

# THE MAKER MOVEMENT'S POTENTIAL FOR AN INCLUSIVE SOCIETY

With the Maker Movement we are seeing a new culture of manufacturing rising: Many makers combine technological interest with a societal mission. In the open environment of MakerSpaces, people with disabilities can connect to maker communities and find pathways for self-empowerment, for instance, through co-creating individualized assistive tools.

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## INTRODUCTION

People around the world are inventing, co-creating and building a broad variety of solutions and objects. They are “high-tech do-it-yourselfers” [1] forming a new movement, commonly referred to as the *Maker Movement*. Many of them want to be change-makers, aiming at finding solutions to societal challenges (e.g. [2]). The establishment and diffusion of new making-practices is especially enabled by digital (fabrication) technologies and platforms providing a basis for new approaches of inventing, prototyping, creating tangible objects and providing access to them. Technologies like 3D-printers and laser-cutters allow makers to easily create prototypes for testing. They also enable creative people to invent and realize low-cost objects and solutions. Thanks to platforms for open access, makers can connect to a community of other makers and exchange ideas, knowledge and models for 3D printed objects. Through platforms, objects and solutions can easily be reproduced by nearly anyone with access to the necessary machines, devices and software like computers, 3D-printers or laser-cutters. Such technologies can be found in MakerSpaces, which can be seen as manifestations of “localized spaces of collaborative innovation [...] where knowledge communities meet to collectively innovate” [3]. In these open spaces, people can get the necessary access to the aforementioned technologies and makers can support anyone who is in need for these solutions. This open access to existing solutions already holds some potential for a contribution towards inclusive transformation of societies, in which people have the same chances for accessing whatever they want, need or find useful in any context regardless of their backgrounds and physical or cognitive abilities. When marginalized groups have open access to things that enhance everyday life, more equality is achieved for everyone. However, open spaces like MakerSpaces

or FabLabs can also provide leeway for inclusive practices beyond open access. They open up a pathway for empowerment when users of already existing solutions can also be inventors and creators of new solutions. With the right ideation and development methods, people can find pathways for self-empowerment together with others who are experts for their respective specific skills. A popular development tool for processes of co-creation is found in inclusive, user-centered Design-Thinking processes in which users and others act together. In the right setting of openness, people can co-create whatever they find useful and whatever is needed. If people have specific needs for solutions, such spaces can be the right place to develop solutions tailored to the needs of the respective users. Moreover, when people create together with others (co-create), no matter whom, inclusive social innovation and empowerment become reality in an environment of mutual learning. This observation served as the starting point for the SELFMADE project and its inclusive MakerSpace focusing on co-creation together with people with (complex) disabilities.

## AN ACCESSIBLE MAKERSPACE FOR INCLUSIVE PEER PRODUCTION

As stated above, MakerSpaces often represent spaces for creativity open to everyone. This generally inclusive approach offers leeway for self-empowerment. *However, how can making by people with disabilities be realized in respect of individual needs and capabilities?* Starting in 2017 and funded by the German Federal Ministry of Education and Research, the SELFMADE project aimed at developing new pathways for unleashing this inclusive potential of MakerSpaces for people with (complex) disabilities. While other makers around the world already focused (and still do) on the development of “assistive tools” [4] for people with disabilities

## REALIZATION OF SELFMADE'S INCLUSIVE MAKERSPACE

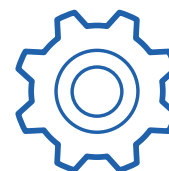
### EMPOWERMENT FOR PEER PRODUCTION



- Development of pathways to **empower persons with disabilities to become active producers** and distributors of goods and tools responding to their own needs
- Creation of an **“intermediate market”** of assistive tools to fill the gap between home-made assistive tools and commercial assistive tools, by linking individual persons with disabilities with large communities that offer long standing experience and models of “intermediate quality”
- **Bringing together persons with and without disabilities** in an inclusive maker space designed as a space for persons with complex needs
- **Empowerment** of persons with disabilities regarding the definition and production of individualized assistive tools

### PRODUCTION OF ASSISTIVE TOOLS & PRODUCTS FOR PARTICIPATION IN EVERYDAY LIFE

- **Production** of assistive tools for work, everyday life/leisure time and communication
- **Exploiting Social Innovation mechanisms** to improve the impact of 3D printing by people with disabilities. The maker spaces represent a social innovation that could be scaled out to other spaces and institutions; one aim of the project is to identify pathways of scaling the developed innovations and improving the project's impact.



### CHECKLIST FOR ACCESSIBLE MAKERSPACES



The checklist was designed as a tool for checking and discussion:



#### Avoidance of barriers in addressing visitors:

- Use of diversity-sensitive language
- Openness for all visitors
- Creation of a respectful environment



#### Avoidance of spatial barriers:

- Access to the building (e.g. sign-posts, banking of the floor)
- Room design (e.g. necessary width of passages)
- Sanitation (e.g. access, necessary space)



#### Avoidance of barriers in the making process:

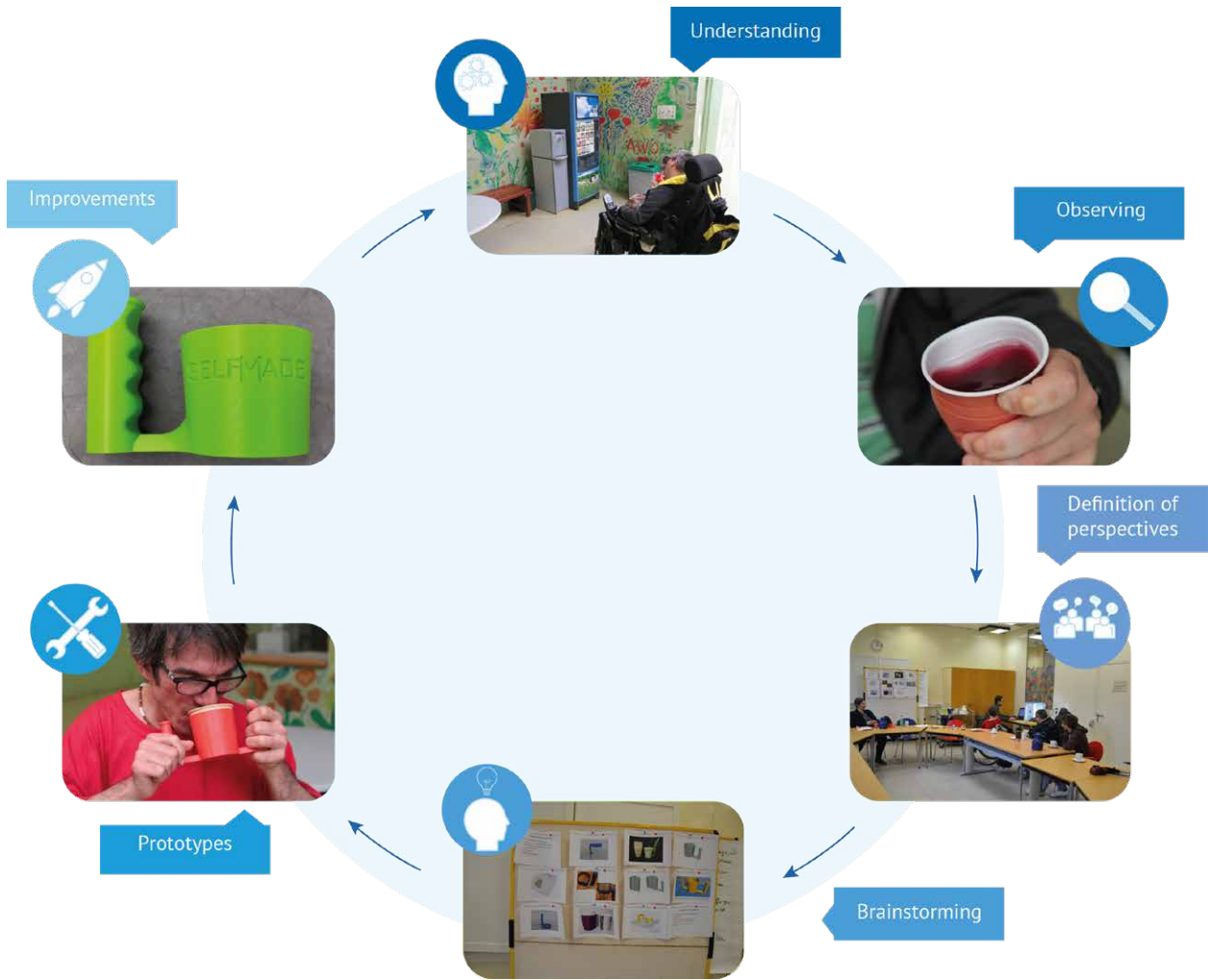
- Development process (e.g. assistance, individualized options for interfaces)
- Information services (e.g. font sizes, contrast, plain language)
- Printing process (e.g. modified user interfaces)

Aims of SELFMADE (cf. [4, 5])

In general, SELFMADE wanted to emphasize the empowerment of individuals with complex disabilities. A main aim was therefore to co-create and produce individual assistive tools together with these people. These tools were designed to support and enhance everyday life, be it in leisure or working time. In line with this goal, the project aimed at an empowerment for peer production. Both aims were added with a strong focus on capabilities and accessibility. Therefore,

an accessibility factsheet for MakerSpaces was developed. Currently, this factsheet is available in the MakerSpace and an extended checklist enclosing additional criteria and findings is available, as well.

The activities of SELFMADE also enclosed the development and realization of a MakerSpace where people with and without (complex) disabilities can work, develop, create and



Iterative steps of the Design Thinking process adapted for SELFMADE's co-creation of user-centered solutions (cf. [4])

ideate together with others in an inclusive environment. To meet the capabilities and needs of people with (complex) disabilities, this MakerSpace was placed in the professional environment of a Service Center for Augmentive and Alternative Communication (AAC) in the city of Dortmund. The main focus of this space is currently 3D-printing as a major opportunity for creating individualized and relatively inexpensive, yet expedient, assistive tools and other objects.

## DESIGN THINKING APPROACH

In co-creation contexts, design tools and methods are already well established. Besides other advantages, some of them enhance development processes by bringing in a user-centered perspective. This specific approach was considered a good entry-point for realizing an inclusive creation-process. A user-centered approach allows taking into account the perspective and, therefore, the needs and capabilities of a solutions' target-group. Moreover, when users are part of a creation-process from its very start to coming up with a solution, a pathway for empowerment and full inclusion in

the process is provided and realized. For SELFMADE, the design thinking approach [6] was adapted to the needs and capabilities of people with complex disabilities. To be clear: an inclusive Design-Thinking process as created for SELFMADE can be a pivotal element for user-empowerment. Hence, it was and still is key for enabling self-determined, inclusive making for people with complex disabilities.

## A SCALABLE APPROACH

Of course, individual needs and capabilities demand individual pathways to peer production. At SELFMADE, a decision for a scalable approach was made. This approach encloses different levels of access, better tailored to

**An inclusive Design-Thinking process as created for SELFMADE can be a pivotal element for user-empowerment.**

individual capabilities. Tested in the practice of the inclusive MakerSpace, a simple and effective solution proved itself best. Since then, a shelf is used where already available solutions are presented to visitors and users.

Each object is added with an SD-card that has the necessary files needed for printing the respective solution. The scalability is found in a selection of pathways provided for users interested in printing the objects with or without assistance.

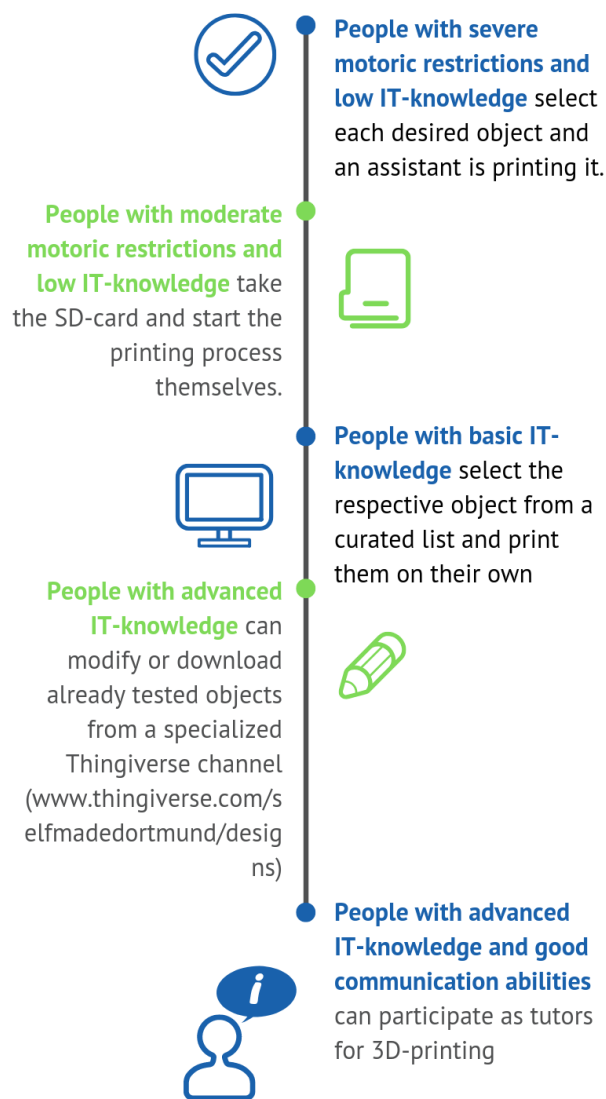
## A NEW MARKET

As mentioned before, SELFMADE had the aim of contributing to the establishment of a new market for assistive tools. However, this potential needs some explanation. Currently, the markets for any kind of assistive tools are usually characterized by either professionalized or highly individualized, homemade solutions. Yet, the opportunity of creating sharable solutions is opening up another marketization strategy in between these two markets: individualized, non-professional solutions can now be provided to other users. While open-access provides a lot of potential to share these solutions for free, access to the necessary hard- and software will not always be provided to potential customers of this intermediary market. Therefore, SELFMADE aimed at contributing to the development of this in-between market as it would allow a broader public to benefit from individual and customizable solutions coming from MakerSpaces. While such solutions could be distributed for relatively low prizes, this strategy is also opening up a pathway for business-opportunities for makers who want to further develop and monetize their co-created assistive tools.

## DIFFUSION OF INCLUSIVE PRACTICES: ADAPTION TO A NEW PROJECT FOR A BROADER TARGET-GROUP IN WORKING CONTEXTS AND BEYOND

The successful approach of SELFMADE points at the potential for inclusive societies found in respective making practices and their further diffusion to other contexts. Whereas SELFMADE – and the prosecution of the inclusive MakerSpace – put a strong focus on people with (complex) disabilities, the tools and approaches developed during the project's course can provide the concrete means to adapt the core idea to other contexts. In other words, the social innovation of inclusive co-creation oriented towards capabilities and needs in MakerSpaces also has a lot of potential for people with a need for assistive tools in general. Supported by social scientists, the successful approach and the practices established in SELFMADE were therefore adopted and modified for another German area: the Emscher-Lippe region – enclosing cities in the northern part of North Rhine-Westphalia, characterized by industrial transition. Here, the project Emscher-Lippe hoch 4 (EL4) ([www.el4.org](http://www.el4.org))

## SELFMADE'S SCALABLE APPROACH



SELFMADE's scalable approach (cf. [4, 5])

was launched in 2018. In the framework of a broader goal of supporting digitalization in this region, the project aims at developing the area into a hotspot for practice and expertise in inclusive, individualized (social) innovation utilizing digital means. While SELFMADE and the established MakerSpace had and still have a focus on enhancing life quality across all areas of life, EL4 has a particularly strong focus on working environments. However, individual solutions created for this context are not always limited to usability at work. Moreover, some solutions can also enhance leisure time and tasks of everyday life beyond work. The successful adoption and modification of these inclusive



The shelf for a self-determined selection of already existing solutions

practices from one context to another is therefore a good example for not only the diffusion of social innovation but also its 'translation' to another context while keeping its core characteristics and its basic, successful, approach.

However, back to EL4's main focus: prior to the project, its partners found a strong need for assistive tools, made to support people at the workplace – for instance in work centers for people with disabilities or in the regular labor market. For coping with this need, the individually tailored and already successfully tested and refined approach of SELFMADE led to the key idea of creating a space for developing individualized assistive tools together with people who would benefit from these tools, ranging from (complex) disabilities to e.g. refractive errors. As the project is rooted in the context of a FabLab with its strong network and broad expertise, EL4 can also go beyond co-created solutions rooted in possibilities enabled by 3D-printing. In the FabLab context, more machines are available and, therefore, more opportunities for creative and individualized solutions are given. Laser-cutters, vinyl-cutters, 3D-scanners, VR devices and other technologies provide additional pathways. Furthermore, the participation of a FabLab adds to the worldwide movement of other FabLabs aiming at the inclusion of people with a need for assistive tools. Thanks to

already existing knowledge and experiences available in the strongly organized FabLab-network, this link is highly beneficial to the aims of EL4. Furthermore, the connection to this larger community is more than just a connection. In fact, it has to be seen as a pathway for inclusion and diffusion of underlying practices. When people with disabilities join FabLabs where makers from any context co-create, such FabLabs have the chance of becoming lighthouses and role-models for inclusion – and some already are. In this environment, the tools of SELFMADE and EL4 can be even further developed and brought to new contexts. Through EL4, the connection of SELFMADE's MakerSpace to the worldwide FabLab community is also established: as the inclusive MakerSpace is presenting an example of best practice, interested makers from this larger community are already visiting and consulting its staff. As a result, inclusive mutual learning is also established more and more and the concept and its innovative practices are starting to be diffused.

## CONCLUSION

The practices established and diffused by SELFMADE and EL4 present a route for inclusion and empowerment through making in open, inclusive spaces. Such spaces serve as role models for inclusive environments as they are open to everyone and tailored to individual needs guaranteeing this access. Whereas marginalized groups in society are often facing barriers to accessing tools or services that significantly enhance everyday life, open access and peer-production provide possible solutions for overcoming such barriers even beyond the respective context of the aforementioned projects and MakerSpaces or makers in general. Practices specific to making could be translated to other contexts. While the open access approach is not specific to making, open access to self- and peer-production and inclusive co-creation can be identified as particularly typical for MakerSpaces. If the underlying core idea and the practices of access to technology and collaborative creation diffused to other contexts in a similarly consistent way as is brought to life in many MakerSpaces, a big step towards inclusive transformation would be made.

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