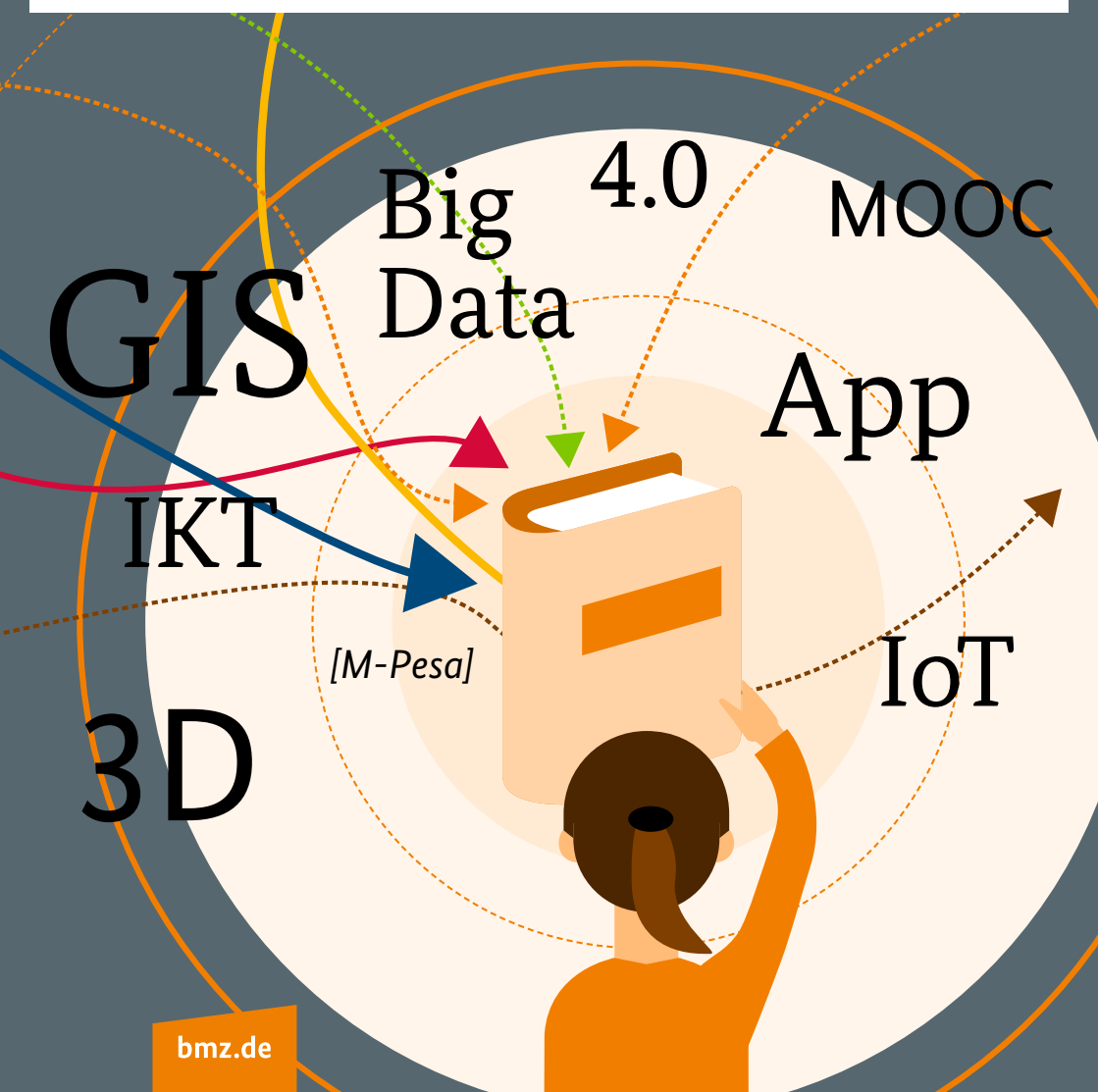




Federal Ministry
for Economic Cooperation
and Development

Toolkit – Digitalisation in Development Cooperation and International Cooperation in Education, Culture and Media





Overview

Digitalisation in Development Cooperation
and International Cooperation in Education,
Culture and Media

*“Let’s work together
not just to stop the digital
divide from widening,
but also to make sure that
ICT drive development
worldwide!”*

Thomas Silberhorn

Parliamentary State Secretary of the German Federal Ministry
for Economic Cooperation and Development (BMZ)

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Symbols:

➔ See glossary for an explanation of this technical term

📄↗ Projects promoted by organisations external to German DC/IC (Ch. 2)

☑ Checklist

Introduction

Dear Reader,

The digital transformation is influencing Development Cooperation (DC) and International Cooperation (IC) institutions in diverse ways: the profound processes of change at political, economic and society levels triggered by digitalisation require a strategic-political analysis of its opportunities and challenges. In this way, digital solutions can be better harnessed to drive development and help achieve development goals in a faster, more efficient and cost-effective manner.

How can we best utilise and further develop the enormous potential of digitalisation in all its diversity? This toolkit on *Digitalisation in Development Cooperation and International Cooperation in Education, Culture and Media* has been developed to provide answers to this question.

The toolkit explores how digital instruments can be employed to meet the sector- and region-specific needs of those planning, managing and implementing DC/IC measures. It provides political decision-makers and DC/IC implementers with information on the kinds of digital applications that are relevant for their work and on the value they can add to DC/IC projects. The toolkit constitutes a guide for analysing digital options and backs up advice with examples from different regions and sectors.

Specifically, you can find the following topics in this toolkit:

- 1) **Inspiring projects:** Case studies from German DC/IC and the international context illustrate the diverse ways in which digital solutions can be applied.
- 2) **Management of ICT projects:** Here, you are offered guidance that supports the strategic planning and implementation of digital measures.
- 3) **Methods, tools and approaches:** Guidelines on the deployment of digital solutions in specific contexts and scenarios are presented.
- 4) **Glossary:** Key terms related to the digital transformation are defined, vividly explained and transferred to the DC/IC context.

The toolkit is the result of the combined effort of a number of German institutions that are active in DC/IC and are working to harness the opportunities arising from the digital transformation.

Participants: German Federal Ministry for Economic Cooperation and Development (BMZ), the German Federal Foreign Office, KfW Development Bank, the German Investment and Development Corporation, Deutsche Welle Akademie, Deutsche Welthungerhilfe e.V., the Goethe-Institut, and Gesellschaft für Internationale Zusammenarbeit (GIZ).

The digital transformation is rapidly evolving, as are the topics, tools and approaches it is giving rise to. This toolkit should therefore be understood as a living document that will be continually updated in line with the participants' experiences. In addition to this initial printed version, the toolkit is also available as an e-book.

Do you have any ideas or experiences worth adding to the toolkit?

We would be delighted to hear about them at ikt-toolkit@giz.de

We hope you find the toolkit an inspiring read!

The Toolkit Team

Shaping the Digital Revolution

Ten years ago, nobody anticipated the world-changing impact of digital technology. In development cooperation, first the advent of mobile phones and then the introduction of → **smartphones** triggered new developments. The figures speak for themselves: on average, eight out of every 10 people in developing countries own a smartphone.

A prime example of this incredible transformation is Myanmar, which, as a “least developed country”, leapt straight from the pre-digital age to the → **smartphone** and → **app** era in just a few years, virtually skipping two whole generations of telephony, landlines and mobile phones. In 2015, around 66% of mobile users in Myanmar owned a smartphone.

So the world is becoming increasingly digital, and development cooperation is no exception. In all regions, German implementing organisations are developing digital solutions for all sectors of development cooperation. These new instruments are enabling projects to optimise value chains, gather information, identify local needs, improve participation, ensure transparency and measure impacts. On the ground, this is reflected in insurance cover for farmers against climate-related crop failures, medical insurance for particularly impoverished target groups and new administrative tools designed to increase tax revenues. In this way, digital technology is helping to counter marginalisation, quickly and efficiently close gaps in provision and enable greater transparency and participation. As you will see, the examples described in this booklet demonstrate just how innovative digital solutions for development cooperation can be.

However, digitalisation does not only prompt high expectations; it can also cause problems. Experiences in recent years have shown that “digital” does not invariably mean “better”, “faster” or “more efficient”. On the contrary, digitalisation creates new challenges to do with → **data protection** or → **access** to hardware, the → **internet** and know-how. So before getting carried away on a wave of digital euphoria, we should always bear these challenges in mind when discussing innovative projects.

At the same time, in many partner countries software-based solutions find people and projects eager to take them up, because the digital transformation is inspiring innovators and entrepreneurs worldwide to seize and then exploit new opportunities. Examples include mobile payment systems (→**e-payment**) which finally provide easy access to financial services for even the poorest people.

Today, Rwanda is benefiting from the fact that 15 years ago it adopted a digital strategy to become a knowledge-based society (Rwanda Vision 2020). The majority of Rwandans will soon have broadband access and be able to use digital technologies. Thanks to the digital transformation, German development cooperation and its partners have great opportunities to boost potential and initiate leaps forward in all sectors.

The integration of information and communication technologies (→**ICT**) into development cooperation is a priority for the Federal Ministry for Economic Cooperation and Development (BMZ). Investments are therefore being made in new partnerships and initiatives.

Digitalisation in Figures

Around the world, digital technologies are now commonplace ...

The number of internet users has risen from **1 billion** to around **3.5 billion** in the last **10 years**.



In developing countries more people have access to a **mobile phone** than to **electricity** or **decent sanitation**.

In developing countries

almost **70%** of the people in the bottom **fifth** of the income pyramid own a mobile phone.



Almost **300 billion** people in **89 countries** use one of the **255 mobile payment systems** available to them.

The potential contribution of the internet to African GDP in **2025** is:

USD 300 million
(2016: **USD 18 million**).



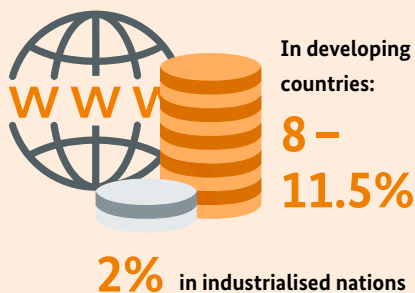
... but many challenges remain to be overcome.

4 billion people

in developing countries (4.2 billion people worldwide) are still offline.



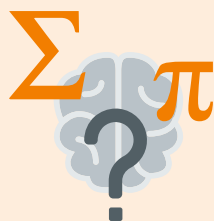
→ **Internet access** costs a disproportionately high percentage of people's wages:



Lack of access:

31% of people in developing countries still have no access to a mobile broadband network¹

71% in rural areas



Other factors besides **technical access** play a role:

→ **ICT know-how, age, education, income and gender.**



In Africa only

12% of women, compared to

18% of men, use the internet.

¹ Fixed-line networks are of limited use for providing internet access in developing countries.

Overarching Principles for Digital Projects

The diversity of digitalisation also creates new forms of complexity. A striking example of this is the fact that the → **internet** challenges existing boundaries (e.g. national borders) while, at the same time, new ones come into being (e.g. those imposed by the monopolies of the internet giants). In this context, it is not always easy to maintain orientation. Thus, overarching principles for digital projects are required to support decision-makers and promote value-oriented decision-making. These kinds of normative frameworks play an important role at different levels: in negotiations with partner organisations, in formulating strategy documents and in the design of digital projects. A range of reference frameworks exist to guide actions at each of these levels:

- United Nations, *Universal Declaration of Human Rights*: <http://t1p.de/kw7x>
- *African Declaration on Internet Rights and Freedoms*: <http://africaninternetrights.org>
- NETmundial, *Multistakeholder Statement*: <http://t1p.de/3duf>
- *Declaration of Internet Freedom*: <http://www.internetdeclaration.org>
- Deutsche Welle, *The South2South Manifesto*: <http://t1p.de/mf9h>

UNESCO has put together an online list of available international and regional instruments. Moreover, UNESCO's current internet study is an important reference document for the discussion on overarching principles.

Information provided by UNESCO:

- *International and regional instruments relevant to the areas of access, freedom of expression, privacy and ethics*: <http://t1p.de/70dr>
- *Internet study: Keystones to foster inclusive Knowledge Societies: Access to information and knowledge, Freedom of Expression, Privacy, and Ethics on a Global Internet*: <http://t1p.de/0mmi>

THE PRINCIPLES FOR DIGITAL DEVELOPMENT: A SET OF CRITERIA FOR PROJECT DEVELOPMENT AND EVALUATION

The Principles for Digital Development serve as an excellent reference framework for the design of new projects and evaluation of existing ones. Initially compiled by individual donor organisations, the Principles are now being further developed by a consortium of development cooperation organisations. The following nine Principles constitute the basis for the responsible handling of technology and provide a set of criteria to guide the planning, development and evaluation of new initiatives:

- 1) Design with the user
- 2) Understand the existing ecosystem
- 3) Design for scale
- 4) Build for sustainability
- 5) Be data driven
- 6) Use open standards, open data, → **open source** and open innovation
- 7) Reuse and improve
- 8) Address privacy & security
- 9) Be collaborative

At www.digitalprinciples.org regular updates and announcements for events are published. Putting the principles into practice definitely constitutes a challenge. The report *From Principle to Practice* (link below), published by a working group in early 2016, provides support. However, the instruments and methods in this toolkit will offer you plenty of inspiration for implementing the principles.

2030 AGENDA FOR SUSTAINABLE DEVELOPMENT AND INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

→ **ICT** are key to sustainable development and have a decisive role to play when it comes to achieving the Sustainable Development Goals (SDGs) contained in the 2030 Agenda for Sustainable Development. While ICT are only explicitly mentioned in four SDG goals (education; gender equality; infrastructure, industrialisation and innovation; and partnerships), the innovative solutions they offer can and do feature in initiatives for achieving each of the 17 SDGs. Given the 2030 Agenda is an essential frame of reference for almost all development projects going forward, those formulating project proposals must endeavour to dovetail ICT with the SDGs.

The follow-up process of the two World Summits on the Information Society (WSIS), provide – among other things – the political framework for dovetailing ICT with the SDGs. By interlinking the 18 thematic lines of action of the WSIS process with the SDGs, the International Telecommunication Union (ITU) has developed the WSIS-SDG Matrix. This provides an initial overview of how ICT can be strategically deployed to fulfil the 2030 Agenda and constitutes the reference point for the activities of participating UN organisations, governments and private and civil society actors.

The kinds of digital solutions that can be deployed for achieving specific goals are highly diverse and depend heavily on the context and type of measure being developed. NetHope Solutions Center's *SDG ICT Playbook* summarises the impacts different technologies can have on different goals (see also the Ericsson study on ICT's role in delivering the SDGs, link below).

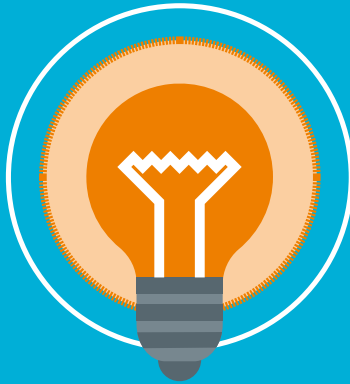
Furthermore, ICT will play an important role in the coordination of the 2030 Agenda and in the evaluation of its goals and sub-targets. Digital applications enable networking and communication within organisations and between development actors. An important goal of the 2030 Agenda is to strengthen the global partnership between different actors (from governments, science, economics and civil society). ICT offer innovative ways to promote participation and ensure inclusion and transparency

in the process. The new data management systems required for verifying where goals are being met will also make it possible to compare activities, to enable evidence-based decision-making and, ideally, to develop flexible responses.

ICT offer those working to deliver the 2030 Agenda an array of opportunities, but to harness the potential of this new era of digitally enabled development cooperation, creative thinking and approaches are essential. The following pages present an inspiring range of instruments and methods that, with adoption, deployment and further development, will be refined and enhanced over the coming years – maybe even with your support.

Further information and links:

- ITU, *Linking WSIS Action Lines with Sustainable Development Goals*: <http://t1p.de/viof>
- Nethope, *SDG ICT Playbook. From Innovation to Impact*: <http://t1p.de/p164>
- Ericsson, *How information and communications technology can achieve the Sustainable Development Goals*: <http://t1p.de/eym6>
- Principles for Digital Development, *From Principle to Practice: Implementing the Principles for Digital Development*: <http://t1p.de/akos>



Inspiring Projects

Practical Examples of How ICT Are
Being Used by German DC/IC and Others

Inspiring Projects

There is a tremendous need for information that illustrates the actual, practical impact of the digital revolution and demonstrates exactly how the use of digital applications in different projects and sectors can add value. Drawing on existing examples, this section on inspiring projects covers the diverse uses of digital technologies in development cooperation and international cooperation in education, culture and media.

Based on example projects run by different German implementing organisations and/or grant recipients in eight subject areas, we will clearly demonstrate how digital approaches improve the attainment of project goals. At the same time, the examples highlight the sheer variety of ways in which digital solutions are being deployed in a DC/IC context. Just as importantly, they show how digitally competent DC/IC projects already are.

Other international example projects suggest where the remaining “digital journey” may be leading us. This is further taken up by the section entitled “ICT Future Scenarios”, which examines digital trends that could end up revolutionising the prevailing view of how DC/IC should or does actually work.

ICT for Rural Development



The use of →*ICT* in rural areas is often hampered by inadequate or non-existent infrastructure. However, if they are deployed, they can improve many aspects of rural life, providing people with better networking opportunities and facilitating access to outside expertise. ICT also enable rural populations to open up new markets and gain access to digital services, such as credit insurance or crop failure insurance, or consult the latest weather report, making their agricultural activities both more productive and more secure. Moreover, ICT offer solutions for overcoming problematic access to educational and health services in rural areas.

However, right from the outset, special care needs to be taken to ensure that proposed solutions are tailored to local conditions, for rural areas are often characterised by a lack of experience in the use of ICT (→*e-literacy*) – or existing services are not suited to the local language or specific cultural situation.

Measures to Rehabilitate Land, Mali



The Inner Niger Delta is a green oasis in the middle of the Mali desert. Despite the fertility of the delta, many people who live there are very poor because the small fields they cultivate lack irrigation. The Northern Mali Programme – co-financed by the German Development Bank (KfW) – is promoting the construction of small-scale irrigation systems. The smallholders affected are covering 30% of the cost. Normally, external experts would have to be drafted in to help them build water pumps and train and oversee them during the construction process. However, the high risk of kidnapping makes this impossible.

Consequently, only Malian nationals are deployed in the area, though external experts can still be involved. For example, monitoring is carried out using georeferenced satellite images, which are supplemented by likewise georeferenced photos taken on site (→ **Geographic Information System**). The result? Strong depth of detail and clearly presentable data, enabling it to be determined whether the construction plans have been followed properly. This minimises the risk of funds being misused and paves the way for some projects to be realised in the first place. The project is not only securing the food supply of the inhabitants of the inland delta, but also giving them new earning opportunities through sales of the rice and vegetables they cultivate.

For further information, see: <http://t1p.de/oj15>



In Ghana, climate change is increasing the frequency of droughts. Resulting crop failures pose a major threat to farmers, often robbing them of their livelihood. So in 2011 the government of Ghana launched a micro-insurance programme, designed to prevent the dry climate from jeopardising the very existence of anyone affected.

Data confirming the emergency situation are a prerequisite for such insurance policies. Thanks to the use of modern →*ICT*, the requisite data can be gathered and processed automatically. Weather stations record local climate data, such as wind strength, rainfall and temperatures. If these records show that there has been hardly any rain or no rain at all for more than 12 consecutive days, the insurance company will pay compensation to the farmers in the vicinity of such a station, provided that they paid a tenth of the cost of their seeds into the insurance at the time of planting.

However, this offer is only available where the necessary infrastructure exists, so GIZ is backing the project in Ghana by providing 36 new weather stations, thereby establishing a basis for far more people to gain insurance cover. So insurance has now become a key tool for guaranteeing subsistence.

For further information, see: <http://t1p.de/z6c7>



The “GartenBank” App for Pest Control, Worldwide



The world’s population is steadily growing. By 2050, there will be 9 billion people on the planet, leaving each individual just a third of the agricultural land theoretically available to them back in 1960.

The challenge is to safeguard the food supply despite such demographic growth. One way of promoting future food security is to prevent crop damage caused by pests. To this end, scientists in Hannover developed the “GartenBank” → **app**, which provides knowledge about plant diseases. If anyone has a plant at home suffering from, say, leaf curl, they can upload a photo of it to the app and immediately get tips about the cause of the disease and how to treat it. Over 10,000 people are already using this app, though so far only in Germany. But the GartenBank team has set its sights on a much more ambitious objective: combating plant damage worldwide.

Every year fungi, viruses, bacteria and insects damage 15 to 30% of harvests around the world. Crop infestation with pests can mean the complete loss of crops for small farmers, in Africa or Asia for example. The GartenBank app is designed to help protect these people’s livelihoods and guarantee that there is enough food to feed the world’s rising population. The app can provide important tips anywhere in the world via a → **smartphone** and simultaneously collect valuable data on the extent and spread of plant diseases. Such data has never been collected before and could serve as a basis for effective action by policymakers.

For further information, see: <http://t1p.de/bl1d>

ICT and Good Governance



The use of →*ICT* not only boosts efficiency, provides an overview and enables better decisions in a governance context, it also creates fresh opportunities for citizens' participation in politics. Thus, ICT provide information about existing opportunities for political participation, but also open up entirely new possibilities by establishing bi-directional communication channels. Yet helping to shape relationships and interaction between government, civil society and private sector actors in a more transparent, needs-based and participative way is not all that ICT achieve. They also help to make public-sector administrative processes more readily verifiable, making government more transparent and less prone to corruption. Furthermore, as is the case everywhere, ICT help to improve decision-making by creating a broader knowledge base (→*big data*) and getting actors involved.

However, ICT impose their own tasks and challenges: they have to be regulated. Internet governance must prove practicable, both for citizens, who are to be involved in it, and for authorities, which need useful, integrated and secure systems. Only then can such systems be applied and exploit the potential offered by ICT.

The “Dooz” Citizen Information Platform, Palestinian Territories



Until recently, inhabitants of the Palestinian municipality of Nablus in the West Bank had very little information about their politicians' activities. Decisions were made behind closed doors, without involving citizens. “People have very little confidence in local government”, says Verena Wendisch, the Palestinian co-ordinator at DW Akademie. To counter this, GIZ teamed up with DW Akademie to develop a joint project aimed at improving exchanges of opinions between members of the community and politicians.

The new online platform providing information on the work of local authorities is called Dooz. “We report on issues that directly affect people, in other words on what can happen right on your doorstep”, says the young journalist Majdoleen Hassouna, who helped the three-strong editorial team to develop the platform. She and her colleagues report on budgets, municipal spending and other topics.

The editorial team always seeks to discuss live issues directly with government officials. Dooz users can submit their wishes and questions to politicians by responding to short surveys. Furthermore, the platform has already published interviews with the mayor and governor, as well as organising public consultations where citizens could speak to politicians. These discussions are documented on the website, making them freely accessible. The popularity of the project is clear from its Facebook page, which has over 100,000 subscribers.

For further information, see: <http://www.dooz.ps/>



Uganda's main mass media outlets are concentrated in a small area of the country's capital city, Kampala. However, 87% of the population live in rural areas, where local FM radio stations are the most significant – indeed, often the only – source of information. Approximately three-quarters of these stations belong to members of the government and most of them are tied into a tangled system of government control. Moreover, surveillance and phone tapping are not uncommon. “Journalists, bloggers (→**blog**) and other media professionals in Uganda are not usually aware how important data security is for themselves and their sources”, says project manager Antje Deistler from DW Akademie, which together with its partner organisations trains journalists to be digital safety experts and trainers.

These mentors comprise a network that extends right across Uganda, advising their immediate colleagues, raising awareness of digital risks and providing practical assistance to protect computers, telephones and other devices against potential attacks or espionage by outside agencies. At the same time, the Ugandan mentoring network is involved in developing an app tailored specially to its needs. This Open Mentoring app contains the latest and best data security information and tools.

For further information, see: <http://t1p.de/dg1o>

Getting Citizen Feedback by Text Message, Togo



Launched in 2014, KfW's decentralisation project in Togo enables citizens to give direct, public feedback to their local government by → **text message**. Basically, the service is about the notification of requirements, planning and progress of local infrastructure development or user satisfaction levels regarding the accessibility and quality of municipal services.

The system works like this: first, the survey in question is promoted on the radio and by NGOs. People who want to take part register for the survey by text message and are then sent a number of questions, which they respond to also by text message. Any proposals put forward – e.g. on improving waste management or restoring marketplaces – are forwarded for validation and then published on a web platform. The local authority discusses the inputs provided and, in response, seeks to reflect the public's ideas and concerns in its decision-making. After the authority has reached its decisions, they are fed back to the general public, again through radio broadcasts and by NGOs.

With this approach, target groups can get more involved in the planning and monitoring of projects. This not only strengthens civil society and contributes to the fight against corruption, but also improves the visibility, quality, sustainability and governance of the projects in question. Since the local authority's responses and related actions are shared directly with the public, the system helps to generate public pressure for better governance and leadership.

For further information, see: <http://t1p.de/4j98>



Anyone in Bangladesh who wants to marry, open a bank account or enrol a child in school needs a birth certificate. This is usually issued by a local authority, but in many parts of the country the process can take weeks because of poorly defined responsibilities and processes, impenetrable mountains of paper-based filing in local authorities and citizens' struggle to → **access** information.

The pilot project → "**E-governance** in Municipal Offices", delivered by GIZ on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ), worked with two cities in Bangladesh to help them improve their municipal services. In Jamalpur and Narayanganj, digital data management systems (→ **Information Management System (IMS)**) and centrally located and accessible municipal public offices were set up. As a result, birth certificates are now issued in these new offices in under half an hour.

Anonymous customer surveys show that the municipal offices are performing more quickly, efficiently and effectively. As such, service users are expressing higher levels of overall satisfaction. Other benefits of the system are that municipalities have been able to increase their revenues and that mayors have been able to monitor staff performance using data captured securely by the system. Since the pilot project completed, the combined data management and municipal office model has been replicated in 13 other cities in Bangladesh. This represents a major step forward for the country in terms of making local administration more effective and providing citizens with a legal basis and fit-for-purpose registration systems that enable their participation in societal, political and economic life.

For further information, see: <http://t1p.de/jhd1>



A successful revolution in Tunisia in 2011 meant that democracy could finally gain a foothold there. But how can transparent politics and citizen participation be achieved? Trade-offs negotiated in parliament risk remaining secret. After many years of dictatorship, the country’s elected representatives are simply not accustomed to being accountable to the people, so hardly any efforts are being made to be more transparent. The Tunisian NGO Al Bawsala (meaning “the compass”) was unwilling to accept this and launched a project called marsad.tn (“the monitoring station”). This internet platform is modelled on abgeordnetenwatch.de, a website through which German citizens can put questions to politicians.

Marsad.tn collates information on the work done by the country’s elected representatives, publishes their biographies and interviews, and monitors their political initiatives and voting behaviour in parliament. As on the equivalent German website, the public can use a question and answer process to take their MPs to task.

In an effort to reach as many people as possible, marsad.tn also uses Facebook and Twitter (→ **social networks**). Since the project is proving so popular, the marsad.tn team is now also covering regional politics and the national budget.

For further information, see: <http://www.marsad.tn/fr/>



The field of social development covers a number of important DC/IC issues, which can be split into three subcategories, for greater clarity:

SOCIAL SECURITY

→ *ICT* enable security systems to provide targeted assistance specifically tailored to the respective situation, offering decentralised, and therefore faster, access to data, and facilitating data transfers and analysis. Thus, they not only increase the range of social services, but also create transparency and curb corruption.

HEALTH

→ *E-health* and telemedicine solutions offer numerous possibilities for improving medical care, even in rural areas. Examples include experts who offer their know-how and carry out analyses remotely. However, in the health sector, more than any other, the necessary → *e-skills* are vital, as they are the only way of gaining acceptance for and properly implementing new solutions.

EDUCATION

→ *ICT* provide easier access to education and enable higher-quality teaching tailored to specific target groups. New and effective digital forms of learning provision are enriching educational processes and putting learners in touch with each other worldwide. Digital technologies enable the dissemination and acquisition of knowledge even in decentralised and remote regions.

Social Security: a Smartcard to Support the Development of a Social Security System, Malawi



The average annual income in the southern African country of Malawi, expressed as gross national income per capita, is just EUR 230. The poorest inhabitants make do with even less. The Malawian government wanted to launch a social welfare programme with the support of the German Development Bank (KfW) and UNICEF to help those most in need. However, the government had no way of determining which families required what kind of assistance. The question also arose as to how such assistance could be paid out securely. So the KfW promoted the development of a computer-controlled administration comprising a central database where the data on needy families are collected (→ **Information Management System**).

Each family entitled to welfare payments now has an electronic card on which the owner's biometric and other data are stored. To receive their benefit, every two months they have to present this card at their welfare office, where the data are checked to ensure that they are still correct. If the cardholder's living conditions have changed, the data are updated and the welfare payments adjusted. The cash dispensed is also registered, this being an important tool for fighting fraud and corruption. So far the programme has supported just under 30,000 families, helping more than 100,000 people. Modern data management ensures that those who receive assistance are the people who need it most.

Health: a Digital Health Information System, Bangladesh



“Until only a few years ago, we wasted a lot of time storing and searching through paper files”, says Dr Islam, the man in charge of health and family planning in southeastern Bangladesh: almost 160 million citizens, thousands of health facilities, endless mountains of paper and no shared data administration.

It was information chaos.

Meanwhile, however, a digital revolution has occurred in the country’s health sector. Supported by German international cooperation, the Ministry of Health and Family Welfare introduced → **open-source** software, the District Health Information System (DHIS2, → **e-health**, → **Information Management System**).

Not only has this cut down the administrative work of reporting, it is now possible to work with datasets from different departments and programmes, which were previously incompatible. This makes both health-care provision and the monitoring of the health situation easier and more effective. With the click of a mouse, Dr Islam can now access important data and organise health-care provision more effectively. However, the most important thing for him is that “we now have more time for patients”. Around 15,000 health facilities are currently working with the system. In addition, over 20,000 health assistants nationwide have been trained to use it to gather data.

Health: Rehabilitation of the Faizabad Provincial Hospital, Afghanistan



Medical care is often inadequate, especially outside the large cities. Many hospitals are outdated and poorly equipped. Above all, there is a shortage of qualified staff. It is also a problem for the Afghan province of Badakhshan, with around 1 million inhabitants.

To improve the situation there, the provincial hospital in Faizabad was rehabilitated, reorganised and expanded with KfW funds.

An important component of the positive development is the use of telemedicine solutions, which afford access to services and knowledge that are not locally available. To this end, the hospital was integrated into the Aga Khan Health Services (AKHS) network, which runs the hospital. So now video conferences and data exchanges (e.g. sending x-ray images) enable staff there to tap into the expertise of the French Medical Institute for Children in Kabul and the Aga Khan University in Karachi.

Specialists at these distant institutions advise their hospital colleagues, assess findings and hold → **e-learning** seminars which offer specialist training for medical staff, continuing training courses for managers and instructions on how to use the → **e-health** tools. In 2014, almost 1,500 people in Faizabad received telemedical care, and the hospital itself has now become a regional hub for telemedicine.



As the many examples presented in this document make clear, →**ICT** offer great potential for development. Around the world, however, including in South America, there is one major barrier to unlocking this potential. The technologies in question cannot be put to use because, quite apart from technical obstacles, people often lack →**e-literacy**, i.e. the knowledge how to implement such services and technologies and experience in deploying them.

In light of this, the Goethe-Institut (GI) is rolling out its Future Adapter South America project across the entire continent to carry out training measures designed to improve the digital competence of the target group and thereby promote inclusion and participation.

To be of as much practical use as possible, the required knowledge is fed directly into the digital devices used. In libraries, effective →**internet** searching is taught on PCs, and in “maker spaces” people are trained to use modern technologies, such as 3D printers (→**3D printing**). Librarians are taught how mobile teaching methods work and pass on what they have learnt. Workshops with gaming specialists in libraries and “Ludotecas” (games libraries) increase young people’s interest in (playful) learning. QR code rallies, variations on treasure hunts that use →**smartphones** and QR codes, incidentally train people to use the technology, are fun and therefore generate interest in ICT.

In all, 2,000 people have already benefited from the implemented measures.

Education: Blended Learning for Local Journalists, Ukraine



Ukraine is going through hard times: in Donbass, the war against separatists and Russia is continuing, the Crimean Peninsula has been annexed by Russia, and the rest of the country is enduring a difficult phase of reforms and modernisation. Impartial, objective and diverse press coverage is essential for the democratisation process as a whole. However, many local reporters are not equipped for the current challenges. Journalism courses offered by universities lack quality, and hardly any continuing training is available.

This is now set to change, thanks to the Ukrainian Media E-School (UMES). The school was launched in February 2015 by DW Akademie and the Independent Association of Broadcasters (IAB) to improve the range of continuing training on offer, especially in rural areas and in particular for online journalism. The method being relied on to reach large numbers of people is blended learning (→ **e-learning**), in online courses supplemented by classroom teaching, which ensure good and economically viable advanced training. The open source management system Moodle (→ **open source**) is used for exams, seminars or lecturers' feedback. In August 2015, the first 14 students graduated from the Ukrainian Media E-School. The hope is that they will now go on to become successful independent journalists and bloggers (→ **blog**).

For further information, see: <http://t1p.de/ufqq>



“Although I’ve organised many cultural projects, I always felt I lacked the firm grounding needed to do so. And whereas cultural events take place almost every second day here in San José, there is no training available for professions in the cultural sector.” This statement by the 32-year-old Costa Rican José Sibaja illustrates the need for professional qualifications for cultural professions, especially in the Global South.

Recognising this need, in 2015 the Goethe-Institut (GI) and Leuphana University developed the massive open online course (→**MOOC**) called “Managing the Arts” as a capacity-development measure for the cultural sector (→**e-learning**).

Over 17,000 people from 170 countries took part in the 14-week online course. 800 students were academically mentored and managed to gain a university certificate after completing the course. Managing the Arts stood out from other MOOCs due to its intensive support, software-based group work, intercultural learning process and strong focus on specific practical cultural work in different regions of the world. Four video case studies from Lagos, Bangkok, Budapest and Berlin taught the participants how to apply theoretical knowledge in practice.

This first MOOC, held in 2015, enjoyed above-average success, with 40% of mentored students finishing the course, including numerous culture managers from DC countries, such as Fiji, Gabon, Suriname and Yemen.

For further information, see: www.goethe.de/mooc



Education: War Child – Game-Based E-Learning, Sudan



In Sudan, over 2 million children of primary school age have no access to education. Providing them with a conventional school-based education would require an additional 110,000 teachers and 15,000 new classrooms, necessitating at least a fivefold increase in the government's education budget.

The project, led by the Dutch NGO War Child, the Sudanese Ministry of Education and UNICEF, aims to educate children via a game-based mathematics self-learning application. The idea is that if children cannot go to school, then schooling must be brought to them. The project staff distribute solar-powered tablets to communities, show the adults how to use them, and instruct them how to help children work with them. The learning units take the form of audio and video files, and the game is based on the maths syllabus taught in schools, with its content tailored to the target group. For example, in one lesson children learn to boost the income of their make-believe shop, and in the next they help to build a hut, or role-play as a goat herder or teacher.

Evaluation of the pilot phase showed that all children managed to significantly improve their maths skills. The ultimate goal is to use the same method to enable children to complete their primary education. Plans are already under way to expand the project to other school subjects and regions.

For further information, see: <http://t1p.de/1a18>



The economic effects of the digital transformation are being felt at all levels, from small entrepreneurs gaining easier access to important markets and market information (e.g. prices) to entire national economies becoming integrated into global value chains.

Micro, small and medium-sized businesses can use continuing training delivered in the form of →**e-learning** wherever and whenever they want to develop their potential, unleash their creative potential and give birth to new ideas. Moreover, easier access to financial services facilitates the subsequent implementation of these ideas.

In a production context, →**ICT**-supported management systems increase workflow efficiency, reduce costs and pave the way for largely automated production plants (→**Industry 4.0**).

ICT, their further development and use also constitute an entirely new occupational field, though suitably trained personnel are essential if it is to be fully exploited. In any case, →**e-skills** are essential for developing a competitive national economy; otherwise the country in question will fall behind its international rivals.

Promoting Vocational ICT Training, Uzbekistan



Young people hold the future of their country in their hands. However, in Uzbekistan a quarter of those aged between 16 and 25 fail to find work.

A few years ago, the Uzbek government decided to modernise vocational training, i.e. make it closer to real life and focus more heavily on sustainable labour markets. The prime aim was to train →**ICT** specialists, because like everywhere else in the world in Uzbekistan the →**internet** and →**smartphones** play a key role in business. Uzbekistan has long suffered from a shortage of bona fide ICT experts.

The Uzbek government was supported by KfW and GIZ, which provided financing, assistance with the didactic methodology and help with the content of the training.

In all, 32 vocational training colleges were chosen, in cities and in the countryside. These colleges were then kitted out with the requisite technical equipment; maintenance and operational concepts were developed, teachers were trained and support was provided to develop the teaching material.

The success is reflected in the following statistics: 12,000 training places were created and nearly 87% of graduates found work. This major success attracted attention and at the end of the programme 30 more colleges were preparing to offer ICT training. The Uzbek government declared the new training course a model for basic vocational training in the modern world.

For further information, see: <http://t1p.de/awk2>

Optimising Value Chains in the Farming Sector, Uganda



A million small farmers live off coffee cultivation in Uganda. However, they earn very little because they depend on agents to sell their produce. To secure higher prices, many farmers have set up cooperatives, like the Uganda Coffee Farmers Alliance (UCFA), which sells the harvests of some 54,000 people on major markets. However, some of the profit earned in this way was lost to high organisational costs and an error-prone, paper-based administration system.

Change came in the form of a special → **app**, developed by SAP in cooperation with GIZ. Now small farmers deliver their harvest to regional managers, who use their → **smartphone** to scan the barcodes attached to the sacks brought to them and note the quality and amount received.

Each sack is now recorded in the system and can be accurately tracked. The resulting data also give the UCFA an overview of how much coffee is available, what needs to be transported where and where there is room for improvement. As a result, administration costs have dropped by 11% and more possibilities are opening up: income can now be paid out digitally (→ **e-payment**), which is a safer option than cash. The collected data also provide a basis for fair savings and loan offers (→ **digital finance**).

For further information, see: <http://t1p.de/eo03>



Mohamed Chraibi studied political science in Münster and then returned to his home country, Morocco. Huang Jan from China studied for six years in Dresden and Stuttgart and now works for a biogas plant operator in Beijing. Both belong to the growing group of international professionals whose studies in Germany have given them excellent qualifications and established a special bond with this country. Alumniportal Deutschland is a global contact, career, competence and cooperation network (→ **social networks**) that enables such people to stay in touch and consolidates their ties to Germany. The portal is supported by the German federal government and aims to combine development cooperation, science, culture and education.

Alumni from German higher education institutions are organised into dozens of different groups and various specialist and regional networks, providing graduates with an opportunity to present themselves and their work, sift through international job offers and participate in webinars. More than 118,000 former students have already registered on the portal.

For further information, see: <http://t1p.de/4eih>

The “E-Zwich” Cashless Payment System, Ghana



In the West African state of Ghana, only 40% of the population have a bank account, and most of those live in cities. Yet without an account many services are inaccessible or can only be used with difficulty. In a bid to promote financial inclusion and at the same time reduce the circulation of cash, the government commissioned the Bank of Ghana – the country’s central bank – to set up a nationwide cashless payment system, called “e-zwich” (*→ e-payment*).

On behalf of BMZ, KfW is supporting the central bank’s efforts to strengthen this system and expand it to cover rural areas as well. To this end, it is financing e-zwich-compatible cash dispensers, card readers and chip cards (smart cards) that can be used to carry out financial transactions, such as transfers, cash deposits and withdrawals and electronic bill payment without having to visit a bank. The integration of fingerprint recognition technology into the smartcard system to verify customers’ identity makes it safe and easy to use, even for people who are illiterate, have a limited education or are simply old.

Evidently, these advantages also apply to small, rural companies. As such, the system is opening up new horizons for economic activity on an unprecedented scale in Africa.

For further information, see: <http://www.ghipss.net/>



Almost 50% of Afghans are underemployed or jobless. The Afghan economy is running to seed as its security instability and persistently reoccurring political unrest continue to deter investors.

As most Afghans work the land, GIZ's Sustainable Economic Development and Employment Promotion programme (SEDEP) is working very hard to create new jobs in key agricultural sectors, like wheat cultivation and milk production. But before this could be done, the team first had to gain a precise understanding of current work and production practices by putting questions to local people.

However, since many provinces remain unsafe, there was no way that interviewers could go out and conduct surveys themselves. A written questionnaire was also out of the question because many rural people are illiterate. However, fortunately most of them have a mobile phone. So an automated interview system was developed to call selected farmers regularly on their mobile phone and ask them some simple questions, like how many people had worked on the field in the past week and how many of them were family members. The responses were automatically transmitted into the →**cloud**, analysed and evaluated, providing a basis for SEDEP to start its work.

For further information, see: <http://t1p.de/qzgh>

Digital Registration, Allocation and Tracking of Cocoa Production, Sierra Leone



Cocoa produced by smallholders in Sierra Leone's Eastern Province tends to pass through the hands of many middlemen before it enters international markets, and the often opaque pricing policy of these agents means that farmers usually end up not seeing much of the proceeds. Another problem is lack of certification, which restricts access to sales markets. To tackle this issue, an EU-funded project run by the German food aid NGO Welthungerhilfe is seeking to facilitate access to the world market for small farmers and local cocoa trading companies. The hope is to boost the incomes of 30,000 farmers simply by certifying local cocoa dealers, the cocoa itself and agents. One element of the project is a tracing and mapping system (TMS) that digitally records farmers, farms and their cocoa output (→ **Information Management System**). The TMS is a custom-built web application, desktop application and → **app** that, for the first time ever, confirms the exact size and location of farmers' plots, and trading companies receive data on the participating farms and the quantity and quality of their cocoa. After six months of development, configuration and tests, the system was put into operation at the end of 2015. At the time of writing some 3,000 farmers and one trading company had signed up.



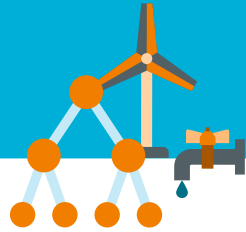
In Africa, women produce about 60 to 80% of all goods, but only receive 10% of the income earned from them. Due to their often lower level of education, women have little access to the formal labour market, are often less-well paid than men for the same work, and for the most part do that work under precarious circumstances. To find work and generate their own income, they end up in the so-called “informal” sector.

Many women sell handicrafts (e.g. jewellery, clothing or handmade crockery) at local markets. However, the high fees charged for stalls there mean they frequently end up with little income at the end of the day.

The Soko e-commerce platform set up in 2012 has significantly changed the business dealings and lives of these women. Soko enables them to offer their goods online worldwide and deal directly with customers. Those with no →**access** to the →**internet** can run their virtual shop over a standard mobile phone, sending customers photos of their products and then negotiating sales by →**text message**. The proceeds of sales are paid out to the seller at specified kiosks, rendering bank accounts unnecessary. Over 1,000 artisans – of both genders, though 74% of them are women – are currently selling their wares on Soko. Their average household income has quadrupled.

For further information, see: <http://t1p.de/i460>

ICT for Sustainable Infrastructure



→ **ICT** can significantly help to make infrastructure sustainable. For example, they provide numerous ways of handling resources more responsibly in future and reducing damage to the environment, e.g. through the use of intelligent electricity grids or more environmentally compatible production processes.

→ **Smart cities** use millions of sensors and all kinds of communication channels to manage traffic flows efficiently and thus reduce greenhouse gas emissions. ICT are also indispensable for water management, being used to develop weather forecasting models, gather data on water resources and plan, administer and secure access to supplies to meet users' needs.

These kinds of infrastructure require special attention because they need to be fully secure to prevent any unauthorised access or manipulation by outside agents (→ **cyber security**). At the same time, they must protect the data (→ **data protection**) of anyone whose motion profiles are used to operate and improve systems. Furthermore, sufficient capability (→ **e-skills**) must be available for the monitoring and operation of such infrastructure.

An Off-Grid Energy Supply for Rural Areas, East Africa



Millions of people have no access to electricity. For example, some 590 million people in Sub-Saharan Africa alone have no power supply, so when the sun goes down, huge areas are plunged into darkness.

One solution would be to develop the grid, but another – often faster and more cost-effective – option is to provide individual households with a decentralised electricity supply, say, by harnessing solar power. And although the initial investment required to purchase such a system often makes it unaffordable for the people concerned, the Berlin-based company Mobisol has shown that it can be done.

Mobisol offers off-grid solar systems with capacities ranging from 30 to 200 Watts. In an innovative payment scheme, users pay in small monthly instalments instead of covering the full cost up front. Since a mobile payment system (→ **e-payment**) is integrated into the scheme, these small amounts can be settled simply by → **text message**, freeing up access to the power system.

Over 21,000 households already have Mobisol units and, backed by the German Investment Corporation (DEG), another 150,000 people and 10,000 small businesses are set to sign up to the scheme.

Not only does the scheme yield positive economic effects, it is also good for the environment. Replacing kerosene lamps and candles with solar light reduces CO₂ emissions by up to 15,000 t per annum.

For further information, see: <http://t1p.de/7wv5>

An App for Saving on Energy Costs, Philippines



The Philippines is ranked as the third most vulnerable country to climate change. Consequently, the government is seeking to slash its CO₂ emissions by 70% by 2030. To achieve this, it is having to implement more climate-friendly measures in many domains, including transport, forestry and even the national energy supply.

To underpin these efforts, GIZ and a broad range of partners organised the GreenOvation → **hackathon**, a competition that challenged entrants to develop an → **app** promoting the efficient use of resources.

The winning idea was OneWatt, which combines an app for efficient energy use with a high-performance battery that stores surplus solar electricity. The app automatically sources power from the grid when prices are low and switches over to the battery during expensive high-demand periods. This not only saves money, but also helps the environment because it flattens peaks in consumption. As a result, less use needs to be made of the country's old, less efficient power plants, which are kept on standby to boost the energy supply when demand peaks.

The OneWatt team is now using its prize money to continue developing the app, primarily to enable small and medium-sized enterprises (SMEs) to control their power consumption more efficiently.

For further information, see: <http://t1p.de/970n>

Securing the Water Supply – GIS-Based Land Registry, Peru



The Andean state of Peru is already suffering badly from the impact of climate change, one consequence being an increasing water shortage, especially in the coastal region. Around 95% of the population is supplied with drinking water from the Andes, but rising temperatures are making glaciers melt faster, and the freshwater they store is being lost. Rainfall levels are also changing, with the coastal region becoming drier and drier.

Seeking solutions to Peru's water stress, BMZ is providing EUR 10 million through the KfW to fund measures designed to curb water loss in two cities. These measures include not just fixing leaks in water distribution networks and installing domestic water and bulk water meters, but also resorting to digital technology by installing computer-based supervisory control and data acquisition (SCADA) systems or → **Geographic Information Systems (GIS)** and linking them to commercial and technical land registries. This way, any inconsistencies between billed and actual water consumption can be detected, locating leaks in the system and enabling more efficient use of scarce water resources.



Clean water is a luxury for many people in developing countries, and Kenya's rural areas and urban slums are no exception, being characterised by a sub-standard water supply and sanitation.

So a new approach is being tried. Responsibility is being decentralised and handed over to district administrations, which know best what the local supply situation is like. However, even they often lack up-to-date data that can be used to plan infrastructure measures and distribute scant water resources fairly. To provide them with this data, GIZ is supporting the MajiData project.

MajiData is an online database (→ **Information Management System**) containing data on some 2,000 impoverished urban areas, including details of their population, water supply, sewage disposal, topography and urban planning. These data can be easily retrieved and kept up to date and enable broad analyses of the situation at any specific location. Based on this, measures can be planned and tailored precisely to local needs. In addition, the database helps water companies to draft proposals for the Water Services Trust Fund (WSTF), which promotes water and sanitation projects in poor communities. MajiData is thus an important step along the way to ensuring that Kenya's water sector is sustainable.

For further information, see: <http://www.majidata.go.ke/>



A Sustainable Public Transport System in Dar es Salaam, Tanzania



Population growth in megacities is throwing down major challenges around the world, including in the transport sector. For example, the citizens of Bangkok spend 36% of their travel time in traffic jams. This causes air pollution, climate change and the allocation of yet more land to transport infrastructure.

To prevent traffic congestion, app provider Ally is mapping major metropolitan areas by → **crowdsourcing**. In Dar es Salaam, for instance, based on a special → **app** and GPS data, the movement patterns of volunteers are collected and tracked on OpenStreetMap (→ **Geographic Information System (GIS)**), showing the city's major and minor transport corridors. Refining this information by adding municipal and public data enables complex traffic modelling, which in turn serves as a basis for devising measures that significantly lower the strain on urban transport.

Analysis of the collected data provides important insights into the transport needs of the Tanzanian capital, benefiting both the government and the city's inhabitants.

The app displays traffic routes and potential intermodal connection points, enabling travellers to select the best route of many, depending on their preferred form of transport. This is a totally new situation, especially in cities where public transport is not yet as well organised and developed as it is in Germany.

ICT Infrastructure



→*ICT* have huge potential. In almost every conceivable domain – health, education, security, environment, economics, etc. – digital services provide a basis for further developments and offer fresh opportunities, making processes more efficient, enabling better decision-making (thanks to a wider range of information) and giving more people access to more services.

However, if the potential of ICT is to be fully exploited, they must be accessible (→*access*), and this constitutes a challenge because ICT infrastructure is expensive to build and many areas do not even have electricity. As a result, 4 billion people around the world are offline, 90% of them in developing countries (in 2014, less than 20% of Africa's population used the →*internet*). These people remain partly or totally cut off from the benefits of the digital transformation, opening up a →*digital divide* between industrialised and developing countries, between different social classes and between urban and rural areas. Improving digital participation is therefore an important aim in German development cooperation. However, access to →*ICT infrastructure* is not the only obstacle. Suitable solutions need to be available and people need to know how to use them (→*e-literacy*).

“EASSy” – Bandwidth for East Africa



In recent decades a global network of undersea cables (→**ICT infrastructure**) has been laid for international data traffic. Africa’s east coast was one of the last “blank spots” on the network map. The Eastern Africa Submarine Cable System (EASSy) project, which laid a 10,000-kilometre-long submarine glass fibre cable, has now closed this gap. Inhabitants of Africa’s east coast previously had to rely on satellite-based →**internet** access. This was a costly affair and the number of users was correspondingly low. The advent of the cable connection slashed prices by up to 70% during its first year in operation. At the same time the number of users rose by 25%.

The fibre optic cable runs along the continent’s east coast from South Africa to Sudan, linking a total of 21 African states together and connecting them to the rest of the world. The countries hooked up to the cable now have an additional capacity of 4.72 terabits per second (the bandwidth EASSy provides).

Overall, USD 235 million have been invested in the project. About two-thirds of this total was raised by African telecom providers; the remaining third was contributed by international development banks. KfW contributed a development loan worth USD 13.2 million.

For further information, see: <http://www.eassy.org/>

Mobile Communications for Rural Areas, India



Being able to make calls on a mobile phone at any time, which is an everyday experience for us, often remains an unfulfilled wish for the rural population, for example in India. Yet →**mobile communications** offer tremendous potential for remote regions by bridging vast distances and poor roads and providing →**access** to information and services. The problem is that for most providers, expanding their network into the countryside (→**ICT infrastructure**) is simply not worthwhile.

Against this backdrop, the German Investment and Development Cooperation (DEG) supported the Indian telecom provider Viom Networks by providing a loan worth USD 30 million to enable the construction of mobile phone masts in rural areas. Instead of each provider having to erect its own towers, they can now lease sites from Viom. Since each tower supports the systems of several operators, the costs are more widely distributed, making their construction affordable in more rural regions, too. “Our commitment is enabling the company to build modern communications infrastructure in sparsely populated regions as well”, says DEG Managing Director Michael Bornmann.

Thanks to this additional infrastructure, more people now have access to digital services like →**e-learning** and →**e-health**, which can significantly improve people’s quality of life and boost development.

Using Balloons to Provide Internet Access, Worldwide



People in developing countries, especially in rural areas, often have insufficient → **access** to the → **internet**.

To get these regions online, Google has been working since 2011 to set up a network of balloons that float in the stratosphere and transmit broadband internet signals down to the ground (Project Loon). The balloons can remain airborne for several months, network flexibly with each other by laser, and provide an area with a radius of 40 kilometres at a relatively high bandwidth. The floating balloons are blown in different directions and steered solely by adjusting their altitude, which brings them into contact with other winds. However, guaranteeing gapless network coverage in this way is a complicated business, and questions remain to be answered in a number of domains: technical issues, legal issues (especially overflight rights) and the fundamental issue of whether such an operational network can ever cover its costs.

However, some initial successes have been scored: in 2012, a school in the remote village of Água Fria in eastern Brazil was, briefly, connected to the internet by balloon. Google is now striving to give entire countries internet connectivity in this way. In July 2015, Sri Lanka was the first country to announce its partnership with Google. In spring 2016, the entire population was scheduled to gain balloon-based internet access.

For further information, see: <https://www.google.com/loon/>



Especially in fragile contexts, →*ICT* provide new ways of collecting important data and making it available. One area to benefit from this is project monitoring, which can only be carried out in part – or with great difficulty – by conventional means, due to security concerns or the lack of infrastructure. Yet such monitoring is particularly useful to the local population because in a crisis it provides them with potentially life-saving information. Contributions by the locals affected and people wishing to help (→*crowdsourcing*) make this information more accurate and more quickly available than if the relevant agency was relied on to provide it. For example, in recent natural disasters and crises citizens have used social media tools like Facebook and YouTube (→*social networks*) to great effect to share information. Of course, this swifter flow of information also helps government and non-government organisations speed up their production and distribution of security bulletins.

At the same time, digital information channels are also instruments of power in the modern world. Authoritarian regimes can shut down mobile networks (→*mobile communications*) whenever they deem it necessary, →*internet* access is cut off and only desired information is disseminated. So these channels of information need to be given the best possible protection.

A Database of Ex-Combatants Registered for Job Placements, South Sudan



For almost 50 years, Sudan suffered from armed conflict over greater autonomy for the southern part of the country. In 2011, after peace had been restored and South Sudan declared an independent nation, as many as 150,000 former soldiers and other uniformed personnel had to be re-integrated into society, an essential step for preventing former soldiers with no prospects from joining military groups that could subsequently destabilise this young country.

On behalf of the Federal Foreign Office (AA), KfW helped the country develop new prospects for ex-combatants. In a bid to find them jobs in training establishments, agricultural cooperatives or other workplaces, KfW and its partners are relying on an IT-based database. This Information, Counselling and Referral System (ICRS) (→ **Information Management System**) compiles a personal digital profile of each former fighter, listing their qualifications and job preferences.

At the same time, job vacancies and available training courses are stored electronically. The profiles created give the ex-combatants a picture of the domains where work is available and which opportunities exist there. Ideally, case workers find them suitable jobs. In this way, the project is significantly helping to integrate these people and stabilise the country.

Deescalation Training for Security Forces, Yemen



Yemen is an unsafe country dogged by frequent violent clashes. The country's security apparatus is part of the problem, with the police and security forces too quick to resort to arms in conflict situations, which usually merely exacerbates them. This makes anti-violence training crucial. But how can training be delivered in a country where many people are illiterate? The answer is by embracing the Arabic tradition of storytelling, albeit in a digital variant (→ *digital storytelling*).

With support from GIZ, a story-based learning game was developed for this purpose (→ *e-learning*). A group of Yemeni authors, police officers and security personnel teamed up to write a story, a love story no less, much like a soap opera, featuring numerous conflicts. The drama was then acted out and the audio recording turned into a story-based learning game that participants in anti-violence training courses can play on a PC or mobile phone. The special thing is that at particular points in the narrative, the trainees are required to intervene themselves, using the keyboard to determine how the story continues. This makes them more aware which forms of behaviour can defuse or fuel conflicts. Since almost everyone in Yemen owns a mobile phone and the story can be played by people without reading skills, it reaches a very large audience. A normal textbook would not have accomplished this.

Humanitarian Aid for Syrian Refugees



In 2015, there were around 60 million refugees worldwide, including internally displaced persons and migrants to neighbouring or more distant countries. The present refugee crisis is considered to be the worst since the end of World War II. The situation in northern Iraq, Syria and Turkey is particularly difficult, with many millions of refugees stranded in these countries, having to subsist without a job.

Wishing to provide targeted assistance, aid organisations are faced with the questions of who needs financial support the most and how cash can be transferred securely. To enable this, the German NGO Welthungerhilfe is introducing a suite of →**ICT** tools in the region. Mobile data collection systems help to gather and store specific information on potential beneficiaries (→**Information Management System (IMS)**). The next stage involves the automated analysis of these data to identify which families are in particular need of assistance (→**ICT and refugees**). Payouts are also made using digital technology, crediting an electronic payment card that can specifically be used to buy certain goods and services from businesses participating in the programme, which were equipped with card readers for this purpose.

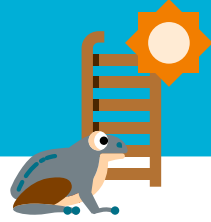
By early 2016, the programme had already helped 9,000 particularly needy Syrian families (54,000 people), paying out a total of EUR 5.8 million.



Around 85,000 people currently live in Zaatari, a Jordanian refugee camp close to the Syrian border. Many Syrian refugees suffer not only from psychological trauma caused by the civil war in their country, but also from severe physical injuries caused by bomb blasts and shrapnel. Approximately 200,000 Syrians are now dependent on prostheses (→ **ICT and refugees**).

Zaatari is going to be the first refugee camp in the world to have a FabLab: an open workshop equipped with modern technology. Here, refugees can gain the technical skills they need to produce items on site that they need. So the FabLab's → **3D printer** will even enable them to make complex items, like prostheses, which would otherwise be virtually impossible to obtain due to their high cost and the lack of access to providers of medical supplies. The project, aimed at helping refugees to help themselves, was dubbed Refugee Open Ware (ROW).

3D-printed prostheses would mark a tremendous improvement, especially for children, whose steady growth means that their prostheses have to be frequently adjusted or even replaced. In the pilot stage of the project, a young Syrian who himself has an artificial limb was trained as a technician and can now use the 3D printer in the FabLab to help himself and others.



→*ICT* can be used to collect, structure and analyse large quantities of climate data and make them publicly accessible. Only on this basis can evidence-based statements on climate change be made. Likewise, any response to climate change, such as global emissions trading, will depend on *ICT*. Vulnerability analyses for climate risk management, regional early warning systems or measures like climate risk insurance policies (e.g. affording protection against crop failure) are all based on data produced by *ICT* processes.

When planning to use such technology, however, the counter-arguments also need to be considered: *ICT* consume huge amounts of electricity, which is often generated in ways that promote climate change, being derived from raw materials produced by processes that harm the environment and people and, last but not least, generate mountains of hazardous waste (→*e-waste*), which is not toxic, but is often recycled in ways that damage the environment and can cause harm to people.

REDD+ – Reducing Emissions from Deforestation and Forest Degradation, Central America



The tropical forests of Central America are not only rich in species, but store a globally significant quantity of CO₂. Yet they are constantly under threat, with illegal logging and agricultural encroachment destroying countless hectares every year. Honduras alone lost almost 3 million hectares of trees between 1990 and 2010 – a third of its total forest.

The governments of El Salvador, Guatemala and Honduras want to preserve their forests better in future, and GIZ and Google are supporting them. A digital environmental map (→ **Geographic Information System**) has been jointly developed that uses satellite imagery to record all the important forest data required, such as tree populations, CO₂ reservoirs and reforestation activities. The map shows exactly where the forest needs to be better protected or managed differently, where environmental efforts are already bearing fruit and where the forest is recovering.

Furthermore, the database is an important instrument for the governments to drum up support for climate protection. The UN's REDD+ programme helps countries (also financially) that are demonstrably doing something for their forests and thus saving CO₂. This way, protecting forests, rather than just cutting them down, proves lucrative. This significant step gives governments a directly measurable incentive to campaign for climate protection.

For further information, see: <http://t1p.de/t3eo>

Satellite-Based Monitoring of Fisheries, Mauritania



Overfishing poses a threat to many fish species around the world, endangering the food resources and economic survival of many people. As a result, with financial support from KfW, compliance with catch quotas in Mauritania is now being ensured using the latest technology. A satellite-based monitoring system (→ **Geographic Information System**) checks that only licensed fishing boats operate in Mauritanian waters and that they catch only as many tons as agreed.

The system also includes patrol boats and coastal radar stations that transmit the information they gather to control stations, where staff review them on their computer screens, verifying that the fishermen are plying their trade within the permitted limits. “If a dot on the digital map looks suspicious, speedboats are dispatched to check out the vessel concerned”, explains Lieutenant Némane.

However, at the beginning of the project it first had to be decided what was permitted and what was prohibited. In this connection, a GIZ advisor worked with Mauritania’s Ministry of Fisheries to draw up plans for fishing licences. The main focus of these plans was on protecting the livelihoods of Mauritanian fishermen. When drafting the plans, the GIZ created a database, collating all the relevant information. Mauritania’s coastal surveillance is now considered exemplary in West Africa.

For further information, see: <http://t1p.de/2z71>



Crowdsourcing Earthquake Early Warnings, Indonesia



Mount Merapi in Indonesia is one of the world's most active volcanoes, and its repeated eruptions threaten the lives of hundreds of thousands of people. Whenever the volcano erupts, information on evacuation routes, secure accommodation and the supply situation must be extensive, targeted and quickly passed on to the public. During the 2010 eruption, when government agencies were occupied with coordinating disaster relief, local residents unceremoniously got organised and set up Jalin Merapi, a multimedia early warning system that issues warnings via radio stations, Twitter, walkie-talkies and →**text message** and coordinates aid.

Volunteers from the villages around the volcano keep watch at key points and collect up-to-date information (→**crowdsourcing**) that is broadcast daily on Lintas Merapi, the community's radio station. Monitoring cameras, sensors and measuring devices provide additional data that are passed on to community radio stations and the Merapi Volcano Observatory in nearby Yogyakarta.

In 2010, Twitter proved to be a particularly effective communication channel. For example, one tweet was all it took to arrange meals for 40,000 evacuees in under 4 hours! Twitter's reach is stupendous: the Jalin Merapi Twitter account has published 28,000 tweets and currently has more than 100,000 followers.

For further information, see: <http://t1p.de/3an8>



The digital revolution has already dramatically transformed our lives. It affects us every day, changing how we work, and touches the lives of the people we work with in partner countries. The “mobile miracle” in particular exemplifies these “disruptive” changes brought by →*ICT*. Today, in the blink of an eye millions of people can gain →*access* to a wide range of services that previously were either beyond their reach or did not exist. Many of them were presented in the inspiring projects presented above.

The main current focus in development cooperation is on systematically harnessing these new digital technologies, making them widely available and constantly striving to develop them.

This will undoubtedly generate fresh impulses based on new technologies and innovative ideas and their open and creative integration into development cooperation and government work.

The ICT of the future described below provide an idea and foretaste of what lies in store.

Blockchain: an Incorruptible Code



National land and property registers are not always reliably managed. Poor administrative structures result in errors and corruption leads to intentional fraud. Large, scattered, non-governmental systems could prevent this from remaining the case in the future.

In a number of Central American countries, property data are poorly maintained and/or badly protected. Public-sector employees can access records and alter them. Sometimes they register themselves or their relatives as owners of particularly attractive plots of land and then expel the rightful owners from the property, invoking the rule of law and giving the victims barely a chance to defend themselves.

In Honduras, politicians want to give citizens back their legal security. To this end, they are planning a transparent and reliable registry system using a new data technology based on a blockchain, the system behind the digital currency Bitcoin. Although blockchain was originally developed as a means of payment, the crucial factor in both cases is to be able to identify an asset's owner with certainty, regardless of whether that asset is a unit of currency, a plot of land or some other object. Put simply, a blockchain is a data chain that lists all executed transactions in chronological order, with the current situation reflected in the most recent block. Each block contains information on the previous transaction, so no subsequent alteration can go unnoticed. Furthermore, the data chain is not stored only in a single location, but is available and processed in separate locations, protecting against loss.

The American startup Factom (→ **tech startups**), a blockchain specialist, was commissioned by the Honduran government to develop a new, digital land register based on blockchain, in which all entries and alterations are administered in a transparent, decentralised way, protecting them against fraud. Greece, which also has no functioning database and where only 7% of property ownership is formally registered, has also expressed an interest in the new system.

Potentially, blockchains offer a viable alternative for many other administrative tasks. This makes them a particularly interesting instrument in this context, since it places officials' work in the hands of the public. However, a number of technical and content-related questions remain to be answered, such as: How can the huge quantities of data involved be handled? The Bitcoin blockchain is already 47 gigabytes in size and growing steadily. Also, which limits should be imposed on this powerful technology (→ **cyber security**)? All things considered, though, blockchains provide a model that is leading us in a new direction, towards a more open and secure world with less unwieldy government administration.

Unconditional Cash Transfers (UCTs) and ICT – Pennies from Heaven



Today, the recipients of benefits can also be selected by satellite, and benefit payments can be transferred (→ **e-payment**) and the use of the money subsequently be ever more efficiently evaluated thanks to → **ICT**. This lays the foundations for models like the Unconditional Cash Transfer (UCT).

The notion of the UCT, as opposed to assigned budget transfers to households, is nothing new. The concept takes account of the enormous costs of the organisational effort required to ensure that financial resources are used correctly. Studies have shown that, even when not checked up on, people tend to spend money in keeping with the provider's wishes, and sometimes even make far better and more sensible use of funds than their providers could ever have known or demanded of them. Nonetheless, funds assigned for specific purposes have so far usually had a better impact.

However, new technologies are increasingly enabling benefit payments to reach the right, targeted households, be distributed and have their usage assessed. One example was provided by the NGO Give Directly in Kenya, which used satellite images to identify the huts of potential benefit recipients by their straw (as opposed to corrugated iron) roofs, since straw roofs are permeable and have to be re-thatched twice a year, at a cost of around USD 40.

The detailed procedure was as follows: with the help of a web service (Mechanical Turk), the task of evaluating satellite images was divided up into manageable pieces among freelancers (→ **crowdsourcing**), who analysed the satellite images and identified recipients' dwellings and logged their GPS coordinates (→ **Geographic Information Systems**). Armed with this information, locally based employees were able to drive to those huts and register their occupants. Funds were then transferred to the recipients' mobiles phones using a payment service, → **M-Pesa**. The use of these funds can subsequently be assessed by reviewing new satellite images to see whether roofs have been replaced.

This example highlights the possibilities that ICT offer throughout an entire chain of processes. The key is to identify those in need of benefit. This can be done by referring to census data (→ **big data**), again by assigning

tasks to the crowd and providing cashless benefit payments (for example, in some projects recipients were given prepaid mobile phones instead). The verification process can be automated, too.

Small Digital Factories, Open and Accessible to All



Global → **open source** networks will soon be producing essential goods on site and thereby stimulating the local economy and educational scene. Here are a few scenarios: someone in Vietnam might download a virtual tractor design from the → **internet**, then print it using a 3D printer and assemble the parts herself, like Lego. Or a chair designed in Brazil could end up being milled in Ghana using digital instructions provided by a British company. Or Bolivia and Rwanda could organise exchanges between several hundred experts on how to optimise a biogas tank. Or a Uruguayan farmer could erect a wind turbine for USD 30, using just a few square metres of steel sheeting and an instructional video. Or a hospital in Haiti experiencing supply problems could print out the cannulas it needs (→ **3D printing**).

Cannulas, chairs, biogas tanks and wind turbines are actually already being manufactured this way in many parts of the world, and the 3D-printable tractor design is now 75% complete. What do all these examples share? New global networks of open source producers who are beginning to manufacture essential goods themselves on site and share their designs globally.

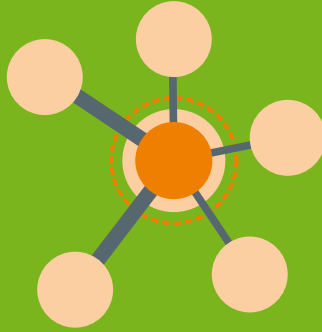
Two long-term trends are opening up fresh opportunities in this connection. The first is the Appropriate Technologies movement. In many countries, followers of this movement have come together to form networks of “makers”, i.e. people who combine digital and analogue technology to manufacture, repair and improve essential items and spare parts on site.

The second trend is towards sharing knowledge openly on the internet. The Wikipedia project shows that over 1.7 million people can produce more information better and faster than any editorial team. This knowledge is the common property of all those involved in its production, making it freely available to anyone around the world and open to additions.

This open source principle is now also being applied to blueprints of machines and courses teaching people how to manufacture products. This combination of Appropriate Technologies and open source knowledge has the potential to shape tomorrow’s small digital factories on a global scale, opening up immense opportunities for German International Cooperation

(GIZ) and development cooperation. The bureaucratic technology transfer system is morphing into voluntary technology sharing. And this is happening in fundamentally important sectors like energy supply, health, climate protection and education. Even more importantly: new, highly decentralised operating and business models are springing up everywhere.

A radical change in how goods are produced is in the offing: the small digital factory is coming soon to consumers everywhere, turning them into producers.



Managing ICT Projects

Tools to Support Strategic
Planning and Implementation

Managing ICT Projects

By following the lead question “How to use ICT in a strategic way within my project context” this chapter contains practical tools to support the strategic planning and implementation of →*ICT* activities, and also serves as a guide, enabling project managers to see project management from the perspective not only of DC/IC, but also of the digital sector. The digital principles (see section 1.4 below) constitute an overarching reference framework.

This chapter provides, among others things:

- **Different methods of participative project development from the digital world:** co-creation, design thinking and scrum. Learning more about these methods will provide you with a better understanding of the “digital ecosystem” and the behaviours of its component actors. It will also provide inspiration, presenting instructive examples to enrich your own approaches to project management.
- **Checklists** to help you contextually plan ongoing or new ICT projects, to identify weaknesses in ICT projects and to generate awareness of the range of influencing factors that need to be considered.
- **Support for the planning, development and implementation** of ICT projects or of forthcoming projects/programme components, as well as for the amendment/development of existing ICT projects.
- **Tips and tricks** for designing tenders.

BEFORE YOU START – A FEW PRINCIPLES TO CONSIDER AT THE OUTSET

Latest does not always mean best

The latest and most popular → **app** is not always the best choice. In the partner country, notice whether certain applications and types of applications are broadly adopted and ascertain how they are used, who uses them and when. The results of your research into these issues will inform your choice.

The digital world is global but the application is local

The development maxim that “whatever is based on local realities and needs will be successful” is also true of the digital domain, as it is local people who use the systems and who are, in turn, shaped by their local environment (their language, culture, media usage behaviour, level of → **access** to ICT, etc.).

Do not exclude the analogue world

It is often the case that the most promising and inclusive approaches seek to combine new and old media/ICT. For example, those seeking to communicate key information as part of their project will find it much easier to reach older or rural user groups through radio and newspaper, whereas younger urban groups can be reached via social media (→ **social networks**). It is important to bear this in mind when selecting media/ICT for different user groups.

Incorporating ICT in DC/IC involves more than developing apps and online platforms

DC/IC's adoption and incorporation of ICT can involve the creation of large databases (→ **big data**); the collection, storage and analysis of data; and the development of complex → **Information Management Systems**, telecommunications infrastructure and satellite technologies (→ **ICT infrastructure**). Apps and online platforms (intranets and extranets) are often the element of an ICT system most visible to users and gain significance through their role as, for example, a “gateway” to complex data management systems. For instance, through the Facebook profile interface, people can access diverse applications.

The development of apps and online platforms will be particularly significant in this section. Information on the specific features of the development and tendering of major ICT infrastructure projects can be found in section 3.5 “ICT Project Tenders”.

Methods for Participative Project Development: Co-Creation, Design Thinking and Scrum

Participative methods are playing an increasingly central role in digital development processes in the for-profit sector. The rule of thumb is that the more users are involved in development, the better the results and products turn out to be. Given that DC/IC commonly involves participation, methods like co-creation, design thinking and scrum are relevant for deployment in its work. Applying these methods can help secure “ownership” of → **ICT**.

When weighing up the various participative methods and new approaches from the for-profit ICT sector to see which are relevant for development cooperation, make sure to consider the following:

- Co-creation, design thinking and scrum are ideal for technical and financial cooperation projects and programmes, but they require at least a medium-term commitment if they are to be successful.
- When deployed one-off in individual workshops, these methodologies are likely to be only partially successful. In cases where a methodology is to be used, it should therefore be assessed whether the methodology can be deployed in a targeted manner throughout the entire project.
- The process should be well thought out: What is the ultimate objective? Which users/user groups will you be working with? What intermediate results are needed?
- These participative methods are based on time-consuming and personnel-intensive processes.
- Applying these methods to the often linear logic of DC/IC with its fixed targets can be challenging, because they are based on agile planning processes and have been developed for open-ended processes. Participative project components with qualitative targets and indicators are therefore especially suitable for testing these methods.
- The contracting entity should be prepared to be one of many stakeholders involved in the process, given that target groups will be actively involved in project development and will make a decisive contribution to results.

Co-Creation

Co-creation brings different parties together to collaborate on achieving a positive and useful outcome for all participants. The co-creation process is iterative, encouraging teams to loop back to previous stages to refine their work, and particularly involves the target group in the development phase. As a result of their cooperation, users are much more likely to end up with a product they actually need.

Objective: To jointly develop a solution.

Central feature: Collaboration.

Other features of the method: Dialogue, discovery and feedback.

REQUIREMENTS:

- Possibility of an open-ended process.
- The contracting entity can assume the role of one of many stakeholders in the development process.

An integrated co-creation approach is based on a large number of steps, which can range from researching a specific workshop design or managing participation to implementing the resulting solutions.

Further information:

- Butterfly Works: *CO-CREATION for a better world – White paper N° 1 on Social Campaigns and Learning*: <http://t1p.de/8q9t>
- *IDEO Design Kit*: <http://t1p.de/zzzj>

Design Thinking (DT)

With its origins in architectural design practices, design thinking (DT) has been further developed by Stanford University into a multidisciplinary approach for developing products, services and concepts for different contexts. DT combines creative thinking and design processes with methods from technology and economics. DT focuses on, among other things, enabling new forms of cooperation and prioritising user needs. As such, the application of design thinking can, in general, be considered as an approach for managing transformation processes in DC/IC. The development of new initiatives involving → *ICT* can provide the impetus.

Objective: To develop integrated and user-based solutions to problems, and to promote innovation.

Central feature: Problems are tackled collaboratively and intensively, and solutions are identified as early as possible in the form of prototypes.

FOUR PRINCIPLES THAT UNDERPIN A DT PROCESS:

1) **The process is iterative (repetitive)**

The development process will include several iterations needed to refine the solution. An iteration normally comprises six procedural steps: 1) identify the problem, 2) observe the problem, 3) take a position, 4) develop solutions/ideas, 5) develop prototypes, and 6) refine the solutions/prototypes.

2) **Complying with the rules of the game is important**

In a design thinking process, participants capture and share information visually, avoid criticising ideas as they arise, produce quantity (so that you have a choice), stay “on-topic” and build upon each other’s ideas.

3) **Interdisciplinary teams**

People from different disciplines are required to work together.

4) **Alternative and varied workspaces and ways of working**

People may work standing up rather than seated at desks, ideas and thinking may be written up on whiteboards rather than on computers, etc.

Further information:

- Frog Design: *Collective Action Toolkit (for NGOs)*: <http://t1p.de/02b9>
- Hasso Plattner Institute of Design at Stanford: *An Introduction to Design Thinking – PROCESS GUIDE*: <http://t1p.de/c11z>
- School of Design Thinking, Hasso Plattner Institut Potsdam: *Information for Potential Project Partners*: <http://t1p.de/tk5m>

Scrum

“Scrum” is a process framework originally intended for the development and maintenance of complex IT projects and products. The term “scrum” is derived from the sport of rugby and describes a clustered and interlocked formation of players. Scrum, like DT, is an agile process management method,¹ which assumes that IT projects are often too complex for all their components to be defined at the outset. “Scrum accepts that the development process cannot be predicted. The product is the best possible software taking the costs, functionality, time and quality into account.”² Scrum is suitable for teams consisting of three to nine members. The work process is divided into **events** (e.g. development “sprints” or review meetings) and **artefacts** (i.e. minutes or task lists). The process sets out **clearly defined roles** (from “scrum master” and development team member to “product owner” – the owner of the end product).

Objective: The division of a complex and extensive development process into small sub-projects tasked with achieving the best possible results and taking costs, time, quality and functionality into account.

Central features: Precise objectives; the way of moving towards these is defined by the implementation process itself, with constant consideration of new developments.

1 Agile process management methods are the counterpart to the waterfall model, which is usually applied in IC/DC. Waterfall process management is characterised by clearly defined work steps that follow successively. Iterative methods are embedded in agile process management (where one is partly exposed to iterative process sections or skips steps). In large tenders with clearly defined goals and intermediate steps, it can be a challenge to, among other things, integrate agile process management. Establishing target figures and time frames or applying agile process management for clearly defined and definable work steps is, however, recommended.

2 Ken Schwaber in a contribution to the OOPSLA conference 1995

SCRUM IS BASED ON THREE PRINCIPLES:

- 1) The process must always be **transparent** for all participants (“transparency”).
- 2) Results are constantly **reviewed** and questioned/inspected (“inspection”).
- 3) Results are constantly **adapted** and improved according to “review” (“adaptation”).

THE PROCESS CONSISTS OF FOUR TYPES OF EVENTS:

Sprint

A “sprint” is an intensive and time-limited period of project working that can last from one to four weeks. At the start of the sprint, a clear goal and strict time frame are set, neither of which can be changed during the process. The result is what you manage to create within the established time frame. The sprint leads on to the “sprint review” and “sprint retrospective”.

Daily Scrum

The “daily scrum” is a 15-minute meeting held once a day with the development team, scrum master and product owner, and serves as a regular forum for rapidly exchanging information. If questions are not answered within the 15-minute time frame, they are carried over to the next day.

Sprint Review

At the end of the sprint, the development team’s work results are reviewed with the product owner. If a new sprint is deemed necessary, the adaptations required for the process must be established.

Sprint Retrospective

A sprint retrospective is a self-reflection process. Guided by the scrum master, the development team reviews its working methods in terms of efficiency, accuracy and so on, according to the findings of the sprint review. The sprint retrospective also considers the “product backlog” (the list of any outstanding tasks) and its implications for adapting the process.

Further information on scrums can be found here:

- Wikipedia: https://en.wikipedia.org/wiki/Scrum_%28software_development%29<http://t1p.de/2py7>
- Scrum Alliance: *Agile Manifesto*: <http://t1p.de/4zys>
- The original and detailed *Scrum Guide* can be downloaded in many languages: <http://t1p.de/k95v>
- Other helpful resources etc. can be found on the official website of the Scrum Alliance: <http://t1p.de/3fsc>

Project Design Guide “Do’s and Don’ts”

You may be just starting to develop a new project. Your project may have failed to meet expectations during its pilot phase and now needs to be revised and adapted. You may be considering implementing an existing project in another context. Whatever situation you find yourself in, keeping in mind the following do’s and don’ts for →ICT-supported projects can help you to avoid major mistakes.

Begin with the Problem and Not with the (Technical) Solution!

ICT are a means, not an end, yet they are often used as a starting point. Modish concepts like →*e-participation* platforms, mobile learning (→*e-learning*), mobile reporting, →*big data* challenge, →*text message*-based →*e-health* apps, etc. frequently feature in IT project development, and delivering these concepts can sometimes end up being considered the primary objective. However, ICT are merely instruments for achieving targets and should not be regarded as targets in themselves. At the outset it is vital to define your project goal and then decide how ICT can help you to achieve it. The provision of technological components is often the least significant aspect of successful project design.

Other important points to consider include the following:

- **Be careful to ensure that your project remains goal-oriented and that the tools you use do not end up becoming more important than the solution of the problem you are addressing.**
- **The most appropriate solution for a specific context is often not the latest technology that is currently in vogue.** Successful ICT projects usually comprise a blend of analogue and digital media (see the principles at the beginning of this chapter).
- **“One size often does not fit all”:** Different problems require different solutions and ICT. For example, a telephone helpline might be the best

approach to support victims of domestic violence, whereas a → **crowdsourcing** platform (i.e. a system that seeks public input) set up to enable anonymous incident reporting may be better for developing strategic and site-specific preventative measures.

- While ICT tools automate, they do not bring about automatic change. In other words, the mere existence of ICT tools does not mean that they are automatically known about, the promotion of a tool does not mean it automatically gets used, and the use of a tool does not automatically bring about change.

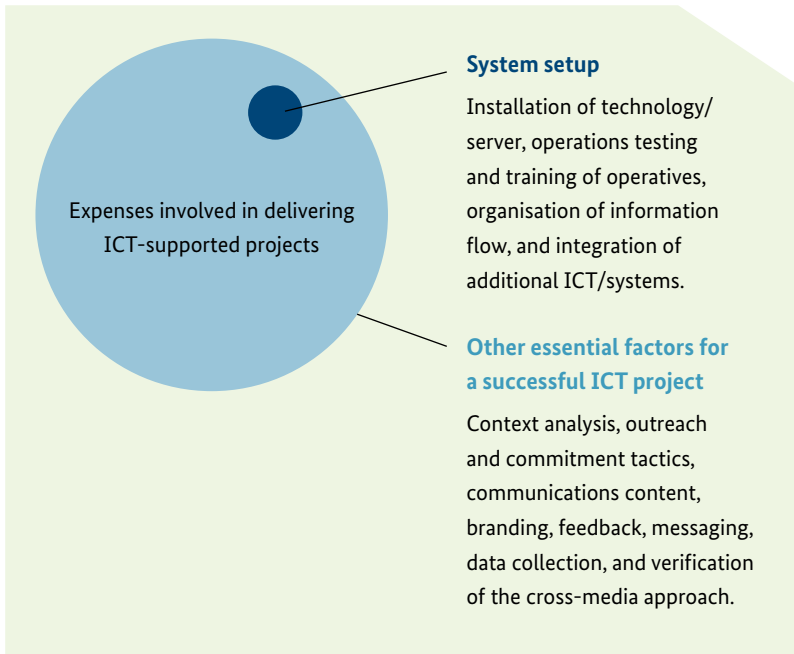


Diagram: The relationship between technology provision and project development

ICT Cannot Replace What Is Not Available; Rather, They Can Accelerate Transformation Processes

Example of a partner country with weak governance structures:

Possible causes of a lack of citizen participation include: insufficient clarification of rights, (state) oppression of civil society actors, cultural challenges, political disenchantment and an insufficient sense of self-determination with regard to political participation, etc. These kinds of factors will problematise the deployment of an →**e-participation** tool. However, if the tool is carefully developed in collaboration with state and civil society actors, improvements in the use of such tools can be made.

Example of how varying levels of →access to ICT and →mobile communications technologies impact on the health sector (→e-health):

The use of and access to mobile phones can vary radically between countries, between national regions and between individuals. While an e-health campaign for young people might make sense in technology-hungry Nairobi, the situation in the Cambodian capital Phnom Penh is less conducive. A key issue is that the Khmer alphabet is not supported by all mobile phone providers. However, this problem is partially mitigated by the increasingly widespread use of →**smartphones** that offer more accessible graphical interfaces. This also allows for use in projects with illiterate people.

“People First” – Putting ICT Users Centre Stage

If an ICT project is to be successful, it is essential to clearly identify not only the underlying causes of the present challenges in ICT deployment, but also the actors and contexts involved. Only in this way can suitable ICT be determined for each target group of actors.

The ICT sector offers a wide range of tools. However, not all technologies are equally available or useful for all areas or target groups. Therefore,

decisions on what combinations of ICT to use must reflect the individual scenario in which they are being deployed.

Bear in mind that introducing new ICT can, in the early stages, make processes more complex. However, well-chosen ICT applications will quickly facilitate existing processes and enable decision-makers to take more informed decisions, managers to ensure greater oversight and administrative staff to carry out their work more efficiently, etc.

If the project is to be a success, it is crucially important to develop a user experience (i.e. the digital work environment and application interface) that is appealing, clear and intuitive.

“Lessons Learned” From Project Practice:

- Take needs and contexts as the starting point, co-create instead of dictating, and work with relevant target groups to identify ICT user behaviours.
- Engage in an ongoing dialogue to understand needs, (communication) habits and risk factors and to ensure a maximum level of ownership among target groups.
- Communicate with target groups using the media that they most commonly use and are most comfortable with. Do they prefer e-mail, newspapers, radio, social media, etc.?
- Do not expect target groups to seek out information or engage with contextually inappropriate communications channels/ICT.
- The ways in which people communicate and use tools can vary greatly depending on the message they want to convey. Many civil society actors share thinking and information with their peers using digital media such as → **blogs** and will only use public service broadcasters to complement their digital communications. For experts in partner countries who wish to discuss topics and exchange their expertise,

social networks and open and closed online groups are often relevant channels. For rural dwellers, the sharing of information in the local marketplace is still often their most important source of information. Given these differing needs, make sure to identify the most appropriate channel for your target group.

Availability ≠ Accessibility

Mobile phone user rates are, on their own, not a sufficient indicator of the relevance of incorporating mobile phones in a project. Even in places with a high level of mobile phone ownership, it should not be automatically assumed that everyone has unfettered access to a mobile phone. For example, in locations where the majority of mobile phones are under the control of the male head of the family, it would not be appropriate to open up a telephone helpline for women, as this could expose women to further risks. In such cases, it is better to focus on approaches that involve discreet in-person contact in the community. In this way, women can obtain information and advice anonymously and covertly.

While social media are often suitable for organising civil society communications and action, they can easily be monitored, exposing activists in sensitive locations to high levels of risk. As a result, they are often avoided by many such activists.

ICT Enables “Glocalisation”

ICT have given rise to an unprecedented array of ways to collaborate. In situations where an insufficient market or lack of expertise has made it impossible to provide IT services, → **cloud**-based services can be deployed to meet local needs. In cases where international IT providers lack local expertise, they can work together with local companies to ensure better results. It is therefore useful to trial different forms of ICT-based collaboration that are tailored to and appropriate for your target users.

Be Brave and Give It a Go

In many places, ICT use is a new phenomenon and, although the situation is quickly changing, little supporting data currently exists on user behaviour. At present, many ICT projects fail to get past the pilot phase. Yet ICT solutions can be cost-effectively trialled prior to deployment using simulations or prototypes. So, before drawing up large tenders for technological solutions, make sure to test them out first. Do not commit yourself too early to a specific tool, and keep in mind that the tool is only a means for achieving a goal and not an end in itself.

Remember to include in your planning and comparison of different ICT alternatives a realistic estimate of maintenance costs and support – i.e. the “total cost of ownership”.

Not “Either-Or” but “Both”: Mix Different Media to Get Better Results

Blending different media can help to maximise the impact of your communications. For example, in radio broadcasts you can refer people to websites, on your websites you can provide links to podcasts, etc. Look for interesting and intelligent ways to combine old and new media in order to enhance the range and resonance of your communications.

ICT Help Communication, but They Do Not Communicate Themselves

When a new ICT tool is introduced, it is essential to promote it to target users. Options include viral marketing campaigns planned and delivered by digital advertising agencies or promotion through existing channels like the radio or television. People who are just starting out using your ICT tool will often need to be supported with information and possibly training.

Don't Reinvent the Wheel: Use Existing and Freely Available ICT

→ **Open source** software and many → **ICT** can be shared with a large number of potential users and reused and adapted to new contexts. In this way, optimal ICT solutions can be developed with others, resources are used more efficiently, and user support is frequently provided by an international community of users either free of charge or at a low cost. In developing countries, applications are increasingly being programmed using open source software. While those required to use these open source packages may require more training, the costs involved in purchasing licensed software are avoided – costs which the administrations of smaller developing countries are often unable to cover.

In this context, it is important for the project to:

- research whether it is possible to use free and open source technologies;
- use or reuse existing technologies;
- build upon existing technologies;
- check, together with the partner, whether the source code can be opened up to allow for reworking or new developments by the open source community;
- explore the opportunities for collaboration with the “civic tech community” (civil society actors who work in a digital context) – such collaborations are usually possible during the pilot phase but are difficult or impossible when working on high-volume special applications (→ **e-health**, → **e-government**, etc.) or projects focusing on infrastructure;
- undertake research in the project country to ascertain whether and where similar projects/activities already exist and, where possible, support them or collaborate with them.

Example:

Setting up five different citizen reporting platforms in each country is likely to be counter-productive. Yet it is often the case that different NGOs and development cooperation organisations roll out similar but competing platforms. To avoid this kind of duplication, determine whether similar ventures have been delivered by local actors or other organisations and make contact with them. Also, make sure to learn from the mistakes made by your organisation and others. The local civic tech community is almost always keen to share its learning.

“Do No Harm”: Data Protection and Security

Digital technologies present great opportunities, but also risks and challenges. Most development projects collect data digitally, yet fail to properly consider the implications of possible lapses in → **data protection** for their ICT users. It is therefore important to carefully assess the potential data protection risks at each stage of project development and implementation and to take appropriate measures where required. Always ask the following: How are the data collected, gathered, stored and evaluated? Who has access to them and when? What legal frameworks apply? How are human and personality rights preserved or threatened by the new measure? Can risks be mitigated or avoided through certain measures (e.g. by employing independent data protection officers)?

If you are unsure about how to answer any of the above, consult with data protection and security experts to ensure that your target or user groups do not end up exposed to unnecessary risks.

Alongside careful security assessments and preventative measures, it is vital to explicitly inform all target groups about the potential risks involved in each ICT project (e.g. those arising from the use of mobile phones or online tools) and about how to prevent them. Make clear exactly what kinds of protection against potential risks you can or cannot guarantee as an organisation.

For further guidance on data protection and security, visit:

- <https://responsibledata.io/>
- <https://tacticaltech.org/projects/28>

Five Steps for Identifying Appropriate Actors

A fundamental principle in agile project development is the involvement of diverse actors in the development and change process. It is therefore important at the outset to analyse which actors are relevant for the process. The five-step approach presented below is a tried-and-tested way to perform this analysis and, while it does not replace existing methods used in development organisations (e.g. GIZ's Capacity WORKS), it can provide inspiration or be aligned with your organisation's existing process management methods.

Stage 1: Identify Actors

Identify all actors and visually map them. Which actors have the power of veto and which are primary, secondary or intermediary?

Stage 2: Map the Actors

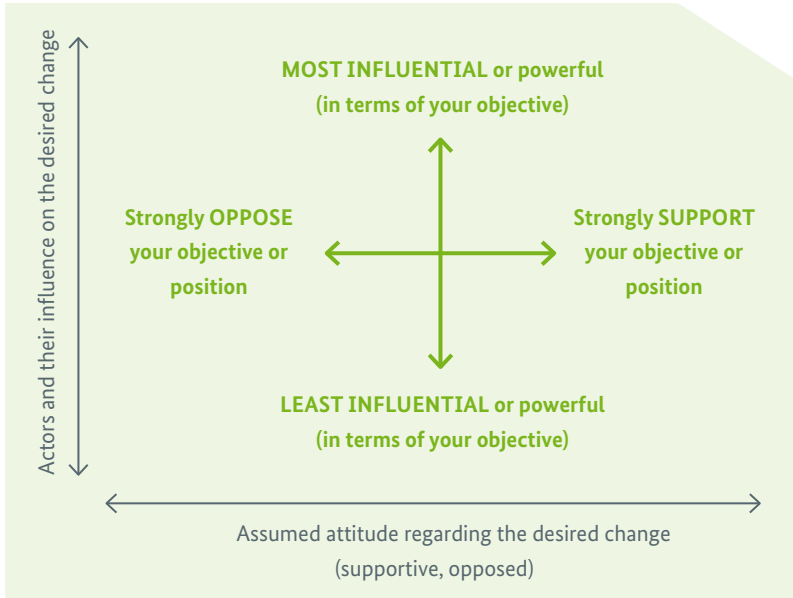
What is the nature of the relationships between the actors? Are there transparent and accountable relationships in place that need to be maintained? Are there opportunities for ensuring greater transparency in the system? What role does each individual actor play along the trajectory of the initiative? Who loses and who gains power? Who is involved and with whom and how? It can be helpful to depict the actual and the target situations side by side in order to clearly indicate the changes required by the transformation process.

Stage 3: Classify and Rank the Actors

Once all the actors and their roles in the change process have been identified, they should be ranked.

This makes it possible to prioritise certain actors in the project (possibly in different project phases), to infer tactics and to define the resulting \rightarrow ICT solutions (content-related project strategy). It also provides a basis for the context analysis and the resulting choice of appropriate ICT.

The matrix below will help you to categorise and rate your different actors:



For further information, see: <https://www.newtactics.org/>

Stage 4: Define Your Tactics for the Development Process

Once the actors have been ranked, the different interaction and communication processes for actors in the change process can be determined and the tactics for the project development defined. Make sure to ask the following:

How can the actors in question support the achievement of the specific goal?
How can different actors be involved and interact? What framework is

required for these processes? Which existing communication channels and exchange platforms are suitable and can be used? Which new forms must be offered first?

Stage 5: Choose the Right ICT

As soon as you have compiled an overview of possible tactics and processes, identify the ICT suitable for support by asking: What kind of user behaviours do the different groups of actors display? Do you have → **access** to the preferred ICT options or can you afford them? Should you communicate through old media (e.g. newspapers) or new media (the → **internet**)? Always remember that the security and privacy of individual actors must be guaranteed throughout the entire process (→ **data protection**).

Section 3.4 of this toolkit contains useful checklists to guide you through these stages.



Project Design Guide: Checklists as Planning Aids

The following checklists help you to:

- ask the right questions when planning your project in order to ensure that decision processes are based on relevant factors;
- review existing unsuccessful projects in order to identify and tackle weaknesses.

PROJECT CONTEXT CHECKLIST

- Is there the possibility of linking up with **comparable, relevant projects** in the country of operation so that the projects can reinforce and complement each other?
- Is it possible to **take approaches existing in one sector and adopt or replicate them in another?** For example, is there already an exchange or communication platform that you can adopt, further develop and/or use elsewhere?
- Have **relevant local experts and/or communities been identified** and consulted, e.g. developers, hubs, civic tech groups, digital activism communities, community media producers, etc.? If not, are there relevant actors in the same international region who can provide relevant solutions for neighbouring countries? Can support be provided in the same language using the →**cloud**?
- Will project sponsorship continue, even after the funding period ends?** Must/should the project continue to be funded after the funding period ends, e.g. to carry out a large-scale online survey or similar? If it intends to continue, then ask: Who will bear the ongoing costs associated with →**ICT**, such as maintenance or capacity development, in the short, medium and long term? What kind of ICT ecosystem might develop during the implementation of the project and how can this sustainably contribute to the preservation and further development of the ICT project or component?



-
- Have I considered all the foreseeable and relevant future developments in ICT?** As difficult as it may appear in the fast-paced ICT world, trying to understand what the future will bring is often vital for success. Will a different social media platform (→ **social networks**) be used more heavily in future than the one you currently rely on for project development? Looking forward, what kinds of new and innovative technologies might influence your ICT project or necessitate an update, adaptation or rethink? Which actor in the ICT ecosystem relevant to your project would be able to respond to these innovations when no more funding is available? Can the actor be involved at an early stage?

ENVIRONMENT ANALYSIS CHECKLIST (PRIOR TO PROJECT COMMENCEMENT)

- Do I have partners who know the project's context and location and who can help me to identify my target group and find partners for developing the ICT project or components?** Local knowledge or knowledge of the relevant ecosystem is often a requirement for initially making contact with target groups and possible partners. Local people must therefore be identified at the outset of the process and brought in as sparring partners in the development phase. For example, individuals who already know the location, technology or even NGO can be appointed for the entire project phase.
- Have relevant target groups articulated or confirmed the demand for the intended project outcomes?** Ensure that you sufficiently develop project ideas – or at least test them – with target groups. Many ICT projects fail because they do not address real needs.



□ **Are user-oriented technologies being employed and do users have the relevant skills to operate them?** Understanding the →*e-literacy* (ICT knowledge) and →*e-skills* (ICT skills) of your different user groups is vitally important. If they are low, very simple or highly intuitive ICT solutions must be used. If more complex ICT applications are required, substantial training should be provided to develop users' knowledge and skills. The goal is to ensure that users maintain or further develop the digital solution they are offered. Keep in mind users' different roles in the planning, implementation, management and operation of ICT components. For example, a network administrator job requires different skills to that of an office clerk who uses an input mask to carry out their daily data input. A member of an online editorial team will use a communication platform differently to a community manager who uses the same platform to host community forums.

□ **What prevailing legal and institutional framework conditions affect the project and place constraints on the search for a suitable ICT solution?** The framework conditions vary greatly from country to country. In some states, like China for example, citizens are blocked from using Facebook and a number of other social media platforms. Many countries also restrict the exchange of personal data. Conversely, other states are members of the Open Government Partnership and/or have drafted Right to Information Acts and thus promote transparency and accountability (→*open government*). Given this diversity, you will need to gather information on the →*data protection* and freedom of information legislation relevant to your project locations, and make contact with national or local data protection officers and authorities (and, where appropriate, the courts) to seek their advice.



Also check:

- The political situation in the project location
- Political sensitivities regarding the project issue/desired change process
- Legal restrictions or leeway
- Any possibility/history of censorship, intimidation, violence, etc. against your target groups
- Whether the media landscape is non-pluralistic
- The space for civil society (freedom of assembly, freedom of information and expression, etc.)

COSTS, CAPACITY AND RESOURCES CHECKLIST

- What will the project cost in the medium and long term?** The most frequent causes of ICT project failure include insufficient consideration of the long-term costs involved and of the need to build the required capacities among those tasked with operating the project on an ongoing basis. This is not done by simply calculating by calculating the costs incurred in the development phase. Therefore, calculate at the outset: the project's upfront investments and recurring costs such as those for long-term maintenance, e.g. purchases, updates, licences, repairs and renewal. Has budget been allocated for essential equipment and resources? ICT are associated with numerous costs. Think beyond the purchase of hardware. For example, if you did not (or could not) use → **open source** products, you will need to provide for the ongoing cost of software licences. Also, mobile solutions (e.g. the bulk sending of → **text messages**, etc.) must be paid for. Every country has different regulations regarding licences, etc. The long-term operating costs involved in your project must be calculated as exactly as possible.



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- Have the costs of possible licences and production activities incurred in the country of operation been identified and factored into planning and budgeting?** How much do national telecommunications providers charge for the services you require? Depending on the country: these services may involve time-consuming licensing systems and high costs (e.g. for national or local providers, bulk text messages (SMS), short codes, etc.).
 - Have organisational/internal capacities (administrative, professional, technical) been taken into account when designing the project?** Will partners be able to cover the costs of the licensed software and the maintenance of the terminals installed for the project, even after funding ceases? If not, who will cover these costs? Can the projects be developed further by the users?
 - Are the selected ICT applications available and accessible?** Which ICT (e.g. standards, hardware and IT platforms such as Microsoft, Oracle, open source, etc.) have been used so far by the partner organisation and their cooperation partners (other authorities, government institutions, NGOs, etc.)? How are they to be considered/integrated when new ICT solutions are introduced? Are they compatible with your own plans? Are internally available or previously used ICT and applications being taken into account? Gather information on possible IT and telecommunications solutions (including open source solutions) available on the market and, at the same time, factor in the full range of potentially relevant, traditional communications channels (radio, print, TV, meetings) for communication activities. Employing previously used ICT saves on resources and, where required, draws on existing expertise.
 - Do the required ICT knowledge and skills exist?** Test organisational/internal skills (→ *e-literacy*, → *e-skills*), bearing in mind that the personal use of ICT does not automatically imply an ability to use them in the professional context. In cases where it is necessary to put in place the relevant knowledge and skills, the cost of doing so should be included in the budget.



-
- Has a pool/network of experts been developed and sufficiently interconnected for maintaining, servicing, operating and further developing the project and its components?** The involvement of local experts is crucial when developing a platform in a partner country. Building a strong network and relationships with local ICT/civic tech communities and integrating this network into the international ICT scene/civic tech community can also be of immense value. The technical assistance and advice this network can provide will help to ensure that mistakes already made in other projects do not get repeated in yours. Global exchange is extremely important for large projects or when operating in countries or locations where the civic tech community remains underdeveloped. The international network can, where appropriate, assist with developing a local scene.
 - Have all the necessary steps been taken to ensure optimal protection for all the actors involved and have the costs involved in ensuring this security been considered?** To ensure the protection of user groups and their personal data, it is best to consult existing material and best practice examples on safety and ethical standards (codes of conduct, netiquette) in data collection, data usage and data backup. Of course, this protection does not come free of charge, so the associated costs will need to be factored into the budget, as will those for the hardware, software and expert advice required.

TARGET GROUP RELEVANCE CHECKLIST

- Are the ICT to be deployed suitable, available and accessible for your target groups?** Important: availability should never be equated with accessibility. Diverse target groups may have little or no → **access** to certain technologies (due to language barriers, illiteracy, costs, discrimination, etc.) or may be exposed to increased risks when using the technologies (→ **data protection** and monitoring)



- Are the selected ICT definitely suited to the context in which they are being deployed and thus relevant for your target groups?** When selecting ICT for your project, remember that certain ICT are suited to particular uses, particular target groups, etc.
- Ascertain what → **ICT infrastructure** is available in your project's intervention area and how all your relevant target groups currently use ICT. Bear in mind: infrastructure quality and ICT use can vary greatly from one project location to the next, for example, when they are located in different provinces. It is usually the case that the national capital is well serviced with a constant internet connection, whereas rural areas are forced to rely on inconsistent → **mobile communications** connections.

INFRASTRUCTURE CHECKLIST

For each project area, check the following:

- The availability and stability of the internet connection and whether it uses fibre optic, copper or other forms of cabling
- The availability and stability of the mobile communications network
- The availability and stability of the 3G network
- Local access to relevant ICT/communications channels
- Internet/mobile communications costs (is it affordable for the target groups?)
- The rationale for using specific communications channels for specific target groups is clear and sensible
- The stability of systems during political or infrastructural crises, e.g. How stable is the power supply? Does the area suffer from recurring natural disasters such as destructive weather events? In times of political unrest, do IT platforms get temporarily shut down? etc.



CHECKLIST FOR ASSESSING THE PROJECT'S SOCIAL AND CULTURAL CONTEXTS

When checking the project's social and cultural contexts and seeing how well they fit with the available ICT, make sure to consider the following:

- Inclusion**
Consider alternatives to the written word when presenting to target groups! Target groups often include children, people with disabilities and illiterate people. Can you present your contents graphically or using audio- or video-based techniques (cross-media approaches)?
- Which language/dialect should be used when addressing the target audience?** Not all people can read or speak official languages and some languages are not officially recognised. A presenter speaking a dialect that is different to that used in the project area may be poorly received. It is therefore important to produce translations and formats in different languages and dialects, where required, and to factor in the additional costs involved.
- Does your project require the use of two or more different writing systems?**
In many development cooperation partner countries, local languages are not written using the Roman alphabet. For some – but certainly not all – of these languages, good and well-established transliteration software is available. But even where this software exists, not all IT users will have mastered using it, leading many to resort to using software in English or other official languages that do use the Roman alphabet. Select the writing system according to function: for information purposes, use two languages and scripts or, for the sake of simplicity, audio and video; for inputting data, use the official language (using Roman letters or local script) or the local language (and its script), or both. Whatever approach you adopt, do not forget to factor in how much it will cost.
- Anti-discrimination:** Do forms of discrimination exist with regard to → **gender**, age, sexual orientation, or ethnic or religious affiliation? How



can these be avoided or prevented by the use of ICT, so that all groups have unobstructed access? Conversely: do closed, homogeneous groups create a network where exchanges are particularly non-discriminatory?

- **Customary ways of communicating:** In the partner country, are problems openly addressed in society or is it deemed more important to “save face”? Is it acceptable to have a discussion with seniors on equal terms in a forum? When should praise and criticism be expressed? The modes of communication and social manners adopted for the ICT project should reflect local traditions and customs.
- **Variability of use: Which channels are used for which purposes?** Where do you obtain information? Where do you search for support? Where do citizens express themselves? Which of the different media do you use for your own ICT project?
- **Authenticity, trust, credibility: What respected and trustworthy information sources exist?** Sometimes village elders or the community radio station enjoy greater credibility than state media and information sources. If these credible actors are represented on → **social media**, these channels can sometimes become as highly regarded as the established media. For this reason, where required, make sure to use these platforms and credible multipliers for your project!
- **How is open exchange possible in hierarchical societies?** The opportunity for open exchange and constructive criticism is an important requirement for the equal cooperation of different actors in the development phase of an ICT project. In many development cooperation partner countries, open exchange and criticism are, however, considered to be problematic, especially in hierarchical communities or when criticisms relate to the activity of specific community members. In such contexts, employing the highly participative, hierarchy-free methods espoused by the civic tech community when collaborating with government actors often fails. To understand and reflect these social mores in your work, analyse the



culture of criticism in your partner country by asking: Are satire and humour in theatre and song permitted forms of criticism? Can these playful methods be used in collaborative planning? Can high-ranking actors be assigned senior roles, such as mentor or chairperson, that correspond with their understanding of the hierarchy and leadership? For example, for the scrum methodology (see section 3.1 c) senior participating government officials could be appointed as product owners or as a kind of scrum master or arbitrator of open exchange, instead of being an equal member of a scrum development team.



IT-sector procurement and tendering processes are often very diverse and complex, and are therefore often difficult for non-experts to manage. Invitations to tender may range from the purchasing of software licences and purchasing or leasing of hardware to the recruitment of IT consultancy services. In addition, implementation and migration services for integrating new systems into the existing IT landscape will also often be required, and the users of these new systems will need to be supported and trained. Depending on the product or service procured, maintenance, servicing and support services will often also be provided throughout the contract period.

Since there is no blueprint for ICT project tenders, it should be noted that procurement in the IT sector will often consist of a combination of requested services.

The step-by-step tendering guidance below shows you what you need to consider at each stage of the tender process for →ICT projects.

Stage 1: Set the Objective

ICT projects in the context of development cooperation aim to deliver change and developmental effectiveness. Even if the invitation to tender (ITT) sets out clearly defined services and quantities at the outset, it is still essential to define the change process required and its goal and to include these in your ITT narrative and framework before it is issued.

Stage 2: Ascertain What Similar Options Cost and Who Can Help with Researching the Market

Before developing your ITT, you should look at whether and how others have carried out similar work. As such, in the preliminary stage of a tendering process, it is essential to **research the market**, which will also help you to ascertain what kind of budget will be required. As project leaders often lack the knowledge required for researching markets themselves, **it is**

recommendable to appoint a competent consultant who can guide you through the whole tendering and service provision process.

Stage 3: Define the Scope and Content

Next, precisely identify all the main services that the contractor must provide, and make sure to prevent any unintentional growth in scope – so-called “scope creep”.

You should not defer decisions regarding pricing until the implementation phase. The performance specification should be sufficiently detailed and specific to minimise the possibility of conflict arising with the contractor regarding service obligations in the bidding phase.

If scope creep is likely because, for example, you have decided to adopt an **open-ended agile methodology** (see section 3.1), you should also consciously plan for this. However be aware of your limits: you will need to find out what your ultimate parameters are, how much the development of an ICT solution should cost at most and how long it will take, how many participants in the process you or your contractor can manage, and whether you have **laid down these parameters in contracts**.

DECISION GUIDANCE: HOW TO CHOOSE BETWEEN OPEN SOURCE OR LICENSED PROPRIETARY SOFTWARE SOLUTIONS

→ **Open source** (see chapter 4) is a term used to describe software built with source code that is open and freely available.

Open source software tends to be used by people or organisations who cannot afford the high upfront costs involved in procuring proprietary software. This is also a possibility for open-ended ICT projects, where solutions are incrementally implemented – e.g. when a local authority develops its own data management system and rolls it out department by department. The low costs involved in procuring and maintaining open



source software can, at first glance, make it a very attractive proposition. However, training users to operate open source systems can be time consuming and, when it comes to licensing rights, a number of questions are likely to remain unresolved.

If you opt for open source solutions, keep the following factors in mind when drawing up your invitation to tender:

- Open source ownership:** Do all participants in the project know what open source is and what the implications of agile development are? Have they agreed on these development methods?
- Comparable solutions on the market:** Do you know other comparable open source solutions and have you assessed them?
- Rationale:** Can you describe exactly why you are seeking an open source solution and not a licensed software solution?
- Scope:** Can you describe exactly what the open source solution will and will not comprise?
- Service:** Does your ITT describe the service required (i.e. provide a functional description – see below) without specifying proprietary products?
- Use existing options:** Does any open source software already exist that is relevant for your tender?
- Who can bid?** Will you permit subcontractors and bidding consortia? Are the required company size and references adequately specified? Keep in mind: bidders who work with open source software are not usually able to provide a list of references similar to those using proprietary software.
- Open source: indispensable or just nice to have?** Is the use of open source code to develop the solution imperative or optional? If it is obligatory, you will need to ensure bidders detail their open source competencies in their tenders.



-
- Open source potentially belongs to all:** As the name suggests, open source solutions involve adopting and further developing open software for your needs, which, on the whole, makes these solutions much more cost effective. Those who use open source software are, in turn, expected to contribute to the further development of IT solutions. Are you willing to make this kind of contribution? For example, will you be happy if your bidders use other developers' open source solutions or if the source code developed for your project is used by other parties and not solely for your intended purposes? Does this fit with your requirement for developmental effectiveness? Can you justify using open source code to develop your own software, but then insist that you and your partners retain ownership and do not make your product available to the developer community? Note, however, that retaining ownership in this way could discourage small and experienced companies from bidding.
 - Total costs:** In your tender, have you measured the “total cost of ownership” – i.e. the cost of the IT solution throughout its whole life cycle?

Further information on the tendering/procurement process for open source software can be found at: <http://t1p.de/1ety>

QUANTIFYING HARDWARE AND SOFTWARE PROCUREMENT

What and how much should be procured?

- Do you only need to buy in new desktop computers or also new operating systems for these computers?
- Does the new software system you are planning to install necessitate the procurement of new hardware?
- Do you just need the software to be installed or will you need the provider to carry out maintenance and further development?



Quantitative or qualitative: What services should be provided?

Are the benefits of the new system

- qualitative in that they improve existing solutions, or
- quantitative in that they provide additional services?

Indispensable or nice to have: What performance requirements are essential for your project?

- What are the indispensable minimum requirements for the system (potential rejection criteria)?
- Which requirements are not obligatory but would be nice to have?

When assessing the tenders, bids failing to meet the indispensable requirements can be immediately rejected, and the remaining bids' treatment of the optional criteria will give you alternative ways of assessing the quality of the tenders.

TIME AND MATERIAL, OR FIXED PRICE: WHICH INVOICING METHOD IS RIGHT FOR YOU?

In your invitation to tender, do you stipulate that you want to be charged

- a fee that is directly related to services and expenses (e.g. for staff time and materials used), or
- a fixed price for each project?

Where projects have an easily calculable, small and fixed frame of effort within a circumscribed time scale, fixed-price projects are typically assigned. Hybrid forms are also common.

INDIVIDUAL OR FRAMEWORK CONTRACT?

If you have a recurring standardised procurement need (e.g. licences of standard software) that cannot be quantitatively determined going forward, it is worth considering using a **framework contract**. A framework contract allows the contracting entity to demand individual services (e.g. 25 licences) without having to retender each time.

DECISIVE FOR THE SUCCESS OF THE ENTIRE ORGANISATION OR MERELY A “SMALL” ICT COMPONENT?

If you want to put **organisation-critical management solutions** (e.g. enterprise resource planning systems – see <http://t1p.de/d0bp>) out to tender, special attention must be paid to the maintenance model requested. Stipulate in the tendering documentation that the contractor must ensure their work has a long lifecycle, which will deter them from using outdated software or reduces similar risk factors. Bear in mind that the success of the organisation will depend on the maintenance and operation of the ICT solution being procured. As such, integrate as many risk-mitigating factors as possible in the service description.

TECHNICAL-CONSTRUCTIVE OR FUNCTIONAL SERVICE DESCRIPTION

While a functional service description describes goals and sets out a framework for bidders (e.g. that the system must meet certain performance criteria without specifying how these are to be achieved), a technical-constructive service description makes very concrete specifications regarding individual performance features (e.g. a detailed description of the technical performance features of the hardware and software to be procured). Note that it is possible to combine elements of the technical-constructive and functional approaches in a performance specification.

In a functional performance description, the detailed specification on the later realisation of the project can be adjourned to the implementation phase,

which means in the initial project phase, the contractor defines the project goals to be achieved in the implementation phase.

CONTRACT MANUFACTURER OR COOPERATION MODEL? DETERMINING HOW THE CONTRACTING ENTITY AND CONTRACTOR WILL COOPERATE

The way in which tasks are distributed between the contracting entity and contractor can vary greatly in ICT projects. However, it is useful to **divide your project into three phases: planning, implementation and operation**. In each phase different models of cooperation between the contracting entity and contractor can be adopted. These models are described below and should be specified in your invitation to tender:

In the contract manufacturer model the responsibility for preparing the specification in the planning phase falls to the contracting entity. The contractor is responsible for the implementation (e.g. of an existing concept), whereas activities relating to the operation are performed solely by the contracting entity. With this model, the costs and time requirements will be higher for the contracting entity during the planning phase, and the entity must ensure it possesses the necessary resources (professional expertise, personnel, time) to put together the specification. Careful preparation will ensure that the estimated costs of the implementation phase to be met by the contracting entity will be much more accurate and reliable.

In the cooperation model the contracting entity and the contractor jointly draw up the professional and technical specifications, which determine what is to be carried out by the contractor in the implementation phase. When using this model, it often makes sense to assign the specification and implementation processes to two different companies. Cooperation between the contracting entity and contractor can resume in the operation phase.

Whichever model of cooperation the contracting entity opts for, it is essential to **clearly define who is responsible for what** in the performance specification and contract.

Regarding **quality assurance**, contracting entities are well advised to seek the advice of consultants who specialise in this area, unless sufficient resources are already available in the company. This kind of external input ensures the contracting entity's interests are better protected throughout the project.

The selection of IT consultants should mainly be based on whether they have sufficient experience working on similar projects. Contracting entities should seek contractually assured commitments from IT consultants that they have **no conflict of interest** with other potential contractors and will provide independent and unbiased advice to the contracting entities.

When awarding the contracts for installation, customisation, maintenance, operation and training services, consider which **services the contracting entity itself intends to deliver**. These will need to be carefully defined in the performance specification because they are directly relevant to costings.

Furthermore, it may be advisable when jointly developing the project to provide anonymised information on the qualifications held by the contracting entity's employees. In this way, bidders preparing tenders can form their own impression of the resources that will be available to them when they deliver the project. However, with complex and long-term projects, **the contracting entity may well be unable to reliably predict the availability of its human resources throughout the project period**. Staff churn may potentially leave the contracting entity unable to contribute the services it intended to, which can result in the contractor incurring **unexpected additional expenses** that it will subsequently seek to reclaim. Accordingly, it is important that, as contracting entity, you describe the services you intend to deliver yourself as precisely as possible. Contractors may also wish to offer further support services as optional extras in their bid, which you can choose to incorporate in your contract with them or not. When assessing bids, it is useful to treat proposals for support services and the thinking behind them



as a positive criterion that, where appropriate, can help with refining your performance specification.

FURTHER INFORMATION FOR A GOOD INVITATION TO TENDER TEXT

Questionnaires that list all the functions required of the contractor and that bidders will find comprehensible and quick to complete have proven very effective.

Furthermore, besides detailing the participation services you intend to contribute, the invitation to tender should **contain precise information on the contextual environment** of the work being tendered out – e.g. the IT infrastructure already existing at the start of the project, → **data protection** requirements, etc.

Stage 4: Final Checking of the Invitation To Tender

The following aspects are particularly useful to consider when preparing the performance specification:

Is the specification sufficient?

- To ensure the service description has sufficient depth and detail, the contracting entity must clarify its strategic goals in advance and spell out its IT strategy.
- Calculate properly how much time and capacity is required for preparing major tender documents before starting the official tender process.
- Do not delegate the responsibility for defining the specification to tenderers, especially when procuring complex projects, as this can result in heterogeneous tenders that are difficult to compare.



Are concepts in line with the market?

- Tenderers should be granted sufficient time to prepare their tenders – imposing tight deadlines often results in low-quality bids.
- Consider including allowances for expenses, especially when dealing with complex themes and extensive activities – e.g. the preparation of test samples.
- Make sure to factor in particularly complex activities like quality assurance, coaching and change management, especially when the work involves complicated procedural changes. Consider dedicating 15% to 20% of the total budget to cover the cost of these activities.

Are risks fairly distributed?

- Do not set commercial conditions that bidders are likely to reject – e.g. issuing source code in standard software or barring the subsequent use of open source code (which is often the business model of smaller, agile IT development companies).
- Do not define work contracts for tenders relating to the provision of services. A work contract already reflects the contracting entity's desired outcomes so, to agree on a work contract, the contracting entity must be able to specify in advance the criteria relevant to achieving these outcomes. If the successful outcome of a project cannot be clearly defined, it will not be possible to conclude a work contract. If work contracts are agreed, the contracting entity must invest more effort in the specification and subsequent monitoring of success according to the framework of the above-mentioned criteria.

Are administrative discretion factors and flexibility sufficiently defined?

- A high degree of flexibility is essential when selecting and implementing a procedure. Experience shows that overly formal and strict tender processes are prone to error, especially when it comes to innovative IT



projects, because new knowledge often arises as the process unfolds. The risk of procedural errors occurring in inflexible processes is also significantly higher than in flexible ones. Given the formality and rigorousness required by financial and technical cooperation, promoting flexibility can be challenging and will therefore require particularly careful preparation.

- Wherever possible, contracting entities should exploit leeway: optional and alternative invitations to tender should therefore be prepared and approved. Note that framework agreements are an efficient tool for allowing contracting entities to assess possible performances.

How to prevent conflict from the outset through the proactive management of the tendering process

- In the run-up to the tender process, the market must be researched and precisely analysed. To do this, the contracting entity or commissioned IT consultancy will need to make contact with an adequate number of actors in the market in question. The contracting entity must ensure “equality of opportunity”, so that the company commissioned to research and analyse the market does not skew the results of its work for its own gain, making itself out to be better than competitors in an attempt to influence the award.
- When it comes to communications, companies should be provided with a level playing field. The high costs involved in preparing bids should be recognised. As such, unsuccessful tenderers should be provided with an appropriate debrief, detailing why their bid did not win.

Stage 5: Formulation of the Selection Criteria

Draw up a list of the criteria for determining which tender represents the best value. These criteria must relate strictly to the tender and not to the companies which submitted bids.

For each phase of the performance specification, the contracting entity will decide what constitutes a high-quality bid in the area in question, and will detail the weightings attached to each of these phases.

Examples of selection criteria:

- Extensibility and adaptability of the system
- System environment and platform
- → **Data protection** and security
- Compatibility with existing/predetermined systems
- Interfaces
- Migration of old data
- Maintainability of the systems
- Introduction, training
- Customer service and response times
- Presentation/testing (fulfilling the task set)
- Aesthetics
- Commercial conditions (contractual conditions, risk structure)

The above criteria are examples only and must be adapted to the particularities of the case. If necessary, sub-criteria should be developed to support the development and use of the criteria. The sub-criteria should be weighted and their weightings made transparent to bidders.

The selection criteria must be defined as either **exclusion (potential rejection criteria) or assessment (nice to have) criteria**. Tenders that fail to fulfil an exclusion criterion are rejected outright, whereas those failing to fulfil an assessment criterion are awarded 0 points for that specific item only. In the latter case, the tender remains in the competition and may be able to offset the lack of points for one criterion with high points for another. When defining the list of criteria, contracting entities tend to focus on setting exclusion criteria, because they deem all aspects of the service description to be mandatory requirements and of special importance for the project. However, having high numbers of exclusion criteria substantially inhibits the qualitative evaluation of tenders, because reviewing bids using exclusion criteria only ensures compliance with minimum technical requirements. On the one hand, innovative solutions to technical problems are not honoured by this kind of evaluation and, on the other, all bidders meeting the minimum requirements will end up achieving the same score, thus homogenising the cohort of tenderers. In practice, a combination of exclusion and assessment criteria for simple technical requirements has been shown to be the best approach.

Example:

						Weighting	0–3 points	4–7 points	8–10 points
1	2	3	The software must enable the detailed processing of documents for tracing registered products.	A					
1	2	4	Document processing is user-friendly and can be operated intuitively.	B	Reason	5%	Inadequate user-friendliness	Average user-friendliness	Very good user-friendliness

Formulate additional test exercises (trial installations)

When procuring software and hardware, contracting entities should avoid evaluation merely on the basis of paper tenders. Trial installations give contracting entities the opportunity during the tender process to test the products they are seeking to procure. Trial installations also represent a good opportunity to include committees in the tender evaluation process (e.g. as the audience for a presentation of the software). In this respect, the trial installation constitutes the practical side of the tender evaluation process.

There are two kinds of trial installation:

- **Trial installation for verification**, which is used to verify information included in the tender.
- **Trial installation for evaluation**, which is used to evaluate the tender as part of the contract award decision and results in a separate score in the trial installation.

Both types of trial installation are possible and their use will be determined by the tendering process in question. It is, however, important to inform tenderers in advance whether the trial installation is for evaluation or only verification.

In a trial installation for verification, the contracting entity must also provide tenderers with a list of criteria for the trial installation. Where required, this can also detail how the scoring of the trial installation and individual criteria (including the scores to be achieved) will be weighted.

Stage 6: Criteria for Selecting the Winning Bid

It is helpful if the tenderer sets out the expected investment and operating costs for a five- or ten-year time frame from a total cost of ownership (TCO) perspective. This makes various project constellations comparable. Service, licensing and hardware costs should also be broken down. Important: in this stage, parameters based on the selection criteria must be reflected in the

contract and, where required, defined as enforceable. Only then can providers be expected to make realistic TCO forecasts. Also, without this kind of contractual consideration, there is a risk that those providing realistic figures will be at a disadvantage to those providing optimistic ones.

If software licences are required, the provider should offer different procurement options:

- Purchase
- Lease
- Software as a Service (SaaS) – The SaaS model is based on the principle that the software and IT infrastructure are operated by an external IT service provider and used by the client as a service. An internet-enabled computer and internet connection to an external IT service provider are required to use online services. More information at <http://t1p.de/s176>

What are the qualifications and experience of the bidding team?

- Examples of useful qualifications
- Experience of/direct link to the open source/civic tech movements
- Experience of adapting existing ICT
- Experience of ensuring the interoperability of different ICT
- Experience of identifying suitable ICT in diverse contexts
- Experience of providing effective solutions for complex scenarios/contexts
- Experience of working with multidisciplinary development teams, different clients and, above all, with the public authorities
- Experience of design thinking or other participative processes

Focus specifically on the methods and checklists presented in this chapter, as these cover all the important requirements for successfully implementing an ICT project.



Methods, Tools and Approaches

Practical Tips for Incorporating ICT

Methods, Tools and Approaches

This chapter provides clear and concise practical guidance on using →*ICT* in a range of specific contexts and scenarios, tackling the kinds of issues project leaders commonly face and offering quick, road-tested solutions. For example: What actually is a →*MOOC*? For what contexts is a →*hackathon* suitable? And how can we ensure responsible handling of data?

Obviously, the possible solutions offered by digital technologies are incredibly broad-ranging and constantly evolving. Therefore, to avoid information overload, a small selection of options have been drawn from what is a vast “digital toolbox” and concisely presented.

In this way, rather than in-depth methodological descriptions, this section provides the key information you need to help you ascertain whether or not these methods fit with your specific project context.

Alongside the criteria to support your decision-making, practical tips are provided on planning and implementation, and on dealing with the kinds of challenges you are likely to face.

How Does DIGITAL/REMOTE MONITORING Work in Fragile Contexts?



When working in fragile contexts, it is often difficult to carry out traditional project monitoring and evaluation (M&E) activities due to security concerns or a lack of infrastructure (→ **ICT infrastructure**). In these situations digital tools offer numerous alternatives, which can be used to facilitate relationship-building and document the sensible use of funds by donor organisations.

ADVANTAGES:

- **Greater range:** The proliferation of mobile phones makes it possible to include “hidden populations” (i.e. groups that are difficult or costly to reach in conventional M&E) in project evaluations using digital approaches.
- **Participation and empowerment:** With digital systems, more people’s perspectives can be included, making survey results much more representative. They also promote greater transparency in the collection and monitoring of data.
- **Price-performance ratio:** A number of digital solutions already deployed in development cooperation for data collection (by, among others, the World Bank) have been shown to be more cost-effective, even when studies are large-scale.
- **Quick iteration:** In digital projects, individual data collection cycles usually complete in under 24 hours. Results are also available in very close to real-time, meaning teams can quickly adjust activities to ensure they better achieve the project goals.

CHALLENGES:

- **Not a panacea:** Digital systems are only one instrument in the M&E toolbox and, to be really effective, must be “mainstreamed” in the project cycle.
- **Training needs:** Digital projects in DC require a minimum level of technical understanding of what is often complicated subject matter (e.g. → **mobile**

communications technology, digital data collection, data science). In existing teams, this understanding is often lacking (→ *e-skills*, → *e-literacy*).

CLARITY AT THE OUTSET:

It is essential to determine the most appropriate communications channel/s upfront (i.e. the best media for reaching the target groups in question), even in cases where DC/IC projects are using digital M&E. → *Internet*- and → *smartphone*-based systems are often not suitable, because reliable internet access is limited in rural areas and smartphones and data plans are too expensive for many users. → *Text message*-based and Interactive Voice Response (IVR) systems are therefore often the best choice, as they work on every kind of mobile phone, regardless of its age and whether it is internet-enabled. Also, huge numbers of people around the world are now familiar with → *text message* and IVR technologies and are thus able to operate them.

BEST PRACTICES:

- **Digital as a cross-cutting issue in the project cycle:** Digital M&E is a cross-cutting task involving all members of the extended team. As such, it should not be outsourced!
- **Keep it simple:** The vast majority of people in traditional DC/IC target regions neither own a smartphone nor have access to the internet. Therefore, make sure to choose the technologies that target groups are actually able to use.
- **Cost-free and incentivised participation:** Participating in the evaluation should come at no cost to the target group. Also, for certain surveys, incentives may be required to secure a healthy number of respondents.
- **Customise to reflect literacy levels and local languages:** For target groups with a low level of literacy, choose IVR-based solutions (IVR = Interactive

Voice Response). For those deemed to have functional reading and writing skills, opt for → **text message**.

- **In all cases:** Translate questionnaires into the most important local language.
- **Reduce complexity:** Work with short questionnaires (break down long questionnaires on complex topics to make them more manageable and comprehensible).
- **Check data quality at an early stage:** Incorrect data entry or allocation is to be expected. Raw data must be manually checked in the early stages of digital M&E projects, and data validity checks must be carried out.
- **Opt-in and opt-out:** Ensure → **data protection** and comply with the statutory spam regulations of project countries. Document the agreement to participate in surveys and put in place an easily accessible opt-out function that can be used at any time.

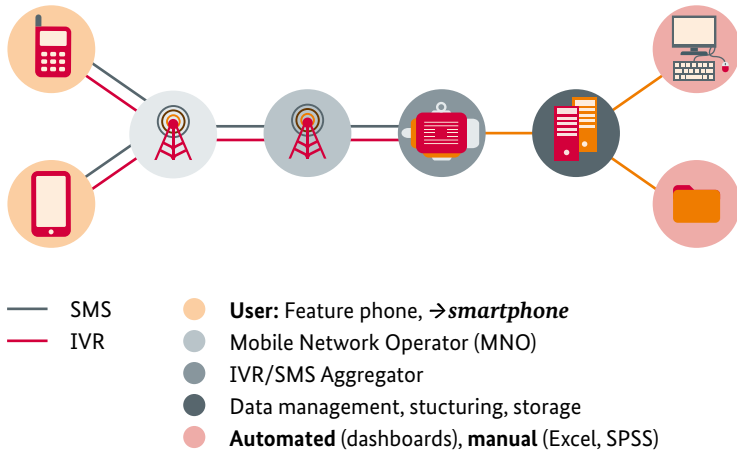


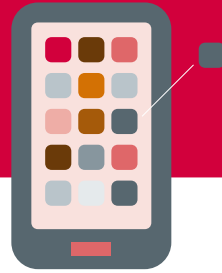
Diagram: Digital monitoring via mobile phone/smartphone: how user data reach the project monitoring system.

Further information:

- USAID (2012): *Mobile Applications (→ **app**) for Monitoring and Evaluation in Agriculture (→ **e-agriculture**):* <http://t1p.de/4vkj>
- World Bank (2013): *ICT for Data Collection and Monitoring and Evaluation: Opportunities and Guidance on Mobile Applications for Forest and Agricultural Sectors*
- O'Shea, Shannon (2015): *Participatory Monitoring and Accountability Literature:* <http://t1p.de/scg6>



APP: All-Purpose Weapon?



→ **Smartphones** are becoming commonplace around the world, even in developing countries where their uptake is now growing at a remarkable rate. Smartphone → **apps** are therefore, at first glance, a particularly convenient, inexpensive and effective way to communicate with target groups and provide them with a large number of important services.

As such, DC/IC project teams are now much more likely to be involved in developing an app as part of their work, and partners and clients are increasingly requesting them (see the examples in chapters 2 and 3, and GIZ apps like TRIMS (Trade Route Incident Mapping System, Nigeria, trimsonline.org) and FLI (Financial Literacy Initiative, Namibia, fli-namibia.org) available in the respective app stores).

Difficulties arise, however, when apps are included in project specifications without sufficient consideration of the actual goals of the project in question. Setting out by focusing on the medium rather than by exploring the full range of approaches for meeting the project's objectives carries the risk that the application will fail to contribute or will contribute little towards solving the development problem at hand (for more on this issue see chapter 3). The professional development of an app is in itself a major challenge.

The following guidelines provide a useful framework for assessing the pros and cons of using an app to achieve a project goal. However, because app development projects are highly context-dependent, requiring major customisation, they should be treated as a rough guide only.

Stage 1: Clarify the Goals

Prior to developing the technical requirements of the app, it is essential to determine the framework conditions and context in which the app will be used. Two key questions are therefore:

- What specific contribution will the app make towards achieving the project goal?

-
- What specific benefits does the app offer the target group (e.g. better business processes, easier access to key information, etc.)?

If, after detailed analysis of the framework conditions, a mobile app is not deemed to be the most appropriate method, other digital tools can be considered.

Stage 2: Analyse the Target Groups

- It is also essential to ascertain whether the targeted user group and chosen technology are compatible. Make sure to ask the following questions:
- Does the target group (or an appropriate part of it) have → **access** to smartphones, or do → **text message** or voicemail represent the best approach?
- What are the usage patterns of the group?
- Which → **ICT** competences already exist in the target group and which will need to be developed (→ **e-literacy**, → **e-skills**)?

Stage 3: Exploit any Synergies

Once the app's added value and relevance have been clearly established, next ask the following:

- Are there already existing mobile solutions or mobile-based services to build on, to avoid having to develop the app from scratch? When seeking to answer this question, explore the options available in the → **open source** community.

Expert networks are a helpful source of information about similar existing solutions (see section 3.3.1). Further useful sources are the *Mobile for Development Impact product and services directory* (see below) of the “Groupe Speciale Mobile Association” (GSMA) and the *NOMAD Selection Assistant* (see below).

If no mobile application with a similar purpose is identified, then take a look at the section on “digital principles” (see section 1.5) and also USAID’s *Integrating Mobiles into Development Projects* manual to determine the next planning step.

Stage 4: Realistic Use of Resources

If it is not possible to build on a pre-existing solution and, instead, the app must be developed from the ground up, a realistic assessment of the resources required must be carried out. Note that, besides the cost of programming the app, you will also need to factor in the costs of market analysis, testing phases, design, maintenance work, further development phases, hosting and training measures.

Stage 5: Develop an Operating Concept

The operating concept describes everything that is required of the planned application on a technical, organisational and also financial level. It provides an overview of who is responsible for what, routine maintenance work, the backup system and the security concept. It also defines the operating costs (see Stage 4) and ensures that all activities and the necessary resources are identified and properly allocated.



If this shows that the expected costs of the app exceed the value of its projected use, early project termination should be considered, as this makes more sense than half-hearted implementation.



Stage 6: Technical Implementation

The following checklist outlines what you need to consider when planning technical implementation. Answer the following questions:

6.1 PROJECT PLANNING

Select the technology:

- Which operating system should be used (Android, iOS, Windows Phone, other)?



With its 75% share of the global market (and around 50% of the African market), Android is typically the first choice when targeting poorer groups. However, each app development project must be assessed individually.

Define the range of functions:

- What functions should the app have? (See the Specifications annex, which, among other things, describes and differentiates core and additional functions.)
- Which work packages need to be defined for the implementation?

Examine the legal frameworks:

- Do data protection regulations exist on, for example, the further processing of data (use of personal data, etc.)? (→ **data protection**)

Estimate costs:

- What is the specification for the app (functionalities, etc.)?
- What are the budget implications of this specification?



Choose a suitable revenue model:

- Which revenue model should be adopted (e.g. subscription charges, app purchase, in-app purchases, fees for new services, free of charge with incentive model)?

Identify partners:

- Which services should the partner take care of?
- What are the underlying selection criteria? (See chapter 3)

Develop an implementation strategy:

- What are the milestones in the development project plan?
- Who is responsible for which work package and which milestone?
- Do service providers need to be contracted?
- What communications strategy will be employed to support the app development process?
- How will progress on the app's development be measured and what are the criteria?

6.2 PROJECT IMPLEMENTATION

Methods for supporting communication

- Is a “mock-up” (demo version for reviewing the design) required?
- When will a “wire-frame” (demo model for reviewing navigation) be available for review?
- Will “use cases” and “user stories” (descriptions of the projected requirements of different users) be created for reviewing the user experience?



-
- Has the app's design been determined?
 - Will the app be tested to ensure it is intuitive?
 - Are the app's functions and design compatible?
 - Is the Corporate Identity relevant for recognising the app?
 - Is the app design flexible enough to allow for additional content to be added at a later stage?

6.3 RELEASING THE APP

Platform transfer and provision

- Has access to the platform been organised?
- Does the app need to be certified?

Distribution

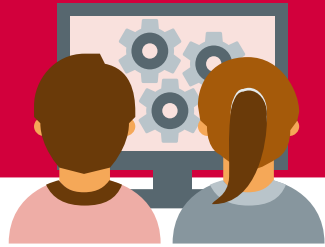
- Is the app available in the right store for the target group?
- Through what other channels can the app be promoted and/or distributed?

Further information:

- Groupe Speciale Mobile Association (GSMA): *Mobile for Development Impact product and services directory*: <http://t1p.de/kbqx>
- NOMAD (HumanitariaN Operations Mobile Acquisition of Data): *Selection Assistant* <http://t1p.de/9eyk>
- USAID: *Integrating Mobiles into Development Projects*: <http://t1p.de/72gs>



How Do I Plan a HACKATHON?



When new multimedia programs, mobile applications or other software are needed quickly, a →**hackathon** is often the best approach to take. A portmanteau of “hack”, meaning in this context tool or solution, and “marathon”, hackathon describes an event where programmers, graphic designers, user interface designers, subject matter experts and other stakeholders come together to work creatively on a specific problem. Hackathons usually last between a day and a week. A focus is essential for the success of a hackathon, for example, the creation of customised software for a specific project goal. Expenditure of time and development costs for new software drop drastically in this context. This is due in part to the fact that programmers can reuse the code for core functions developed in earlier projects and thus need only concentrate on building new functions. While hackathons are now common practice throughout the IT world, they are also proving very useful in other contexts, such as development cooperation and international cooperation.

THE 12 STAGES OF ORGANISING AND IMPLEMENTING A HACKATHON

Step 1: Constellate Organising Teams

- Alongside the person designated to lead the overall process, it is important to have in place a technical expert who is well informed about the data concepts and technologies to be used, an event manager to organise the venue and technical equipment and serve as the contact person for all participants, and a social media specialist (→**social networks**) to manage the hackathon’s social media presence during and after the event.

Step 2: Define the Goal

- The goal of the hackathon must be clearly defined at the very outset: Is it to create software, develop a prototype or build a network? Should the hackathon be a cooperative or competitive event?



Step 3: Define the Software to Be Developed

- Hackathons can have very diverse outputs: collections of ideas, snippets of code, prototypes, and marketable products. What kind of output are you seeking from the event? Remember that developing different kinds of output requires different amounts of time.

Step 4: Define the Legislative Framework

- Determine the legislative framework of the event. This involves aspects such as property rights for non-creative-commons projects. If you want to protect the results, you must inform all participants in advance and get them to sign an appropriate declaration of consent.

Step 5: Define the Time Frame

- Set a realistic time frame for those preparing and delivering the hackathon and also for those participating in the event itself, ensuring sufficient time is allocated for the “hacking sessions” and the presentation of results. Note, however, that a certain time constraint is part of the format. Allowing too much time can be counterproductive.

Step 6: Select the Location

- Finding the right space is vital for fostering the teamwork and creativity that underpin the hackathon experience, and for ensuring participants’ well-being during the event. Remember: participants will need food and refreshments throughout the day and, depending on the event’s duration and location, may also need overnight accommodation. While hackathons can involve virtual participation (online meetings, virtual collaboration, etc.), most interactions are in the form of face-to-face discussions, especially in the brainstorming sessions.



Step 7: Invite Participants

- Which participants do you want to invite and how many? This depends on what you want the event to achieve. In any case, the make-up of the hackathon's participants will have a major impact on its success. The event can be made open to all or limited to people from a certain geographical region or community. Aspects like → **gender**, age, background and profession should also be taken into account. For the event, the cohort can be divided up into teams (which may be new or pre-existing), individuals, or a mixture of the two. The benefits of having pre-existing teams are that the team-building phase tends to be much shorter and more efficient. However, new teams create new networks, increase diversity and often elicit higher levels of creativity.

Step 8: Offer a Prize

- Prizes are a useful way to recognise participants' efforts. You will therefore need to decide whether to opt for prize money or gifts, a follow-up project or a reputational award. Bringing in event sponsors is a useful way to source prizes.

Step 9: Choose Comperes

- Hosting a hackathon is a major undertaking. As such, it is often best to hand much of this responsibility to the participants themselves. What is key is ensuring that the process moves in the direction you desire. Besides keeping the content on track, good hosting will ensure the event runs to time and in sequence and will work to motivate all those involved.

Step 10: Invite a Jury

- A competent jury is essential if a hackathon is to be successful. While it is easy to recruit jurors from your own organisation, the jury is more



effective when it includes external experts and objective voices. Make sure to include a mix of experts from different backgrounds in the jury.

- When the event is seeking explicitly technical outputs, jurors with relevant IT expertise are essential (→ **e-skills**). Furthermore, to ensure fairness and transparency, the jury should be provided with a set of clear, weighted criteria for scoring outputs.

Step 11: Document the Event

- Appoint a person to document the hackathon in detail and to do so using a range of media such as reports, images, videos, → **blog** posts, interviews, and so on. Capturing the event in this way not only benefits the host organisation, but also supports public relations activities and promotes the visibility of the hackathon.

Step 12: Review the Hackathon

- When reviewing the hackathon, ask the following questions: Is the hackathon a one-off event or is it indirectly related to other events or projects? What happens with the results? Will participants be involved in relevant future plans? It is important to minimise the amount of software that gets abandoned (“abandonware”) after the event. Often, lots of good ideas fail to be identified in the pressured environment of the hackathon: teams may give hurried or poor presentations of their work or reviewers may fail to recognise an output’s value or potential uses.

To give outputs a second chance, it is useful to present the work online. Another possibility is to invite investors and venture capitalists to review the outputs themselves. In this way, your hackathon can end up having more than one winner.

E-LEARNING – When Is It Useful to Employ Digital Learning Formats in Projects and What Needs to Be Considered?



There are many arguments in favour of using digital learning approaches (→ **e-learning**): for example, online learning platforms empower learners, allow flexible timings, location-independent access, and options to determine the preferred depth of learning. Learning contents are therefore available for many people who would often otherwise not have access. Learning providers and projects benefit because a vastly greater number of participants can be reached, uptake and impacts can be measured and, last but not least, substantial costs and time can be saved. The → **internet** is also making new forms of learning possible, with modules comprising games (→ **gamification**), visualisations and other forms of digital interaction.

However, getting e-learning right is not as easy as people tend to think. First, existing options and formats need to be considered and clarified, the resources already existing in DC/IC must be ascertained, and the typical stumbling blocks identified. Here we present an overview and initial decision-making tool:

E-LEARNING FORMATS – AN ARRAY OF OPPORTUNITIES

A huge range of learning formats based on or incorporating digital learning approaches are available, including:

- **Web Based Training** – E-learning accessed on desktop computers using a web browser or other program. Participants work independently through the e-learning content and are usually assessed through quizzes and practice questions.
- **Blended Learning** – Combination of classroom learning and digital learning units.
- **Webinars** – Online seminar events where participants watch a presentation, which is either live or pre-recorded, and have an opportunity to discuss the points raised with the presenter and

other participants. In addition, surveys can be taken and chatroom discussions captured and posted on a whiteboard for later review.

- **Video Lectures/Courses** – Learning modules in the form of short videos, often accompanied by quizzes and additional learning material.
- **Mobile Learning** – Specific form of “Web Based Training” in which the learning content is accessed through either a mobile → **app** or mobile web browser, or even by → **text message**.
- **Wiki** – Wiki is a hypertext system for websites that allows content not only to be read, but also to be amended by users.
- → **MOOC (Massive Open Online Course)** – MOOCs are free, accessible online courses for a very large group of participants (see section 4.5).

New learning methods and techniques such as Augmented Reality, → **digital storytelling** and → **gamification** provide additional options for learning formats.

For a more detailed overview visit <http://t1p.de/5a6c>



**FOR E-LEARNING TO BE SUCCESSFUL AND SUSTAINABLE,
THE FOLLOWING POINTS NEED TO BE CONSIDERED, CLARIFIED
AND REVIEWED:**

Identify where e-learning fits and its context and aim

- Where should e-learning be taken up and what is the goal of its inclusion?

Define the target group

- Which target groups need to be reached? Would the target group accept e-learning approaches and do they have the required experience? Which competences are needed to fill any gaps? (→ *e-skills*, → *e-literacy*)

Clarify existing and required resources

- Technical:** What is the target group's existing and required technical access and equipment (computers and devices, internet connection, etc.)?
- Financial:** What kind of budget is available?
- Personal:** What competences already exist in the target group?
- Content-related:** Who will prepare the learning content? Who will manage the course?

Define the learning goals and competences sought

- What should the measure ultimately deliver? What should be imparted: knowledge and/or skills? What new competences do the participants develop through participating in the course?

Identify any potential stakeholders

- Which, if any, of the target group's (strategic) stakeholders need to be kept informed and involved in planning (e.g. supervisors or national accreditation authorities)?



Networking and “social learning”

- How much face-to-face and group learning is required? Should participative elements be integrated? Should participants be grouped into some form of learning network?

Increase sustainability and ensure quality

- How can the e-learning approach be permanently integrated into the training curriculum? Should e-learning organisations be set up in the partner organisations? What will quality assurance look like? How can the intended impacts be measured?

CHALLENGES THAT NEED TO BE CONSIDERED:

- If the target group is small and the measure one-off: Do the substantial costs involved in developing these approaches, such as their expensive development and planning processes, make them a poor investment?
- Does the e-learning approach under consideration really match the needs and context of the target group? Does the target group have the levels of → **access** and media competence (→ **e-literacy**), and the time- and self-management competences required to use and complete the e-learning packages?
- Select suitable methods that will motivate participants, encourage them to complete the learning and enable them to identify successes and areas requiring further work. Offering students access to a well-trained “e-tutor” is a powerful way to ensure all of these things happen while, at the same time, providing individual support to participants.

PRE-EXISTING PLATFORMS AND APPROACHES IN DC/IC:

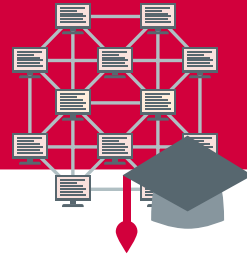
There is no generally applicable template or “blueprint” for developing digital learning. However, most DC/IC institutions have their own (internal) learning platforms that they can refer to.

- GIZ’s **Global Campus 21** provides a platform for traditional e-learning courses, but can also be adapted to specific teaching and learning needs, incorporating virtual collaboration, MOOC and other digital formats as well as Web 2.0 applications like wikis and → **blogs** (<http://t1p.de/f7ku>).
- The **Goethe-Institut** uses a Moodle-based learning platform to deliver further education and training, such as “Lehrerfortbildung Per Fernunterricht” (<http://t1p.de/e2qj>) and “Deutsch Online” (<http://t1p.de/oz37>).
- **Deutsche Welle** uses the DW Akademie Connect platform (<http://connect.dw.com/>), also based on Moodle, for its internal education and training activities. Furthermore, Deutsche Welle provides German language learning in the form of podcasts, drama series, social media (→ **social networks**) and other interactive learning formats (<http://t1p.de/4wrrr>).
- External providers and free software solutions are also available, such as Candena (<http://t1p.de/sqii>).

Section 2.3 provides different examples of DC and IC projects with a focus on education.



What Should I Consider When Using MOOCs in the Project?



→ **MOOCs** (Massive Open Online Courses) provide DC/IC with new ways to contribute to development, politics and education. So-called “MOOCs for Development” are used to mainstream methods and expert knowledge, to deliver broadly effective peer- and self-learning and/or to develop or expand “Communities of Practice”. Usually MOOCs also involve the networking of interest groups and the transfer of learned skills into practice.

Incorporating MOOCs in programmes

PLANNING A MOOC

Just as with other further education and training measures, when planning a MOOC a number of general questions relating to the wider programme need to be answered in the preliminary stages:

- How can the measure contribute to the achievement of my programme goal?
- How does the MOOC fit with the impact model of the project?
- When and how often should I offer the MOOC within the programme context?

In terms of the desired impacts:

- Which group of people will my measure address? Is it an expert community or rather a general community (don't forget that the first two letters of MOOC stand for “massive” and “open”)?
- What learning goals have been defined?
- How do I ensure the measure is sustainable? For example, is it worth forming a community of practice and how can this be further supported in the context of the programme? Can other projects or stakeholders also participate and can a MOOC support an entire sector? How can the

planned interventions be controlled and implemented (e.g. providing experts with further training, developing special e-competences, outsourcing tasks to external or internal providers, etc.)?

Depending on the issue being addressed, a MOOC can be deployed in different phases of the programme cycle. A MOOC can:

during the programme preparation:

- engage in “fact finding”
- test the intercultural legitimacy of a particular theme
- test the acceptance levels of specific topics
- find a partner keen to get actively involved

during the delivery phase of a programme:

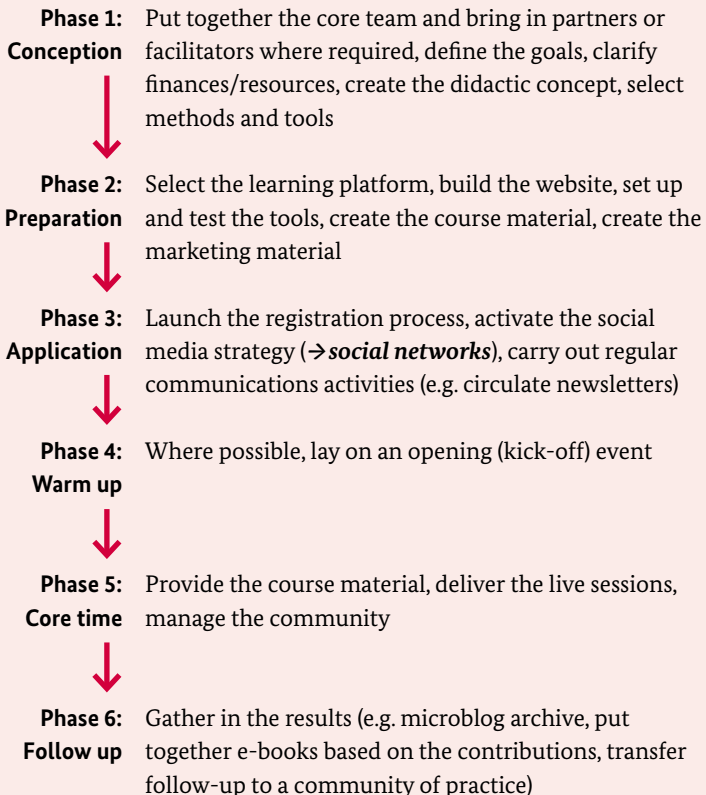
- contribute to the scaling up of a topic
- encourage learning and sharing
- instigate networks for a specific topic area
- create a public for a topic
- test and disseminate tools or approaches

during the closing phase of a programme:

- prepare a new project
- where possible, hand over the “thematic leadership” to a given community

BASIC STRUCTURE OF A MOOC

Designing and developing a MOOC takes a few months to complete. The course itself should be kept to a period of between six and ten weeks. The following phases can be defined:





Success Factors



TECHNOLOGY:

- Selection of learning platform
- (Partly) commercial standard offer (Coursera, edX, Udacity, among others)
- Separate learning management systems (LMS)
- **Open source** technologies (Wordpress, Drupal, etc.)
- Social media technologies

Success criteria:

- Worldwide and continuous access to platform
- Accessibility of IT support staff
- Harmonisation of the learning platform with the methodology
- User-friendliness



TEAM:

- Online facilitators
- “Instructional” designers
- IT technicians
- Social media experts
- Cooperation partners (guest lecturers, etc.)



Success criteria:

- Clear allocation of roles and transparent communication channels for all participants
- Visible “e-readiness” of the facilitation team and their continuous presence



COURSE MATERIAL:

- Selection/preparation of suitable multimedia materials (text, audio, video, animation) and live sessions (webinars)
- Checking the integration and preparation of “open educational resource“ (OER) materials
- Use of “creative commons” licences
- Selection of certification type to provide incentives for completion (“open badges”, institutional certificates, etc.)

Success criteria:

- Integration and adaptation of the course materials to the course concept (e-didactic principles and user-friendliness)
- Take into account the diversity of the participants in the choice of course materials



METHODOLOGY/COURSE DESIGN:

- Consider e-didactics (synchronous and asynchronous elements)
- Integrate and vary interactive, cooperative and self-learning elements
- Open up spaces for co-creative processes (wikis, etc.)

Success criteria:

- The diversity of participants' different learning styles is catered for
- Systematic promotion of participants' self-learning competence (promote the individual exchange of learning experiences)
- Clarity and orientation



COMMUNICATION STRATEGY:

- Employ social media tools
- via MOOC lists
- Exploit cooperation partners' networks
- Promote MOOC on own website

Success criteria:

- Communications strategy prepared at an early stage



BUDGET:



MOOCs can be developed on a low budget, but this usually means internal staff need to put in substantially more time and effort.

Decisive factors for the budget:

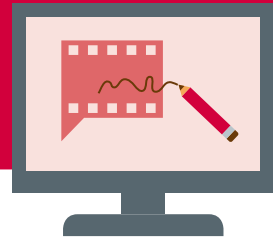
- The technology
- The team
- The course materials

Success criteria:

- A well-crafted overall concept



How Does DIGITAL STORYTELLING Work?



→ **Digital storytelling** combines narrative elements with digital media to impart knowledge and information, and enables different people to participate and have their say (→ **e-learning**). In recent years digital storytelling has become increasingly popular, as new → **internet** tools and channels become available for telling and sharing “digital stories” using a range of different media (text, photos, videos, audio, graphics, cards, etc.). Digital stories are often told from an individual perspective, presenting a largely personal point of view, and they can be designed and delivered in very diverse ways, adhering to certain rules and formatting requirements. An example of this diversity is the interactive documentary format used by Deutsche Welle’s Global Ideas multimedia project to create “Serengeti – A journey into the unknown”.

The strength of digital storytelling is that texts, images and films are greatly reduced on a didactic level. This makes stories easily comprehensible. Complex development cooperation issues and topics can also be broken down and packaged to make them more understandable. Furthermore, the fact that the narratives are very often presented from a personal perspective makes the content more authentic and credible. The multimedia nature of these approaches makes them a valuable instrument for knowledge transfer – even in countries with low levels of literacy. Of course digital storytelling also presents challenges:

The amount of time required to develop a professional and didactically sound package should not be underestimated. Given the very personal nature of the stories provided, great care must be taken to ensure that they are relevant and appropriate for the aims and objectives of the package. Simplifying complex issues to a concise format, its publication and response to feedback require practice.

It cannot be emphasised enough that there are no “blueprints” for digital storytelling: the project goal, context and target group will determine the content, media, methods and narrative style to adopt.



Digital storytelling can also be integrated into wider project processes. It can, for example, be used to:

- promote technological and methodological media competence,
- raise awareness among target groups of the values, goals and ideals you are seeking to inculcate by getting them to reflect on specific topics and challenges,
- present the desired outcomes for the project,
- evaluate qualitative responses to the narratives and assess the impacts achieved by getting target groups to tell their own stories about how the content has affected them, and
- train journalists.

The following checklist outlines the main elements involved in developing a digital story.

Stage 1: Brainstorming

- The starting point for every story is an idea and an audience – i.e. what should the story convey and who should it be directed at? The richer the background and description, the more authentic the topic will appear. Remember that a digital story is more than just a presentation of facts and information. It also reflects the emotional and personal perspectives of the storyteller.

Stage 2: Scripting

- The script is the most important element in digital storytelling as it constitutes the structuring narrative. The script's author should seek to describe from her or his own perspective the issue to be addressed. Contrary to the development of other kinds of digital product, the script



must be written first. Only when it is complete should the media for conveying the story be identified. When it comes to identifying topics and developing the script, creative writing and group work techniques are particularly helpful.

Stage 3: Storyboarding

- Storyboarding is the process of presenting the outline and sequence of the story in a series of frames (images) captioned with simple language. First, pre-existing images, sketches and textual descriptions useful for depicting the story are gathered. New material is then created or sourced online from copyright-free image banks. In this way, developers get to handle diverse media and must address copyright issues (see section 4.9).

Stage 4: Selecting Multimedia Instruments

When selecting digital approaches, it is vital to consider which solution will best convey the message of the story and have the largest reach in the target group. The production facilities and technologies available must also be considered.

Useful questions to ask are therefore:

- What technology already exists? What software is provided?
(→ **open source**)
- What channels should be used to disseminate the story?
- Are those developing the package experienced in using the software or should external experts be brought in?
- Does the target group have prior knowledge of using digital media? If not, how can the necessary “IT competences” be imparted to inexperienced users?



Stage 5: Bringing Together the Script and the Multimedia Approaches

- Once suitable multimedia instruments are selected, the package content is then developed for the channels in question. If the package includes video or audio material, the relevant storyboard frame is used to guide the production of any new material required or the sourcing of pre-existing material, which is then processed and built into the story. The technical nature of this work means that participants will need a minimum level of training in how to use the software.

Stage 6: Publishing

- Given the personal nature and content of the stories, those providing them should give their explicit permission for the publication.

Stage 7: Feedback and Reflection

- Publishing the package is only half of the story! Depending on the medium used for publication, reactions to the story can be captured and shared to promote an ongoing dialogue on its themes and issues. The way in which feedback is to be managed and the person/s responsible for overseeing this process must be determined prior to the publication of the digital story package.

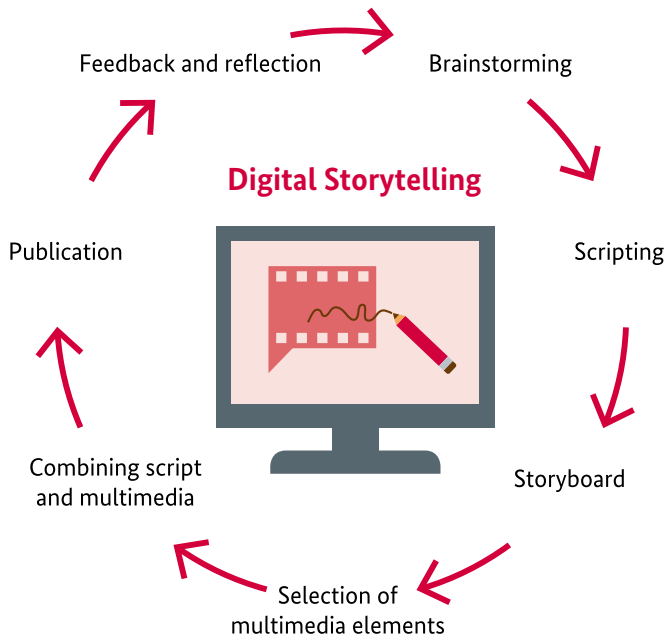
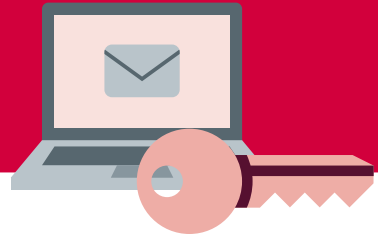


Diagram: The optimum sequence for developing a digital story package

Some examples of digital storytelling

- The current situation in Yemen narrated as a digital story: <http://t1p.de/hutv>
- “Serengeti – Journey into the unknown” from Deutsche Welle “Global Ideas”: <http://t1p.de/pdo5>

DATA PROTECTION – Why the Responsible Use of Data Can Bring Many Benefits



In the digital age, data and →**data protection** have become powerful instruments. Some therefore refer to data as the “oil of the future”. There is something to be said for this comparison, as the right data combined with smart algorithms can prove highly lucrative. Also, similarly to oil, certain data when brought to the surface can change the world, as evidenced by Edward Snowden’s disclosures. However, it is the data monopolies of the world’s major internet companies or of certain nation states that create the biggest challenges for data protection. As such, the responsible handling of data is anything but boring, as it not only serves to protect cooperation partners, but also makes projects more successful. The first principle, then, is not to be afraid of data protection!

NEW CHALLENGES ARISING FROM DIGITALISATION

The myriad benefits of digitalisation are counterbalanced with at least as many challenges. The data revolution that has occurred over the last decade is a prime example of this. On the one hand, digital data have been used to create new and effective mechanisms for sustainable development – take, for example, the electronic patient filing systems that help medical staff to deliver better health care (→**e-health**). On the other hand, such data have been used to discriminate against certain groups and even oppress whole societies. The use of data in development cooperation thus opens up a lot of opportunities but can also have an oppressive effect. In the age of mobile phones, online search engines and →**social networks**, the databases amassed by private companies and nation states have reached unprecedented dimensions. This is giving rise to a completely new set of problems, which make it all the more important to actively discuss and shape data protection going forward.

WHO IS DATA PROTECTION RELEVANT FOR?

The broad-ranging data protection concepts required for development cooperation mean that the responsible handling of data is relevant for all actors in the sector. Data protection includes not only secure IT systems,

but also declarations of consent and relevant transparency and accountability mechanisms. To protect data in the age of digitalisation, it is important to consider the consequences of gathering them in the first place and also to respect and claim → **digital rights**. It is safe to say that, nowadays, no development cooperation project exists that does not collect data. Whether one is assessing the impact of projects, implementing evidence-based initiatives or gathering information as a project goal, data are needed everywhere. That is why it is important to consider the consequences of collecting these data upfront. How could the data be misused (even in totally different contexts)? Who benefits from the data and who is disadvantaged? Who owns the data and how are they stored?

WHAT DOES THIS MEAN FOR PROJECTS IN DEVELOPMENT COOPERATION IN PARTICULAR?

Digital rights have a significant role to play in all international cooperation projects. Data protection, transparency and the rights to privacy and freedom of opinion should be overarching guiding principles for the work of both the cooperation body and its partners (→ **internet freedom**). Responding to all of these principles is likely to generate a range of challenges that, rather than being treated as peripheral issues, need to be actively addressed.

Digital rights issues should be addressed at the outset, when planning data collection, by applying the principle of data economy – i.e. ascertaining which data are actually relevant for asking questions and which actually need to be collected. The digital rights implications for data analysis should also be considered at an early stage. For example, → **big data**, on the one hand, can bring great benefits and, on the other, can allow interested parties to draw conclusions about people from their data, be they anonymised or otherwise. When dealing with potentially sensitive data, careful storage is essential. This requires taking both technical and organisational precautionary measures.

Some of the biggest challenges arise in the subtle or hidden manipulation of data – for example, using algorithms to perform automatic data analyses or to aggregate figures. Algorithms only work if certain presuppositions are established and “registered”, which means that these digital functions are making active decisions. As such, discussion of these algorithmic presuppositions and registrations is of the utmost importance. It is important to ask: What standards are used? How can a qualitative examination be used in a supportive way? At what intervals do the mechanisms need to be evaluated and revised?

The data infrastructure we set up in development cooperation is not neutral. It brings with it values, standards and other presuppositions. Understanding and discussing these processes is a key part of responsible data use.

WHERE DO I FIND SUPPORT?

A number of websites provide guidance and support on data protection issues. The NGO Tactical Technology Collective’s *Security in-a-Box* is a broad-ranging web-based toolkit on data security for activists and human rights defenders. As well as providing tactical information on secure → **internet** use, it contains an annotated listing of data security applications. The Responsible Data Forum is a network of different organisations that deal with ethics, data protection and security. The Forum’s website provides information on relevant events as well as extensive practice-oriented information on data-related themes.

As the digital revolution rolls on, new challenges constantly arise, which means data protection is no longer an optional activity. It is nowadays essential to deal actively with data protection and to develop and use new instruments for responsible data handling.

Further information:

- *Security in-a-Box* – Toolkit of the Tactical Technology Collective: <http://t1p.de/k071>
- The Responsible Data Forum: responsibledata.io
- *Digital Safety for Journalists*, an open online workshop delivered by Deutsche Welle Akademie: <http://t1p.de/rc9d>

OPEN DATA: Transparent Governments, Shared Knowledge

Open data or → **open source** data (i.e. data that are freely accessible, available and reusable) ensure transparency and greater participation and knowledge, and have social and economic value. Open data have the potential to make political action more democratic, efficient, effective and sustainable and to open up new fields of business and activity. Besides having the data and the relevant infrastructure and technology in place, a cultural paradigm shift towards transparency, participation and cooperation is also required.

WHAT ARE OPEN DATA?

Open data are data that can be freely accessed, used, disseminated and evaluated. They are not personal data but, as a rule, comprise administrative data like statistics and birth and death registry data, environmental and weather data, transport and traffic data gathered by the public authorities, legal and court decision data, and so on. As such, huge amounts of data are of public interest and potential use. According to a definition by the Open Knowledge Foundation (OKF), data are “open data” when they are freely used, processed and shared for any purpose while maintaining the protection of privacy. An open licence and an open, machine-readable format for the data are fundamental.

WHY SHOULD DATA BE OPEN?

Open data are extremely useful for political, societal, administrative, economic and scientific bodies and purposes. Openness can contribute to achieving greater democracy, transparency, participation, accountability, efficiency, effectiveness, profitability and knowledge generation, and can help in the fight against corruption. When data sets are available, they can be processed by citizens, NGOs, data journalists, enterprises and other societal stakeholders to provide meaningful information. They can also be converted into infographics, video clips, interactive websites, → **apps** or other publications and made available to the public. It is particularly important to have a legal framework in place that protects against data misuse and data theft.

Open data have been shown to benefit many sectors. In public administration, data bundling and networking processes can be used to optimise processes and eliminate redundancies. Citizens can be provided with personalised information, cooperate in local decision-making processes and check government activities such as where tax revenues are being spent. For example, the Open Knowledge Foundation's Open Budget project provides the budgetary data for Germany's federal, state and local governments in an open data format and through data visualisation (www.offenerhaushalt.de).

WHO MAKES DATA OPEN AND HOW?

Numerous manuals exist describing how governments, administrations and organisations can make their data open in an efficient, participative, transparent and accountable way, and according to the principles of → **open government** (see below). Any move to an open data system must be accompanied by a strategy to open up communications, organisations and processes, which usually requires a long-term process of change in public administration.

Thus, it should be done as follows:

- Actively include target and user groups (who know best which data sets are interesting and relevant).
- Formulate strategic goals in advance (in accordance with any national Open Government strategies) and decide which data sets are to be made open first.
- Issue open licences that grant users the greatest possible scope in handling data.
- Offer open data, if possible as raw data and in a machine-readable format, for downloading.

Recommend the OKF manual guidance which states that, during the process of making the data open, an institution within the government body should be tasked with leading the process, developing a data catalogue and structuring it so that other ministries and state authorities can easily adjust and update their data.

WHERE DO RELIABLE DATA COME FROM?

Besides statistical surveys and registration processes, data are generated from a variety of sources in “digital life”. In line with the UN International Covenant on Civil and Political Rights, most states in the world have undertaken to make publicly relevant information accessible to their citizens.

Worldwide, billions of bytes of data are generated daily through internet surfing, social media use (→ **social networks**), → **mobile communications**, search engine queries, digital consumer behaviour, and so on. These rapidly increasing digital data mountains (→ **big data**) belong to the service providers – most often private enterprises – that generate them. As the legal frameworks for data are often ambiguous, this ownership puts at risk the fundamental right of privacy and informational self-determination.

However, big data can also be used as open data for inclusive and sustainable development. For example, enterprises are increasingly donating data for scientific or planning purposes, such as in the fight against the Ebola virus or malaria. And where data are lacking, in many cases gaps can be plugged using digital tools and through the concept of openness.

Open Government makes an important contribution to the implementation of the 2030 Agenda for Sustainable Development: directly, by contributing to the achievement of goals 9, 16 and 17, and indirectly, by harnessing the potential of data collection for those working to achieve the SDGs (→ **Digital Agenda**).

Source references and related links:

- Betterplace lab: betterplace-lab.org (see Trendreport Data Protection)
- The Data Portal for Germany: govdata.de
- Open Data for Development: od4d.net
- Open Knowledge Foundation: <https://okfn.de/en/>
- Open Data in Developing Countries (ODDC) and Open Data Research Network: opendataresearch.org
- World Bank: *Open Data Handbook*: opendatahandbook.org
- World Bank: *Open Data Toolkit*: opendatatoolkit.worldbank.org/en
- Open Data Institute: theodi.org
- Stiftung neue Verantwortung: <http://www.stiftung-nv.de/about-us>



MAKING CONTENT AND APPLICATIONS OPEN: the Opportunities and What Needs to Be Considered

There is a lot of talk about the potential of open content and open software, and development cooperation (DC) and international cooperation (IC) in particular can benefit from the sustainable nature of these open models. This is not to say, however, that open options are always the right way to go. “Open and freely available” does not equate to “without rules”.

The following section sets out the advantages and disadvantages of making content available to the general public. Based on the decision guidance in section 2, a checklist helps to review whether and to what extent content should be made freely accessible. To this end, approaches are presented with the specific aim of supporting informed and sound decision-making.

Development and Use of OPEN CONTENT

Creating and sharing actionable knowledge is central to much of German development cooperation's work: information is gathered and then shared. But what needs to be considered when creating, disseminating and using this knowledge? Why is making information freely available worthwhile? This section offers an insight into the main advantages of the open approach, sets out guidelines for making content open and highlights potential risks.

1. WHY OPEN CONTENT?

Making jointly or individually developed content available to the general public has many advantages: as well as increasing the effectiveness and sustainability of their work, creators can also benefit directly when knowledge flows back to them. There are, however, certain risks that need to be considered.

THE ADVANTAGES OF MAKING YOUR WORK FREELY AVAILABLE INCLUDE:

- **The broader range and higher number of owners** achieved when partners, stakeholders and third parties are able to take forward and enhance the usability of content
- **The advertising effect** that results from the crediting of project partners in all future releases
- **The possibility of contributing freely available resources to major third-party sources** (for example, Wikipedia usually requires open licences)
- **Free third-party input on your own material**, which also supports the further development of open material
- **A lower risk of distorting competition**, because all parties have equal access to the information



- **The greater sustainability of the material** that results from project partners and stakeholders continuing to develop and use the material for commercial and non-commercial purposes.

ISSUES TO BE AWARE OF WHEN MAKING WORK FREELY ACCESSIBLE INCLUDE:

- **Reduced authorial control** over the material and its use. This can be problematic if future versions of the material are inappropriate. Including a disclaimer is a useful tool to counter this issue
- **Copyright for all used materials** must be owned or be freely usable
- **The quality standards for open content are likely to be considerably higher**, which will require additional expenditure.

In order to make the right decision, you will need to consider a range of different factors. The checklist below helps you to ask the right questions.

2. CHECKS TO CARRY OUT BEFORE MAKING CONTENT FREELY AVAILABLE

- What are the central information products? Who prepared the material? Who owns the publications? Are copies allowed? If so, on what terms?
- Who owns the website(s), the accompanying database and other databases of the cooperation system if there are several partners?
- How might the information be used by partners? Who should have access to the information available on the website?
- What will happen to the website, databases and libraries at the end of the project?



-
- Who owns the other products that emerge during the project (e.g. software, toolkits, cards)?
 - Who will own the logos and corporate identities that may be developed for groups and networks, etc.?
 - What about the ownership rights and regulations required by other partners and donors? For example, partners or donors may wish to retain ownership of publicly funded publications.
 - Are the rights of those interviewed for/portrayed in the content being respected (→ **data protection**)? Have all participants given their consent?
 - When licensing content, it is important to consider the rights not only of authors, but also of the people studied/depicted, especially in terms of image rights generally and of images of children and young people particularly. The legal framework conditions relating to these rights may vary between countries.

Basically, the following applies: All information products or standards created on behalf of development cooperation should be the shared property of all cooperation partners and freely accessible to all stakeholders. The goal should be to enable open access to information and open and collaborative knowledge production. The new information and knowledge products that result from this production are known as “knowledge commons” (such as Wikipedia, Energypedia, etc.).

3. DETERMINING AN APPROPRIATE LICENCE

Different licensing models exist for disclosing and protecting content according to specific requirements. In the next section the world’s most popular open licensing model, Creative Commons, will be elucidated. It is also a good option for development cooperation. Note that, of the various forms of Creative Commons licence available (briefly explained below), “copyleft” licences such as the “Attribution-ShareAlike” licence have been

shown to be effective. They provide the required degree of openness to facilitate the reuse of information but, at the same time, prevent the misuse, misappropriation and reprivatisation of jointly created information.

The previous sections are based on a chapter of GIZ's 2015 manual *Work the Net – A management guide for existing and emerging formal networks*. These sections therefore have the following Creative Commons licence: Attribution-NonCommercial-ShareAlike 4.0 International.

Link: <http://t1p.de/aqt5>

Creative Commons Licences

“Creative Commons” is the world’s most widely used licensing model and is immensely popular among creators and users of works intended for open reuse. Thus, it is also particularly useful for development cooperation activities and contexts.

1. The Four Elements of the Creative Commons (CC) Licence

Each Creative Commons (CC) licence consists of a combination of four optional licensing elements. These elements enable authors to determine how the public can use their works. Licensees can use CC material as long as they meet the requirements of the licence applied to it.

Each licence element is represented by an icon and a two-letter code.



Attribution (BY)

The authors, the title of the work and its CC licence must be specified in the publication.



Non-Commercial (NC)

A piece of work may only be used for non-commercial goals.



No Derivative Works (ND)

Only verbatim copies of the work may be used. Changes are only allowed with the **explicit** permission of the authors.











ShareAlike (SA)

Any use of the material in a new piece of work must be made available under the same CC licence as that of the original work.

2. Six Examples of Creative Commons Licences

The following examples of standard licences represent the most common combinations of the individual elements described above.

LICENCE AND LOGO	PURPOSE	USE
Attribution (BY)  	Commercial and non-commercial	<ul style="list-style-type: none"> • Copying • Adaptation and change • Dissemination (publishing, presentation, public performance or display) • Licensing for third parties
Attribution, non-commercial (BY-NC)  	Non-commercial only	<ul style="list-style-type: none"> • Copying • Adaptation and change • Dissemination • Licensing for third parties
Attribution, ShareAlike (BY-SA)  	Commercial and non-commercial	<ul style="list-style-type: none"> • Copying • Adaptation and change • Dissemination by third parties under the same CC licence
Attribution, No Derivative Works (BY-ND)  	Commercial and non-commercial	<ul style="list-style-type: none"> • Copying • Dissemination of verbatim copies exclusively • Licensing for third parties

Attribution, non-commercial,
ShareAlike (BY-NC-SA)



Exclusively
non-commercial

- Copying
- Adaptation and change
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Attribution, non-commercial,
No Derivative Works (BY-NC-ND)



Exclusively
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- Copying
- Dissemination of verbatim copies
- Licensing for third parties (<http://t1p.de/qxrh>)

Source: <http://t1p.de/9lj>

Further information:

- Creative Commons: de.creativecommons.org
- Besides Creative Commons, there are other licensing systems with similar terms such as copyleft.org, konomark.org and gnu.org

Development and Use of FREE SOFTWARE

Development cooperation requires increasingly sophisticated software systems in its work. Websites or databases containing technical information, directories of experts, → **apps** and much more need to be developed for projects. FOSS (“Free and open source software” (→ **open source**)) is an important resource, offering highly sustainable and cost-effective ways to develop these systems.

The additional advantages of FOSS include the higher quality and greater reliability and flexibility achieved when other actors further develop and finesse the software for similar purposes. However, FOSS does have its downsides, so an accurate (context-specific) assessment will need to be carried out before adopting the approach. Section 1 explains the basic advantages and disadvantages of FOSS. Sections 2 and 3 contain checklists that support informed decision-making and take local conditions into account.

1. WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF USING FREE AND OPEN SOURCE SOFTWARE?

The basic advantages and disadvantages of FOSS are contrasted below.

	ADVANTAGES	DISADVANTAGES
Cost-efficiency	No licence fees and open standards. Software development projects can start out small, be quickly disseminated and then scaled up to service many users.	Costs may be incurred for consultancy, training, maintenance, support and warranties.

Security and legal aspects

Developers are given extensive rights to reuse and redesign FOSS programs and are entitled to change the general orientation of a FOSS product for their own purposes.

As there is no non-disclosure agreement in place for open source programs, any errors found during security checks can be disclosed. As such, users can be quickly informed when any security issues are detected.

Using FOSS does not automatically imply that the system will be secure. Security problems may arise if maintenance is insufficiently carried out.

Liability and warranty claims are usually ruled out by FOSS licences, but they can be incorporated in separate contracts with service providers.

Note that very new FOSS products often (temporarily) suffer from legal uncertainty.

Furthermore, holes in security can also occur in locations where state regulations on data protection or on the use of private data (e.g. in the health-care system) are insufficient or absent.

Productivity, innovation and infrastructure

In large FOSS projects interfaces are usually well defined, open and documented. Therefore existing FOSS components can efficiently be reused and integrated within other programs.

FOSS can serve as a basis for new business models and promote or accelerate innovation and thus business potential.

FOSS can simplify the integration of different → **e-health** solutions by, for example, incorporating → **cloud**-based systems.

Partners can support the project's conception, initial implementation phase, and roll out and training of employees. Internal staff can be responsible for long-term maintenance, etc. and be supported to do so by contracted FOSS developers.

It is not just the lesser-known, small-scale FOSS solutions that have few or no contact persons available to provide support. FOSS projects generally require a huge amount of time and effort from qualified staff.

The lack of → **IT infrastructure** and/or of qualified staff (whether external or internal) to maintain software or to identify/address security issues are just some of the common problems affecting partners in the Global South.

Standardisation	Using FOSS often counters the kinds of interoperability-related problems that can arise with proprietary software, e.g. when applying e-health tools in several different health-care systems. The adoption of FOSS standards can therefore support the standardisation of e-health.	The stage of maturity of different FOSS applications varies significantly. A common criticism is that there is no recognised international or regional institution for testing FOSS products, or defining and reviewing applications and their legal bases (non-disclosure agreements, privacy, etc.).
Competition	Open standards and free access to source code can reduce dependency on specific developers, cut costs and help to differentiate providers. FOSS allows competitors who want to develop or improve the FOSS to do so by using freely available knowledge and technology.	Specific FOSS solutions are often linked via proprietary interfaces to proprietary software, which hinders the adoption of open standards for the FOSS. FOSS drivers (or the best ones, at least) are not always available for particular devices.
User recognition	FOSS is recognised for both private and business use.	FOSS products are no harder or easier to operate than proprietary software. However, as users are often more familiar with proprietary software packages, any transition to a FOSS alternative must be well communicated (e.g. through marketing campaigns, training, etc.).

2. WHAT LOCAL CONDITIONS SUPPORT THE STRENGTH OF FREE SOFTWARE? WHICH ONES PRESENT OBSTACLES?

Checklist 1: Local Conditions and Corresponding Strengths of FOSS

LOCAL CONDITIONS	STRENGTHS OF USING FREE SOFTWARE
<input type="checkbox"/> The partner organisation has a limited budget.	Cost-wise, FOSS is often a very reasonable alternative, since no licence fees are incurred. (However, it is important to compare the in-house programming capacity and specific training required for a FOSS-based scenario against that required for a scenario in which licensed software is used.)
<input type="checkbox"/> The partner organisation does not wish to be dependent on a particular company and wants to foster competition among service providers.	FOSS can significantly reduce dependency on proprietary technology and can often be used by more companies and in more products and services.
<input type="checkbox"/> A pool of local IT companies with qualified personnel is available, or FOSS service companies from other countries have guaranteed access to the target market.	Open source software can make it much easier for local SMEs to participate in public procurement. Also, many FOSS applications already exist that can be used directly or adapted.
<input type="checkbox"/> The partner's systems need to be secure, or the system has national security implications.	The use of open source code means that programs can be tailored to users' precise needs. As there is no non-disclosure agreement in place for open source programs, any errors found during security checks can be disclosed.



Checklist 2: Local Conditions and Obstacles that Inhibit the Use of Free Software

LOCAL CONDITIONS	OBSTACLE TO USING FREE SOFTWARE
<input type="checkbox"/> Dissemination of proprietary software in the target organisations.	The organisation's users and IT employees are familiar with proprietary software and are resistant to using new interfaces or systems.
<input type="checkbox"/> The contracting organisations lack the knowledge required to put together open source software specifications and do not know the relevant support services sector.	Contracting entities in the public sector often prefer to use proprietary software because the companies that make it are also likely to offer training, maintenance and follow-up support. Another problem is that the degree of maturity of open source software solutions is often wrongly assessed.
<input type="checkbox"/> Proprietary software and/or specific hardware was heavily deployed in the previous system.	In the short term, changing over to FOSS may generate additional costs and also interoperability issues between the new FOSS and existing proprietary systems (e.g. interface problems).
<input type="checkbox"/> The local IT industry is more focused on proprietary options and/or specialist staff lack relevant qualifications.	The competences needed for using and developing FOSS are often limited due to the fact that previous IT-sector capacity-building has focused primarily on proprietary technologies.



3. NEXT STEPS WHEN DECIDING ON THE ADOPTION OF FREE AND OPEN SOURCE SOFTWARE (FOSS)

When considering the adoption of FOSS-based solutions, ask the following questions:

- Which open source software or technology will your work be based on?
- Which service providers will adapt or further develop the solutions?
- Which licence is right for your solution?

Taking the considerations above into account, the appropriate software and respective licence can be selected or software requirements for a tender/solicitation can be formulated.

Further information on licensing:

- Free Software Foundation's list of licences: <http://t1p.de/326k>
- Open Source Initiative's approved licences and standards: <http://t1p.de/nuo4>

Further guidance and tools:

- IDABC European eGovernment Services: *Guideline on public procurement of Open Source Software*
- UNCTAD Report: *Promoting local IT Sector Development through Public Procurement*
- Handouts on what to include in the supplementary conditions of IT procurement contracts when procuring open source software for government agencies and public bodies.

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