

# Benefits of Citizen-Oriented Projects and Collaboration between FabLabs Programs

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## Abstract

The paper describes the potential benefits of developing larger urban citizen oriented projects as a series of smaller workshops in cooperation with local maker spaces and FabLab initiatives. The approach is demonstrated in a case study of the Potulná Alej (PA) project developed by the Maker Institute (MI), a Prague based non-profit maker organization.

Evolution and benefits of schemes have changed in maker spaces (MS) and FabLabs (FL). Examples of the definition of MS and its mixed missions have led to various definitions and identity variations, some disregarding its coworking schemes (van Holm, 2015) and impact in circular economy; changing the hobbyist character of makers into more entrepreneurial and community projects as suggested by Li, Eberhart, and Easley (2021) in their study on the relationship between MS, entrepreneurship, and institutions; and the need to valorize the need of these spaces by emphasizing critical socio economic agendas with its push for 21st century skills according to Rayna and Striukova (2020) showcasing that FL and MS play a significant role in fostering skills for the 21st century. FL and MS are yet to find their standing in society, not unlike other new places and establishments that aim for similar sharing of technologies and knowledge such as core facilities (Soltwedel & Haase, 2023). The mission of the facilities sometimes calls for a widespread use of services and not just tailored and expert tools or staff in order to be more ample. Some questions arise about the impact of these MS and FL and their mission (Schneider & Lösch, 2019), which is why we suggest that some public intervention projects would aid this process, making these spaces operable for the public and materializing ideas in public space.

This paper addresses the original Wanderbaumallee (WBA) project in Munich, its iteration in Stuttgart, and integration from the MI as a flagship project to incentivize the maker community on Kampus Dejvice (Prague's technical campus containing 5 educational institutions and 1 municipality)<sup>1</sup>. We outline the advantages of collaboration between FL, MS, and grass-root communities and the benefits of developing community projects through public workshops, such as WBA projects. Emphasis is made for the need for FL and MS to integrate sustainable and nature-based solutions into their core programs. We point out benefits to assess why FL and MS should integrate within their strategies to pilot, promote and cultivate activities together with existing community projects or develop new ones on their own. We aim to discuss the similar impact in with which grassroots projects and organizations can benefit from the standing of makerspaces to create more wholesome projects and garner further municipal support in their missions, while makerspaces and FabLabs gain a sustainable and reputable project that will strengthen their community standing and future impact.

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<sup>1</sup> Website of Wanderbaumallee Koln collecting various WBA projects: <https://wanderbaumallee-koeln.de/wanderbaumalleen-in/>

## 1 Introduction

Emphasizing environmental projects as core programs for teaching both low-tech and high-tech skills is crucial in the context of makerspaces (MS) and FabLabs (FL). While educational access and open machinery, such as the visible, public, and tangible WBA, play a significant role in addressing this issue, creating middle ground platforms, as proposed by Ferro et al. (2022), is essential for urban policy transformation projects involving projects like PA and WBA in FL and MS. In addition to the holistic approach outlined by Bulckens, Mohamed, Neiryck, and Verbeke (2021) towards creating a sustainable society through fostering creative thinking and entrepreneurship, we assert the importance of materializing functional outdoor projects like PA within fablabs equipped with the necessary tools and facilities.

The making should be taken as a project on its own and use that to educate and engage the general public. This will ideally not only inform the audience about the issue being solved but also educate and propagate ideas about FL and manufacturing. Various observations and addresses have been made in the Pre-Event FabX Conferences for Czechia 2025, where the spaces are still struggling to communicate their agendas and find support in the governmental policies<sup>2</sup>. Projects involving public space and municipality cooperation are not highlighted, even though there is a gap of financial and political support. Even outside Czechia, some questions arise about the impact of these makerspaces and FabLabs and their mission (Schneider & Lösch, 2019), which is why we suggest that some public intervention projects would aid this process.

### 1.1 The Maker Institute

The Maker Institute (MI) is a recently established non-profit organization and FL operating in Prague, Czech Republic, since 2022. The institute was founded to drive students to polytechnic fields and to open the public to new technologies, on behalf of both the University of Chemistry and Technology (UCT) and Czech Technical University (CTU) in Prague. It belongs to the wider Kampus Dejvice organization, where it focuses mostly on cultural events and showcases research to the public. The mission of the MI is to use technology for a social and environmental purpose, and adhere the institute's agenda to various Sustainable Development Goals (SDG). Three thematic pillars were created in order for users/members of the FabLab and workshop attendees to grow as an individual, citizen within Prague, or beyond, and ultimately have a great impact in the world. These are 1) "make your home", "make your city", and "make your own".

### 1.2 The Potulná Alej project

The aim of the Potulná Alej (PA) project is to explore the possibilities of combining FL communities with grass-root environmental urban initiatives in order to create a multifaceted project that is functional, educative and aimed at the general public. The main part of the project are mobile wheeled modules planted with trees (Figure 1). The modules can be moved around the city in order to create local pop-up parks. The details of the design and function is explained in further detail below.

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<sup>2</sup>No specific reports have been made but rather informal focus group discussions.

Figure 1. Tree Shift to second station of Potulná Alej in 2022



## 2 Methodology

### 2.1 Definitions and overview of the WBA projects

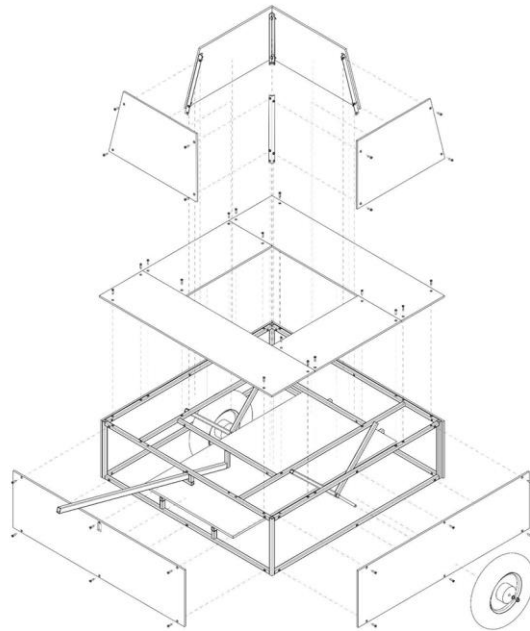
The Wanderbaumallee project (translated to English as Wandering Tree Alley) launched in 1992 in Munich has grown its reach in various German, Austrian, and other European countries. The goal of the local projects is to create temporary green spaces in the urban environment and raise awareness of the lack of permanent green spaces and places to linger within the city. The projects usually involve mobile tree carts that are regularly moved within the particular city during the growing season and in addition to the same goals and ideas they usually share similar mobile tree cart design and logo.

While a few local projects relied on the assistance of physical workshops, hardly any of these workshops were fully integrated in terms of involving citizens in the process of building and designing new pieces, let alone prioritizing sustainability, circularity, reuse, or technical aspects. Participation of citizens and growth of communities is difficult to achieve as a separate action to learning about technologies and making (Diaz, Tomàs, & Lefebvre, 2021), however we inspire actors to engage in a nature-based solution that further encourages them to hone skills learned and apply them to a project that they see and relate to in the form of mobile tree carts.

### 2.2 Definition of Potulná Alej (PA)

Inspired by the WBA in Stuttgart the PA project is an initiative of the MI under the thematic pillar “make your city”. It is based in Kampus Dejvice with Technická street as the first station. The project currently includes 20 modules with 15 of the modules serving as mobile tree carts and 5 of them as activation modules (not necessarily nature-based but rather visions of a specific community). Each module consists of self-supporting steel substructure equipped with rubber wheels and exterior protective cladding made out of timber or reused materials. The modules are moved to a new location roughly every 2-3 months. The design and function of the activation modules (eg. bike electricity generator modules) and the temporary locations are chosen by the request of the public for the upcoming year.

Figure 2. Potulná Alej Module Axonometric Scheme



## 2.3 Case studies

### ***Wanderbaumallee Munich - Green City Verein (1992-on going)***

The original project in Munich demonstrates the importance of citizen participation and the will to make greener streets but does not involve seating or refined cart design. The project is one of many within the Green City Verein that focuses on larger activation of communities and has kept the project almost untouched since its beginnings. The first and original project of wandering trees that originated in Munich demonstrates the importance of citizen participation and will to make greener streets, the fabrication, design, and integration of other technologies has not been relevant. The project has been active for the last 3 decades and comprises a simple approach to greening streets and is coordinated by Green City Verein, an association that educates, empowers, and proposes solutions for a greener and sustainable Munich with over 2.500 members. The model of the WBA of trees does not involve seating, making, nor any other polytechnic approach and instead defies public space appropriation.

### ***Wanderbaumallee Stuttgart - Tilia Verein (2018 - on going)***

The WBA project in Stuttgart is part of a larger association, Tilia Verein, that attempts to build on the success of the mobile tree carts and develop further urban DIY projects and interventions. This association reinvented the way of transporting trees, from simple pots to larger modules with seating, that have had some iterations and refining throughout the year. The fabrication was co-created and at times outsourced to the local makerspace, and has been modified by some members of the group. However, technical integrations, and other studies on the materialized aspects of the project have stagnated. The project attempts to garner partnerships with universities and other entities to provide such data, but as a community association, the limitations of space, time, and organizational skills have weakened this possibility. The team has managed very well to share and motivate other cities to build and even improve their core basis module, as seen in WBA Koln and WBA Furth. However, their want and need for integration of further technologies has stagnated. WBA Stuttgart has not been interested in academic

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work and tends to focus on specific aspects of urban or citizen approach interventions. Its grassroots approach inhibits at times its potential to integrate with research institutions. The WBA projects after Stuttgart have multiplied since the creation of the sitting module, despite WBA Munich having a great communal resonance for decades.

### ***Potulná Alej***

The PA project at Maker Institute has developed technical skills with sustainability in mind building upon the design of WBA Stuttgart. While various WBA projects have used community workshops, makerspaces, or fablabs, the projects have not focused on teaching the fabrication and material aspects, missing on the opportunity to gain further fabrication and technical knowledge of the projects while also poorly leveraging the communal resources that these workshops have to offer. MI has leveraged every aspect of the building of this project as well as integration of many disciplines found on both university campuses and integrated the project as part of accredited courses in the university. As part of various existing entities, the MI has the opportunity to utilize various experts in the academic institutions to aid in teaching, scientific know-how and expand the impact of the PA project.

## **2.4 Survey**

An informal survey was conducted both with the WBA participants as well as with other members of not related maker communities. While the survey was informal and the sample was relatively small (23 interviews in total, 6 took part in the WBA project for at least a year). Based on the answers it can be carefully concluded that:

1. When asked about what they like about makerspaces and fablabs Community and Collaboration was a theme that was mentioned more than twice as often (more than 60%) as Learning and Skill Development or Resources and Access.
2. When asked about the value of communal or public projects they participated in, Community and Collaboration was the most mentioned theme (~60%) followed by Community Impact and Social Good (~40%). Learning and Skill Development was the least mentioned (~10%)
3. Public administration is the biggest challenge in developing projects in the public space for more than a half of the respondents.
4. Only about 50% of the WBA participants actually actively participated in making of the modules.
5. Only about 8% of the respondents joined makerspace or fablab because of a project related to an SDG.

## **2.5 Distinctions of the Maker Institute adaptation:**

In order to integrate the project as part of the MI program, various topics were addressed and measured for impact from its creation in 2022 and its second ongoing run in 2023. Post-pandemic and ongoing Ukrainian conflict directly impacted the participation and development of the project, however the results of the two years project has still been meaningful to the development of the MI mission and the immediate response to the project.

The distinctive improvements and innovations were achieved in the following categories:

- Fabrication: The fabrication of the modules in the WBA Stuttgart community was done during several community workshops with the help of several open workshops around Stuttgart. The workshop days were always focused more on the help from the Wanderbaumallee community itself. The focus of the MI was from the beginning on creating the modules through a series of educational workshops focused on the general public. This approach allowed to integrate the workshops in the educational plan of the MI and at the same time to enlarge the community and introduce the activities of the MI to a larger audience. The workshops were organized in cooperation with two public workshops in Prague, Skautský Institut (Figure 2) and Cirkulární Dihná.

The PA workshops were beneficial for them mainly because, according to their directors, they are lacking long term collective projects in their curriculum.

Figure 3. Welding and module creation at Skautský Institut



- Design: adaptation of the original concept developed by WA Stuttgart was developed by the MI in cooperation with the Faculty of Architecture students. The main drawback of the original Stuttgart design was a high mass and decreasing stability of the timber to timber joints over time. Furthermore, subsequent repairs or part replacements are difficult due to the monocoque character of the design. In the MI approach the wooden base structure was replaced by a sturdy and lightweight steel load bearing frame with thinner and therefore lighter protective outer timber shell. This approach not only decreases the overall weight of the module but also makes it possible to easily replace destroyed or degraded parts of the outer shell.
- Education: As mentioned in the previous paragraph one of the differences to the WBA Stuttgart project is the focus on the educational aspect. Alongside the hands-on public workshops for the general public, the MI also partnered with the Faculty of Architecture of the Czech Technical University and integrated parts of the process in the undergraduate curriculum. The students were given 5 modules to develop and fabricate innovative public space interventions. The student projects ranged from a public gym to a place where to relax and rest.
- Sensor integration: Several modules were enhanced with Long Range (LoRa) enabled sensor stations. The sensors provide a useful plant health related feedback for the community (e.g. soil moisture content) as well as environmental metrics. The collected environmental data can be used for analysis and identification of potential issues, leading to effective strategies for mitigating environmental impact.<sup>3</sup> Similarly to other aspects of the project the sensor network design and integration was partially developed within a workshop open to the general public. This feature is currently missing in the Stuttgart Wanderbaumallee project altogether but the integration is being actively developed in cooperation with the MI.
- Policy: Approval and financial support of the Prague 6 Municipality has increased and ease of permits has been facilitated by some political actors. The municipality has also been keen to the sensor data collected by the trees and is interested in the potential of embedding these in older trees in the municipality. The environmental data (Figure 2) that is collected with such wandering trees is experimental and will output data relevant to the first station of the project, while building up data, IoT, and environmental skills. The project showcases the appropriation and use of streets

<sup>3</sup> State environmental policy of the Czech Republic 2023 with outlook to 2050 find [here](#)



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in a different manner and has started stirring up conversations on the usage of parking lots, university campus streets, and concrete plazas. Faster turnover of the results via the tech-enhanced Potulna Alej approach of planting further trees.

Figure 4. Sensor integration for soil moisture



## 2.6 Overview of the developed workshops

The table 1 summarizes workshops that were developed in cooperation with various partners to achieve specific milestones during the PA project lifetime.

Table 1. Sorting Potulná alej workshops

Topic	Content	Audience	Partner
Module making	Wood and metal working using power and hand tools (Figure 2)	General public	Skautsky Institute
Public space interventions	Design and fabrication of innovative public space installations	University students	CTU, Faculty of Architecture
Reused shell	Reusing of workshop waste and leftovers for module outer shell	General public	Z Pokoje do Pokoje
Sensor integration	Integration of various environmental and plant health monitoring sensor	General public	Czech Radiotelecommunications
Electric city	Creating a human energy powered charging stations in the public space using upcycled and recycled components	General public	Cirkulární Dílna

### 3 Discussion

The participation and recurrence of members of the PA project has been measured in the two separate years of its creation. An increase has been seen in the participation of the planting event, questions regarding the stations and the activation of communities, as well as interest to have the mobile trees at several events. Some of the students and participants from the previous years have been repairing and bettering the modules, and the environmental analysis has garnered interest from municipal authorities that have been proposing new stations for the project.

While projects of WBA reflect the use and integration of citizens in building community oriented projects, the design, manufacturing and hands-on aspect of the project does not enhance aspects of the maker movement, but rather citizens interested in community building projects. This refers specifically to both Munich and Stuttgart. Cities and projects in public space might be funded or supported by political movements and might jeopardize their sustainability for the future, yet this refers as well to makerspaces, fablabs and open workshops that rely on governmental support and approval in some cases.

The approach of PA and MI might jeopardize independence and freedom of citizens to launch such projects, but will create larger systemic impacts on an educational, fabrication, design, and policy level, hopefully an environmental one too. It guarantees the possibility of expanding projects with the purview of a makerspace and technical approach, while incentivizing a nature based project that has already enough momentum.

In terms of MS and FL, it provides a good platform and base in which to focus on sustainable development, community projects, and has a seasonal and integrative approach to it.

Grassroot projects and organizations can benefit from the standing of MS to create more wholesome projects and garner further municipal support in their missions, while MS and FL gain a sustainable and reputable project that will strengthen their community standing and future impact.

### 4 Outlook

The WBA Projects and further iterations have not had much academic rigor due to their grass-root and tend to focus on specific aspects of urban or citizen approach interventions. Further research is needed to study the impact of the DIY mobile carts and further activation of spaces for these activities. They have the subject of other technical studies on environmental impact or activation of communities once the trees have been installed, however, the focus of the projects and research does not study the impact of the DIY mobile carts and further activation of spaces of these activities. As the role of makerspaces to society and cities focuses on the shared spaces and shared tools, we argue that a further level or shared projects and vision could further emphasize the importance of such spaces. While the WBA grows and further cities adapt it, so should the design and fabrication of these modules.

Design and fabrication limitations and needs have been changing according to the various executors of the projects. Further work can be developed while launching the project in other FL using the scheme devised by MI whilst aiding existing or potential new grass-roots projects to leverage use of open workshops and their technical value.

### 5 Final Considerations

A worldwide level challenge could integrate these proposals and propel the use of MS for such projects, enhancing both the opportunities of makerspaces to address climate change and public space themes, and further work can be developed while launching the project in other makerspaces using the scheme devised MS.



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Citizen projects that are pushing the boundaries of design and policies have had great impact and received community backing in all the cities that have launched them in the form of *Wandering Tree Alleys*. These have managed to activate public spaces and citizens that have taken matters into their own hands and created DIY projects, while creating communities. Both distinct maker and activist communities can gain insights and ways in which the educational, fabrication, design, technical, and program aspects can be enhanced in order to integrate both ideals, and addresses once again the role of makespaces in their role to create sustainable and resilient communities.

This paper emphasizes the importance of integrating sustainable and nature-based solutions into FL. It also provides insights into the technical skills and educational value with sustainability in mind that the PA project at MI has developed. Overall, this paper offers practical implications for FL, grass-root communities, and bottom-up growth of projects, providing a valuable resource for those interested in creating citizen-oriented projects and collaborating with makespaces/fablabs/open workshops and outlines the importance of fabLabs to add such projects as part of their core agenda. Several examples of skills and projects that can be further developed to benefit these community projects as well as enhance FL and MS to attract and legitimize their standing in community and work for and with public space.

Even though no studies have been made of the overall environmental impact of projects such as the Wanderbaumallee in various countries, the projects have gained traction to incentivize a DIY and collective attitude towards inhabiting and creating public spaces with more trees on wheels.

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