

Roadmap for smart and sustainable cities and communities in Norway

A guide for local and regional authorities developed by
Design and Architecture Norway (DOGA), the Norwegian
Smart City Network and Nordic Edge.



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01 Purpose

The main goal of this roadmap is to promote the development of sustainable, productive and resilient cities and communities.

The roadmap is to serve as a:

Guidebook. Describing the possible positive societal effects of smart city initiatives and identifying key opportunities, challenges and issues.

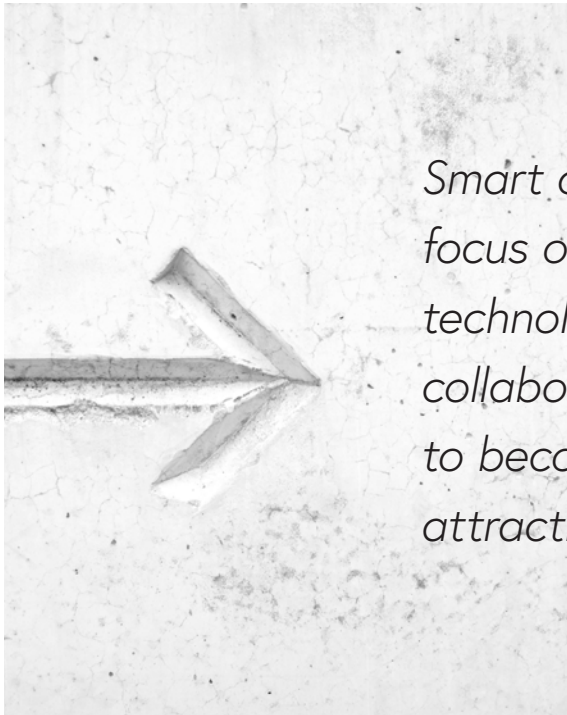
Bridge Builder. Defining smart cities in a Norwegian context and using this definition to establish a common set of values that promote collaboration and co-creation across all sectors, professions at all levels and, in particular, together with the public.

Value Creator. Aiming to contribute to renewal and innovation in the public sector. It describes the link between smart cities and urban and community development. It also shows how local and regional authorities can be the driving force behind this transformation.

Platform. Positioning Norway within the smart city context. It serves as a communication platform both internally and externally and stimulates the development of innovative, multidisciplinary solutions that can be scaled, thereby promoting value creation.

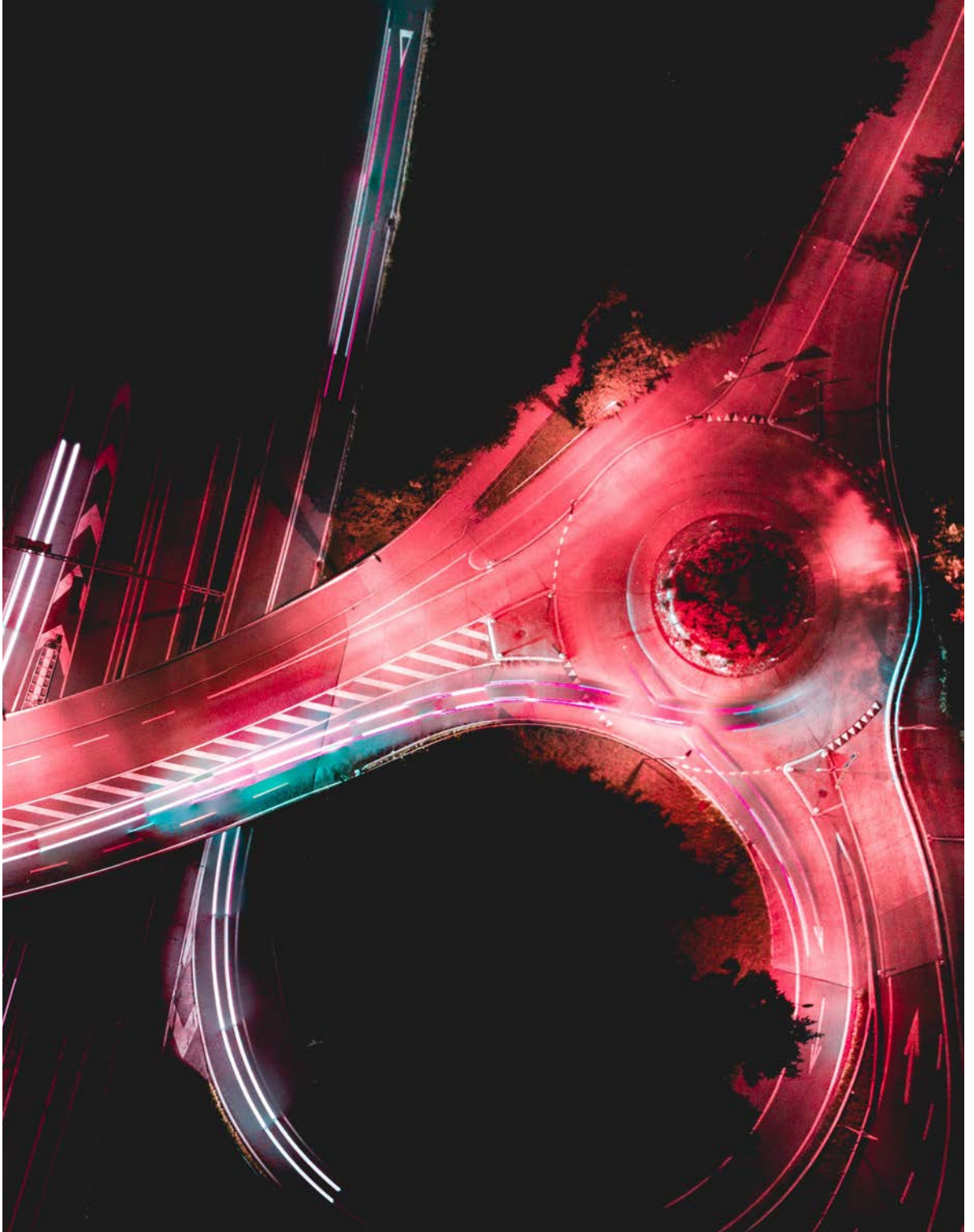
This first version of the roadmap provides a framework for smart city initiatives in Norwegian local and regional authorities, describing overriding principles and visions. In the next phase, the roadmap will be expanded with recommended measures, tools and best practices.

02 Our definition of a 'smart city'



In a Norwegian context, our definition of a 'smart city' is as follows:

Smart cities and communities focus on people, while using new technology, innovative methods, collaboration and co-creation to become more sustainable, attractive, productive and resilient.



03 Eight principles for smart and sustainable cities and communities

The following eight principles are designed to help local and regional authorities prioritise focal areas and direction for their smart city initiatives:

1) Place people in the centre

Identify and listen to the views of the people on how smarter, safer and more sustainable communities can be developed. Identify measures and solutions that can use new technology to improve and make more effective the range of services offered to all levels of society. In addition, contribute to better, greener living and working environments, while taking into consideration individual differences such as age, gender, cultural and socioeconomic background.

2) Consider the bigger picture

Formulate a long-term smart city strategy using regional planning tools and the social and economic plans of local authorities to integrate the strategy into all service areas, including urban and

community development. Ensure strong political and administrative support. Base the strategy on real problem areas and needs, describing the results that are to be achieved through the use of new technology, innovative methods and co-creation. Identify various resourceful individuals and groups who can contribute to the development of new solutions, involving them along the way. Build on existing knowledge and experiences in all sectors, occupations, professions and across municipal boundaries.

3) Prioritise climate and environment

Link smart city strategies to the UN Sustainable Development Goals and consider how new technology, new business models and co-creation can accelerate the 'green shift', while contributing to reducing the use of resources and making eco-friendly choices for people easier. Develop concrete measures and make the necessary adaptations

to standards and regulations that, all in all, result in lower greenhouse emissions. This is to be done through more environmentally friendly transport, new energy solutions and more energy-effective buildings.

4) Promote inclusion and co-creation

Establish and operationalise physical and virtual platforms for co-creation to which local citizens, social entrepreneurs, the local business community, knowledge groups and volunteer sector are invited to identify challenges and solutions. Prepare a plan for how input is to be interpreted, developed and put to use. Approach this as a continuous dialogue that generates both a greater understanding and ownership of local and regional projects and initiatives.

5) Focus on next generation business

Facilitate business development that is diverse and sustainable. Play a proactive role as community developers in close collaboration with local businesses, as well as research and educational partners. Be open to trying new, 'green' business models based on new technology and a circular economy. Use innovative public procurement as a tool for community and business development and explore other financing models. Develop open, multidisciplinary innovation processes, pilot projects and test arenas.

6) Share and use open data

Facilitate the availability and use of data as the basis for greater efficiency, quality improvement, innovation and business development, while at the same time offering clear guidelines for data handling in order to safeguard ethics and citizen privacy.

Facilitate increased digital proficiency in terms of understanding with regard to data use across all sections of society. Share with citizens the basis for decisions and priorities as part of efforts to create a more democratic society.

7) Develop competencies and embrace change

Focus on how the internal development of expertise and collaboration within research groups, professionals and organisations, as well as the testing of new technology, can contribute to transition and innovation. Be mindful of the resistance to change that can occur within the organisation, but actively use employees as a valuable resource for knowledge and new ideas. Develop a unified organisation with a high level of digital expertise that has the authority to coordinate smart city initiatives across all departments. Make sure to spotlight the positive effects of smart city initiatives, both within the organisation and to citizens.

8) Act local, think global

Base efforts on the local identity, challenges and needs. Look to other cities, municipalities, communities and collaborative partners for inspiration and opportunities. Formulate a plan for the national and international scaling and sharing of new solutions. Always consider how global frameworks, regulation guidelines and international standards within the smart city context should or ought to be followed. Find ways to collaborate with national public authorities to facilitate a joint technical infrastructure, organise funding schemes and formulate regulations.



1.
Place people in the
centre



2.
Consider the bigger
picture



3.
Prioritise climate
and environment



4.
Promote inclusion
and co-creation



5.
Focus on next
generation business



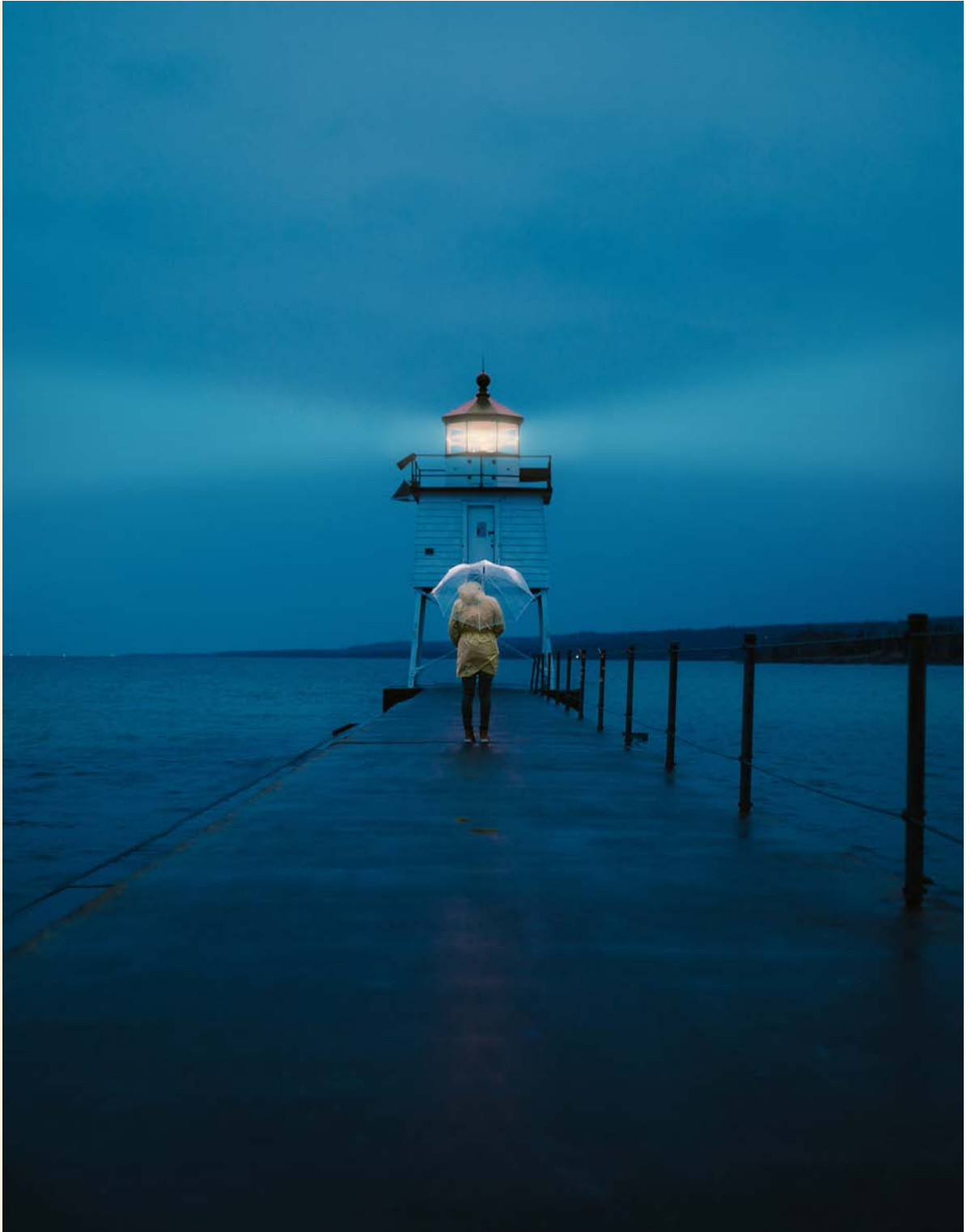
6.
Share and use open
data



7.
Develop
competencies and
embrace change



8.
Act local, think
global





04 The Norwegian smart city model

4.1 Background

In the years to come, local and regional authorities will face various challenges that will require smarter and more effective use of the available resources. These challenges will, of course, vary in terms of scope, geography, finances and other local conditions. But what they will all have in common is the need to answer the following question: How can we improve the quality of life of citizens and contribute to greater business development without compromising on the environment and climate, as well as the opportunities and needs of future generations?

The smart use of technology and data combined with the constructive contributions of citizens can help improve public services, promote a more effective use of resources, increase productivity and make cities more attractive and environmentally and climate-

friendly. This is the essence of what we refer to in the roadmap as a 'smart city'. The guiding principle of this is that efforts towards creating a smart city can and should play an important role in the transition to more sustainable cities and communities.

Many local and regional authorities have already begun unlocking the potential and positive opportunities offered by the smart city concept. But to achieve even better results, we need long-term, comprehensive strategies that integrate smart city thinking into overall urban and societal development. We need to tap into the available technology and collaborate and share knowledge across sectors, occupations and hierarchies to a greater degree in order to promote innovation and the capacity for implementation. Last but not least, we need to ensure that efforts are based on the needs of citizens and that they are included in the processes.

4.2 Roadmap and UN Sustainable Development Goals

In the autumn of 2015, the United Nations member countries approved a set of 17 goals for sustainable development through the year 2030. In these goals, the environment, economy and social development are intertwined. They apply to all countries and serve as a guide for global efforts to promote sustainable development.

The eight principles in this roadmap are designed to help Norway achieve the UN Sustainable Development Goals.

The roadmap emphasises **Sustainability Goal no. 11, which pertains to making cities and communities more inclusive, safer, resistant and sustainable.**

The focus is on sustainable urbanisation with access to satisfactory and safe housing, good transport solutions and other fundamental public services for everyone. In addition, the focus on the environment is reinforced by, among other things, efforts to improve air quality, waste treatment, eco-friendly buildings, respect for cultural heritage, access to green areas and the opportunity to experience nature for everyone.

Sustainability Goal no. 9 related to innovation and infrastructure also plays a key role in smart city efforts. Infrastructure is fundamental to the functioning of society. It is a prerequisite for growth and productivity, as well as for improvements in education and health care facilities. The infrastructure of the future must be developed in a smart and environmentally friendly way – and in partnership with other interested and local parties.

Sustainability Goal no. 17 pertains to collaboration in order to achieve the sustainability goals.

Government authorities, the business community and civil society must work together to achieve sustainable development and create new and stronger partnerships.

All in all, the Sustainable Development Goals describe concrete needs that pave the way for innovation and major new global market opportunities. Smart solutions in urban and community development can contribute to achieving several of these ambitions. The goal is for the roadmap to inspire targeted efforts and collaboration that enable Norway to make an important contribution and promote development that meets the needs of citizens today – without compromising opportunities for future generations.

4.3 'The Norwegian smart city model'

If we are to achieve the UN Sustainable Development Goals by 2030, we must promote a radical mobilisation of citizens, the business community, academia and the public sector in which we work together in a targeted fashion to achieve smarter and more sustainable cities and local communities. We believe that Norway has a unique opportunity to set an excellent example.

Transparency, inclusion, equality, good social welfare and being closer to power are other values we consider important building blocks in the Norwegian society model. We have an effective public sector that enjoys a high degree of confidence. We have good traditions for collaboration across sectors. We also have a well-developed digital infrastructure and high level of digital competence among the population. In addition, we feel strongly about safeguarding the interests of both urban and rural areas in order to ensure an optimal utilisation of resources throughout the country.

All in all, this provides us with a solid platform to develop smart and sustainable solutions and services that can be scaled and exported, which in turn contributes to growth and value creation. This is what we call the 'Norwegian smart city model'.



05 Target groups and visions

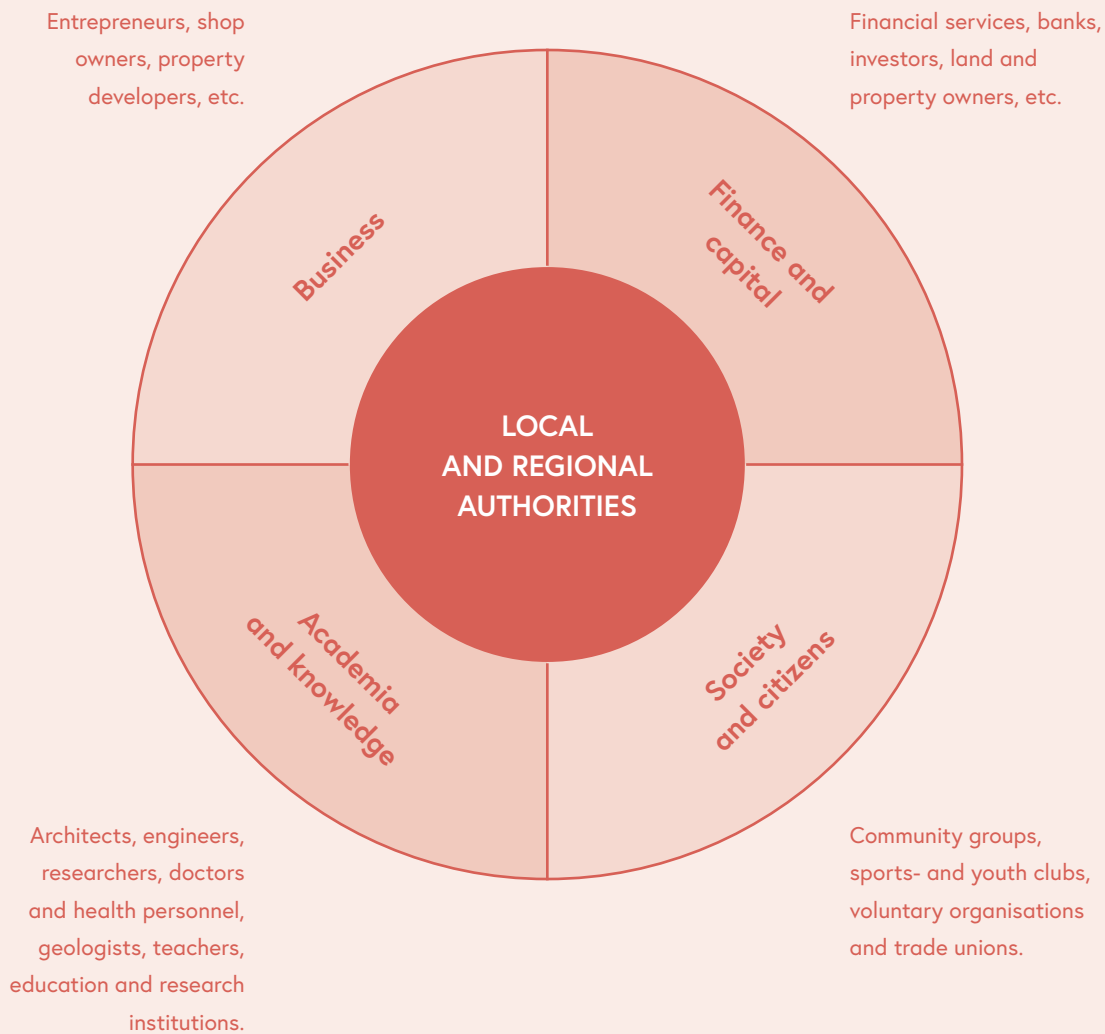
5.1 Target groups and roles

Citizens play a key role in the roadmap, both as active participants in co-creation processes and citizen initiatives and as recipients and users of the solutions and services developed.

But when it comes to who is to use the roadmap as a guide and put it into action, it is the **local and regional authorities that are the main target group**. It is they who are to engage in dialogue with the relevant government agencies in order to implement the principles and measures defined in the roadmap.

The business community, which develops products and services, as well as organisations and academia, which contribute with a knowledge base, are also involved in pursuing the defined goals. This is why **business professionals, organisations and academics are defined as the secondary target group**.

When it comes to local and regional authorities, the roadmap emphasises a greater role for them as facilitator and driver (see model 1.0), as well as greater responsibility for effective multidisciplinary collaboration and the use of new forms of partnerships to achieve the goals.



MODEL 1.0: Based on a penta helix model. The local and regional authorities are positioned in the centre to represent their role as facilitator and driver.

5.2 The visions

To concretely define the types of cities and communities we want to achieve, the various parties involved in the development of the roadmap have established six common visions. The principles described in chapter 3 contribute to achieving them. A more detailed description of the visions is provided below.

Attractive

Attractive cities provide the conditions for a variety of cultural activities, experiences, trade and other activities, as well as good public services. They pursue the development of a compact city structure and recognise the value of meeting places and other well-designed spaces that can create greater well-being for citizens, including homes and workplaces. They implement measures to promote a diverse business community. They highlight their own unique identity and cultural heritage, as well as local and individual opportunities.

Inclusive

Inclusive cities are fully aware that the involvement of citizens is a key factor in creating genuinely good places to live and work. They recognise the value of diversity. They establish physical and digital platforms that connect citizens with the local community and strengthen local democracy. They facilitate collaboration among academia, business professionals and the local authorities. They also encourage collaboration across their own organisational hierarchies.





Effective

Effective cities offer seamless services of high quality that ensure that citizens have access to what they need when they need it. They facilitate an easier everyday life for citizens and greater agility for the business community. They utilise the available local resources effectively and structure land use, energy solutions and transport.

Climate-friendly

Climate-friendly cities work in a targeted and comprehensive fashion to reduce greenhouse gas emissions and resource use in all areas of society. They implement environmentally friendly energy and transport solutions. They promote the switch from a linear to a circular economy and encourage recycling and restoration of existing buildings. They organise society in a manner that makes it easy for citizens to choose climate-friendly solutions.

Resilient

Resilient cities have a high innovation capacity and ability to develop and adapt to changing conditions and circumstances. They learn from past experiences with a view to anticipating and preventing new challenges and unexpected events. They have the flexibility and strength to tackle both known and unknown situations and steer the development in the desired direction. They also focus on strengthening the community in order to promote safety, robustness and resilience.

Health-promoting

Health-promoting cities view society, nature and health within a strategic context. They ensure citizens' rights to clean air, clean water and access to green recreation areas. They facilitate a varied blue-green infrastructure that contributes to dealing with climate challenges and promote biological diversity and animal life, as well as the physical and mental well-being of citizens.

06 Implementing the roadmap and limiting conditions

06 Implementing the roadmap and limiting conditions



6.1 Implementing the roadmap

The foundation of the roadmap comprises the eight principles and six visions described above. The visions portray what we wish to achieve with the roadmap, while the principles explain how we should act in order to achieve these visions. In other words, they indicate what we believe Norwegian local and regional authorities – in collaboration with citizens, the business community, organisations and academia – must do to build smart and more sustainable cities and communities.

The roadmap is intended to ensure a comprehensive and inclusive approach to smart city efforts. It can be used as a basis for discussions pertaining to the formulation of new strategies, policy documents, projects and services. It can serve as a starting point for co-creation processes with citizens, business professionals, academics and other parties. The roadmap can also act as a strategic tool for communicating ambitions and values, both externally and internally within local and regional authorities. Last but not least, the roadmap should support the 'Norwegian smart city model', aimed at promoting sustainable societal development through 'green' business activities on the one hand and quality services and living environments for citizens on the other.

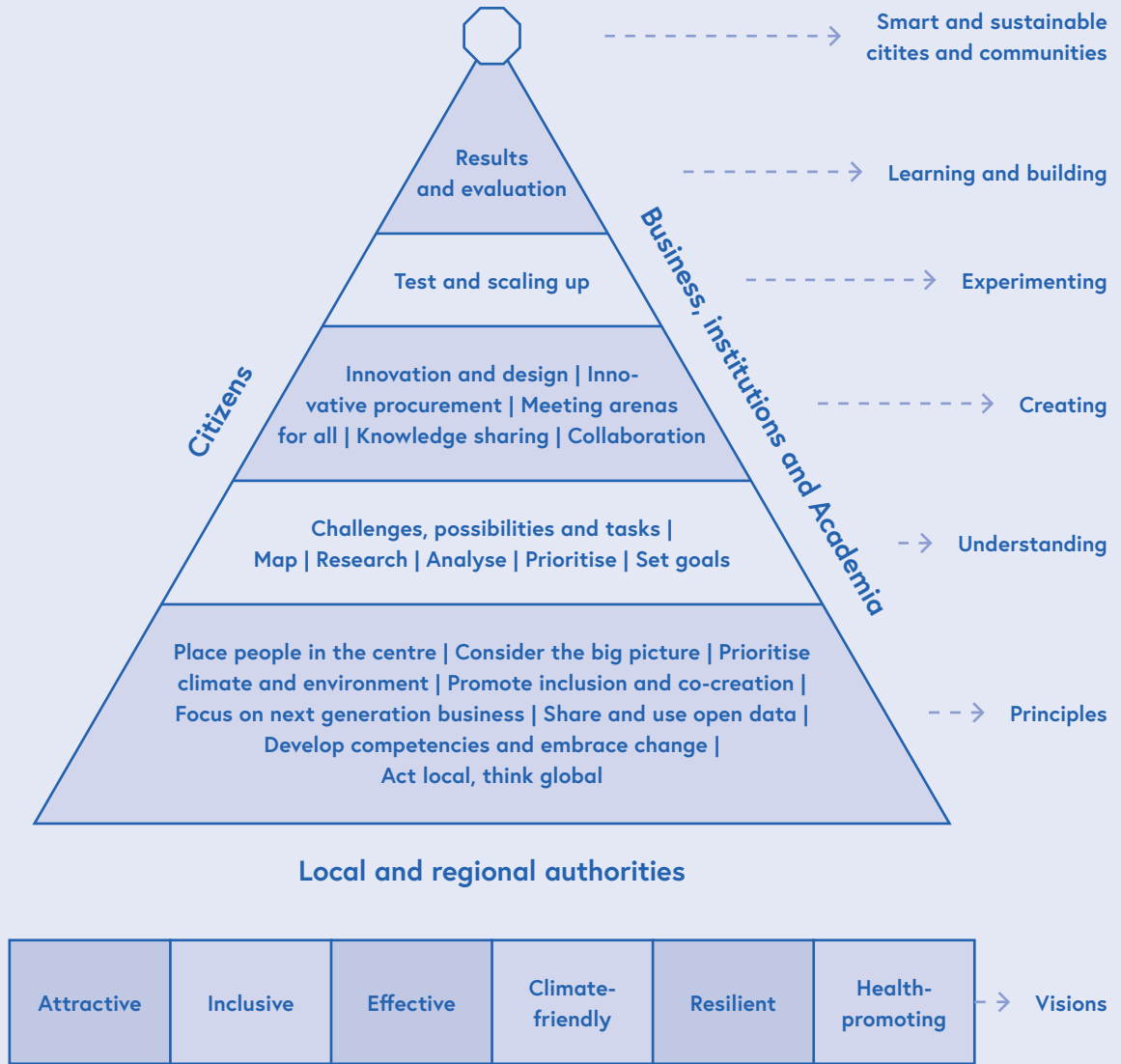
6.2 Limiting conditions

The roadmap does not replace other governmental or local and regional strategies and plans, but is designed to provide building blocks that can be

incorporated into existing planning and strategy work. It is there to strengthen collaboration – in new ways across all occupations, sectors and levels – in order to further the development of smarter and more sustainable cities and communities. It is through excellent tools, updated knowledge, experience sharing and motivation that we can successfully carry out partnership projects that result in new and innovative solutions.

The roadmap does not compete with government support for digital transformation in the public sector outlined in the digitalisation strategy for 2019-2025. The smart city roadmap has a wider focus in which digitalisation (resulting in greater effectiveness and increased productivity) is one of several components encouraging the use of other new technologies, multidisciplinary collaboration and citizen involvement – the primary goal of which is to promote improved quality of life for citizens.

Every city and every community has its own unique possibilities and challenges. Some have progressed significantly with their smart city efforts, while others have yet to begin. Since the prerequisites are very different, it is important to point out that the roadmap is first and foremost intended as a source of inspiration, not as a detailed formula for how specific topics or subject areas should be approached. Nor does it prescribe which business sectors should be prioritised or how the work should be organised on a national, regional or local level.



MODEL 2.0: This model shows how local and regional authorities can use the visions and principles of the roadmap and design a process based on collaboration across all sectors – from analysis, innovation and design to testing, adjustment and scaling.

07 Challenges, obstacles and key questions

The goal of this chapter is to inspire reflection on the current situation in each region, identify various challenges and obstacles related to the visions and principles and address questions that must be answered in order to solve these challenges/obstacles.

The model below illustrates how citizens, the business community, organisations and academia can help create smarter and more sustainable cities and communities. The more we can agree on a value platform, set of concepts and methods, the easier it will be to collaborate in order to overcome the challenges identified. Collaboration will also contribute to professionalising the supplier industries by way of more stringent and clearer requirements related to sustainability and the environment.

When it comes to challenges/obstacles, the roadmap focuses on what the Norwegian local and regional authorities can tackle on their own. We have chosen to focus on issues that can be easily influenced and, therefore, have a greater impact more quickly.

Yet it is important to point out that various challenges and framework conditions may, of course, surface on a macro level that must be dealt with by the various parties involved. Urbanisation, globalisation, demographic changes, digitalisation, climate changes and a scarcity of resources are examples of challenges and framework conditions that are difficult to influence in the short term.

7.1 How do you progress from challenges and obstacles to measures?

This section presents challenges and obstacles that prevent the development of sustainable, productive and resilient cities and local communities. These are linked to the eight principles defined in chapter 3, which have been used to create a set of key questions that local and regional authorities can use as the starting point for dealing with challenges and obstacles they face.





1. Place people in the centre

Identify and listen to the views of the people on how smarter, safer and more sustainable communities can be developed. Identify measures and solutions that can use new technology to improve and make more effective the range of services offered to all levels of society. In addition, contribute to better, greener living and working environments, while taking into consideration individual differences, such as age, gender, cultural and socioeconomic background.

Challenges/obstacles

- A lack of common understanding and interest in the smart city as a concept/idea, both internally and among the general population.
- Internal work processes and procedures incapable of listening to citizen desires regarding changes and improvements.
- Ensuring the collection and processing of qualitative data and information that is representative of the diversity of citizens (status, ethnicity, age, etc.) and that safeguards the views of citizens regarding quality of life.
- Establishing processes that reach out to all categories of citizens through participation.

Key questions

- How can active measures for citizen inclusion be designed at an early phase?
- How can a better internal understanding of citizen views, perspectives and needs be ensured?
- How can measures be tailored to ensure the inclusion of all population groups?
- How can good, accessible democratic arenas (physical and digital meeting places) be created?
- How can greener, more attractive and safer living environments be cultivated?
- How can cultural monuments and historic buildings be preserved to ensure a culture that is characterised by a shared identity and sense of belonging?

2. Consider the bigger picture

Formulate a long-term smart city strategy using regional planning tools and the social and economic plans of local authorities to integrate the strategy into all service areas, including urban and community development. Ensure strong political and administrative support. Base the strategy on real problem areas and needs, describing the results that are to be achieved through the use of new technology, innovative methods and co-creation. Identify various resourceful individuals and groups who can contribute to the development of new solutions, involving them along the way. Build on existing knowledge and experiences in all sectors, occupations, professions and across municipal boundaries.

Challenges/obstacles

- Silofication contributes to citizens not receiving integral public services and can result in ineffectiveness, an abuse of available resources, fragmentation and little innovation internally within local and regional authorities.
- Organisational cultures with a low level of tolerance, lack of willingness to take risks and little to no allowance for mistakes.
- Lack of links and synergy with other planning work/focal areas (like digitalisation and urban planning).
- Politically established subject areas with which many local politicians are largely unfamiliar.

Key questions

- How can a strategy for smart and sustainable development (and the UN Sustainable Development Goals) be integrated into the organisation and management system of local and regional authorities?

- What will it take to promote more sharing and collaboration between local and regional authorities and mobilise large-scale 'joint efforts' for innovation and expertise sharing throughout Norway?
- How can new business models based on public-private collaboration be established that embrace innovation, piloting and circular thinking?
- How can the knowledge level and leadership skills be increased in relation to the 'green shift', the environment and climate to ensure a more solid anchoring and common understanding of smart city efforts?
- How can conditions be established for better collaboration between departments and organisations internally within local and regional authorities?
- How can joint innovative procurement processes be established?

3. Prioritise climate and environment

Link smart city strategies to the UN Sustainable Development Goals and consider how new technology, new business models and co-creation can accelerate the 'green shift', while contributing to reducing the use of resources and making eco-friendly choices for people easier. Develop concrete measures and make the necessary adaptations to standards and regulations that, all in all, result in lower greenhouse emissions. This is to be done through more environmentally friendly transport, new energy solutions and more energy-effective buildings.

Challenges/obstacles

- Air, water and soil pollution.
- Preparedness for climate changes manifested in extreme weather, avalanche risk, drought, deforestation, flooding, etc.
- Reduced biodiversity.
- Waste sorting and processing.
- Reduced car traffic and more environmentally friendly transport solutions.
- Reduced emissions from local industry.
- Reduced greenhouse gas emissions from the sectors/industries that contribute most.
- Implementation of new energy solutions and increased energy savings.

Key questions

- How can the indicators in the UN Sustainable Development Goals be prioritised, translated and adapted to local conditions?
- How can the purchasing power of local and government authorities be used to promote innovation and 'greener' solutions?
- What demands are made of suppliers in terms of more sustainable solutions?

- How can collaboration and co-creation be structured between the owner of the needs (the local authority) and the creators of the solutions (business community/R&D groups and organisations)?
- How can triple bottom line thinking be implemented in all smart city projects that takes into account social, economic and environmental sustainability factors?
- How can local climate and environmental strategies use new technologies in order to create added value for both people and the environment?
- How can the use of new technology and cross-sector collaboration be used to effectively prevent the consequences of climate and natural disasters?
- How can companies, organisations and citizens be encouraged to deliberately choose smart and sustainable solutions?
- How can more sustainable urban development and a higher percentage of renewable energy be supported?
- How can a more sustainable management of farming, forestry and maritime resources be established?

4. Promote inclusion and co-creation

Establish and operationalise physical and virtual platforms for co-creation to which local citizens, social entrepreneurs, the local business community, knowledge groups and volunteer sector are invited to identify challenges and solutions. Prepare a plan for how input is to be interpreted, developed and put to use. Approach this as a continuous dialogue that generates both a greater understanding and ownership of local and regional authority projects and initiatives.

Challenges/obstacles

- Lack of resources, expertise and communication with regard to the facilitation of processes and provision of arenas that ensure the continuous involvement of citizens in co-creation projects.
- Internal resistance in allowing for increased citizen involvement.
- Absence of physical and virtual platforms/ technologies for co-creation.
- Genuine involvement, not just the semblance of it.
- Lack of experience with including the research and education sectors in development and co-creation processes.
- Lack of measurement criteria for evaluating the effects of inclusion and co-creation.
- Who should act as the facilitator of such arenas and processes in which concrete methods and tools are made available?
- How can we progress from 'listening' to 'doing' in co-creation processes?
- What is the best way to involve citizens in the development of local politics and, consequently, obtain relevant knowledge that results in better informed and more accurate decisions?
- How can citizen involvement be facilitated so that it contributes to citizen participation and a sense of responsibility for strengthening the local community?
- What is the best way to measure the effects and benefits of citizen involvement and co-creation processes?
- How can experiences and knowledge be collected and shared to enable other local and regional authorities to be inspired to take concrete measures, learn from each other and connect on both the individual and network level?

Key questions

- What kinds of digital platforms and methodical frameworks can be used and how can they be managed?
- Where, when and how can a system be implemented for citizen involvement and co-creation that results in the approach becoming part of the 'modus operandi' of local and regional authorities?

5. Focus on next generation business

Facilitate business development that is diverse and sustainable. Play a proactive role as community developers in close collaboration with local businesses, as well as research and educational partners. Be open to trying new, 'green' business models based on new technology and a circular economy. Use innovative public procurement as a tool for community and business development and explore other financing models. Develop open, multidisciplinary innovation processes, pilot projects and test arenas.

Challenges/obstacles

- Major actors with considerable power and smaller actors with limited resources – risk of exclusion /monopolisation/too little innovation in co-creation projects and procurement processes.
- Lack of overview of relevant parties and networks in smart and sustainable urban development in Norway.
- Local and regional authorities that are too passive in terms of business development.

Key questions

- How can the business community be stimulated to make more extensive use of smart technologies to create socioeconomic benefits?
- How can we be a good host that ensures dialogue and an understanding of roles between us the local authority, educational sector and business community?
- How can urban development and business development be linked systematically and effectively in smart city projects?

- What defines a pioneering local authority when it comes to the use of innovative public procurement as a tool for societal and business development?
- What other local and regional authorities are desirable partners and that can share the most knowledge in terms of smart and sustainable urban development?
- How can more meeting places and arenas for sharing and new collaboration constellations be structured and facilitated?
- How can local passionate change-makers and entrepreneurs wanting to pitch and test out business ideas in our focal areas be seen and heard better?
- What financing options/sources are available for new, business-promoting smart city projects?
- How can the added value of projects resulting in multidisciplinary collaboration be made more visible?

6. Share and use open data

Facilitate the availability and use of data as the basis for greater efficiency, quality improvement, innovation and business development, while at the same time offering clear guidelines for data handling in order to safeguard ethics and citizen privacy. Facilitate increased digital proficiency in terms of understanding with regard to data use across all sections of society. Share with citizens the basis for decisions and priorities as part of efforts to create a more democratic society.

Challenges/obstacles

- Access to data and knowledge on how to use it – an increasingly important prerequisite for decision-making, developing new services and ensuring an open and enlightened democracy.
- A complex and unstructured data pool, often spread over numerous recordkeeping and management systems, makes it difficult to access high-quality key information data.
- Degree of openness: assessment of which data can and should be shared and who/which parties and organisations should have access to the sorting, interpretation and use of that data.
- Digital class divides in society in which entire groups of citizens are left behind or excluded.
- Risk of cybercrime.

Key questions

- What is the strategy for using open datasets for decision-making, developing new services and ensuring an open and enlightened democracy?
- How can a secure smart city infrastructure be developed founded on common data platforms and standards?
- How can increased access to public data and knowledge facilitate the greatest possible value creation?
- What is the current status in those areas the government has designated focal areas in public data (transport, map and property data, culture and research)?
- How can various types of data be collected, categorised and made available without compromising privacy protection and other security aspects?
- How can other public investments in protocols and standard infrastructure be dealt with?
- What approach is taken to ethical considerations as an integral part of everything related to open data?

7. Develop competencies and embrace change

Focus on how the internal development of expertise and collaboration within research groups, professionals and organisations, as well as the testing of new technology, can contribute to transition and innovation. Be mindful of the resistance to change that can occur within the organisation, but actively use employees as a valuable resource for knowledge and new ideas. Develop a unified organisation with a high level of digital expertise that has the authority to coordinate smart city initiatives across all departments. Make sure to spotlight the positive effects of smart city initiatives, both within the organisation and to citizens.

Challenges/obstacles

- Little willingness to accept change and risks.
- Need for increased digital competence.
- More and better multidisciplinary collaboration, both within the organisation and between local and regional authorities.
- Lack of knowledge of and expertise on smart cities as a concept, both in the public and private sector, as well as among the general population.
- 'Pilot death': solutions that are not successfully implemented and/or scaled.
- Existing systems, infrastructure and organisational structures that must be increasingly able to embrace complexity and new technology.
- Lack of standards, tools and culture for measuring smart city projects.

Key questions

- How can a higher level of participation, involvement and ownership be achieved among all employees in terms of digitalisation and other

technology-driven change processes that can help develop the organisational culture?

- Where and how can more be produced with fewer resources?
- What is needed to improve and reform a range of services that develop at the same pace as society (rapid prototyping)?
- How can innovative procurement processes in smart city projects be used to a greater degree?
- How can funding schemes and other incentives stimulate more spontaneity, creativity and innovation?
- How can our knowledge and expertise in terms of smart city thinking, concept development, technology and business opportunities be optimised?
- How can collaboration take place with research and educational institutions to ensure we are fully up to date on relevant technologies and processes that strengthen smart city development?
- What must be done to measure the effects and results of projects in a more effective and accurate way?

8. Act local, think global

Base efforts on the local identity, challenges and needs. Look to other Cities, municipalities, communities and collaborative partners for inspiration and opportunities. Formulate a plan for the national and international scaling and sharing of new solutions. Always consider how global frameworks, regulation guidelines and international standards within the smart city context should or ought to be followed. Find ways to collaborate with national public authorities to facilitate a joint technical infrastructure, organise funding schemes and formulate regulations.

Challenges/obstacles

- Limited knowledge about macro and framework conditions that affect local urban development and smart city projects.
- Too little sharing of experiences among Norwegian local and regional authorities, resulting in unnecessary duplication of efforts and more expensive solutions.
- No tradition for defining local challenges from a smart city perspective that include technology, cross-sector collaboration and citizen involvement.
- No plan for scaling or commercialising new solutions.

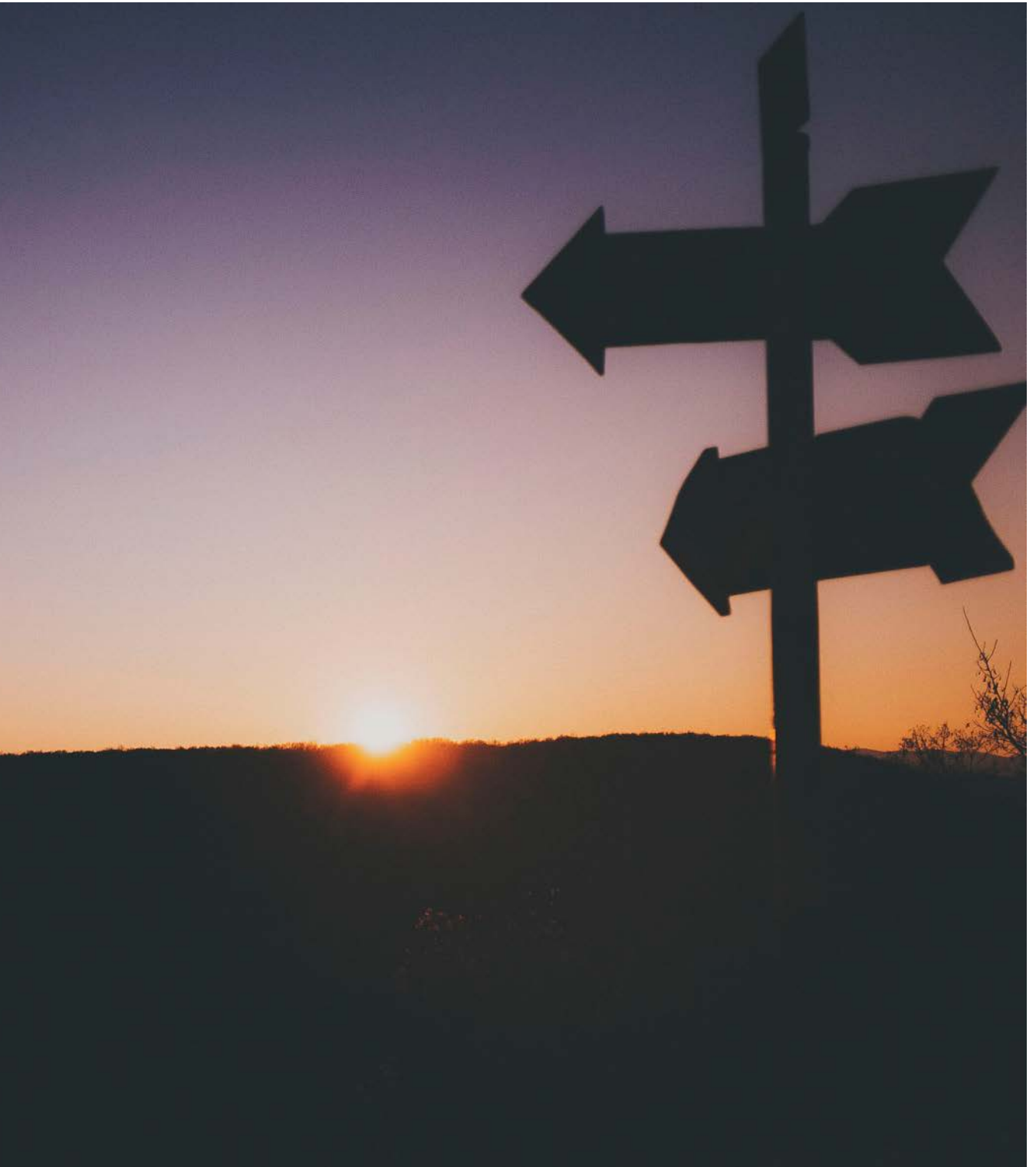
Key questions

- What are the local challenges that could be resolved better and more cost-efficiently through new technology, citizen involvement and collaboration?
- How can the experiences of other local and regional authorities with similar challenges be found?
- What projects are currently underway that can be defined as smart city projects that may involve several disciplines, departments and areas of expertise?
- How can project experiences be shared and perhaps even commercialised elsewhere?

08 Further development of the roadmap

The first edition of the roadmap was completed and launched in August 2019. With a timeframe up to 2030, the goal is for the roadmap to be a dynamic and living document that continuously evolves and builds on the visions and principles contained in it.





Appendices

a) About the process

The national roadmap for smart and sustainable cities and communities was initiated and developed by Design and Architecture Norway (DOGA) and the Norwegian Smart City Network in collaboration with Nordic Edge and Innovation Norway. To ensure broad involvement from a professional, sectoral and geographic perspective, around 150 contributors from all over the country, representing businesses, organisations and research and academic institutions, were invited to participate in three workshops from December 2018 to June 2019 and, in doing so, help formulate the visions, principles, challenges/obstacles and opportunities for smart and sustainable cities and communities described in the roadmap.

Between the workshops, regular meetings were held in the working group consisting of the following local authorities: Asker, Bergen, Bodø, Fredrikstad, Narvik, Stavanger, Trondheim and Ålesund. In addition, the roadmap has the support and guidance of a reference group comprising of representatives from the Ministry of Local Government and Modernisation (KMD) the Ministry of Climate and Environment (KLD), The Norwegian Association of Local and Regional Authorities, Agency for Public Management and eGovernment, Innovation Norway and the Research Council of Norway.

The roadmap is owned by everyone who uses it. Our goal is to achieve the broadest possible mobilisation and support for the goals and principles of the roadmap. It is only through effective collaboration across all sectors and disciplines that the desired effects can be achieved.

b) Definitions

Sustainability is defined as a development that meets the needs of today's generation without reducing possibilities for future generations to meet their needs (Brundtland Report, 1987). It is also defined as the framework for our efforts to achieve a higher quality of life for all people, in which economic development, social development and environmental protection are interdependent and mutually reinforcing (World Summit on Social Development, 1995).

Co-creation is defined as when two or more public or private parties work together to define problems and design and implement new and better solutions (Jacob Torfing, RUC).

Silofication is defined as a trend in which specialists in specific fields or areas of responsibility are not willing or able to collaborate across departments, government agencies and areas of expertise.

Pilot death is defined as the inability to scale pilots and test projects to create solutions that can be implemented on a larger scale and shared with or/and copied by others.

New technology as a collective term encompasses enabling **basic technologies** like artificial intelligence, algorithms, connectivity, 3D printing, blockchain, visualisation, sensors and big data. It also includes **system technologies** like autonomous systems, drones, 5G, digital twinning, IoT (Internet of Things), AR (Augmented Reality) and VR (Virtual Reality), cloud computing and robotics. What all of these enabling technologies have in common is that they are generic, i.e. can be used by all traditional industries and sectors.





HEY-HO LET'S GO