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Innovation Ecosystem

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List of Abbreviations

CA	Consortium Agreement
CO	Confidential
DIH	Digital Innovation Hub
DI	Digital Innovation
DMP	Data Management Plan
DoA	Description of Action
DOI	Digital Object Identifier
DSI	Digital Social Innovation
DoW	Description of Work
EC	European Commission
EGE	European Group on Ethics in Science and New Technologies
GA	Grant Agreement
GDPR	General Data Protection Regulation
H2020	Horizon 2020 programme of the European Union
IPRs	Intellectual Property Rights
LFA	Logic Framework Approach
MAB	mAkE Advisory Board
MOOC	Massive Open Online Course
OERs	Open Educational Resources

ORDP	**Open Research Data Pilot**
PMB	**Project Management Board**
PU	**Public**
RE	**Restricted**
R&I	**Research & Innovation**
SDGs	**Sustainable Development Goals**
SMEs	**Small and Medium-sized Enterprise**
STEM	**Science, Technology, Engineering, and Mathematics**
SWOT	**Strengths, Weaknesses, Opportunities, Threats**
WP	**Work Package**

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Executive summary

This document, titled Impact Assessment Plan, has been developed within the framework of the mAkE project, which is funded by the European Union's Horizon 2020 programme under grant agreement No. 101016858.

The evaluation and impact assessment of the mAkE project, which constitutes mAkE work package 7 (WP7), has two main objectives. First, we want to ensure that the project's network structures, the capacity building support, the created infrastructures, and the created materials are developed according to the project plan and are contributing to the project objectives. Second, we aim to provide evidence of the envisioned impact, and to identify facts and stories that demonstrate the project's influence beyond the borders of the consortium, especially in terms of capacity building. The evaluation of results is organised in relation to the general objectives set up by the project, and seeks evidence of the effectiveness and efficiency of the mAkE approach at an individual level as well as at the collective and societal level for the organisations and communities involved.

mAkE's evaluation and impact assessment approach is comprised of:
- summative evaluation of the benefits to participating individuals, their organisations, and communities
- formative evaluation of the implementation of support measures, which helps to iteratively shape activities, infrastructures, networks, and materials developed by the project

Being aware that an impact assessment is not only critical for the project itself but also, from a long-term perspective, is a key tool for the wider reach of the mAkE project, WP7 aims at the elaboration of a customised impact assessment model, tailored to the needs of the involved stakeholders, which can be used even after the end of the project.

In the mAkE project, evaluation has been integrated into project activities from its very beginning in early 2022. mAkE's approach to evaluation is understood as a form of participatory evaluation that initiates and

supports conversations on expectations, objectives, and impact–right from the start of the project. Consequently, all mAkE consortium members were involved in a first collection of expected project outcomes during the Kick-Off Meeting in February 2022. Only through knowing what consortium members aim to achieve in this project, and the visions that guide consortium members' activities, can mAkE be in a position to evaluate its levels of success at the end of the project.

In a second step, the evaluation team drafted evaluation models for each work package, i.e., for work packages 1 to 6. These draft models, based on the Description of Work (DoW) in the Grant Agreement (GA), comprised the main tasks of each work package, a list of expected outputs and outcomes, and defined impact measures. Two rounds of Zoom meetings, between the evaluation team and WP leaders, took place the first year of the project, with the meetings focused on WP leaders working with the evaluation team to engage with, and refine, the logic models for their respective WPs (which are in the form of matrices). These logic models, in the form of Google Docs editable in the cloud by WP leaders, are understood as living documents and, accordingly they evolved throughout the first 12 project months due to an increasingly clear understanding of the work being done in each of the WPs.

The mAkE indicator framework presented in this Impact Assessment Plan is, thus, a summary and prioritisation of the main indicators in the logic model matrices for work packages 1 to 6. The framework in this document shows the outputs and intermediate and long-term outcomes projected for each package, all aligned to the general objectives set out by the project. This understanding of indicators has informed the evaluation team's choice of data collection instruments that will be needed in order to collect evidence of outputs and outcomes, thus generating understanding of the successes and challenges experienced by the project. The chosen evaluation instruments are listed and described in detail in this document.

In the course of the remaining two years of project activities, the evaluation team will support mAkE consortium members, and in particular the WP leaders, in adapting the suggested evaluation instruments to the specific activities, so as to optimise collection of evidence on outputs and outcomes on a continuous basis, and so as to optimise learning from the formative aspects of mAkE's evaluation plan, with the ultimate, long-term aim of providing increasingly mature and sustainable support to African and European Digital Innovation Hubs (DIHs) and makerspaces.

1. Introduction

This Impact and Assessment Plan document presents the mAkE project's evaluation and impact assessment framework. This document is the basis for the project's evaluation activities, and contains the following chapters:

- **Chapter 1: Introduction**
- **Chapter 2: Vision, goals and success criteria**

  Presents the results from the working session at the Kick-Off Meeting, where the whole consortium was invited to reconsider the main project objectives.

- **Chapter 3: Work package success criteria**

  Introduces the results from the evaluation team's online working sessions with work package leaders for WPs 1 to 6. These sessions focused on work package-specific activities and how evidence for successful achievement and impact can be collected for each of the activities.

- **Chapter 4: mAkE indicator framework**

  Structures the success criteria from the project and the work packages in the form of indicator matrices, and shows, in a condensed form, the main indicators that mAkE aims to collect over the remaining run-time of the project. This includes formative feedback as well as evidence of initial impacts in target organisations and communities.

- **Chapter 5: mAkE's contribution to the Sustainable Development Goals (SDGs)**

  Links the mAkE activities to the SDGs.

- **Chapter 6: Evaluation instruments**

  Presents the main quantitative and qualitative evaluation instruments mAkE aims to apply to collect the data required to populate the indicator framework.

- **Chapter 7: Outlook**

  Presents the upcoming activities of the evaluation and impact assessment work package (WP7).

- **References**

2. The vision: Overarching goals and success criteria

The starting point: During the Kick-Off Meeting that was convened online in February 2022, all mAkE consortium members were actively involved in the discussion of project motivations, expectations, and visions. The discussion was facilitated on a Jambord, which is shown in Figure 1.

Figure 1: Jamboard of the first evaluation exercise during the mAkE Kick-Off Meeting

This summary of the consortium members' inputs at the Kick-Off Meeting shows that the identified objectives related to a broad range of activities, including learning, networking, manufacturing, and influencing policies. An overview of these expectations is shown in Figure 2, together with the project's proposed legacy in 10 years.

Learning and knowledge exchange
- Learn from the diversity of partners and local knowledge that emerges
- Learn from the trainings and the capacity building

Networking and collaboration
- Explore new collaborations
- Foster and maintain new and strong partnerships between DIH in Europe and Africa

Support and infrastructure
- Provide DIH with the needed support systems
- Create a structured ecosystem that brings innovative solutions to realization

Production and manufacturing
- Promote Open Science Hardware as locally adapted, culturally relevant, technologically and economically feasible means of production
- Increase Africa-based manufacturing

Policies
- Establish links with policy makers in African countries
- Influence policies to support DIH

Investment
- Increase investments in African DIH

Expectations, objectives

We are successful, if we create:

A repository of sustainable open-source methods, devices and products for DIHs

A platform that ensures fair collaboration for inclusive innovation

New business alliances

Meaningful working relations producing meaningful innovations together and de-centrally

Inclusion of more African members in DIH- and maker networks

More successful Hardware Startups and DIHs

A successful model to be presented as African European partnership

A global scaling of the project

Legacy

Figure 2: Collected expectations and brainstorming of project legacy during the Kick–Off Meeting

3. Work package success criteria

The collection of overarching expectations defined in the previous chapter was followed by the more detailed discussion of success criteria for each work package. The mAkE evaluation methodology regarding the work package processes, outputs, outcomes, and impact is defined by a logic model (Kurz & Kubek, 2016). This model gives a systematic overview of logical relationships between the project's activities and results, and includes a formative evaluation — determination of the extent to which the project is on track, and which fine–tuning activities should be implemented—as well as summative evaluation at the end of the project.

The illustration in Figure 3 below shows the basic elements of the logic model, which distinguishes between inputs/resources, activities, outputs, outcomes, and impact:

- inputs/resources: all necessary inputs devoted to realise the project's objectives, such as efforts, material; or equipment
- activities: what the project does with the resources like events, tools, workshops, actions – the activities should bring out the desired change
- outputs: services and products offered by and resulting from the project like the number of services and actions implemented

The activities and outputs are important for the project's outcomes and impact, and for that reason, the progression from the outputs to the outcomes and impact is crucial for the project's success.
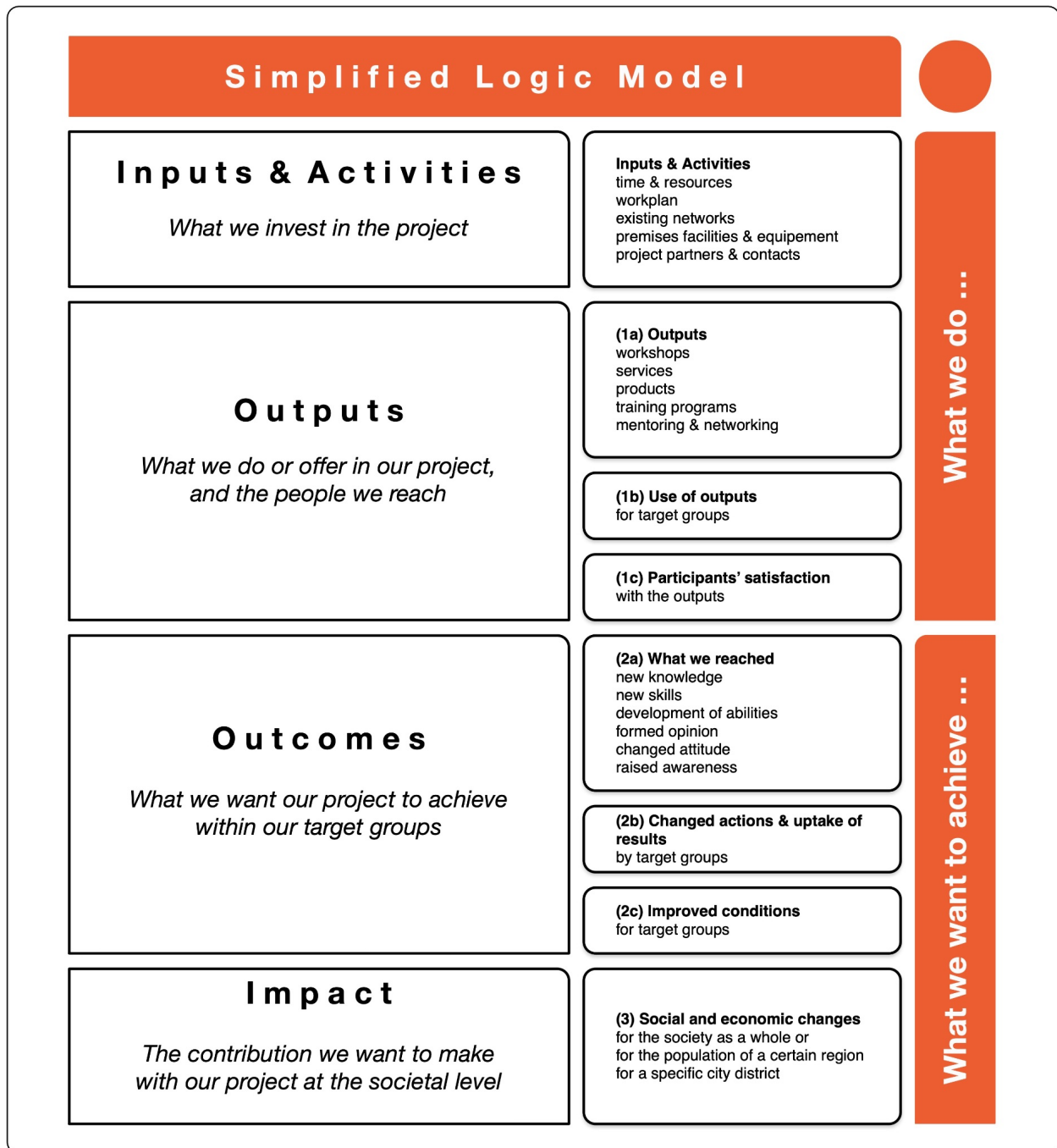
Simplified Logic Model

Inputs & Activities

What we invest in the project

Inputs & Activities
time & resources
workplan
existing networks
premises facilities & equipement
project partners & contacts

Outputs

What we do or offer in our project, and the people we reach

(1a) Outputs
workshops
services
products
training programs
mentoring & networking

(1b) Use of outputs
for target groups

(1c) Participants' satisfaction
with the outputs

What we do …

Outcomes

What we want our project to achieve within our target groups

(2a) What we reached
new knowledge
new skills
development of abilities
formed opinion
changed attitude
raised awareness

(2b) Changed actions & uptake of results
by target groups

(2c) Improved conditions
for target groups

Impact

The contribution we want to make with our project at the societal level

(3) Social and economic changes
for the society as a whole or
for the population of a certain region
for a specific city district

What we want to achieve …

Figure 3: Overview of Logic Model, adapted from Kurz and Kubek (2016)

For the purposes of the online evaluation reflection meetings with mAkE work package leaders during the first 12 months of the project, matrices were drafted for each WP (following the structure shown in Table 1 below). These matrices, refined by WP leaders during the reflection meetings, combine the output and impact in one field. As the inputs are in the hands of the project management, this category was left out of the WP matrices, with the focus being on analysing tasks, outputs, outcomes, and impacts. Also, for optimal planning of evaluation activities, a column was included for capturing potential means of data gathering, and another column was provided for reflections on associated risks and assumptions.

Later in this document (see chapter 4), where the indicator framework is presented, we return, for purposes of simplicity and clarity, to the original logic model distinction between outputs, outcomes and impact—which we rename output, short-term outcome, and long-term outcome.

Table 1: Overview of Logic Model template

title	planned activities	engaged actors	expected outcomes /impact	measures /indicators	means of data gathering	risks/assumptions
task1	description	….	…	…	…	…
task2	description	…	…	…	…	…

The logic model template was used to guide, during the reflection meetings with WP leaders, the review, discussion, and explication of all applicable components within the individual WPs. The template was initially filled in by the ZSI evaluation team using content drawn from the DoA. These initial drafts were then collaboratively discussed with the WP leaders, and amended where necessary. In addition to refining the WP evaluation matrices, the sessions with the work package leaders also included reflection on the most important expected impacts that each of the work packages aims to achieve. The results from the aforementioned processes are now presented in the following six sub-sections, one for each WP.

3.1. WP1: Venture building and business models

This work package (WP1) aims to collect, analyse, and provide information on the objectives and operating models of successful organisations in the startup, SME, Digital Innovation Hub (DIH), and makerspace arena in order to generate a rich resource to support early-stage startups and related entities to establish their businesses. It provides targeted matchmaking opportunities between digital innovators, SMEs, businesses, investors, public bodies, academic institutions and NGOs in Europe and Africa, and aims to identify investors and potential investors to catalyse more private capital for investment in digital social innovation (DSI).

There are several stakeholder groups involved in this work package. First, there are stakeholders who support the analysis of business models and the venture building and matchmaking activities of this WP, such as: businesses, who act as a source for inspiration and join the matchmaking activities; mentors for business development and training institutions, who support the mentoring programme; and investors, who will join the pitch event and discuss innovative funding mechanisms. Second, there are entities and individuals able to benefit from the work done in this work package, including startups, SMEs, DIHs, makerspaces and entrepreneurial makers.

The key activities, and expected outputs and outcomes, of WP1 are summarised in the matrix below. The matrix also includes a listing of potential data collection instruments for the evaluation of outputs and outcomes. (These instruments are described in more detail in chapter 6 of this document.) In the course of the remaining project activities, the evaluation team will, together with the work package leaders, decide on the respective data collection instruments to be applied, and will collaborate on elaboration and usage of the instruments for the purposes of collecting evidence of the work package's outputs and outcomes.

Table 2: WP1 planned activities

WP1 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Document and disseminate an open catalogue of Business Models Documentation of "how"' existing successful businesses and makerspaces are operating as examples to other early-stage startups as well as profitable makerspaces State-of-the art analysis of already existing documentation Recording of webinars to disseminate the catalogue and tell people how to use it	**Output:** Database of Business Models (M12): • 50 interviews with successful businesses representing a cross-section of sectors, geographic focus and scale • 20 published example business models of hardware DIHs and ventures • Access to the catalogue and download of related documents • Catalogue shared in social media • Citation and references to catalogue from other sources • Perceived usefulness of the business model catalogue Regular recorded webinars (M12): • 1-2 webinars about the launch of the catalogue, telling people 'how' to use it. • No. of regular webinars to share the business models • No. of participants in the webinars • Perceived usefulness of webinars **Outcome:** • 10 business models applied by local businesses • Inspiration & increased practical knowledge about different successful business models for startups and makerspaces • Practical application of the new knowledge • Lessons learned on 'how' the catalogue is used by startups, which information they could take out of it, and how to apply them. • Enhanced networking activities between successful businesses and other startups	• Internal reports and documentation by consortium members involved in the task • Access and social media statistics • Pre-test of business model catalogue with "friendly makerspaces" • Formative evaluation of the webinars via questionnaires • Individual Impact pathway interviews with users of the business model catalogue • Focus group with several interviewees to discuss the lessons learned

WP1 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Set up and offer a company builder programme for ventures ● Sourcing and in-depth analysis of individual startups and DIHs ● Development of a strategic roadmap ● Provision of dedicated venture building expertise to startups and SMEs ● Provision of venture building expertise to DIHs (train-the-trainer workshops) ● Creation of open learning material to share lessons learned, guidelines and templates with DIHs and makerspaces not involved in the venture building programme	**Output:** ● 20 startups and SMEs supported in venture building (M12–M30) ● 10 makerspaces supported in venture building (M12–M30) ● 100 hours of company building provided ● Venture Building Handbook (M24) produced ● Venture building report produced to capture progress ● No. of open learning material produced and shared ● Access to venture building handbook and open learning material, download of related documents ● Venture building handbook and learning material shared in social media ● Perceived usefulness of the venture building programme and open learning material by startups, SMEs and makerspaces ● Perceived usefulness of the train-the-trainer workshop **Outcome:** ● SMEs/startups in the venture building programme being able to make it to the next stage of venture building ● Inspiration & increased knowledge on venture building for other DIHs and makerspaces ● Practical application of the newly gained knowledge by DIHs and spaces ● Lessons learned on the impact pathways of participants of the company builder programme ● Lessons learned on how to support DIHs to become sustainable digital innovation startups ● Lessons learned how makerspaces share the knowledge with their members	● Internal reports and documentation by consortium members involved in the task ● Access and social media statistics ● Pre-test of learning material with "friendly makerspaces" ● Formative evaluation of the train-the-trainer workshops ● Individual Impact pathway interviews with participants of the venture building programme ● Focus group with makerspaces who participated in the training workshops and offer the information to their members

WP1 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Offer targeted marketing and matchmaking services • Mapping of African and European makerspaces, developing a strategy on how to approach them • Definition of the selection process and selection of participants in the makers-in-residency programme Organisation of • Founder-to-Founder matchmaking opportunities • Business-to-Business networking events	**Output:** • Up to 10 entrepreneurial makers involved in the makers-in-residency programme • Up to10 co-created digital innovations in collaboration between European and African makers of the makers-in-residency programme • At least 20 networking events, meetups, and other exchanges between European and African DIHs communities hosted online and offline • No. of participants to these events • No. Founder-to-founder matchmaking events • No. of Business-to-business networking events • Perceived usefulness of the events and matchmaking services • Matchmaking and Residency Report (M34) **Outcome:** • Mutual learning between involved makers and makerspaces of the makers-in-residency programme • Increased networking and mutual learning between founders and businesses • Lessons learned on how to trigger matchmaking between makers, DIHs, businesses and founders, about the impact of these activities and what should be improved or scaled.	• Internal reports and documentation by consortium members involved in the task • Access and social media statistics • Questionnaire with formative evaluation and direct outcomes of the matchmaking events • Individual Impact pathway interviews with participants of the makers-in-residency programme • Pictures from events
Create a network of early-stage investors, corporates, NGOs, philanthropic and family funds, and explore the creation of a hybrid fund to support early-stage impact innovation ventures	**Output** • Report on innovative funding mechanism to support next-gen tangible ventures (M34) • Number of people accessing and downloading the report • Report referenced to from other sources • Report mentioned in social media **Outcome:** • Makerspaces and their startups learn about different innovative funding mechanisms	• Internal reports and documentation by consortium members involved in the task • Access and social media statistics

There are also some risks related to the activities in this work package. These risks were identified at the very beginning of project activities, and will be continually reassessed:

- Businesses are not willing to speak about confidential information (e.g. financials)
- The WP does not find mentors who are willing to share their expertise in the mAkE company builder programme
- The maker movement is strongly associated with the idea to be in service of the Common Good, without looking after money. Sometimes this tension between service of a Common Good and making Business (in the sense of Capitalism) can be problematic
- The venture building process for the individual startups takes too much time and it is not possible to assess 20 startups
- Makers, founders, and businesses do not see the need for further opportunities for matchmaking and networking and making use of the mAkE offers

3.2. WP2: Hub ecosystem and policy frameworks

This work package (WP2) aims to improve connections between DIHs/makerspaces and public sector actors and local political decision makers, so as to build recognition and favourable policies in support of national and regional startup ecosystems. WP2 is working to facilitate an informed dialogue on DIH/makerspace policy needs and demands, as well as the role of DIHs/makerspaces in fulfilling policy agendas such as the UN Sustainable Development Goals (SDGs). Existing policy frameworks and approaches are being mapped and an important outcome will be the formulation of practice-based policy needs along with recommendations for bottom-up approach to policy advocacy directed at hubs and hub networks.

There are several stakeholder groups involved in this work package. Collective associations and other structures supporting DIHs/makerspaces in Africa and Europe are involved in the WP's case study work and formulation of needs and policy recommendations. Policy makers at different levels are to be engaged to help define government needs and expectations with respect to DIHs/makerspaces, and to receive the WP's developed common policy agenda recommendations.

The key activities, and expected outputs and outcomes, of WP2 are summarised in the matrix below. Also listed are potential means of data gathering for evaluation purposes.

Table 3: WP2 planned activities

WP2 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Collection, mapping and comparative analysis of case studies focused on how DIHs organize themselves in supportive structures for policy advocacy on national and regional levels • Data collection for the case studies via semi-structured formal interview, • Comparative analyses of cases • Formulation of recommendations of bottom-up approach for policy advocacy actions	**Output:** • Report (M12) on national and regional hub associations: • including 7 documented case studies (5 from Africa, 2 from Europe) and a comparative analysis • Recommendations of bottom-up approaches to multi-actor policy advocacy for DIHs • Organised semi-structured interview to of recommendations with makerspaces • Access to the reports and download of related documents • References to reports from other sources • Perceived usefulness and applicability of the report and the recommendations **Outcome:** • Increased understanding on how to leverage collective advocacy efforts work and create interfaces to the ecosystem including policy makers, corporates and funders • Increased knowledge about the benefits of different collaboration approaches and how to develop and trigger bottom up DIH networks • Dissemination and uptake of collected knowledge by DIH, makerspaces, etc.	• Internal reports and documentation of DIHs and collective associations involved on the case studies • Access and social media statistics • Semi-structured interviews with collective associations and supportive structures involved in the analysis to discuss the recommendations • Semi-structured interviews with representatives of DIHs/makerspaces to discuss the recommendations

WP2 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Creation of a common policy agenda for makerspaces in Africa and Europe and recommendations for policy makers ● Definition of who are "policy makers" and decision makers, who should be approached ● Definition of relevant policy areas ● Assessment of existing European and global frameworks and initiatives like the EC European Circular Economy Action Plan, European Green Deal and the SDGs ● Organisation of focus group discussions on existing concepts and initiatives (DIHs, collective associations) ● Organisation of the "Minister meet Makers" dialogue events	**Output:** ● No. of organised focus groups discussions and no. of participants ● Report on Common Policy Agenda and Recommendations for Policy Makers (M24) ● Access to the policy agenda and recommendations, downloads of related documents ● Reference to the policy agenda and recommendations in social media and from other sources ● Perceived usefulness and applicability of recommendations by makerspaces and policy makers ● 4 "Minister meet Makers" events (M34) to reflect on existing policy recommendations and no. of participants ● Documentation and Report of "Minister meet Makers" Dialogue events (M34) **Outcome:** ● Uptake of the policy recommendations in other international policy dialogs (e.g. UN HabitatSmart Citizens Initiative) ● Increased knowledge on how to support the interface between DIHs including makerspaces, and policy makers, corporates and funders ● Increased knowledge on how the recommendations can be applied in the different policy contexts ● Mentions of the recommendations in policy documents ● Changes in policies to support regional startup ecosystems	● Internal reports and documentation by consortium members involved in the task ● Focus groups organised for makerspaces in Africa and Europe to assess existing global frameworks and to develop a common policy agenda ● Access and social media statistics ● "Minister meet Makers" dialogue events to discuss the recommendations ● Formative evaluation of the Minister meets Maker events via short interviews ● Impact Pathway interviews with selected policy makers who participated in the Minister Meets Makers events

Risks associated with the tasks in this work package are:

- The comparative case study analysis struggles to identify common benefits and triggers of collaboration approaches across diverse and complex local settings.
- Organisations who participate in the case study interviews refuse publication of the study they are part of.
- mAkE does not succeed in getting the attention and interest of policy makers that will be necessary to get policy makers reflect together on the recommendations mAkE provides to them.

3.3. WP3: Open education, skill development and capacity building

This work package (WP3) is dedicated to the training and up-skilling of DIHs/makerspaces and the makers, innovators, entrepreneurs, SMEs and startups they interact with. It aims at developing a joint learning space for African and European DIH/maker networks that supports the development of the technical ethical, entrepreneurial skills necessary for advanced digital fabrication and sustainable digital innovation.

The main audiences to make use of the developed training materials and to participate in this WP's workshops are to be representatives of DIHs and makerspaces, who will act as trainers within their institutions. Additionally, this WP aims to address makers themselves, as well as instructors and students of local universities, and secondary school teachers teaching science and technology, who are interested in installing and running makerspaces in their institutions. Also targeted are local government councillors and staff, as they can be involved in establishing makerspaces.

WP3's main activities, its expected outputs and outcomes, and the potential tools for gathering data to evaluate the WP, are presented in the matrix below.

Table 4: WP3 planned activities

WP3 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Develop an Open Makerspace Toolkit ● Collect and review relevant existing open learning content (open educational resources (OER)), including from consortium members and their networks ● Coordinate the creation of new content (OERs) ● Host focus group discussions on focal topics ● Drive collaborative content creation ● Peer review new training content ● Document reusable training activities of consortium members ● Development of a practical Toolkit	**Output:** ● Toolkit (M24) about OERs on how to set up, manage, equip, and sustain different types of digital innovation makerspaces ● Training and learning formats for different focal topics, presenting projects, business models, case studies, resources, and methodologies ● 800 open learning resources collected in the mAkE library ● 200 OERs about resources & toolkits with social innovation aspect and maker movement ● Around 100 OERs created by mAkE consortium ● 1500 people accessing the OERs in year 3 ● 500 people accessing the digital version of the Toolkit ● Citations/references of/to Toolkit and OERs in social media and other sources. ● Perceived usefulness and applicability of the learning content and formats **Outcome:** ● Increased knowledge amongst the key audiences on of how to set up, manage and equip DIHs and makerspaces ● Examples of the practical application and implementation of the newly gained knowledge ● Lessons learned on the training needs of DIHS and makerspaces and the best formats of transferring the knowledge ● Request at Africa OSH 2022 in Yaounde to APSOHA from GIZ Cameroon to support GIZ municipal makerspaces in upskilling their makers	● Internal reports and documentation by consortium members involved in the task ● Access and social media statistics ● Focus groups with users of the OERs to learn about the applicability and usage in the different contexts ● Or Individual Impact Pathway Interviews ● Short pools and surveys from users of the OERs

WP3 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Organise and host training of trainers • Prepare an introduction to the mAkE Toolkit and training resources • Select DIHs ad makerspaces who participate in the training • Organise trainings workshops in DIHS and makerspaces at national level	**Output:** • 20 trainers of African DIHs/makerspaces trained how to use the toolkit (M24) • 80 training and capacity building events organised across Africa, with at least 20 people attending each • Perceived usefulness and applicability of Toolkit and training workshops • Access to the mAkE Toolkit and download of related documents • Citations or reference of mAkE workshops and Toolkit in social media or other sources • Train-the-trainer report (M30) **Outcome:** • Participants of the train-the-trainer event organise trainings in own countries (No. of organised trainings and participants) • Increased knowledge amongst the key audiences on of how to set up, manage and equip DIHs and makerspaces • Examples of the practical application and implementation of the newly gained knowledge • Lessons learned on the training needs of DIHs and makerspaces and the best formats of transferring the knowledge	• Internal reports and documentation by consortium members involved in the task • Access and social media statistics • Questionnaires to training participants for formative evaluation of workshops and usefulness of toolkit and OERs • Focus groups with trainers as users of the toolkit and OERs to learn about the applicability and usage in the different contexts • Or Individual Impact Pathway Interviews

WP3 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Development and implementation of the mAkE MOOC • Selection of the technical platform to host the mAkE MOOC • Harmonisation of WP2 and WP3 activities to link mAkE OERs and material with the mAkE MOOC • Conceptualisation and content creation • Implementation of MOOC on the GIG or IAAC platform	**Output:** • Online platform providing access to existing and newly created training content for digital open hardware initiatives and ventures • Online training content openly licensed and made available in French and English • Implemented MOOC (M36) • 100 people per year from year 3 accessing the mAkE-MOOC online platform • Perceived usefulness and applicability of the MOOC training content • Reference to the MOOC in social media and from other sources **Outcome:** Increased knowledge amongst the key audiences on of how to set up, manage and equip DIHs and makerspaces Examples of the practical application and implementation of the newly gained knowledge Lessons learned on the training needs of DIHs and makerspaces and the best formats of transferring the knowledge	• Internal reports and documentation by consortium members involved in the task • Access and social media statistics • Pre-testing of the MOOC by "friendly makerspaces" • Questionnaires to participants for formative evaluation and usefulness of MOOC content • Individual Impact Pathway Interviews with MOOC participants

The risks associated with this work package are:

- The available learning formats and training resources that should be part of the mAkE toolkit are not sustainable in regard to the mAkE's infrastructures

- DIHs and makerspaces are not interested in co-creating new OERs together with the mAkE consortium

- Evaluation focuses too much on reaching high output numbers, whereas qualitative criteria provide a better understanding of training needs and learning processes in DIHs/makerspaces is important outcome

- Provision of all of the materials in both English and French is not possible within the project timeline

3.4. WP4: Distributed manufacturing network

This work package (WP4) aims to foster distributed manufacturing among DIHs/makerspaces by prototyping and supporting adoption of digital infrastructures that enable sharing of skills, machinery, and contracts within DIH/makerspace networks.

The main stakeholders for this work package are DIHs and makerspaces, as well as users of these spaces (makers), as beneficiaries of the developed digital infrastructure, who will not only participate in testing and refining the digital tools – Maker Passport, Map of Machinery and digital contracting system – but will also attempt a proof-of-concept by using the tools. Additionally, WP4 includes reaching out to other initiatives, such as Fablabs.io and Hackaday, for collaboration on the creation of the digital infrastructure and on dissemination of the outputs.

The main activities of WP4, together with its expected outputs and outcomes, as well as potential means of data gathering for evaluation purposes, can be seen in the matrix below.

Table 5: WP4 planned activities

WP4 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Developing mutual recognition open standard and Maker Passports for the mutual recognition of makers' skills • Conduct desktop research and interviews • Create a working group • Co-create an initial open standard for beta testing • Implement a Maker Passport prototype system for proof of concept • Promote the open standard and Maker Passport internally and externally	**Output:** • Beta version of an initial open standard for mutual recognition of maker skills (M12) • Prototype of a Maker Passport system (M18) • Revised Skills – Maker Passports & Prototype (M34) • 500 references to the open standard (request or access) • 50 adoptions of the new open standard, i.e. 50 organisations/DIHs/makerspaces are willing to use the Maker Passport system based on the new open standard. • Around 150 people using the new open data standard for maker skills (Maker Passport) • Perceived usefulness and applicability of the Maker Passport to makers and members of DIHs **Outcome:** • Improved demonstration of skills and experience levels of participating makers • Facilitated search for peers to scale up production and fill skill gaps • Facilitated search for mentors • Lessons learned on how to share makers' skills and support digital fabrication processes	• Internal reports and documentation by consortium members involved in the task • Results from data collection survey • Access and social media statistics • Pre-testing of the initial open standard • Focus groups with makers and DIHs who used the Maker Passport to learn about the applicability and usage in the different contexts and the benefits of usage • Interview or focus group discussions with makerspaces who did not follow up using the Maker Passport to learn from their experiences

WP4 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Mapping of machinery in and near makerspaces across Africa and Europe ● Mapping of machinery and collection of new mapping data ● Collection of existing data and conversion to the Open Know-Where standard ● Creation and testing of data upload processes ● Improving upload processes according to the testing ● Cooperate with WP2 regarding collective associations and WP1 regarding venture building support	**Output:** ● Machinery – Map (M34): Creation of a Map of Machinery with entries from Europe and Africa ● At least 500 entries in the Map of Machinery (each machine is one entry) ● Machinery data integrated into existing maps via an API ● Access to the mapping of machinery and download of related documents ● References to the machinery map from social media and other resources ● Perceived usefulness and applicability of the Map of Machinery and the upload processes **Outcome:** ● Increased transparency and improved demonstration of Machinery available to scale and replicate local production ● Changed attitudes such as "*You cannot make anything in Ghana, you have to buy it in China*". ● Raising the awareness, that not everything needs to be imported from other countries, but could be created in the own region ● Opening business opportunities for African and European DIHs ● Identification and publication of stories about the usage of the map to initiate further improvements	● Internal reports and documentation by consortium members involved in the task ● Access and social media statistics ● Pre-testing of upload processes ● Quick survey to collect formative feedback on upload processes and machinery map and perceived usefulness ● Impact interviews with makerspaces, who used the map to share and find data on the machinery

WP4 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Digital contracting system to distribute production across the DIHs network • Evaluate and improve the existing Field Ready prototype • Develop and test a model digital contract with makers from several makerspaces • Offer digital contract templates based on the developed business models in WP1	**Output:** • Contracts – Model & Prototype (M34): Prototype of the digital contracting system with an improved user-interface of the existing prototype • 150 people testing the digital contracting system • Perceived usefulness and applicability of the digital contracting system • Access to the digital contracting system and download of related documents • References to the contracting system from social media and other resources **Outcome:** • Lessons learned on progress, successes and failures of the digital contracting system • Increased revenue options for hardware DIHs and makerspaces • Raising uptake of distributed production (as long term impact)	• Internal reports and documentation by consortium members involved in the task • Access and social media statistics • Pre-test of the digital contract • Impact interviews with makers and makerspaces, who tested the contracting system

The risks associated with this work package are:

- It might be difficult to find interested experts who are willing to participate in the working group to develop the new open standard for maker mutual skill recognition
- The WP does not get a high number of makers involved in testing the Maker Passport
- It might be difficult to find DIHs/makerspaces who are ready to document their machinery and to test the mapping of machinery and the digital contracting system
- Testing the prototypes requires success in identifying "real" use cases (i.e. orders) to test the digital contracting system (such as a Kickstarter campaign, a donation, or a ministry or company placing an order)

3.5. WP5: Communication, dissemination and outreach

WP5 is dedicated to the communication and dissemination of project outputs and findings to defined target audiences in the best communicable form. The aim of the outreach activities is to maximise the project impact and support the capacity building, community engagement and network building, providing key stakeholders with the necessary information in a time–effective manner to allow for early engagement, market uptake and implementation.

The main audiences for this work package are, on the one hand, the consortium member organisations who are supporting and engaging in the mAkE dissemination and communication campaign by actively communicating to and within their own networks. On the other hand, there are the recipients of the campaigns:

- Makers, technology developers, hackers, entrepreneurs, and leaders of DIHs
- Policy makers, global and regional innovation agencies, and social innovation experts
- Academic communities and scientific forums that place a focus on bottom–up innovation practices

The main activities of WP5, the expected outputs and outcomes, and the potential means of collecting evaluation data are all presented in the matrix below.

Table 6: WP5 planned activities

WP5 planned activities	Expected output and outcome	Potential means of data gathering
Develop and establish a dissemination and outreach campaign • Define specific dissemination and communication actions to address each target audience • Establish links to WP1, WP2, WP3, WP4, WP6	**Output:** • Communication, Dissemination and Outreach (CDO) Plan (M3) • Appropriateness of defined actions and tools for each target group • Being present in around 3 events per year (delivered by mAkE consortium members, attended by mAkE consortium members, or where consortium members are invited to participate and present the project) • Dissemination and Communication KPIs as defined in the project description **Outcome:** • Increased awareness of stakeholders, participant communities and the general public with regards to the project aims, activities and findings • Fostered early engagement, market uptake and implementation of project results • Supported capacity building, community engagement and network building	• Internal reports and documentation by mAke consortium members involved in the task • Google Analytics web statistics of mAkE website • Access and social media statistics of mAkE communication tools • Feedback from mAkE members and the DIH network (documented in the "events collector" spreadsheet)
Create project identity, website and social media	**Output:** • Creation of a clear and recognisable visual identity (M3) • Applied to the website, social media channels, printed media, conferences and other items subjected to the use of the mAkE brand • Described in clear guidelines for the members to be applied • Licensed under open-source principles **Outcomes:** See first task of this WP	• Feedback from mAkE members and the Digital Innovation Hubs (DIHs) network

WP5 planned activities	Expected output and outcome	Potential means of data gathering
Test mAkE global innovation ecosystem technical solutions	**Output:** • Recommendations to integrate network portfolios and websites, focused on the user experience of potential stakeholders (M36) • Tested white label solutions to integrate open APIs • Access to the recommendations and related documents • References to the recommendations in social media and from other sources **Outcomes:** See first task of this WP	• Feedback from consortium on the quality of recommendations and white label solutions • Access and social media statistics (who will have access after the project around the social media community)
Define and develop guidelines for capacity building tools for social innovation • Establishing an internal process of creating a mAke branding, and apply it to mAkE videos, resources, blog posts, templates for social media and reports	**Output:** • Guidelines, templates and how–to's for best practices for designing project outputs and self–learning tools (M12) • Perceived quality of guidelines • Access to the guidelines and related documents • References to the guidelines in social media and from other sources • Monthly WP5 meetings to keep updated on the WP activities **Outcomes:** See first task of this WP	Feedback from consortium members on the quality of the guidelines, templates and best practices

The risks associated with this work package are:

- Makers, technology developers, hackers and members of DIHs may require dissemination material in their native languages — and thus costs and efforts for translation might become extensive.

- A substantial time commitment is necessary from all of the consortium member organisations, in their respective networks, if all the communication dissemination and outreach goals are to be reached. Success requires all consortium members to take the time to become fully acquainted with the project identity, communication tools, resources, documentation and planned outcomes, and to actively promote mAkE in their networks according to the defined communication plan.

3.6. WP6: Community engagement and sustainability

WP6 is dedicated to an active community engagement, ensuring that the mAkE stakeholder communities are involved in the co-creation of mAkE outputs. Thus the WP aims to meet the real needs of target communities and support bottom-up development of sustainable knowledge and infrastructure. The activities of WP6 link closely to the dissemination and communication work done in WP5 and to all the activities of content creation and digital infrastructure development in WP1 to WP4.

The main engaged actors of this work package are the makers, technology developers, startups, SMEs, makerspaces and leaders of DIHs who are part of the mAkE consortium members' networks and are actively engaged in the co-development of mAkE outputs and outcomes. The main activities of WP6, its expected outputs and outcomes, and potential evaluation instruments to be applied for this WP are presented in the matrix below.

Table 7: WP6 planned activities

WP6 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Manage the community ● Elaborate a Community Activation and Engagement Strategy, guidelines and code of conduct ● Support onboarding, reaching out to new communities ● Facilitate and document engagement opportunities and formats	**Output:** ● Community Activation & Engagement Strategy (M12): Definition of specific actions to onboard and engage the different stakeholders, guidelines for community engagement and code of conduct to be used by the consortium members ● Perceived usefulness and applicability of defined engagement actions and tools for each target group ● Number of participants from the different stakeholder groups actively engaged in our project ● At least 500 businesses engaged in mAkE activities (makerspaces, founders, early-stage investors, corporates, NGOs etc.) **Outcome:** ● Uptake, application and implementation of mAkE outputs by the DIH community ● Sustainability of the mAkE outputs	● Internal reports and documentation by consortium members involved in the task ● Access and social media statistics of mAkE communication tools ● Feedback from mAkE members on the usefulness of engagement strategy, guidelines and code of conduct ● Stories about the quality of communicated engagement by mAkE stakeholders

WP6 planned activities	Expected outputs and outcomes	Potential means of evaluation data gathering
Facilitate and document co-creation process • Organise, facilitate and document offline/online co-creation sprints • Facilitate continuous collaboration between sprints • Ensure synergies between WP1-4, and alignment with dissemination in WP5	**Output:** • Defined digital-physical actions during selected identified events that benefit the DIH community, such as DOTS Impact Summit and AfricaOSH annual summit, to co-create deliverables with the community • Perceived usefulness of co-creation sprints • Number of participants in the co-creation sprints and continuously involved in co-creation between the sprints • Co-Creation Report (M34) **Outcome:** Uptake, application and implementation of mAkE outputs by the DIH community Sustainability of the mAkE outputs	• Internal reports and documentation by consortium members involved in the task • Feedback from mAkE members and participants on the usefulness of co-creation sprints • Stories about the quality of communicate engagement by mAkE stakeholders
Facilitate and support results sharing and embedding • Develop a sharing and embedding strategy (in collaboration with WP5) • Offer webinars, offline meetups, and peer to peer learning sessions • Facilitate knowledge transfer (with WP2) on licensing and open repositories • Ensure community participation in the development of capacity building materials, trainings and other open educational resources developed in WP1, WP2, WP3 and WP4	**Output:** • Sharing & embedding Strategy (M12): Guidelines for open sharing and knowledge communing, describing how all members can embed the mAkE outputs into their portfolios • Perceived usefulness and applicability of the guidelines • Number of on- and offline actions to foster the dissemination of capacity building material • Active community participation and number of participants in the on- and offline actions • At least 80 training and capacity building events, with at least 20 people attending each • Sustainability Report (M36) **Output:** • Sustainable embedding of mAkE outputs into consortium member portfolios • Increased knowledge on licensing and open repositories	• Internal reports and documentation by consortium members involved in the task • Feedback from consortium members on the sharing & embedding strategy, its usefulness and applicability in the different contexts

The main risks associated with this work package is:

- Community engagement relies strongly on the support of all mAkE consortium members in their respective networks. All consortium member organisations need to actively drive the co-creation of mAkE outputs in their networks. The risk associated with this is its potential to over-stretch the resources and time that consortium members are able to contribute.

4. The mAkE indicator framework

Chapter 3 introduced the outputs and outcomes that are expected from mAkE work packages 1 to 6, as well as the risks associated with each WP. These indicators emerged from the project's DoW and from the online reflection meetings with the work package leaders. These indicators are only a starting point, as the upcoming workshops and engagements with the mAkE target groups will allow the project to capture and better understand external stakeholders' specific expectations and desired outcomes from their involvement in the mAkE project.

The matrix in Table 8 below summarises the main indicators drawn from the six matrices presented in chapter 3, providing an overview of the initial baseline that will be continuously adapted and critically reflected on in the remaining 24 months of the project. The matrix distinguishes between micro, meso and macro levels in respect of outputs, intermediate outcomes, and long-term outcomes.

Additionally, Figure 4, immediately below and drawn from Deliverable 6.1 in WP 6, provides a visualisation of how the out three levels of impact—the micro, meso and macro levels—constitute the "mAkErverse" that this project aims to animate.
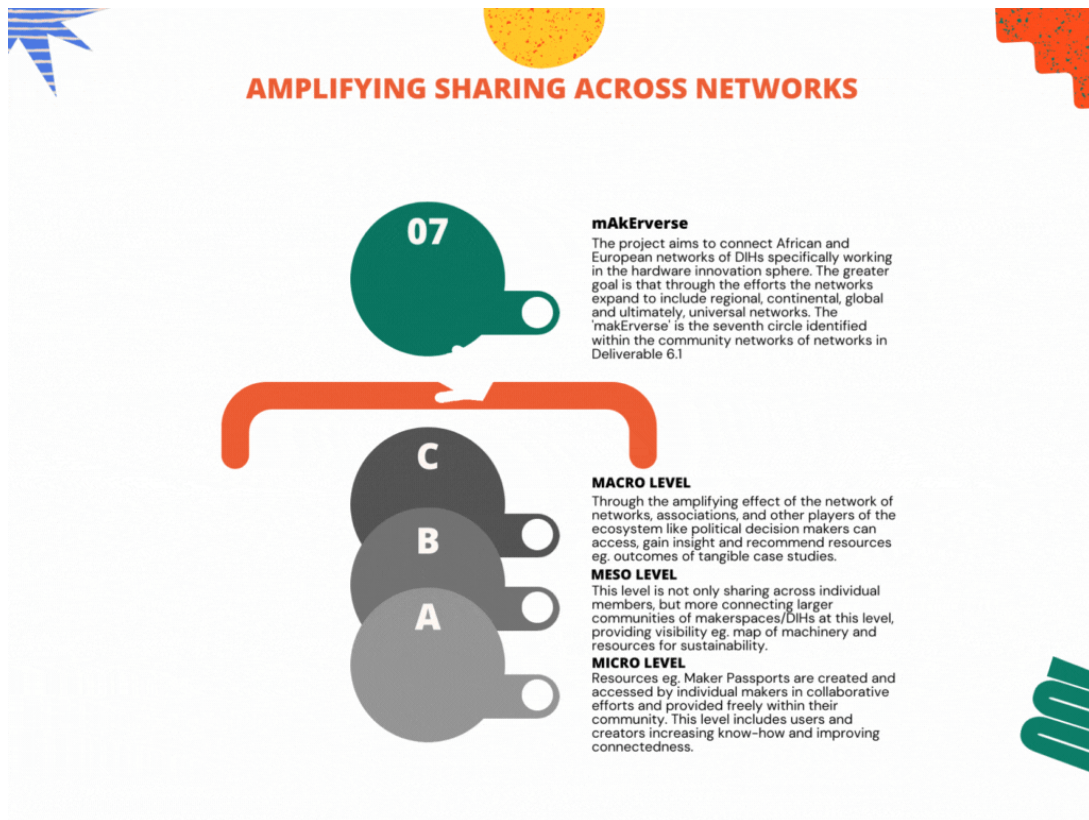
AMPLIFYING SHARING ACROSS NETWORKS

07

mAkErverse
The project aims to connect African and European networks of DIHs specifically working in the hardware innovation sphere. The greater goal is that through the efforts the networks expand to include regional, continental, global and ultimately, universal networks. The 'makErverse' is the seventh circle identified within the community networks of networks in Deliverable 6.1

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MACRO LEVEL
Through the amplifying effect of the network of networks, associations, and other players of the ecosystem like political decision makers can access, gain insight and recommend resources eg. outcomes of tangible case studies.

MESO LEVEL
This level is not only sharing across individual members, but more connecting larger communities of makerspaces/DIHs at this level, providing visibility eg. map of machinery and resources for sustainability.

MICRO LEVEL
Resources eg. Maker Passports are created and accessed by individual makers in collaborative efforts and provided freely within their community. This level includes users and creators increasing know-how and improving connectedness.

Figure 4: mAkE – communities (graphic taken from Deliverable 6.1)

Table 8: Co-created indicators

	Micro level (individual makers, innovators, etc.)	Meso level (makerspaces, DIHs, startups, etc.)	Macro level (associations, networks, policy level, etc.)
Outputs	**Individual participants actively involved in co-designing, shaping and using the mAkE outputs** • 1500 people accessing the open educational resources (OERs) in year 3 • 500 people accessing the digital version of the Toolkit • 20 trainers of African DIHs/makerspaces trained in how to use the toolkit	**DIHs/makerspaces, startups andSMEs and other relevant stakeholders actively involved in co-designing, shaping and using the mAkE outputs** • 20 startups and SMEs supported in venture building • 10 DIHs/makerspaces supported in venture building • 50 open standards adopted, i.e.,50 organisations/DIHs/ makerspaces, who are willing to	**Political decision-makers and representatives of DIH associations involved in co-designing, shaping, using the mAkE outputs** **mAkE events organised** • 4 "Minister meet Makers" events organised **mAkE resources created and**

- 100 people per year, from year 3, accessing the mAkE MOOC online platform
- Diversity in individual participants (gender, age, social background)

mAke training events organised

- 80 training and capacity building events organised across Africa, with approx. 20 people attending each
- mAkE presence in approximately 3 events per year

mAkE educational resources created and shared

- Online platform providing access to existing and newly created training content for digital open hardware initiatives and ventures
- OERs on how to set up, manage, equip, and sustain different types of DIHs/makerspaces
- 800 OERS collected in the mAkE library
- 200 OERs about resources and toolkits with social innovation and maker movement aspects
- Around 100 OERs created by mAkE consortium
- OERs addressing diversity in making

mAke Infrastructure developed and tested

- Prototype of a Maker

use the Maker Passport system based on the new open standard
- 50 successful businesses interviewed
- At least 500 entities/businesses engaged in mAkE activities (e.g., DIHs/makerspaces, startups, SMEs, founders, early-stage investors, corporates, NGOs)

mAkE networking events organised

- At least 20 networking events, meetups, and other exchanges between European and African DIH/makerspace communities hosted online and offline
- Founder-to-founder matchmaking events organised
- Business-to-business networking events organised

mAkE business modelling and venture building resources created and shared

- 20 successful business models analysed and shared
- Webinars to introduce the business model catalogue convened and shared
- 100 hours of company building provided
- Venture building handbook and learning material shared in social media

mAke digital Infrastructure developed and tested

- Prototype of a Maker Passport system launched and tested by makerspaces
- Map of Machinery created and tested

shared

- 7 documented case studies of actions by DIH/makerspace associations created and shared
- Recommendations for the development of DIH/makerspace networks and associations created and shared
- Report on Common Policy Agenda and Recommendations for Policy Makers created and shared

	Passport system developed • Around 150 people using the new open data standard for maker skills (Maker Passport)	• At least 500 entries in the Map of Machinery • Prototype of the digital contracting system developed and tested • 150 people/entities testing the digital contracting system	
Inter-mediate outcomes	**Capacity building and knowledge gains** • Increased knowledge amongst the key audiences on of how to set up, manage and equip DIHs and makerspaces (based on OERs and MOOC) • Mutual learning between involved makers and makerspaces of the makers-in-residency programme **Visibility gains and increased collaboration between makers** • Improved demonstration of skills and experience levels of participating makers • Facilitated search for peers to scale up production and fill skill gaps • Facilitated search for mentors • Increased collaboration between makers of all genders, age groups and social backgrounds **Engagement, awareness and motivation**	**Capacity building and knowledge gains** Inspiration and increased practical knowledge about different successful business models for startups and makerspaces Increased knowledge of digital contracting systems **Visibility gains and increased collaboration** • Increased transparency and improved demonstration of Machinery available • Increased networking and mutual learning between founders and businesses **Practical steps towards higher sustainability** • 10 business models applied by local businesses • SMEs/startups in the venture building programme able to make it to the next stage of venture building **Engagement, awareness and motivation** **Uptake, application and implementation of mAkE outputs by the DIH/makerspace community**	**Capacity building and knowledge gains** • Increased knowledge of how to support DIHs in the different national contexts • Increased understanding of how to develop and trigger bottom- up DIH networks • Better understanding about the innovation potential of DIHs and makerspaces for local production **Dissemination/uptake of the policy recommendations in other international policy dialogues** **Mentions of the recommendations in regional policy documents** **Engagement, awareness and motivation** **Inclusion of more African members in DIH/ makerspace networks**

Long-term outcomes		Sustainable embedding of mAkE outputs into consortium member portfolios	
	A sustainable repository of open-source methods, devices and products used and implemented by members of DIHs/makerspaces **Higher employability** **Increasing number of innovators** **Increasing number of co-created digital innovations**	**Opening business opportunities for African and European DIHs/makerspaces** **Increased revenue options for DIHs/makerspaces** **Sustainable usage of mAkE outputs** **New business alliances and more successful hardware startups and DIHs/makerspaces** **Scaling and replication of local production** **Raising uptake of distributed production**	**Changes in policies to support national and regional startup ecosystems** **Higher acceptance of DIHs/makerspaces by public authorities** **Better interfaces between the ecosystem players, including policy makers, DIHs/makerspaces, corporates and funders**

In addition to the indicators presented in the table above, the formative evaluation of the project activities provides a rich source of learning on how to best support DIHs/makerspaces and their work in Africa and Europe. For example, lessons will be learned and documented on:

- the training needs of DIHs/makerspaces and the best formats/modalities for knowledge transfer
- how to share makers' skills and support digital fabrication processes
- how to support DIHs/makerspaces, and the startups/SMEs they work with, to become sustainable digital innovation entities
- how DIHs/makerspaces can best share venture building knowledge with their members/collaborators
- how to trigger matchmaking between makers/entrepreneurs, DIHs/makerspaces, businesses and founders, the impact of matchmaking activities, and what should be improved or scaled.
- progress, successes and failures in the Map of Machinery, Maker Passport, and digital contracting systems

5. mAkE's contributions to the Sustainable Development Goals (SDGs)

Overall, the mAkE programme will contribute to awareness raising and capacity building needed to achieve the SDGs. The following Sustainable Development Goals are considered highly relevant to the sustainable local digital innovation and manufacturing that are central to mAkE:

- SDG 5: Gender Equality: mAkE will develop measures (e.g. trainings) to address the existing gender bias in the DIH/maker movement (WP3). mAkE recognises that gender imbalances are intersectional issue, which means that together with gender, mAkE considers the diversity of DIH/makerspace actors more broadly to also include dimensions of age, ethnic background, and minority group status.

- SDG 8: Decent Work and Economic Growth: mAkE aims to create methodologies and tools that will foster engagement, by an increasing number of people, in grassroots digital innovation activities. DIH/maker practices are already challenging the existing industrial paradigm, empowering people to create innovations that can lead to novel employment opportunities and support livelihoods.

- SDG 9: Industry, Innovation and Infrastructures: The DIH/maker movement has the potential to contribute importantly to the emergence of new forms of industrial production, including distributed manufacturing and customised and user-centric design and production. mAkE aims to support modalities through which DIH/maker movement actors can develop these practices in a socially responsible way that mitigate unanticipated negative side effects and establish production and businesses that are both socially responsible and responsive to societal needs.

- SDG 10: Reduced Inequalities: By supporting engagement by people with diverse backgrounds (particularly in terms of gender and youth) in the DIH/maker movement, and by advancing openness and reproducibility in grassroots innovations, mAke contributes to the broader societal goal of reducing inequalities. Broader engagement of people provides possibilities for the improvement of livelihoods for a larger number of people (particularly low-income citizens), and also potentially broadens the scope of socio-economic challenges that DIH/maker innovations address, thus increasing the societal benefits of the innovations.

- SDG 12: Responsible Consumption and Production: mAkE aims to foster responsible open hardware business development, with a particular emphasis on social and environmental sustainability. mAke aims to enhance the ability of grassroots innovators to develop sustainable solutions, and to support wider learning from these solutions.
- SDG 17: Partnerships for the goals: SDG 17 is a call for countries to align policies, as well as facilitating knowledge transfer and networking for technology in service of the development goals. WP 2 (advocacy & policy), WP 4 (technical infrastructure) and WP 6 (partnerships) outcomes serve these goals. The mAkE project provides the time and space in which to prototype new human networks of partnerships (civil society, public and private), and new technological networks for digital innovation.

6.Evaluation instruments

This chapter introduces a set of evaluation instruments that will be applied to collect the indicators introduced above. All of the instruments will feed data into the evaluation framework described in this document. The fields of the evaluation matrix that each instrument feeds into are listed at the beginning of each of the sub-sections that follow.

6.1. Internal reporting

Feeds into: Outputs (numbers and formative feedback for key activities), intermediate outcomes (visibility, awareness, knowledge)

Internal reporting is a key source of evaluation data. It is linked to all key activities in the mAkE work packages, and helps to:

1) keep track of the output indicators for all key activities, e.g. number of events, workshops, involved DIHs/makerspaces and makers, startups, SMEs, etc.

2) collect the experiences of the mAkE consortium members involved in the project activities. This can, for instance, be formative feedback on the developed catalogues, guidelines, OERs, events etc. (what worked and what did not), as well as inputs on the perceived benefits (the key impacts for the project and for participants)

With these aims, we foresee the following internal reporting activities:

- a spreadsheet for the internal reporting on dissemination and outreach was elaborated by WP5 in collaboration with WP6
- regular online sessions organised by the evaluation team with all WP leaders to keep track of their activities and outcomes
- annual interviews by the evaluation team with all mAkE consortium members (to collect evidence of impacts on their institutions due to their involvement in mAkE, or any other regional or national impacts from the activities driven by their participation in mAkE)

6.2. Online usage statistics and online comments

Feed into: Outputs (numbers for mAkE's key activities)

Measurement of users' interaction patterns with mAkE's online resources through tracking of usage statistics, will be one of the main tools for observation of interest in mAkE activities and resources.

In addition to the usage statistics, online comments (linked, for example, to the mAkE MOOC and social media channels) will be another rich source of data.

Examples types of data that will be collected are:
- Number of visitors to mAkE online resources (returning/new)
- Visitors' countries' of origin
- Pages/resources most visited, and those less/least visited
- User journeys through mAkE's online resources
- Time spent engaging with the resources
- Number of downloads of documents, OERs, etc
- Number of, and content of, comments in the MOOC, and in social media channels in response to OERs, digital tools, the business model catalogue, webinars, etc.

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The basic usage data will be collected with Google Analytics, transferred to a matrix in Excel, structured, continually collected and amended, and then processed in order to come up with meaningful indicators about the online usage.

6.3. Participant feedback cards

Feed into: Outputs (formative feedback for mAkE events and workshops), intermediate outcomes (visibility, knowledge, awareness, networking)

Feedback cards (Figures 5 and 6) will be dedicated to evaluation of events in a very "lightweight" way. Such cards will be designed for the events supported by mAkE, and will not demand a lot of time and effort for completion. The cards will aim to collect participants' feedback on digital innovation matters in general and the potential impacts of their event participation. The questions on the cards will be kept at a general level, with the aim being to use this tool across a large diversity of events supported by mAkE, allowing for large numbers of feedback cards to be distributed and collected by the project consortium members.

Figure 5: Participants' feedback card, front page

Figure 6: Participants' feedback card, back side

6.4. Participant questionnaires

Feed into: Outputs (formative feedback for mAkE events, trainings and workshops), intermediate outcomes (visibility, awareness, knowledge, networking)

These questionnaires will aim to collect more detailed feedback from event, training, and workshop participants, including formative feedback and the benefits experienced by participants in mAkE events. As these two-pager questionnaires require two to three minutes of the respondent's time, they are designed for events where mAkE has the opportunity to distribute them to participants and then collect them again. Questionnaires are distributed directly at the end of an event, training, workshop, to collect immediate feedback from participants. This tool can also sometimes be applied for online events, training or workshops.

These evaluations of events, trainings and workshops will collect:

1) formative input: such as the set-up, timing, speakers

2) input on the participants' intermediate benefits: e.g. perceived usefulness and applicability of the content discussed during the event/training/workshop; increases in knowledge and skills; intention to apply

the shared knowledge, materials, resources; interest in follow-up with additional activities; and perceived networking opportunities.

As mAkE events, training, and workshops cover a broad range of topics, questions will be tailored to the activity in question—while at the same time trying to keep a certain homogeneity in the broad foci of the questions, so as to allow for comparability between events.

6.5. Impact Pathway interviews

Feed into: Intermediate outcomes (e.g. knowledge gains, networking, implementation of mAkE outputs) and expected long-term outcomes (e.g. higher production capacity, more sustainable DIHs/makerspaces)

One of the main evaluation data collection methods in mAkE will be semi-structured Impact Pathway interviews. The mAkE evaluation team will use this technique to investigate intermediate and long-term effects of the mAkE project on individuals, in the broad African-European DIH/makerspace community, who are involved in mAkE activities (i.e. the mAkErverse), and also to understand which circumstances and contexts influence the generated impact for these individual participants.

These semi-structured Impact Pathway interviews will be guided by a set of question guidelines (an interview protocol) covering the main aspects under investigation. These guidelines support the interviewer's need to cover certain topics, and provide a framework of orientation to ensure comparability of interviews. The guidelines include ideas for questions guiding towards individual topics as well as pre-formulated questions to start discussions. These initial questions are broadly formulated and function "like an empty page which is filled out by the interviewee in his or her own words, structured in his or her own way" (Witzel, 2000). Narrative elements of the interview allow the interviewee to determine what is relevant for them. Through this, initial concepts that are reflected in the question guidelines are refined and enriched by the interviewee (in a form that generates empirical data for project evaluation purposes).

The Impact Pathway interviews will be conducted online or face-to-face, and will be audio-recorded for later transcription (if agreed upon by the interviewee). If an interview is not recorded, interviewers will take notes and prepare detailed protocols to replace the transcript. Whether recording permission is granted

or not, memory minutes will also be written by the interviewers directly after the interview, so as to keep a record of the topics discussed, of situative and non-verbal aspects of the interview, and topics and ideas which can inform data analysis and subsequent interviews later interpretations.

For analysis of the interview data, the evaluation team will conduct qualitative content analysis of the transcripts as proposed by Mayring (2000). The applied method is a technique of summarisation, whereby categories are created in an inductive procedure by reducing, paraphrasing and generalising relevant text passages using software such as MAXQDA[1] or Nvivo[2]. The central aspect of the employed technique is to develop categories resembling the original data as closely as possible.

6.6. Focus group discussions

Feed into: Outputs (formative feedback for material, trainings and workshops), intermediate outcomes (e.g. knowledge gains, networking, implementation of mAkE outputs) and expected long-term outcomes (e.g. higher production capacity, more sustainable DIHs/makerspaces)

Focus group discussions are moderated group discussions on a certain topic with several participants (Mayring, 2002). The method is widely applied in qualitative research and is considered as a sort of group interview, where a semi-structured approach guides the group discussion while also relying on the responses themselves to move the discussion along. The method is used for an explorative approach to reveal opinions, needs, and interests of the interviewed groups. This method can potentially serve as the principal data source for understanding the outputs and outcomes of mAkE from the perspective of various target groups. Focus group discussions can be supplemented with, or be supplementary to, other sources of data, such as the other sources outlined in this chapter.

In comparison to one-on-one interviews, focus groups have the advantage of allowing the interviewers to observe interactions on a topic, and to experience similarities and differences in participants' opinions

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[1] https://www.maxqda.com/de/

[2] https://www.nvivo.de/

directly, instead of deriving them from analyses of separate statements from individual interviewees (Morgan, 2011).

In recent years, there has been increased use of online focus groups, which provide the advantage of participants being able to take part from a range of locations. One comparison between traditional in-person and online focus groups found that the content of the data generated in both formats was remarkably similar (Woodyatt, Finneran and Stephenson, 2016). For sensitive topics, online focus groups might even foster a dynamic whereby participants can open up more than they would in person. Given mAkE's international setting, online focus groups are likely to be a valuable tool for the evaluation team's collection of data.

6.7. Pre-test peer reviews by DIHs/makerspaces

Feed into: Outputs (perceived usefulness and applicability of mAkE outputs)

This evaluation instrument will be applied before launching certain key mAkE resources.. The aim will be to collect initial inputs on ease of use and perceived usefulness, of certain mAkE outputs, before they are made public and disseminated to the wider mAkErverse, from DIHs/makerspaces that have a close linkage with one or more of the mAkE consortium member.This feedback from outside of the consortium will help to pre-test certain mAke outputs, document challenges that individuals have in using the outputs, provide indications for ways to overcome the identified challenges before public launch. The pre-tests and peer reviews will also generate data on perceived and expected benefits from the outputs in question.

The format for these pre-test peer reviews will be in the form of "walk throughs", where a test user (or users) from the chosen DIH/makerspace and mAke consortium members will join a session (online or face-to-face) and "walk" together through the developed output, with the user feedback documented by the participating mAkE consortium members.

7. Ethics

mAkE is committed to open science practices and transparency while at the same time adhering to strict data management rules, particularly when it comes to personal data. During the evaluation and impact assessment activities described in this document, personal data will be collected from participants during administration of feedback cards, questionnaires, interviews, focus group discussions, pre-testing peer reviews, and possible other encounters during mAkE events, training and workshops. Accordingly, mAkE has e.g. created informed consent, anonymity and confidentiality protocols that will be employed during evaluation activities, as well as a secure, password-protected, cloud-based data management system to manage data storage and, where necessary, data-sharing among consortium members (with the necessary anonymity and confidentiality measures for certain kinds of data).

The mAkE evaluation activities align with J.E.D.I (Justice-Equity-Diversity-Inclusion) and with F.A.I.R principles (Findable – Accessible – Interoperable – Reusable).

- Justice refers to identifying and dismantling barriers to resources and opportunities in the maker ecosystem, so that all stakeholders and communities can take advantage of the maker movement. To achieve this vision, mAke will work to break down barriers and address inequalities rooted in differentials of power and privilege related to the "isms" in society: racism, classism, sexism, etc. Evaluation activities in mAkE will carefully support the identification and dismantling of barriers to resources and opportunities.

- Equity – mAkE recognizes that advantages and barriers exist, especially with individuals that are underrepresented in the maker ecosystem and underserved in society at large. That is why we work to allocate resources to ensure everyone has access to the same opportunities. That is why, our contents are aligned with the F.A.I.R principles (Findable – Accessible – Interoperable – Reusable) and F.A.I.R principles will also guide evaluation activities in mAkE.

- Diversity – we believe that diversity is not just about racial differences, but can be related to age, race, ethnicity, gender identity, sexual orientation, physical or mental ability, socioeconomic status, religion, and national origin, among others. In the mAkE evaluation activities a mix of gender balance and geographical representation is strived for.

- Inclusion is the way we create environments in which an individual or group can feel accepted, respected, and valued. Inclusivity strives to create a sense of belonging for all individuals, regardless of different identities. The mAkE evaluation activities contribute to amplifying the voices, perspectives and styles of those who experience more barriers based on their identities, disabilities.

More details on mAkE's ethical approach and data management instruments can be found in the Project Handbook (Deliverable D8.1), the Data Management Plan (Deliverable D8.2), and the ethics deliverables (D9.1: H-Requirements 1 and D9.2: POPD-Requirements 2).

8. Outlook

The main focus of the WP7 evaluation team in year 2 of the projects will be on selection of evaluation instruments in collaboration with WP leaders, tailoring of the instruments to the WP requirements, and implementation of the instruments for evaluation data collection.

This work will be supported via regular calls with the WP leaders, using the logic model matrices (see chapter 3) as the living documents for keeping track of all the activities, outputs, outcomes, indicators and evaluation instruments. Of course, the evaluation work is closely related to the WPs' timelines and milestones. Pre-testing will be organised shortly before the public launch of key mAkE outputs. Formative feedback and indicators of intermediate outcomes can be collected soon after outputs are implemented and disseminated to the broader mAkErverse, while lessons learned on expected long-term outcomes will have a certain time delay and will only come after the outputs have been applied, implemented, and used for a certain period of time.

mAkE resources, programmes and digital infrastructures are to be implemented in diversified regional and national context, and thus an in-depth understanding of the contexts in which outcomes can be realised will be important. This aim will inform the evaluation team's use of the quantitative and qualitative evaluation instruments introduced in chapter 6 of this document.

As evaluation data collection will be organised in various locations and with manifold mAkE consortium members, the evaluation team will provide mAkE members with the required briefings and training on use of the applicable evaluation instruments.

While the evaluation data collection will be supported by all mAkE consortium members, the analysis and synchronisation of data will be conducted by the WP7 evaluation team, led and directed by ZSI, and the results of this work presented in Deliverable D7.2: Interim Impact Assessment Report (M24) and Deliverable D7.3: Final Impact Assessment Report (M36).

9. References

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