Federal Ministry
for Economic Cooperation
and Development

Toolkit 2.0 – Digitalisation in Development Cooperation

Overview

**Digitalisation in
Development Cooperation**

'Education, health, a world without poverty and hunger – the only way to achieve the Sustainable Development Goals is for us to successfully optimise how we use digitalisation in international cooperation.'

Federal Minister for Economic Cooperation and Development, Gerd Müller

Foreword

Digitalisation is changing all aspects of life around the world, and development cooperation is no exception. Between 2010 and 2016 alone, the number of internet users in Africa tripled. This means that in developing countries, access to the internet is growing at a faster rate than access to electricity and clean water. Digital solutions are often adopted in these countries faster than in Germany. Mobile payment systems, for example, are spreading five times faster in Africa than in the rest of the world.

I am therefore convinced that the well-planned use of digital technologies in our partner countries is worthwhile. The many project examples in this publication provide a snapshot of how digitalisation can help future-proof jobs and create knowledge and value, making it an essential element in shaping fair globalisation. The same applies to the Sustainable Development Goals: the only way we will make these leaps in innovation is by harnessing the potential of digitalisation.

We also need to bear in mind that while implementing digital solutions may eliminate injustice, it can make it more entrenched, too. We want to channel digital technologies in a way that empowers institutions and brings people together, rather than driving them apart. I strongly believe that German development cooperation needs to be digitally advanced and therefore encourage you to make active use of this toolkit.
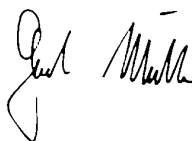
Our priorities:

→ Digitalisation must boost employment and economic growth.

→ Digitalisation must support local innovations.

→ Digitalisation must foster education and health care.

→ Digitalisation must nurture and sustain democracy and human rights and improve rule of law.

→ Digitalisation must stimulate trade and investment.

We believe in the opportunities afforded by digitalisation. For this reason, our partners are already working on our behalf to implement 482 projects with a digital focus in roughly 90 countries. These projects improve education, and leverage digitalisation for good governance and the modernisation of state structures, for health, rural development, climate change adaptation and energy as well as for sustainable economic development and the development of financial systems. While we are pleased with the number of projects already being implemented, we must aim to apply optimised technologies in every development cooperation programme, wherever they help achieve our goals more efficiently, rapidly or transparently. We plan to harness digitalisation to modernise development cooperation and push it into a new digital age. We also need to actively shape the fourth industrial revolution and have developed this practical, application-based digital toolkit for this very purpose.

The toolkit has been developed by the German Federal Ministry for Economic Cooperation and Development (BMZ) based on the first, very successful version from 2016. We created this new version in response to high demand, as well as to rapid technological advancements, which in themselves have created new challenges. For example, we need to ensure that artificial intelligence does not lead to discrimination. At the same time, new trends and tools are evolving which we want to leverage for digital development. This revamped version therefore includes sections on 3D printing and artificial intelligence.

The toolkit includes a list of interesting digital projects, methods, tools and innovative approaches that we have compiled with our development cooperation partners. I urge you to start reading today.

Dr Gerd Müller

Federal Minister for Economic Cooperation and Development

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Introduction

Dear Readers,

In May 2016, we published the Digitalisation in Development Cooperation Toolkit, a manual that deciphers the meaning of digital transformation for development cooperation (DC) and explains its key principles clearly and succinctly. Since then, there has been strong interest in both BMZ's toolkit and digitalisation. We are observing an ever-growing degree of digitalisation in DC.

Today digital solutions are more than just an integral part of most of our project work. In fact, the premise of 'digital by default' goes hand-in-hand with the expectation that we will exploit the potential of digitalisation in our projects wherever it is useful. The key question here is not 'if', but 'how'. The focus is on leveraging lessons learned and recognising specifically which technological opportunities are available. In doing so, we want to ensure that the technologies used are appropriate for the target group while protecting the people we intend to reach.

This second edition of BMZ's toolkit is designed to inspire you and provide interesting examples that will support your work. It covers the following topics:

1) **Overview:** What are the defining features of digitalisation? What opportunities and challenges does digital transformation offer? Where do we stand in regards to this topic and German DC?

2) **Inspiring projects:** Case studies from DC and the international context illustrate the diverse ways in which digital solutions can be applied.

3) **Managing digital projects:** Here, you are offered guidance for strategically planning and implementing digital measures.

4) **Methods, tools and approaches:** Guidelines on the deployment of digital solutions in specific contexts and scenarios are presented in this section.

5) **Resources:** German DC actors explain what they do and their activity areas in the field of digitalisation. Relevant and helpful publications are listed as well.

6) **Glossary:** Key digital transformation terms are defined and explained in detail in the context of development cooperation (DC) and international cooperation (IC).

The toolkit is the result of combined efforts of a number of German institutions that are active in DC/IC and work to harness opportunities in the field of digital technologies.

Participants: German Federal Ministry for Economic Cooperation and Development (BMZ), Deutsche Investitions- und Entwicklungsgesellschaft (DEG), DW Akademie, the Friedrich-Ebert-Stiftung e.V., the German Academic Exchange Service (DAAD), the German Federal Institute for Geosciences and Natural Resources (BGR), the Goethe-Institut e.V., KfW Development Bank, Welthungerhilfe and the World Food Programme (WFP).

Embedded in an extremely dynamic environment, this toolkit should therefore be understood as a living document that will be routinely updated based on participants' experiences. It will therefore also be available online (www.toolkit-digitalisierung.de) as well as in print format.

Do you have any ideas or experiences worth adding to BMZ's toolkit?
If so, please contact toolkit-digitalisierung@giz.de.

We hope you find the toolkit an inspiring read.
The Toolkit Team

Digital transformation: Opportunities and challenges

Since the emergence of computers, digital transformation has been transforming our life and work at an ever-increasing pace. This has been made particularly clear by →*smartphones*, which were only developed ten years ago and and have become at lightning speed an indispensable companion for many people. These days, we often communicate more by text message and →*social networks* than we do in person. New provider and working models have emerged as well. The platform economy allows people today more than ever to offer freelance professional services, be it transportation or accommodation. Traditional types of enterprise are no longer mandatory and in some cases, are even becoming a thing of the past.

This transformation is also taking place in developing countries – and is frequently occurring at a faster pace and with more far-reaching consequences than here in Germany. It offers enormous opportunities for people and for DC. As more and more people have →*access* to mobile phones and the internet, the easier it becomes to offer them important information and services. Knowledge and education *(→e-learning)*, social and political participation *(→e-participation)*, health services even in remote areas *(→e-health)* and access to digital services *(→digital finance)* are just a few areas in which significant advances are possible and are already being achieved. This can also benefit disadvantaged minority groups, accelerating their inclusion.

Organisations and countries also benefit from more efficient and more transparent administrative processes. This offers great potential in terms of reduced corruption, the more targeted use of tax revenues, but also increased productivity, boosting job creation.

All this can enable German DC in particular to achieve its objectives more efficiently and effectively. In 2018, it applied new opportunities in this field in 482 projects. The examples in section 2 show how creatively and effectively DC already operates today.

Facts and figures:

From 1 to 3.5 billion in 10 years:
The number of people who use the **internet** is increasing at a dramatic pace.
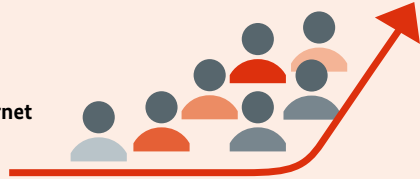
50 % of people in Africa will own a **smartphone** by 2020.

The use of **mobile payment systems** is **5 times** faster in Africa than anywhere else in the world.

Productivity in developing countries could increase by up to **25 %** in the long term if access to the internet was at the level of industrialised countries. This would create **140 million jobs.**

263 million people around the world do not go to school. **1.4 billion text books and learning aids** and many continuing education courses are available **on the internet for free** and **offer educational opportunities.**

Digital transformation:
Risks and negative effects

Digital transformation also presents major risks as well as new challenges for countries, people and DC.

Digital divides emerge in regions where people do not yet have access to the digital world *(→ digital divide)*. They not only miss out on the opportunities on offer – in many cases their circumstances are actually exacerbated. This already affects disadvantaged groups in particular, such as people living in developing countries and in rural areas as well as women, the elderly and people with disabilities. *→ Access* is either non-existent or too expensive and there is a lack of suitable content and practical experience *(→ e-literacy)*. The desired impact can only be achieved if DC measures correspond to the target group's situation *(→ digital readiness, see section 3.1)*.

Automation and new ways of working: Digitalisation can unleash economic potential and boost job creation. On the flip side, it can also make certain work obsolete, especially in the area of low-skilled jobs. Up to two thirds of current jobs in developing countries are therefore currently at risk.

→ Data protection and human rights: Data can provide information on individuals and population groups and can therefore also be used against them. For this reason, attacks on data systems and data misuse are effective methods for fuelling conflict and manipulating public opinion, especially in fragile contexts.

Electronic waste *(→ e-waste)*: Digitalisation also generates billions of tonnes of hazardous waste. Even mining the raw materials for electronic devices often poses serious risks for both humans and nature. Disposing of this waste, which is often done in developing countries, frequently causes significant damage.

Digital transformation is real and presents huge opportunities. At the same time, it poses risks – not everyone is set to benefit. DC can and must help turn this transformation into a win-win situation for everyone.

Sources: ITU, Measuring the Information Society Report 2017; ITU, The State of Broadband 2017: Broadband catalysing sustainable development; GSMA, State of the Industry Report on Mobile Money 2017; World Bank, World Development Report 2016 and 2018; United Nations University (UNU), The Global E-waste Monitor 2017; Deloitte 2014: Value of connectivity. Economic and social benefits of expanding internet access; McKinsey 2017: Lions (still) on the move: Growth in Africa's consumer sector; Creative Commons 2018: State of the Commons Report.

Facts and figures:

Over 4 billion people

in developing countries are still **offline**.
For example, only 4% of the population in the
Central African Republic use the internet.
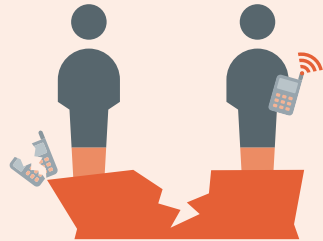
Between 11 and 25% of a

month's wages. This is how much access to the internet
in developing countries costs (compared with between
1 and 2% of a month's wages in industrialised countries).

90% of all people who do not use the internet live in

developing countries. Around the world, 12% fewer women
than men use the internet (in Africa even 25% fewer).

In developing countries, up to **two thirds of current jobs** could be made obsolete as
a result of digital automation.

44.7 million tonnes of e-waste were generated in 2016, the equivalent of around 4,500 Eiffel Towers.

A mere 20% of such devices that are contaminated with toxic
materials are disposed of and recycled properly.
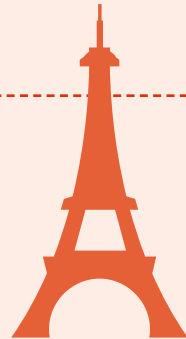
Overarching principles for our work in the area of digital development

Digitalisation is changing society, economics, and politics throughout the world. This is not just a well-known fact, it is also true. Alongside taming fire, inventing the wheel, automating printing and the spread of the steam engine, digitalisation is one of the most fundamental technological developments in human history. As part of this rapid shift, it is not always easy to keep your bearings. For this reason, there now are many overarching principles for digital projects decision-makers can use as guidance. This also applies for digital projects in the field of DC.

THE 2030 AGENDA AND DIGITAL TECHNOLOGIES:

→ *Digital technologies* are key when it comes to achieving the Sustainable Development Goals (SDGs), whether for health, education or sustainable production. Therefore, digitalisation is not just some sort of hype for us. Instead, we see it as an important contribution to implementation of the 2030 Agenda. For this reason, it is even more important to dovetail digital technologies and the SDGs when we write project proposals and design digital projects.

An important frame of reference in this context are the Action Lines and the associated matrix for linking digital technologies with the SDGs developed at the World Summit on the Information Society (WSIS), which were supported by the United Nations:

• ITU, 'Linking WSIS Action Lines with Sustainable Development Goals': www.t1p.de/qzba

In this context, BMZ, together with its national and international partners, wants to provide the right impetus for digital innovations and ensure that opportunities are harnessed and possible risks considered. For this purpose, German DC is geared towards normative frameworks, when designing digital projects.

PRINCIPLES FOR DIGITAL DEVELOPMENT

The Principles for Digital Development serve as an excellent reference framework for designing, planning and implementing digital projects in DC. Initially compiled by individual donor organisations, the Principles have been further developed by a large consortium of DC organisations (including GIZ) and are used to guide their actions. 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:* Get to know your (potential) users by talking to them, analysing their behaviour and teaming up with them to create digital applications.

2) *Understand the existing ecosystem:* Well-designed digital initiatives and tools take into consideration the special circumstances of each country, each region and each community.

3) *Design for scale:* Widespread distribution of digital projects requires more than a pilot project, but also sustainable models and funding and partners who are also able to implement the initiatives in other regions.

4) *Build for sustainability:* To achieve long-term impact, it is important to support users and stakeholders equally – with sustainable programmes, platforms and digital tools.

5) *Be data driven:* When an initiative is data driven, these data can be used to make informed decisions about the project.

6) *Use open standards, open data, open source and open innovation:* An 'open' approach allows for collaboration in digital DC and avoids duplication. Open source also supports scaling (Principle 3) and sustainability (Principle 4).

7) ***Reuse and improve:*** Digital development projects can only be improved and distributed by working iteratively – no organisation is able to do this on its own.

8) ***Address privacy and security:*** Project creators must think about which data are collected, used and shared.

9) ***Be collaborative:*** Working collaboratively means sharing information, insights, strategies and resources across projects, organisations and sectors, making projects more effective and efficient.

There are a number of tools, case studies and reports to help you translate the principles into practice at www.digitalprinciples.org.

HUMAN RIGHTS PRINCIPLES

Every human has the right to use the internet as a means of communication. In order to ensure that the same rights apply to both offline and online activities, we align our work in digital DC with human rights-based approaches:

- BMZ's guidelines on incorporating human rights standards and principles, including gender equality, in programme proposals for official German technical and financial cooperation: www.t1p.de/o0o2

- UNESCO has put together an online list of international and regional instruments that are relevant for access to freedom of speech and privacy on the internet: www.t1p.de/70dr

There also are a number of principles that apply to the technology and application level. Here are a few relevant examples:

- Reflecting the Past, Shaping the Future: USAID's Guide to Making Artificial Intelligence Work for International Development (2018): www.t1p.de/4c7d

- Privacy Design Guidelines for Mobile Application Development: www.t1p.de/y8yg

- Principles of donor alignment in the area of digital health: www.digitalinvestmentprinciples.org

Furthermore, GIZ's Responsible Data Guidelines as well as the Principles on Identification for Sustainable Development: Toward the Digital Age compiled by the World Bank may be interesting for initiatives that focus on data and the digital identification of individuals.

Digital technologies for development: Our goals and priorities

Those of us in development policy must work with our partner countries to provide the right impetus for digital innovations to ensure that we leverage opportunities and take potential risks into account. But what specifically do we at BMZ do in the area of digitalisation, and how can we work together to stand up for everyone? Our work in the current legislative term is focusing on the following five objectives to tackle the challenges of digital transformation and to make use of its opportunities.

Goal 1: Work and Employment

Digitalisation is a catalyst and basis for sustainable economic development. We promote the founding of start-ups and are committed to fair and good digital working conditions around the world. We create job opportunities – especially for young people and women.

We want to invest in training for future-proof and internationally sought-after occupations in order to create jobs in the digital economy of developing countries. More specifically, we promote degree courses like information technology, vocational training courses like mechatronics as well as the associated institutions for research, education and vocational training. These activities aim to increase people's employability, enabling international companies in the partner country to have a better-trained workforce at their disposal. We want to create new jobs in a growing digital industry by way of targeted economic cooperation arrangements.

Goal 2: Local Innovations

Modern economic development requires ingenuity. The population on the African continent is currently the youngest in global comparison. We want to empower young people to realise their visions and digital innovations for solving local problems. We promote digital inventors because local innovations and digital solutions for the challenges in the countries are an important lever for developing knowledge societies. This is why we are creating digital centres

for sustainable development in the MENA region (Middle East and North Africa). These 'digital lighthouses' will bundle tech expertise, support start-ups, offer programming training, support digital tinkerers to develop their own solutions in workshops and serve as a point of contact for the international and local digital industry.

Goal 3: Equal Opportunities

According to the coalition agreement, we will be using the opportunities of digitalisation in particular to improve education and health in developing countries. We want more people in these countries to receive access to a good education and have an opportunity to undergo digital training. This calls for better educational systems, more and better-trained educators, as well as investment in the school infrastructure. The objective is for children and young people to have an easier time finding a job in future as well as be able to program, navigate the internet better, distinguish fake news from facts and handle their data responsibly. We will expand the existing virtual training programmes and in so doing reach more educators, trainees, students and schoolchildren online. →*E-learning* is particularly well-suited for training groups of people that we do not reach by way of schools: women, persons with disabilities and ethnic minorities *(→digital inclusion)*.

We are focusing on strengthening public health systems by way of digital health solutions *(→e-health)*. In so doing, we are improving access to health services and preventing from people dying from treatable diseases. We are also investing in digital data collection in real time, specifically for predicting epidemics and for improved management in the event of an outbreak. We are also using →*drones* to deliver required medicine and blood supplies to regions that are difficult to access.

Goal 4: Good Governance and Human Rights

We are promoting digital solutions in our partner countries in order to help build more transparent, efficient and democratic governance systems and better protect human rights. We are supporting the modernisation of administrative systems, citizen participation and the free democratic basic order, which must be applied equally to the internet worldwide.

We are establishing new standards in IC in tracking financial cooperation through tamper-proof Blockchain solutions.

We are advocating strongly for protecting basic democratic rights such as the freedom of expression and the rights to privacy on the internet.

Goal 5: Data for Development

We want to protect data and prevent their uncontrolled distribution and abuse *(→ data protection)*. Data security is a mandatory requirement for any form of secure data transfers, either in digital commerce or for the electronic registration of newborns or refugees. Too often, the people in our partner countries are still completely unprotected when they are active in digital spaces.

Against this backdrop, we support values-based digital development oriented along European data protection legislation (EU GDPR) as a quality feature and hallmark. To strengthen data security in our partner countries, we support the development of ethical and technical standards.

We will also support our partner countries in making administrative systems more efficient and transparent, which strengthens civil rights and curbs corruption. The focus here is on digital access to health services, school attendance or recording land in the land register.

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For more information, go to:
www.tinyurl.com/bmz-issues

Goals, Subgoals and Challenges of BMZ position paper at a glance

Digital technologies for people

Work and employment	Local innovation	Equal opportunities	Good governance & human rights	Data for development
1. International economic cooperation	1. Creating digital centres	1. Customised learning opportunities through digital learning formats	1. Building digital administrative systems	1. Strengthening data-related capacities and knowledge
2. Digital applications for the agricultural sector	2. Promoting local tech start-ups	2. Promoting digital skills for women and girls	2. Creating transparency in governance and freedom of opinion in partner countries	2. Promoting open data
3. Promoting fair trade and decent work in the online platform economy	3. Testing key technologies for development	3. Digital health management, social health protection schemes/ health financing	3. Ability to critically assess digital media	3. Improving data protection in partner countries
4. Expanding digital financial services	4. Networking African and European innovators	4. Disease control with digital solutions	4. Effective digital justice	4. Digital data for better decision-making

Addressing challenges effectively and thoroughly exploiting potentials

Unemployment *versus* new jobs	Lack of innovation *versus* digital inventions	Opportunities for a few *versus* opportunities for all	Democracy and freedom under threat *versus* good governance	Data abuse *versus* data use

Digital development in figures

Digital transformation has also made its mark on German DC. The number of projects that focus exclusively on digitalisation or that boost effectiveness and efficiency by incorporating digital components is therefore increasing. A breakdown of projects with digital components by country, implementing organisation and sector is provided in the following graphics. We also give an initial overview of the digital tools we use in our project work.

BMZ's digital portfolio currently comprises **482 projects** in over **90 countries.**

Use of digital tools in German development cooperation projects

Number of projects that use certain tools or provide advice on using these tools

Tool	Number
Web platforms	110
Digital skills development	109
E-learning software	97
Management systems	95
Geoinformation systems (GISs)	95
Databases (incl. blockchain technology)	85
IT equipment	82
Apps	82
Social media	68
Data protection	48
Open data	30
Telecommunications infrastructure	28
Drones	25
Digital storytelling	25
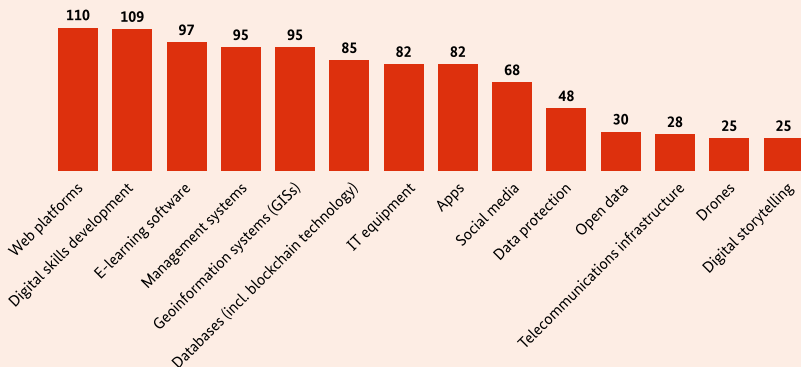
The figures are based on surveys among selected grant recipients and implementing organisations of German DC.
As of: October 2018

The digital portfolio of German development cooperation by region, institution and sector

Number of projects by region

Europe **42**

Asia **131**

Africa **181**

Oceania **1**

Global **81**

America **46**
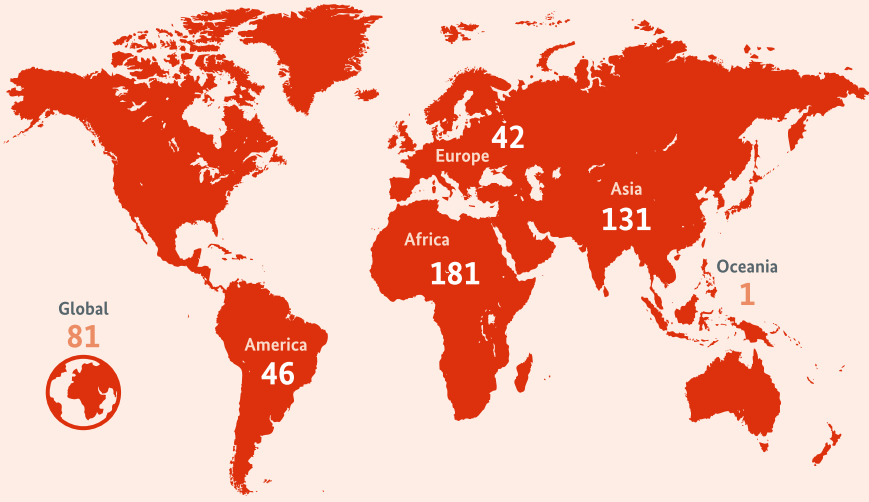
Number of projects by institute

33: DW Akademie (DWA)

39: German Academic Exchange Service (DAAD)

80: KfW Development Bank

261: Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)

26: German Federal Institute for Geosciences and Natural Resources (BGR)

20: UN World Food Programme (Innovation Accelerator)

8: Engagement Global

7: Physikalisch-Technische Bundesanstalt (PTB)

5: DEG – Deutsche Investitions- und Entwicklungsgesellschaft

2: Welthungerhilfe e.V.

1: Goethe-Institut e.V.

Number of projects by sector

50: Rural development

55: Sustainable infrastructure

70: Economic development and employment

82: Environment and climate

23: Security, peace, reconstruction

104: Good Governance

98: Social development and education
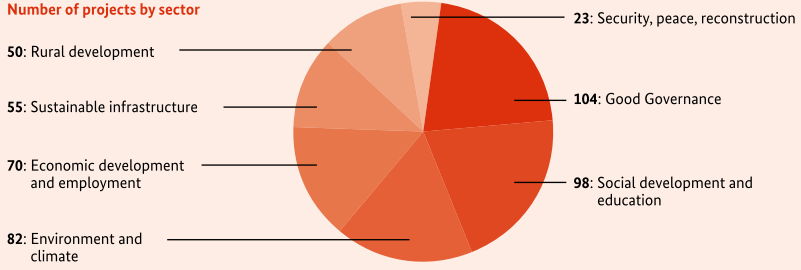
Take the test.
How digital is my project?

How relevant are digital elements and components for boosting effectiveness? This is a hard thing to measure. In most cases, therefore, it is hard to translate the added value of digitalisation for DC into numbers.

This test will help you conduct an assessment by establishing the significance of digital technologies in your project. It also encourages you to think about what steps could be carried out and what potential scenarios could entail.

Take the test: become a 'digital champion' in six steps

1. Use the diagram on the next page. Start at the top left and work your way down step-by-step.

2. The diagram contains data for a sample project from the area of environmental protection and climate change adaptation. It shows potential applications and uses of technologies – assessed on a scale from 'helpful' to 'essential'.

3. Check which technologies you use in your project and assess how relevant this use is for boosting project impact.

4. Write down the total number of points (see scale below).

5. Which further uses do you believe are possible?

6. Add up the points: Are you a digital champion?

Score:

Keep track of your points here: |||| |||| |||| **Total points:**

Analogue	Initial digital approaches	Digital technologies are relevant for achieving the objective	Digital technologies are essential for achieving the objective
(0 points)	(1-2 points)	(3 points)	(ab 4 points)

Collect points here.

How relevant is the use of digital technologies are for achieving the project objective?

Digital components used in the project	Is helpful (1 point)	Is significant (2 points)	Is essential (3 points)
Technology			
3D printing, IoT, telecoms infrastructure, robotics	…	…	…
Drones	Teams investigate areas to check for mining activities on foot. Drones sporadically provide an overview.	Drones and satellite images are regularly used for evaluating the state of the environment.	Drone fleet surveys the area continuously and analyses conditions automatically (using AI).
Software			
artificial intelligence, big data, GIS, blockchain technology, databases	Your …	… use of ….	….. technology
Apps, social media, text messages, instant messaging, virtual reality,	In addition to meetings, a few other employees are reached using an app with an information group.	A significant amount of communication takes place via moderated chat groups.	Automated chats and chatbots enable any number of questions to be answered in real time.
Messenger app			
Digital method			
E-learning	Learning materials on safe mining of resources are provided via a web platform.	Combining face-to-face and online courses improves employee training.	A MOOC reaches a large number of employees and offers course modules on all important topics on demand.
Data protection, HCD (e-skills/ e-literacy), cyber security, gamification, management/ control systems…	…	…	…

Your project?

Example: Supporting small-scale miners

Take the digital test: www.toolkit-digitalisierung.de

Points

Inspiring projects

**Practical examples of how digital technologies
are being used by German DC and others**

Inspiring projects

There is a tremendous need for information to illustrate the actual, practical impact of digital transformation and demonstrate exactly how the use of digital applications in projects and in the different sectors can add value. Drawing on existing examples, this section on inspiring projects covers the diverse uses of digital technologies in DC and IC.

In eight areas, example projects run by German implementing organisations and/or grant recipients as well as international actors illustrate how digital applications improve the attainment of project objectives. 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.

The section 'Visions of the future' outlines the potential digital journey and examines current digital trends that could end up revolutionising the prevailing view of how DC/IC should or actually does work.

This section also shows the rapid pace at which digital transformation is taking place: → *Blockchain*, which was still considered a technology of the future in the first edition of this toolkit, has been included in the project examples, proof once again that the future is often closer than expected.

Rural development

The use of → *digital technologies* in rural areas is often hampered by inadequate or non-existent infrastructure. However, if → *access* to the internet is available, digital solutions can improve many aspects of rural life, providing people with better networking opportunities and facilitating access to outside expertise. Digital technologies also enable rural populations to open up new markets and gain access to digital financial services, such as credit insurance or crop failure insurance, or consult the latest weather report, making their agricultural activities both more sustainable and more secure. Moreover, digital technologies 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 since rural areas are often characterised by a lack of experience in the use of digital technologies *(→ e-skills, → e-literacy)* – or existing services are not suited to the local language or specific cultural situation.

Digital knowledge platform for smallholders, India
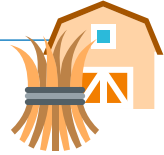
Extreme weather phenomena resulting from climate change are a major challenge for India. Rainfall is becoming less frequent but more intense. This puts smallholders in rainfed agriculture areas (in which only rainfall is used for irrigation) in a difficult position: When crops are not harvested in time, heavy rainfall destroys them. At the same time, longer periods of drought require new special cultivation techniques. There is often conflicting or no information at all on how smallholders can adapt their agricultural enterprises to the changed climate conditions. To fill this gap, a digital knowledge platform which GIZ developed together with the Indian Ministry of Agriculture provides assistance.

The platform offers smallholders personalised and localised information on how they can adapt their agricultural practices to climate change. The information is provided by experts, compiled by the system, validated and adapted to regional contexts and then presented in short fact sheets. A web-based system is used to send the information to regional farmer groups via an API interface and Telegram, a messenger app (see section 4.2.1). Smallholders can also use the messenger to give feedback on the usefulness and applicability of the information. Extension agents also support the farmer groups.

In the project period from 2014 to 2017, the platform reached 20,000 Indian smallholders in three regions. The platform is currently being used successfully by BMZ's ONE WORLD – No Hunger initiative. Indian partners are also using the platform at their own expense in other states.

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For more information, go to:
www.t1p.de/ellw

Smartphones as extension agents, Zimbabwe

Smallholders rely on subsistence farming in many rural areas of sub-Saharan Africa. They usually lack the information they need to increase their yields and market their crops; in many cases, governmental extension agents are unable to cope. In Zimbabwe, there now is an →*app* to support smallholders and the state extension services.

Kurima Mari is an interactive smartphone app that provides smallholders with relevant information (→*smartphones)*. It was developed by Welthunger-hilfe and includes features such as price information that smallholders can use to sell their goods at a fair market value as well as guidance on increasing production and marketing products. Producers and buyers can also use the app to contact each other. This makes it possible, for example, to use a database to find and contact local buyers for agricultural products.

The app is available in Shona, Ndebele and English. Information is provided as short posts and as videos and podcasts. In addition, digital literacy clinics are organised to help smallholders install and use the app. The services and information are also made available to people without a smartphone by cooperating with other organisations and running a training programme for governmental extension agents in rural areas.

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For more information, go to:
www.t1p.de/6coq
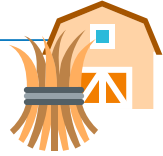
How a biometric payment system
is strengthening financial inclusion, Ghana

Only roughly 34% of Ghana's population of 28 million has a bank account. People from poorer sections of the population and from rural areas in particular have little access to financial services. For example, only individuals with proper forms of identification are able to open a bank account. If people cannot prove their identity, there are many possibilities for fraud. KfW Development Bank is therefore supporting the Ghanaian Central Bank's subsidiary Interbank Payment and Settlement Systems Limited (GhIPSS) in developing a biometric payment system called e-zwich. This payment platform and compatible cash dispensers, card readers and chip cards open up access to payment services. It makes it easy to carry out electronic money transfers and other transactions – even for small amounts. Money can be withdrawn from any partner bank or GhIPPS agency by producing a bank card and providing a finger print on the card reader or cash dispenser as identification. The device even works without an internet connection, synchronising with the central database once the connection is available again.

The e-zwich infrastructure gives even the smallest companies access to innovative financial projects and enables them to pay for products and services digitally. 2.4 million people in Ghana currently use e-zwich. Sixteen public and private institutions now also use the app to transfer money for wages, salaries or social payments. A whopping 8.4 million e-zwich transactions amounting to GHS 3.431 million (about EUR 615 million) were conducted in 2017.

Over 35,000 cases of fraud could be detected between 2016 and 2017 thanks to e-zwich's match-on-card fingerprint authentication. One person, for example, was found to have assumed up to 10 identities to benefit from multiple state social welfare payments.

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For more information, go to:
www.t1p.de/rpww
www.t1p.de/6zs9

Good governance

The use of → *digital technologies* not only boosts efficiency, provides a clear overview and improves the transparency of decision-making, it also creates fresh opportunities for citizens to participate in politics. Thus, digital technologies provide information about opportunities for political participation and also open up entirely new options by establishing 'two-way' communication channels. Helping to shape relationships and interaction between government, civil society and private sector actors in a more transparent, needs-based and participatory manner is not all that digital technologies achieve, however. They also help to make public sector administration processes more readily verifiable, making government more transparent and less prone to corruption. This, in turn, builds trust and strengthens state institutions. Furthermore, digital technologies help to improve decision-making by creating a broader knowledge base *(→ big data)* and getting various actors involved and connecting them.

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

Myth detector spots fake news, Georgia
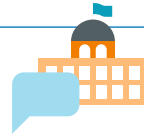
Fake news and propaganda are an everyday occurrence also in Georgia. The country's heavily centralised media system exacerbates the problem. A project of the Georgian Media Development Foundation is working to address this issue, with support from DW Akademie.

The myth detector is a multimedia education programme that aims to expose, detect and analyse fake news and propaganda distributed by the Georgian media. A myth detector lab has been set up with support from DW Akademie. The lab involves two six-week programmes in which students learn how to apply verification tools online, recognise internet trolls and correct fake news. Students are also taught how to create multimedia content. Clips made by the students are published on the myth detector portal and broadcast on private TV channels. The trainers receive training from DW Akademie in a train-the-trainer programme.

Over 70 young people and students have attended the training so far. Nearly 200 fake reports have been corrected on the portal. Many of the trainees remain active on the platform once they have completed the training. TV channels invited students who have completed the training to report on exposing propaganda and some editorial departments have already submitted inquiries for receiving advice. The project is thus achieving results and encouraging media institutions to take action.

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For more information, go to:
www.mdfgeorgia.ge/eng/home
www.mythdetector.ge/en

Monitoring and evaluation information system for local government, Rwanda

Digitalisation rarely starts in rural areas. But in Rwanda, that's exactly what happened. Here, digital solutions have been developed to help decentralised administrations put available funds to more effective use. Strengthening transparency and citizen participation in planning and implementing projects – especially those that build infrastructure and promote social standards – play an important part. The digitalisation of business processes at the subordinate administration levels and solutions to strengthen citizen participation are part of the national decentralisation strategy. The aim is to improve the services of local administrations.

In mid-2016, the Local Administrative Entities Development Agency (LODA) introduced the Monitoring and Evaluation Information System (MEIS) with support from financial cooperation. In addition to monitoring and evaluation, the system makes it possible to manage all core functions related to planning, procuring and implementing municipal infrastructure projects as well as social measures to protect particularly needy sections of the population. In the area of infrastructure development, this includes the planning, construction and operation of health, education, transport and other infrastructure. The technology used ranges from digital procurement systems to online databases and monitoring tools for mobile devices *(→ mobile communications)* to an Android app *(→ app)* that can be used to provide feedback on public hearings.

Since 2016/17, MEIS has been used to collect information on 4,187 citizen concerns, implement 640 projects and create over 235,000 temporary jobs in public projects. Data from all 30 districts of the country can currently be accessed in real time. Providing feedback for the districts also systematically improves the quality of the data, increases transparency and improves the management of infrastructure and of social measures. Reporting has also been standardised, making it more efficient.

For more information, go to:
www.t1p.de/75c3

Digital infrastructure strengthens local administrations, Benin
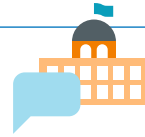
Benin has been pursuing its decentralisation process for quite some time now. Competence development measures are being provided for cities and municipalities, enabling them to provide better care for their citizens. Shifting the decision-making authority to the municipal level enables political decisions to be geared more closely to local needs, the aim being to reduce poverty and grow the local economy. However, the administrative system faces enormous challenges: There is a general lack of digital networking (→ *access*) both between the ministries in Cotonou, Benin's seat of government, and between the decentralised state agencies and the municipalities. Thus, existing digital applications in the area of public finance – for budget planning or procurement, for example – can only be used to a limited extent. Data are often exchanged between administrative units on paper or using external data storage devices. This process is prone to errors and results in significant processing delays.

For this reason, KfW Development Bank, on behalf of the German Government, is funding the establishment of a reliable, safe, high-speed fibre broadband government network and providing equipment for a national data centre for data protection. In the first step, the ministries in Cotonou will be connected to the fibre broadband network and infrastructure of the so-called 'last mile' will be provided to connect the decentralised agencies of the Ministry of Finance.

In the next step, the subordinate authorities of the Ministry of Finance at the prefecture and municipal levels will be connected, using wireless broadband and other technologies.

With financial support from KfW, this will make public financial administration viable and improve information management. Using digital solutions and investment in → *digital infrastructure*, KfW is helping Benin to strengthen key governance structures.

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For more information, go to:
www.t1p.de/gn6x

Blockchain registers, Georgia
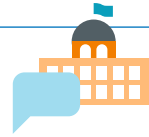
In Georgia, GIZ has joined forces with the government to reform the legal system on behalf of BMZ. Improving legal certainty encourages foreign investment, which in turn promotes sustainable economic development.

State-of-the-art →**blockchain** technology can help out here: The Georgian National Agency of Public Registry (NAPR) is working with the private company Bitfury to make registry entries available digitally using blockchain technology. Integration of the entries into the blockchain guarantees their authenticity. How exactly does it work? A technical solution incorporates official documents taken from land transactions and cryptographic checksums (hashes) of these documents are saved to the secure main registry of the bitcoin blockchain. Data sets are assigned a time stamp that also applies for all subsequent changes to the data sets. These unchangeable documents allow interested individuals to quickly check earlier transactions, verifying the authenticity of documents, such as the claim for real estate property by a seller.

This immutable audit trail, however, is only the first step within a much more ambitious plan. The aim is to complete property transactions entirely using the blockchain – including proving the identity of the buyer or seller. This registry will be based on 'smart contracts' that are properly implemented and supported by appropriate legislation and could completely change the management of land rights in Georgia, transforming the country into a global pioneer in the field of blockchain technology.

This technology can help prevent manipulation and corruption. It also helps boost the trust placed in the legal system by the population and by investors. The fact that one million transactions have already been registered is testament to the acceptance of the system.

Social development

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

Social security

→ *Digital technologies* enable social security systems to provide targeted assistance that are specifically tailored to a particular situation, offering decentralised, and therefore faster, access to data, and facilitating data transfer and analysis. They therefore 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. Digital solutions also allow for medical information services via text message, instant messenger, online office hours or consultations and even deliveries of medication with → *drones*. 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

Digital technologies provide easier access to education and enable higher quality teaching tailored to specific target groups. New and effective digital forms of learning *(→ e-learning)* are enriching educational processes and connecting learners worldwide. Digital technologies allow for the dissemination and acquisition of knowledge even in rural and remote regions.

Social security: Borderless money transfers for everyone, Jordan

For years, Jordan has been a key receiving country for refugees from the neighbouring regions affected by crisis and conflict. Palestinians, Iraqis and Syrians seek refuge in Jordan, which is considered relatively safe. According to UNHCR, the United Nations Refugee Agency, over 670,000 Syrian refugees were registered in Jordan as of mid-2018. Domestic and cross-border money transfers are an important source of income for these refugees and many Jordanian households. However, cashless transactions at banks are very expensive, as are other money transfer services.

GIZ is working together with the FinTech Dinarak to make access to financial services easier for refugees and low-income Jordanians and thus offer them the opportunity to develop further economically and socially. Dinarak has developed a mobile phone-based service for digital domestic money transfers. The service is based on a sophisticated network of agents ranging from large institutions such as exchange offices to small mobile businesses. Customers can register and pay in, send, or receive money with this network. There are 390 active agents in the entire country – 90 of which are currently working in Irbid, where the service started in 2017. In addition to a solid and accessible network of agents, it is important that people know about the service and have the knowledge to make responsible decisions. For this reason, the introduction of a mobile phone-based financial service was accompanied by a comprehensive marketing and awareness-raising campaign.

About 82,000 people have opened an account with Dinarak so far, over half of them in the pilot region of Irbid. Unfortunately, only one third of the users is female, which is significantly below the anticipated 50%. In addition, regular use of the accounts does not yet match the project's expectations. For this reason, there is a focus on developing campaigns that underline the benefits of the service for women.

For more information, go to:

www.t1p.de/gyc5

Social security: Online portal for comparing financial products

Fewer than half of adults in Indonesia and the Philippines have their own bank account. For the poorer sections of the population in particular there is a lack of suitable offers, transparency and knowledge on the topic. Many people also find banks intimidating. The creditworthiness criteria imposed by banks themselves are sometimes too strict and directly exclude poorer people. DEG – Deutsche Investitions- und Entwicklungsgesellschaft mbH – is therefore providing funding to a FinTech start-up that is tackling this problem with an online platform.

The platform already offers people a large and transparently structured, low threshold range of financial products. Ninety financial institutions already participate, making special offers like health insurance policies for dengue fever available throughout the country. In addition, telephone hotlines help answer any questions citizens may have. This lowers the creditworthiness threshold. The platform also offers financial institutions important services in cooperation with financial specialists. Thanks to differentiated risk analyses of potential customers' creditworthiness, the price models for the product can be adapted correspondingly. Such offers provide significant potential for including customer groups that were previously denied access to formal financial services.

This success is not only noticeable for customers who now have access to important services like loans and insurance policies; banks also benefit since the platform generates an increasing share of business volume. This already amounts to 20% of the contracts completed online for some of the 90 partner institutions, underlining the potential as well as the need to increasingly make customised services available to poorer sections of the population as well.

Health: SORMAS – Mobile app for early warning for epidemics, Nigeria

In regions with a weak health infrastructure, it is particularly difficult to detect epidemics early on and contain them in a targeted manner. This is because information is disseminated among the different health facilities and institutions very slowly, since it is usually passed on by phone or by paper. This results in infection patterns only being detected late in the game, allowing epidemics to spread faster. After the experiences of the Ebola outbreak in West Africa in 2014, a digital early warning system was established in Nigeria with support from GIZ.

The Surveillance, Outbreak Response Management and Analysis System (SORMAS) is an →*e-health* system developed by the Helmholtz Centre for Infection Research and the Nigeria Centre for Disease Control. Epidemiological data for ten epidemic-related pathogens can be passed on to the responsible authorities in real time by mobile phone.

For each pathogen there are specific forms and processes to ensure that the information is entered correctly (often a problem with paper forms) and make it easier to trace those who have been potentially infected. This makes it possible to take targeted measures for containing the epidemic. In addition, the system improves communication – from filing a report of a possible disease outbreak by citizens to the verification of the report by the community health workers and the lab up to the Ministry of Health. This ensures fast and robust reporting, and health interventions can be planned and coordinated better. The system is based on →*open source* technology and is undergoing continuous development.

So far, SORMAS has been used successfully to fight outbreaks of monkeypox, meningitis and Lassa fever. As of May 2018, 475 users from various occupations in 155 districts and 80 health care facilities in 15 Nigerian states are integrated into SORMAS using tablet computers.

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For more information, go to:
www.t1p.de/idee

Health: Digital solutions for universal health coverage, Tanzania

Childbirth and the first months of life are still risky for mothers and their newborn babies in Tanzania. Officially, medical care for pregnant women and children under the age of five is free. However, insufficient government funding means that the reality is often quite different. The Tumaini La Mama ('A mother's hope') project supported by KfW Development Bank gives pregnant women, mothers and their newborn babies health insurance for up to six months after the birth. The health insurance is comprehensive and digitally enhanced, which makes it more efficient.

Newly developed software makes it possible to register women using simple mobile phones and to forward their data to the National Health Insurance Fund (NHIF) securely and in real time. The software now handles master data, invoicing and other processes much more efficiently. The women, for example, can be notified about upcoming prenatal examinations, vaccination appointments as well as the beginning and end of insurance cover by automated and personalised → *text messages*. This is free of charge thanks to cooperation with mobile communications providers.

The project has already afforded access to health services to over one million mothers and babies. The reach of the project to more remote areas could be expanded using mobile registration and more efficient digital solutions.

For more information, go to:
www.t1p.de/qdt2

Education: I Am Science, South Africa

When it comes to access to knowledge in South Africa, social and gender inequality are still widespread. This applies to the natural sciences in particular. The I am Science project is addressing this situation using videos for digital dissemination.

Girls from disadvantaged urban regions shoot professional and entertaining videos in natural science experimentation workshops. These videos are then shared on digital platforms where they can be accessed indefinitely. The users of the popular South African learning platform LevelUp can also view the girls' videos in quiz games and win vouchers for data credit.

So far, 17 professionally produced videos have received over 10,000 clicks on Facebook, Instagram and YouTube. Users of the learning app have already used the videos 2,000 times to play the quiz games. Using a peer-to-peer learning approach, the girls' interest is initially sparked by digital dissemination and their self-confidence for engaging with the subject areas is enhanced. In the long term, the aim is for the project to sustainably change the perception of girls and women of colour in science. The videos produced by girls in English and in local languages are an absolute novelty. Through workshops, the project trained 72 girls from eight schools in sub-Saharan Africa to be I Am Science ambassadors and encourage other girls to take an interest in natural sciences.

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For more information, go to:
www.iamscienceproject.com

Education: Digital media skills, Moldova

Conveying digital media skills is undoubtedly an important task. However, it is one rarely undertaken by public education providers. A locally funded DW Akademie project in Moldova pursues a multi-level approach.

In hackthons, local civil society organisations work with experts from IT, media and education to develop digital solutions for handling media in a more well-reflected manner (→ *hackathon)*. A jury ensures the relevance of the problems and contexts addressed by the mobile phone and online tools. Two hackathons have been held since 2016, and there are plans to hold the event every year. At the same time, the Independent Journalism Center in Chisinau enables other organisations to publish materials on media criticism on its Media Azi online platform. In the ethnically and linguistically diverse southern region of the country, the local channel Bas-TV has teamed up with the youth media centre Centrul Mediu pentru Tineri to support child and youth editorial teams. The motto here is 'learning by doing'. The supervisors are trained in on target group oriented and participatory teaching methods as well as video production, social media and digital safety. The videos are broadcast nationwide.

The project's versatile approach makes it possible to establish a critical, broad-based approach to media and propaganda. Topics including digital security and dealing with propaganda now are also an official part of the national curriculum and are offered at 55 primary schools. Secondary school teachers are currently undergoing training in these topics.

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For more information, go to:
www.t1p.de/qwps

Hackathon 2018 information website:
www.hackathon4.media-azi.md

Education: HEdIS – Promoting sustainable and unlimited knowledge, South Africa/Germany

In Germany, there are very few courses that address the challenges and opportunities faced in a globalised, digital age and are also practically oriented. The same goes for the Global South. The Hub for Education on ICT for Sustainability (HEdIS) supported by DAAD addresses this issue in South Africa through international cooperation in the education and industry sectors.

HEdIS is a collaboration between the Carl-von-Ossietzky University in Oldenburg, Germany, the Nelson Mandela University and the University of Cape Town in South Africa, as well as a number of South African and German business partners. The hub explores six sustainability topics, including energy efficiency and waste management, in research and practice-oriented teaching modules that focus on South Africa. With their direct practical orientation, the business partners support structural alignment of the courses on offer with the demands of the labour market. The teaching modules are run in annual summer schools at one of the South African universities. In addition to university students, the modules are also open to staff at the business partners.

The key project objective is to establish the area of Sustainability Informatics in tertiary education. HEdIS promotes active knowledge-sharing and close cooperation of the partner institutions through internationalisation and networking of German and South African universities as well as relevant economic partners.

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For more information, go to:
www.hedis-project.org

Education to go: Shule Direct's Makini SMS self-study platform, Tanzania

In many countries, issues such as outdated teaching materials and underpaid teachers may result in students lacking even basic skills like reading and writing. A project of the Human Development Fund (HDIF) in Tanzania – with support from the UK's Department for International Development (DFID) – is now bringing the curriculum into homes using mobile phones.

Shule Direct's Makini SMS is a mobile revision platform for secondary school students. It is coordinated with the Tanzania Institute of Education and is therefore based on official curricula. The platform was developed with local teachers and is geared to the needs of students and teachers. Students can prepare for exams using multiple-choice questions on specific subjects. The text message system can be used with an access number and a simple mobile phone (→ *text messages)*. This is particularly important as in many regions there is very little → *access* and few → *smartphones*. Schools and parents are actively included – which is also a success factor. Partner schools provide information on the platforms; the children often use their parents' mobile phones for learning. There even are a few children who have successfully passed their exams without ever having attended a school, using only Shule for learning.

Around 800,000 students use Shule. The project will also be supported in marginalised regions. One of the greatest challenges will be to eliminate the current cost of using the platform and offering Shule uniformly via multiple mobile communications providers.

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For more information, go to:
www.shuledirect.info
www.t1p.de/do8z

Economic development and employment

The economic effects of 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 enterprises can use continuing training delivered in the form of →*e-learning* wherever and whenever they want to develop their skills, unleash their creative potential and give birth to new ideas. Easier access to financial services also facilitates implementation of these ideas.

In a production context, digital management systems increase workflow efficiency, reduce costs and pave the way for largely automated production plants *(→Industry 4.0)*. Technologies such as →*3D printing* also make it possible to use local production sites. This creates local jobs and facilitates demand-based production.

Digital technologies, their development and use also constitute an entirely new occupational field in themselves, though suitably trained personnel are essential if potential is to be optimised. In any case, →*e-skills* are essential for developing a competitive national economy; otherwise businesses will fall behind their international rivals.

Promoting digital skills among women and girls, Mexico

Education and social security

In South America, millions of people, especially young women, have no access to training. Many young people are unemployed or work in the informal sector. In these times of digital transformation, the training market is also not oriented to the modern-day labour market. Laboratoria, a social enterprise supported by GIZ, is addressing this issue.

Laboratoria gives disadvantaged young women in South America access to the technology sector. In six-month bootcamps, the participants learn technical and team skills that train them to work as web developers or UX designers. The programme also solves another problem. Tech companies often find it very difficult to recruit suitable staff. These special training courses can help solve this problem. By combining training and direct networking with the technology sector, Laboratoria also supports the company side.

So far, Laboratoria has established training centres in Lima, Santiago, Mexico City, Guadalajara and São Paulo and has successfully placed its graduates at over 250 leading companies. Nearly 1,000 women have completed training since 2015. Over 80% of them were able to find a job in the technology sector thanks to the digital skills they acquired. They thus serve as positive role models for other women and girls and demonstrate that jobs in the digital industry are also attractive for women. The young women only have to pay for the training once they have found a permanent job. Laboratoria is part of the G20 initiative #eSkills4Girls, which promotes digital skills for women and girls around the world. #eSkills4Girls is being implemented at a multilateral level through the work of the EQUALS multi-actor partnership (The Global Partnership for Gender Equality in the Digital Age). In 2018, Laboratoria received an 'EQUALS in Tech Award' in the 'Skills' category, which BMZ jointly chairs with UNESCO.

For more information, go to:
https://www.laboratoria.la/en
https://www.eskills4girls.org/
https://www.equals.org/

Access to finance for smallholders, Uganda

Over two thirds of Ugandans work in agriculture. Agricultural yields account for an average of one quarter of GDP. It is therefore important for smallholders to increase yields in order to generate more income and improve their standard of living.

Completing banking transactions and accessing finance have been a challenge for smallholders to date, however. For this reason, GIZ in Uganda is cooperating with the local coffee purchaser Ibero Uganda as part of the develoPPP.de programme. Ibero Uganda developed a digital management system that can be used to track the production and sale of coffee. The creditworthiness of coffee farmers can be verified with an assessment and quality check. Once coffee farmers are approved, they qualify for pre-financing. This financing can be an 'agronomic input' – such as fertiliser – or a direct cash payment. Farmers who have registered digitally receive information via →*text messages* on the quantity of coffee sold or the status of the application and are able to query their repayment schedule using a USSD code. It is important for the farmers to receive the pre-financed input promptly and be able to use it in line with good agricultural practice. Repayments are geared to the agronomic calendar, that is, the harvest and selling times, and can be made in a number of different formats such as mobile money *(→e-payment)* or cash. The system gives farmers and buyers a simple, transparent overview of the marketing and pre-financing processes in the coffee value chain. For Ibero, linking up pre-financing to a digital application means it can easily access data, which improves monitoring and reduces the risk of default. Farmers receive additional access to agronomic inputs, financing and information.

Since the start of the project in 2017, around 2,500 coffee farmers in central Uganda have received access to pre-financing through this programme. Another 3,000 are to be added in the next cycle (March 2019).

TruBudget – transparent and manipulation-proof transactions using blockchain technology

When it comes to using public funds in particular, transparent and manipulation-proof documentation of work processes and investments is vital. Risks due to misappropriation of public funds must be excluded. Digital innovations help to achieve this aim. With TruBudget, a digital work platform developed by KfW Development Bank, technical advancements are leveraged and the special features of →*blockchain* technology are used for transparency and protection from manipulation.

On the TruBudget online platform, participants can collaborate on all operational and adaptation steps of each project. Every entry on the platform is recorded in an immutable ledger, which enables all participants to detect manipulations immediately. This not only gives all parties (donors, ministries, companies, etc.) an efficient work tool, it also provides round-the-clock access to secure and confidential data related to project implementation and payments. The increased transparency therefore reduces transaction costs, curbs corruption and renders large parts of reporting obsolete.

The Brazilian development bank Banco Nacional de Desenvolvimento Econômico e Social (BNDES) is currently testing this blockchain technology together with KfW Development Bank. BMZ is also supporting additional pilot trials of TruBudget in Africa, for example in Burkina Faso among others. Designed as free software *(→open source)*, TruBudget is available to all interested parties. KfW Development Bank plans to establish a user and developer community.

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For more information, go to:
www.t1p.de/rpww

YouTube video documentary:
www.t1p.de/6zs9

Modern youth, Iraq

Lost time, a shortage of work and a lack of prospects are serious issues for refugees – especially when they have lived away from home for years. Open spaces where refugees and the local population can learn new skills together, implement projects creatively and find access to work opportunities can close gaps and offer them future prospects.

In Iraq 'makerspaces' are being established in the three provinces of Basra, Baghdad and Sulaimaniyya, with support from GIZ. These spaces offer young people in particular training on programming, graphic design and website development. In these 'digital workshops', modern technologies and machines such as 3D printers *(→ 3D printing)* are available for the joint development of new ideas and projects. Innovative approaches for brainstorming such as 'design thinking' (see section 3.4) and training on economic principles are also offered. The aim here is to empower as many young people as possible to learn skills that are in high demand around the world so they can find employment in a future-proof profession.

Once training is completed, it's time to find a job: To help young people get a foot on the career ladder, makerspaces help them contact local companies or start their own businesses. Shared match-making programmes are therefore developed, for example, to link up companies and suitable trainees.

Sustainable infrastructure
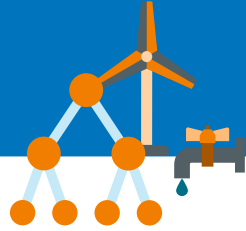
→ **Digital technologies** can play a key role in making infrastructure sustainable. For example, they provide numerous ways of handling resources more responsibly and reducing damage to the environment, e.g. through the use of intelligent electricity grids or more environmentally compatible production processes. → **Smart cities** use millions of sensors and all kinds of communication channels to manage traffic flows efficiently and thus reduce greenhouse gas emissions. Digital technologies are also indispensable for water management, being used to develop weather forecasting models, gather data on water resources and plan, manage and secure access to supplies to meet users' needs.

This type of infrastructure requires special attention because it needs to be fully secure to prevent any unauthorised access or manipulation by outside agents (→ **cyber security)**. At the same time, it must protect the data (→ **data protection)** of anyone whose movement profiles are used to operate and improve systems. Furthermore, sufficient competences (→ **e-skills)** must be available for monitoring and operating such infrastructure.

Responsible mining of resources, DR Congo
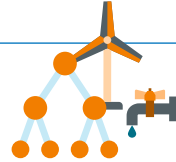
Over 240,000 small-scale miners and their families live primarily from mining gold in the eastern provinces of the Democratic Republic of Congo. However, 90% of mining and trade activities are conducted unofficially. This means that every year gold valued at around USD 600 million is smuggled out of the country, which means that the government misses out on significant tax revenue. Human rights violations are also ever-present. In order to promote the responsible extraction of natural resources, BMZ has commissioned the Federal Institute for Geosciences and Natural Resources (BGR) with a project to boost transparency in gold supply chains.

Since late 2016, the use of combined hardware and software solutions for improved traceability has been tested in the Kampene Gold Pilot project. Digitalisation of the documentation of the supply routes, which was previously paper-based, enables information to be accessed from a centralised location. All of the supply chain participants are registered with an electronic tag and must verify their activities by logging into the system. The mining authorities use the system as a monitoring tool. Individual gold deliveries are registered with special positioning chips. Data of the individual deliveries – such as the amount, date, time and geodata – are recorded and stored to a central database along formalised trading points.

So far, around 5.5 kilogrammes of gold have been registered. The equipment used is particularly robust and especially adapted to climate change as well as the unreliable network coverage in the region.

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For more information, go to:
www.t1p.de/3fzj

Using data to fight droughts, Namibia
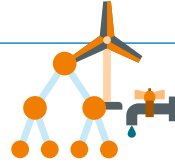
Like many other countries in southern Africa, Namibia has been fighting serious drought for the past five years. The authorities have therefore repeatedly put massive restrictions on water use in the capital Windhoek and in specific cases have also monitored compliance by helicopter.

This makes it all the more important to strategically plan and use groundwater reserves in the region. The GROWAS II database system – which has been developed by BGR since 2012 – makes it possible to collect and assess important observation data over longer periods. For the first time, Namibian hydrogeologists have a viable tool for storing all groundwater-related information such as point data, time series and area data. The database is used by both the Ministry of Agriculture, Water and Forestry, which is responsible for water management, and the national water supplier NamWater – an important step for streamlining the exchange of data between the supervisory authority and suppliers.

The supervisory authority is also in charge of awarding water concessions, which are required for Namibian farmers who wish to drill wells on their property. GROWAS II data provide information on the number of concessions already awarded in the region. These applications for drilling and extraction concessions are now processed five times faster using the centralised database. The quality of the work has also improved, since decisions can take account of additional measurement data.

The database can be used free of charge and the infrastructure can also be utilised by other ministries. In addition, the open software is constantly being developed further. In future, it will be possible to access some of the data records by mobile devices and farmers will be able to upload their own measurement data.

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For more information, go to:
www.t1p.de/2fh9

Smart card for clean drinking water, Tanzania
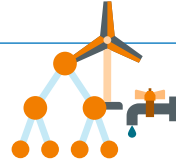
In Tanzania, half of the population does not have access to clean drinking water. Corruption and non-transparent water prices are part of everyday life in rural regions where water is very scarce. A Human Development Fund (HDIF) project that is supported by the UK's Department for International Development (DFID) in Karatu, Tanzania, is establishing a transparent and reliable water supply.

Revolutionising Remittance Recovery in Water (R3W) has made municipalities directly responsible for managing water and decision-making. Previously, the origin of the water supply was unclean, and water often was not potable. In addition, the monthly bills issued by the municipalities lacked transparency and were sometimes inflated. Today, citizens are able to get their water themselves from separate, solar-powered water kiosks. They use a card to pay directly for the water. Citizens are able to top up their cards at the kiosks or using their mobile phones, which allows them to keep track of spending. Consumption can then be recorded centrally, which safeguards a reliable supply of water for everyone.

Kiosk operators are members of the Community Owned Water Supply Organisations (COWSOs) that are also responsible for maintenance and quality management. Technicians receive special training in the municipalities.

Using this local approach, R3W has created a system that stabilises water prices, regulates the quality of the water and ensures constant availability.

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For more information, go to:
www.t1p.de/gud9

Digital infrastructure

→ *Digital technologies* offer huge potential. Digital services pave the way for further development and progress in almost every conceivable domain – health, education, security, environmental protection, industry, etc. They also make processes more efficient, enable better access to information – which improves decision-making –and open up access to services.

However, if the potential of digital technologies is to be fully exploited, they must be accessible *(→ access).* This constitutes a challenge because digital infrastructure is expensive to establish and many areas still do not even have electricity. As a result, every second person around the world is still 'offline'. These people remain partially or totally cut off from the benefits of digital transformation, creating 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 objective of German DC. However, access to → *digital infrastructure* is not the only obstacle. Suitable solutions also need to be available and people need to know how to use them *(→ e-literacy; → e-skills)*.

SupaBRCK – Reliable and affordable internet, Kenya

Less than one third of people in Africa have →*access* to the internet. The main reasons for this are the lack of availability, especially in remote regions, and high usage fees. The Kenyan start-up BRCK has developed SupaBRCK and PicoBRCK to offer affordable internet in remote areas and enable data updates from these regions.

The SupaBRCK router enables the wireless transfer of data even in remote regions using a battery-operated WiFi box that acts as a 3G hotspot and an off-grid server. An integrated microserver stores cached content that users can access at any time without an expensive internet connection. Multiple high-speed modems can be connected to the routers at the same time, offering a large storage volume, which further extends network coverage. The rechargeable battery runs for ten hours, which makes it possible to overcome frequent power outages without internet disconnection. SupaBRCK can also be used for health systems in rural areas.

PicoBRCK was specifically developed to connect physical sensors and devices to the internet, enabling activities such as monitoring water services, locating animals or transferring weather information in real time.

BRCK currently offers the free WiFi platform, Moja, and has installed free WiFi in 1,000 public transport vehicles in Kenya and Rwanda. Users only need to connect to Moja to immediately surf the web or access previously stored content.

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For more information, go to:
www.brck.com

Internet access for rural communities, South Africa

In Africa, only about 22% of the people used the internet in 2017. In rural areas, in particular, there is a lack of affordable → *access*. As there is little potential for income here due to the lower population density and purchasing power, developing the infrastructure is particularly expensive. For this reason, the economy is not investing sufficiently in the infrastructure. Media Monitoring Africa with its initiative Shika Moto in southern Africa is taking a municipality-oriented approach. The initiative is supported by the fesmedia Africa project of the foundation Friedrich-Ebert-Stiftung (FES).

Shika Moto is based on two pillars: One pillar relies technologically on meshing. WiFi routers from Shika Moto can be placed on roofs of houses and can be linked up very easily into a network that can cover a few villages. Even without internet access, all participants can use the Shika Moto app *(→ app)* to chat, exchange files and access central information. If the network is able to access a mobile communications network *(→ mobile communications)*, the internet access can be distributed to the entire network. The second pillar is the community. This pillar places the routers and buys data volume as a group. This enables free access to websites jointly selected by the community *(zero-rating)*. These websites are stored in the Shika Moto network and when accessed only have to be updated. This reduces the volume of data, which saves money. Separate data must be purchased from the community for access to additional websites. Scale effects also allow for savings.

Zero-rating enables access to be granted to poorer people. However, a critical aspect is the fact that third parties determine which information and services are available to these people, which could allow opinions to be manipulated. Part of the implementation therefore is also to sensitise the community to this. In addition, it should be kept in mind that the capacity of such a network is limited. As long as many people do not have affordable access to broadband networks, Shika Moto offers small, low-income communities the opportunity to partake in the digital world.

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For more information, go to:
www.shikamoto.org

Mobile communications for rural areas, Myanmar
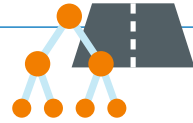
In 2014, only 14% of the over 56 million inhabitants of Myanmar had → *access* to the mobile communications network. Enabling people in rural areas in particular to participate in digitalisation urgently requires expansion of the mobile communications network. For this purpose, DEG is financing a partner company to set up mobile phone masts and operate them as a private business.

So far, the company has set up and installed over 2,000 masts, which are helping to ensure that 50% of the population now have access to the mobile network. In rural areas in particular, expansion of → *mobile communications* plays an important role in promoting economic development, for instance, by offering access to mobile financial services and other services. Many daily challenges of the rural population, such as a doctor's visit or paying for a service can now be handled more easily by digital consultations and mobile phone. In addition, installing and maintaining the mobile phone masts have created around 1,000 jobs. The company offers continuous training for all employees and is making an important contribution to transferring technical and business expertise. In 2017, for example, the staff received training on anti-corruption, leadership, English, health and occupational safety.

Due to this success, DEG has granted an additional USD 12 million for the operator of mobile phone masts to further expand the network. By 2019, the partner company plans to erect and install a further 3,000 masts to get even closer to its goal of full network coverage.

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For more information, go to:
www.t1p.de/eph8

Security and reconstruction

Especially in fragile contexts, → *digital technologies* provide new ways of collecting important information and making it available. One area to benefit from this is project monitoring, which is difficult to implement by conventional means, due to security concerns or a lack of infrastructure. Such monitoring is particularly useful for the local population however, because it provides them with potentially life-saving information in times of crisis. Contributions by the locals affected and volunteers *(→ crowdsourcing)* make this information more accurate and more readily available than if the relevant agency were to provide it. For example, in recent natural disasters and crises, citizens have used social media tools like Facebook and Twitter *(→ social networks)* to share information to great effect. Of course, this swifter flow of information also helps governmental and non-governmental organisations to distribute updates on security matters.

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 see fit, cut off internet access and only disseminate desired information. In fragile contexts, therefore DO NO HARM is the guiding principle and the population must be protected, whenever possible, and not put in any further danger.

Mobile reporting: Cross-border journalism for refugees, South Sudan/Uganda

People affected by displacement and conflicts often find it difficult to obtain reliable information from their home countries. Rumours, misinformation and a lack of information also unsettle their relatives in the home country. A radio network in the border region between South Sudan and northern Uganda aims to change this.

The Cross Border network, which is being supported by DW Akademie, was initiated by 20 local radio stations based on the direct needs of the population. The stations share posts with the network. Two editors check the reports and prepare them for broadcasting. They are then put back into the network via a cloud folder. The other channels can make the reports available to their listeners in local languages. At refugee camps, the refugees gather around the few transistor radios. The information is then passed on by word-of-mouth and community leaders.

The radio is a key source of information since many of those affected cannot read or write. Local stations in particular have the population's trust. In multilingual regions, radios also broadcast in multiple local languages. As part of the project, South Sudanese media workers living abroad are also being trained as mobile reporters. They are connected with stations in the receiving country to report for and about South Sudanese refugees. These reports can also be accessed on the network's own website.

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For more information, go to:
www.crossbordernet.org

Arabia Felix – Gaming for peace, Yemen

Living in the midst of a civil war has become normal for people in Yemen. Mined roads, rocket attacks, bombing and kidnappings pose heavy challenges for the local population but also for international cooperation's efforts to achieve peace. How should dialogue be fostered when there is no protected space? In collaboration with GIZ's Academy for International Cooperation (AIZ), the GIZ project Peace Support Yemen motivates young citizens to become actively involved in their country's peace process – using their mobile phones. To do so, GIZ deploys →*gamification* through Arabia Felix.

The mobile game series Arabia Felix was developed for and with Yemeni citizens. For this purpose, the Amsterdam-based social design organisation Butterfly Works is leading a co-creation process (see section 3.4) with local developers, gamers, writers and designers in Yemen. The team works together intensely from the design to the implementation phases. Game scenarios, characters and sound effects are also developed locally to ensure needs orientation and local ownership. In Arabia Felix, the players lead their country from conflict to disarmament through different levels, promote dialogue and reconciliation and celebrate ambition and diversity. In addition to improving conflict management between hostile sections of the population, the objective is to establish a community for peace-building dialogue. A Facebook fan page connects the growing community through videos, discussions on the Yemeni culture and creative approaches for rebuilding the country.

The Arabia Felix games have already been downloaded over 46,000 times from the Google Play store. The team is currently working on integrating performance assessment surveys.

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For more information, go to:
www.t1p.de/ui4k
www.t1p.de/uerr

Blockchain technology assists in times of need, Jordan

Cash transfers are frequently used in DC. However, having banks and other financial service providers as intermediaries for this form of money transfer generates high transaction costs and results in data security being poor. →**Blockchain** technology now allows the United Nation's World Food Programme (WFP) to pass on financial aid to beneficiaries at the Azraq and Za'atari refugee camps in Jordan more securely and effectively and at lower cost.

Refugees are able to buy supplies with biometric identification (iris scans) and blockchain technology. The blockchain, a specially structured, manipulation-proof database, is used as a payment system for purchases. Thanks to the secure bundling of information via the blockchain, the WFP is able to significantly reduce the number of transactions financial service providers use to process purchases, which considerably reduces transaction costs and significantly increases data security.

In May 2017, the WFP launched its pilot project and reached 10,000 beneficiaries with this payment system. The project has now been expanded so that 106,000 people benefit. By July 2018, over 900,000 transactions had been carried out for over USD 21 million, slashing bank charges by up to 98%.

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For more information, go to:
innovation.wfp.org

Financial support for Syrian refugees, Turkey

In 2017, there were around 68.5 million refugees worldwide. Most of them are internally displaced, however one third have left for neighbouring or more distant countries. No country has accepted more refugees than Turkey: Around 3.5 million people fleeing from the war in Syria are now stranded there. Many of these refugees had to leave everything behind and rely on support from aid organisations.

Time and again, aid workers are faced with the dilemma of deciding who is most in need of financial support and how to transfer cash securely. Welthungerhilfe uses a combination of different digital tools in Turkey for this purpose. Information on potential beneficiaries is gathered and stored in mobile data collection systems. These data are automatically analysed and scored to identify families most in need of aid. Payments are also made using digital technology, crediting an electronic payment card that is similar to a debit card. This card can be used to withdraw money from cash machines or to purchase goods in shops. The beneficiaries are free to choose what to do with the money – pay rent and electricity, buy food, an oven or clothing for the winter.

Since early 2016, the programme has already helped 27,000 Syrian families (162,000 people) that are most in need, paying out a total of around EUR 30 million. In 2018, around 8,000 families received financial support for the winter months.

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For more information, go to:
www.t1p.de/kf7k

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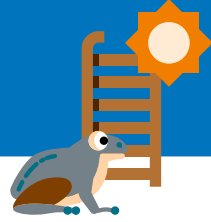
→ *Digital technologies* can be used to collect, structure, classify and analyse large quantities of climate data and make them accessible to the public. Only on this basis can evidence-based statements on climate change be made. Likewise, any response to climate change, such as global emissions trading,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

When planning to use such technology, however, we need to look at both sides. Digital technologies consume huge amounts of electricity that is often generated in ways that exacerbate climate change. Hardware is often manufactured using natural resources extracted in ways that harm both people and the environment. And of course, such processes generate mountains of hazardous waste *(→ e-waste)* that is not only toxic, but is often recycled in ways that are, again, detrimental to people and to the environment.

Drones against climate change in the Mekong Delta, Viet Nam
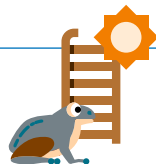
The Mekong Delta is home to 17 million people, Viet Nam's third-largest business hub and one of the world's most important rice cultivation areas. The delta is at risk of being wiped out by climate change, however. The region must therefore be protected from flooding and erosion. Accurate data aim to help monitor the area. However, generating data on the condition of the coast and mangrove forests in the region, which is dominated by mudflats, is quite difficult and time-consuming. A GIZ-funded project is working with →*drones* to carry out this very task.

Using drones saves time and money and allows the government authorities to provide accurate data on the current situation in remote regions in particular. Processing and analysing data from the drones enable rapid monitoring. Instead of collecting data for days at a time, the drones provide them in real time. In addition, the detailed drone data are of much higher quality than GPS-based satellite images and are also tailored to needs. This is very helpful, for example, when a decision needs to be made about where to target investment in the region.

In the first six months of 2018, the drones took around 17,000 pictures from about 200 metres. Once they were joined up, the images yielded a map of a coastal section of 10,770 hectares in three coastal provinces that are home to around 5,275 hectares of protected mangrove forest as well as adjoining mud flats, dykes and hinterland. In future, the use of drones will help monitor 590 kilometres of coastline and 530,000 hectares of mangrove forest in four coastal provinces, which will support decision-making processes.

For more information, go to:
www.t1p.de/tg88

Digital management platform protects rainforest, Brazil
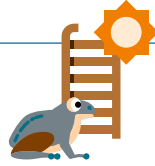
Although deforestation rates in Brazil have declined by nearly 80% since 2004, an area nearly three times the size of Luxembourg is still being cleared every year in the Amazon region alone. This results in major environmental and developmental issues in the Brazilian Amazon region and the adjoining Cerrado forest area. Since 2009, Brazil has had a legally enshrined climate policy that also includes initiatives for addressing deforestation. The environmental registry (Cadastro Ambiental Rural –CAR) is making a major contribution to effective forest conservation. KfW Development Bank provides financial supports for the registry.

CAR is an environmental registry that includes information on how a property's land is used. It therefore also covers data on compliance with legally prescribed protection and use areas. Anyone who owns or uses the land must register with CAR and provide electronic information on how the land is used. These data are compared to satellite images and then stored in the online platform Sistema Nacional de Cadastro Ambiental Rural (SICAR). In so doing, KfW Development Bank assists small land owners in registering with CAR and in developing plans for rehabilitating deforested areas.

So far, an area 13 times the size of Germany has already been registered in 5.4 million entries on the SICAR platform. Despite the challenges described, the development of the online system constitutes a major step towards conservation of the Brazilian rainforest.

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For more information, go to:
www.t1p.de/byrm

Satellite-supported fishing monitoring, Mauritania
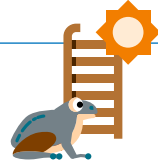
Fishing is an important source of income for Mauritania, accounting for 5% of GDP. Around 55,000 people live from fishing – either from fishing in coastal waters or working in the fishing industry. The sector provides a livelihood for around 300,000 family members. However, the fish stock in Mauritania's waters is threatened by overfishing and illegal fishing. Mitigating this problem is one of the objectives being pursued by KfW Development Bank on behalf of the German and Mauritanian governments.

KfW provides financial support for the development and establishment of a satellite-supported monitoring system, combined with radar stations dotted along the coast. The system also funds surveillance and patrol boats, the optimisation of databases as well as the construction of radar systems and boat moorings. These investments in infrastructure, equipment and training particularly support the coast guard (Garde Côtes Mauritanienne – GCM), which is tasked with enforcing fishing legislation. All operators of the industrial fleet – whether they fish in open seas or on the coast – are required to submit information using the coast guard's vessel monitoring system. The most important of these data are the exact coordinates of their positioning. This is the only way they can obtain a licence to operate in Mauritanian waters. The GCM can use this information to control the surveillance boats and identify illegal trawlers that are then stopped by the surveillance boats. This package of measures protects fish stocks, including endangered species, from overfishing. These measures prevent illegal activities, thereby protecting Mauritania's economic interests.

These measures are producing results: Illegal fishing, which used to be commonplace, has now largely fallen by the wayside. This secures the regeneration of fish populations and the country's future to a large degree. Using digital systems, for example, the project achieves two objectives at once: it conserves species while securing the livelihoods of many thousands of people.

For more information, go to:
www.t1p.de/0pak

Visions of the future

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 in partner countries of German DC too. The 'mobile miracle' in particular exemplifies the sea change that → *digital technologies* have brought about. Today, in the blink of an eye, millions of people can access a wide range of services that previously were non-existent or were beyond their reach. Many of them have been presented in the inspiring projects described above.

DC's main focus is currently on systematically harnessing the new opportunities that have opened up for our own project work, making digital technologies available, supporting people and innovations in our partner countries, further developing their capacities in an iterative manner and in this way enable them to participate in shaping digitalisation.

This will undoubtedly generate fresh impetus based on new technologies, innovative ideas and open integration into DC and government work.

The following visions of the future described will give you some food for thought and provide a snapshot of things to come.

3D printing and computer-controlled milling: The industrial revolution in local production
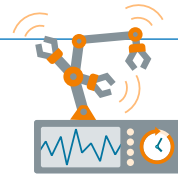
The number and intensity of natural disasters has jumped drastically in recent decades, hitting developing countries particularly hard. Millions of people lose their homes as a result – in addition to those who are already refugees or permanently live in slums. →*3D printing* could offer an inexpensive and fast solution for the over one billion people worldwide without a fixed roof over their heads: a house made of concrete in under 24 hours, basically at the push of a button. The ICON construction company is planning such a project and has teamed up with the NGO New Story for 2019 in El Salvador. The first houses are already being 'printed' in China today.

With 3D printing, a digital print model is created on the computer using special computer-aided design (CAD) software. This model is then built by the printer in layers. A large variety of materials can be used in this process: plastics, resins, metals, concrete, ceramics or even human cells. Synthetic material made from recycled plastic waste can be used as well. In computer numerical control (CNC) milling, on the other hand, material is cut away. This, for example, allows for the creation of durable metal parts at the touch of a button.

The revolutionary dimension in both cases is being able to share and improve digital models worldwide and then create as many copies of the real objects as you like. Today, hundreds of 3D models are already available under →*open source* licences. These print models are of particular interest to developing countries since they are available for free and give innovators (or 'makers'), the freedom to be creative and pave the way for open manufacturing.

This technology offers great potential in a natural disaster scenario, where there is often a lack of medical equipment. In the wake of earthquakes in Haiti (2010) and Nepal (2015), the NGO Field Ready used 3D printers on site to produce urgently needed goods such as cannulas, pipe clamps, bottles and incubators. Without 3D printing, it often took weeks or even months to deliver a sufficient quantity of these items to remote areas. The on-site printer shortens the supply chain significantly.

Technology centres called 'makerspaces' and 'fablabs' (open fabrication laboratories) are increasingly making 3D printing available around the world. From 2006 to 2016, the number of makerspaces grew fourteen-fold – to over 1,400 such microfactories with digitally controlled machines. In these spaces, makers and (social) enterprises create new solutions and prototypes that are tailor-made to match the local needs. This is a promising development indeed in emerging and developing countries that often rely on foreign imports or are cut off from value or supply chains. trendradar_2030, which is supported by BMZ, therefore sees the maker movement as one of only four digital megatrends for achieving the Sustainable Development Goals (SDGs). Vital goods and replacement parts can be produced locally. New operator and business models are being created that strengthen local value creation, disseminate open innovations around the world and generate jobs.

BMZ has supported the MakerNet initiative for this purpose. Here, multiple technological and civil society organisations have joined forces: Field Ready, Gearbox from Kenya, Kumasi Hive from Ghana, Civic and CoStruct. The organisations have demonstrated that it is worthwhile producing medical devices and replacement parts in Kenyan makerspaces instead of importing them. Not only were the products competitive in terms of pricing, they were also better adapted to local needs, were produced faster and created new jobs.

Now, the prerequisites for broadening the scope of the production transformation must be put in place, particularly in developing countries: training for computer-aided design and (open) business models, better political frameworks for local production and value creation, global libraries for open-source 3D models, such as for medical devices, as well as the establishment of 3D printing hubs and makerspaces with corresponding machine parks. Massive technological advances are anticipated for 3D printing and for computer-based milling. Futurologists like Jeremy Firkin assume that the price will continue to drop exponentially while production speed and accuracy will continue to increase. The industrial revolution in local production is upon us – for a wide range of objects as diverse as cannulas, prostheses and houses.

For more information, go to:
https://www.trendradar.org/en/trendradar-2030/

Artificial intelligence in digital development: from fantasies about the future to real-life challenges and opportunities
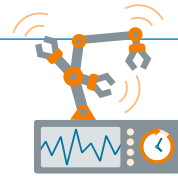
Will my smartphone *(→ smartphones)* soon guide me to the nearest water source and tell me about hazards on the way? Will we soon be warned in time before the next drought or informed how to choose alternatives for cultivating grain? People around the world are enthusiastic about the possibilities offered by new technology and the globally burgeoning collection and distribution of massive amounts of data. We can expect innovations ranging from self-driving cars to drone-controlled agriculture. Algorithms that work with large volumes of data to autonomously predict possible changes to the climate or health sectors fall into the realm of *→ artificial intelligence* (AI).

DC is already seeing a few pilot projects that use AI applications to solve local problems – the current focus is mainly on areas such as agriculture, health and geoinformation. One such example is the Red Cross Red Crescent Climate Centre, which works together with the Nangbéto Dam in Togo. For their work, the team combines manually measuring precipitation data with a self-learning algorithm to identify the long-term risk of the Togo river flooding. Such systems can also help to predict natural disasters in countries lacking in infrastructure and make the required preparations.

However, the purported intelligence of machines must be controlled by humans if digitalisation is to be fair. Key actors of the Global North are currently establishing themselves in developing countries. Google, for example, is opening an AI centre in Ghana and IBM is setting up a research centre in Kenya. This offers both opportunities and risks. On the positive side, AI computing and think tanks are also being created in the Global South and are taking account of the local context in their future development. The negative aspect, however, is that the number of data monopolies establishing themselves on the world stage is limited to a few key players. They benefit from a 'self-enhancing effect': The enormous amounts of data they can access enable them to make better predictions and offer better services. More people are therefore using their services, which in turn generates even greater volumes of data and improves predictability. In addition, many countries of the Global South are themselves only consumers of the technology, and their own norms, values or culture are not considered for developing AI.

When we talk about the future commitment of development organisations for AI, it is also imperative that we discuss the issue of sustainability in greater detail. To what extent can AI solutions be funded locally after the end of the project and can the technology be maintained? Artificial intelligence also relies on a large and growing volume of data. In countries of the Global South, however, less digital data are produced in general since many people there lack → *access* to the internet and → *digital technologies*.

How can DC sustainably counteract this trend? This situation has already given rise to several fields of action. First, it is essential for there to be more locally developed solutions. For AI to be deployed in a worthwhile manner, it is essential to find needs-oriented solutions that are put into practice locally. To this end, investment in training and business options in these places must happen today in order to ensure a seat at the AI table tomorrow. Secondly, the barriers to accessing AI must be lowered for the population, the research community and for companies in these countries, for instance, by investing in → *open source* and open data approaches.

Thirdly, data sets and algorithms must be transparent so that companies and relevant research centres can work together effectively, especially when it comes to shifting the focus to taking account of and monitoring civil and human rights (such as banning racist AI systems) and fostering civil society commitment. The results of global and German AI initiatives are also helping to compile initial guidelines.

To conclude, an exciting future application: AI offers radical new opportunities for automating (real-time) speech recognition and translation. This could be an important 'key innovation' for digital DC/IC of the future. Aside from the large internet companies, players such as Mozilla and local research institutions like the Centre for Artificial Intelligence Research (CAIR) in South Africa are already active in this field. Open-access and inclusive AI-supported speech recognition and interpretation can potentially be used to ensure that 'no one is left behind'. This could be particularly useful in regions that are multilingual or have high illiteracy rates.
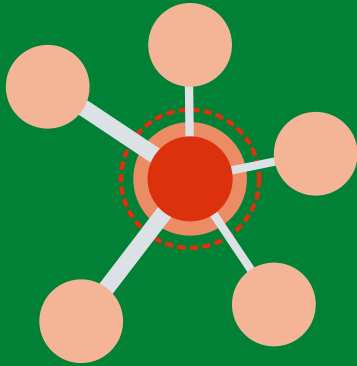
Managing
Digital Projects

**Tools to support strategic planning
and implementation**

Managing digital projects

Using digital technologies to strategically manage DC and IC projects can sometimes be complicated. This section contains practical tools that will help you to plan and implement such projects.

This section serves as a guide, enabling you to see project management from the perspective not only of DC/IC, but also of the digital sector. The digital principles outlined in section 1.3 constitute an overarching reference framework.

Specifically, this section includes the following:

- **Digital readiness:** Check the local conditions for digital projects:

  - **World map:** What is the situation like in our partner countries?

  - **Self-test:** How far along is your target group?

- **Different methods of participatory project development from the digital world:** *co-creation, design thinking* and *scrum*. These methods will help you better understand the digital ecosystem and the behaviour patterns of its actors. They will also enhance inspiration and creativity, presenting useful examples to enrich your own approaches to project management.

- **Checklists** to help you contextually plan ongoing or new digital projects, to identify weaknesses and generate an awareness of the range of influential factors that need to be taken into consideration.

- **Support for planning, developing and implementing** digital projects or forthcoming projects/programme components, as well as for amending/developing existing digital projects.

- **Tips and tricks** for designing tenders.

BEFORE YOU START – A FEW KEY PRINCIPLES

The latest does not always mean the best.

The latest and most popular → *app* is not always the best choice. In the partner country, observe how and why certain digital applications are universally adopted, 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, → *access*).

Do not forget about the analogue world.

Very often, the most promising and inclusive approaches for reaching different user groups seek to combine new and old technologies. Imagine the information portal as a project. It will be easier to reach younger urban user groups using → *social networks*. Older or rural user groups, on the other hand, can be better reached through radio and newspapers.

World map of digital readiness:
Status of German digital development in partner countries
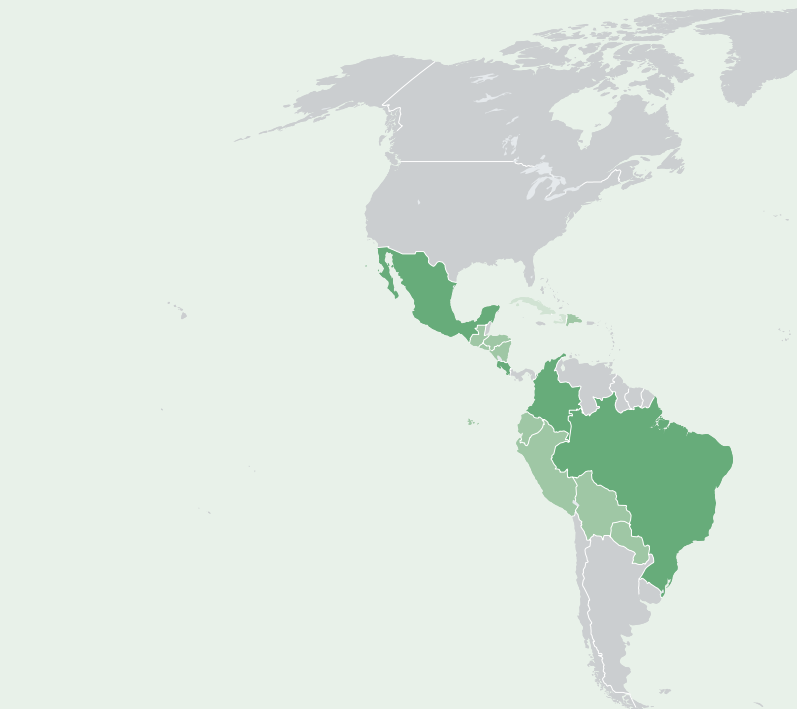
Depicted here: Partner countries of German DC

The prerequisites for using digital technologies are …

0 to 3	… very restricted
4 to 5	… restricted
6 to 7	… in place to a large degree
8 to 10	… very good
	No data available

Detailed information is available in the ICT Development Index (IDI)

3.1.1
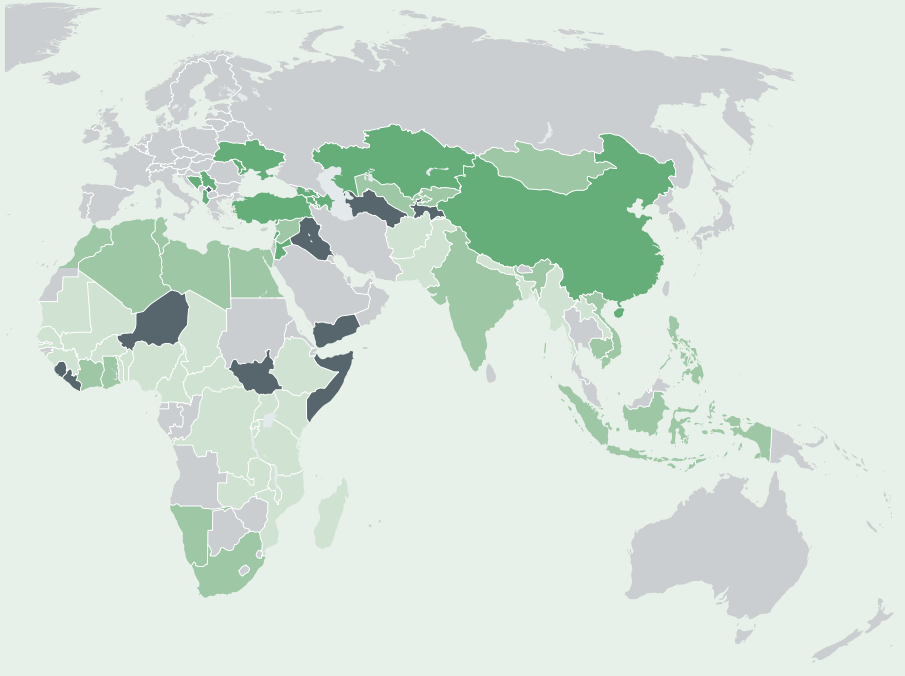
How conducive are the conditions for digital projects in 'my' project country?
One possible answer is provided by the United Nations International Tele-
communications Union (ITU)'s ICT Development Index (IDI), on which this
map is based. This index determines the → *digital readiness* of over 176 coun-
tries and includes an assessment of access to the internet and the prevalence
of digital skills *(→ e-skills)*.

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Links to the IDI and other relevant indices:
ICT Development Index (2017): www.t1p.de/s4yb
Global Open Data Index (2016): www.t1p.de/4r6q
Networked Readiness Index (2016): www.t1p.de/jitw

World map digital readiness   **3.1.1**

This test will help you to ask the right questions to determine the → *digital readiness* of your target group and will help you to design digital change processes successfully. You can also recognise the level of complexity that is possible in your digital project.

The test differentiates between the dimensions relevant for sustainable development projects of an individual, an organisation and society. For the test, you have to rate the individual statements according to the scale and tally the points:

5 points: The statement is **completely true**.
4 points: The statement is **mostly true.**
3 points: The statement is **rather true**.
2 points: The statement is **rather false.**
1 point: The statement is **mostly false**.
0 points: The statement is **completely false**.

In order to assess the correct number of points, base it on a combination of your own experience and research and interviews with representatives of the target group.

Always keep the following questions in mind when assessing the statements:

→ What impact should the project have on the users?

→ To what extent can the project benefit from the targeted use of digital solutions in the long term?

Digital readiness: Individual level

The target group regularly uses digital applications and systems.

Scale:	0	1	2	3	4	5	points:

The target group is skilled at handling mobile devices.

Scale:	0	1	2	3	4	5	points:

The target group has a positive attitude towards digitalisation.

Scale:	0	1	2	3	4	5	points:

Digital readiness: Organisational level

(This level may not apply for certain target groups, such as refugees, unemployed people, etc.)
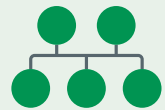
Digital →access: Within the organisation, there is sufficient and appropriate access to IT infrastructure (software/hardware).

Scale:	0	1	2	3	4	5	points:

Skills development: The employees have basic knowledge about digital approaches and are supported by the management level to continuously develop these skills.

Scale:	0	1	2	3	4	5	points:

Agility. The organisations are able to react flexibly to digital changes and provide the required financial, technical, and staff resources to do so.

Scale:	0	1	2	3	4	5	points:

☑
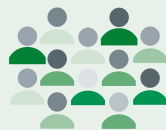
Digital readiness: Society level

Relevant government institutions, NGOs and civil society organisations are in place for digitalisation.

Scale:	0	1	2	3	4	5	points:

The ICT Development Index score (IDI score) of the country is ≥5.0 (5 points)/ ≥ 4.0 (4 points) / ≥ 3.0 (3 points) / ≥ 2.0 (2 points) / ≥ 1.0 (1 point). (Source: ITU)

Scale:	0	1	2	3	4	5	points:

A legal framework for working with digital data is in place and is enforced.

Scale:	0	1	2	3	4	5	points:

	Total points:

SCORING:

0 to 14 points: digital novices

Your target group is not yet completely ready for digital change processes and for the use of new digital technologies. The project should offer rather simple solutions with additional alternative solutions for technological gaps. Sufficient planning, advisory services and training are important for the success of the project.

15 to 29 points: digital learners

Your target group is somewhat ready for digital change processes and for the use of new digital technologies. The project should primarily tackle simple solutions. More complex solutions are possible, but only with sufficient planning, advisory services and training.

30 to 45 points: digital pioneers

Your target group is ready for digital change processes and for the use of new digital technologies. The project can start, even with more complex solutions.

This checklist gives you an initial sense of your target group's digital readiness. This can be followed up with a more in-depth analysis.

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For more information, go to:

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

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

Digital by default – Digitalisation's evolution from trend to modern standard

Digitalisation makes processes faster and more efficient and transparent – this also applies to implementation of the 2030 Agenda. When it comes to reaching young target groups in particular, there are often no alternatives to digital technologies. Currently, 482 projects implemented by German DC use digital components – to improve administration, education and health systems, provide advisory services on digital transformation and much more. While up to now the use of digital elements has been an exciting trend, partner countries are increasingly demanding digitalisation as a modern standard.

What does 'digital by default' mean?

The concept of digital by default describes a scenario where it goes without saying that digital components support project implementation. This approach is not a general obligation to use digital tools or methods in project activities. However, the burden of proof is now the opposite. If no digital elements are used, their lack of appropriateness must be proven. This approach has been implemented successfully by the UK's Department for International Development (DFID) since 2012, by the Belgian Ministry of Development Cooperation since 2016 and by GIZ since 2018. Belgian DC has enshrined this standard in its Digital for Development strategy. DFID has also integrated the review of digital options in the design phase of projects. In so doing, the agency intends to encourage digital standards such as the international digital principles and save unnecessary spending on the duplicate development of software.

Status quo in German DC

BMZ's Digital Agenda defines priority areas for the use of digitalisation in German DC. GIZ implements projects on the basis of 'digital by default'. All operational departments have been working according to this principle since 2018. Other German DC implementing organisations are testing this approach as they draw up their digital strategies. Initial experience underlines the importance of testing the potential for using digital technologies and incorporating options into the project's design phase to boost the chances of success. At the same time,

it is essential to support project managers in developing their digital expertise. In addition to publications and guidelines such as the Principles for Digital Development, competency development also includes exchanges with digital experts from leading donor and implementing agencies.

Using a step-by-step model and <Digital Lab> at GIZ

Digital experts assist GIZ projects and programmes in implementing the digital by default objective. For new projects, the Sectoral Department, as part of its involvement in appraisals and concept development, reviews the application of digital technologies and methods during implementation. Digital-savvy advisors in GIZ's Sector and Global Programmes Department also offer ongoing projects support as part of the <Digital Lab>. Here, colleagues work in tandem to advise the projects on potential digital solutions. This advice is documented and can then be implemented by the team.

Within the scope of BMZ's digital portfolio (see section 1.5), projects are reviewed with regard to the use of certain digital technologies and methods and their relevance for achieving the objective. The use of resources for these components is also evaluated. For the first time, it is now possible for BMZ to unequivocally determine what constitutes a digital project. GIZ has developed a step-by-step digitalisation model in order to further evaluate these projects, en- abling decision-makers and project officers to know where they stand and how they can move a step closer to digitalisation. The projects can also save time and money by exchanging their experiences more professionally and sharing technology solutions. In future, the model can be used to determine how many projects use defined digital elements or services. Even more importantly, how- ever, it can be used to determine the exact degree of digitalisation and classify projects based on set levels.

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How digital is your project? Take the test in section 1.6.

Digital responsibility: Secure handling of data

Responsible handling of data means first and foremost respectfully handling the rights of the individuals whose data are being processed. The use of personal data must therefore always consider protection of the affected individual's privacy *(→ data protection)*. Ethical and data protection considerations must be taken into account throughout the entire usage cycle of the data. This also means that digital systems have to be planned and partners must be selected so that the data are secure and protected against theft and misuse.

Many organisations have developed guidelines that offer orientation. In the following sections, we introduce GIZ's guiding principles for raising awareness of the responsible handling of data. KfW Development Bank also provides its employees with a cyber security checklist that conducts an initial assessment of the information, data and cyber security of potential project partners, allowing any risks to be detected at an early stage. It can also be used to better evaluate behaviour within your own organisation.

Guiding principles for responsible handling of personal data:

Planning: Responsible data practices should already play a fundamental role during project design and planning. This means, for one, taking into account national legal principles as well as your organisation's guidelines. For another, processes for the project must be planned in such a manner that data are used carefully and that time and resources are considered – in security audits or additional feedback loops, for example.

Data collection: Inform those concerned about collection of their data and request their consent. This is crucial. Also, develop clear processes for using and storing data. Take the following questions into consideration: Where are the data stored exclusively? And for what clearly defined period?

Data storage and information security: Who in your organisation is responsible if data are lost or security is breached? Talk to them about your project. Last, but not least, the technical skills of your partners are essential. Is their technical equipment and expertise adequate? If not, you should plan an additional budget for capacity building measures. Make sure that you know what to do in the event of serious data loss. Develop guidelines for action in the run-up to the project.

Data usage: Anonymise data to the greatest extent possible. Only selected individuals should have →*access* to the data.

Publishing of data: You should plan different levels of data distribution. For example, only raw data can be shared with project partners. Sign written agreements with those who will be using the data. Risks that you believe exist regarding the handling of data do not necessarily match the perception of other people. Get different opinions on risks before publishing the data.

Data archiving: Ask the question about the archiving of data right at the start of the project – otherwise it tends to be forgotten. However, responsible data archiving also means that only very specific data will be stored for further use. All other data should then be deleted.

What's next? Responsible handling of data is an ongoing process, not just a one-off task. Stay on top of things. Use additional resources, create structures and appoint contact persons within your organisation.

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Helpful resources:

Responsible Data Handbook by The Engine Room: www.t1p.de/7ppt

Digital Security in Deutsche Welle's Mediadev expert portal: www.t1p.de/egbb

ITU's ICT Regulatory Tracker: www.t1p.de/c4l8

Overview of national data protection laws around the world: www.t1p.de/3z7s

ITU Global Cyber Security Index: www.t1p.de/o0oh

Cyber security checklist:

The questions included in this list address typical security weaknesses within organisations as well as processes and IT systems used by organisations that can also be identified without any expert knowledge. It consists of two parts:

Part A: Questions that can be answered through online research or by communicating with the partner directly (phone, email).

Part B: Questions that can only be answered with an on-site inspection.

Any question you answer with 'No' indicates a weakness in the system. While this does not automatically result in damage, it does represent a risk.

Although the checklist is not sufficient to obtain a comprehensive and detailed overview of information and cyber security, it will enable you to form an initial impression and use this as a basis for deciding whether detailed verification – such as a 'security audit' by digital experts – is required. The following is an excerpt from the cyber security checklist:

Part A: Questions that can be answered with online research or direct communication (phone, email) with the partner.

Question	Explanation	Yes	No	Observations
Are there statements on certifications in ISO/IEC 27001 in publications of the organisation?	ISO/IEC 27001 is a globally accepted standard for information security	☐	☐	
Does the organisational chart contain roles for information security and data protection?	Such as the data protection officer	☐	☐	
Are non-disclosure agreements (NDAs) an established practice at your company?	Such as routine handling of NDAs	☐	☐	

| Do the draft contracts already include the topic of information security? | Indications for (non-) permissible usage and handling of information of the company based on the planned contractual relationship | ☐ | ☐ | |

Part B: Questions that can only be answered with an on-site inspection

Question	Explanation	Yes	No	Observations
Are there access controls?	Means for preventing uncontrolled access: registration desks and access gates, video monitoring, security personnel, etc.	☐	☐	
Is there an established process for identifying visitors?	Such as visitor passes that have to be worn openly	☐	☐	
Are computer screens locked when they are not being used?	Screen savers, for example, start automatically	☐	☐	
Is there a defined process if digital equipment is lost?	Examples: Reporting deadlines, the option to delete data externally	☐	☐	
Are employees reminded about the importance of data protection?	Posters, information boards	☐	☐	
Are special measures for handling data storage devices obvious?	Is, for example, the use of USB sticks prohibited or are they used frequently (risk)? Are data on storage devices encrypted?	☐	☐	

Table based on: Checklist for Cybersecurity for Projects of Financial Cooperation,
TÜV Rheinland/KfW Group

Methods for participatory project development: Co-creation, design thinking and scrum

Participatory methods play an increasingly important role in digital development processes used by the for-profit sector. As a general rule of thumb, the more users involved in development, the better the results and products. Given that DC/IC commonly involves participation, and methods like co-creation, design thinking and scrum are relevant in its work. Applying these methods can help secure 'ownership' of → *digital technologies*.

When weighing between the various participatory methods used in DC and new approaches from the for-profit digital sector to decide which are relevant, make sure you 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 viewed in terms of the ultimate objective. What users/user groups will you be working with? What intermediate results are needed?

- These methods are based on time-consuming, labour-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. Participatory project components with qualitative targets and indicators are therefore especially suitable for testing these methods.

- The commissioning party 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 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. A key feature is that it 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 commissioning party may assume the role of one of many stakeholders in the development process.

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

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For more information, go to:
IDEO Design Kit: www.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 used in technology and industry. Among other things, it focuses on enabling new forms of cooperation and prioritising user needs. As such, the application of design thinking may, in general, be considered as an approach for managing transformation processes in DC/IC. The development of new initiatives involving → *digital technologies* may provide the impetus.

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

- Central feature: Problems are tackled collaboratively and intensely, 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 in order to refine the solution. An iteration normally comprises six steps:

   a) identify the problem, b) observe the problem, c) adopt a stance,

   d) develop solutions/ideas, e) develop prototypes, and f) refine them.

2) **Complying with the rules**

These rules include, for example,

- participants always carry out work visually,

- only one person speaks at a time,

- allow far-fetched ideas,

- avoid criticism,

- quantity is produced (so that you have a choice),

- stay 'on-topic',

- 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**

Stay mobile – people may work standing up, ideas and thoughts may be written on whiteboards, etc.

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For more information, go to:

Frog Design: Collective Action Toolkit (for NGOs): www.t1p.de/9lz7

Stanford University's Hasso Plattner Institute of Design: An Introduction to Design
Thinking – PROCESS GUIDE: www.t1p.de/n17i

School of Design Thinking, University of Potsdam's Hasso Plattner Institute:
Information for Project Partners: www.t1p.de/ujnt

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 rugby. It describes an interlocked cluster of players. Like design thinking, scrum is an agile process management method[1] that assumes that IT projects are often too complex for all their components to be defined at the outset.

'As a method, scrum accepts that the development process cannot be predicted. The product is the best possible software taking the costs, functions, time and quality into account.'[2] Scrum is suitable for teams 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 functions into account.

Central feature: Precise objectives; the way of moving towards these is defined by the implementation process itself. New developments are constantly taken into consideration.

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[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, sequential work steps. In agile process management, iterative methods are embedded, which means process sections are partly repeated or steps skipped. In large tenders with clearly defined goals and intermediate steps, it can be a challenge to integrate agile process management. Establishing target figures and time frames or applying agile process management for clearly delineated, definable work steps is recommended.

[2] Ken Schwaber in a lecture at the 1995 OOPSLA conference

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 intense period of project work 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 agreed upon.

Sprint Retrospective

A sprint retrospective is a self-reflection process. Guided by the scrum master, the development team examines its working methods in terms of efficiency, accuracy and so on, according to the findings of the sprint review. The retrospective is used to update the 'product backlog', a list of outstanding action items.

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For more information on scrums, go to:

Wikipedia: www.t1p.de/bml6

Scrum Alliance: Agile Manifesto: www.t1p.de/4zys

The original and detailed Scrum Guide can be downloaded in many languages:

www.t1p.de/k95v

Other helpful resources can be found on the official website of the Scrum Alliance: www.scrumalliance.org

Are you just starting to develop a new project? Has your project failed to meet expectations during its pilot phase and now needs to be revised and adapted? Or are you thinking about implementing an existing project in another context?

Whatever your situation, keep in mind the following do's and don'ts for digitally-supported projects. They will help you avoid common pitfalls.

Begin with the problem and not with the (technical) solution.

Digital technologies are a means, not an end, yet they are often used as a starting point. Buzzwords like → *e-participation*, mobile learning *(→e-learning)*, mobile reporting, → *big data*, text message-based health apps *(→e-health)* etc. frequently feature in IT project development, and delivering these concepts can sometimes end up being considered the primary objective. However, digital tools are merely a means of 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 which digital technologies 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:

- **Instrument-focused rather than goal-oriented projects can overshadow the causes of the existing challenge.**

- **The most appropriate solution for a specific context is often not the latest technology that is currently in vogue.** Successful digital projects usually comprise a blend of analogue and digital media (see the principles at the beginning of this section).

- *One size rarely fits all:* Different problems require different solutions and digital tools. For example, a telephone helpline might be the best approach to support survivors 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.

- Remember – ICT tools automate processes. They may not bring about automatic change, however. In other words, the existence of a digital tool alone does not mean it is known; the awareness of a tool does not necessarily lead to its use; the use of a tool does not automatically bring about change.

Time required for preparing digitally-supported projects

System set-up

Installing technology/server, testing and training for operating equipment and software, organising information flow and integration of additional digital components and systems

All other essential requirements for a successful digital project

Context analysis, outreach and engagement tactics, communication content, branding, feedback, messaging, data collection and verification, cross-media approach
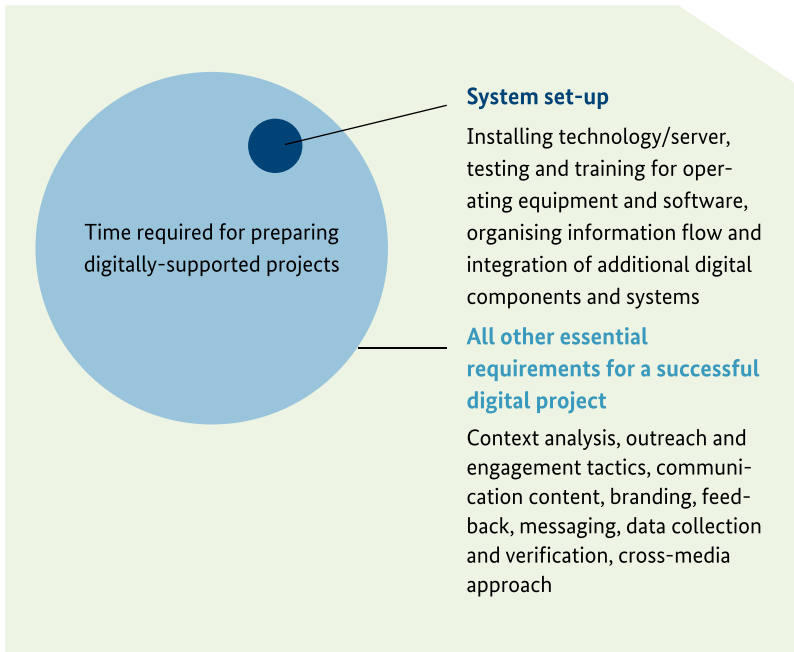
Diagram: The relationship between technology provision and project development

Digital technologies cannot replace what is not available, but 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 make the deployment of an →*e-participation* tool more problematic. However, the situation can be improved if the tool is carefully developed in collaboration with state and civil society actors.

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

Use of and access to mobile phones can vary radically between countries, regions within these countries and individuals. While an e-health campaign for young people might make sense in tech-savvy Nairobi, conditions in the Cambodian capital Phnom Penh are less conducive. A key issue is that the Khmer alphabet is not supported by all mobile phone providers. However, this problem can be partially mitigated by the increasingly widespread use of →*smartphones* that offer more accessible graphic interfaces.

'People first' – putting users of digital technologies centre stage

If a digital project is to be successful, it is essential to clearly identify not just the underlying causes of the present challenges in digital deployment, but also the actors and contexts involved. This is the only way to identify suitable digital tools for each group of actors.

Digital technologies offer 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 digital technologies to use must reflect the individual scenario in which they are being deployed.

Bear in mind that introducing new digital components can, in the early stages, make processes more complex. However, well-chosen digital 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, do not dictate. Work with relevant target groups to identify the digital behaviour of users.

- 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 email, newspapers, radio, social media, etc.?

- Do not expect target groups to seek out information or engage with contextually inappropriate communications channels/digital technologies.

- 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 through →*blogs* and will only use public service broadcasters to complement their digital communications. Social networks and open and closed online groups are often relevant channels for experts in partner countries who wish to discuss topics and share expertise. For rural populations however, exchanges at the local marketplace are still often the most important source of information. Needs differ – make sure you identify the most appropriate channel for your target group.

Availability ≠ accessibility

On their own, mobile phone user rates are not a reliable indicator of the relevance of incorporating mobile phones in a project. Even if there is a high rate of mobile phone ownership, not everyone may have unrestricted access to one. For example, it would not be appropriate to open up a telephone helpline for women in places where the majority of mobile phones are controlled by the male head of the family. This could expose them to further risks. In such cases, it is better to focus on approaches that involve face-to-face contact in the community. This will enable women to obtain information and advice anonymously and discreetly.

While social media are often suitable for organising civil society engagement, they can easily be monitored, exposing activists in sensitive locations to high risks. They are therefore often avoided by many such activists.

Digital technologies enable 'globalisation'

Digital technologies have given rise to an unprecedented array of ways to collaborate. In situations where an inadequate 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 collaboration that are tailored to and appropriate for your target users.

Be brave and give it a go

The use of digital technologies is a new phenomenon in many places. Although things are changing quickly, little supporting data on user behaviour is available. That's why many digital projects fail to get past the pilot phase. Simulations or prototypes can, however, be used to cost-effectively trial digital solutions in advance. So, before drawing up large tenders for technological solutions, make sure you test them first. Do not commit to a specific tool too early, and keep in mind that the tool is not an end in itself. It is only a means of achieving a goal.

When planning and comparing different digital technology alternatives, remember to include 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 maximise the impact of your communications. In radio broadcasts, for example, you can refer people to websites or 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.

Digital technology helps communication, but it does not communicate itself

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

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 actors?

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 change? Who loses and who gains power? Who is involved? With whom? How? It may be helpful to depict the actual and the target situations side by side in order to clearly visualise 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 derive tactics and to define the resulting digital solutions (content-related project strategy). It also provides a basis for the context analysis and choosing the appropriate digital tools.

The matrix below will help you to categorise and rate your different actors:
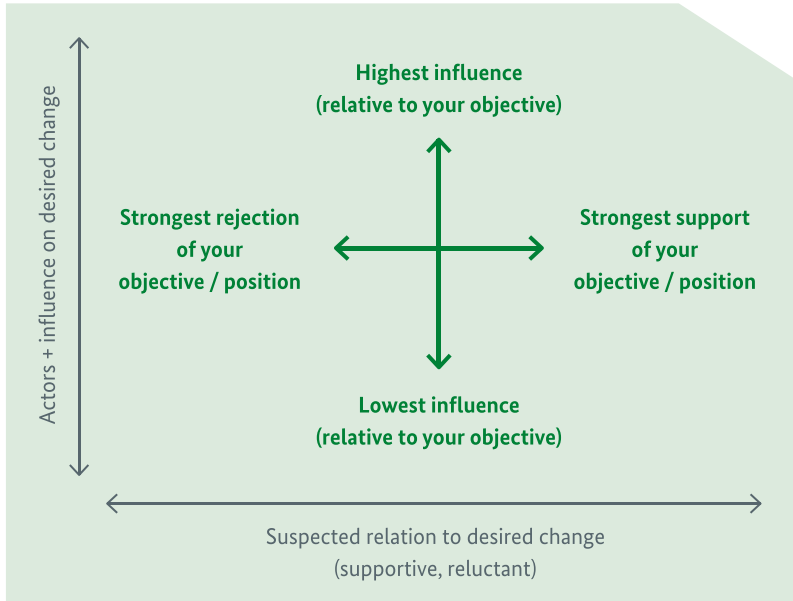
For more information, go to:
www.newtactics.org

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 project development defined. Make sure to ask the following:

How can the actors in question support achievement of the specific goal? How can different actors engage and interact? What framework is required for these processes? Which existing communication channels and exchange platforms are suitable and can be used? Which new formats must be offered first?

Stage 5: Choose the right digital technology

As soon as you have compiled an overview of possible tactics and processes, identify the digital tool suitable for providing support by asking: What kind of user behaviour do the different groups of actors display? Do you have → **access** to the preferred digital options and can you afford them? Should you communicate through traditional 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)*.

The following sections contain useful checklists to guide you through these stages (Sections 3.7 and 3.8).

The following checklists will help you:

- ask the right questions when planning your project in order to ensure that decision processes are based on relevant factors;

- review unsuccessful projects in order to identify and rectify weaknesses.

PROJECT CONTEXT CHECKLIST

☐ Is it possible to link up with **comparable, relevant projects** in the country of operation so that the projects can reinforce and complement each other?

☐ Is it possible to **build on existing approaches in a sector**? 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 the project executing agency remain in place even after the funding period ends?** Must/should support continue after the funding period ends, e.g. to carry out a large-scale online survey or similar? If it is to continue, then ask: Who will bear the ongoing costs associated with →*digital technologies*, such as maintenance or capacity development, in **the short, medium and long term**? What kind of digital ecosystem could develop during implementation of the project and how can this sustainably contribute to the continuation and further development of the digital project or component?

☑

Have I considered all the foreseeable and relevant future developments of the digital technologies? As difficult as it may appear in the fast-paced digital 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 frequently in future than the one you currently rely on for project development? Looking forward, what kinds of new and innovative technologies might influence your digital project or necessitate an update, adaptation or rethink? Which project-related actor in the digital ecosystem 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 digital 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, a local and tech-savvy individual or even an NGO can be appointed as a consultant for the entire project phase.

☐ **Have relevant target groups articulated or confirmed demand for the intended project outcomes?** Ensure that you sufficiently develop project ideas – or at least test them – with target groups. Many digital projects fail because they do not address actual needs.

☐ **Are user-oriented technologies being employed and do users have the relevant skills to operate them?** Understanding the *→ e-literacy* (digital knowledge) and *→ e-skills* (digital skills) of your different user groups is vitally important. If they are underdeveloped, very basic or highly intuitive digital solutions must be used. If more complex digital 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 digital com-

ponents. For example, a network administrator job requires different skills to that of an office clerk who uses a data entry screen to input data on a daily basis. 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 digital solution?**
The basic 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 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 contact 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 theme/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?** Among the most common causes of failed digital projects are 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. Therefore, the calculation of costs incurred in only the development phase is not sufficient. From the outset, calculate the project's startup and recurring costs such as those for long-term maintenance, e.g. purchases, updates, licences, repairs and renewal. Has a budget been allocated for essential equipment and resources? Digital technologies are very costly. Think beyond the purchase of hardware. For example, if you did not (or could not) use → *open source* products, you will need to budget 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.

☐ **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.

☐ **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 pilot projects be developed further by the users?

☐ **Are the selected digital applications available and accessible?** Which digital technologies (e.g. standards, hardware and IT platforms such as Microsoft, Oracle, open source) 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 digital solutions are introduced? Are they compatible with your own plans? Are internally available or previously used digital technologies 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. Using previously used digital technologies saves on resources and, where required, draws on existing expertise.

☐ **Do the required digital knowledge and skills exist?** Test organisational/internal skills *(→ e-literacy, → e-skills)*, bearing in mind that the personal use of digital technologies 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 digital communities and integrating this network into the international digital community can be immensely valuable. The technical assistance and advice this network can provide will help to ensure that your project does not repeat mistakes made by others. 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 to guarantee safety 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 digital technologies 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 they may be exposed to increased risks when using these technologies *(→data protection)*.

☐ **Are the selected digital technologies definitely suited to the context in which they are being deployed and thus relevant for your target groups?** When selecting digital technologies for your project, remember that certain types are suited to particular uses, particular target groups, etc.

☐ **Ascertain what →*digital infrastructure* is available in your project's intervention area and how all your relevant target groups currently use digital technologies.** Bear in mind that infrastructure quality and the use of digital components can vary greatly from one project location to the next, for example, when they are in different provinces. The national capital is usually well served with an uninterrupted internet connection, whereas rural areas are forced to rely on inconsistent mobile connections.

INFRASTRUCTURE CHECKLIST

For each project area, check the following:

☐ The availability and stability of the internet connection via fibre-optic, copper or other forms of cabling

☐ The availability and stability of the mobile communications network

☐ The availability and stability of the data transmission rate

☐ Local access to relevant digital communication 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 digital technologies, 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 content visually 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. Some languages are not even 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 other measures 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 scripts?** In many DC partner countries, local languages do not use the Roman alphabet. Good and well-established transliteration software is available for some – but certainly not all – of these languages. But even where this software exists, not all IT users will have mastered its use, leading many to resort to using software in English or other official languages that use the Roman alphabet. Select the writing system that best suits the 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, remember to factor in the 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 using digital technologies, so that all groups have unrestricted 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 mores adopted for the digital 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 digital project?

- [ ] **Authenticity, trust, credibility:** What respected and trustworthy sources of information are there? Sometimes village elders or the community radio station enjoys greater credibility than state media and information sources. If these credible actors are represented on →*social networks*, these channels can sometimes become as highly regarded as established media. For this reason, make sure to use these platforms and credible multipliers for your project where required.

- [ ] **How is open exchange possible in hierarchical societies?** The opportunity for open exchange and constructive criticism is an important requirement for equal cooperation between different actors in the development phase of a digital project. In many DC partner countries, open exchange and criticism are, however, considered to be problematic, especially in hierarchical communities or when criticism relates to the activity of specific community members. In such contexts, the highly participatory, hierarchy-free methods espoused by the civic tech community when advising government actors often fail. 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 hierarchy and leadership? For example, senior participating government officials could be appointed as product owners who serve as specialists and will be able to assess implementation in terms of functions, usability, performance and quality.

Procurement and tendering processes in the IT sector are often very diverse and complex, and can are therefore be difficult for non-experts to manage.

Invitations to tender may cover a range of areas from purchasing software licences and purchasing/leasing hardware to IT consultancy services. 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 support and training. Depending on the product or service procured, maintenance, servicing and support will often also be provided throughout the contract term.

There is no blueprint for digital project tenders, so procurement in the IT sector will often consist of a combination of requested services.

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

Stage 1: Set the objective

Digital projects in the context of DC aim to deliver change and development effectiveness. Even if the invitation to tender sets out clearly defined services and quantities at the outset, it is still essential to digital technologies.

Stage 2: Ascertain what similar options cost and who can help research the market

Before you draft your tender, 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 advisable 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 ('scope creep').

You should not defer decisions regarding pricing until the implementation phase. The performance specification should be sufficiently detailed and specific in order to minimise the risk of conflict with the contractor over performance 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 3.4), you should also consciously plan for this. Be aware of your limits. What should be the maximum cost for the development of a digital solution and how long should it take? How many people involved in the process can you or a contractor manage? Set upper limits as parameters of the contract.

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

→ *Open source* 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 digital 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.

Checklist for using open-source software solutions

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

☐ *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 invitation to tender describe the service required without specifying proprietary products?

☐ **Use existing software:** 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 specify the open-source competencies bidders need to have as eligibility criteria.

- [ ] **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 development 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: www.t1p.de/hsp6

QUANTIFYING HARDWARE AND SOFTWARE PROCUREMENT

What and how much should be procured?

☐ Do you only need to buy 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 just 'nice to have': What performance requirements are essential for your project?

☐ What are the indispensable minimum requirements for the system (potential exclusion criteria)?

☐ Which requirements are not obligatory but would be nice to have?

When assessing the tenders, bids that fail to meet the mandatory requirements can be immediately excluded; the optional criteria should help you rate the quality of the remaining bids.

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 time and material or
- a fixed price for each project.

Fixed prices are often used for projects requiring resources that can be easily calculated, are usually small-scale, and can be provided over a set period of time. Hybrid forms are also common.

INDIVIDUAL OR FRAMEWORK CONTRACT?

If you have a recurring standardised procurement (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 commissioning party to request individual services (e.g. 25 licences) without having to retender each time.

DECISIVE FOR THE SUCCESS OF THE ENTIRE ORGANISATION OR MERELY A 'SMALL' DIGITAL COMPONENT?

If you want to put out to tender management solutions that are critical for the organisation (e.g. enterprise resource planning systems – see www.t1p.de/rx6k), you need to pay special attention to the maintenance model requested. Stipulate in the tendering documentation that the contractor must ensure their product has a long lifecycle. This will deter them from using outdated software and lower similar risks. Keep in mind that the organisation's success will depend on the maintenance and operation of the digital solution being procured. As such, integrate as many risk mitigating factors as possible in the specification.

TECHNICAL-CONSTRUCTIVE OR FUNCTIONAL SPECIFICATION?

While a functional specification 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 specification 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 a term of reference can combine elements of both approaches.

In a functional specification, the details of the later realisation of the project can be adjourned to the implementation phase. This means that 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 COMMISSIONING PARTY AND CONTRACTOR WILL COOPERATE

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

In the contract manufacturer model, responsibility for preparing the specification in the planning phase falls to the commissioning party. The contractor is responsible only for implementation (e.g. of an existing concept), whereas activities relating to the operation are performed solely by the commissioning party. With this model, the costs and time requirements will be higher for the commissioning party during the planning phase, and the commissioning party must ensure it has the resources (professional expertise, personnel, time) required to put together the specification.

Careful preparation will ensure that the estimated costs of the implementation phase to be assumed by the commissioning party will be much more accurate and reliable.

In the cooperation model, the commissioning party 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 commissioning party and contractor can resume in the operation phase.

Regardless which cooperation model the commissioning party decides to use, it is essential to clearly define who is responsible for what in the specification and contract.

Regarding quality assurance, commissioning parties are advised to seek the advice of specialised consultants, unless sufficient resources are already available in the company. This kind of external input ensures that the commissioning party's interests are better protected throughout the project.

The selection of IT consultants should mainly be based on whether they have sufficient experience in similar projects. Commissioning parties 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 commissioning parties.

When awarding contracts for installation, customisation, maintenance, operation and training services, consider which services need to be provided by the commissioning party itself. These will need to be carefully defined in the specification because they are directly relevant in the cost calculations.

Furthermore, it may be advisable when jointly developing the project to provide anonymised information on the qualifications held by the commissioning party's employees. In this way, bidders can form their own impression of the resources that will be available to the project.

However, with complex and long-term projects, the commissioning party may be unable to reliably predict the availability of its human resources throughout the project period.

The commissioning party may be unable to perform the intended services, which can result in the contractor incurring unexpected additional expenses that it will subsequently seek to reclaim. It is therefore important that, as the commissioning party, 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 avail yourself of if necessary. 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 you refine your specification.

FURTHER INFORMATION FOR FORMULATING A GOOD INVITATION TO TENDER

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

Besides detailing the services you intend to contribute, the invitation to tender should contain precise information on the contextual environment of the work being tendered– e.g. the specification of the existing IT infrastructure that you wish to develop or the →*data protection* requirements.

Stage 4: Use a checklist for a final revision once you have drafted the tender

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

Is the specification sufficient?

☐ Ensure the specification is detailed enough and goes into sufficient depth by clarifying strategic goals in advance and 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 responsibility for defining the specification to bidders, especially when procuring services for complex projects, as the tenders received may be heterogeneous and difficult to compare.

Are concepts in line with the market?

☑

- ☐ Bidders 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 developments.

- ☐ Make sure to cost particularly time-consuming activities such as quality assurance, coaching and change management. 15% to 20% of the total budget should be allocated to these activities.

Are risks fairly distributed?

- ☐ Do not set commercial conditions that bidders are likely to reject – e.g. publishing 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 use contracts for work and labour for services-related tenders. A contract for work or labour already reflects the commissioning party's desired outcomes. In other words, in order to be able to enter into such a contract, the commissioning party must be able to specify the acceptance criteria in advance. If the success of a project cannot be clearly defined, contracts for work and labour are not permitted. Instead, a service contract based on time and materials must be used. If contracts for work and labour are to be used, the commissioning party must spend more time on drafting the specification and on subsequent monitoring of success during the acceptance phase.

Are scope for discretion 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 digital projects, because new knowledge often becomes known to the commissioning party as the process unfolds. Procedural errors are also much more likely to occur in inflexible processes than in flexible ones. Given the formality and rigorous detail required by financial and technical cooperation, promoting flexibility can be challenging and will therefore require particularly careful preparation.

☐ Commissioning parties should use any scope for discretion: options and variant tenders should be defined and permitted. Note that framework agreements are an efficient tool for granting commissioning parties such discretion (via the option to request services).

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 commissioning party or commissioned IT consultancy will need to make contact with an appropriate number of actors in the market in question. The commissioning party 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.

☐ Communications with companies should occur on a level playing field. The high costs sometimes involved in preparing bids should be recognised. As such, unsuccessful bidders should be provided with an appropriate debrief, detailing why their bid was unsuccessful.

Stage 5: Drawing up 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.

In terms of logic and structure, the list of criteria follows the specifications. For each section of the specification, the commissioning party will decide what constitutes a high-quality bid and how this aspect will be weighted vis-à-vis other aspects of the specification.

Examples of selection criteria:

- Ability to expand and adapt the system

- System environment and platform

- → *Data protection* and security (see section 3.3)

- Compatibility with existing/predetermined systems

- Interfaces

- Migration of legacy data

- Maintainability of the systems

- Onboarding, training

- Customer service and response times

- Presentation/testing (fulfilling the task set)

- Aesthetics

- Commercial conditions (contractual terms, risk structure)

The above-mentioned criteria are examples only and must be adapted to the specific case. If necessary, sub-criteria should be developed to support the development and use of the criteria. The sub-criteria should be weighted and the rationale for this weighting made transparent to bidders.

The selection criteria must be defined as either exclusion (potential criteria for being rejected) 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, commissioning parties tend to focus on setting exclusion criteria, because they deem all aspects of the specification to be mandatory requirements and of special importance for the project. However, having a lot 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 bids received. In practice, a combination of exclusion and assessment criteria for individual technical requirements has been shown to be the best approach.

Formulate additional test exercises (sample development)

When procuring software and hardware, commissioning parties should avoid evaluation merely on the basis of printed tenders. Sample developments give commissioning parties the opportunity during the tender process to test the products they are seeking to procure.

They are also 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 sample development constitutes the practical side of evaluating tenders.

There are two kinds of sample development:

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

Both types of sample are possible and their usefulness will be determined by the tendering process in question. It is, however, important to inform bidders in advance whether you will be using the sample development for evaluation or only for verification purposes.

If an evaluation sample is used, the commissioning party must also provide bidders with a list of criteria. Where required, this must also detail how aspects of the sample and the individual criteria will be weighted (including the overall scores).

Stage 6: Criteria for selecting the winning bid

It is helpful if the bidder 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. It is important here that parameters based on the selection criteria must be reflected in the contract and, where required, defined as enforceable.

Only then can bidders be expected to make realistic TCO forecasts. Without this kind of contractual consideration, there is also 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. For more information, please see www.t1p.de/2s30

What qualifications and experience does the bidding team need to have?

Examples of useful qualifications

- Experience of/direct link to the open-source/civic tech movements

- Experience of adapting existing digital technologies

- Experience of ensuring the interoperability of different kinds of digital technologies

- Experience of identifying suitable kinds of digital technologies 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 sector

- Experience of design thinking or other participatory processes

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

Methods, Tools and Approaches

**Ways to leverage digital change
to achieve your goals**

Methods, Tools and Approaches

This section presents tips for using digital technologies in a range of specific contexts and scenarios in five different areas, tackling the kinds of issues project leaders commonly face and offering quick, road-tested solutions.

Monitoring and collecting information: Analysing data and organising them systematically can play a crucial role in the success of a project. But how are data collected? What do you need to keep in mind when doing so? And how can data be used to support decision-making?

Information, communication and participation: Digital solutions can foster participation, provide information in a targeted or broad-based manner, and enhance transparency. But how do I reach my target group and get them to participate? And what methods can help me to boost the transparency of my projects?

Promoting innovation: Complex issues call for innovative solutions. This area will show you how to set the right impetus for innovation.

Capacity development: digital technologies can help mobilise skills as well as adapt and expand on them. The teaching formats presented here range from playing games *(→ gamification)* to *→ digital storytelling*, as well as 'conventional' teaching *(→ Massive Open Online Courses)*.

Apps – an all-round solution?: At first glance, apps appear to be an all-round tool, whether used for capacity development, participation or monitoring. But what do you have to keep in mind when developing them? And are they really as promising as they are being made out to be?

Rather than in-depth methodological descriptions, this section provides key information that will help you ascertain whether or not these methods will fit your specific project context.

Digital/remote monitoring – Maintaining an overview, even in fragile contexts
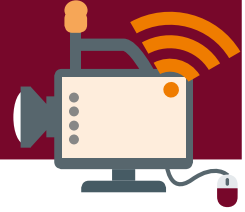
When working in fragile contexts, it is often difficult to carry out traditional project monitoring and evaluation (M&E) activities due to security concerns or a lack of infrastructure *(→ digital infrastructure)*. In these situations digital tools offer numerous alternatives, which can be used to collect data and contact target groups, even in areas that are difficult to access. They also allow you to document the expedient use of funds by donor organisations. But remote monitoring activities can be highly complex and very context sensitive. The following is therefore only intended to offer guidance.

> ⚠ DO NO HARM: *While this principle obviously applies to all contexts, it is particularly important in fragile situations. The* DO NO HARM *principle should be taken into account at the outset of all project planning and integrated into ongoing monitoring. Unintended negative impacts caused by project activities that may jeopardise the project objective or result in dangerous situations for target groups and local partner organisations should be avoided at all cost.*

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 using conventional M&E) in project evaluations that use digital approaches.

- **Simpler analysis:** Digital analytical tools help improve the evaluation and formatting of data (e.g. using graphics). Digital solutions can make it much easier and less time-consuming to use complex statistical analytical methods that can help produce more evidence.

- **Participation, empowerment and ownership:** Digital systems can be used to include more people's perspectives, making survey results much more representative. They also promote greater transparency in the collection and monitoring of data and boost the acceptance of results and recommendations compiled on this basis.

- **Cost-benefit ratio:** Initial digital solutions for data collection that have already been deployed in DC (by the World Bank, among others) have been shown to be more cost-effective, even when collecting large volumes of data. When collecting data however, you must establish the following:

    1) What do I want to achieve with the data and how do they fit in with my project objective?

    2) How do I relate the data sources with each other (data mining)? For instance, if mobile communications data can be correlated with age-related or income-related data, what can be derived from this correlation and how can these findings be used to achieve the project objective?

- **Quick iteration:** In digital projects, individual data collection cycles can usually be completed in under 24 hours. Results are also available practically in real time, meaning teams can quickly adjust activities to ensure they better achieve the project objectives.

CHALLENGES:

- **Not a magic cure:** Digital systems are only one instrument in the M&E toolbox. If they are to be really effective, they must be 'mainstreamed' in the project cycle. To this end, roles, processes and the inclusion of partners also have to be coordinated so that digital systems can unleash their true impact.

- **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).*

CLARIFY AT THE OUTSET:

It is essential to determine the most appropriate communications channel/s from the very start even in cases where DC/IC projects already use digital M&E. What is the best medium for reaching the target groups in question and what uses of media could cause negative, unintended impacts?

4.1.1   Digital/remote monitoring

In many cases, after careful investigation, the decision is made not to use internet- and smartphone-based systems *(→ smartphones)*, because reliable internet → *access* is limited in rural areas and is only available to a few users. Smartphones and data plans are too expensive for many users (see section 1.2). 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 the device's age and whether it is internet-enabled *(→ Text messages).*

(POTENTIAL) 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, including partner organisations. As such, it should not be outsourced. Instead, you should promote capacity development.

- **Keep it simple:** The → *digital readiness* of the target group in the DC/IC target regions is diverse. 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. At the same time, incentives are required to recruit as many participants as possible for surveys. Be careful, though. Incentive systems can motivate participants to make false statements. Potential local partners acting as intermediaries need to be made aware of this.

- **Customise approach used to reflect literacy levels and local languages:** For target groups with a low level of literacy, choose voice-based solutions. For those deemed to have functional reading and writing skills, opt for text messages or messenger services.

- **In all cases:** Translate questionnaires into the most important local languages.

- **Reduce complexity:** Work with short questionnaires.

- **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, at least randomly. To ensure that such checks are carried out regularly, it is a good idea to establish control mechanisms to validate data.

- **Opt-in and opt-out:** Ensure → *data protection* and comply with statutory spam regulations, security regulations and prohibited technologies and applications and data privacy legislation of project countries. Document consent to participate in surveys and put in place an easily accessible opt-out function that can be used at any time. Users should have control of their data at all times.
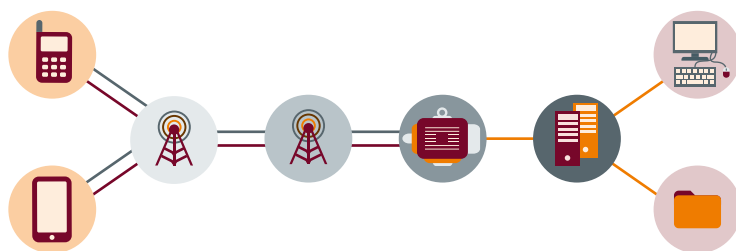
——	SMS
——	IVR
●	**User:** mobile phone, → *smartphone*
●	Mobile network operator
●	IVR/SMS-Aggregator
●	Data management, structuring, storage
●	**automated** (dashboards), **manual** (Excel, SPSS)

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

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For more information, go to:

World Bank (2013): ICT for Data Collection and Monitoring and Evaluation: Opportunities and Guidance on Mobile Applications for Forest and Agricultural Sectors

4.1.1   Digital/remote monitoring

Building a new school serving a large number of children in a rural region, monitoring the state of the Amazon rainforests or marking safe roads in a disaster area are all challenges that can be better managed using a →*geographic information system* (GIS).

GISs capture geographic data that are then enriched and combined with information, organised, analysed and presented in a visually appealing format. For instance, to find the best location for the aforementioned school, a digital map can be connected with demographic data. But how do we collect or access this data to create a relevant map? And what obstacles could we encounter? The following three steps will make it easier for you to start using such systems:

1. GIS STARTER KIT: KNOWING AND ASSESSING RESOURCES

Before starting any GIS activities, you should review existing project resources. These include:

Hardware: Data capture, analysis and visualisation are all GIS activities that are impossible to carry out if PCs do not have the right performance and memory specifications. Before you get started, you should also consider (and plan into the project budget) whether, for instance, scanners are required to digitalise analogue data, or whether you need GPS devices to collect data yourself if necessary.

Software: You can acquire GIS software free of charge as →*open source* software or purchase a program with a licence. Within the software, a database is set up for storing and managing the geodata. The database is accessed to analyse the project-related information and to evaluate, integrate and visualise it. An alternative is WebGIS, for which the software and the data are on a server that can be accessed via the internet. No installation is required. To use the program, however, you need a stable internet connection. The following GIS programs are suitable for use:

Open source: QGIS Open Street Maps

Proprietary: ArcGis, Manifold System WebGIS: Carto, Mangomap

Data: Data and the associated database are at the heart of a GIS. However, a GIS will only unleash its full potential for the project if the data are properly linked. A distinction is made between two types of geodata: vector and grid data. Grid data are cell-based data such as aerial photos. They may be compared to paper maps. Vector data are spatial data depicted as dots, lines and polygons and can display multi-dimensional planes. The geodata required depends on the project objective and should be defined in advance. GIS experts can be helpful here.

Specialists: Many GIS programs include detailed tutorials and thus also offer novices the possibility to perform GIS assessments. Depending on the application, however, specialist, methodological and technical expertise, that may even include programming skills, is required. For this reason, the extent to which GISs will be used in the project should be clarified in advance. You also need to determine whether users have the skills required to operate the systems or do these skills need to be developed?

2. BLANK SPOTS ON THE MAP: HOW DO I OBTAIN THE CORRECT DATA?

No data, no map. Data bring digital maps to life and make them usable. There are different ways to obtain data. It's important to determine what data is required for the project, and to do so before the project is launched. In addition to geodata (grid and/or vector data), this may involve meta data, for instance, whether buildings have a water connection. For an infrastructure project, this can be important for subsequent analysis. The following section explains where you can find such data:

- **Digitalisation of analogue maps:** Paper maps and city maps help visualise developments, such as urban sprawl. That's why it can be useful to digitalise analogue maps. For this purpose, it is helpful to coordinate efforts with official agencies and research and partner institutions, in order to access archives, for example.

- **Georeferencing other data:** A data set such as scanned blueprints, census data, etc., are assigned a spatial relation. For georeferencing, it is also a good idea to collaborate with research institutions and official agencies to be able to access the data records that are important for the project.

- **Geodata generated from remote sensing:** Remote sensing involves exploration or measuring of remote objects without making physical contact. Consequently, this includes satellite images, aerial photos taken from aeroplanes, as well as pictures taken by →*drones*. Geodata acquired through remote sensing have huge potential for many issues related to DC. GISs and geodata are primarily used in DC for resource management, environmental monitoring and for integrated rural regional development.

- **Using GPS data for field measurement:** The Global Positioning System (GPS) is a satellite-based system that spans the entire globe. Special GPS devices are used to collect GPS data for a geoinformation system. Many →*smartphones* also offer GPS functions. With the right →*app* and a stable internet connection *(→access)*, smartphones can serve as GPS devices without any other equipment. For instance, for disaster prevention, escape routes can be indicated through GPS markings and emergency corridors can be set up in the event of a disaster. However, GPS measurements are very time-consuming and require precise planning.

- **Crowdsourcing:** →*Crowdsourcing* can be used to harness the knowledge of a large group of people by means of a public appeal for input. For GIS activities, crowdsourcing can be used to identify transport hubs in a city. To this end, the participants transmit their daily motion profile to the project via GPS. Correlating these points on a city map by means of GIS software makes it possible to create an overall picture of urban transport. This, however, requires willingness on the part of the 'crowd'. Incentives may be created through →*gamification*.

- **Don't re-invent the wheel:** Many data sets have already been created in the context of other projects. For this reason, carrying out detailed research and consulting with partners or government agencies can be highly useful and can save unnecessary work.

3. OBSTACLES AND CHALLENGES

Sustainability: For proprietary software, licences often have to be renewed once they expire. If the owner fails to do so, data sets may be lost which means that progress, and therefore results, will not be documented. To ensure sustainability of the project, you should therefore discuss who will possibly take over responsibility for the licence and renew it as needed. For open-source solutions, there is a risk of the software itself no longer being further developed. The GIS software QGIS has a large community associated with it, however, that helps resolve problems and develop useful plug-ins and add-ons (see also section 4.3.3).

Compatibility and standardisation: There is a wide range of GIS file formats. To ensure compatibility, the file formats for the software in use should be tested and used by all project partners in the same way. For larger-scale projects in particular, such as surveying different cities, one file format should be defined as the standard format to ensure long-term compatibility. One option involves the straightforward use of Excel tables that can be read by all GIS programs.

Visualisation: In some cases, the software used may be unable to visualise the data set. If this happens, you should consult a graphic designer, who will ensure that you will be able to present your work in a visually appealing manner.

Data protection: Drone and satellite images, as well as GPS data and the associated motion profiles enable unprecedented insights into people's personal space. For this reason, the protection of personal data must be ensured through technical and organisational measures taken early on in the development of GIS activities (→ *data protection*, see section 3.3).

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For more information, go to:
www.openstreetmap.de | www.qgis.com | www.arcgis.com | www.manifold.net | www.carto.com | www.mangomap.com

Satellite images:
German Aerospace Center (DLR): www.t1p.de/2lfs
European Space Agency (ESA): www.t1p.de/v772

Text message, messenger and social media – How best to reach my target group

The first text message, sent in 1992, was 'Merry Christmas' *(→ text messages)*. Today, sending text and voice messages, images, videos, files, contacts, locations and even money with *→ smartphones* is commonplace throughout the world.

This is all possible thanks to messenger services like Threema, Signal, Line, WeChat, WhatsApp or Telegram. In addition to enabling communication between two individuals, many messenger services also offer the option of sharing information with a larger, hand-picked group. The services offer a quick and low-cost way to contact a certain target group as well as an opportunity to improve the effectiveness of the work of DC and IC.

Using this type of communication offers numerous advantages: as an information service in agriculture *(→ e-agriculture)* or for medical advisory services *(→ e-health)* for rural regions, as early warning systems for natural disasters, and also as feedback mechanisms (see section 4.2), to determine and measure project progress.

Social media platforms such as YouTube, Sina Weibo, Soundcloud, Facebook, Twitter or Instagram, also offer the requisite digital infrastructure for sharing user-generated content such as videos, texts, images or even podcasts with the target group. However, unlike text messages, use of social media and messenger services requires an internet connection – and this precondition is not always met in some DC and IC project countries.

The following overview presents the associated challenges, realistic solutions and options for communicating with the target group.

4.2.1

1. Added value

Before you decide to use text messages, messenger services or social media. you need to look at what added value they offer your target group. Using these services for establishing contact to certain groups of people is popular, and even state actors and commercial enterprises use them too. These enterprises use the services to inform farmers about the weather, while at the same time advertising their new fertilisers, for example. You therefore need to ask yourself the following questions at the start of project planning:

• What (information) services already exist in the project region?

• What added value can my service provide for the target group?

By doing so, you can avoid duplicating services and refine the unique selling proposition in subsequent planning stages. Another option is to consider cooperation arrangements with actors that offer similar solutions.

WHAT OFFERS ADDED VALUE?

Closing information gaps: In agriculture, access to information can boost production or even save lives in times of crisis (issuing a tsunami warning, for example). For this reason, it is essential to precisely identify what information is needed in a certain project region.

Quality: Despite the wealth of digital information services available, not all of them are of equally good quality. A cooperation arrangement with universities or government agencies that verify and secure information before it is shared with the target group can significantly improve quality compared to other similar services.

Specification: Information services should be tailored to the target group as specifically as possible. Farmers who grow grain, for instance, need different weather information than those who raise livestock. Customising information services leads to quicker acceptance by users.

UP-TO-DATENESS: The factors 'regularity' and 'reliability' can set new information services apart from existing ones. It is important to check these factors very precisely during project planning to ensure they can be guaranteed.

2. Target group

The target group determines the means of communication best-suited to contacting them. Factors such as age, gender, culture, religion, living and housing situation, as well as the income of the relevant group make or break the project.

It is therefore important that you keep the following points in mind:

Mobile internet → *access:* You need a 3G telecommunication network to use instant messenger services and social media. However, this is often not available, especially in remote project regions (see section 3.1). That means that you need to analyse the network coverage available to the target group before you select the technology. It is advisable to commission external IT service-providers to check this in the project region. National telecoms providers can also provide this information on a certain region.

End devices: A smartphone is needed to use messenger services and social media. While smartphones are now widely used in German DC partner countries, you should still check beforehand whether the target group has them at their disposal.

→ *Digital literacy* **and literacy levels:** Operating a smartphone or tablet and using messenger services and social media require digital skills *(→ e-literacy).* The language (such as regional dialects) and literacy levels also have to be clarified in advance. Digital formats such as images, videos or voice messages can provide excellent alternative options for communication, since they reach people who cannot read or write.

Create incentives: Discounts for mobile data volume or reduced phone rates are economic incentives that can make using the services more attractive for the target group. Such incentives can be negotiated with a regional network provider that could then serve as a project partner.

Vulnerable target groups: When identifying the target group, it is important to include and strengthen vulnerable groups. For example, many women and girls have more limited access to digital technologies than men and boys. In rural areas in particular, there is often only one smartphone per household, which is often controlled by male family members.

Solutions:

- Special economic incentives, such as special conditions specifically for women and girls, may be a solution, for example, in the context of corporate social responsibility activities of national network providers.

- To guarantee internet access and in turn, the use of information services that are tailored specifically to women – such as pregnancy apps – girls and women can be given the appropriate equipment and undergo training courses in separate programmes.

It is not always easy to obtain a realistic picture of the target group. Survey participants' responses may not be truthful and incentive systems may be used only to gain financial benefits and not to obtain access to the information service content on offer. For this reason, ongoing evaluation is key. You also need to determine in advance how personal data *(→ data protection)* will be protected during the course of the project.

3. Technology

Once the added value for a target group has been identified, you need to select the appropriate technology. Initially, developing a proprietary → *app* may appear to be the best way of establishing contact with the target group. Doing so, however, is very costly and time-consuming (see section 4.5).

In many countries, text messages are the preferred means of communication, as mobile communications networks are often adequate, even in remote regions. The limited number of characters or the inability to send voice messages and other file formats, however, may be grounds for deciding against using text messaging as the distribution method.

It is therefore helpful to use digital solutions along the lines of the Digital Principles (see section 1.3), which ...

> ... have already been developed,
> ... are available free of charge or at low cost
> ... and that have been tried and tested worldwide.

The advantage is that established digital solutions have the requisite resources to continue to be viable in future. When selecting established options, however, you should bear in mind the following points:

Do No Harm: Not all messenger services can be used in every country. In many countries, using services that offer a high level of encryption for communications is discouraged or even prohibited. You must not pose a risk to the target group by using such messenger services.

Double-check: Some messenger services may not be known to the target group, or they do not know how to use them. You should therefore use services that are established among the members of your target group.

Application programming interface (API): When creating an information service for a large target group, such as a weather forecasting service for small farmers, you need to create a backend to collect, classify, save and automatically send the resulting huge data volume. The only way to do this is with → *open source* messengers that have an (open) application programming interface or API for short. An API enables you to adapt the messenger as needed and supply it with information without having to spend money on developing your own app (for DC, Telegram is one of the services that has proven very useful – provided its use is permitted in the project country).

Combine: It is also possible to use two different technologies. For instance, in the event of a (weather-related) disaster, sending a text message to the target group in addition to a message sent via a messenger group can be useful because it may reach them more quickly. Combining messenger and social media channels can also be helpful. This way, a piece of information will not only reach a limited group of people but is also available to others.

4. Responsibility and upkeep

Whether you choose to use text messages, a messenger service or social media, all three of these options must be maintained on an ongoing basis in order for the target group to accept them as a means of communication. Maintenance can be carried out automatically or manually. From the very outset of the project, you need to consider who will carry out maintenance and what state institutions or other actors will eventually take over the service.
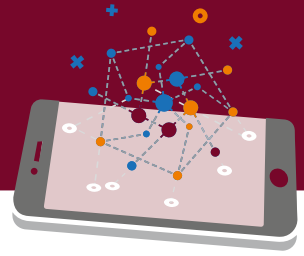
Other points to keep in mind:

Responsibility: The sender of information is responsible for the content communicated. In other words, if the information, 'It will rain tomorrow' is shared, and farmers sow their fields and the predicted rain does not come, financial damage will be incurred. This can have devastating consequences for the people and jeopardise continuation of the project.

Safeguarding: Specialists should validate the content to be communicated in advance in order to minimise the risk of misinformation. To this end, cooperation arrangements with specialist institutions, universities and government agencies in the project regions can be helpful. Including state actors can also prevent mistrust of the project.

Feedback and moderation: For messenger groups and social media channels, feedback by the target group can help improve the project and enable it to meet specific objectives and needs. Input by moderators, either manually or via chatbots, can move the discussion forward and enhance willingness to use the service.

In the DC context, online communities and networks can be used in a number of ways. They …

- … promote communication and coordination in order to achieve sustainable development;

- … act as effective catalysts for establishing partnerships and engagement between public and private special-interest groups;

- … support mutual learning and capacity development;

- … help build trust-based relations for exchanging information and know-how;

- … pool expertise.

The tips below show how to work with an online community to achieve results and what you need to keep in mind. These tips can also be used for online networks, since here too, setting objectives, assigning roles and mobilising participants are all crucial factors for the success or failure of the network.

Managing and using online communities

Community management involves nurturing relationships. Community managers are moderators who promote dialogue among the members of a community and between members and the online platform. Whether for blogs, online forums or groups on social media platforms and whether the groups are closed or public, there are number of rules that are not too unlike those applied in analogue spaces regarding respect for other users and adopting a solution-oriented focus during interactions.

Communities fulfil diverse functions both within and outside the group, such as setting agendas, learning, exchanging know-how, coordination, dialogue among actors with different or opposing interests, maintaining contact, setting standards, developing markets or fundraising. These communities give the participants the opportunity to work together without having to address insurmountable formal hurdles or show strong commitment. They also enable

them to float shared perceptions and bounce ideas off each other. Some groups are heterogeneous and others are more homogeneous. It's important for the members, the goals and the working styles to blend.

Tips for managing a community:

A COMMON GOAL

Online groups need shared interests or a common goal. It should be clear to the users what benefit they derive from their active involvement in the community, since activities are voluntary in most cases.

The goal is determined by the size and composition of the group, as well as by how long the group is intended to exist. Co-creative processes with a high level of complexity require smaller groups in order to be able to work effectively. In contrast, less intense tasks such as networking and sharing knowledge may be easier to achieve in larger communities. The level of openness and transparency of a community should be determined in line with the purpose (who should be able to see the posts?).

ALLOCATE ROLES

Large online communities often have more than one community manager. Communication in online communities is usually asynchronous. Additional responsibilities such as moderating sub-groups or acting as administrators may also be assigned. Individual responsibilities can also be distributed, such as welcoming new members, serving as experts and points of contact for certain topics, providing support for IT problems or taking responsibility for developing certain content.

IT'S NOT WHAT YOU SAY, BUT HOW YOU SAY IT

Community managers typically communicate with the participants authentically, openly and respectfully. At the same time, however, they ensure that participants use an appropriate tone to communicate with each other. When rules are violated, they reprimand bad behaviour. In the case of extreme

violations, they delete individual posts, remove participants from the group or request that the relevant administrators in the community do so. Such actions should be carried out transparently. The group, under the guidance of the community manager, can jointly decide how they wish to communicate with each other and what constitutes appropriate communication. To this end, they may draw up netiquette rules or a manifesto for using the online community. Having participants establish these rules together also increases the degree with which they identify with the community.

BUILD TRUST AND PROMOTE CONTACT

Trust plays a key role when working together in online communities, especially when dealing with sensitive topics. It's no coincidence that many online groups also meet up offline in order to intensify their contact. Community managers can initiate and support such meet-ups. User profiles help participants get to know each other and find shared interests. By modelling open and respectful communication and by offering positive feedback, community managers can help build trust. They are willing to listen to the group's issues and concerns and use the community's feedback to continuously improve their own work.

MOBILISE PARTICIPANTS

Even in the best online communities, most members are only passive users, meaning that these 'lurkers' are not active posters. To help (re)engage these participants, community managers may address them directly (for instance, by sending them messages that are visible only to the community managers and the member in question).

They may ask them whether they need more guidance for using the platform or whether they do not feel that they are properly valued or even that they are outsiders. Community managers can find out what the particular members need into order to contribute to the community.

In addition to the joint compilation of results, feedback from the group and from the community managers (such as responses to questions by other participants) may play an important role. →*Gamification* aspects may also offer further incentives for members to participate actively (see section 4.4.5).

RELATIONSHIP TO THE PLATFORM

Community managers also serve as points of contact for participants who need guidance and support with using the technical platform. They can answer requests either themselves or can forward them and see to it that they are answered. They are also points of contact for the platform operators and pass on feedback from the community, such as technical issues or usage statistics. Depending on the community's goals, tasks and needs, the platform must be aware of different forms of cooperation and may need to take this into account when developing features. Examples include sub-communities or forums, synchronised dates and Skype connections.

GROWTH

If the community plans to expand, the community managers can also take on roles for advertising the community and act as ambassadors, for example. This is often the case for social media channels.

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For more information, go to:

GIZ (2006): Work the Net – A Management Guide for Formal Networks: www.t1p.de/scs0

Open data: Transparent governments, shared knowledge

WHAT ARE OPEN DATA?

Open data are data that can be freely accessed, used and disseminated. They are not personal data but, as a rule, comprise administrative information like statistics, birth and death registry data, environmental and weather data, transport and traffic data, financial data, minutes and information on legislation and court decisions. As such, huge amounts of data are of interest and potential benefit to the public. They ensure transparency and greater participation and knowledge, and are of social and economic value. Open data can help achieve greater democracy, transparency, participation and cooperation, accountability, efficiency, effectiveness, profitability and knowledge generation, and can help in the fight against corruption. Besides having the data and compatible infrastructure and technology in place, a cultural paradigm shift towards transparency, participation and cooperation is also required.

WHY SHOULD DATA BE OPEN?

Open data are extremely useful for political, societal, administrative, economic and scientific bodies and purposes. When data sets are available, they can be processed by citizens, NGOs, data journalists, enterprises and other societal stakeholders to provide useful information. They can also be converted into infographics, video clips, interactive websites, an → *app* or other publications and made available to the public. Openness creates trust. 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, participate in local decision-making processes and check government activities such as where tax revenues are being spent. Open Knowledge International has a project, which automatically collects all small-scale queries submitted to state parliaments and the German Bundestag. This makes it easier to find queries and responses, which can be searched for and interlinked.

4.2.3

This enables the creation of an overview of topics from parliamentary work across federal states and creates transparency (https://kleineanfragen.de/).

WHO MAKES DATA OPEN AND HOW?

Numerous manuals exist describing how governments, administrations and organisations can make their data open in an efficient, participatory, transparent and accountable way, in line with 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 the public administration.

The following approach should be adopted in this context:

• 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.

A recommendation from Open Knowledge International's manual states, when making 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 the digital world. 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. This offers potential for development. The lack of data that prevails in many places can be remedied 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 SDGs 9, 16 and 17, and indirectly, by harnessing the potential of data collection for those working to achieve the SDGs.

For more information, go to:

betterplace lab: www.betterplace-lab.org (see trendradar on data protection)

The Data Portal for Germany: www.govdata.de

Open Data for Development: www.od4d.net

Open Knowledge Foundation: www.okfn.de

Open Data in Developing Countries (ODDC) and Open Data Research Network:
www.opendataresearch.org

World Bank: Open Data Handbook: www.opendatahandbook.org

World Bank: Open Data Toolkit: http://opendatatoolkit.worldbank.org/en/

Open Data Institute: www.theodi.org

4.2.3   Open data

There is a lot of talk about the potential of open content and → *open source* software, and DC and 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 'no rules'.

The following section sets out the advantages and disadvantages of making content available to the general public. Based on the decision-making aid in section 2, you can 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

Collecting, creating and sharing actionable knowledge is central to much of German DC's work. 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. Not only can it increase the effectiveness and sustainability of the 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:

- **Greater reach and ownership** through better usability of content by partners, stakeholders and third parties.

- **The raised profile** that results from the crediting project partners in all future publications

- **Contribution to major third-party sources of freely available resources** (for example, Wikipedia usually requires open licences).

- **Free third-party input on your own material**, which also supports the further development of open material.

- **Less risk of distorting competition**, because all parties have equal access to the information.

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

RISKS OF OPEN ACCESS TO INFORMATION IN NETWORKS INCLUDE:

- **Reduced ownership** of material and its use. This can be problematic if future versions of the project material were to be utilized in a deviant manner than originally intended. Including a disclaimer can prove useful in addressing this issue.

- **Copyright for all used material** must be owned by the individual providing the content or such material must be freely usable.

- **The quality standards for open content may be significantly higher**, which requires additional time and effort.

In order to make the right decision, you will need to ask a number of different questions. The following checklist will prove helpful here.

☑ 2. ISSUES TO CONSIDER BEFORE MAKING CONTENT FREELY AVAILABLE

☐ What are the key information products? Who prepared the material? Who owns the publications? Can copies be made? 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 may 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, maps)?

☐ 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 in general and of images of children and young people in particular. The legal conditions relating to these rights differ from country to country.

As a general rule of thumb: All information products or standards created on behalf of DC 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 creation. The new information and knowledge products that result from this process are known as 'knowledge commons' (such as Wikipedia, Energypedia, etc.).

3. OPTIONS FOR DETERMINING AN APPROPRIATE LICENCE

Depending on the specific requirements, there are different licensing models for disclosing and protecting content. The next section describes the world's most popular open licensing model, Creative Commons. It is also a good option for DC. Note that, of the various forms of Creative Commons licence explained below, 'copyleft' licences such as the 'Attribution-ShareAlike' licence have proven 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 from 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-Non-Commercial-ShareAlike 4.0 International. Link: www.t1p.de/aqt5

Related discussion:
Creative Commons Licences

Creative Commons (CC) 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 DC activities and contexts.

1. The four elements of the Creative Commons licence

Each CC license 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 applicable licence.

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 Derivatives (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	• Copying • Adaptation and change • Dissemination (publishing, presentation, public performance or display) • Licensing for third parties
Attribution, non-commercial (BY-NC) 	Non-commercial only	• Copying • Adaptation and change • Dissemination • Licensing for third parties
Attribution, ShareAlike (BY-SA) 	Commercial and non-commercial	• Copying • Adaptation and change • Dissemination by third parties under the same CC licence

Attribution, no derivatives (BY-ND)	Commercial and non-commercial	• Copying • Dissemination of verbatim copies exclusively • Licensing for third parties
Attribution, non-commercial, ShareAlike (BY-NC-SA)	Non-commercial only	• Copying • Adaptation and change • Dissemination by third parties under the same CC licence
Attribution, non-commercial, no derivatives (BY-NC-ND)	Non-commercial only	• Copying • Dissemination of verbatim copies • Licensing for third parties (www.t1p.de/qxrh)

For more information, go to:

Creative Commons: www.creativecommons.org/

Test – Which licence best suits my work?: www.creativecommons.org/choose

Besides Creative Commons, there are other licensing systems with similar terms such as

copyleft.org, konomark.org and gnu.org

Creative Commons Licenses　**4.2.5**

Related discussion:
Open knowledge in practice – Open-source technologies K-Box and K-Link

Implementing effective knowledge management systems in development projects can pose quite a challenge. How can we share studies, reports, graphics, statistics, data and other information with external partners and make them easy to find? How can we be sure that the knowledge gathered in a project will remain accessible for current and future participants even after the project has been completed? And how can we help partner organisations set up a digital knowledge management system?

K-Box is a flexible knowledge management system in which documents, videos and GIS files can be stored, visualised and shared, either via the cloud or physically at the partner institutions. An effective search function enables data to be found easily. Thanks to a plug-in-based architecture, additional functions can be added to K-Box (such as data collection and analysis).

K-Link on the other hand, connects different knowledge platforms (websites, K-Boxes, digital libraries, etc.). Documents and files published from this type of platform in a K-Link network are automatically accessible to all users and remain available in the K-Link network even after individual platforms are closed (such as when a project website is shut down). This ensures long-term access to the information.

K-Box and K-Link were developed by GIZ and the World Bank in Central Asia. They were published as **→ open source** platforms and comply with the EU General Data Protection Regulation (GDPR).

K-Box and K-Link are currently used by different projects and institutions in Central Asia, which have found them to be modern and flexible. The technology is universally usable and can also be introduced and used in other geographic and thematic contexts.

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For more information, go to:
Existing K-Link networks: www.klink.asia | www.slmtj.net/en
Open and free: www.github.com/k-box

Innovation platforms

Open innovation describes a decentralised and participatory notion of how ideas are generated and implemented in organisations. It involves moving from 'closed' to 'open' innovations; in other words, finding ideas outside the boundaries of one's own organisation. After all, in the 21st century useful knowledge is distributed far beyond organisational boundaries. No matter how large or capable an organisation may be, without input from outside the organisation, renewal processes are less effective and are often restricted by organisational boundaries and knowledge silos. Organisations can use open innovation to address this risk.

An important element of open innovation processes involves ideas competitions, which are used to solve a particular problem with the assistance of the crowd. This type of competition has a long tradition in brainstorming but in the past it was extremely complex and time-consuming. Today, organisations can easily use their own or open online platforms to invite all interested parties worldwide to participate in ideas competitions.

For example, on the OpenIDEO platform, participants from all over the world develop solutions to social problems in an online design thinking process. Three to five-month processes referred to as 'challenges' examine a certain social or ecological problem and bring together teams that work collectively to develop solutions. The challenges are initiated and funded by development organisations, companies, foundations, public institutions or associations. Over 16,000 ideas from 185 countries have been submitted and discussed to date.

GIZ example: Call for Solutions (AGE)

GIZ's Commissioning Parties and Business Development (AGE) Department also uses an open innovation approach in its Call for Solutions programme. The 2018 challenge called for solutions for strengthening shared business opportunities for refugees and their host communities. The teams submitting the selected ideas will be invited to a one-week Innovation Lab in Rwanda, where the solutions will be adapted to local conditions.

Checklist for ideas competitions

The following questions may help with preparing open innovation processes:

☐ Is the organisation ready for open innovation approaches?
Or is the mindset still mostly hierarchy- and silo-oriented? If this is the case, before kicking off the process, you need to invest a great deal of effort in educating the organisations to ensure that the ideas submitted will fall on fertile ground.

☐ Is there a team that can support the competition/process?
The entire process, from conception of the idea to evaluation of the results, must be supported by a team rather than by just one innovation officer.

☐ What is the problem to be solved?
There are two options, depending on what you want to accomplish. If you simply want to gather new ideas and generate an impetus, asking an open question is appropriate. For example, 'How can we use digital tools in DC?' If you wish to solve a very specific problem, you need to use a closed question.

☐ Who is the target group?
A competition will only be successful if it addresses the right target group. The trick here is to avoid inviting only the 'usual suspects', but to also be prepared to explore new paths.

☐ What incentives are we offering participants?
It doesn't always have to be money, but participants need to clearly understand what they will receive for their efforts. The incentive must be aligned with the expectation of the competition. No one will be prepared to develop a new type of rocket for a bar of chocolate.

☐ How will be ideas be used?
Before the competition kicks off, it should be clear to the organisational team how the ideas will be used. Is the goal to have a pilot project in place at the end? Or are you trying to recruit new 'brains' for the organisation? Who owns the rights for the ideas that have been submitted? Clear communication and clear management of the participants' expectations are important here.

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For more information, go to: www.openideo.com
OpenIDEO Impact Report: www.openideo.com/content/open-reflections-2017

4.3.1 Innovation platforms
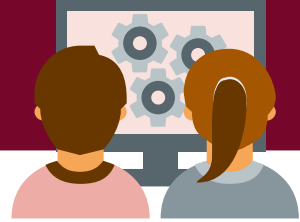
A **→ hackathon** is often the best way of developing new multimedia programs, mobile applications or other software. A portmanteau of 'hack', meaning in this context tool or solution, and 'marathon', the word 'hackathon' describes an event where programmers, graphic designers, user interface designers, subject matter experts and other stakeholders come together to work creatively on a specific problem. Hackathons usually last between a day and a week. In order for a hackathon to be successful, a focus must be identified, for example, the creation of customised software for a specific project goal. Hackathons not only save a lot of time, they also drastically cut the cost of developing new software. This is due in part to the fact that programmers can reuse the code for core functions developed in earlier projects and can concentrate on building new functions. While hackathons are now common practice throughout the IT world, they are also proving very useful in diverse contexts in the areas of DC and IC.

THE 12 STAGES OF ORGANISING AND IMPLEMENTING A HACKATHON

Stage 1: Set up 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.

Stage 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?

Stage 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 the time need to develop different kinds of output will vary.

Stage 4: Define the legal framework

☐ Determine the legal framework of the event. This involves aspects such as property rights for projects that are not Creative Commons. If you want to protect the results, you must inform all participants in advance and get them to sign an appropriate declaration of consent.

Stage 5: Define the time frame

☐ Set a realistic time frame for those preparing and delivering the hackathon, 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.

Stage 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.

Stage 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 group can be divided up into (new or pre-existing) teams or individuals, or a mixture of both. The benefit of pre-existing teams is 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.

Stage 8: Offer a prize

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

Stage 9: Choose hosts

☐ Hosting a hackathon is a major undertaking. As such, it is often best to hand much of this responsibility to the participants themselves. It is crucial to ensure that the process moves in the direction you desire. Besides keeping the content on track, a well-hosted event will run on time and in the correct sequence and will motivate everyone involved.

Stage 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 more effective option is to choose external, objective experts. Make sure to include a mix of experts from different backgrounds in the jury.

☐ When the event is seeking outputs that are explicitly technical, 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.

Stage 11: Document the event

☐ Task 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.

Stage 12: Review the hackathon

☐ When reviewing the hackathon, ask the following questions: Is/was the hackathon a one-off event or is it indirectly related to other events or projects? How will the results be used? Will participants be involved in 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 a hackathon: teams may give hurried or poor presentations of their work or reviewers may fail to recognise an output's value or potential uses.
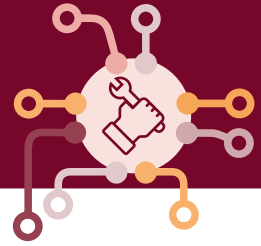

For more information, go to:

Hacking for Global Health: www.t1p.de/3c9j

GIZ's hackathon expert, Dr. Philipp Busch: philipp.busch@giz.de

DC requires increasingly sophisticated software systems in its work. Websites or databases that contain technical information, directories of experts, apps and much more need to be developed for projects (→ *app*). Free and open source software (FOSS) (→ *open source*) is an important resource, offering highly sustainable and cost-effective ways of developing these systems. The additional advantages of FOSS include the higher quality and greater reliability and flexibility achieved when other actors further develop and fine-tune the software for similar purposes. FOSS does have its downsides however, so an accurate (context-specific) assessment will need to be carried out before using it. 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 outlined 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.

4.3.3

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.	Using FOSS does not automatically imply that the system will be secure. Security problems may arise if maintenance work is not properly carried out.
	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. As such, users can be quickly informed when any security issues are detected.	Liability and warranty claims are usually ruled out by FOSS licences, but they can be incorporated in separate contracts with service providers.
		Note that legal uncertainty often (temporarily) surrounds very new FOSS products.
		Furthermore, security holes can also occur 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 infra-structure	In large FOSS projects, interfaces are usually well defined, open and documented. Therefore existing FOSS components can be efficiently reused and integrated to make new large-scale programs. Many FOSS solutions offer flexible integration. 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 design, initial implementation phase, and roll out and training of employees. Internal staff can assume responsibility for long-term maintenance, etc. and be supported in this 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 large 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. Considerable complications can arise when FOSS is connected to other applications, especially commercial software.

Standard-isation	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 maturity levels of different FOSS applications differ 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.) and standardising them across various levels as needed, which could limit the risk of isolated applications, among other things.
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 it 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 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 CONSOLIDATE THE STRENGTHS OF FREE SOFTWARE? WHICH ONES PRESENT OBSTACLES?

Checklist 1: Local conditions and corresponding strengths of FOSS

LOCAL CONDITIONS	STRENGTHS OF USING FREE SOFTWARE
☐ 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.)
☐ 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.
☐ 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.
☐ 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 no non-disclosure agreement is 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	OSTACLES TO USING FREE SOFTWARE
☐ 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.
☐ The contracting organisations lack the knowledge required to put together open-source software specifications and are not familiar with 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.
☐ Proprietary software and/or specific hardware was heavily deployed in the previous systems.	In the short term, changing over to FOSS may generate additional costs and also create interoperability issues between the new FOSS and existing proprietary systems (e.g. interface problems).
☐ The local IT industry is more focused on proprietary options and/or specialist staff lack relevant qualifications.	Local individuals with the skills needed to use FOSS may be scarce, because in the past, 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 use 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 above considerations into account, the appropriate software and respective licence can be selected or software requirements for a tender can be formulated.

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For more information on licensing, go to:
Free Software Foundation: List of licenses: www.t1p.de/8g9k
Open-Source Initiative: Approved licenses: www.t1p.de/nuo4

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Further guidance and tools:
IDABC European eGovernment Services: Guidelines for the procurement of free and open-source software in public administration: www.t1p.de/zbkg
UNCTAD Report: Promoting local IT Sector Development through Public Procurement: www.t1p.de/d1pk
Open Source Business Alliance: Guidelines on the use of the supplementary conditions of contract for ICT procurement (EVB IT) for the use and procurement of open-source software for agencies and public institutions: www.t1p.de/86jk

4.3.3   Open source – Development and use of free software

E-learning –
Using digital learning formats

There are many arguments in favour of using digital learning approaches (→ *e-learning*). For example, online learning platforms allow flexible timing, options to determine the preferred depth of learning, the possibility to learn with location-independent access and, most importantly, while working part-time. Learning content is therefore available for many people who would otherwise often have no access. Learning providers and projects benefit because a vastly greater number of participants can be reached, uptake and results can be measured and, last but not least, substantial costs and time can be saved. The internet also makes new forms of learning possible, through games (→ *gamification*), visualisations and other forms of digital interaction, for example.

However, getting e-learning right is not as easy as people think. First, existing options and formats need to be considered and clarified, existing DC/IC resources 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 independently work through the e-learning content and are usually assessed through quizzes and practice questions.

- **Blended learning** – Combination of classroom learning and digital learning units.

4.4.1

- **Webinars** – Online seminars where participants watch a presentation, live or pre-recorded, and have an opportunity to discuss the points raised with the presenter and other participants. In addition, surveys can be conducted and chatroom discussions captured and posted on a whiteboard for later review (see also section 4.4.3).

- **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 with → *text messages*.

- **Wiki** – A hypertext system for websites that allows content not only to be read, but also to be amended by users.

- → *Massive Open Online Course* (MOOC) – MOOCs are free, accessible online courses for a very large group of participants.

- 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 www.t1p.de/5a6c

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

Identify how e-learning fits into the results framework and into the overall context

☐ What intervention points should e-learning link into? What is the objective 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 skills do they need? (→ *e-skills*, → *e-literacy*)

Clarify existing and required resources

☐ **Technical:** What resources do the target group have? (Equipment, internet connection, etc.)?

☐ **Financial:** What budget is available?

☐ **Personal:** What skills does the target group already have?

☐ **Content-related:** Who will prepare the learning content? Who will manage the course?

Define the learning goals and targeted competences

☐ What should the measure ultimately deliver? What should be taught: knowledge and skills? What new competences do the participants need that they will 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. line managers or national accreditation authorities)?

Networking and 'social learning'

☐ How high should the level of interaction be? Should communicative and cooperative elements be integrated? Should participants be grouped into a learning network?

Increase sustainability and ensure quality

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

CHALLENGES THAT NEED TO BE CONSIDERED:

- If the target group is small and the measure one-off: Is the substantial outlay involved in developing these approaches worthwhile? Take account of expensive development and planning processes.

- Does the e-learning approach under consideration really match the 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 achieve learning goals and identify success and areas that require further work. Offering students access to a well-trained 'e-tutor' can provide helpful support.

PRE-EXISTING PLATFORMS AND APPROACHES IN DC/IC

There is no generally applicable template or 'blueprint' for using e-learning. However, most DC/IC institutions have their own (internal) learning platforms that they can use as a basis.

- 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, MOOCs and other digital formats as well as Web 2.0 applications approaches, → *blogs* (www.t1p.de/f7ku).

- The **Goethe-Institut** uses a Moodle-based learning platform to deliver further education and training (www.t1p.de/qusm, www.t1p.de/x4pg).

- **Deutsche Welle** uses the DW Akademie Connect platform (https://connect.dw.com/), also based on Moodle, for its internal education and training activities. It also provides German language learning in the form of podcasts, drama series and social media (→ *social networks*). One highlight is 'Nicos Weg', a self-study course that can be used on mobile devices. Each lesson starts with a video in which users accompany the protagonist – Nico – in his new life in Germany (dw.com/nico).

- External providers and free software solutions are also available, such as Candena: www.t1p.de/sqii.

Section 2.3 provides different examples of DC and IC projects that focus on education.
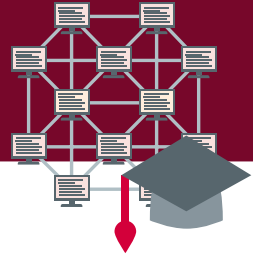
MOOCs (→ *Massive Open Online Course*) provide DC/IC with new ways of making a development contribution (through education). 'MOOCs for Development' are used to mainstream methods and expert knowledge, to deliver inclusive peer- and self-learning and/or to develop or expand 'Communities of Practice'. MOOCs usually focus on networking interest groups and transferring learned skills into practice.

Incorporating MOOCs in programmes

PLANNING A MOOC

Like in other further education and training measures, when planning a MOOC a number of general questions relating to the wider programme need to be answered at the outset:

☐ How can the measure contribute to the achievement of my programme goal?

☐ How does the MOOC slot in with the project's results framework?

☐ When and how often should I offer the MOOC within the programme context?

In terms of the intended results:

☐ Which group of people will my measure address? Is it an expert community or a general community (don't forget that the first two letters of MOOC stand for 'massive' and 'open')?

☐ What learning objectives have been set?

☐ 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? 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-skills*, outsourcing commissions 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 scaling up of a topic

- encourage learning and sharing

- instigate networks for a specific topic area

- publicise a topic

- test and disseminate tools or approaches

during the closing phase of a programme:

- prepare a new project

- where possible, hand over '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 run for six to ten weeks. The following phases can be defined:

Phase 1: **Design**
Put together the core team and bring in partners or facilitators where required, define the goals, clarify finances/resources, create the didactic concept, select methods and tools

Phase 2: **Preparation**
Select the learning platform, build the website, test the tools, create the course material, develop marketing material

Phase 3: **Application**
Launch the registration process, roll out the social media strategy (→ *social networks*), conduct regular communications activities (e.g. circulate newsletters)

Phase 4: **Warm-up**
Offer a kick-off event

Phase 5: **Core time**
Provide the course material, deliver the live sessions, manage the community

Phase 6: **Follow-up**
Safeguard the results (e.g. microblog archive, put together e-books based on the contributions, transfer follow-up to a community of practice)

Success factors

TECHNOLOGY

☐ Selection of learning platform

☐ (Partly) commercial standard offers (Coursera, edX, Udacity, etc.)

☐ Separate learning management systems (LMS)

☐ → *Open source* technologies (Wordpress, etc.)

☐ Social media technologies

Success factors:

- Worldwide and continuous → *access* to platform

- Accessibility of IT support staff

- Harmonisation of the learning platform and methodology

- User-friendliness

TEAM

☐ Online facilitators

☐ Instructional designers

☐ IT technicians

☐ Social media experts

☐ Cooperation partners (guest lecturers, etc.)

Success factors:

- Clear allocation of roles and transparent communication channels for all participants

- Strong →*e-skills* on the part of the facilitation team and their continuous presence

🏅 COURSE MATERIALS

☐ Selection/preparation of suitable multimedia materials (text, audio, video, animation) and live sessions (webinars, see section 4.4.3)

☐ Checking integration and preparation of 'open educational resource' (OER) materials

☐ Use of Creative Commons licences (see section 4.2.5)

☐ Selection of certification type to provide incentives for completion ('open badges', institutional certificates, etc.)

Success factors:

- 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 factors:

• 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

COMMUNICATIONS STRATEGY

☐ Employ social media tools

☐ In MOOC lists

☐ Exploit cooperation partners' networks

☐ Promote MOOC on own website, etc.

Success factor:

• Communications strategy prepared at an early stage

BUDGET

Decisive factors for the budget:

☐ Technology

☐ Team

☐ Course materials

Success factor:

- A well-crafted overall concept

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

Whether offered as continuing education, to exchange know-how with project partners or to train experts, webinars and web conferences are popular →*e-learning* and virtual communication methods used for honing specialist skills and sharing information using multimedia. They are available wherever participants are located. Unfortunately, many of these events are poorly organised and executed. A few simple techniques, however, can help you host both webinars and web conferences very effectively. The following checklist offers guidelines for both formats.

☑ Checklist for hosting webinars and web conferences

☐ **Prepare well.** Use the 'Plan-Prepare-Rehearse-Deliver' model to ensure that everything runs as smoothly as possible.

- *Plan: Plan the event. Send out invitations and if appropriate, arrange for an assistant who is familiar with the technology.*

- *Prepare: Create the PowerPoint presentation and items you want to cover with exact times and instructions for the assistant (where applicable).*

- *Rehearse: On the day before the event, conduct a dry run under the actual conditions (same room, same technical equipment), if possible, with the assistant present.*

- *Deliver: Conduct the event. Be prepared to adapt flexibly to any conditions that may have changed.*

☐ **Initial greeting and lobby activity.** Welcome the participants (if possible, by name). This will create a positive atmosphere. Ask participants to answer a short question in the chat. This question will serve as a 'lobby activity' that will give attendees something to do before the event officially starts. While you are waiting for the other participants to 'arrive', you can briefly comment on the answers in the chat.

☐ **Welcome and introduction.** To officially start the event, welcome all the participants and briefly introduce yourself, if possible, with your webcam running. After you have introduced yourself, it is a good idea to turn off your webcam, which will ensure smooth transmission. <u>Briefly</u> introduce the topic, outline the learning objectives and share the housekeeping rules for the event. Spend only about two or three minutes on this part. If you have a small group (no more than six to eight participants), have the attendees briefly introduce themselves. Be sure to tell the attendees in advance how much time they have for the introduction, e.g. 30 seconds per person.

☐ **Interaction with the participants.** Enhance interactivity by posing yes-or-no questions that participants answer using emoticons, such as the 'thumbs up' or 'thumbs down' symbol.

Tip: Pose the questions such that <u>all</u> of the participants have to respond, even if their answer is 'No'. For example, 'Have you ever had the experience that X, Y, Z happened?' If you have, please give me a 'Thumbs up' and if you haven't, please give me a 'Thumbs down'.

☐ **Voice and personality.** Use a good external microphone, such as Jabra, which will ensure the best audio quality. Since the attendees cannot see you, communication takes place exclusively through your voice. Pay attention to modulation and variation in your voice and make sure that your tone is warm and professional. Pause as needed and use effective intonation. Do not speak too quickly, especially if non-native speakers of your language are attending. Address the attendees by name, especially if the group is small.

☐ **Back-up option for extreme audio disturbances/situations with poor audio quality.** Sometimes, the transmission is considerably delayed with distortions. If you know that your attendees will be participating in locations that tend to experience these kinds of problems, be sure to plan a back-up solution in advance. One option involves using the webinar/web conference program only for the visual level and to use a landline connection for the audio part of the event.

Please note: Depending on the organisation, you must reserve the phone conference number for the landline connection a few days in advance. Remember to inform participants about the change and the new dial-in details in good time and switch off the audio option in the web conference program.

☐ **Combination (online and offline)**. If you plan an event where participants are both online and offline in the conference room, you will need to schedule more time for preparation, since there is a greater risk of technical problems occurring in such situations. In this case it is advisable to request IT support in advance and plan sufficient time for the dry run.

Specific tips for webinars

- **Allocate time for interaction with participants.** During webinars, participants should interact with each other every three or four minutes. They can do this by answering a chat question or a survey, for instance. Some webinar platforms allow you to conduct small-group discussions referred to as 'breakouts'. Even with platforms that do not offer this option, you can conduct breakouts by creating and using several meeting rooms simultaneously.

- **Prepare and set up the room.** If you plan to use surveys or other interactive methods, you need to set these up in advance. You can also upload the PowerPoint presentations and other files ahead of time.

- **Technical assistant.** During a webinar, an assistant should be present to take care of the technical aspects, chats or problems attendees may have. This will allow you to focus on the content and on facilitating the presentation.

- **Webinar platforms.** A number of webinar platforms are available, including Adobe Connect, Saba and GoToWebinar.

Specific tips for web conferences

- **Interaction with participants**. In contrast to webinars, web conferences may be less interactive, depending on the learning objectives you have set. At the same time, web conferences should not be exclusively lecture-style events. You can use interactive techniques every ten minutes or so.

- **Technical assistant/note-taker**. If the group is small and you have not planned a lot of technical activities, you may decide not to use a technical assistant. However, it is important to have a note-taker on hand during the web conference, especially if decisions are to be taken during the event. This individual can also use the chat feed to take notes.

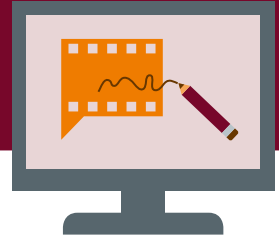**Web conference platforms:** Skype for Business, WebEx, GoToMeeting, etc.

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For more information, go to:

Top 7 Tips to Be a Successful Webinar Host: www.t1p.de/tlre

5 Tips for Conducting a Virtual Meeting: www.t1p.de/eznb

→ *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 – Toward an Uncertain Future*.

The strength of digital storytelling is that texts, images and films are greatly reduced on a didactic level. This makes stories easier to understand. Complex DC issues and topics can also be broken down and packaged to be more comprehensible. 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 literacy rates.

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 can be published, and if so in which context. Simplifying complex issues to a concise format, publication and response to feedback require practice.

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

4.4.4

Digital storytelling can also be integrated into broader project processes or even become the main component. It can, for example, be used to:

- promote technological and methodological media skills,

- raise awareness among target groups of their own values, goals and ideals 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 results 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 towards? 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 heart of digital storytelling. Here, the author describes the issue to be addressed from an individual perspective. Contrary to the development of other digital products, the script must be written first. Only then should the media for conveying the story be identified. When it comes to selecting 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 appropriate and 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 4.2.5).

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 would be suitable? *(→ 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 skills (→ *e-literacy* and → *e-skills*) be imparted to inexperienced users?

Stage 5: Merging the script and the multimedia approaches

☐ Once suitable multimedia instruments have been selected, the package content is then developed for the channels in question. If the package includes video or audio material, for example, the media defined in the storyboard are re-recorded or existing material is edited and the story set to music. The technical nature of this work means that participants may need 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 therefore be determined prior to publication of the digital story package.
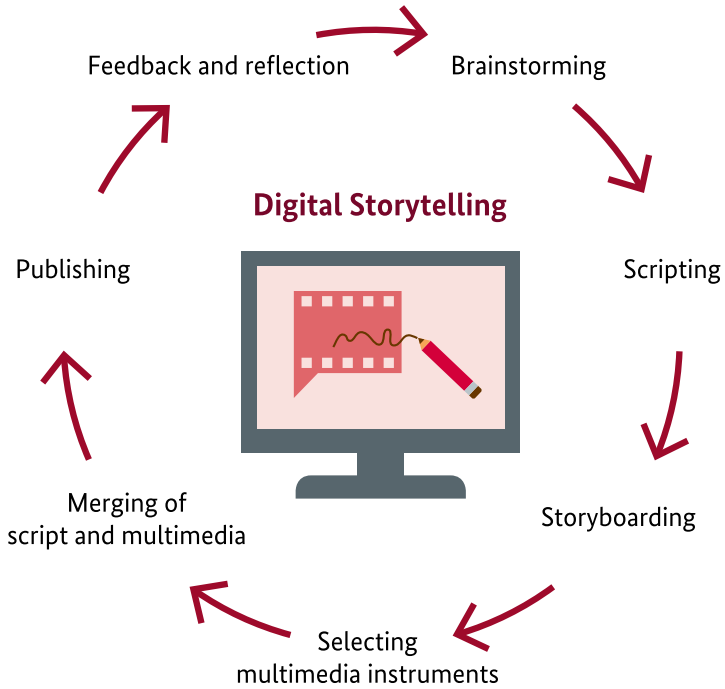
Feedback and reflection

Brainstorming

Digital Storytelling

Publishing

Scripting

Merging of
script and multimedia

Storyboarding

Selecting
multimedia instruments

Diagram: The optimum sequence for developing a digital story package

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Some examples of digital storytelling

Serengeti – Toward an Uncertain Future from Deutsche Welle's 'Global Ideas':

https://p.dw.com/p/18xMJ

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

Gamification –
Boosting effectiveness through games

People play games in every culture throughout the world. Whether they are children or adults, people love overcoming obstacles, and solving puzzles sharpens their intelligence. They derive pleasure from achieving goals and become motivated to tackle the next task. This behaviour is being capitalised on now more than ever. This means that we play games without even knowing it. We collect points at the supermarket and enjoy cashing them in or qualifying as 'Gold' customers or receiving a discount on a cordless drill. It makes us more motivated to buy, work and learn. We use the term → *gamification* to describe this phenomenon. In these games, entertainment is not the primary aspect. Instead, the focus is on conveying large volumes of information, which often works better than with conventional learning methods. After all, playing a game motivates us and makes us want to continue and have fun, in contrast to reading boring reports and learning materials. This approach used by 'serious games' can also be very pragmatic for DC and is already in use today.

THE BRIEF OVERVIEW BELOW ILLUSTRATES THIS APPROACH.

Objective: Motivate the target group to perform certain actions or initiate a behaviour change.

Key characteristic: Playful elements and dynamics are in a context that is not a game (gamification); (learning) content is conveyed through games (serious games).

EXAMPLES OF SERIOUS GAMES:

- vHealthCare: medical simulation for training doctors. (www.breakawaygames.com)

- Foldit: Puzzles for protein folding. The data set generated by the users is used for cancer research. (www.fold.it)

- Arabia Felix Games: Serious game developed by GIZ for building peace in Yemen (see section 2.7.2).

4.4.5

EXAMPLES OF GAMIFICATION:

- DuoLingo: gamified app and website for learning languages.

- Speed Cam Lottery: Speed measurement in Sweden, in which people abiding by the speed limit were entered into a draw and one person chosen as the winner of fines paid by the speeders.

- Miles & More: Loyalty points and other incentives to boost customer loyalty and influence customer activity.

The examples show that incentives do not necessarily have to be implemented digitally and can pursue different objectives.

Is gamification the right approach for achieving my goal? Use the questions below to determine the answer:

- What are the **goals**? Which **method** could be the right one?

- In which **context** and in which situation do I wish to reach the target group?

- Which **game dynamics** (such as collecting points, giving awards, ranking) can I use to reach the goals?

- How I can I **verify** that the target group's activities have really taken place? For example: Are the learning results better after a gamified system has been used?

A crucial factor for the success of a serious game or of a gamified system is activation of **basic psychological motivators** such as social relationships, growth intentions (the need to become better at things) or expression of one's own creativity. In short, things that are fun. A common stumbling block is the ill-conceived integration of game dynamics whose effects have not been carefully thought through. In other words, it's not enough to just introduce a few points or a ranking system.

You have to choose the right composition of the gaming elements, which changes depending on the context and target group. Still, since games are a part of every one of the world's cultures, the approaches can be used world-wide.

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For more information, go to:

Information on the topic and a gamification framework by expert Yukai Chou:

www.yukaichou.com

University of Pennsylvania's gamification MOOC: www.coursera.org/learn/gamification

GIZ gamification expert, Dr. Philipp Busch:: philipp.busch@giz.de

→ *Smartphones* are becoming commonplace around the world, even in developing countries where their uptake is now growing at a remarkable rate.

Apps are therefore, at first glance, a particularly convenient, inexpensive and effective way of communicating with target groups and providing them with a large number of important services As such, DC/IC project managers are now much more likely to be involved in developing an app as part of their work, and partners and commissioning parties are increasingly requesting them → *Apps*.

As such, DC/IC project managers are now much more likely to be involved in developing an app as part of their work, and partners and commissioning parties are increasingly requesting them.

Difficulties arise, however, when the development of an app is viewed as the starting point of a project without sufficient consideration of how it can be used to achieve the project's actual goals. By focusing on the development process itself, there is a risk that the application will fail to contribute or will not contribute to a sufficient degree to solving the problem in hand. 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 is highly context-dependent, and requires major customisation, it should be treated as a rough guide only.

Stage 1: Clarify the goals

Prior to clarifying the technical requirements of the app, it is essential to determine the framework conditions and context in which it 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 user group's digital readiness (see section 3.1)

When assessing the targeted user group's → *digital readiness*, you need to ascertain whether the group and chosen technology are compatible. Make sure to ask the following questions:

- Does the target group (or a part of it) have → *access* to → *smartphones*, or do → *text messages* or voice messages represent the best approach?

- What are the group's usage patterns?

- Which digital competences already exist in the target group and which may still 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, ask the following question:

- Do any mobile solutions or mobile-based services already exist that you can build on, to avoid having to develop the app from scratch? When answering this question, explore the options available in the → *open source* community.

Expert networks are a helpful source of information about similar solutions that already exist. 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).

If you are unable to identify mobile applications with a similar purpose, take a look at the section on 'digital principles' (see section 1.3) as well as USAID's Integrating Mobiles into Development Projects handbook to determine your next steps.

Stage 4: Realistic use of resources

If you are unable to build on an existing solution and need to develop a new app, you will need to conduct a realistic assessment of the resources required. Note that, besides the cost of programming the app, you will also need to factor in the costs of market analysis, test 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 at this stage you realise that the expected costs of the app exceed the value of its projected use, you will need to consider terminating development, as this would make 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:

PROJECT PLANNING

Select the technology:

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

> With more than 85% share of the global market, Android is typically the first choice when targeting poorer groups. However, each app development project must be assessed individually.

Define the scope:

☐ What functions should the app have? Compiling a specification is advisable, broken down among other things into core and additional functions.

☐ Which work packages need to be defined for implementation?

Examine the legal framework:

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

Estimate costs:

☐ What is the prospective specification for the app (scope of functions)?

☐ 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, fees for new services, free of charge with incentive model)?

Identify implementation partners:

☐ Which services should partners take care of?

☐ What are the criteria for their selection?

Develop an implementation strategy:

☐ What are the milestones for the development process?

☐ Who is responsible for which work package and which milestone?

☐ Do service providers need to be contracted?

☐ What communications strategy will be used for the development process?

☐ How will progress of the app's development be measured? What are the criteria?

PROJECT IMPLEMENTATION

Methods for supporting communication:

☐ Is a 'mock-up' (demo version for reviewing the design) required?

☐ When will a 'wireframe' (demo model for reviewing navigation) be available?

☐ Will 'use cases' and 'user stories' (descriptions of the projected requirements of different users) be created to review 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 corporate identity relevant to the recognition of the app?

☐ Is the app design flexible enough to allow for additional content to be added at a later stage?

RELEASING THE APP

Platform transfer and release:

☐ 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?

☐ What other channels can be used to promote/distribute the app?

———

For more information, go to:

Groupe Speciale Mobile Association (GSMA): Mobile for Development, Impact product and services directory: www.t1p.de/6ehn

NOMAD (Humanitarian Operations Mobile Acquisition of Data): Selection Assistant: www.t1p.de/9eyk

USAID: Integrating Mobiles into Development Projects www.t1p.de/72gs

Resources

Partners and Publications
Related to Digitalisation

Resources

Using → *digital technologies* in DC and IC means thinking outside the box. It means creating and establishing new digital standards, having an open mindset about innovations and ideas and being prepared to actively participate in shaping digital transformation.

PARTNERS:

In this second edition of the toolkit, implementing organisations and grant recipients of German DC and IC once again share their experience and expertise. Their project case studies clearly illustrate the contribution digital technologies can make to project work today.

The following pages are dedicated to these partners. Who are they? What activities do they carry out in the field of digital transformation? Who can answer questions about certain topics? Meet DC's digital actors.

PUBLICATIONS:

Copious knowledge has also been pooled in publications prepared by BMZ and/or its partners that provide important insights into our topics. A list of key publications is presented at the end of this section.

DEG – Deutsche Investitions- und Entwicklungsgesellschaft

DEG has been successfully funding, advising and supporting private companies that operate and invest in developing and emerging countries for over 55 years. Its clients receive tailored solutions comprising financing, support programmes and individual advice. Companies can help foster development and contribute to adding value to the local economy. With a portfolio of around EUR 8.6 million in over 80 countries, DEG is one of the largest development finance institutions for the private sector.

In this role, DEG acknowledges that digital transformation can be a key driver of development. It thus offers digital solutions in areas such as expansion of the telecommunications structure, modernisation and development of mobile communications provider services and internet-based services. For example, DEG supports an Asian FinTech start-up that promotes financial inclusion and funds a private company from Myanmar that builds and operates a network of mobile phone masts.

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KFW DEG

As a service provider in the field of international cooperation for sustainable development, GIZ is dedicated to shaping a future worth living around the world. We have over 50 years of experience in areas ranging from economic development and employment promotion, energy and environmental protection to peace and security.

Our commissioning parties – first and foremost the German Federal Ministry for Economic Cooperation and Development (BMZ), our main commissioning party – are already actively engaged in dealing with the impacts of digital transformation and expect the same of us. Work in our partner countries is strongly changing as a result of digitalisation, and state-of-the-art approaches are in demand.

Since 2018, we have geared our work to adhere to the international Principles for Digital Development (www.digitalprinciples.org). Digital approaches need to be used even more effectively and GIZ needs to establish itself as an innovative partner for digital solutions in DC. To this end, we have drawn up a Guiding Framework for Digital Change at GIZ and a Target Image for Digital Change. The establishment of the new Digital Transformation and IT Solutions (DIGITS) Department on 1 September 2018 shows that the significance of digitalisation is reflected in our organisational structure. The digital literacy of our colleagues is one of our core concerns. After all, at GIZ, it is always people, not technology, that are the focus of digitalisation.

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DW Akademie

DW Akademie works with its partners to strengthen independent media, journalists and media users worldwide. In around 50 developing and emerging countries, it defends the human right to freedom of speech and freedom of information. DW Akademie has positioned itself as a leading actor for international digital media development. Its digital strategy comprises five focal points:

Media and Information Literacy (MIL): DW Akademie empowers young people in particular to use digital and conventional media independently, critically and in a self-determined manner. This counteracts polarisation and radicalisation.

Media viability: DW Akademie safeguards the economic viability of media and supports it in producing high-quality content.

Training for media professionals: Whether it's mobile journalism or data journalism, DW Akademie's offerings turn young media creators into pioneers in the digital media sector.

Digital rights: DW Akademie does its part to ensure that human rights and international standards for diversity, openness and privacy are also valid for social media and internet communication.

Innovative dialogue: DW Akademie develops innovative options for people to use mobile communication, databases and social media.

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5.1.4

Federal Institute for Geosciences and Natural Resources (BGR)

The Federal Institute for Geosciences and Natural Resources (BGR) is the central geoscientific authority providing advice to the

German Federal Government and is under the Federal Ministry for Economic Affairs and Energy (BMWi). In its role as a competence centre for the geosciences, it advises and informs the German Government and the German private sector and society on all geoscientific and natural resource issues. BGR is a German DC implementing organisation, conducting geoscientific and natural resource projects in around 30 countries on behalf of BMZ.

Collecting, using and providing digital data has been a key cornerstone of BGR's work for many years. We thus ensure that geoscientific data, geoinformation and geodata services *(→ geographic information system)* find more widespread use in multiple areas. The goal of working digitally is to archive data sets so that they can be accessed in the long term for research and networking purposes.

Geodata infrastructures are used to provide internal and external users from administration, science and research, industry and the general public with geoscientific information in a high-performance, user-friendly and sustainable manner. For example, new innovative, hi-tech tools are used to process 3D data for deep underground mining or *→ big data* methods are used to manage mass data generated by remote sensing. Semantic Web technologies are used to disseminate and connect the databases on a more widespread basis.

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German Academic Exchange Service (DAAD)

The German Academic Exchange Service (DAAD) is the world's largest organisation for promoting the international exchange of students and academics. DAAD contributes to DC in numerous ways with a broad range of scholarships, partnership programmes and advisory services.

DAAD strives to:

- broaden access to higher education and science in developing countries and ensure equal opportunity;

- improve the quality of higher education and research in developing countries and further increase its relevance for development purposes.

DAAD operates in three fields of activity using academic exchange in developing countries and emerging economies:

- **Educating professionals and leaders of tomorrow** for scholarship holders, in line with the goals of the 2030 Agenda.

- **Building strong universities.**

- **Providing expertise for academic cooperation:** DAAD possesses extensive knowledge about the structures of higher education cooperation and scientific systems worldwide.

DAAD's offerings help create digital structures and know-how, educate professionals for the digitalised labour market and promote digital skills for students and in science.

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DAAD

Goethe-Institut e. V.

Goethe-Institut e.V. is the globally active cultural institution of the Federal Republic of Germany. It promotes awareness of the German language abroad, encourages international cultural exchange and relations and provides information on German culture, society and politics. Educational and cultural programmes encourage intercultural dialogue, strengthen the development of civil society structures and foster mobility worldwide.

With its network of Goethe-Instituts, Goethe Centres, cultural societies, reading rooms and examination and language learning centres, it has served as many people's first point of contact with Germany for over 60 years. In partnership with governmental and non-governmental educational institutions, Goethe-Institut works on behalf of artistic stakeholders undergoing training and education in cultural professions.

Goethe-Institut sees digitalisation as providing opportunities to open up new points of access to art and culture, information and knowledge and promote international structures that enable knowledge and ideas to be transferred to the cultural and creative economy. It therefore places a particular focus on expanding digital platforms and online education programmes. One example of this is the I Am Science education project, which addresses young girls and women in southern Africa and encourages them to acquire digital knowledge for technical professions.

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KfW Development Bank

KfW is one of the world's leading development banks. It applies its decades of experience to improve economic, social and environmental living conditions across the globe on behalf of the Federal Republic of Germany and the federal states.

On behalf of the German Government, KfW Development Bank assists developing and emerging countries in using innovative technology, in order to improve basic services, create employment, boost competitiveness and combat climate change.

The scope of information and communication technologies ranges from pure infrastructure projects (such as the construction of fibre broadband networks in Africa), to complex management and monitoring units (such as for power supply or expanding the underground system in emerging economies), to diverse digital applications in various fields (such as telemedicine apps, the use of drones for topographic 3D models, text message-based citizen participation or timber transport licences for rainforest protection).

Innovative technologies must prove their worth in practice. KfW Development Bank and KfW's Digital Office have developed the TruBudget blockchain software, for example. It makes the use of public funds transparent and traceable. Blockchain technology also makes financial transactions manipulation-proof.

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KFW

Welthungerhilfe

Welthungerhilfe is one of the largest private aid organisations in Germany, with no political or religious affiliation. The organisation is fighting to eradicate hunger by 2030 (#ZeroHunger). Since it was founded in 1962, Welthungerhilfe has provided funding of EUR 3.27 billion to support more than 8,500 projects in 70 countries outside Germany. An increasing number of these projects comprise digital activities. Welthungerhilfe subscribes to the Principles for Digital Development, which all relevant projects will have to comply with in future. Focal points include:

- Mobile data collection systems for recording information, for example, from grant recipients, to check attendance rates or determine how project inputs are used (for school latrines or drinking water kiosks, for example).

- Digital registration: During emergency relief missions, beneficiaries are digitally registered and biometrically identified for distribution of relief supplies.

- For disbursement of financial aid with cash cards: Beneficiaries can use electronic payment cards to withdraw cash or make payments.

- Digital systems for disseminating information and managing knowledge: The Kurima Mari app helps farmers boost yields. WhatsApp groups in Liberia and text messenger services in Zimbabwe disseminate information.

- Innovative technologies: 3D scans, artificial intelligence and sharing economy models are tested with innovative apps.

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5.1.8

World Food Programme (WFP)

The UN World Food Programme (WFP) is the leading humanitarian organisation in the fight again hunger worldwide and reaches over 80 million people in around 80 countries each year. To achieve the global Sustainable Development Goal of a world without hunger by 2030, emergency relief and development assistance must be dovetailed with technological innovations. Artificial intelligence, mobile communications, blockchain and innovative business solutions can improve the way we help people in need all over the world. WFP is therefore breaking new ground and in cooperation with Germany, has established the WFP Innovation Accelerator to find and support bold ideas and solutions for a world without hunger.

The WFP Innovation Accelerator offers the following functions:

- Innovation challenges: Identifying internal and external projects and solutions for a world without hunger

- Innovation bootcamps: Intense training for project teams to develop their projects using lean start-up and design thinking methods

- Sprint Programme: Financial support, mentoring and access to the global WFP network for field tests of selected projects

- Thought leadership: Exploring application possibilities for innovative technologies and business models in emergency relief and development assistance

- Innovation Fund: Identifying investment opportunities

Since August 2015, the Innovation Accelerator has supported more than 30 projects, from mobile apps like ShareTheMeal, which can be used to send vital food supplies to children simply by tapping a smartphone, as well as blockchain projects for more efficient and secure cash transfers.

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5.1.9

Publications (selection)

Own publications (BMZ or BMZ-funded)

Title	Language	Date	Publisher	Link	
Digitale Agenda des BMZ – Die digitale Revolution für nachhaltige Entwicklung nutzen	German	01.02.2017	BMZ	www.t1p.de/bn8z	
Trendradar 2030 – Ein Blick in die Zukunft der digitalen Technologien und wie sie unsere Welt besser machen können	German	01.05.2017	BMZ/ betterplace lab	www.t1p.de/aezv	
Women's Pathways to the Digital Sector: Stories of Opportunities and Challenges (Studie)	English	01.02.2017	BMZ	www.t1p.de/81fh	
ICT4Refugees: A report on the emerging landscape of digital responses to the refugee crisis	English	01.05.2016	BMZ/GIZ	www.t1p.de/nk6k	
Internet of Things. Using sensors for good: How the Internet of Things can improve lives	English	01.11.2015	BMZ/GIZ	www.t1p.de/hv8k	
Data for development: What's next? Concepts, trends and recommendations for German development cooperation	English	01.05.2016	BMZ/GIZ	www.t1p.de/o1dn	
The Role of Open Data in Sustainable Transport	English	01.05.2015	GIZ	www.t1p.de/pw5r	
Use of ICT for Agriculture in GIZ projects – Status quo, opportunities and challenges	English	01.02.2016	GIZ	www.t1p.de/abx7	

External publications

Title	Language	Date	Publisher	Link	
Fast-forward progress: Leveraging tech to achieve the global goals	English	01.07.2017	ITU	www.t1p.de/380g	
World Development Report 2016: Digital Dividends	English	01.05.2016	World Bank	www.t1p.de/qd3r	
Affordability Report 2018	English	23.10.2018	A4AI	www.t1p.de/wlb7	
Open Data Barometer	English	20.09.2018	World Wide Web Foundation	www.t1p.de/wlhu	
Measuring the Information Society 2017	English	15.11.2017	ITU	www.t1p.de/ge9b	
Information Economy Report 2017 - Digitalization, Trade and Development	English	23.10.2017	UNCTAD	www.t1p.de/wpb9	
World Development Report 2019: The changing nature of work	English	11.10.2018	World Bank	www.t1p.de/k1r2	
Is open data working for women in Africa?	English	01.07.2018	World Wide Web Foundation	www.t1p.de/6675	
Artificial Intelligence: Starting the policy dialogue in Africa	English	01.12.2017	World Wide Web Foundation	www.t1p.de/e3ci	
Scaling digital health in developing markets	English	01.06.2017	GSMA	www.t1p.de/rhck	
ICTs for agriculture in Africa	English	01.05.2014	World Bank	www.t1p.de/x55v	

BMZ: German Federal Ministry for Economic Cooperation and Development,
GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH,
ITU: International Telecommunication Union
GSMA: Groupe Speciale Mobile Association
A4AI: Alliance for Affordable Internet

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