, major companies and media authorities. 'First, the principles and values that the law should embody were discussed online. Then we drew up a bill that was posted for discussion, with citizens able to comment on each article of the legislation', explains lawyer Ronaldo Lemos, one of the participants in the project.

RELEVANCE TO DC/IC

In recent years, people in developing countries have become more vocal in their demands for greater transparency and more reliable forms of government, seeking to have a say in public life. For example, in GIZ projects, e-governance approaches have been deployed to underpin the reform of public finances, modernise administration, fight corruption, promote transparency in the extractives sector, transfer knowledge and support the sector.

Further information:
see Toolkit 2.2.2 – Blockchain registers, Georgia
see Toolkit 2.2.4 – Monitoring and evaluation information system for local governments, Rwanda

Justice and prison reform for promoting human rights and preventing corruption in Bangladesh
www.t1p.de/75r0

Myth detector detects fake news in Georgia, see Toolkit 2.2.1
www.mythdetector.ge/en

E-Health

Short definition: The use of electronic media to deliver health care, medical treatment and advice in the event of illness.

Examples: Simplified data exchanges (electronic patient records), health monitoring (the DiabetesPlus app), online health information portals (https://medlineplus.gov), telemedicine diagnostics (online consultations).

Relevance to DC/IC: In many countries, health care services are too expensive for some of the population and are difficult, if not impossible, to access. E-health applications promise cost-effective, fast and efficient health services – even in regions where medical specialists are in short supply.

E-health is the term used to describe medical and health sector apps for electronic devices like computers, →***smartphones,*** smartwatches or mobile phones. They enable patients to consult medical experts remotely. E-health apps are set to shape, and even revolutionise, health care in the future. Three key developments in e-health are as follows:

1. Data can be exchanged more easily between doctors and patients or between public sector and private health facilities, providing an overview of the progression of a patient's disease or supplying valuable health data on a population at the push of a button.

2. Algorithms and standards can automate health care to a certain extent. Using digital apps, trained individuals, or even patients themselves, can make their own diagnoses and therapy recommendations.

3. Telemedicine, another e-health service, involves the remote diagnosis and treatment of patients by trained medical personnel using technology to carry out consultations at a distance, without the patient being there in person.

RELEVANCE TO DC/IC

While health is a fundamental human right, in many countries it is one that many people are denied. For them, medical treatment is too expensive, they are not well informed, doctors and specialists are not available locally, and important drugs are impossible to access. German development cooperation is committed to ensuring that this human right is respected around the world. →***Digital technologies*** can significantly open up access to information and medical care and deliver better quality. In particular, health apps for mobile phones or smartphones can reach a much larger target group. For example, diagnostic →***apps*** can make treatment recommendations for patients living in even the remotest areas, while other systems can send crucial information (e.g. vaccination reminders) by →***text messages*** to anyone with a mobile phone.

Further information:
see Toolkit 2.3.4 – Health: Digital solutions for universal health coverage, Tanzania

Health: SORMAS – Mobile app for early warning for epidemics in Nigeria, see Toolkit 2.3.2
https://sormasorg.helmholtz-hzi.de

E-Learning

Short definition: E-learning is the term used to describe teaching and learning delivered through electronic media.

Examples: Video, virtual classrooms, webinars, vocabulary training tools for desktop computers.

Relevance to DC/IC: E-learning enables educational content and specialist knowledge to be delivered anywhere, irrespective of where the participants happen to be.

E-learning is short for 'electronic learning', the generic term for the electronically supported transfer of knowledge. Educational television programmes and instructional videos are considered to be early forms of e-learning. The emergence of personal computers saw the arrival of learning software and CD-ROM packages. Nowadays it is the internet and the web-based apps it supports that shape the world of e-learning.

The sector's products range from small e-learning packages on specific topics to broad-based learning platforms that can also be used in traditional educational establishments like schools and universities. These e-learning systems guide users through the learning process and provide multimedia content and a host of tools for organising how they learn. They also provide opportunities for communication and interaction. Discussion forums, online chat rooms

or video conferences enable groups of learners to exchange information with each other and collaborate virtually.

Compared to conventional methods of learning, e-learning offers far greater flexibility, as delivery does not need to be tied to certain times or locations. As such, learners can work at a pace and rhythm that suits them best. E-learning is also usually significantly cheaper than conventional learning methods, which considerably boosts its potential for participation.

Where e-learning is combined with face-to-face teaching, it is called blended learning, and when e-learning is designed especially for →***smartphones*** or tablets, it is called mobile learning. The integration of game playing as a way of motivating learners is referred to as →***gamification.***

RELEVANCE TO DC/IC

A major focus of DC and IC's work is to improve educational opportunities in partner countries. E-learning's extensive reach, combined with its relatively low development and delivery costs, make it a powerful option for providing more people with targeted learning. Instead of having to send books to each region, electronic materials can be distributed wherever people have, and are able to use, the internet (→***access***). Developing →***e-literacy*** is therefore an important factor to bear in mind, and one that can also benefit from e-learning approaches.

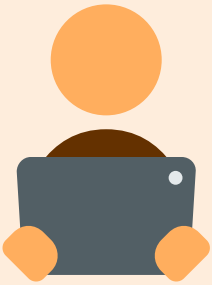
Further information:

see Toolkit 2.3.6 – Education: Digital media skills, Moldova
see Toolkit 2.7.2 – Arabia Felix – Gaming for peace
see Toolkit 4.4.1 – E-learning – Using digital learning formats

Education to go: The self-study platform Shule Direct's Makini SMS learning platform in Tanzania, see Toolkit 2.3.8
www.shuledirect.co.tz/index

Training young people in Tunisia
www.t1p.de/4m1u

E-Literacy | Digital Literacy



Short definition: E-literacy is the ability to use digital devices such as computers, tablets or →***smartphones.***

Examples: E-literacy includes know-how like creating or reading text on a computer, searching the internet or using a smartphone.

Relevance to DC/IC: →***Digital technologies*** are becoming an integral part of life. As such, the ability to use them is becoming increasingly essential, opening up a world of opportunities. Digital technologies are also being deployed more and more in development cooperation projects to support people in the field. If people do not know how to use these applications, they miss out on opportunities, reducing the effectiveness of development cooperation projects.

'E-literacy' is the ability to use digital devices and services. At the most basic level, this means understanding how devices and services can be of use, and how to use technology (starting by switching on the equipment). At a higher level, e-literacy involves understanding the correct, specific application and use of technologies – for example, for calling friends or sending a →***text messages*** using a simple mobile phone (feature phone), smartphone →***apps*** or computer software. People need to be e-literate to derive any benefit from word processing or internet applications, search engines, e-learning or the myriad of channels for communication offered by modern technologies.

Levels of e-literacy are often linked to users' reading ability. However, the use of touchscreen technologies, images, audio and other modern methods can help to make sure that illiterate people are no longer excluded from using digital technologies.

There is an important distinction between e-literacy and →***e-skills***. While e-literacy refers to basic skills required to use digital technologies, e-skills can be described as specialist digital know-how, particularly the knowledge required and used in a work context.

RELEVANCE TO DC/IC

E-literacy enables people to benefit from digital technologies and participate in digital life. Many development cooperation initiatives require a level of e-literacy – for example, →***e-learning*** courses or apps. Accordingly, the e-literacy level of the target group must be taken into account when developing solutions for partner countries. If projects are to be implemented effectively, solutions for partner countries may need to be adapted to the target group's e-literacy level or the group's e-literacy level may need to be raised.

Further information:

see Toolkit 2.4.1 – Promotion of digital skills of women and girls, Mexico

TEGA – Technology Enabled Girl Ambassadors
www.t1p.de/j5nx

E-Literacy and programming knowledge for the young generation
www.africacodeweek.org

E-Participation

Short definition: Harnessing the internet to enable people to participate in political processes.

Examples: The German Federal Government's Citizen Dialogue, internet-based citizen surveys and consultations, online petitions, the decision-making software LiquidFeedback.

Relevance to DC/IC: Online participation procedures strengthen political participation in many developing countries, even in regions where infrastructure is poor.

E-participation is the term used to describe the participation of people in political processes through digital applications. Both the State and its citizens can interact through online tools like →***blogs,*** wikis, forums or →***social networks*** (e.g. Facebook and Twitter). A classic example of e-participation is the German Federal Government's Citizen Dialogue. The website www.gut-leben-in-deutschland.de gives citizens an opportunity to hold online discussions with government representatives on what a good life in Germany means to them. Past experience shows that the best way to get people participating in political processes is to blend online and offline approaches – for example, by providing conventional forms of engagement like public meetings and

consultations in tandem with online citizen discussion forums and petition platforms.

E-participation involves not just (top-down) government initiatives, but also (bottom-up) grassroots movements, like online petitions or campaign platforms developed by citizens. A broader definition of e-participation goes beyond the relationship between a State and its citizens to include discussions within civil society.

It is important to distinguish between the terms 'e-participation' and 'e-government', as the latter refers to the electronic processing of administrative and governmental procedures. So whereas e-government provides citizens with online public services, e-participation enables them to influence political debates and decisions. E-participation and e-government are discussed in the entry on →***e-governance***.

RELEVANCE TO DC/IC

The steady spread of the internet (→***access***) is paving the way for simple, cost-effective ways of encouraging citizen participation in developing countries. For example, digital oversight systems can be set up that enable citizens in remote areas to evaluate the delivery of public services and demand accountability through feedback reports (online comments, images or text messages). The internet also makes it possible for members of the public to contact government representatives directly, demand transparency in public life and discuss government decisions with others.

Further information:
see Toolkit 2.2.4 – Monitoring and evaluation information system for local governments, Rwanda

Al Bawsala – Transparent policy-making in Tunisia using online platform
http://www.albawsala.com/en/

E-Payment

Short definition: The generic term for cashless electronic payments, e.g. by email, pre-paid card or mobile phone, as well as via online banking transactions.

Examples: Worldwide internet payment systems like PayPal, or the →***M-Pesa*** electronic money transfer service provided by the Kenyan mobile company Safaricom.

Relevance to DC/IC: E-payment systems make financial transactions and money transfers easy and safe. People no longer need to carry cash or even go to the bank. E-payment services also provide access to financial services for people without a bank account.

These days, when buying groceries in a supermarket, paying restaurant bills or booking flights, we tend to pay electronically using debit or credit cards. When purchasing goods online, we use electronic payment systems like PayPal, Apple Pay and Google Wallet. Online banking can be used to carry out nearly all of our banking transactions on our smartphones or PCs. All such cashless financial activities are considered to be forms of electronic payment (e-payment).

E-payment saves time and money. It also gives users far greater flexibility, as they are not obliged to carry cash and can make payments anywhere. Some systems are so fast that recipients receive funds within seconds.

While a bank account is still required for most kinds of electronic payment, some mobile-phone-based payment systems avoid the need for conventional accounts. A good example of this is M-Pesa, a money transfer service provided by the Kenyan mobile communications company Safaricom, which currently has more than 20 million customers.

RELEVANCE TO DC/IC

In developing countries in particular, e-payment systems like M-Pesa have revolutionised the world of finance. For the first time, people in rural areas can access financial services locally – instead of having to go to the bank, they can use their mobile phones or go through agents like petrol stations or kiosks. These simple and cost-effective systems enable money to be transferred and social transfers or remittances from relatives and friends to be paid into a mobile wallet, eliminating the need to make long, often expensive and risky journeys to the nearest bank. Payment flows can also be made more transparent, which is important when it comes to fighting corruption. Such systems are now widespread in Africa, in particular.

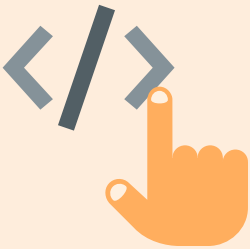
Further information:

see Toolkit 2.4.2 – Access to finance for smallholders, Uganda
see Toolkit 2.7.3 – Blockchain technology assists in times of need, Jordan
see Toolkit 2.7.4 – Financial support for Syrian refugees, Turkey

Off-grid power supply
for rural regions
www.plugintheworld.com

Smart card for clean drinking
water, see Toolkit 2.5.3
www.t1p.de/84xo

E-Skills



Short definition: The digital skills needed for certain job profiles or in companies and organisations.

Examples: Programming skills, software expertise (Microsoft Excel, SAP, SQL, etc.).

Relevance to DC/IC: E-skills lay the foundations for a well-functioning, competitive economy and increase the earning capacity of those who possess them. However, they are often either in short supply or are not sufficiently developed. DC and IC are ideal partners for filling this skills gap.

An economy must harness the new digital opportunities to remain competitive in our increasingly digital world. People require digital knowledge and skills to get a job. These skills using →***digital technologies*** (i.e. e-skills) are increasingly becoming core competencies in the modern world, as borne out by the widespread use of Microsoft Office applications for business analysis or administration. Equally essential are programming expertise (e.g. the know-how required to develop →***apps*** and websites), media skills (e.g. for the responsible use of data and →***data protection***) and the ability to operate →***3D printers***.

→***E-literacy*** encompasses the basic skills needed to use digital devices and is a prerequisite for developing e-skills. By contrast, e-skills are the (specialised) knowledge required to use complex digital tools in a day-to-day work context or to develop user-specific digital services and tools. Education and advanced training targeting specific occupations, play an essential role in developing e-skills.

RELEVANCE TO DC/IC

If countries are to modernise their economy and administration and compete internationally, the development of e-skills is a must. Well-trained IT specialists are urgently needed to program software, apps and platforms, install digital administration systems, build →***smart cities*** and manage networks (smart grids), for example. Development cooperation can help partner countries develop e-skills by delivering digital training, training digital experts as multipliers (train the trainer), and promoting school and university curricula that feature e-skills.

Further information:
see Toolkit 2.4.4 – Modern youth, Iraq
see Toolkit 2.3.7 Education: HEdIS – Promote knowledge sustainably and across borders, South Africa/Germany

'icecairo' innovation hub in Egypt
www.icecairo.com/fablab

I am Science – Getting girls excited about science and technology, see Toolkit 2.3.5
www.t1p.de/nz01

G20 Initiative #eSkills4Girls
www.eskills4girls.org

E-Waste

Short definition: The physical waste created when electronic devices reach the end of their life cycle.

Examples: Mobile scrap, old televisions and refrigerators, etc.

Relevance to DC/IC: E-waste contains valuable metals that are an important source of income for informal actors in developing countries, where it is often recycled illegally. Uncontrolled dumping and recycling result in serious risks to the environment and to people's health, however and waste valuable resources.

Technical progress and digitalisation have a major downside. In 2016, 44.7 million tonnes of e-waste were amassed around the world – only 20 % of this waste was reported as being handled formally (that is recycled and disposed of according to regulations).

However, e-waste is also an extremely valuable resource. The gold content of old mobile phones, for example, is 50 times higher than that of the ore extracted from lucrative gold mines. Silver, palladium, copper, cobalt and rare earth elements can also be recycled and re-used. This process is both labour- and cost-intensive however, if carried out in an environmentally friendly manner, with costs often outstripping the returns.

Since these countries often have no official recycling industry, waste is processed in backyard operations that are borderline or outright illegal.

This usually involves children and young people having to extract valuables by burning off plastic coatings and materials over an open fire or by dissolving recyclable metals in acid baths. They do this without protective equipment and are exposed to toxic vapours and dust. The chromium, arsenic, lead, nickel and mercury generated by these processes cause serious illnesses and contaminate the soil and groundwater. These methods are also inefficient, which means that many of the valuable resources are lost.

Since 1992, the Basel Convention has allowed the export of functional used electronics for further use but forbids the shipment of e-waste to countries that have no capacities for managing it in an environmentally friendly manner. However, it is difficult to control all exports. In addition, e-waste is often illegally exported and falsely declared as a 'donated' or 'used'.

RELEVANCE TO DC/IC

German development cooperation is determined to reduce damage to the environment, climate and people and prevent the waste of valuable resources (that have often been sourced in an environmentally harmful manner). Some partner countries are supported in introducing sustainable e-waste management. Financing systems for environmentally friendly recycling are just as important as greater efforts to make our own consumption more sustainable. Manufacturers can take on responsibility for waste and focus on sustainability early on, during the design and production phases.

Further information:

German Federal Ministry for Economic Cooperation and Development (BMZ) position paper: Improving the sustainability of electronic waste management www.t1p.de/j8lr

The Global E-Waste Monitor 2017 – Quantities, Flows, and Resources www.ewastemonitor.info

Gamification

Short definition: Computer gaming elements transferred to other areas and tasks to make them more attractive to users.

Examples: Airlines' frequent flyer programmes, corporate web portals with points systems and rankings.

Relevance to DC/IC: Knowledge transfer is an important task of development cooperation. Gamification offers new approaches for conveying knowledge.

'Gamification' is the process whereby principles and features of computer games are transferred to other areas or tasks. Typical elements used in this context include reward and points systems, rankings and progress indicators. The aim – and proven effect – of incorporating fun elements into activities is to boost users' motivation to pursue (and enjoy) them.

One example of this is the SAP system, which encourages its employees to contribute to the company's internal platform, earn bonus points and rise through different levels and rankings instead of being obliged by senior staff to do so. Even customers are tied into the system, and training measures are also used to encourage users to continue attending courses regularly.

Gamification is not to be confused with 'serious games'. The former means the transfer of game elements to other domains, whereas the latter describes actual games that serve not to entertain, but to transfer knowledge or change people's attitudes. Papers, Please! is a multi-award winning serious game in which players assume the role of border guards of a fictitious Eastern Bloc country and decide who may or may not enter the country. Border Guards are only rewarded if they follow the rules to the letter and allow the 'right' kinds of migrants into the country. Based on the famous Milgram Experiment, the game forces players to address difficult moral dilemmas.

RELEVANCE TO DC/IC

Transferring knowledge is an ongoing task for DC organisations, so new approaches like gamification can serve a purpose in this context, too. Games and game-like formats can be used to transfer knowledge in accessible and engaging ways that motivate users to continue learning. Since many principles of gaming are universal and games are popular all over the world, they appeal to a large target audience.

Further information:

see Toolkit 4.1.2 – GIS: Collecting geodata and making them available
see Toolkit 4.4.1 – E-learning – Using digital learning formats
see Toolkit 4.4.5 – Gamification – Boosting effectiveness through games

Arabia Felix – Gaming for peace in Yemen, see Toolkit 2.7.2
www.t1p.de/lw3k

University of Pennsylvania's gamification MOOC
www.t1p.de/ykkj

Gender (and the Internet)

Short definition: Gender describes the culturally and socially conditioned sex of a person. For this reason, people often talk of 'social gender'.

Examples: →***Blogs*** on gender issues (genderblog.de), gender debates on →***social networks*** (the Twitter campaign #MeToo), information pages on gender awareness (www.un.org/womenwatch), gender responsiveness in IT occupations (www.eskills4girls.org).

Relevance to DC/IC: Participation in today's society depends to a large extent on →***access*** to →***digital technologies.*** Since fewer women than men own a mobile phone in many countries and also use the internet less frequently, the worry is that inequalities between men and women will increase. DC can help to promote greater gender equality.

In every culture, social norms condition gender roles. They determine what is considered typical– for example, how men and women should dress, which occupations they carry out, and the role they play in the family. 'Gender' is a social construct. Because social norms often discriminate against women, gender equality is a central component of gender politics. Internet access reflects the widespread inequality between men and women, with around 250 million fewer women worldwide having access to the internet than men. 184 million fewer women own a mobile phone. Since access to digital technologies is a key prerequisite for social and economic participation in the

world today, it is feared that this →***digital divide*** between women and men will further exacerbate gender inequality.

RELEVANCE TO DC/IC

The inclusion of a gender perspective in projects and programmes is a fundamental principle of DC/IC. For example, with African women being 25 % less likely to use the internet than men, there is a clear need to take action in this area. If not, many women will remain excluded from new opportunities for social, economic and political participation as well as in education and health. Digital technologies can help to increase inclusion for these disadvantaged groups. As with the digital divide in general, there is a risk that digital technologies, despite the opportunities they present, will end up not just failing to reduce gender inequality, but actually make the problem worse.

Further information:
see Toolkit 2.4.1 – Promoting digital skills of women and girls, Mexico

EQUALS – A global network for overcoming the digital gender divide
www.equals.org

I am Science – Getting girls excited about science and technology, see Toolkit 2.3.5
www.t1p.de/nz01

Geographic Information System (GIS)

Short definition: A system that geographically pinpoints information, linking data to points on digital maps, for example.

Examples: The online service Google Maps, which provides information on the locations and rating of restaurants, shops and services, or the →***open-source*** platform →***Ushahidi.***

Relevance to DC/IC: Geographic Information Systems can be used, for example, to analyse the condition of land-use areas in under-resourced regions, to precisely trace the spread of natural disasters or to highlight hotspots of political unrest. These analyses can be used to support programme to help foster economic, social and political development in the affected regions.

Whether you are looking for a good Peruvian restaurant nearby or for passable and uncongested roads after a flood, geographic information systems (GISs) enrich geographical and location data with an abundance of additional information, make them usable and present them in a simple way that is easy to interpret. Many of these maps are publicly accessible on the internet.

GISs have many uses: for example, Google Maps pinpoints the locations of restaurants and public services, environmental research maps the distribution of plant and animal species, and the police compile maps to identify crime hotspots. The open-source map Ushahidi was developed in Kenya after the

2007–08 election to enable eyewitnesses to map acts of political violence and persecution. This not only made these acts more publicly visible, but also highlighted the areas where most violence occurred. GISs are powerful tools that present spatial information in a way that is easy-to-understand.

RELEVANCE TO DC/IC

Geographic information systems can be adapted to almost any situation, and their ability to present information simply and clearly makes them a very useful tool for DC/IC organisations and their partners. GISs are frequently used to tackle land, water and forestry management issues, in particular in areas with a scant supply of resources. For example, they can be used to analyse land use in order to determine better, more profitable and sustainable management approaches (→***e-agriculture***). In politically unstable countries or in locations affected by natural disasters, GISs can quickly provide life-saving information, showing where help is required, which areas should be avoided, and so on.

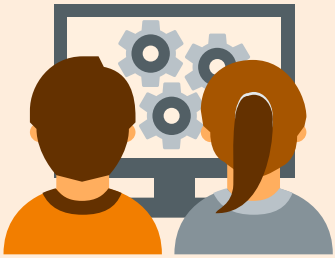
Further information:

see Toolkit 4.1.2 – GIS: Collecting geodata and making them available
see Toolkit 2.5.1 – Responsible extraction of resources, DR Congo
see Toolkit 2.5.2 – Fighting droughts with data, Namibia

Satellite-supported fishing control in Mauritania, see Toolkit 2.8.3
www.t1p.de/3cr6

Cross-border water management in Central Asia
www.t1p.de/eaqt

Hackathon



Short definition: An event where programmers, developers, technicians and designers work intensively together to develop software products within a short and intensive period of time, often with support from experts.

Examples: The German Digital Library's 'Coding da Vinci' hackathon on culture (www.codingdavinci.de), or the World Bank's 'Apps for Climate' hackathon on climate protection (www.hack4climate.org).

Relevance to DC/IC: These programming events give DC/IC tools for quickly finding creative solutions to a range of problems with the help of local actors.

A hackathon is an event where programmers, developers, technicians and designers work together to develop a software product in a specific area within a short time frame, often with support from relevant specialists. The name is derived from the words 'hack', which here means intensive programming as opposed to breaking into computer systems, and 'marathon', alluding to the endurance required of participants. The work is indeed intensive, allowing few breaks and little sleep, because the process is frequently meant to end with the production of a working prototype.

Hackathons usually start with a general introduction or some presentations on the issue to be addressed. Next, ideas for projects are gathered; then interdisciplinary teams are formed and work commences. Mentors and specialists support the participants and, after a few hours or even days, the teams present their results for review by the other participants or a jury. In many cases, the winning team is awarded a cash prize.

The format of hackathons can vary tremendously. They do not even have to take place in a fixed location. Some have taken place on buses or boats, giving the participants a chance to visit relevant locations and meet the target group to discuss the issue at hand and receive important input. Some hackathons are broken down into a series of 'sprints' (e.g. over a weekend). The breaks between sessions give teams an opportunity to exchange ideas and to network.

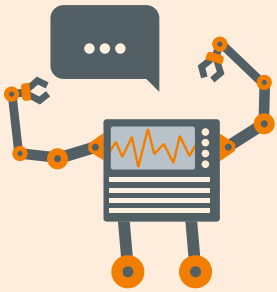
RELEVANCE TO DC/IC

Companies are not the only organisations to stage hackathons. More and more frequently, non-profit organisations, charities and public sector institutions are finding the need to swiftly identify digital solutions to local and global problems. One major advantage of hackathons for development cooperation is that they run for a set time. As a result, unlike long-term projects, they can involve a very wide range of actors from different sectors and regions.

Further information:

Digital media skills in the Republic of Moldova,
see Toolkit 2.3.6
www.t1p.de/c4mg

Industry 4.0: Networked Production



Short definition: The vision of an ultra-modern, decentralised industrial production system based on →***digital technologies*** in which blueprints and parts potentially communicate with machines, leading to self-optimising production processes.

Examples: Machine parts individually produced by digitally controlled milling machines, or workpieces fitted with sensors that send status reports back to the machine manufacturing them.

Relevance to DC/IC: Developing countries face the challenge of making their businesses and economies sustainable. Industry 4.0's more efficient and decentralised, local production process may be a step in the right direction.

James Watt's invention of the steam engine at the end of the 18th century paved the way for mechanised production and launched the First Industrial Revolution. At the beginning of the 20th century, the spread of electricity enabled mass production. The advent of the computer in the 1960s led to the automation of manufacturing processes, with machines taking over tasks that were previously carried out manually. Now we are on the brink of the Fourth Industrial Revolution, often referred to as 'Industry 4.0'. It chases the vision of machines autonomously controlling their manufacturing processes and communicating with sensor-equipped products, assembly lines operated solely by

robots, driverless vehicles revolutionising logistics and →***3D printers*** decentralising and, to some extent, democratising production. This should become possible everywhere thanks to sensors, →***artificial intelligence*** and communication. However, Industry 4.0 also represents a challenge for an entire society whose future is hard to predict. Stepping up automation will squeeze more and more people out of the production process, with many of them facing unemployment due to a lack of qualifications or expertise. For the industrial and political realm, 'future-ready' therefore not only means establishing new technology and production paths but also coming up with alternative career paths, training and qualifications for all people whose work is threatened by technology.

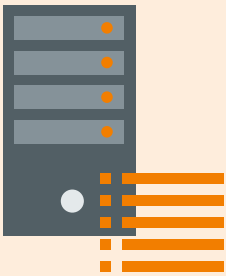
RELEVANCE TO DC/IC

Developing countries also face the challenge of making their economies more sustainable while replacing jobs that will be eliminated by automation. Industry 4.0 can help them develop urban areas in a more sustainable way, open up new markets and allow businesses and the workforce to participate in the digital revolution instead of being left behind. In the future, for example, digitalised and decentralised modes of production will enable important goods and spare parts to be manufactured locally. Key technologies such as 3D printers make it possible to build capacities and manufacture locally, without the need for lengthy production lines. This, in turn, will promote greater autonomy.

Further information:
see Toolkit 2.9.1 – 3D printing and computer-controlled milling: The industrial revolution in local production

AB3D – 3D-Drucker factory in Kenya
www.ab3d.co.ke

Information Management System (IMS)



Short definition: Software for gathering, organising and retrieving data.

Examples: Health information management systems (HIMS) for the health care sector, and product information management systems (PIMS) for businesses.

Relevance to DC/IC: Using information management systems, DC/IC and partner countries' administrations can systematically collect and analyse data and use the resulting information to improve measures and services.

An information management system is a software tool for gathering, organising, retrieving, preparing and analysing data. Information that companies and administrations used to have laboriously document, file and archive can now easily be stored, retrieved and processed with just a few mouse clicks.

Information management systems fall under the concept of →***big data,*** but are more specific. Whereas the term 'big data' describes the availability and potential of huge banks of unstructured data and asks how they can and should be organised and used, information management systems aim from the outset to select data for a specific purpose and then process them in a structured manner. These data, too, can contain many additional ideas that may only be recognised later on. Standard analysis and exportable reports can

provide decision-makers with the information they need to do their job and achieve better outcomes.

Since specific, widely available and swiftly accessible knowledge is becoming more and more important to businesses and administrations, information management systems are now being deployed almost everywhere. While straightforward standardised databases are usually sufficient for smaller organisations, organisations that hold large amounts of data often require specialised software solutions.

Consequently, different types of information management systems have been developed to manage different kinds of data, e.g. corporate product data, research data from laboratories and patient data from health care institutions. The various products offered by SAP and Oracle are well known examples of such systems.

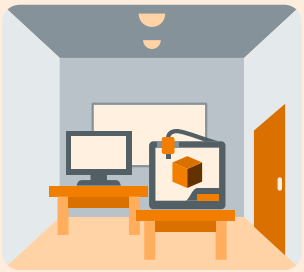
RELEVANCE TO DC/IC

In many partner countries, the management of key data on, for example health or education is often outdated and inefficient. As a result, governments lack important information that they need to improve these sectors and develop and implement appropriate policy measures. Also, corruption is likely to flourish when processes lack transparency. Development cooperation helps partner countries to implement information management systems, which enable them to manage their data more sustainably and efficiently, interlinking cross-institutional data and making them readily accessible.

Further information:
see Toolkit 2.2.4 – Monitoring and evaluation of information system for local governments, Rwanda
see Toolkit 2.5.1 – Responsible extraction of resources, DR Congo

Digital management platform protects rainforest in Brazil, see Toolkit 2.8.2
www.t1p.de/byrm

Innovation Hubs



Short definition: Working and meeting places for creative minds, scientists, start-ups and entrepreneurs.

Examples: icecairo, iHub Nairobi, Impact Hub Berlin, kLab Kigali.

Relevance to DC/IC: Innovation hubs are playing an important role in the burgeoning start-up scenes in Africa, Asia and South America, providing creative minds and entrepreneurs with somewhere to work, discuss their ideas and collaborate with partners and investors.

'Innovation hubs' (also known as innovation labs) are places where researchers, creative minds, start-ups and entrepreneurs can work, develop ideas and discuss them with others. While these hubs are a reflection of the changing world of work, they are often set up for very different reasons. Some hubs follow a distinctly entrepreneurial approach, whereas others primarily focus on a shared social commitment. In 'grassroots labs', which grew out of the do-it-yourself movement, enthusiasm for experimentation and creative exchange is the main driving force. Most of them are not geared towards commercial success. In this respect, they resemble 'hacker spaces' and 'fab labs' (fabrication laboratories), spaces giving private individuals access to modern means of production like →***3D printing*** or computer numerical controlled (CNC) milling machines. Co-working labs, on the other hand, rent space where infrastructure is shared and advice is provided when needed.

'Incubators' and 'accelerators' differ from hubs in that they offer →***tech start-ups*** additional (financial, human or organisational) resources, often demanding a stake in the company in return for their services. Accelerators are special in that start-ups only tend to stay for a relatively short, intensive period during which they benefit from stronger guidance and external knowledge.

RELEVANCE TO DC/IC

Innovation hubs play a significant role in Africa's constantly growing IT and creative economy. According to a GSMA report, in mid-2018 there were already 442 hubs on the continent, representing a 50 % increase compared to 2016.

Innovation hubs enable local actors to find and network with like-minded people, which makes them good places for finding cooperation partners and investors. Most of the resulting projects are in the areas of IT and the internet, but other sectors like renewable energies and farming (→***e-agriculture***) are also featured. Innovation hubs foster the creation of new jobs in these economic sectors and develop creative solutions for local problems. In so doing, they improve many people's quality of life. For this reason, development cooperation backs the development and promotion of innovation hubs in partner countries.

Further information:

see Toolkit 2.4.4 – Modern youth, Iraq

see Toolkit 2.9.1 – 3D printing and computer-controlled milling: The industrial revolution in local production

'Icehubs' – Innovation hubs in Egypt, Ethiopia and Germany
www.icehubs.wordpress.com

Internet Freedom | Net Neutrality

Short definition: Non-discriminatory →***access*** to the internet and its digital content, and the transmission of all data on the net on an equitable basis.

Relevance to DC/IC: State censorship and insufficient infrastructure are the main reasons why internet freedom is noticeably limited in many developing countries, preventing the creation of a digital economy and knowledge society.

'Internet freedom' entails free access to the internet and all its content, unrestricted by government agencies or private companies. Proponents of internet freedom are calling for the internet to be recognised as a public good that must be made available to all people worldwide.

Even in Germany, there is no full internet freedom, which was shown by the discussions on fake news or hate speech, for example. Thus, the big social media providers have to filter/delete this kind of speech. According to the NGO Freedom House, however, Germany did very well in 2017 compared to other countries. In contrast, the citizens of China, Syria and Ethiopia have the least internet freedom. However, even where the internet is not subject to government censorship, free access is not always guaranteed, with obstacles including a lack of extensive coverage (→***digital infrastructure)*** and unaffordable internet access.

There is also a danger of individual companies restricting access to content in their own interests or for specific purposes. Internet service providers give preferential treatment to the internet traffic of certain paid services. This infringes the principle of net neutrality ('zero-rating'), which requires that all internet data be treated equally, with no preference in favour of or discrimination against certain data packets.

RELEVANCE TO DC/IC

Internet freedom can be restricted in many different ways. In September 2015, the Indian authorities disconnected the internet in the north-western states for three days. Egypt and Libya were similarly cut off from the outside world for several days during the 2011 uprisings. As well as denying access altogether, some countries attempt to control information sharing by blocking websites or social networks or persecuting bloggers (→***blog***) and online activists.

Even the business practices of companies like Google and Facebook, which provide users in developing countries with some of their services free of charge (zero-rating), violate internet freedom and the principle of net neutrality because their users are only given access to predetermined content.

In many development cooperation contexts, internet freedom is further restricted by obstacles like the lack of linguistic diversity, the limited availability of locally relevant content, the high cost of internet connections or the lack of access to bank accounts or credit cards, which are essential for accessing many internet-based services.

Further information:

Report: Freedom on the net 2017
www.t1p.de/u3bq

Internet Governance

Short definition: The formulation and application of common principles and regulations for the design and use of the internet.

Examples: Regulating the assignment of internet addresses, ensuring fair competition between internet companies via net neutrality.

Relevance to DC/IC: In an increasingly digital world, internet governance creates the conditions for freedom of opinion or censorship, for privacy or monitoring, for local innovation or global market dominance, for a global knowledge resource or national restrictions.

When summarising the status of the debate on the internet, Fadi Shehadeh, CEO of the Internet Corporation for Assigned Names and Numbers (ICANN), said: 'The internet is a wide river that permeates everything. You cannot stop it. Nowadays we no longer speak about how the internet works, but about everything we can do using the internet'.

Originally, technical aspects of the internet were decided by a handful of computer scientists at U.S. universities. Today, they are managed by institutions like ICANN, the Internet Engineering Task Force (IETF) and the Internet Architecture Board (IAB). Debates around internet governance have shifted from technical matters to political issues and even to development questions addressed by international cooperation. For this reason, the title for the 2015

Internet Governance Forum was 'Evolution of internet governance: empowering sustainable development'.

One particularly hot topic right now is net neutrality (→***internet freedom***), the level playing field that allows →***tech start-ups*** to compete against powerful groups and internet giants like Google and Facebook. This founding principle of the internet is what powers its capacity for innovation, enabling each of the world's four billion internet citizens (aka 'netizens') to share their ideas. However, this same principle is now under greater threat than ever, as telecommunications companies seek to boost their earnings by fast-tracking some data and offering special conditions.

RELEVANCE TO DC/IC

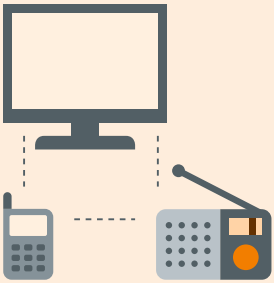
As the world becomes increasingly digital, internet governance is now at an important crossroads. Will it end up bringing more and more people freedom of opinion or censorship? Will it facilitate personal privacy or monitoring, promote local innovation or the global dominance of multinationals, develop a global knowledge resource or a nationalised, 'balkanised' internet? Decisions on such issues need to be taken and negotiated at a global level. For this reason, the German Federal Government is actively participating in international processes and is hosting the Internet Governance Forum in 2019.

The German Federal Government is working to influence the debate on internet governance by actively participating in key international forums, such as the:

World Summit
on the Information Society
www.itu.int/net/wsis

Internet Governance Forum
www.intgovforum.org

Internet of Things (IoT)



Short definition: A network of diverse interlinked physical objects that communicate with each other by means of embedded internet-enabled electronics.

Examples: Tracking parcels on logistics company websites, fitness bands that transmit body data to a server, fridges that tell us when we need to buy milk.

Relevance to DC/IC: The Internet of Things provides the information and data required to make important decisions, improve the management of processes and tasks, and ensure that safer and more efficient measures are implemented which enhance people's quality of life.

We live in an interconnected world. But it's not just people who can communicate with others around the globe using →***digital technologies:*** more and more everyday items are being connected to the internet so that they, too, can exchange information. There are now fridges that can re-order milk, heating systems that switch themselves on when the occupants of the household are on their way home, and traffic lights that inform approaching cars when they will next turn green. The collective term for these diverse digitally networked items is the 'Internet of Things' (IoT). Any item equipped with a digital interface has networking potential, with connectivity provided by special electronic components (e.g. radio-frequency identification (RFID) chips or sensors) and

software. In this way, devices that used to be analogue can now be controlled by computers or →***smartphones.*** These systems can be programmed to carry out actions in response to collected data without the need for human interaction – for example, fridges that automatically order milk when it is running low. Data on the environment, location and status can be conveyed at any time using sensors and chips, and the important information contained in such data can be used by companies, for example, to enhance their work processes. Thus, the Internet of Things lays the foundations for data-based decision-making. However, the mountains of data being accumulated need to be properly managed (→***big data***) and concerns are now being raised about how best to protect this information (→***IT security***). Critics also warn about a loss of control when devices intercommunicate without human input.

RELEVANCE TO DC/IC

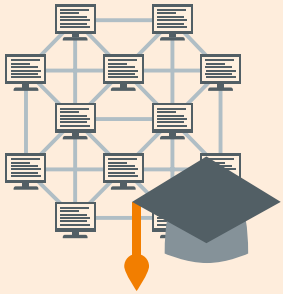
With the cost of chips and sensors tumbling, the →***open-source*** software market growing, and internet connectivity in the developing world increasing, digitally networked devices now offer great potential for development cooperation, with applications in many sectors, including energy, transport, agriculture, health care, environmental protection and disaster prevention. Interconnected devices provide valuable data on the situation on the ground, which can then be used to improve task management, decision-making and the planning of measures designed to improve safety, security and quality of life.

Further information:
see Toolkit 2.9.2 – Artificial intelligence in development cooperation: from future fantasies to real-life challenges and opportunities

PayGo Energy – Clean gas for the people of Nairobi
www.paygoenergy.co

IoT for Good
www.t1p.de/hv8k

Massive Open Online Course (MOOC)



Short definition: Free online courses with an unlimited number of participants.

Examples: In 2011, 160,000 people worldwide took Stanford University's MOOC on →***artificial intelligence.***

Relevance to DC/IC: MOOCs are freely accessible and tremendously diverse learning packages that bring people together from all over the world to exchange ideas in networks and collaborative projects. In a development cooperation context they are useful, among other things, for mainstreaming methods and expertise, promoting peer and self-learning and developing and extending communities of practice.

MOOCs are 'massive' because of their many participants, sometimes numbering in the tens of thousands; 'open' because they can be freely accessed (→***access***) by all; 'online' because the course is delivered entirely on the internet; and 'courses' because they involve teachers and learners. In Germany, the format is still in its infancy, but elsewhere MOOCs are becoming very popular, particularly in the English-speaking world. Universities are increasingly adopting this →***e-learning*** format to make their courses accessible not just to the students on campus, but also to any interested party with an internet connection. Didactically innovative, MOOCs enable learners to manage their own knowledge transfer and sharing by providing learning material, setting topical

weekly tasks or organising forum or group discussions. →***Digital technologies*** enable people around the world to learn together and jointly develop ideas in open innovation processes (from knowledge sharing right up to co-creation). GIZ has developed its own MOOC platform for learning and cooperation called Global Campus 21.

RELEVANCE TO DC/IC

MOOCs help to transfer knowledge around the world, giving learners and teachers in the Global South access to modern teaching materials and the latest research findings. DC/IC stakeholders can also benefit from the shared expertise, methods and exchange involved in MOOC-based learning. However, bearing in mind the cultural diversity inherent in DC/IC, MOOCs need to be used with care. For even though they have the potential to democratise education, recent studies indicate that the goal of achieving this potential has thus far remained elusive, among other things, owing to insufficient levels of education and →***e-literacy*** and language and gender barriers (→***gender and the internet***). For this reason, MOOCs deployed in development cooperation ('MOOCs4Dev') focus mainly on transferring learned skills and networking stakeholders.

Further information:
see Toolkit 4.4.2 – MOOCs –Knowledge for the masses

MOOC 'Managing the Arts'
www.goethe.de/mooc

MOOC 'Economics of Land Degradation'
www.t1p.de/r80k

Media Viability

Short definition: Media viability is the ability of media and media landscapes to consistently produce high-quality content.

Examples: Training journalists by way of online offerings (media e-schools), providing advice to media institutions – such as local radio stations – on programme strategy and innovative social media management (→***social networks***), democratising media, pluralisation of the media landscape.

Relevance to DC/IC: High-quality media content allows for societal dialogue, good governance and functioning markets.

The media industry was one of the first areas revolutionised by digitalisation, in music, film and journalism. New distribution channels, mobile digital devices (→***smartphones***) and new actors have fundamentally changed the way people use media content. Traditional business models are outdated and new sources of income must be developed. Around the world, independent media face economic challenges for the positioning on social media or news platforms, when handling digital advertising formats or regarding marketing strategies. Media viability therefore affects not only individual media institutions but entire media landscapes with a large variety of actors, interests and regulatory guidelines. In fact, media viability is not just about money, since media can only be sustainable when the political and legal framework in the country allows it and there is no censorship, for example. The technical infra-

structure as well as the interest and demands of the users are a prerequisite for providing independent, high-quality content. Thus, media viability is defined as securing the effectiveness and independence of the media in the future even under changing parameters and guaranteeing the rights to freedom of speech and access to information around the world.

RELEVANCE TO DC/IC

The availability of reliable information is a major prerequisite for an enlightened civil society and political participation. Relevant, high-quality media content allows for societal dialogue, good governance and functioning markets. Digitalisation has immensely changed media landscapes around the globe. This applies in particular to business models for journalism in the digital world. Media viability is an overarching task relating to the media industry, politics, technology, content and communities. The media can only provide independent and reliable information if the economic sustainability of media companies and the associated political and legal framework are ensured.

Further information:

DW Akademie in Ukraine
www.t1p.de/noau

E-school
www.t1p.de/tpz1

DW Akademie in Ecuador
www.t1p.de/mjm8

Mobile Communications

Short definition: A technical system that uses radio waves for data and voice transmission, enabling people to communicate whenever they are within range of a network signal.

Examples: The GSM radio network, 5G/4G/3G data networks, or the use of network services with mobile devices like →***smartphones.***

Relevance to DC/IC: Mobile communications provide many people with important, relatively cost-effective and flexible services.

When we speak about mobile communications today, we mean the use of mobile devices that use the networks provided by large telecommunications companies (other forms, like CB radio, tend to be confined to the hobby sector). There are now over 7 billion mobile phones in circulation, with some people owning more than one, especially in industrialised nations. In contrast, not everyone in developing countries has their own phone yet. Mobile communications are defined as 2G, 3G or 4G. The 'G' stands for generation and denotes the different mobile communications standards employed for data transfer: the higher the number, the newer and more efficient the technology. But while data transfer rates increase with each generation, so do the costs of installing and operating the updated systems. For this reason, the efficiency of today's networks varies substantially around the world and even within individual regions or countries.

People can access mobile communications services on their devices (e.g. mobile devices and PCs) without network cables provided they have network coverage. Data are converted into radio signals that are transmitted via fixed base stations that provide coverage over a determined area, called a cell, which can vary in size from a few hundred square metres to tens of square kilometres. There are several thousand such base stations within the Berlin city ring alone.

Mobile telecommunications have two key advantages over cable systems: 1) they enable communication from anywhere with network coverage, and 2) mobile telecoms infrastructure can be made available to the masses without the need for laying cables, which is expensive. As such, mobile telecommunications are proving a more popular option in rural areas, especially for accessing broadband internet services.

RELEVANCE TO DC/IC

Mobile telecoms services in particular have spread incredibly rapidly over the past decade, with the relatively cost-effective development of the required infrastructure finally enabling many people to access communication services. This offers enormous potential for DC/IC. For the first time, almost everyone can be reached by mobile phones and important information and content can be offered directly. Smartphones are also being more widely used, paving the way for ever more sophisticated services in the education and health sectors (→***e-learning***, →***e health***).

Further information:

see Toolkit 2.1.2 – Using smartphones as extension agents, Zimbabwe
see Toolkit 2.6.1 – SupaBRCK: Reliable and affordable internet, Kenya
see Toolkit 2.6.3 – Mobile communications for rural regions, Myanmar

M-Pesa

Short definition: M-Pesa is an →***e-payment*** service developed and offered by mobile service provider Safaricom that enables users to execute banking transactions over their mobile phone without any need for a bank account.

Examples: M-Pesa (Kenya), M-Paisa (Afghanistan), Vodafone Cash (Egypt).

Relevance to DC/IC: Directly and also indirectly through copycat systems, M-Pesa has given millions of people their first ever access to a number of key banking services. Other possible services, like secure payments and access to insurance are also important in a development cooperation context.

Most importantly though, M-Pesa has highlighted the potential of innovative use of →***digital technologies***.

In Germany, almost everyone has a bank account, whereas in rural Kenya the majority do not. This is because the nearest bank is often several hours away by bus and from the banks' perspective the rural poor are not an attractive and profitable customer group. Anyone wishing to build up savings must do so by stockpiling cash, which is unsafe. Most payments are cash-only transactions. For those without bank accounts, transferring money and remitting cash via agents is an expensive and risky option. In 2007, Safaricom decided to fill this gap in the market, and became the first telecommunications company to serve as a bank. The proliferation of mobile phones gives this 'bank' direct

access to a large proportion of the population. 'M-Pesa' (pesa means money in Swahili) is the name of the service Safaricom launched. It works by extending the use of funds pre-paid into a user's mobile phone account. So, as in the past, the balance on this account can be topped up almost anywhere, but it can also be used to make payments at petrol stations, hairdressers, vegetable stalls, bars, etc. – within Kenya and beyond. Funds can also be transferred by →***text messages*** (now even between different mobile companies) to pay sellers and service providers. There are no account administration charges, just transaction fees.

Originally, M-Pesa was conceived as a system for repaying microloans, but as early as the pilot phase its potential as a comprehensive alternative to banking services became clear. In addition to directly comparable services such as Airtel Money, there now are a number of systems that increasingly allow for financial inclusion thanks to digital approaches (→***digital finance***).

RELEVANCE TO DC/IC

Services like M-Pesa have revolutionised access to financial services. Before their introduction, it often took hours to pay a bill because long queues were common at banks, utility companies and authorities. M-Pesa makes these payments simpler, verifiable and transparent and thus makes them better protected against corruption. Furthermore, it is now far cheaper and easier for millions of labour migrants to send money home.

Further information:

see Toolkit 2.4.2 – Access to finance for smallholders, Uganda
see Toolkit 2.7.3 – Blockchain technology assists in times of need, Jordan

M-Pesa website in Kenya
www.t1p.de/taz5

Open Government

Short definition: Open government means increased government transparency and accountability, including opportunities for citizens to participate in political decisions and their implementation. Modern communication technologies play a special role in this context.

Examples: Disclosure of administrative data (open government data), network-based citizen consultation.

Relevance to DC/IC: Open government promotes dialogue between the government and actors in civil society and the private sector. It helps to improve government performance and establish democratic decision-making mechanisms. Open government promotes the DC objective of good governance and makes an important contribution to implementation of the UN's 2030 Agenda for Sustainable Development.

Various approaches have emerged within the framework of the 'open' movement. Perhaps the best known is 'open data' or 'open government data' when referring to information from public sector sources. As well as covering the proactive processing of information by public administrations, open government includes elements of →***e-governance*** that are designed to promote citizen participation (→***e-participation***). In this way, open government seeks to strengthen democracy and improve the quality of administration in an effort to increase co-determination and promote sustainable development.

The open government approach offers many opportunities, though some challenges remain, because in an open data framework simply releasing and analysing data has no positive impact on citizens. For open government to be constructive, it must be applied within a sound legal framework (→***data protection*** and data security), and be appropriately used and interpreted.

RELEVANCE TO DC/IC

Open government is a comprehensive approach for strengthening democracy and improving the quality of administration, in line with the Sustainable Development Goals (SDGs) of the 2030 Agenda. Citizens in partner countries have requested that German development cooperation focus its work on delivering greater transparency and more citizen-oriented services and on giving people a say in public life. Besides implementing small-scale measures to introduce open government systems, German DC offers advice on developing national policies, such as the Country Action Plans of the Open Government Partnership in South Africa.

Further information:
see Toolkit 2.4.3 – TruBudget – Transparent and manipulation-proof transactions using blockchain technology
see Toolkit 2.8.2 – Digital management platform protects rain forest, Brazil

Governance Support Programme, South Africa
www.t1p.de/7wrd

Good Local Governance in South Caucasus, Armenia
www.t1p.de/b9vo

Justice and prison reform, Bangladesh
www.t1p.de/75r0

Open Source

Short definition: Open-source computer programs can be used free of charge and, in theory, be modified by anyone. The open-source concept is not confined to software, but includes areas like knowledge and design (→***3D printing***).

Examples: The Linux operating system, Mozilla Firefox (open software), Wikipedia and OpenStreetMap (open knowledge), open-source biogas tanks or prostheses (products).

Relevance to DC/IC: Open-source solutions give administrations, companies and the public access to high-performance software that would otherwise be too expensive. This can help to generate jobs and income and make work more efficient and the economy more competitive.

Software should be for everyone – that is the motto of the open-source community. In open-source software, the source code (i.e. program operations defined in programming language) is public, replicable, modifiable and usable. This model is in stark contrast to the licence-fee-based systems of private companies that prompted programmer Richard Stallman to unveil a 'free software' licence in 1989. Its four fundamental freedoms assert that a user should be able to run, analyse, distribute and modify software. Today, besides free software, we also speak of 'Open Source' or 'Free and Open Source Software' (FOSS).

Open-source software is usually further refined by a group of developers collaborating around the world in a decentralised manner, exploiting 'the wisdom of the crowd'. These developers work either voluntarily or for major open-source companies like Red Hat or IBM. 'Copyleft' licences ensure that the software cannot be privatised, since any modifications made down the line must be made public again. In the broad sense of the term, open source implies not just open software, but also the free exchange of knowledge, thoughts and information. The online encyclopaedia Wikipedia and the OpenStreetMap mapping project are good examples of this.

RELEVANCE TO DC/IC

High software-licensing costs are an obstacle that denies many people access to new, digital opportunities and thus hinders economic development. Free open-source software provides companies and administrations with solutions that can also be adapted to specific needs and contexts. Likewise, DC/IC can use open-source options to develop software solutions cost-effectively.

Further information:

see Toolkit 2.3.3 – SORMAS – Mobile app for early warning for epidemics, Nigeria
see Toolkit 2.9.1 – 3D printing and computer-controlled milling: The industrial revolution in local production

Training materials for the use of open source for strengthening the IT sector and IT companies
www.t1p.de/47ob

Blog on open-source IT projects in Asia and Africa
www.t1p.de/owhv

OPENCRVS – Open-source system for civil registration and vital statistics (CRVS) in developing regions
https://www.opencrvs.org/

Smart Cities

Short definition: Urban design concepts that use modern information and communication technologies to make cities sustainable, environmentally friendly and socially inclusive.

Examples: Innovations in mobility, energy, the environment, economics, governance, civic commitment, participation and urban quality of life.

Relevance to DC/IC: Ensuring the efficient use of resources and the provision of people-oriented municipal services is particularly important in rapidly growing cities in developing countries and emerging economies.

More and more people around the world are moving to cities. These people need living space, electricity and water and want mobility and security. This leaves many cities facing enormous challenges. The term 'smart cities' describes concepts that offer sustainable solutions to cities' rising use of resources and infrastructure needs. To a large extent, they rely on modern networked technologies.

'Intelligent' cities are now possible thanks to the extensive use of →***digital technologies***. Sensor data from numerous sources can be used to automate processes and manage resources and systems (e.g. traffic flows) efficiently and effectively, depending on the current situation.

They can also be used to notify citizens or raise public awareness, for example in emergencies.

Smart city systems constantly monitor the current state of infrastructure. The resulting mass of information about a city paves the way not only for automatic decision-making, but also for decisions on long-term urban development. It can also expose hidden connections between mobility, energy, the environment, business and so on.

Furthermore, the use of participatory methods like crowdmapping (→***crowdsourcing***) facilitates broad citizen participation in municipal decision-making. By using digital technologies, city administrations can also optimise their services and make them more customer-oriented.

RELEVANCE TO DC/IC

Cities and megacities are growing particularly fast in developing countries and emerging economies, their expansion fuelled by general demographic growth and migrants from rural areas. As a result, pressure is mounting on their urban infrastructures, administrations and environments. Intelligent solutions are required to use existing structures and resources as efficiently as possible, to engage citizens in political processes and optimally manage the development of infrastructure and administrations.

Further information:

City traffic systems for smart cities
www.t1p.de/dht5

Smartphones

Short definition: A mobile phone with computer functionalities.

Examples: Apple iPhone, Samsung Galaxy, Fairphone.

Relevance to DC/IC: Smartphones give mobile users – including DC actors – access to extensive information and services and facilitate social participation. They do this via flexible, user-friendly →***apps*** that are downloaded from the internet.

Since the launch of the Apple iPhone in 2007, smartphones have developed into a remarkable success story that has significantly changed people's lives, and not only in industrialised nations. In 2018, no fewer than 3 billion of these high-performance devices were in circulation.

Key features of smartphones are their high computing power, mobile communication capabilities (telephony and internet), wide range of functions and, in particular, their intuitive usability. Smartphones differ from standard mobile phones and 'feature phones' (mobile phones with some advanced features, like internet →***access,*** music players or email), which still serve mainly to make calls. With smartphones, telephony is often no longer the core functionality.

Touchscreen technologies incorporated in smartphones provide an intuitive and visually supported interface and are thus simple to use. Small and flexible

computer programs called apps enable users to tailor and enhance their device's functions to meet their personal requirements. Millions of different apps are available, covering almost every life situation and ranging from weather apps and games to complicated software packages like word processing or spreadsheets. This makes them a practical companion for all of life's situations.

RELEVANCE TO DC/IC

These days, smartphones are also becoming increasingly commonplace in developing countries. In 2017, 34 % of people in sub-Saharan Africa already had a smartphone. According to GSMA, this figure is predicted to reach 67 % by as soon as 2025. For this reason, smartphones constitute a special channel for DC/IC actors seeking to deliver information and services to the people. This is because they are user-friendly, relatively inexpensive (compared to a desktop computer) and have internet capabilities that allow their users to access these services.

Further information:

see Toolkit 2.1.2 – Using smartphones as extension agents
see Toolkit 2.7.2 – Arabia Felix – Gaming for peace, Yemen
see Toolkit 2.3.3 – SORMAS – Mobile app for early warning for epidemics

LoveLive app for health education,
South Africa
www.t1p.de/5yio

Social Networks

Short definition: Social networks are groups of people who exchange opinions, experiences, information, photos and videos on online platforms.

Examples: Facebook, Twitter, YouTube.

Relevance to DC/IC: Development aid organisations can use social networks to communicate quickly and easily with target groups and partners. Furthermore, users can access these networks to communicate as equals and exchange knowledge.

The internet has radically altered how we communicate, and social networks are a major driver of this change. As a rule, these networks function as online portals where users have to register and create a profile in order to communicate with members of the same network via →***digital technologies***. Social networks make it easy for people or organisations to communicate with each other on a one-to-one basis, within groups or with an unlimited number of users, regardless of their location or time zone. The only limitation is their level of internet →***access***. With very little effort, a huge number of people can potentially be reached. Social networks promote real interaction, not just one-way traffic, enabling real-time conversations among groups of friends across the world, limitless exchange of knowledge, large-scale virtual conferences and many more possibilities besides. The world's best-known social networks are Facebook and Twitter, but there are also networks for specific topics, such

as LinkedIn and Xing for business and Instagram and Flickr for image-sharing. There are even social networks for pets and their owners.

RELEVANCE TO DC/IC

In recent years, social networks have become increasingly important in a DC context, as they remain the most powerful way of quickly and easily reaching people worldwide. When DC and IC organisations incorporate social networks in their communications (e.g. to present projects or publicise their mission and engagement), they prompt a far higher level of awareness than they could have done through conventional communication channels. Social networks also enable these organisations to encourage programme participants to engage in dialogue with each other. Organisations can also use them to maintain lasting relationships with all specialists and managers trained with German backing (every year there are over 11,000 such people), many of whom will be German development cooperation's future partners and collaborators. Last but not least, social networks can be used to support democratisation processes. They are a platform for the equal exchange of ideas and thus enable people's active participation in political processes. The speed, low cost and huge reach of communication via social networks enable citizens to come together and take action, facilitating major political change, as was the case in the Arab Spring.

Further information:
see Toolkit 2.1.1 – Digital knowledge platform for small farmers, India
see Toolkit 4.2.1 – Text message, messenger and social media – How to reach your target group

Alumniportal Deutschland
www.alumniportal-deutschland.org/en/

Tech-Start-ups

Short definition: Start-ups are fledgling enterprises intent on developing and marketing innovative business ideas.

Examples: Google, Facebook, Twitter (began as start-ups in the not too distant past), Airbnb, SoundCloud

Relevance to DC/IC: Start-ups strengthen the local economy and create new jobs. They also provide creative solutions for many challenging issues that can be used to promote development.

Start-ups are young companies seeking to pursue and market innovative business ideas. Even today's internet giants like Facebook and Google began as start-ups. The →***social network*** Facebook, for example, was started by four students at Harvard University who developed the project in their spare time. Today, the company has over 10,000 employees and is worth billions. However, such success is the exception rather than the rule. Most entrepreneurs never manage to make their company sustainable – well over 50 % of tech start-ups fail – and even former start-ups like Twitter continue to operate at a loss and are therefore still dependent on investors.

Until start-ups establish a foothold, if they manage to do that at all, they have to work through several stages. The first stage involves developing the idea and business concept and setting up the company. During this time, it is dif-

ficult for entrepreneurs to find investors, so they will often rely on family and friends, crowdfunding options (→***crowdsourcing***) and/or business angels to provide the required finance. At the same time, the business lays foundations (its business plan, market analysis, concept refinement) that will potentially attract investors. Next, in the development stage, the start-up rolls out its product and launches it on the market. At this point, financial backing can be sought from venture capitalists. Support provided by start-up incubators and accelerators goes further, including things like company shares, office premises and management support.

There are start-ups in all kinds of sectors, but today a high percentage of them focus on ICT and the internet. These 'tech start-ups' develop ideas and solutions based on →***digital technologies*** and the internet such as special →***apps*** or websites. Another growing sector is social start-ups, which develop sustainable solutions for local or global problems.

RELEVANCE TO DC/IC

Start-ups generate employment and promote economic development. They offer creative and customised solutions for a huge range of problems. As such, they help increase people's quality of life. In partner countries, development cooperation can promote and support start-ups, for example by providing infrastructure (broadband, →***innovation hubs***), educational opportunities, know-how (→***e-learning***, →***e-skills***) and financial aid.

Further information:
see Toolkit 2.4.4 – Modern youth in Iraq
see Toolkit 2.9.1 – 3D printing and computer-controlled milling: The industrial revolution in local production
see Toolkit 4.3.1 – Innovation platforms

German Federal Ministry for Economic Cooperation and Development (BMZ) Tech-Entrepreneurship Initiative 'Make-IT'
www.t1p.de/956p

Text Messages

Short definition: Text messages are communications transmitted via the Short Message Service (SMS) system, which can be used to send and receive messages of up to 160 characters, generally by mobile phone.

Examples: Text messages exchanged between people or providing information (e.g. weather updates) or mobile banking services.

Relevance to DC/IC: Mobile phones are now commonplace in developing countries and text messages represent an affordable alternative for many people. Citizens can communicate with each other, with officials and with companies by text message. Services can also be accessed in this way. For example, small-scale entrepreneurs and farmers can sign up to receive important information about the weather or market prices.

Since its invention in 1992, the text message, restricted to 160 characters, has been an unparalleled success worldwide, revolutionising how we communicate and opening up a whole new world of mobile services. In 2012 alone, 59 billion text messages were sent in Germany. In recent years, text message use has declined as new →***smartphone*** and internet-based messaging services like WhatsApp or Telegram have become more popular. In developing countries, where smartphones and mobile internet are not yet available everywhere, text messages continue to play a dominant role in person-to-person communications. Besides enabling communication, text messages

also provide access to information. For example, special subscription services offer weather or health information. Authorities can also use text messages to broadcast important information to the public, though text messages also serve as vehicles for delivering more complicated services, e.g. mobile payment systems (like the exchanges of data through text message used by →***M-Pesa*** in Kenya). Citizens can take part in political discussions via text message (→***e-participation***) or use the system to broadcast important information that would otherwise not have a platform.

RELEVANCE TO DC/IC

In most developing countries, mobile telecommunications are well developed and mobile phone use is widespread. However, the proportion of smartphone users remains low. As such, popular and cost-effective text messaging remains an important channel for DC actors to send or receive information and provide a wide range of services. For example, farmers and small entrepreneurs can receive text-message updates on the weather or market or use text messages to communicate their needs or exchange product information with their suppliers and customers. Governments and authorities can make important announcements to the general public, e.g. provide essential health or security information in the event of a natural disaster, and citizens can express their views on how they are being governed. Furthermore, text messages allow civil society members to highlight injustice and raise public awareness for their concerns.

Further information:

see Toolkit 2.3.4 – Digital solutions for universal health coverage, Tanzania
see Toolkit 2.3.8 – Education to go: Shule Direct's Makini SMS learning platform, Tanzania
See Toolkit 4.2.1 – Text message, messenger and social media – How to reach your target group

Farmerline: How farmers in Ghana achieve better yields with text messages and voice messages
https://t1p.de/rqe5

Ushahidi

Short definition: Ushahidi is a non-profit technology company from Kenya that is known particularly for its crowdmapping platform of the same name, which was used to collect and publish eyewitness reports on anomalies and civil disturbances during the country's 2007–08 presidential elections.

Relevance to DC/IC: Crowdmapping platforms like Ushahidi make it possible to document how problematic social situations manifest, especially crises like political conflicts or natural disasters, and to coordinate aid relief.

'Ushahidi' – the Swahili word for 'testimony' – is a non-profit company from Kenya that is acclaimed for its development of →***open-source*** software, which was first used during the civil disturbances associated with the country's 2007–08 presidential elections. Ushahidi's software is a crowdmapping system (→***crowdsourcing***) that collects eyewitness reports and geolocates them on a digital map, enabling users to see where and what kind of events are occurring. For example, during political conflicts (like those in 2007–08 in Kenya), natural disasters or epidemics, Ushahidi can provide a visual overview of the situation and visualise hotspots or problem areas like conflict flashpoints or pinpoint where medical supplies are needed.

The system works as follows: Anyone with a mobile phone or →***access*** to the internet can transmit eyewitness reports by email, →***text message*** or multimedia messaging service (MMS).

These incident reports are then geolocated on a map and, where possible, supplemented with information from conventional media, like newspaper reports, or related content from →***social networks.*** In this way, a snapshot overview of incidents can be quickly obtained.

Right from the outset, Ushahidi proved to be a powerful information tool. After the presidential elections in 2007–08, Kenya was shaken by severe rioting. In the ensuing chaos, the government silenced the press. However, the blogger Ory Okolloh wanted to report about what was happening in her country, so she and other activists developed the Ushahidi.com platform, which scored over 13,000 hits during its first five days in operation.

RELEVANCE TO DC/IC

Ushahidi is now being used around the world and has become an important tool for aid agencies and political activists. To date, the software has been used 90,000 times. For example, in 2008 Ushahidi was used to geolocate outbreaks of violence in the Democratic Republic of the Congo and to document crime. In 2009, it was used to monitor parliamentary elections in India, collecting information on anomalies, electoral fraud and vote-buying. After the 2010 earthquake in Haiti, helpers used Ushahidi to ascertain which places were worst affected and where help was most urgently needed. It goes without saying that tools such as this can be used to provide invaluable information to DC/IC organisations.

Further information:

Ushahidi website
www.ushahidi.com

Further Sources

A glossary can only offer a selection of terms and describe them in a certain level of detail.

It is therefore always worthwhile seeking further information – as a source of additional terms, but also to gain a different perspective.

Here are some more links for digitalisation terms:

https://pc.net/glossary/

https://techterms.com/

https://www.wikipedia.org/

www.gartner.com/itglossary

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