



# Development of a Smart City Matrix to assess the impact of innovative technologies

## Abstract

Based on the information related to sustainability actions, plans and strategies of cities, a Sustainable City Matrix (SCM) impact assessment tool was developed by the Smart Cities Institute (ISC) researchers of the Public University of Navarra (UPNA). This SCM is a powerful and practical tool to assess the impact of innovative technologies in any European city. It provides an initial quantifiable value to measure the degree of sustainability of corresponding city, in the form of a label. This labelling could help city managers, policy makers and urban planners to outline and appraise those actions, plans and strategies towards smart / sustainable urban environments, as part of the Smart Cities STARDUST project, but it can be used by any European city.

## Key points

Smart city matrix

Sustainability labelling

Impact assessment indicators

The SCM developed during the STARDUST project helps cities to assess their plans and strategies in pursuit of smart/sustainable urban environments. The matrix uses measurable information, uploaded by cities, to capture a 'big picture' of their sustainability and smartness.

More specifically, the SCM gives a label ranging from A++ to F, based on numerical values assigned to each smart / sustainable key performance indicator (KPI), which are taken from the following six categories:

- A- Urban Planning
- B- Mobility
- C- Housing
- D- Energy
- E- Production & Consumption
- F- Governance

These six categories are aligned with the 17 Sustainable Development Goals (SDGs) defined at the 2030 Agenda for Sustainable Development, and adopted by all United Nations Member States in 2015. In this respect, and given the scope and goals of the STARDUST project, such SDGs can be grouped into three main sets:

- Environmental
- Social
- Governance

Furthermore, the categories draw on the Principles for Responsible Investment (PRI)6, developed by the UN Environment Program's finance initiative, whose aim is to understand the investment implications of environmental, social and governance (ESG) factors. The PRI were developed in conjunction with the UN Global Compact's governance framework. Indeed, the UN's 11th Sustainable Development

Goal is pivotal: Make cities and human settlements inclusive, safe, resilient, and sustainable, as depicted in the figure.

Each of six categories has three smart and sustainable indicators, giving at total of 18 indicators, as seen below:

### A- URBAN PLANNING

- (A1) Sustainable land-use planning
- (A2) Renaturalisation and NBS actions
- (A3) Climate change adaptation measures

### B- MOBILITY

- (B1) Sustainable land-use planning
- (B2) Public transport services
- (B3) Pedestrian / Non-motorized transport

### C- HOUSING

- (C1) Private renovation and new construction
- (C2) Public renovation and new construction
- (C3) CDW and use of recycled materials

### D- ENERGY

- (D1) Energy production and consumption
- (D2) Management of energy networks / services
- (D3) Decarbonization measures

### E- PRODUCTION & CONSUMPTION

- (E1) Circular economy and life-cycle impacts
- (E2) Sustainable industry, business, and services
- (E3) Waste management

### F- GOVERNANCE

- (F1) Measures of socioeconomic development
- (F2) Environmental and climate policies
- (F3) Promotion of environmental awareness.

Each indicator is composed of a series of sub-sections (referring to actions, plans and strategies) with which a sub-score of each section is obtained. Each action is weighted regarding different smart and sustainable strategies planned by the cities, and it obtains a value from the corresponding indicators according to the level of implementation. With these values, each section obtains a qualification and a final sustainability label.

Furthermore, as one of the aims of the STARDUST project is to promote a carbon footprint reduction in urban environments, the SCM includes a carbon footprint indicator and offers a comparison with the European average. Thus, each initiative can be related to a corresponding carbon footprint, weighting its result with a possible reduction of CO2 emissions.

From preliminary information provided by STARDUST partner cities, the six sections of the SCM have been completed.

### Conclusions

The aim of the researchers from the Institute of Smart Cities (ISC) of the Public University of Navarra (UPNA), that developed the STARDUST SCM, has been to offer a powerful but simple-to-use tool to assess the impact of innovative technologies on any European city, avoiding overloading and overlaps. This assessment tool can offer an initial measurable value and a named labelling to quantify how sustainable the city is. Such labelling could help city managers, policy makers, and urban planners to define and evaluate actions, plans and strategies towards an improvement in sustainability and a reduction of its carbon footprint.



The six categories for Key Indicators of Performance, in the light of the 17 Sustainable Development Goals defined at the 2030 Agenda for Sustainable Development.

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