VISUALISING OUR FUTURE PUBLIC REALM

Discovery - art and mobility design

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1. INTRODUCTION

This discovery research explores how digital tools can support community-scale urban design and retrofit projects that promote sustainable and inclusive transitions in our public realm.

We consider the range of direct and indirect citizens and stakeholders that architects, urban designers and transport planners serve, as well as their high-level needs and challenges.

We review best practice design patterns and approaches that contribute to neighbourhood scale green transitions, including sustainable streetscapes, low traffic neighbourhoods and urban systems, with a focus on the mobility and service design elements, which together with building and urban design, are critical to creating sustainable, equitable and vibrant communities.

We also investigate the digital tools that are being used by planners and other urban practitioners to support the development and visualisation of our future public realm.

Finally, we suggest a framework for a future digitally enabled participatory design ‘game’ that helps architects and communities to imagine their future within the constraints of just and green transitions.

2. WHO ARE WE SERVING?

“Only the experience of sharing a common human world with others who look at it from different perspectives, can enable us to see reality in the round and to develop a shared common sense.”

Arendt (2013)

CITIZENS & STAKEHOLDERS

Architects, urban planners and transport designers serve a wide range of direct and indirect clients, citizens and stakeholders. Landowners, local authorities, government agencies and developers are among the primary direct clients, while young people, families, future generations and non-human members of the natural world are among the indirect stakeholders that we need to support. Each group has unique needs and challenges that must be considered to achieve sustainable and inclusive design in the built environment.

Designing for a post-carbon future requires us to consider the needs and perspectives of all members of the community. By involving diverse groups in the design process, we can tap into their expertise, insights and experiences and generate a rich source for creativity and innovation. (Sanders & Dandavate, 1999)

We can also draw on Ivan Illich’s “tools for conviviality” (1973), emphasising systems and structures that support human flourishing and social interaction and use these to help communities take a more holistic view of the human condition and design neighbourhoods that address all of the issues that make their communities more liveable, vibrant and sustainable.

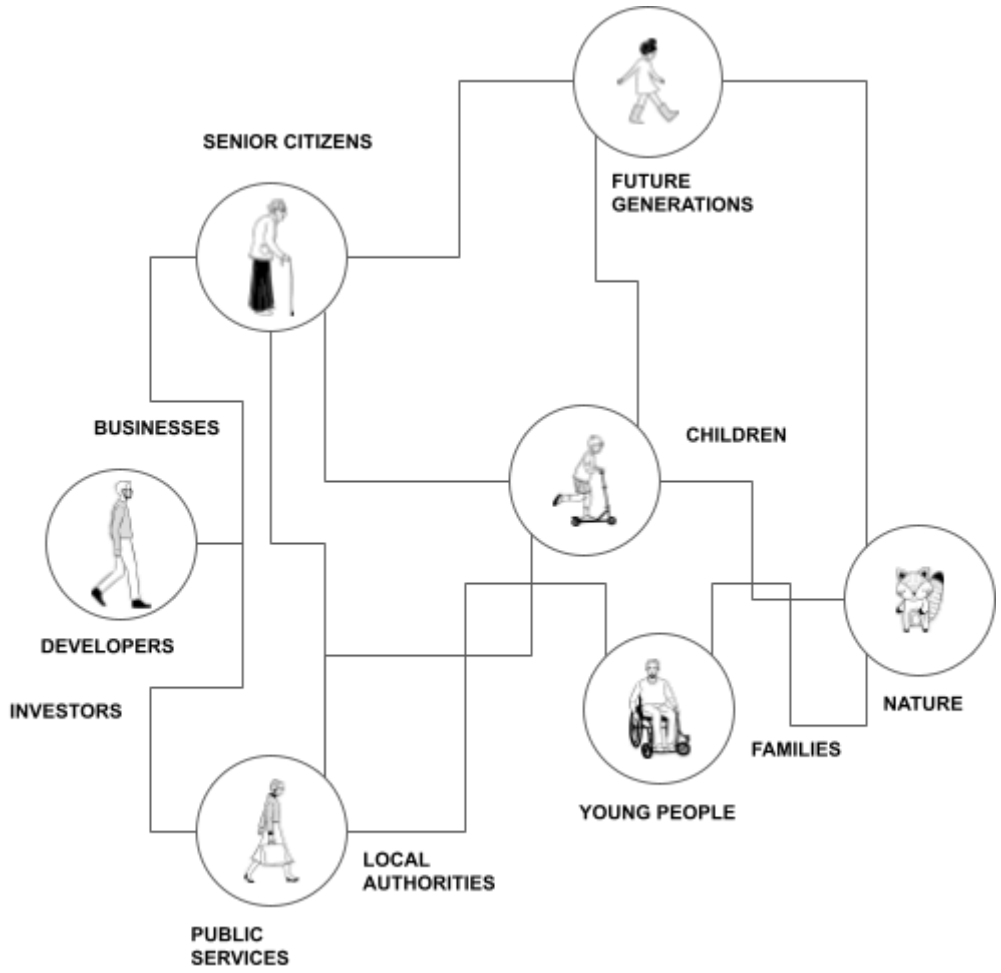


Fig 1: Stakeholder diagram illustrating the range of direct and indirect clients, citizens and stakeholders in urban design

3. WHAT ARE THEIR NEEDS AND CHALLENGES?

“The re-establishment of an ecological balance depends on the ability of society to counteract the progressive materialisation of values.”

Illich (1971)

NEEDS AND CHALLENGES

The green transition represents a path toward a society that prioritises improved human well-being, reduced inequalities and environmental sustainability. In Europe, this transition is being pursued through the European Green Deal, which aims to achieve no net emissions of greenhouse gases by 2050, economic growth decoupled from resource use and no person or place left behind. (European Commission, 2019)

The cultural and design industries connect to the green deal through the New European Bauhaus which aims to create beautiful places, practices and experiences that are:

- Enriching, inspired by art and culture, responding to needs beyond functionality.
- Sustainable, in harmony with nature, the environment and our planet.
- Inclusive, encouraging a dialogue across cultures, disciplines, genders and ages.

The architectural and urban planning profession has a unique opportunity to integrate culture into community, reconfigure communities to bring nature and sustainable innovation into the built environment and create inclusive neighbourhoods that centre equity in the design of our public realm.

One approach to achieving these goals is through ‘deep retrofit’ - large-scale transformations of buildings and neighbourhoods that include energy systems and fabric upgrades. The rapid transition alliance suggests that a neighbourhood-by-neighbourhood approach can help split the significant upfront cost of renovation and maximise impact, making retrofitting and renovation a collective infrastructure project that have synergies with projects focused on energy and transport.

The inclusion of energy and mobility into the discussion of neighbourhood green transitions acknowledges the relationship between place-making and transport as well as the combined impact of building and mobility on our lives, on energy systems and on the environment.

In addition to buildings, sustainable urban mobility plans are crucial for achieving green transitions, satisfying the mobility needs of people and businesses in cities while also delivering a better quality of life. These plans take into account integration, participation and evaluation principles, operating at a city and regional level but filtering through to local neighbourhoods via policy and regulations as well as through city-wide mobility services and infrastructure.

Finally it’s important to acknowledge that our local economies sit within our social and cultural structures and that these are embedded in wider ecological and natural systems.

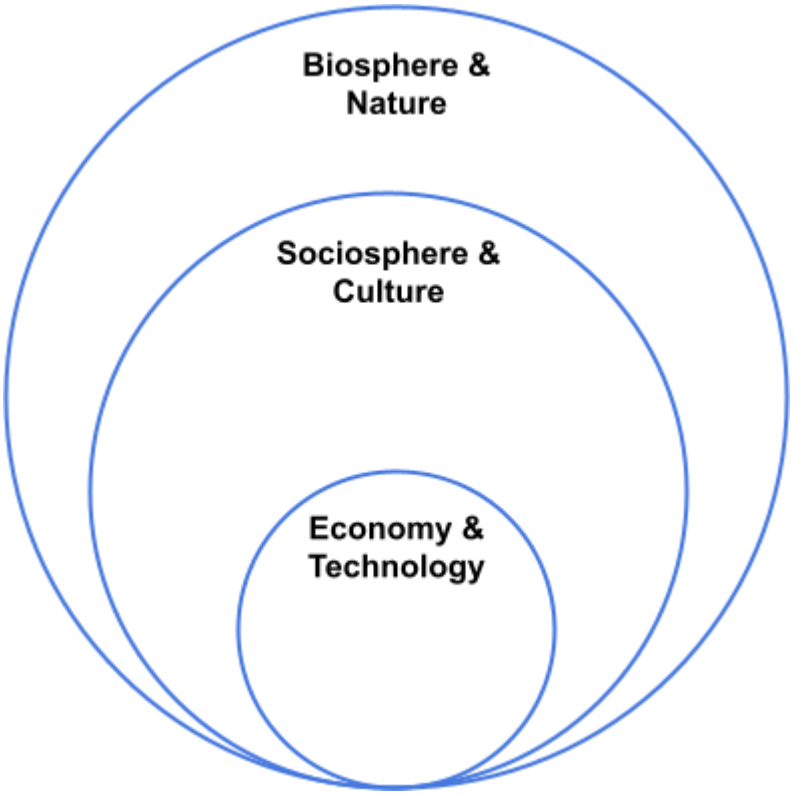


Fig 2: Nested dependency model of society and economy within nature

GLOBAL SUSTAINABILITY GOALS

While citizens have varying short and long term goals, many designers and planning professionals have attempted to organise design processes around global sustainability goals.

A variety of organisations have created frameworks to support these goals, from local building and transport regulations and standards to sustainably led guidance such as BREEAM, LEED, WELL and One Planet Living.

Fig 3: Examples of sustainability frameworks and goals related to global sustainability efforts.

CITIES HAVE OVERLAPPING AMBITIONS, CHALLENGES AND CONCERNS

Fig 4: Future Agenda Limited, 2017. Future of cities report 2017 illustrating the overlapping ambitions, challenges and concerns of cities.

LOCAL AUTHORITY PLANS

Local authorities, in the UK, develop ‘local plans’ as a tool to manage development across their communities.

These cover a range of interrelated issues, set out by the national government, through a national planning policy framework.

In the UK there is an assumption that all development that meets a local plan is ‘sustainable’ (a presumption in favour of sustainable development) meaning that it complies with social, economic and environmental objectives.

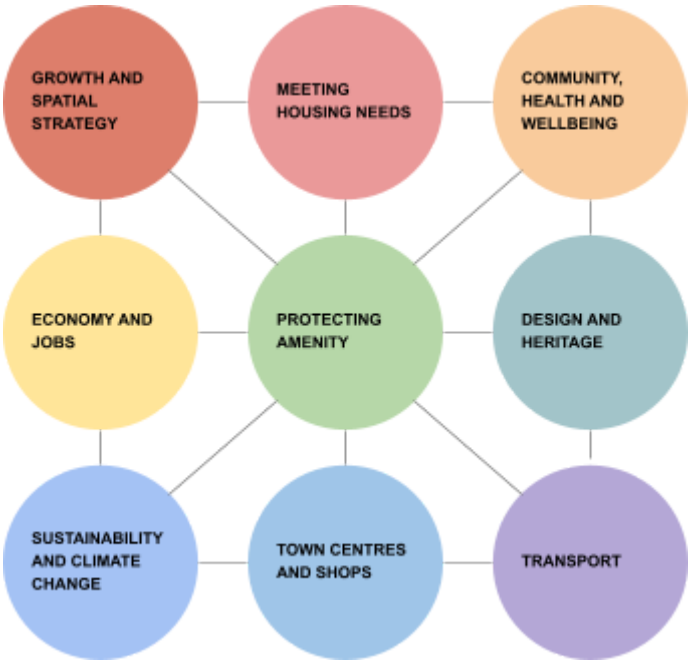


Fig 5: UK local plan guidance outlining various objectives related to sustainable development and local planning.

REGIONAL SUSTAINABILITY ASSESSMENTS

Despite the assumption of sustainable development, many developmental economists believe that our communities are not meeting long term sustainability goals.

Researchers have compared local and regional areas with UN SDGs and found shortfalls across a range of factors.

A complementary regional model, developed by OECD researchers, assesses the 'livability' of different regions across eleven topics important for well-being - from health and safety to the quality of housing and life satisfaction.

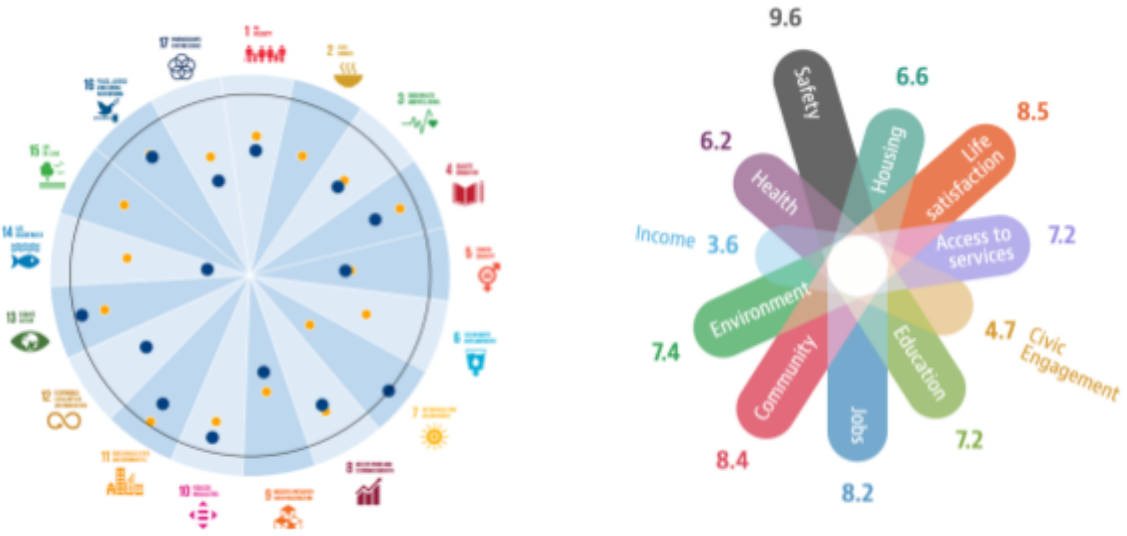


Fig 6: Regional sustainability assessment models evaluating livability metrics for the West Midlands, UK. OECD

NEIGHBOURHOOD SUSTAINABILITY REVIEW

Building on these wider sustainable development goals, the Doughnut Economic Action Lab (DEAL) has developed a framework for inclusive and sustainable development that uses social foundations and an environmental ceiling as a 'safe and just space for humanity'. (Fanning et al. (2022))

A UK community action group, Civic Square, carried out a local analysis of its 'sustainability' using DEAL's framework for social and planetary boundaries.

Their analysis suggested, "with a fairly high degree of confidence that we are not meeting the needs of our own place, our collective responsibilities to each other or working within

ecological boundaries.” and highlighted the need to, “oppose a lot and, more importantly, propose and demonstrate a lot more..”

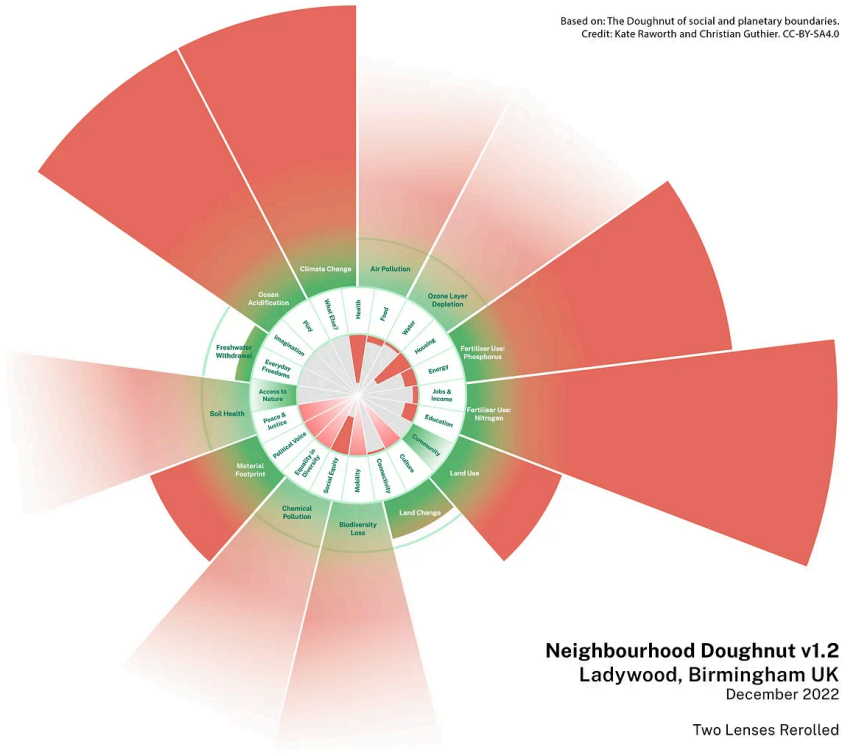


Fig 7: Doughnut assessment for Ladywood Neighbourhood, Birmingham, 2022 highlighting local sustainability metrics. © Civic Square

DEVELOPER GOALS

While many developers are primarily concerned with financial objectives and return on investment, public land owners often have wider and deeper remits.

A case study example is the approach of Transport for London’s sustainable development framework which highlights nine dimensions for place-based planning:

- Vibrant Places
- Social Cohesion
- Liveable Communities
- Health and Wellbeing
- Climate and Ecological Resilience
- High Performance Buildings
- Financial Sustainability
- Local Prosperity
- Neighbourhood Investment

This framework also highlights how these principles might be embedded in the planning process. (TFL (2021))

Fig 8: TFL (Transport for London) developer goals emphasising multiple dimensions for place-based planning.

HEALTHY STREETS

Beyond the building footprint, TFL have adopted the healthy streets framework to prioritise walking, cycling and public transport and to create a healthy city. (Saunders, L. (2017))

These factors combine clear quantitative measures with qualities that make active travel and active streets both desirable and sustainable.

“The benefits are not limited to good health and wellbeing. The things that make a street work well for people are the same things that make a street work well for local and international businesses, and that create a resilient and sustainable environment.”

Fig 9: TFL Healthy street model, © Lucy Saunders, healthystreets.com

MOBILITY AND THE SDGS

The Sustainable Mobility for All Partnership has placed mobility design within a number of sustainable development goals and reference inclusion, efficiency, green mobility and safety as key drivers for innovation.

While many of the underlying measures speak to the automotive industry, they also apply to the planning, design and operation of our cities and neighbourhoods.

Fig 10: Sustainable Mobility for All Partnership SDG goals linking mobility design to sustainable development goals.

HUMAN CENTRED DESIGN

While sustainable development goals, local plans, doughnut economics and public planning frameworks and principles set out ambitions for spatial development, they do not fully address the radical changes that will be needed to meet the speed and scale of the green transition when viewed from the perspective of the young, the excluded, future generations or non-human members of our communities. (Van der Heijden (2023) on scaling for urban climate action and governance)

To engage with these communities we also need to look at ways to frame our communal lives.

Various researchers have reflected on these needs and developed alternative models to support child and age-friendly communities, as well as engaging with concerns for the natural world and future generations.

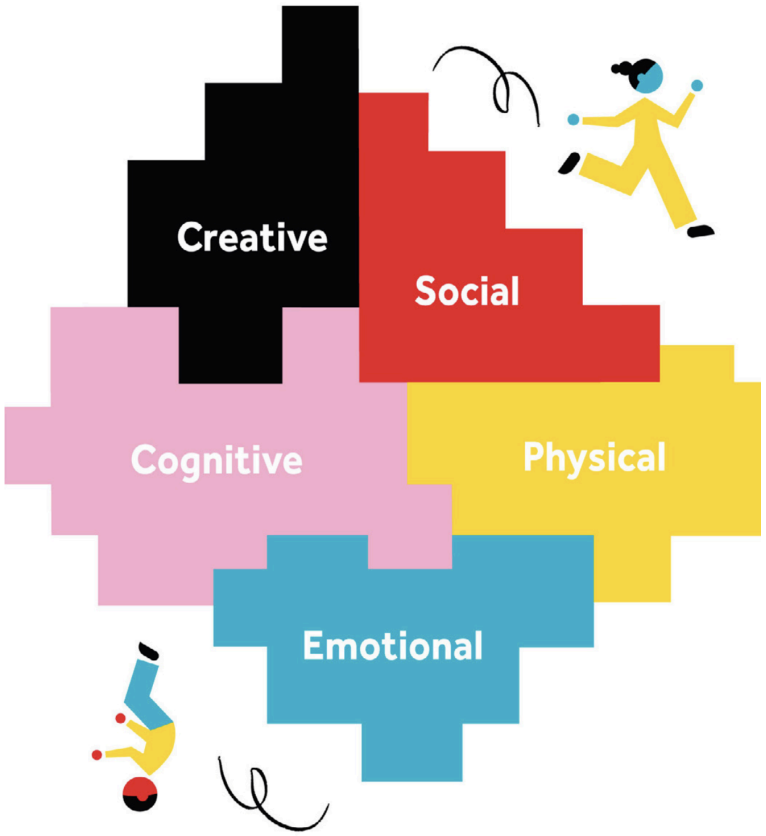
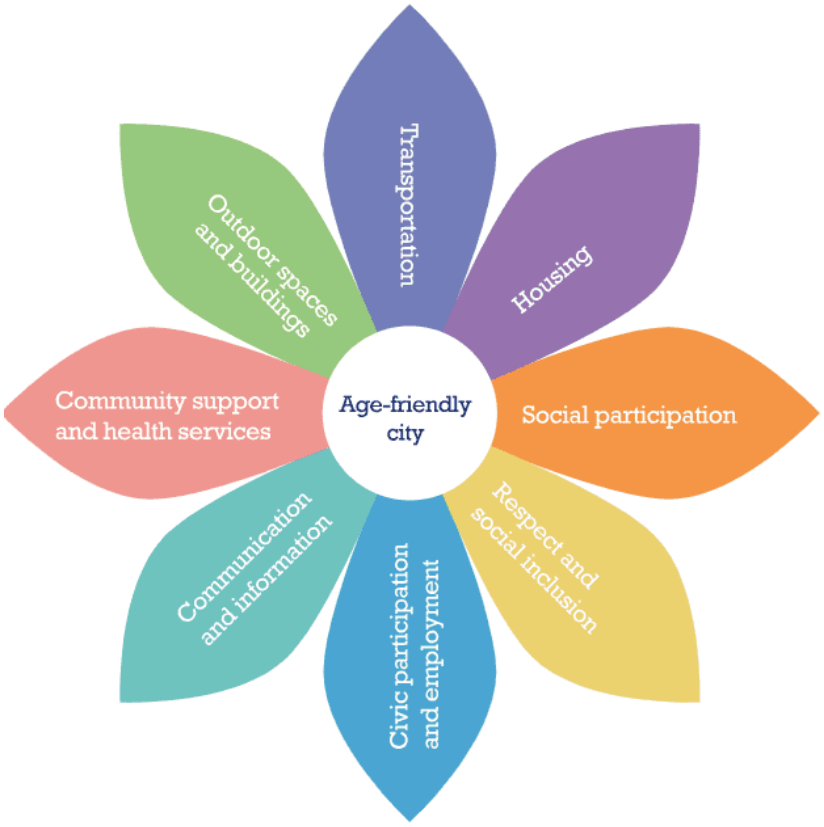


Fig 11: Child friendly cities, Brown, Caroline, et al. "child-friendly cities." Cities & Health 3.1-2 (2019): 1-7.

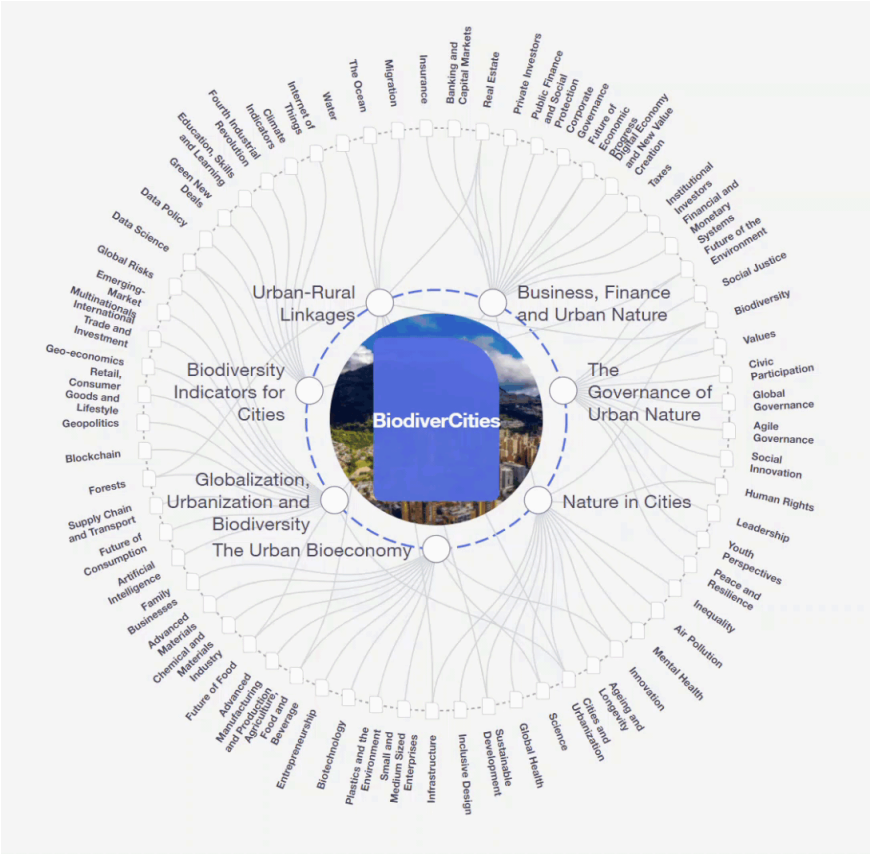
The urban play framework asks designers to consider children's needs through 'play' - considering space, time and support at different scales - from the home to the city

Fig 12: Yoshizawa, A. and Katz, B., 2020. The urban play framework:



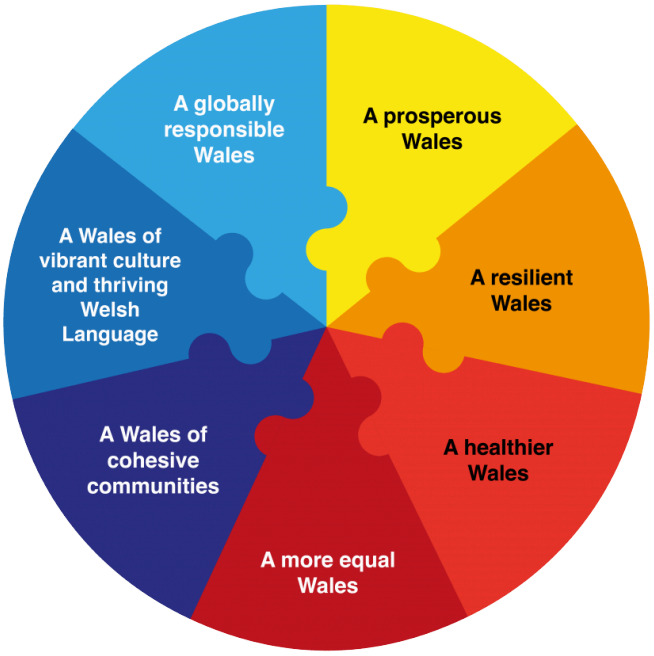
The age-friendly city framework includes 8 domains that places should address to improve their structures and services to meet older people's needs and all of us as we age.

Fig 13: Age Friendly Sheffield, 2024. WHO Age-friendly Cities and Communities



BiodiverCities asks that cities put nature at their core, and that they hold themselves accountable for their collective impact on planetary health

Fig 14: World Economic Forum, 2022. BiodiverCities by 2030:



Wales is the first country to legislate in the interests of future generations. The act asks all public servants to consider future needs through wellbeing goals, duties and principles

Fig 15: Welsh Government, 2022. Wellbeing of Wales: National indicators

CRITICISM OF FRAMEWORKS AND MODELS

As Reinier de Graaf points out in ‘Architect, verb’ (2024), “‘Excellence', 'Sustainability', 'Well-being', 'Liveability', 'Placemaking', 'Creativity', 'Beauty' and 'Innovation'” are terms that architects often use to describe the goals of design.

But despite their common use, there remains a gulf between the language of architecture and the lived experience and the social, economic and environmental outcomes that these models aspire to achieve.

These ambitions for sustainable and liveable places fail because stakeholders struggle to collaborate; there are limited financial and human resources for change; a lack of support from developers or local businesses; resistance to change at a political or community level; high levels of inequality and exclusion within a community and a lack of skills in facilitating transformation.

But they also fail because architects and designers are part of a system of design where people, institutions and capital have different goals and aspirations. (Angheloiu & Tennant (2020) on systemic urban interventions using Meadows' leverage points)

We see these play out across our cities as developers and citizens create demand for luxury housing, gated communities, privatised spaces and services, private transportation and culturally exclusive neighbourhoods that focus on wealth rather than community cohesion.

So, despite the many overlaps between ‘development goals’, ‘liveable cities’ and the ‘needs of future generations’, our cities and neighbourhoods remain highly contested places that often lack the necessary balance or focus on environmental, social and economic goals, especially those that help to deliver significant transitions at scale.

One reason for this is that our modern world has been built on the separate foundations of multiple specialists, but the challenges we face are deeply interconnected. (Griggs et al. (2017))

This suggests that the development and liveability goals that form the basis for the planning and design of post-carbon communities need to integrate learning and action across different technical and creative disciplines and the role of the architect, planner and designer may be to curate and support the imaginative development and creative delivery of ‘neighbourhood missions’ that can be co-designed across community, organisational and political silos.

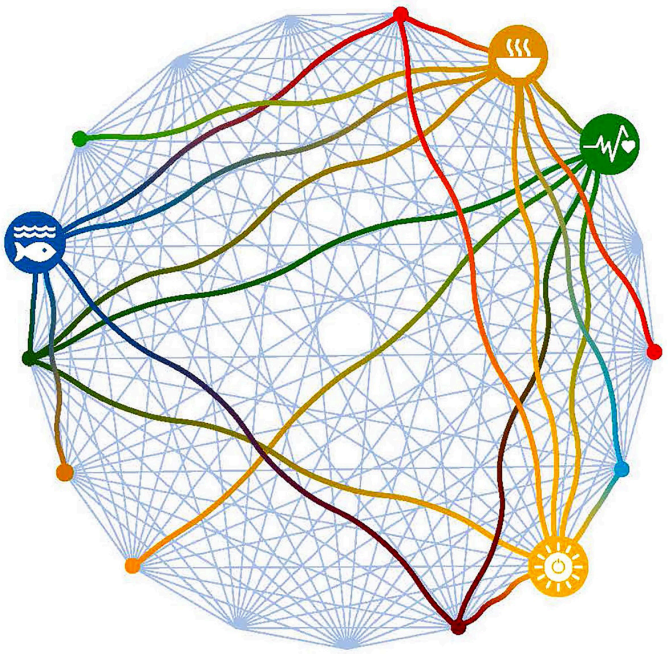


Fig 16: International Science Council, 2017. A guide to SDG interactions: from science to implementation

This curation and facilitation of change can be visualised as a journey that links citizens with sustainable development goals through a series of overlapping neighbourhood missions that can address issues of place, service and mobility as well as the social, economic and environmental challenges that communities face.

How this is mediated through best practice knowledge and processes as well as through the use of digital tools will be examined in the next sections.

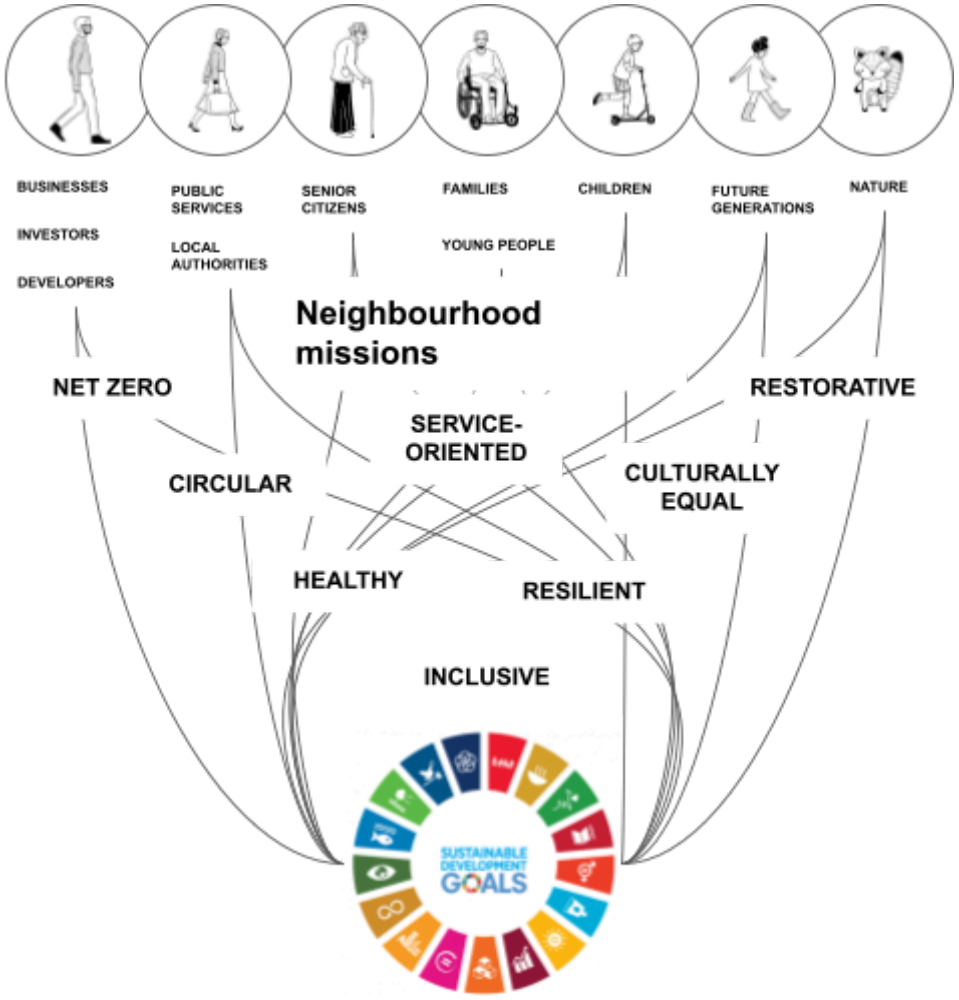


Fig 17: Relationship between stakeholders, missions and sustainable development goals

4. BEST PRACTICE URBAN AND MOBILITY DESIGN RESPONSES

It could be that the neighbourhood, not the individual, is the essential unit of social change. If you're trying to improve lives, maybe you have to think about changing many elements of a single neighbourhood, in a systematic way, at a steady pace.

David Brooks (2018)

This research asks us to:

- understand the relationship between mobility, service and sustainable development goals where the 'environment and the 'movement of information, matter and people' are key features.
- consider the benefits of 'evolutionary design' in 'creating value in urban environments' and to consider the 'spatial resources of mobility systems' and how they 'can be optimised in relation to the green transition'.

To answer these questions we review a number of best practice 'design patterns' and approaches that contribute to neighbourhood scale green transitions from sustainable streetscapes and blocks to low traffic neighbourhoods and urban systems.

We also consider examples of future practice that could be integrated into future architectural and planning tools.

The UN new urban agenda has a vision of "cities for all' highlighting 'equal use and enjoyment', promoting, "inclusivity and ensuring that all inhabitants, of present and future generations, without discrimination of any kind, are able to inhabit and produce just, safe, healthy, accessible, affordable, resilient and sustainable cities and human settlements to foster prosperity and quality of life for all."

Whether our cities truly embed these aspirations or not, we can highlight sources for, and examples of, best practices that show that a sustainable future is here but it is far from evenly distributed.

WHAT IS A NEIGHBOURHOOD?

A neighbourhood is "a social and geographic concept that plays an increasingly important role in research and practice that addresses disparities in health and well-being of populations".

But the neighbourhood is also based on, "a social framework, which appears wherever human beings live together, because neighbours are simply people who live near one another and neighbourhoods ... exist wherever human beings congregate, in permanent family dwellings''

Recent research in Europe asked citizens to describe their neighbourhood and, "on average, the size of a self-defined neighbourhood was 2 km2 but this differed significantly across

neighbourhood types and European regions. - from 0.9 km2 in France to 3.3 km2 in Hungary”

Fig 18: Vauban, in Freiburg, is considered to be one of the most sustainable neighbourhoods in Europe

URBAN PLANNING BEST PRACTICE

Cities around Europe are responding to sustainable development challenges through a range of urban planning and mobility design responses. These are happening at a variety of scales and support social inclusion, adoption of new economic models and adaptations to mitigate and respond to climate and ecological change:

- Compact and mixed-use development aims to reduce sprawl and encourage vibrant neighbourhoods, walkability and active travel, epitomised in ‘15 minute cities’ and ‘low traffic neighbourhoods’
- ‘Positive energy districts’ that reduce energy consumption, limit carbon emissions and integrate with industrial, mobility and building needs.

- ‘Circular urban economies’ that focus on material demand reduction and aim to bring micro-manufacturing, urban agriculture and sharing services into neighbourhoods.
- Social inclusion and affordability concerns that aim to deal with housing and accessibility challenges of marginalised and excluded communities.
- Participatory planning and placemaking that involve communities in design and decision-making processes, often through online tools and living labs.
- Smart city solutions that use technology to optimise urban services including mobility through modelling, sensors and digital platforms.
- A focus on health and wellbeing that promotes physical and mental well-being including active travel, a greener public realm and healthier living choices.

Fig 19: Barcelona is one of a number of European cities adapting it’s roads and neighbourhoods to deliver 15 minute communities - Robert Poorten - stock.adobe.com

Fig 20: Uppsala in Sweden - a positive energy district that aims to be Climate-Neutral by 2030 and Climate-Positive by 2050 - Photo by Shubhesh Aggarwal on Unsplash

MOBILITY DESIGN BEST PRACTICE

Urban mobility and transport design interventions include infrastructure changes, improvements to public transport and micromobility as well as the adoption of electric and shared private vehicle use.

Mobility infrastructure includes the development of low traffic neighbourhoods and car-free zones; dedicated cycling and micro-mobility lanes as well as separated bus and tram routes; increasing the intensity of green infrastructure to support wildlife and adapt to climate challenges; together with work to future-proof infrastructure for emerging technology including connectivity, automation, mobility as a service and electrification.

Innovative cities are also adapting and expanding their public transport fleet including electrification, low or no fare incentives, multi-modal interchanges and an increased focus on inclusion and accessibility. In less densely populated areas, and to support inclusion, they are investing in demand responsive alternatives and working with private companies to develop ‘smart’ digitally enabled service innovations.

Micro-mobility is also being transformed through innovations in product and service platforms, including electric bikes, micro-logistics, sharing platforms, integration with public transport and improvements in safety, security, comfort and convenience.

But, despite the fact that 70% of journeys are under 8km, 88% of passenger kilometres travelled were made by cars, vans and taxis (in the UK). Cars remain an incredibly valued part of modern life and, unless safe, comfortable and affordable alternatives are available, they will continue to impact the design of our urban fabric.

WAYS TO REDUCE CAR USE IN CITIES

Research shows that the most effective ways to reduce car use, and the consequent pollution and congestion, in our cities include regulatory sticks as well as environmental carrots. (Kuss and Nicholas (2022) on effective interventions to reduce car use in European cities)

The most effective reduction comes from charging vehicles to enter the city, controlling the availability and cost of parking and providing areas that have limited traffic.

These can be supplemented by subsidised public transport and improved cycling infrastructure as well as more bespoke approaches to mobility planning for large employers.

Fig 21: Tuinstraten is a pilot project that aims to bring green into built-up areas in the city of Antwerp - Arty Om - stock.adobe.com

Fig 22: Luxembourg has free public transport, adding 41 million euros to the annual transportation costs, but not yet reducing car dependency - Markus Mainka - stock.adobe.com

Fig 23: Gothenburg's Stadsleveransen system uses shared micro mobility vehicles and infrastructures to pool deliveries for 500 shops and businesses - Trygve - stock.adobe.com

FUTURE DESIGN PRACTICE

While these best practice examples and processes show what is happening in leading edge cities, they don't account for ongoing social and technological developments.

In transport design, researchers are investigating the potential impacts of connectivity, automation, sharing and electrification on our mobility systems as well as more radical responses to issues of ecological crisis and social inequity.

The following examples illustrate a few potential impacts on urban planning including:

- The effect of automation on street design
- A focus on the street as a ‘one minute neighbourhood’
- The design of ‘parking environments’ as ‘ecological infrastructure’
- The development of intentional neighbourhood centres

Autonomous vehicle researchers optimistically hope that automation will lead to significant reductions in vehicle ownership, increased vehicle sharing, better public transport, more efficient logistics and a reinvention of the street as a ‘fluid’ environment where automated vehicles give priority to pedestrians, cyclists and other activities.

Architects and planners are reimagining these fluid streets at different scales, tailoring streets for different modes, separating streets based on speed, incorporating flexible and shared space, and providing more space for the public realm, public transport, cyclists and walkers.

Dan Hill and colleagues at Vinnova believe that we should focus on designing the street as the ‘one minute unit’ of the city and that this focus will lead to better access, cohesion, environmental and health benefits as well as economic efficiencies.

Studio Nab reimagined parking as an ‘ecological resource’ showing how a centralised approach to neighbourhood parking could inform its gradual transformation into allotments, energy production, water management and storage.

Civic Square and Architect 00 propose the development of intentional neighbourhood centres, collectively owned and built 21st century civic and social infrastructure, that can be used as a social lab, focused on exploring, experimenting, testing and building resilient, regenerative neighbourhoods.

PARTICIPATORY DESIGN BEST PRACTICE

Participatory design enables communities to come together to support the development of transformative projects. They can help communities to set agendas for design, develop local policies and practices, inform decision making and support project delivery. (Ianniello et al., 2019)

Examples that may help to inform future digital platforms include:

- Design Charrettes
- Living Labs
- Citizen’s assemblies
- Participatory Budgeting

These approaches can be understood through theories of collaboration and engagement as described by Arnstein's ladder of citizen participation.

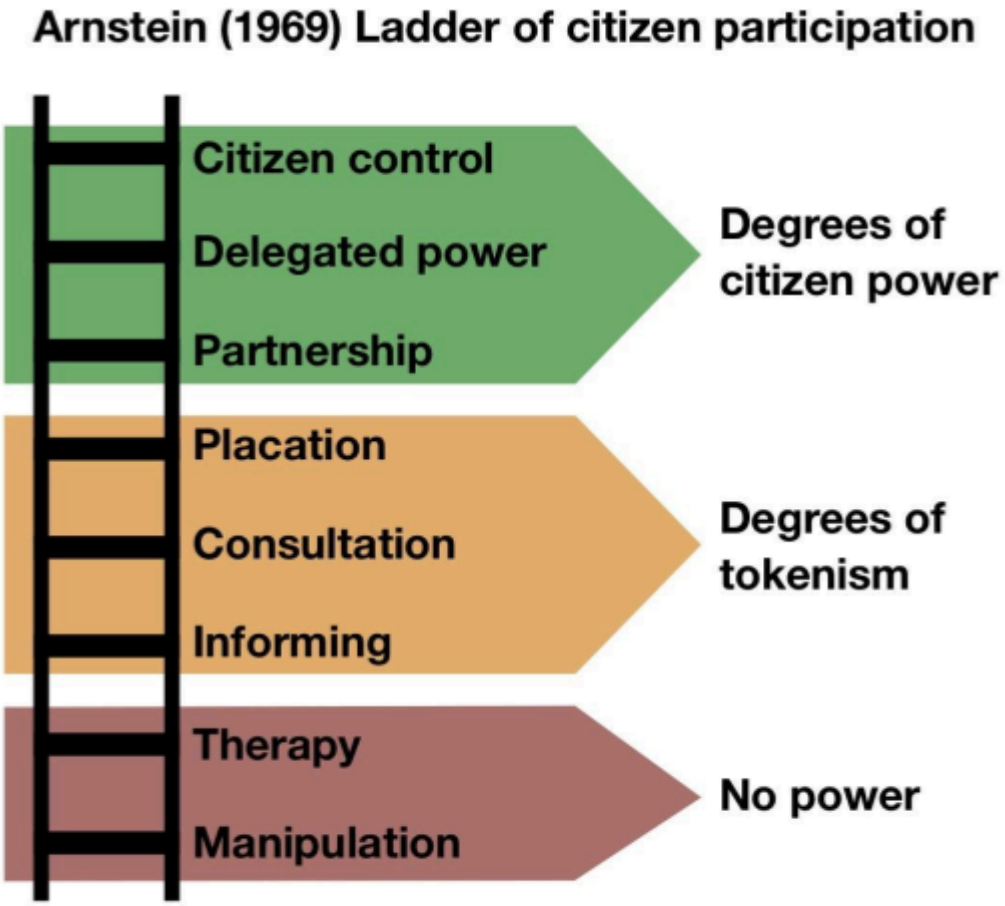


Fig 24: Ladder of Citizen Participation," Sherry Arnstein, Journal of the APA

DESIGN CHARRETTES

Design charrettes are intensive, collaborative design workshops that bring together designers, planners and community members to generate ideas and design solutions. They may take place over a number of sessions and include site visits, brainstorming activities and design crits.

They offer methods to engage diverse communities and generate positive input and genuine ownership.

But these collaborative methods often fail because they are not well planned, do not support real diversity and do not provide adequate time to examine multiple perspectives or incorporate ideas in a systematic way.

LIVING LABS

Living labs are platforms to support the design, testing, demonstration and piloting of new approaches to urban life.

They help cities to address complex urban challenges and test socio-technical innovation in the real world.

They are being used by cities to address a range of challenges from urban mobility to climate risks. Designing neighbourhood centres as living labs can help communities come together around neighbourhood missions and co-design roadmaps for change as well as address resourcing issues around inclusion, collaboration and sharing. (Sjöman & Hesselgren, 2022)

CITIZEN'S ASSEMBLIES

Citizen's assemblies are a form of participatory democracy that bring an intentionally diverse and representative community together to deliberate on specific issues.

While many communities have used them to debate wicked issues like climate change and discrimination, they have also been used to inform local decisions around air pollution, mobility planning and poverty alleviation.

Brussels has now set up the world's first permanent climate assembly to provide ongoing support and to co-determine local climate policy. (Niessen and Reuchamps (2019))

PARTICIPATORY BUDGETING

Participatory budgeting has been implemented in a small but growing number of cities around the world in order to increase transparency, accountability and participation in local governance.

Paris, which has the largest participatory budget in the world, has used this approach to manage 5% of the city's annual budget. (Doustaly (2019))

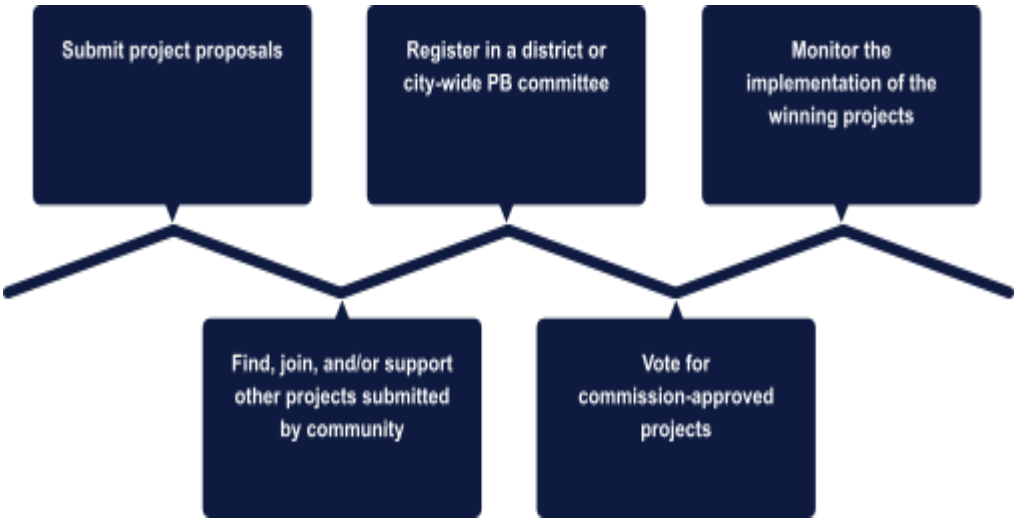


Fig 25: Paris uses participatory budgeting to fund mobility, urban forest, sports and cultural projects

5. DIGITAL TOOLS FOR URBAN PLANNING

“Technology is a useful servant but a dangerous master”

Christian Lange (1921)

Digital tools are programs, websites, or online resources that aim to make tasks easier to complete. They also include the hardware associated with data collection, discovery, sharing and control and extend into the physical world through digital information and communication systems, manufacturing, operation, maintenance and digital upgrade.

In the context of architecture and planning, digital tools are used to map and understand present conditions, support participation or automation of the planning and design process, visualise future states and support the delivery and management of change. Digital tools can be rich in data, rich in connectivity and rich in imagination. (Somanath, Hollberg, & Thuvander, 2021)

Mario Carpo (2023) describes the journey of digital tools in architecture as a series of overlapping and ever-increasing waves of technological adoption starting with reflections on cybernetics through architectural theories, passing through the practical use of technology firstly as thinking and drawing machines and, more recently, as ‘post-human’ platforms for parametric, automatic and ‘despatialised’ forms of urban and human occupation.

While architecture has had to respond to a range of digital disruptions from building information systems and digital twins, to generative platforms, digital fabrication and virtual reality, it now has to reinvent itself once more, not just to engage creatively with social and environmental crises, but with even more powerful and disruptive technologies including mixed reality, AI assisted architecture, internet enabled building systems and predictive analytics.

These architectural tools point to an ever more ‘data-driven’ and ‘automated’ practice that, on the one hand, is being used to drive efficiencies (in process and in outcomes) and on the other hand is being used to advance the differentiation and complexity of architectural forms and constructive technologies.

Similar processes are at play within the mobility design industries with even greater connection between design, engineering, manufacture, marketing and customer personalisation.

But while architecture and building practices adapt to these technologies, the wider public discourse around our public realm relies on more distributed, opaque and social forms of technology which we describe in the following pages.

Public practice, a UK not for profit social enterprise that recruits placemaking professionals to join forward-thinking local authorities, identified 12 tools to support pathways to climate action from neighbourhood climate champions and advisory groups to carbon budgeting tools developed by sustainability consultants and climate change researchers. These tools

aimed to support a range of objectives from ‘encouraging political support’ and promoting ‘cross-department’ working to improving carbon literacy and achieving ‘science-based’ decision-making.

Communities are using a range of tools to listen to each other - from online surveys and polls to virtual town hall meetings and citizens assemblies.

Online place-based engagement platforms include Commonplace, Storymaps and Neighborland. They provide a direct relationship to missions and maps while more general social media platforms are also being used to bring people together around community interests and challenges.

Digital twins, games and metaverse platforms may provide rich environments in which communities can hold continuous conversations about their current and future needs.

While these tools are growing in popularity they still have limitations and are often seen as ‘tick box’ activities in developer engagement that favour existing power dynamics and privilege those with more time, more money and louder voices.

To improve them, we need to engage with a range of barriers from accessibility and language to issues around cultural sensitivity and the potential for loss of privacy and misinformation.

Most researchers believe that digital tools cannot completely replace physical and face to face participation, not simply because of access but because they do not provide a convivial or creative environment in which a range of voices can be understood together.

Psychology tells us that listening is an art, not a science. We need to actively listen without judgement, build empathy and see the world through another’s shoes, create safe spaces where diversity is welcomed and develop constructive debating platforms to support creative dialogue. (Coleman, Lebbon, & Myerson, 2003)

CITIZENS’ ASSEMBLIES

Climate Citizens' Assemblies in France and the UK used online tools to support listening and learning activities.

They can reduce travel and organisational costs for participants and organisers; support less physically mobile and introverted participants; simplify the process and increase its flexibility; support a continuous process and improve the way the assembly is documented and shared.

They can also be technologically selective; reduce the emotional connection and impact of the assembly; and emphasise verbal and pictorial forms of communication.

COMMONPLACE

Commonplace provides an engagement platform for developers and planners that help ‘you to engage with more community members, collect their ideas and make better places.’ (Ramster & Saunders(2019))

In transport, it helps you to ‘crowdsource ideas from your community about ways to shape safer, sustainable and more inclusive transport networks.’

It’s also used for plan-making, development and responses to climate, regeneration and public safety challenges.

ARCGIS STORYMAP

ArcGIS StoryMap is a web-based storytelling tool that helps organisations to create interactive and visually engaging stories that combine maps, multimedia content and narrative text to convey information, tell stories and communicate ideas.

It’s used to support collaboration and engagement and can deliver more inclusive and effective transport plans. (Howland et al (2020))

NEIGHBORLAND

Neighborland is a digital platform that allows people to collaborate with their neighbours to build stronger, more vibrant communities. It provides tools for community engagement, including surveys, maps and discussion forums and allows communities to vote and comment on ideas that are generated by residents and professionals. (Giest & Ansgar (2017))

METAVERSE ENVIRONMENTS

Beyond relatively simple technologies for capturing comments against maps, journeys and environments, some organisations are exploring opportunities for community participation through digital ‘metaverse’ environments.

Seoul, for example, is the first major city to launch a meta twin for the city. While it focuses on ‘establishing a community space where users can creatively express themselves and freely communicate with each other’.

Users can take advantage of public services 24/7 all year round and even visit the virtual mayor’s office and library as well as play seasonal mini-games and participate in public contests.

The implications for spatial and mobility planning are profound. (de Almeida (2023))

From an educational perspective, we need to develop approaches to learning that are participatory, project and activity focused, based on local and community issues, and that support experiential and playful learning opportunities.

These approaches can turn Citizen’s assemblies that are based around dialogue into more creative activities that help communities look at our built and natural world with new knowledge and foster new connections and relationships that cross skills and generational divides.

Learning platforms that may be useful include community participation tools like commonplace but also more general services that explain how shared decision making can be done well and how we can design more sustainable places and transport.

The EU is investing in citizen science approaches that hope to get more people involved in issues around sustainability and organisations like climate KIC, as well as independent gaming platforms have developed immersive games that encourage exploration, experimentation and collaboration.

There are also a number of transport specific applications and approaches that help people to understand sustainable transport planning. Some of these are quite playful and intuitive but the majority are designed for specialists.

INVOLVE

In the UK, organisations like Involve, Sustrans and Living streets provide resources to help people plan their neighbourhoods, integrate sustainable transport and turn their streets into safe and active places.

Despite their active involvement in issues around sustainability there are still many barriers to change including a lack of political will, institutional barriers, community resistance as well as a lack of resources and coordination to involve communities over long periods of time.

CLIMATE-KIC GAMES

Climate-KIC, Europe's largest public-private innovation partnership focused on climate innovation, has developed several tools to support sustainable and climate-friendly innovation.

These include games like ‘change game’ which asks people to build a city, keep communities happy and deal with environmental risks along the way. It aims to help people to ‘learn, while playing, about many aspects of climate change, even if they are not very familiar with its impacts or with strategies to reduce emissions.’ (Oliveti (2023)

LEARNING THROUGH DATA

We can learn about our neighbourhood through digital maps and sensors that can monitor a range of data and these can be used to understand the environment, health & wellbeing, business performance and public services through open platforms, local authority or citizen science portals.

Whether these are accessible to community groups in a meaningful way will depend on what data is being collected, where the data comes from, as well as how it is visualised and shared.

A/B STREET

A/B streets (n.d.) allows people to simulate traffic, edit streets and intersections, plan bike networks, create low-traffic neighbourhoods and learn about 15-minute neighbourhoods through games. The main tools include:

- running a traffic simulation, editing roads and intersections
- exploring gaps in a city's bicycle network and proposing new bike lanes.
- 15-minute neighbourhood explorer for seeing where people live in relation to commercial and public amenities.
- Low-traffic neighbourhood for understanding how modal filters can discourage vehicle traffic from cutting through residential areas.

BETA STREETS

BetaStreets (n.d.) is a street design tool for anyone. Combine photos of the present, with assets from the library of things to create your perfect vision of the future in minutes.

SPACE SYNTAX

Space syntax (n.d.) is a theoretical and analytical framework that explores the relationship between spatial configuration and human movement patterns within urban environments.

It can be used to understand the connectivity, accessibility and integration of different modes of transport and inform how we develop pedestrian and cycling infrastructure, public transport networks as well as land use and urban planning.

REPLICA

Replica (n.d.) aims to organise the world's information about the built environment and make it accessible, valuable and actionable.

The Replica platform uses data from various sources, such as GPS data, public transit data and other mobility-related data, to create a digital twin of a city showing movement and spatial data

URBAN FOOTPRINT

UrbanFootprint (n.d.) is designed to help urban planners, policymakers and developers make data-driven decisions for sustainable urban planning and design.

It offers tools and features that help users to analyse, visualise and model urban data to understand the impacts of various planning scenarios on the built environment, economy and sustainability.

3D VIRTUAL REALITY

Designers are using 3d virtual reality tools to help citizens see future streets and mobility systems. Simple props like Google cardboard can help people see and interact with VR environments using their own mobile devices.

GAME ENGINES

More advanced and immersive environments can be developed in game engines like Unreal. These interactive physical design 'games' and models are proving to be valuable tools in assisting with urban development

3D VISUALISATION

Accessible 3D visualisation platforms primarily serve the design community although they are becoming easier to use, allowing non-designers to contribute to the design process.

While most of these platforms are based on desktop technologies, organisations like Gravity Sketch have reimagined these tools for virtual and augmented reality environments which may make them more accessible for community co-production and feedback.

GAMES FOR URBAN DESIGN

UN-Habitat's Block by Block Foundation is a program that promotes community participation in urban planning and design.

The foundation is a collaboration between the United Nations Human Settlements Programme and Mojang, the creators of the video game Minecraft. Block by block uses Minecraft as a tool for community participation and collaboration in the design of public spaces. (Delaney (2022))

PARAMETRIC DESIGN

Parametric tools and generative design are being used to help developers and architects investigate multiple building and urban block solutions with parameters like daylight, overshadowing and density being used to automatically generate potential solutions.

These aim to speed up the design process, automate the provision of infrastructure including parking and ultimately ‘design buildings faster and smarter’.

But they may also focus on profitability and turnover rather than long term sustainability issues.

ARTIFICIAL DESIGN

Organisations like Urbanist AI are making use of AI platforms to help citizens and stakeholders, “shift from the role of commentators to becoming contributors to the design process”.

They use verbal prompts and existing streets and public spaces as the starting point for visual conversations about the future.

While these tools appear to offer greater opportunities for citizen participation they may also lead to auto-generation of our public realm based on image over substance.

DIGITAL TWINS

Computer simulation models could drive sustainability in urban and non-urban environments. However,there are critical limitations when modelling socio-technical and socio-ecological systems and these limitations may limit technologically focussed systems, where social and cultural transformation, including supportive economic value systems, may be required to achieve radical change.

ROADMAP DEVELOPMENT

AI software can help communities convert a vision of change into a roadmap for sustainable development by providing data-driven insights and analysis.

It can use scenario models to explore alternative delivery strategies and help communities organise development based on need as well as investment availability.

SENSORS IN THE CITY

Technologists, service providers and city authorities are investigating the potential of sensors in the city that can be used to monitor and provide feedback for the development of sustainability and environmental programmes.

The sensors can be embedded in fixed and mobile infrastructure and help to inform existing social and environmental metrics as well as the impact of on-going development.

Despite their promise, sensors and digital platforms in our urban environments may also concentrate power and be used to invade privacy or control rights.

DIGITAL TOOLS REFLECTION

We can imagine the future as artists, as architects, as planners, as game designers or as environmental scientists, but how might communities imagine their future together?

Architects and designers are interested in understanding needs and aspirations in order to codesign future buildings and places, while planners take a longer term and often more data driven approach to support community planning initiatives.

Artists are interested in provoking change, providing alternative narratives, using creative and imaginative techniques from storytelling, theatre, film and visual arts, to encourage people to explore and question social norms and values and consider possibilities for change.

Environmental scientists turn to scenario planning tools and science-based platforms to help communities to understand the implications of different decisions while game designers imagine immersive platforms that simulate different decisions and allow players to explore potential futures and their consequences.

Creating change on the ground moves the planning process from software to shovel, but retrofitting a neighbourhood in terms of its mobility, its services, its infrastructure and its built form does not mean that digital tools no longer have a role.

Intelligent systems can support decisions around retrofit roadmaps, physical transformation and the operation, maintenance and continual evaluation and incremental improvement of our neighbourhoods.

But they can also be embedded into construction, neighbourhood operation and ongoing maintenance and improvement.

Communities will need to embrace this wide range of approaches starting with dialogue and co-creation before developing shared visions that they can test through scenarios and experimentation.

If this is going to create a patchwork vision that supports all members of the community it will need to be respectful and collaborative, recognise the interconnections between place-based interventions and service-based approaches and use different forms of representation from storytelling and rich visualisations.

Perhaps, synthetic intelligence machines will be useful in mining data and meaning as well as visualising the possible futures through words, images and films.

6. FUTURE EXPERIENCE

“Remember, always, that everything you know, and everything everyone knows, is only a model. Get your model out there where it can be shot at. Invite others to challenge your assumptions and add their own”

Donella H. Meadows (2001)

The final research question to consider in this work package is to ask how digital tools can be reimagined for the ‘scenario’ planning of mobility areas and places (mobility design) if the environment is seen as ‘communities’ and the emphasis is on ‘green transition and future orientation’

In this section we briefly describe the idea of neighbourhood and imagine a ‘game’ platform that uses digital tools to enable stakeholders to codesign a sustainable neighbourhood.

We introduce the concept of games as a tool for engaging communities in the design process within the constraints of just and green transitions.

We provide an overview of the game structure, including the various stages and components.

We discuss how the tool might be used by stakeholders and communities and the role of architects in facilitating the experience.

GAMES AS A TOOL FOR ENGAGING COMMUNITIES

Game theory provides a framework for supporting the development of a platform to co-design our future neighbourhoods:

- allows us to understand different stakeholder values, needs and knowledge.
- helps us support decision-making and strategy.
- recognises different values and incentives.
- supports collaboration while recognising the reality of competition among participants.
- helps stakeholders agree on incentives and improve outcomes.
- supports dynamic and iterative decision-making.

If well designed a game platform can help stakeholders to prioritise sustainability and inclusivity and create a holistic and balanced approach to neighbourhood design that considers the well-being of all stakeholders and the long-term sustainability of the community:

- provides inclusive stakeholder participation that avoids a concentration of power and influence in the hands of wealthy stakeholders.

- prioritises sustainable missions that promote environmental sustainability, social inclusivity and resilience.
- promotes collaboration among stakeholders, encouraging them to work together towards common goals rather than competing against each other.
- encourages community ownership and control to ensure that the benefits generated from neighbourhood development are shared equitably among the community members.
- supports inclusivity and cultural equality by prioritising service and human centred design that engages with the needs and aspirations of all community members, including marginalised groups.
- focuses on long term sustainability which avoids short-term, profit-oriented approaches

GAME STRUCTURE

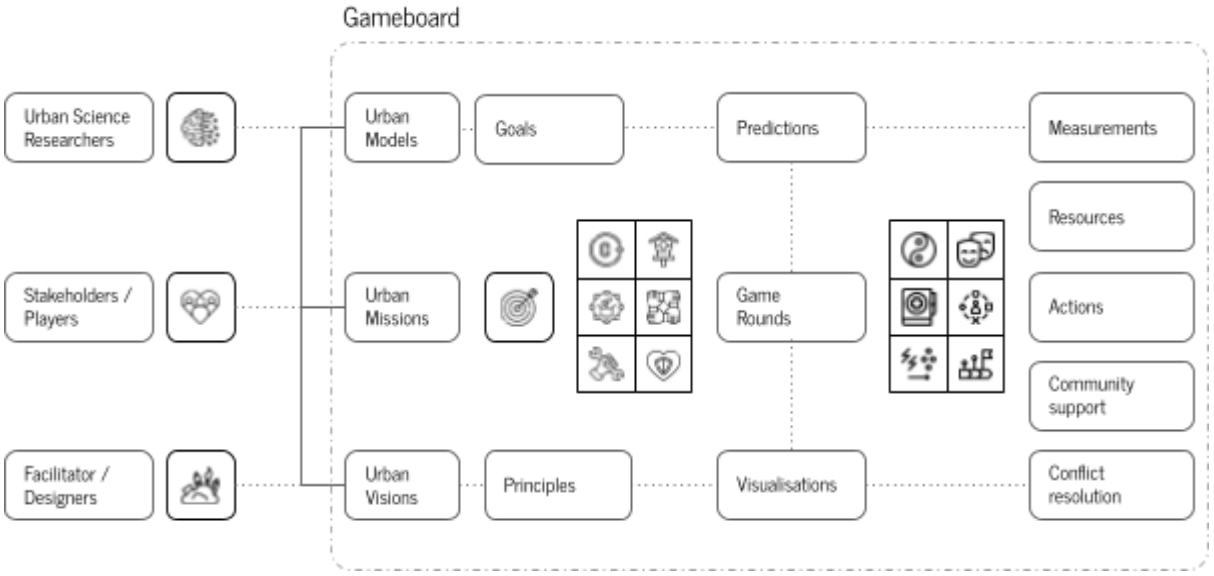


Fig 26: Game based design tools can help designers, researchers and citizens visualise and predict the outcome of value-based missions

OVERVIEW OF THE GAME STRUCTURE

The sustainable neighbourhood design game is based on the following key components:

- Players: The game is based on 11 players including Nature, Businesses, Senior Citizens, Future Generations, Families, Public Services, Children, Investors, Young People, Local Authorities and Developers

- Facilitators: Architects, Urban planners and designers act as facilitators and creative actors

- Neighbourhood Missions: The players have to work collaboratively to address the eight neighbourhood missions including Net Zero, Restorative, Circular, Culturally Equal, Service-Oriented, Resilient, Healthy and Inclusive
- Actions: Players can take a variety of actions which represent their preferences and priorities towards the neighbourhood missions. These could include investing in sustainable infrastructure, proposing policies or regulations, advocating for specific design elements, or forming coalitions with other players.
- Game board: The game board is a digital representation of the neighbourhood including streets, housing, workplaces, community services, parks, play spaces and mobility systems.
- Resources: Resources available for the missions include key elements including sustainable transport, renewable energy systems, green building materials, public funding, community engagement and partnerships
- Community: These are actions and events that can be used to increase participation in delivering the missions including workshops, neighbourhood surveys, public meetings and consultations.
- Conflict resolution: These represent conflicts of interest that may arise during the game, such as conflicting stakeholder objectives, resource limitations or conflicting missions

GAME BOARD

The game board provides players with an interface around which they can collaborate, learn, imagine and make change. It provides access to player information, missions, actions, resources and community support as well as tools for conflict resolution and help.

Players can review progress through the rounds and view how the layers of community knowledge and physical infrastructure change over time.

Players can view 3d street views and access live data about the community including livability, sustainability, equity and economic information.

With the support of the architect and urban planning facilitator they can use predesigned elements to imagine future routes, future mix of transport and future centres as well as new approaches to land management and use.

These future views can also be generated algorithmically and may use models to predict future environmental, social and economic ‘signals’ and ‘outcomes’.

Fig 27: Gaming platforms can integrate with map based interfaces to integrate design with urban environments

New public building visualisations

New public street visualisations

Fig 28: Machine Learning software can help architects and citizens create visual layers based on google street views to bring to life future scenarios

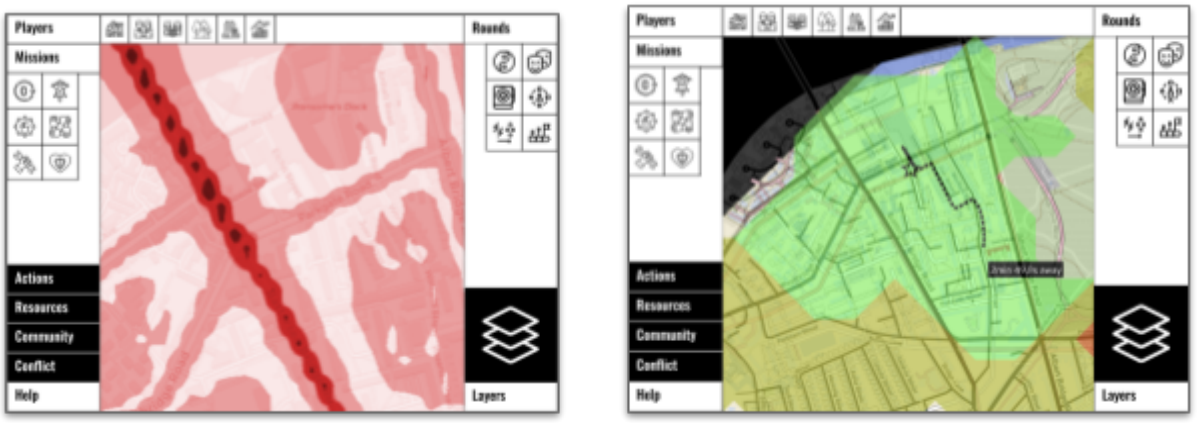


Fig 29: These tools can also be used to visualise predicted social and environmental outcomes as layers of a map at different scales

GAME SET UP

Setup: The digital game board acts as a central resource for the project. Players choose a player card and can review mission cards, action cards, resource cards, community cards and conflict resolution cards.

Turn Sequence: Each stage in the game includes opportunities for players to choose missions, take actions, explain where the action will take place and select the resources and community support that they need to achieve the mission.

They also explain how the card played contributes to the physical changes needed in the community to achieve wider sustainable development goals by 2030.

Discussion and Collaboration: Other players can ask questions, provide feedback and discuss the cards played together with its potential impact on the physical changes in the community.

Players can collaborate and decide how to bring together different stakeholders, missions and resources to create a sustainable and inclusive neighbourhood.

Conflict Resolution: If a conflict arises during the game, a player or facilitator can use one of the conflict resolution approaches and explain how it can help to resolve the conflict and bring stakeholders to an agreed position.

After each round, players use a triple loop to reflect on decisions made and consider the impact of their actions, provide feedback to others on their actions, their collaborative or competitive approaches and potential conflicts. Players can then make adjustments based on feedback.

The triple feedback mental model loop is a continuous process that repeats after each round of gameplay, fostering iterative and collaborative decision-making among players. It helps players to collectively reflect, learn and improve their strategies for designing a sustainable neighbourhood that considers the interests of different stakeholders and achieves the desired missions and key elements. (Biggs et al. (2011))

STAGES IN THE GAME

The game is played in rounds, with each round representing a stage in the co-design process of the neighbourhood. It has five rounds based on listening, learning, imagining, roadmapping and delivering change:

Round 1: Philosophies around missions

Players share their philosophies and values related to the missions through surveys, facilitated discussions and brainstorming that encourage stakeholders to express ideas and beliefs about the project's goals and objectives. The facilitator can capture the philosophies, hopes, fears and values and create a visual representation of them, such as a concept map or a list of guiding principles.

Round 2: Learning together

Players use a collaborative learning process to understand the costs of current lifestyles, benefits of sustainable living and risks from the future. This can include case studies, interactive workshops, or other educational activities that help them develop a shared understanding of the sustainability concepts and their relevance to the neighbourhood project.

The facilitator can provide relevant information and resources, support discussions and encourage everyone to reflect on how these concepts apply to their neighbourhood. This could include real world data on how the neighbourhood is currently performing against SDGs.

Round 3: Imagining the future

Players use creative and visual tools, such as mapping, sketching, or digital visualisation tools to imagine and visualise the future of their neighbourhood.

This includes narratives and storyboards that help to bring to life physical, social, environmental and economic changes in the neighbourhood that build on the shared philosophies, learning and aspirations of the group.

The facilitator can provide guidance and support in the visualisation process and encourage stakeholders to express their ideas and visions through different media.

Round 4: Roadmap for change

Players work collaboratively to develop a roadmap for change that outlines the strategies, actions and timeline for implementing their combined vision for a sustainable neighbourhood.

This includes prioritising ideas, setting goals, identifying actions, allocating resources and assigning responsibilities.

The facilitator guides the players in the strategic planning process, facilitates discussions and helps them develop a feasible and inclusive roadmap that reflects their collective vision and aspirations.

Round 5: Managing change

Players focus on managing the delivery of change through investment and teamwork. This involves developing an action plan, mobilising resources, coordinating efforts, monitoring progress and evaluating outcomes.

The facilitator supports the players in implementing their roadmap, addressing challenges and promoting collaboration among stakeholders. Real-time feedback loops can be established to assess progress, adapt strategies and refine the roadmap as needed.

Throughout the five rounds, the facilitator encourages creativity, playfulness and inclusiveness in the co-design process and ensures that all players have an equal opportunity to contribute their ideas and perspectives.

Digital tools, including mapping, visualisation and collaboration software are used to support creativity, collaboration and participation among stakeholders.

The facilitator also provides guidance on best practices for sustainable neighbourhood design, including principles of social, ecological and economic sustainability and helping everyone to make informed decisions that align with the project's goals and objectives.

DIGITAL TOOLS FOR SUSTAINABLE NEIGHBOURHOOD GAMES

While games like this have been developed as physical systems, they can also be developed as a set of digital infrastructure that architects and urban planners can customise to suit their own practice.

Collaborative design platforms support real-time and non-linear sharing of design ideas, feedback and visualisations, helping players to participate in the co-design process.

Visualisation and simulation tools help architects and urban planners to visualise potential design outcomes for different scenarios and these can be shared in augmented or virtual reality systems.

Data and analytics tools help architects and urban planners to collect, analyse and visualise data related to sustainability, walkability, active travel, public transport etc

Project management tools support planning, resource allocation, progress tracking and communication.

Online engagement tools including surveys, place-based sentiment mapping and social media collect feedback, capture neighbourhood sentiment and share ‘game’ progress with the wider community.

AI services will enhance the experience by providing more personalised support, real-time feedback to improve design quality based on real data, improve the speed and quality of visualisations, analyse neighbourhood data based on real world information and simulations, improve communications between players and the wider community and customise the experience to increase accessibility and support a wider range of learning styles.

ROLE OF ARCHITECTS AND PLANNERS

Architects and urban planners act as facilitators and creative designers helping players to collaborate and resolve conflicts.

They can use the platform to share their own approach to ‘sustainable neighbourhood design’ by customising and localising the different design resources based on their own practice and knowledge. It may also be useful to see the platform as a shared resource where architects collaborate to improve their ability to deliver transformation at scale rather than compete.

As experts in the built environment they will also provide expertise on sustainable design and living to educate different stakeholders and to present examples of best practice when available. As this is a highly collaborative approach to neighbourhood design learning will not be in one direction.

While the imaginative stage will be critical from a design perspective it will be important for designers to use visual tools to support conversations at every stage - from mapping and diagramming to developing 3D models that can be refined through feedback from stakeholders.

These models may include digital walk-throughs and simulations that provide rich immersive experiences around which stakeholders can respond.

The design team will also be able to support the development of roadmaps and delivery plans and the platform will need to integrate and be supported by other specialists - from engineers and landscape architects to quantity surveyors and developers.

In the long run, these platforms could be embedded into communities and become creative environments in which designers continue to support community-led ideas for improvement.

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8. FIGURES