



D2.3 Scenarios planning methodology



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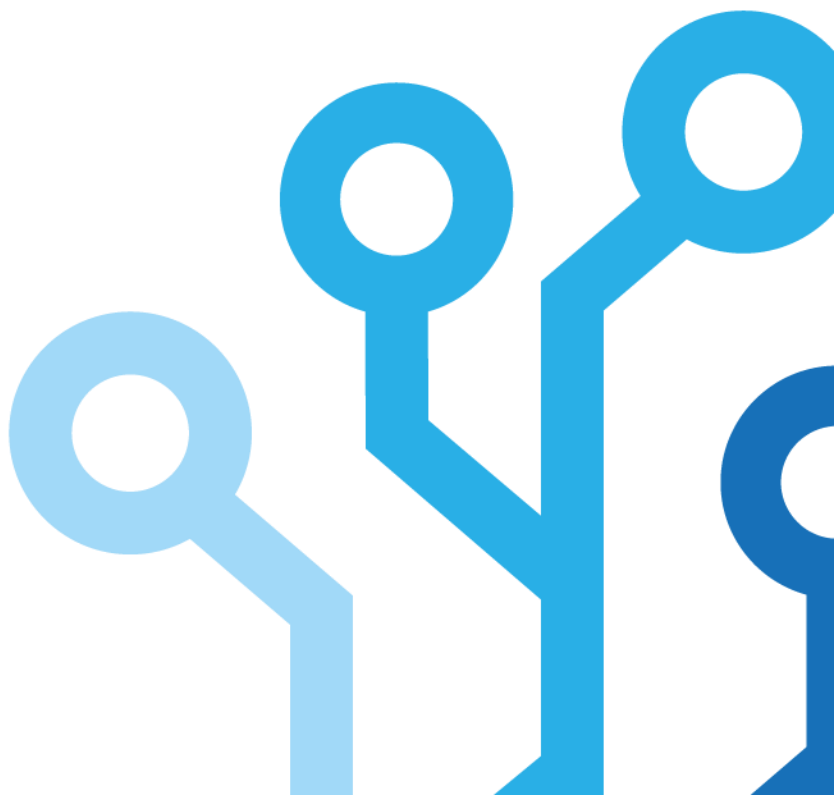


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'Cities are fast-moving things. The conventional wisdom even of the immediate past is not a good guide even to the immediate future.'

(The Economist, 2000, p. 63)

1 Objective of the report

The aim of this report is to provide methodological guidelines to conduct the Scenario planning exercise. It seeks to create links with health smart city challenges and help students to answer forward-looking questions. This report serves as a scenario development manual intended for students involved in ATHIKA project as well as those who are involved in the planning and development of smart city policies, new measures and strategies. The scenario method is most useful for those who need to assess different alternatives in the medium and longer-term and have to involve a range of different actors and conflicting issues.

2 Definitions

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Before going into the scenario planning process, it is required to define two terms: scenarios and scenario planning. While scenarios are structured accounts of possible futures and not predictions or forecast of a particular future, scenario planning is a method for thinking creatively about possible complex and uncertain futures, plausible description of what might happen. Scenario planning is a plausible description of how the future may develop, based on a coherent and internally consistent set of assumptions about key relationships and driving forces. Scenarios are one of the most popular and persuasive methods used in the foresight studies (Fig 1).

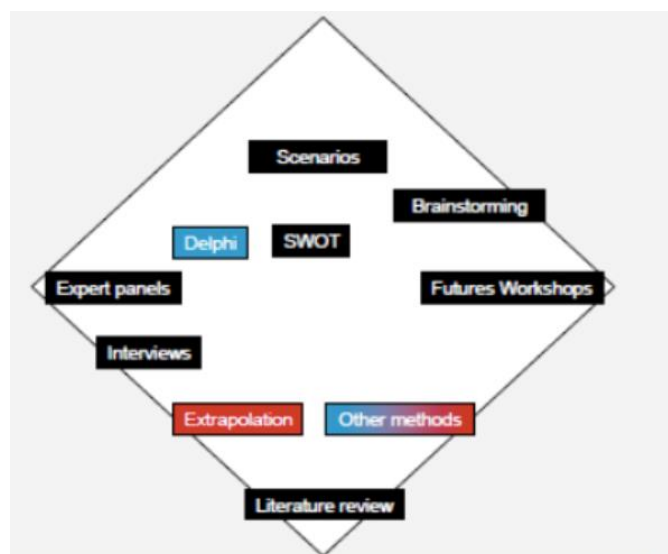


Figure 1 Europe's top 10 foresight methods (Popper et al. 2007)

Scenario planning asks questions about the future (e.g., What if people retire at their eighties? What if people live till their 120th? What if technologies allow to perform surgery at patients homes? etc.). Scenarios provide a context in which one can make decisions for smart cities future development prognosis. In general, scenarios help the students to perceive the dynamics of the smart city environment, recognise new opportunities, assess strategic options.

3 Introduction to scenario method

Scenario approach was created by business initially (Porter, 1985) traced back to 1970s when Shell International was pulling back from the multiplying the cost of raw petroleum (Shell, 2000). The planning techniques being used at that time had neglected any dynamic factors. The scenario method kept the company alive despite of rapid and unexpected changes in the global market. Scenario planning was applied as a practical tool to help to identify how a range of alternative scenarios can be built up in complex contexts and when future circumstances were uncertain. There are different types of scenarios found in the literature. Borjesone et al. (2006) has distinguished three main blocks explained below.

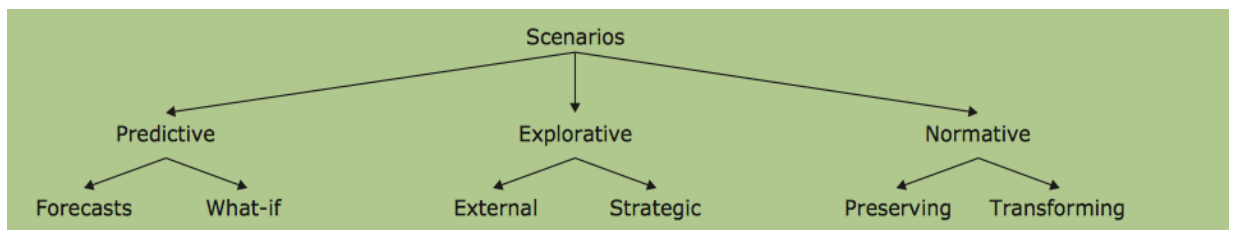


Figure 2 Type of scenarios (Börjeson et al., 2006)

The differences between the scenarios are detailed below in the Table 1.

Table 1 Type of scenarios and questions each scenario seeks to answer

Type of scenarios	Type of question scenario seeks to answer
Predictive Forecasts What-if	What will happen...? ...if the most likely development unfolds ...on the condition of some specified near-future event (e.g. outlooks)
Explorative External Strategic	What can happen...? ...to the development of external factors? ...if we act in a certain way?
Normative Preserving Transforming	How can a specific target be reached? ...by adjustments to current situation ...when the prevailing structure blocks necessary changes?

There are many different approaches to creating scenarios. There is no correct methodology of scenarios development or no single approach regarding scenarios (Godet, 2009, p. 11). Therefore, in order to identify a method appropriate and useful for ATHIKA, TG was assigned the task of developing the common scenario-building methodology which will be presented below in the following sub-chapters. The focus is to create a platform for “learning, awareness-raising, the stimulation of creative thinking and investigating the interaction of societal processes (van Notten, 2003, p. 5). Kosow & Gassner (2008) suggest a common derivation of five different phases of Scenario building; regardless of the approach. They can be summarised as:

- **Identification of the Scenario field:** outlining the purposes of developing Scenarios – topics contemplated, and boundaries are also object of definition.
- **Identification of key factors:** Central points that together can form a description of the Scenario field – they are variables, parameters, trends, developments and events to receive special attention during the Scenarios development process. Identifying such key factors requires knowledge of the Scenario field of interactions between the various key factors. The actual process of identifying these factors varies according to the Scenario approach being applied.
- **Analysis of key factors:** This analysis enables the widening of thinking around these key factors, which is an important feature of Scenario approaches. It tends to involve more intuitive and creative aspects. It is a critical step for a coherent visualisation of the various future developments.
- **Scenario generation:** Consistent factors are brought together and worked up into Scenarios. In this phase, the actual generation also depends on the Scenario approach being applied – it can range from narrative procedures to formalized mathematical techniques.
- **Scenario transfer:** This phase supports the application or processing of the Scenarios that have been generated to a useful format for the project/exercise according to the previous purposes and objectives.

4 Scenario planning process

Scenario planning begins by ‘painting a picture of the future’ at a given date (say 2030) and usually for a given location. Usually the process starts from baseline series of questions “what if?” covering themes ranging from future access requirements or the impacts of smart cities to possible political and economic drivers. Figure 3 provides an illustrative flowchart summarising these steps.

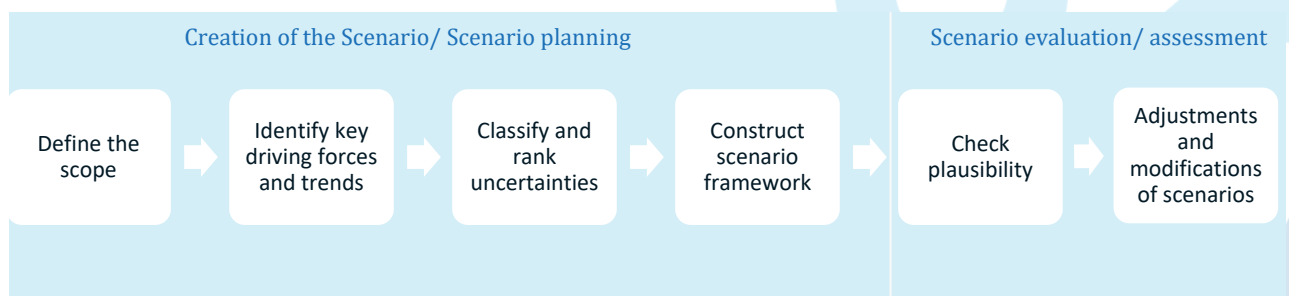


Figure 3 Scenario planning process

STEP 1 Define the scope

Before embarking on a scenario planning exercise, the students have to make it clear what issue they are seeking to address. The students need to determine how far into the future the analysis can usefully extend and what stakeholders to include. In other words, they need to define the proper scope and time perspective for the scenarios to be constructed. The first task for the students is the three questions to be answered at this point are:

- what issues of the smart city are you trying to address?
- who are the main stakeholders or actors involved?
- which are the actors and factors that drive change?

The idea is that students should have an opportunity to envision the future from different aspects/points of view. After the students have made a decision on the aspects(s) to be researched and defined the scope and time horizon for the scenario planning, this should be documented. Below is an example of framing statements for scenario planning exercise:

“Our objective is to understand the drivers of elders choosing remote health services over the next 5 years and how this might allow us to capture the growth of the market share shifting from the traditional healthcare providers”

STEP 2 Identify key driving forces and trends

At this step the students will identify and study the main forces that are shaping the future which are at the core of an effective scenario plan. Drivers are external factors (for example, economic growth; government policy; demographic change; social attitudes) that influence environment and have an impact on internal variables (for example, customer satisfaction; cost structure; quality; time to market; vision). An analysis of key forces is crucial for grasping changes in the healthier smart city environment and how these might unfold in future scenarios. In order to understand the factors that can affect students' thinking and be open to various ideas, it is advised to use ENDSTEP model referring to the forces that could surround the healthier smart city. These forces are grouped as following:

- Environment
- Natural resources
- Nature
- Demography
- Society
- Technology
- Economy
- Finance
- Policies

For example, the technological forces can drive change in many ways: for instance, petroleum becomes more expensive and requires for alternatives to be discovered, but at the same time environmental forces foster concerns with the sustainability of current practices.

This step requires to review key driving forces and their potential impact on the healthier smart city. Some trends can appear as obvious and easily forecasted, e.g. demographic forecasting. The students have to take into account various information sources as well as incorporate expert views in order to avoid possible gaps in the 'whole picture'. The students are asked to create a master list of forces (F) that could influence smart city environment (issue) for the chosen time frame (trends). The time frame usually falls between 5-15 years.

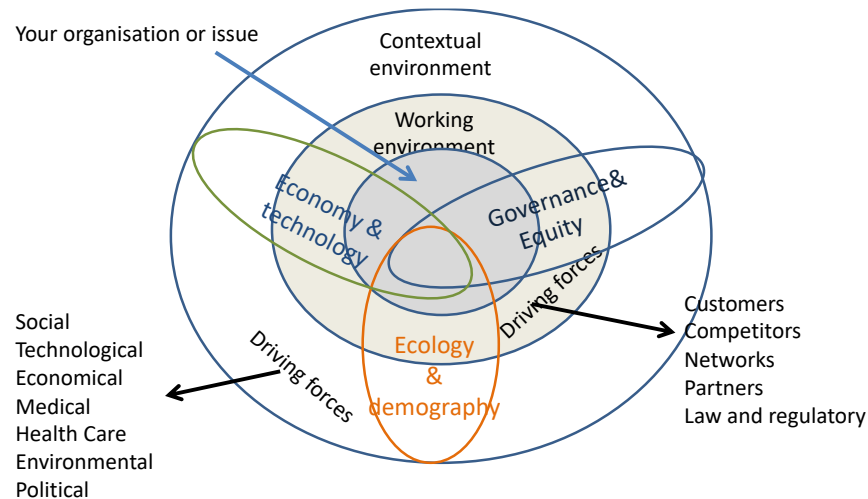


Figure 4 Different factors contribute and are driving forces for the development of our views of the future

Source: World Business Council for Sustainable Development

STEP 3 Classifying and ranking uncertainties

During the review process of driving forces, students are likely to discover various uncertainties. The students are advised to rank the uncertainties which are key in this process as the scenario direction can go various ways in the future. The recommendation is to classify the uncertainties according to timing and potential impact, therefore two questions to be answered at this point are:

1. How important is a particular force (in relation to the others) in shaping the future of the smart city (issue) (rank and combine)
2. How predictable is a force in terms of its overall direction and impact within the time frame of the chosen time frame (key uncertainties)

At the end of this step the students will have a list of 3-6 different key uncertainties (e.g. the technology may be at an emerging stage and there are many unknowns for the further R&D or necessary skills for specific technology may be in a short supply). An example of the ranking and classification is shown below.

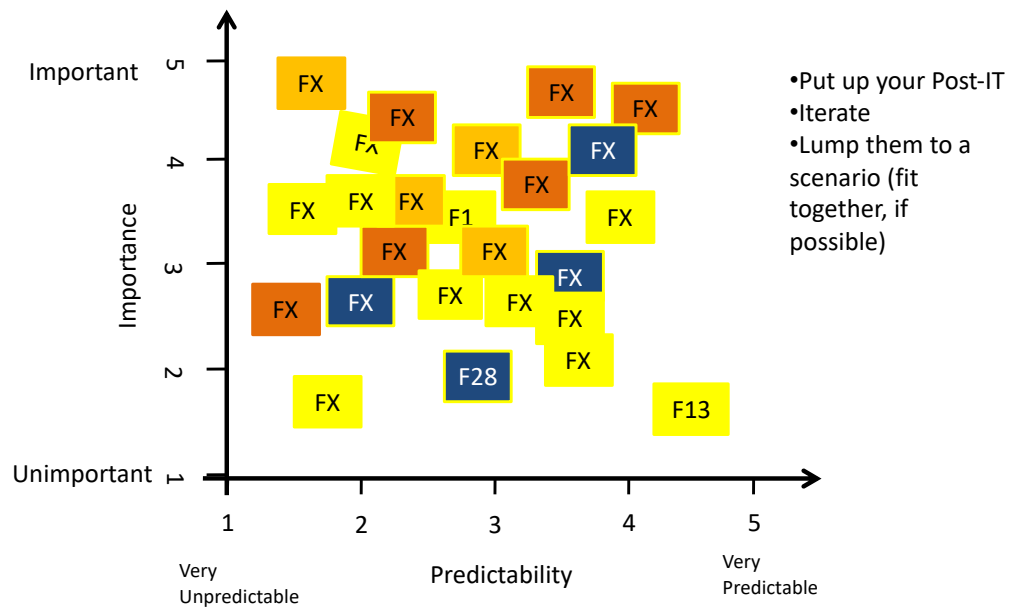


Figure 5 Classifying and ranking uncertainties.

Source: Edgar and Alänge (2014)

STEP 4 Construct scenario framework

This step sets out the basic characteristics of the scenarios that students will later elaborate. It may contain multiple criteria, while at the same time emphasising two or three key variables. A scenario is a rich description of a possible future constructed to explain how specific solution might develop given various forces and assumptions.

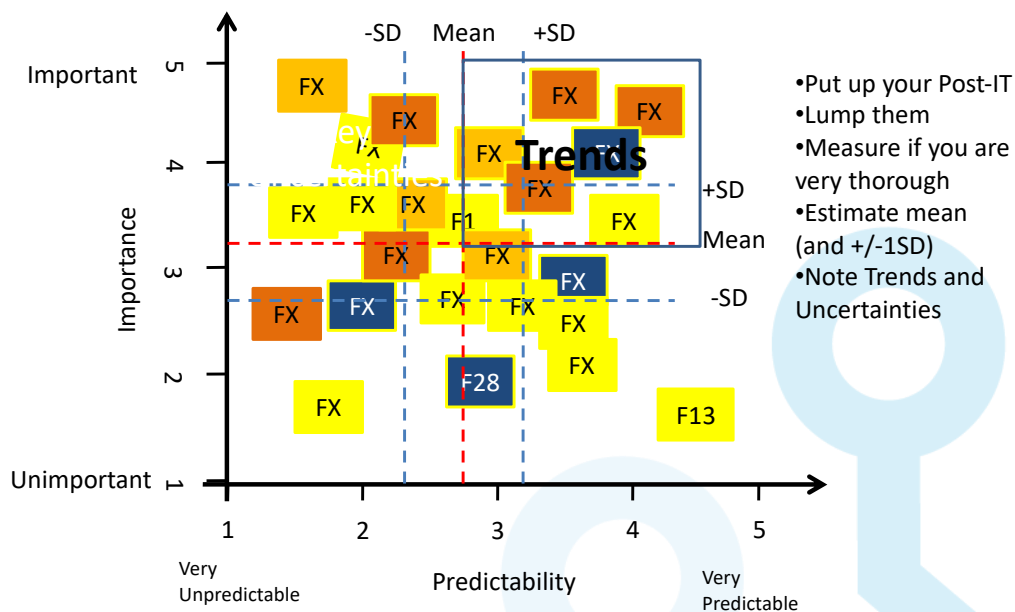


Figure 6 Constructing scenario framework (Note: SD – standard deviation)

Source: Edgar and Alänge (2014)

Four is often seen as the optimal number of scenarios — they give structure to responding to the vast number of future possibilities without causing confusion over the multiple ways all uncertainties could play out. Below is an example of a scenario planning by OECD:

Scenario planning in action: Exploring the future of space technology

A scenario planning investigation of the space sector and space applications was undertaken by the OECD as part of that organization's International Futures Program.

The aims of this project were to investigate:

- (1) the potential contribution the space sector and space applications can make in addressing major economic, social and technological challenges of the future, and
- (2) how OECD governments can help the space applications develop their potential and play a fuller role in meeting challenges.

Key project objectives included: assessment of the long-term prospects of the space sector, identification of promising applications, implications for legal/regulatory/policy framework reform, and strengthening of international collaboration.

A time horizon of 30 years was chosen.

Key driving forces identified were geo-political, socio-economic, and energy and the environment. The methodology included identification and investigation of key trends, core assumptions, and major uncertainties.

Three "synthesis" scenarios were developed, and named "Smooth sailing," "Back to the future," and "stormy weather".

These scenarios envisaged different possible worlds that could arise from combinations of geo-political, socio-economic, and energy and environment/technology trends. "Smooth sailing" corresponded to high levels of progress in technology, international cooperation, global prosperity, and a sufficiency of energy resources. "Back to the future" envisaged moderate technological progress, geo-political confrontations between East and West, moderate growth, and tension over resources. "Stormy weather" described low levels of technological progress, crises in international relations and economics, and tension over resources.

The implications of these scenarios were explored for military, civil, and commercial space sectors, over the medium- and long-term. Application categories identified were: information, transport, space production and related activities. Technological opportunities were explored in IT, communications, nanotechnology, new materials, launch systems, and satellite systems.

Promising applications identified for space technologies were: distance education and telemedicine, e-commerce via satellite, entertainment via satellite, location-based consumer services, location-based traffic management, land use – precision farming, land use – urban planning, land use – exploration, disaster prevention and management, environment and meteorology, and monitoring the application of treaties.

For further information see: Space 2030 (OECD, 2004).

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STEP 5 Check plausibility

Students should follow six questions in order to check the work completed so far:

- are the scenario statements plausible?
- is the timeline plausible?
- are all of the scenarios challenging enough?
- if we were to drop one of the scenarios, which one should it be? Why?
- are the scenarios likely to be relevant to the stakeholders who will be involved in the strategic conversation?
- what modifications would improve the scenarios?

STEP 6 Adjustments and modifications of scenarios

At this stage the students will:

- some details will probably need adjusting to improve the storyline or the descriptions in the set of scenarios;
- decide what format to use to present the scenarios to maximum effect.
- Tips for scenario write up
- Scenarios should be organised around the key questions detailed in STEP 1.
- Each scenario must present a credible and logical alternative view of the future
- Scenarios do not have to be mutually exclusive; in all cases, the differences have to be clearly explained and refer to different challenges across the key drivers.
- The completed scenario should include:
 1. A narrative description that sets out the major elements that describes each scenario.
 2. A listing of the key drivers that will determine whether the scenario prevails.
 3. The definition of the leading indicators that will provide early warning that a particular scenario is unfolding.
 4. Quantifiable metrics that allow the students to test strategies, plans or decisions for efficacy under each scenario.

5 Process of writing up the scenario during the workshop

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- Explaining the purpose of the workshop
- The workshop length should normally be beyond two-three hours.
- Use experienced facilitators
- It is recommended to invite guests who are knowledgeable on the smart cities and health, IoT topics and who could introduce the topic and its challenges (about 15 minutes)
- Use 'post it' boards so that all ideas and issues are captured
- STEP1 Detail research theme and problem: the participants provide information regarding the technical, environmental, political and other constraints that relate to the problem and research theme then provide the participants an opportunity to absorb and comment. Identify key issues and knowledge gaps (social, environmental economic and legal considerations)
- Participants engage in STEP 2, 3, 4, 5 preparing the baseline scenario (visualise if possible)
- STEP 5 output to be circulated with the peers for various opinions. Note the opinions down for the follow-up discussion
- STEP 6 review. At this stage, some details will probably need adjusting to improve the storyline or the descriptions in the set of scenarios; also, the students will decide what format to use to present the scenarios to maximum effect.

6 Considered scenarios

The following scenarios could be considered:

Challenge areas	SCENARIOS
#1. Coordination of Emergency Services	Route optimization for emergency transportation and resource consumption depending on the risk situation of the patient and the destination center
	Emergency fleet management and reduction in response time considering traffic parameters and availability of resources in destination centers
	Definition of an emergency transportation simulation model for emergency situations in urban settings, considering historical data of previous routes, to interact with other scenarios and visualize the impact of response time, number of resources and allocation
#2. Integration of primary care indicators and social/environmental determinants of citizen's health and wellbeing	Improved resource consumption in health/social care services, by measuring aggregated indicators in the different domains (health, public health, social services)
	Personalized and preventive health campaigns in urban settings, focused to vulnerable population (chronic patients, frail population, socially excluded and the like) based on health indicators in urban environments
	Definition of health and wellbeing indicators aggregating data from healthcare, socio-economic variables and urban environment factors
#3. Development of AI-powered preventative personalised participatory healthcare in the ageing society	The accumulating evidence of effectiveness improves data access, governance, and regulation, and leads to the gradual increase in investment and to the eventual wide-spread adoption. Proofs of economic gains, although not immediate, are starting to accumulate due to the growing evidence, and investment renews
	It becomes increasingly difficult for medical AI companies to demonstrate that their services both add value and cost-effectiveness to the existing workflows and control the risks, which leads to price reductions and declining revenues. It is soon revealed that providers that had already implemented medical AI solutions could hardly understand the advice they were getting from the decision support systems, and further audits show that risk factors previously interpreted as causes were mere associations induced by data biases and variations in care.
	The steady growth in investment intensifies after several high-profile successes, including confirmation of safety and efficacy of new drugs initially identified by AI, and validation of new preventative treatment strategies.
	CO2 emissions are reduced mainly as a result of the implementation of more efficient energy sources. CO2 is growing

#4. Transport Planning in the cities 2050 considering Climate Change and Public Health	even in the early years but began to reduce in the transition from fossil fuels to renewable sources of energy.
	Balanced policies in both public and private sectors are applied. There is an optimistic society, as a result of the ability of public institutions to implement and execute effective and profitable policies. There is a gradual process to reduce CO2 which does not have a negative impact on the GDP.
	The increase in traffic regulations, including maximum speeds, etc. induce the rise of public transport. Interurban traffic is reduced, in regards to short-distance trips. Initially, there is a fast process of CO2 reduction

7 Concluding remarks

This document has provided scenario planning methodology for the establishment of healthcare sector future development prognosis. The framework supports the development of dynamics of the business environment, recognise new opportunities, assess strategic options, and take long-term decisions. The identified challenges and solutions will further be refined by partnership to provide the best links between health smart city and a range of potential initiatives to be solved. 12

8 References

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