URBAN WEGENERATION ACTION PLAN AND IMPLEMENTATION ROADMAP – TAMPERE

Vers.1

WeGenerate

PEOPLE-CENTRIC SUSTAINABLE NEIGHBOURHOODS

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
BEN	Beneficiaries
CityBIM	City Building Information Modeling
CO_2	Carbon Dioxide
Digitwin	Digital Twin
DO	Demo Objectives
EO	Expected Outcome
IoA	Internet of Actions
IoT	Internet of Things
NbS	Nature-based Solution
SRL	Societal Rediness Level
SUMP	Sustainable Urban Mobility Plan
TRL	Technological Readiness Level
UHI	Urban Heat Island

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EXECUTIVE SUMMARY

This report outlines the plan and roadmap for implementing the actions conceived within the WeGenerate project to increase human-centric walkability within the City of Tampere.

The use of AI and digital tools in urban planning and development is a rapidly growing trend in local and global arenas. These tools offer many applications, ranging from enhancing urban safety and security, enabling resident participation in city transformation processes, and supporting social resilience and climate mitigation practices. Within an increasingly digitalized urban landscape, socially inclusive practices of listening to the residents, participatory co-design, and co-creating a sustainable future are essential. One promising avenue to enact these aims is that of the use of digital twins with embedded real-time data, and the application of interactive digital tools including virtual reality (VR) and augmented reality (AR) in city urban development processes. Further, digital twins offer broad, versatile value for long-term, forward-looking urban development projects by enabling residents to learn about and visualise upcoming city changes, experience a greater sense of local belonging and empowerment, and foster trust between the residents and the public administration.

Despite the many opportunities for digitalization in urban spaces, a localized need has been identified to ensure socially-just practices and support vulnerable social groups including youth, the elderly, and those living with disabilities during urban digitalization practices. Due to the vulnerable status of these demographics, ethical safeguards will be developed in coordination with the WeGenerate consortium's ethics advisor, adhering to ethical principles, local Finnish and international laws, and the Grant Agreement. These safeguards will ensure that no harm or discrimination will be caused to vulnerable individuals engaging in social innovation and participatory processes within the city.

In Tampere, human-centric sustainability planning addresses these challenges by prioritising digital innovation and social participation in urban development. Intertwined initiatives work to seamlessly merge residents' experience of the physical and the digital through the development of the Tampere Citiverse, digital twins for sustainability projects, and inclusive digital applications. Our Tampere pilot commits to exploring key aspects of how early involvement of residents with digital twin simulations can support walkability and climate-

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friendly practices and provide an enhanced sense of inclusion and engagement for residents with urban spaces. By reflecting on the use of digital tools and resident co-creation for the development of the city's Station Area Green Public Space and Cultural Walk initiative (Kulttuurikävely) within the WeGenerate project, we set out to examine how digital innovation tools in sustainability projects can be leveraged to improve human-centric walkability in cities, empower residents and strengthen the local experience of safety and security.

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INTRODUCTION

Developing human-centric urban walkability requires collaboration between city planners, policymakers, developers, and Tampere city residents. However, a successful widespread implementation can lead to more sustainable, liveable, and equal urban environments and improved quality of life for residents. In the WeGenerate Tampere planning process, numerous elements have been identified as crucial: safe streets and culture, mixed-use neighbourhoods, pedestrian and bike-friendly infrastructure, public transportation, green spaces, and community participation in the planning process. Slow streets are safer, beneficial to community interaction, and more climate friendly. While mobility tends to focus on speed, i.e., how *far* you can go in a certain amount of time, urban walkability within the WeGenerate lens reframes the focus to 'access' meaning thinking of accessibility in terms of "*how much can people safely and comfortably get to"* in their time. Along with the physical meaning of accessibility, social inclusivity and social accessibility are a key priority. A recent Finnish walkability research study found that more *social equality* is needed in accessibility plans. I.e., the concept of walkability is usually researched and designed in cities from the perspective of a healthy average adult. This doesn't describe the daily reality of older people or those walking in winter conditions very well. There is a big variation between older people and younger people in urban walkability experiences (Willberg et al., 2023). These experiential differences have been effectively identified and explored within the Tampere WeGenerate urban planning process and walkability designs, to ensure the ability of all people, of all ages, to engage with the city and public spaces throughout all seasons.

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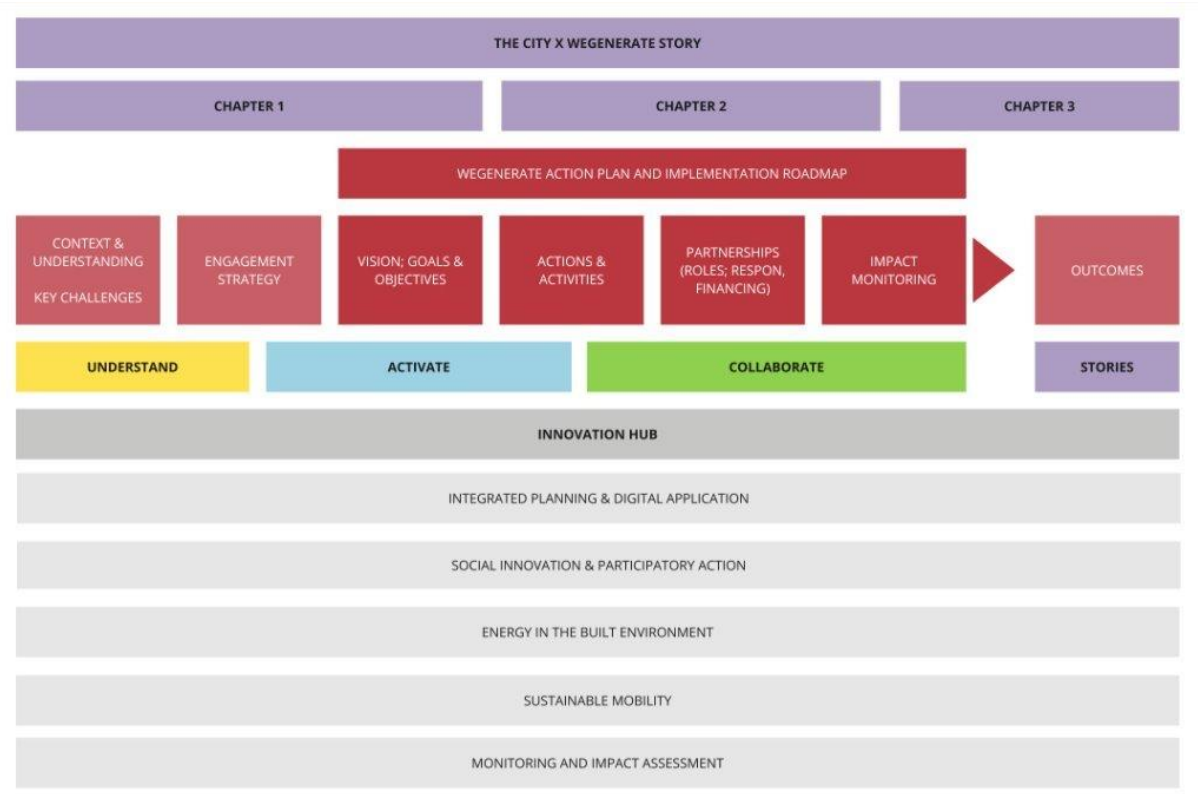

FIGURE 1 - WEGENERATE ACTION PLAN & IMPLEMENTATION ROADMAP PROCESS DIAGRAM

This document is split into two main building blocks (the Action Plan, and the Implementation Roadmap), which are structured in different sections – from prioritizing initiatives to mobilizing stakeholders, allocating resources efficiently and tracking progress. Such sections of this deliverable are further detailed below:

Demo Sites	Policies and Framework	Key Actions
1.1. Station Area Green Public Space	Tampere City Strategy	• Towards the metaverse – creation and utilization of digital twins
1.2. Central Square incl. Laikunlava open-air stage	Data-Driven City for Citizens development programme	• Engagement of citizens in co-creation of a walkable and safe city center
• Culture Walk at Culture District	Sustainable Urban Mobility Plan	• Use digital twins to simulate safety and CO2 emission levels related to people

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		flows and to support the walkability
	Roadmap for Carbon-Neutral Tampere 2030	• Measure well-being and life satisfaction, domains of Environmental, Socio-economic and Safety-related well-being factors
	Tampere Metaverse Vision 2040	• Economic incentives and campaigns for residents to increase walkability and reduce their own carbon footprint based on simulation results from the digital twin.

TABLE 1 – DEMO SITES AND STRATEGIES

ACTION PLAN

2. Demo Intervention Site Overview

To enrich the liveliness and attractiveness of the city center of Tampere, 3 demo sites with different attributes were chosen. The Station Area Green Public Space is future-oriented, agile to experiments and the reconstruction of the whole area is to be started soon. The identity of the area is yet to be established, as the profile of the area is going to change drastically when the new plans are taking place. This demo site is useful for exploring and experimenting with new digital tools.

Central Square (Keskustori) and Laikunlava Open-Air Stage are well-established areas in the city center with plenty of history behind them yet still lacking an identity and a purpose. In these locations, we aim to enrich the purpose of the areas while also creating an identity to them by utilizing tactical urbanism as a method to create liveliness in these areas.

Culture District differs from the previous two by not being a single neighborhood/area but a combination of different areas in the western part of the city center combined into a physical

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yet conceptual area of art, cultural venues, history, shops and other establishments. It is an experimental urban area with the purpose of enhancing the role and visibility of the culture in the city center. In this demo site the aim is to enrich the experience of visiting the culture district by using the digital twin as a new digital tool to encourage to the walkability of the area while also cementing the identity and the purpose of the culture district as a concept to the people.

2.1. Demo site summaries

2.2. Station Area Green Public Space

A new large-scale development has been approved and is in the planning phase for the area between Tampere's central railway station and the Nokia Arena. These two areas will be connected by an overhead deck, with green spaces, commercial areas, and new residential areas structured into the new development, aiming to create a safe, attractive, functional new public space for residents to use. Once the new development is complete, residents will be able to walk all the way from the central train station to Nokia Arena via the overhead platform. This development will be one of the largest in Tampere's history. The goal of the development work is to create a pleasant, greener, more impressive, and unique architectural ensemble in this high-rise building zone, where the high-rise buildings blend naturally with the protected railway station and the culturally and historically significant surroundings. The whole station area is classified by The Finnish Heritage Agency as a nationally significant build cultural environment. The appearance of the station building and other railway buildings in the area are protected by the zoning plan.

The Station Area will be zoned in parts and implemented in phases. Phasing ensures that zoning can consider changes in the operating environment, market needs, and consumer behavior. This way, functions that have demand and need in the future can be brought to the area.

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Zoning began in 2016, and during 2018, the preparatory materials for the zoning plan were on display. The Tampere City Board approved the Station Area master plan in December 2019. The zoning of the area continues.

Station Area is a joint project of the City of Tampere, VR Group, the Finnish Transport Infrastructure Agency, and Finnpark Oy, which also involves private properties and their related development projects.

Fig. 1. The Central Railway Station (Photo credits: Laura Vanzo, Visit Tampere)

Fig. 2. Nokia Arena (Photo credits: Marco Kallio, Visit Tampere)

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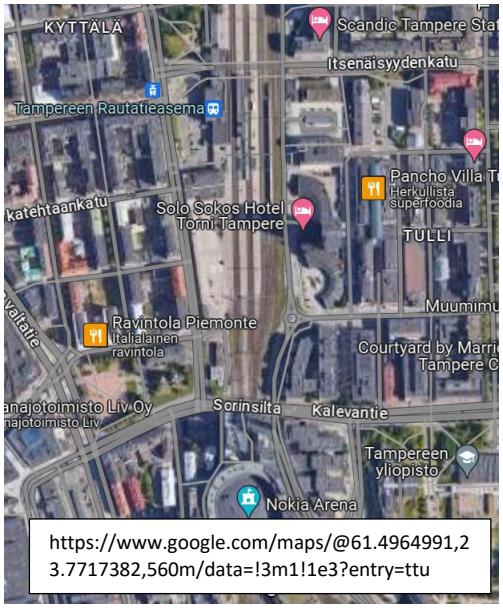

Fig. 3. The Central Railway Station

2.3. Central Square incl. Laikunlava open-air stage

Tampere's Central Square (Keskustori) is the heart of the city. At the Central Square you can find e.g. Tampere Theatre, Town Hall and the Old Church. Central Square is Tampere's central outdoor event venue: concerts, markets and annual outdoor celebrations are held there. Over the years, several reports and working groups have been established around the development of the Central Square, but for some reason very little change for better – turning the Central Square into attractive all-year-round gathering place - has happened.

Regular activities and events (e.g. Monday Market and 1st May Market) have been relocated from Central Square to another place. Keskustori area has frequent disorderly conduction and especially when there are no events on, the general atmosphere has been felt by residents to be uninviting to stay in the area. Despite its key location, resident feedback suggests that Central Square would benefit from a redesigning of the urban space and purpose, to develop accessibility and to include more green areas, seating, shade, and useability for public events and cultural happenings.

A large part of the space in Central Square is used as a parking area. The whole area was examined in the vision work in 2018 including planning and how different parts of the Square

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could be better connected to each other. In addition, technology such as electricity, telecommunications and water and drainage points were reviewed to meet today's needs. Central Square is a culturally and historically valuable environment; hence the planning should pay considerably more attention to the aesthetics of event structures than at present.

Laikunlava, the open-air stage in vicinity of the Central Square, was opened in 2012 and since then, the Central Square has gained the much-needed year-round life around it, which improves the vibrancy of the area. Laikunlava has its challenges, though. It lacks events and activity during winter months. The surroundings of the stage are very dark which makes the place feel unsafe and attracts unwanted behavior. It used to be a popular place for teenagers and youth to get-together, but this changed when a steel gate was installed across the stage that prevented gatherings. During summer the area is often in use for concerts and other outdoor events, but the auditorium (where the audience sits) lacks shade in hot weather, and the area's lighting is generally outdated and old-fashioned.

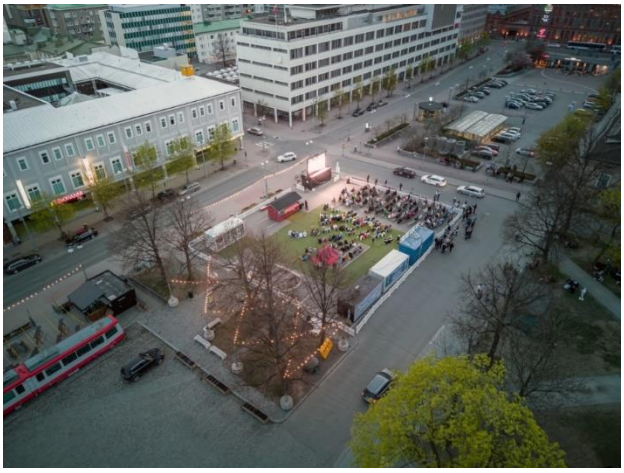

Fig. 4. The Central Square (Keskustori) (Photo credits: Marco Kallio, Visit Tampere)

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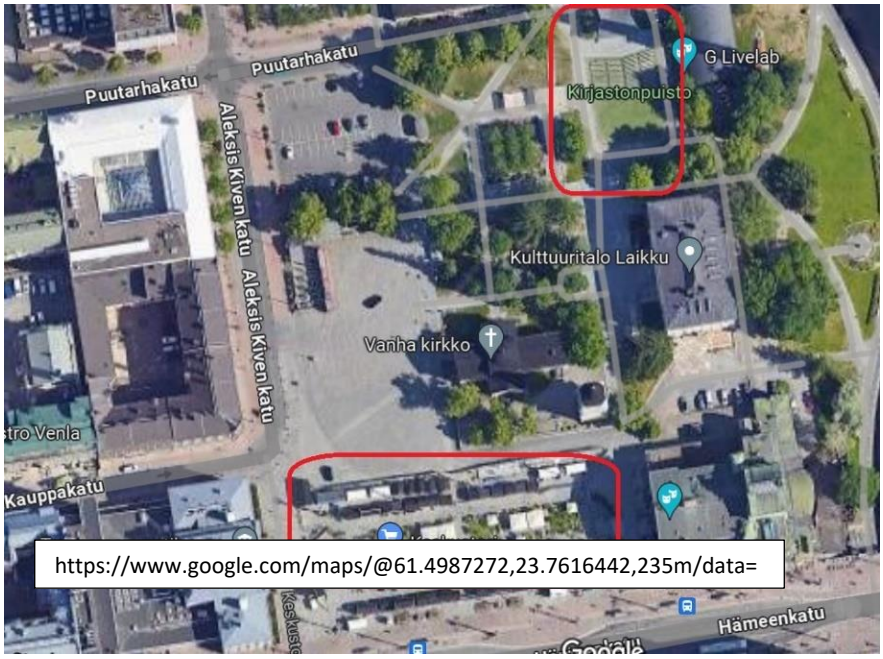

Fig. 5. The Central Square (Keskustori) and Laikunlava Open-Air Stage (circled in red color)

See also:

https://www.virtualtampere.com/eng/keskustori/keskustori

https://www.virtualtampere.com/laikunlava

2.4. **Culture Walk at Culture District**

The Culture District is the cultural area of the western city center that includes more than 20 cultural venues, such as theatres, museums, galleries, music clubs, libraries, cultural houses, and more. The area also includes restaurants, shops, public art, and historical sites.

The WeGenerate project aims to create unique cultural experience walking paths between these venues, which will encourage people to walk, observe, and interact in the common urban space. By bringing together these cultural institutions and business owners, Culture District will create a community and network that is more than the sum of its parts. The Culture District is a new kind of creative and experiential urban area. It gathers the various operators such as attractions, organizations of the western side of Tammerkoski rapids and the surrounding area into a unique entity, which also integrates the region's unique history, architecture, and environment.

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For local business operators, the Culture District is a unifying force and unifying regional brand. It offers various operators and places to visit in the region, support and means for marketing and the creation of new types of content. With the close cooperation of the operators, the area will develop into Tampere's most interesting cultural center.

In conjunction with the WeGenerate project, a new digital map has been developed for the operation of the Culture District, where the visitor can see the themed routes and attractions in the area as well as the current events and products. Routes are being piloted on the map platform to increase the awareness of the Culture District. During the collaboration, the first routes, operators, and events have been compiled on the platform and are presented to the residents in the best possible way—usefully, impressively, and effectively. For visitors, the Culture District is an easily accessible area full of things to see and experience.

In the future, the Culture District will increase the number of visitors and attract more culture and business, promoting the profile of the area as an interesting destination in the eyes of Tampere residents and travelers alike. The Culture District offers both Tampere residents and tourists accessible cultural experiences within a relaxed, interactive environment.

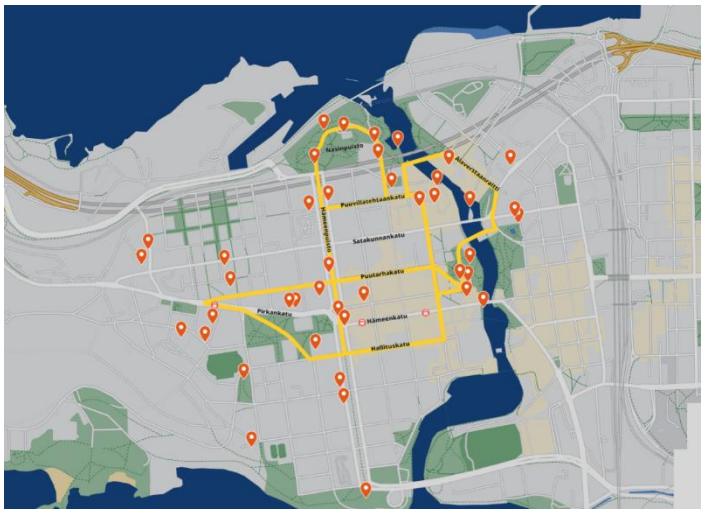

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Fig. 6 The Culture District and thematic walking routes

2.5. Policy & Regulatory Framework Analysis

Many of Tampere's current development programmes well as the Tampere City Strategy 2030 provide the foundational basis for Tampere's WeGenerate vision and pilot. To make it simple, the WeGenerate work plan is based on three Tampere development programs: Data-Driven City for Citizens Development Programme, the Tampere City Centre 2040 Development Program and the Walking and Urban Life Program 2030. In addition to the two development programs, the plan considers the needs of the city's other development projects, e.g. the Culture District, along with other local strategic commitments including the city's Sustainable Urban Mobility Plan (SUMP) and the Carbon Neutral Tampere 2030 Roadmap.

Data-Driven City for Citizens is a development programme implemented during the council period 2021–2025 whose aim is to increase the well-being of Tampere residents, develop competence in the city, strengthen the vitality of the region and promote new business opportunities through data and sustainable digital transformation. The programme is implemented through five flagship areas, out of which one is called Safe Pedestrian City. Safe Pedestrian City is the framework where the Wegenerate project is implemented in.

The Tampere SUMP is a strategic plan that reviews people's mobility needs from the perspective of a better quality of life and is connected to the objectives of the Carbon Neutral

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Tampere 2030 roadmap. Transport is considered from the perspectives of climate, equality, efficient use of space, environmental health, activity, and safety. The most common journeys by Tampere residents are short (less than 5km) meaning there is great potential for the enhancement of sustainable mobility in Tampere. The Tampere SUMP identified the need for the granting of more space for walkability and urban green areas in connection with street renovations (Tampere SUMP, 2021)

Through close alignment and interaction with these various City policies and regulatory frameworks, the WeGenerate values, aims, and actions support the urban environment goals drawn up in the Tampere City Center 2040 Development Program.

In the Vision of the Five Star City Centre 2018-2030, the number of traffic streets in the center and the need for car traffic are minimized by the central ring road and new underground parking facilities. Accessibility will be improved on the main walking and cycling routes, traffic safety and pedestrian safety experience as well as the comfort of the street environment, year-round use, and aesthetic quality (accessible, walkable urban spaces).

Accessibility is improved throughout the city with routes of a special level of accessibility, in addition to the main walking routes. These special routes lead from service centers for the elderly and other special demographic groups to public transport stops and nearby services. The tips for promoting walking are summarized in the Walking and Urban Life programme 2030 which was published in 2018.

Modal split in Tampere (fall, daytime) (source: https://tampereenilo.fi/liikkuminen-ja-vapaa-aika/)				
	2016	**2021**	**2025**	**2030**
Walking	31%	29%	31%	33%
Bicycling	10%	11%	13%	15%
Public transport	13%	18%	20%	21%
Other	1%	1%	1%	1%
Private car	44%	41%	36%	30%

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Share of sustainable transport	54%	58%	64%	69%

TABLE 2 – MODAL SPLIT IN TAMPERE

The targets of the Walking and Urban Life programme 2030 are:

- Promotion of mobility culture
- Design solutions that support a functional walking environment
- Co-creation with residents
- Attractive urban environment and network of services and places
- Functional walking environment year-round.

Currently, the monitoring of walking and urban life mainly consists of pedestrian traffic counts, geospatial-based condition monitoring, and surveys of mobility habits and opinions. Measures to develop monitoring aim to increase knowledge, particularly about the conditions and realization of urban life and staying, the amounts and flows of walking, and the impacts of projects.

Important aspects:

- Good accessibility and smooth movement
- Movement environment part of the urban structure and architecture
- Tram, public transport, walking and cycling the most attractive ways to move
- A comfortable walking environment as part of urban spaces
- Intelligent traffic systems and technical innovations
- Carbon-neutral and safe urban transport

City lighting in the center has been developed not only as part of traffic and city safety, but also as part of the cityscape. The purpose is to form visually coherent night-time entities that structure and help to visualize the cityscape at night. The goal is technically innovative and recognizable urban lighting. Well-designed urban lighting helps to navigate in the urban environment and find important destinations.

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Other guiding strategies and development programmes supporting the WeGenerate project are:

- Tampere City Strategy (https://www.tampere.fi/sites/default/files/2022-06/The%20Tampere%20City%20Strategy%202030_0.pdf
- City of Sustainable Action - The Voluntary Local Review of the UN Sustainable Development Goals in Tampere 2022 (https://www.tampere.fi/sites/default/files/202206/Tampere_FI_VLR_%20City_of_Sustainable_Action_2022.pdf)
- Tampere Sustainable Urban Mobility Plan (https://www.tampere.fi/sites/default/files/2022-05/SUMP_taitto2021_englanti.p%C3%A4ivitetty.pdf)
- Roadmap for Carbon-Neutral Tampere 2030 (https://www.tampere.fi/sites/default/files/202206/Carbon_Neutral_Tampere_2030_Roadmap.pdf)
- Tampere Metaverse Vision 2040 (https://www.tampere.fi/sites/default/files/2023-08/tampere_metaverse_vision_2040_web.pdf)

The City of Tampere is a part of the Net Zero Cities network as well as the Making Cities Resilient 2030 network. Tampere's Participation and Community Involvement Plan gives a framework which puts a resident-centered approach first. This approach guides everything the city does.

2.6. Problems and opportunities

Like many urban centers across Europe, Tampere's city center is grappling with a decline in both **safety and appeal**. According to the Tampere Sense of Safety surveys (2021, 2024), residents feel the least safe in the city center, and the area is widely considered unattractive and unwelcoming to pedestrians. These issues have been further compounded by the COVID-19 pandemic, which led to decreased foot traffic and economic slowdown, as well as by the recent energy crisis and inflation, which are hindering efforts to restore vitality to the area. The Tampere demo seeks to address these social problems by revitalizing the city center, transforming it into a pedestrian-friendly space that will attract people and businesses back.

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The initiative also aims to promote a healthy, low-carbon lifestyle for citizens while reducing the city's overall carbon footprint.

Inner city economic competitiveness is on the wane, and there is a need to attract and retain more young people who can create **value in the city**. Recent research in Tampere has highlighted the importance of listening to residents, involving the community in participatory city processes, and creating collaborative change. The need for increased co-creation between residents and cities emerged as a key aspect to facilitate greater social and ecological resilience. Co-creation methods allow residents a prominent role in driving positive change and open the possibility for residents and the city governance to gain mutual sparks of inspiration from one another, to increase residents' sense of empowerment, well-being, and community connection.

Some of the specific current challenges faced by the city include **emerging climate change impacts** such as **heat islands** in the city centre, **stormwater** management, **biodiversity** loss, and loneliness and isolation among various **social groups**, including as youth. Around half of the city's annual growth is from immigration and approximately 10% of the residents are foreign language speakers (Tampere Welcoming City, 2024). Tampere is working proactively to integrate immigrants and international students.

By prioritising a city-wide philosophy of **interactive, impactful, and inclusive activities**, co-creational practices offer a powerful base for societal change. With Finland's ambitious goal of becoming climate-neutral by 2030 (City of Tampere, 2022) – new long-term sustainability practices and changes in resident lifestyle practices must be adapted to. To ease this transformation, it is essential to include residents directly in decision-making processes and practices through discussions, workshops, and urban planning and co-development opportunities.

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The Digital Twin test user workshops held on the September 3rd, 2024, and found numerous valuable key insights on how the development of the Tampere demo sites can be better adapted to meet residents' needs. Through engagement with the **Digital twin model of the city**, residents were able to visualise the current challenges and upcoming changes to the city. This interactive, gamified process which invited residents to place themselves within the story of the city's development enabled fruitful discussions and rich insights to emerge from a diverse group of local citizens and international residents living in Tampere.

In addition to the above-mentioned issues, the Tampere Demo further aims to address problems and challenges in terms of potential to be developed:

- **Public Space and Greenery**:
  - The railway station public green space area discussed is a central city location where people might bring children to play and hang out. However, the presence of high-rise buildings creates an industrial atmosphere that might not be very inviting.
  - The space has potential due to its greenery, but the experience of walking along the streets is not very pleasant, especially with the sun potentially being blocked by tall buildings.

- **Noise and Traffic Concerns**:
  - There is a concern about the noise pollution caused by traffic, especially in an area where people might want to relax.
  - The area in front of the train station is a hub for taxis. There are questions about what would happen if this space were repurposed for pedestrians, as it could negatively impact taxi drivers' income.

- **Pedestrian Infrastructure**:
  - There is a discussion about the need for better pedestrian infrastructure. The current setup seems to make it difficult for people to navigate, especially if they are unfamiliar with the area.

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- The idea of creating underground spaces for parking or other purposes is mentioned, as seen in other cities like Helsinki.

- **Shading and Lighting**:
  - Shading from tall buildings is a concern. While it might provide relief on hot days, it could also create uninviting "shady alleyways."
  - The lighting in the area is another issue, particularly during darker times of the day. The current lighting might not be sufficient to make the space feel safe and inviting.

- **Tall Buildings and Urban Density**:
  - There's a recognition that tall buildings are necessary due to limited land space, but they also bring challenges in terms of urban planning and creating liveable, inviting public spaces.
  - The transition to more high-rise buildings is noted as a significant change in the city's development.

- **Accessibility Concerns**
  - **Staircase and Elevator Accessibility:** Concerns were raised about the lack of handrails and the difficulty stairs might pose for people with disabilities, those with luggage, or parents with strollers. It's important that urban designs include ramps or elevators, particularly in winter when stairs can become slippery. A suggestion was made to incorporate slides for kids as an alternative route, which is a playful and practical idea.
  - **Winter Usability:** The conversation also touched on how winter weather could exacerbate accessibility issues. A suggestion was made to create covered seating areas that provide shelter from the elements, which could be integrated into walls or structures. These would allow people to rest, meet, or work outside while staying protected from the weather.

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- **Integration of Nature**
  - **Green Spaces and Trees:** There was a strong emphasis on maintaining and increasing greenery within urban spaces. Suggestions included planting taller trees to match the height of new buildings, which could create a more harmonious and natural atmosphere, and potentially introducing water elements.
  - **Vertical Greenery:** The idea of utilising vertical spaces on buildings for gardens or green walls was also discussed. This could provide more green space without taking up horizontal land area. However, challenges like the weight of green walls in Finland's climate were noted, suggesting a need for innovative solutions.

- **Community and Fun**
  - **Spaces for Play:** The discussion highlighted the importance of including fun, engaging spaces for children and families. Playgrounds, slides integrated into the urban environment, and even the concept of turning everyday spaces into areas of play were mentioned.
  - **Seating and Social Spaces:** The idea of creating more social spaces, such as seating areas near trees or semi-enclosed spaces for small gatherings, was raised. These would be particularly valuable in places where people naturally congregate, like outside of railway stations.

- **Technical and Structural Considerations**
  - **Underground Infrastructure:** There was also talk about utilizing underground spaces more effectively, similar to existing structures in Helsinki or other cities. This could help in managing space more efficiently, especially in a densely built-up area.
  - **Safety and Pathway Design:** Safety concerns were raised about current pathways being too linear, which might not encourage people to linger or interact. Suggestions included creating more circular or square spaces where people could gather or participate in activities.

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3. Local Stakeholders Engagement Strategy

A range of stakeholders will be engaged throughout the Tampere Demo actions, including c**ity officials, university representatives and researchers (planning the Digitwin workshop structure, ideating gamification and tactical urbanism activities in Laikunlava demo area), private companies (Digitwin workshop engagement), NGOs (planning tactical urbanism activities for youth), and residents (surveys, tactical urbanism actions)**.

Resident participation will be prioritized within the participatory urban processes, such as through the facilitation of a series of community Digitwin workshops. These workshops will allow residents to learn about social and digital innovation in urban planning, as well as to engage in an immersive and guided experience of the technology.

As **vulnerable social groups**, including youth, the elderly, cultural minority groups, and those living with disabilities, may participate in these urban Digitwin workshop practices, ethical safeguards have been developed in coordination with the WeGenerate Consortium's ethics advisor (see Annex XX), adhering to ethical principles, local Finnish and international laws, and the Grant Agreement. These safeguards will ensure that no harm or discrimination will be caused to vulnerable individuals engaging in social innovation and participatory processes with the city. If advantageous, we plan on co-operating with social and youth workers to ensure that their expertise is consulted and utilized when engaging vulnerable social groups to the Tampere Demo actions.

4. Co-created Visions

The Tampere demo team plans to facilitate **interactive workshops** to gain feedback on urban interventions through use of the digital twin from people who live in Tampere, or visit Tampere due to business or leisure, relatives, friends, cultural activities or sport events.

These workshops support the City of Tampere in developing its **digital tools** in collaboration with the residents to reinforce more inclusive co-creation and co-design processes in urban planning. One of these innovative digital tools is digital twins – a virtual world that provides data and feedback from the real world and its residents. The participants are informed that they don´t have to be digitally fluent and no previous knowledge about urban planning or

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digital twins is required, as professionals will guide participants through the Digital Twin experience.

In practical terms the aim is that different resident demographics will have a more equal opportunity to make their voices heard. Opportunities for participation and empowerment of silent and under-represented groups will be improved. The workshops will be held in Finnish language as well as in English language to facilitate inclusivity of the city's local and international community.

These workshops are a great opportunity for residents to see and experience the future of urban planning, share their valuable insights with the leading experts, and play a role in shaping the future of cities through a co-created vision. The first workshop in the series was held on 3rd September 2024, with the following workshops scheduled for 27th November and 3rd December 2024.

Fig. 7. Digitwin test 1: International and local resident survey group (3rd September 2024)

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User group	Schedule
Combined International and Finnish residents	3rd September 2024
Helsinki commuters to Tampere	27th November 2024
Combined International and Finnish residents	3rd December 2024
Urban planner professionals	TBC: March 2025
Women-only	TBC: April 2025

TABLE 3. DIGITAL TWIN TESTING SESSION BY TARGET GROUP

5. Pilot Transformation Activities

The expected actions are the following:

- Towards the metaverse – creation and utilization of digital twins
- Engagement of citizens in co-creation of a walkable and safe city center
- Use digital twins to simulate safety and CO2 emission levels related to people flows and to support the walkability
- Measure well-being and life satisfaction, domains of Environmental, Socio-economic and Safety-related well-being factors
- Economic incentives and campaigns for residents to increase walkability and reduce their carbon footprint based on simulation results from the digital twin.

By 2040, the vision is to create a highly integrated and sustainable urban environment where:

- Digital Twins will be central to urban planning, allowing for real-time simulations and data-driven decision-making. They will help in optimizing city layouts, improving safety, and reducing carbon emissions.
- Residents will play an active role in shaping their city, leading to more community-oriented and user-friendly urban spaces.
- The city will invest in walkability and low carbon footprints, supported by economic incentives and campaigns that encourage sustainable living.
- Continuous measurement and improvement of well-being factors will ensure a high quality of life for all residents, addressing environmental, socio-economic, and safety-related aspects.

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While the actions may seem disconnected at first glance, they are all part of a cohesive strategy to create a smart, sustainable, and livable city by 2040. Each action supports the others, creating a feedback loop that enhances urban living through technology, community involvement, and sustainability initiatives.

5.1. Action A1 – Towards the metaverse – creation and utilization of digital twins

DO: 1, 2, 3, 4 / S: 2,8 / EO: 1, 5, 7, 8 / TRL 1 to 8 / BEN: City of Tampere, urban planners, citizens
Demo area: Station Area Green Urban Space

A Digital Twin will be developed as a virtual testbed to stimulate co-benefits and economic outcomes of different regeneration options to inform the decision-making. The aim is to collect digital twin-compatible and measurable feedback data from residents' and visitors' sense of safety that enables visualizing how pleasant the city is for all. The Digital Twin can also be used to simulate people flows which helps city planners to design better and more functional urban spaces.

Digital Twins can help simulate how people with different abilities explore the city on foot, what attracts them to go shopping, eat out, visit attractions etc. and local businesses benefit. Digital Twin will be tested on how it can be used in technical performance tracking. This means collecting data from the urban environment (CO2, air quality, temperature etc.) and how it can help Tampere in reaching its goals to become climate neutral by 2030. Digital twins can help to rapidly prototype ideas digitally and test 'what if' scenarios. This would increase the resiliency of the city and Tampere would be better equipped for future challenges.

The content, visuality and accuracy, as well as the functionality of the Digital Twin's 3D environment, are determined in stages: Building a digital twin is focused on phases 1-2 and phase 3 for maintenance and improvements from the user experience. The ITC operating environment of Tampere will be used in the implementation.

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Phase 1 (Q2 / 2024) includes:

▪ Identification of use cases and selection of the main use cases of the first phase (city planners)

▪ Phase 1 of modelling, combining the city model and Station area data models into a unified 3D environment.

▪ Identifying IoT data sources and designing the visuals and content of the digital twin

▪ Testing, joint development and piloting of the use cases selected by city planners.

Phase 2 (Q3/2024) includes:

▪ Refinement of use cases (pedestrian profiles) and selection of implemented use cases

▪ Phase 2 of the modeling, the 3D environment of the digital twin is ready and the agreed data sources have been exported to it

▪ Testing, joint development and pedestrian piloting

Phase 3 (Q4/2024) includes:

▪ Completion of the model, delivery

▪ Development of interactivity, iteration of use cases

▪ Final reporting of the project

The purpose of the digital twin for the station area green urban space is two-fold. Firstly, the digital twin was created to support transport and urban planning. Secondly, the City of Tampere is testing whether citizen engagement in urban regeneration can be enhanced by utilizing digital twins and other digital tools. Therefore, Action A1 is divided into two sub-actions.

A1.1 Station Area Green Public Space Digital Twin to support transport and urban planning

- Digitwin user test workshops with city planners & developers to learn about the usability of the Digital Twin in city planning.

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Pedestrian experiences related to the city environment can be simulated and animated based on data and behavior models. The digital twin can help compare and understand why the design experience is different from the user experience.

Workshops will be organized during the fall of 2024. The aim is to collect information from urban planners about their needs and desires towards the Digital Twin.

A1.2 Station Area Green Public Space Digital Twin to engage residents in urban regeneration

- Workshops to learn about the acceptability/usefulness of the Digital Twin in co-creation with the city residents, and the acceptance of long-term future developments of the area.

The workshops with the residents are divided into four test-user groups:

Group 1: Continuous users

City residents who constantly reside in the area and use it around the clock.

Group 2: Daily users

Business owners and residents who use the area daily but do not primarily reside in the area 24/7.

Group 3: Weekly users

Students and commuters who use the area weekly but do not reside in the area.

Group 4: Visitors and citizen developers

City residents and out-of-town visitors who occasionally visit the area, as well as citizen developers who want to develop their own test solutions for the platform.

Further, a dedicated awareness to including disadvantaged or vulnerable groups in the workshops will be facilitated by ensuring that everyone is welcome and that a safe space is supported for residents of varying backgrounds including young people, people living with disabilities, LGBTQI+ individuals, seniors, and cultural and religious minority groups.

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5.2. Action A2 – Engagement of citizens in co-creation of a walkable and safe city center

DO: 2, 4, 5 / S: 2, 3, 8 / EO: 2, 4, 5, 6 / SRL 2 to 8 / BEN: City of Tampere, urban planners, citizens

Demo area: Laikunlava open-air stage area and Station Area Green Urban Space

A.1.1 Tactical Urbanism/ Art project(s)

The objective of Action 5.2 is to co-create a walking-friendly and safe urban environment by utilizing tactical urbanism as a method. Tactical urbanism refers to a set of low-cost, temporary changes to the built environment, intended to improve local neighborhoods and city gathering places. These interventions are often community-driven and aim to test and demonstrate the potential for longer-term changes. Tactical urbanism projects could utilize e.g. nature-based solutions (NbS) and art to regenerate public spaces. Using nature-based solutions will improve environmental quality and incorporating art will create engaging and vibrant public spaces. Key areas of activity will be playing around with green infrastructure, public art projects and community engagement.

Laikunlava open-air stage and its vicinity are actively used spots in Central Square, especially during summertime. The focus is to enhance the existing area with additional shade, lighting, and art to improve safety and usability of the area.

Implementation Steps:

1. Mapping of different target groups/communities:

In collaboration with the local project called Hengaamo we identified the youth as being major part of the local community in the area. During previous actions in the Laikunlava -area the young people using in the area felt that their voices were not heard when there were changes concerning the Laikunlava -structure and this is why it is important to include them to the upcoming actions in the area. Other communities identified were the people using the area for leisure and by-passing it, as there is a lack of residential buildings near and around the Keskustori and Laikunlava -areas. Hence, we also aim to include local service providers as one of the communities in the area.

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2. Engaging the Communities:

- Internal kick-off in the City of Tampere

3. Conducting a set of surveys for communities

- A set of surveys will be conducted during 2025-2027. The surveys are planned for different target groups that are using the area in different ways. These include e.g. young people/teenagers, by-passers, service providers.
- The surveys provide user-centric location-based information on walkability, safety and security and attractiveness of the area.

4. Design of the Interventions: A list of tactical urbanism activities will be developed based on the information gathered from the surveys.

5. Executing the plan with the help of pedestrians/community members/residents. Documenting the process and gathering feedback.

6. Evaluation and Iteration: Assessing the project's impact and doing adjustments as needed. Using the findings to advocate for permanent changes.

Outdoor Escape Room/Adventure

An outdoor escape room game targeted to the youth and children is planned to be launched during 2025 in the Keskustori area in collaboration with Hengaamo project. The target of the game is to focus on engaging youth in a variety of activities in the Laikunlava, increase the walkability in the area and provide a chance to gather user data/feedback of the area at the same time. These activities aim to decrease issues that have been present in the area, such as public disturbances and a perception that the area has a lack of identity -while increasing the walkability and enhancing the sense of community in the area.

5.3. Action A3 – Use digital twins to simulate safety and CO2 emission levels related to people flows and to support the walkability

DO: 2, 3, 4, 5 / S: 2,3,8 / EO: 5, 4, 6, 7 / TRL 2 to 9 / BEN: City of Tampere, citizens

Demo area: Laikunlava open-air stage area and Station Area Green Urban Space

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The Green Urban Space Digitwin of the Railway Station Area will be used to simulate the people flows in the new area to be built in the future. This data will be extrapolated from the City's IoT system, and predictive data analytics will be used to forecast the future pedestrian flows of the area. Through integrating the expected future people flow scenario into the Digitwin, residents and urban planners can be engaged in visualization and planning activities to prepare for the upcoming changes in the city.

Phases and Measures of the Project

The project focuses on defining the technical requirements of the digital twin in three phases.

Phase 1 of the project involves defining criteria and metrics that align urban planning, the prototype project, and digital twins. These criteria and metrics are crucial for developing the urban environment to meet the needs and preferences of pedestrians, and for defining the technical requirements for digital twins:

1. **Accessibility Criteria:** The urban environment should enable unimpeded mobility for pedestrians in all seasons. This includes sufficient and barrier-free sidewalks, entrances, and traffic arrangements. The digital twin's 3D city model helps evaluate planned routes from a pedestrian's perspective for people with all abilities. Citizen participation can occur through virtual reality or computer viewing programs.
2. **Physical Safety Criteria:** The environment should be safe for pedestrians with adequate lighting, safe crossing points, clear traffic signs, and reduced collision risks. The digital twin's 3D city model and IoT sensor data help visualize and evaluate physical security. Citizens can share their feelings about proposed safety measures using virtual reality or computer viewing programs.
3. **Walking Attractiveness Criteria:** The environment should be attractive, comfortable, and pleasant for pedestrians, with parks, benches, street furniture, and green areas. Citizen participation in evaluating attractiveness can occur through virtual reality or computer viewing programs.

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4. Reachability Criteria: The environment should be easily reachable for pedestrians with good sidewalks, barrier-free routes, and clear signs. The digital twin's 3D city model helps visualize and simulate technical reachability in terms of distance and time.

5. Proximity of Services Criteria: The environment should provide easy access to services like shops, restaurants, health centers, and schools, promoting walking over car use. The digital twin's 3D city model helps visualize and simulate technical accessibility in terms of distance and time.

6. Environmental Quality Criteria: The environment should be healthy and safe, with good air quality, low noise, and clean surroundings. The digital twin can visualize and animate measured environmental values over time.

Metrics: Metrics can include time spent walking, length and quality of walking routes, number of accidents and safety issues, and the share of walking compared to other modes of mobility. These metrics help assess pedestrian-friendliness and plan improvements.

Phase 2, the focus is on the technical implementation of the digital twins. The key steps include:

1. Data Flows Definition: Collaborating with the technical implementer of the digital twins to determine the necessary data flows (e.g., 3D city model, IoT (Internet of Things), sensors, IoA (Internet of Actions) sensors) required for the digital twin. This is crucial to ensure that the digital twin can provide the desired end-user experiences successfully.

2. Technical Obstacles Review: Identifying and reviewing any technical obstacles with the technical implementer. These obstacles are documented for further development, ensuring that they are addressed effectively.

3. Planning Data Collection: Working with the City of Tampere to plan how data from end-user experiences will be collected. This data will be compared to the criteria and metrics of pedestrian-oriented urban planning, providing valuable insights for future planning and development.

Overall, Phase 2 focuses on ensuring that the technical aspects of the digital twin implementation are well-defined and that any potential obstacles are addressed. It also

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emphasizes the importance of collecting data from end-user experiences to inform future urban planning decisions.

Phase 3: focuses on harmonizing the digital twin with the CityBIM to ensure compatibility and support future development.

Tasks

- Define Information Presentation for Urban Planners and Citizen Engagement:

The digital twin will function as both a planning tool and a public interface for the City of Tampere. In collaboration with the city, the project team will determine what information will be shared for citizen engagement and how the viewing experience will be facilitated and managed in the future. Furthermore, a user-friendly interface will be created to enable end-users to provide feedback on ongoing projects, allowing stakeholders to actively participate in the decision-making process.

- Digital twin handover from Sitowise to City of Tampere:

The digital twin will be handed over to the City of Tampere in early 2025 for operational management. The city will continue integrating the digital twin platform with sensor databases, IoT networks, and other smart city technologies. Serving as the technical foundation for future city planning and development, the digital twin will be driven by measured, verified, and validated data. It will also federate multiple databases, including BIM, IoT and traffic data, to create a comprehensive, data-driven planning tool.

- Identifying Update Needs in the Tampere CityBIM:

To enable the digital twin to support additional use cases and further development, the CityBIM may require an update, potentially adding a new layer to represent temporary or permanent sensors in the physical environment. This includes identifying optimal sensor installation locations and the necessary supporting infrastructure during the construction of the pilot district. The project team will recommend the types of sensors needed and where they should be installed throughout the district redevelopment. These sensors will help ensure that the City of Tampere continues to benefit from the digital twin during

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construction and that digital services for citizens can be developed and maintained throughout the area's transformation.

- Next-Generation Digital Twin Capabilities Evaluation:

The technical capabilities of the latest version of the digital twin will be assessed to inform future developments. Any foreseeable update and upgrade needs will be documented and prioritized based on the requirements of the regional development project's main stakeholders. This process will differentiate between "must-have" and "nice-to-have" features, ensuring that the digital twin evolves in line with the needs of the city.

- Additional Database Linkage Evaluation:

The City of Tampere will explore what additional databases could be linked to the digital twin's technical database to better support decision-making. These databases could include financial, social, environmental, or technical data, depending on the city's strategic goals and priorities.

- Continuous Citizen Engagement Evaluation:

The City of Tampere will define the type of information it wants to share through the digital twin and explore how the digital twin can be used to facilitate citizen participation during regional development and construction activities. This aims to ensure that valuable, relevant information is accessible to city planners, construction companies, and citizens, fostering collaboration and engagement throughout the development process.

In summary, Phase 3 ensures that the digital twin is built on accurate, up-to-date information and is aligned with the city's evolving development needs. It also emphasizes the importance of linking the digital twin with other relevant databases for a broader context and enhancing cit**izen** engagement in the planning and construction phases.

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5.4. Action A4 – Measure well-being and life satisfaction, domains of Environmental, Socio-economic and Safety-related well-being factors

DO: 3, 4, 5 / S: 3,8 / EO: 1, 3, 8 / SRL 1 to 8 / BEN: City of Tampere

Demo area: Laikunlava open-air stage area and Station Area Green Urban Space

Residents' satisfaction with walking conditions is surveyed every 2–3 years using a sample-based survey method through the Walking and Urban Life 2030 programme.

5.5. Action A5 - Economic incentives and campaigns for residents to increase walkability and reduce their carbon footprint based on simulation results from the digital twin

DO: 1, 3, 4, 5 / S: 3,5,8 / EO: 3, 6, 7, 8 / SRL 1 to 8 / BEN: Citizens, City of Tampere

Demo area: Laikunlava open-air stage area and Station Area Green Urban Space

The Culture District consists of a digital twin in the form of the Cultural Walk website (https://culturedistrict.tampere.fi/?lang=en/) where residents can check thematic walking routes and experience the attractions and accessibility of the area before physically embarking on the walk. This Digi-twin includes 3D representations of key city cultural areas, which enable residents to navigate through the digital space of the cultural sites in advance of visiting them physically. The benefits of these 3D renderings include enhancing accessibility by allowing residents to check sites first for wheelchair access, stairs, and maneuverability. Each thematic route centers around a unique theme to facilitate resident participation and enjoyment of the city:

- Park Route, showcasing nature trails
- Art Circle Route, with museums and art galleries
- City Block Route – with cafes and cultural attractions
- Industrial Route – showing Tampere's history and industrial landmarks
- Game Route – with video game art, stores, and museum exhibits.

- **A campaign is planned to be launched through the existing Tampere.fi app** to encourage residents toward using sustainable methods of mobility, i.e., walking and cycling to and within the city center. This campaign will be developed based on the insights derived from the Digitwin test group resident workshops which highlight the

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challenges, obstacles, and opportunities for supporting residents in inner-city walkability practices. The campaign will include some rewards/incentives to encourage the uptake of sustainability practices which result in a carbon footprint reduction.

- **Cultural walk demos**

  To enhance walkability and resident engagement with the city's urban spaces, the Tampere WeGenerate pilot has supported the creation of a themed Culture District within the inner city, designed in tandem with local cultural services, and businesses, and adapted from citizen feedback on how to improve the urban experience for residents and visitors. Piloting of the Culture District map together with the end users (residents and visitors) and collecting information and feedback from the user experience will be used to deepen the understanding of the functionalities of map and help to develop it further.

- **Creation of informational signage/QR codes**

  Creating informational signage/QR codes that explain the artistic/stakeholder spots that are part of the Culture District and marked on the map and perhaps offer also a possibility for extended reality experience.

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Fig. 8. The Cultural Walk District

- Participation in European Mobility Week 2025

EUROPEAN MOBILITY WEEK is the European Commission's flagship awareness-raising campaign on sustainable urban mobility. It promotes behavioural change in favour of active mobility, public transport, and other clean, intelligent transport solutions.

The main event takes place from 16-22 September each year, culminating in the popular Car-Free Day. Local authorities are encouraged to use the main week to try out innovative planning measures, promote new infrastructure and technologies, measure air quality, and get feedback from the public.

With more towns and cities joining every year, and with its huge media appeal, the campaign is widely recognised as a driving force towards sustainable urban mobility in Europe and beyond.

Towns and cities can register all the activities they plan to carry out to celebrate the campaign, including organising activities focused on sustainable mobility during the main event week, implementing one or more permanent transport measures throughout the year, and holding a 'Car-Free-Day'.

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The City of Tampere will join the campaign again in 2025, including in the event activities related to the WeGenerate project.

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5.6. Summary of the Pilot Transformation Activities

A standardized operational table summarizing the actions and activities concerned and what's done by who, how and when.

Transformation Action	Description of Tasks	Responsible Partners	Month (Start-End)	Innovation Hub Interaction[1]				Related KPIs
				2.1	2.2	2.3	2.4	
Action A1: Towards the metaverse – creation and utilization of digital twins	Task A1.1 Description	Partner Short Name						[KPI] KPI 3.2 Sociability KPI 3.3. Social engagement KPI 3.7 Cultural Sustainability [KPI]
	Digital twin test groups demo, I (internationals + Finnish residents), II (commuters to Tampere, III (internationals + Finnish residents), IV (companies).	TRE in collaboration with Bloom ry and SaferGlobe ry	09.2024 – 03.2025	X	X			
	Digital twin launch for the City's urban planners	TRE	02.03.2025	X				
Action A2: Engagement of citizens in co-creation of walkable and safe city center	Maptionnaire resident survey related to Laikunlava for data collection and area development.	TRE, VTT, NTNU	01.2025		X			KPI 3.3. Social engagement KPI 3.5 Safety and security
	I, II and III tactical urbanism activities in Laikunlava/Keskustori.	TRE, VTT, NTNU	Summer 2025 Summer 2026 Autumn/Winter 2026		X			KPI 3.3. Social engagement

[1] Innovation Hub Solution Clusters: 2.1 Integrated Planning and Digital Application, 2.2 Social Innovation and Participatory Action, 2.3 Energy in Built Environment, 2.4 Sustainable Mobility.

Transformation Action	Description of Tasks	Responsible Partners	Month (Start-End)	Innovation Hub Interaction[1]				Related KPIs
				2.1	2.2	2.3	2.4	
	Culture District walkability campaigns.	TRE, VTT	Summer 2025 Summer 2026				X	KPI 5.1. Transport Behaviour KPI 5.5. Renewal of Walking and Open Spaces
Action A3: Use digital twin to simulate safety and CO2 emission levels related to people flows and to support the walkability	• Define Information Presentation for Urban Planners and Citizen Engagement • Digital twin handover from Sitowise to City of Tampere • Identifying Update Needs in the Tampere CityBIM • Next-Generation Digital Twin Capabilities Evaluation • Additional Database Linkage Evaluation • Continuous Citizen Engagement Evaluation	TRE, RM3	August 2024-12/2025	X	X			KPI 2.1. GHG Emissions performance KPI 3.3. Social engagement KPI 3.5. Safety and security
Action A4: Measure well-being and life satisfaction, domains of Environmental, Socio-economic and Safety related factors of well-being	Residents' satisfaction with walking conditions is surveyed every 2–3 year	TRE, VTT						KPI 2.1. GHG Emissions performance KPI 2.2. Air pollution KPI 3.2. Sociability

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Transformation Action	Description of Tasks	Responsible Partners	Month (Start-End)	Innovation Hub Interaction[1]				Related KPIs
				2.1	2.2	2.3	2.4	
Action A5: Economic incentives and campaigns for residents to increase walkability and reduce their own carbon footprint based on simulation results from the digital twin	• A campaign launched through Tampere.fi app • Creating informational signage or QR codes that explain the artistic/stakeholder spots that are part of the Culture District and marked on the map. • Piloting the Culture District map together with the users and collecting information and feedback from them. • Participation in European Mobility Week 2025	TRE, VTT		X	X		X	KPI 3.3. Social engagement KPI 4.1. Access to services and amenities KPI 4.4. Investments triggered KPI 5.1. Transport Behaviour KPI 5.5. Renewal of Walking and Open Spaces

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IMPLEMENTATION ROADMAP

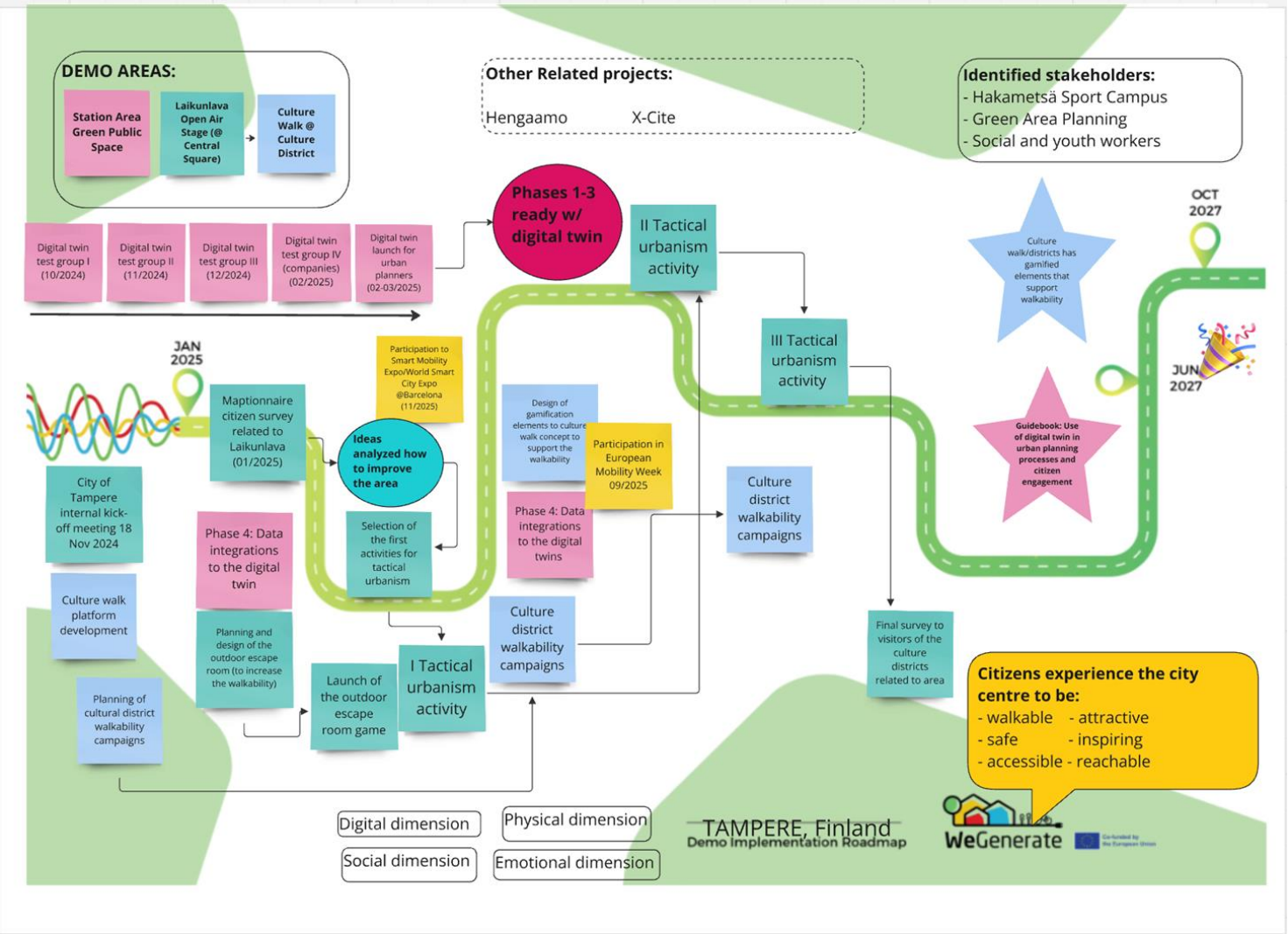

Fig. 8.

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CONCLUSIONS

In conclusion, the actions outlined in this Action Plan represent a comprehensive and forward-thinking approach to transforming Tampere into a more walkable, safe, and sustainable city. By leveraging digital technologies like Digital Twins and integrating community-driven strategies such as tactical urbanism and citizen workshops, Tampere will advance its strategies in addressing growing urban challenges. The use of the Digitwin will provide an invaluable opportunity for residents to visualise the upcoming future of the city and enable city planners and residents alike to engage in informed decision-making and co-creation. The Action Plan also emphasises inclusivity, ensuring that vulnerable and diverse groups are actively involved in shaping their urban environment.

The engagement of citizens through workshops and the use of innovative tools will not only improve the city's infrastructure but also foster a sense of ownership and community. These efforts will contribute to enhancing the city’s resilience, safety, and attractiveness, ultimately encouraging more people to walk, cycle, and embrace a low-carbon lifestyle through their direct involvement in the decision-making processes.

The early workshops found that using the Digitwin as a community engagement tool was an effective action: even this early stage Digitwin was successful in depicting the Station Area Green Public Space in a detailed enough manner that the participants were able to visualise the upcoming future changes of the area.

Participants reported finding value and feeling empowered in having the chance to participate in the City’s planning process early on. Participants expressed that using the Digitwin oriented their thoughts to the future, what could be and what the future could look like - without any limitations. Resident feedback showed that the possibility to participate in co-design and co-governance activities with the city was highly valued and participants felt closer to the decision-making processes of the city.

Further, the integration of art, nature-based solutions, and cultural initiatives, such as through the Culture District and Laikunlava outdoor escape rooms, will make the City's public urban spaces more vibrant, engaging, and functional.

As Tampere moves towards its goal of becoming climate neutral by 2030, these actions will pave the way for a more sustainable, connected, and human-centric city, ensuring participatory processes and interactive opportunities for all residents.

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PARTNER LOGOS

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