Evaluating Smart Cities' Sustainability: Smartainability

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Forum on Shaping smarter and more sustainable cities: striving for sustainable development goals

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Smartainability

Summary

- Methodology introduction
- Case study: Expo Milano 2015
- Guidelines
- Conclusions

Methodology introduction

What is Smartainability?

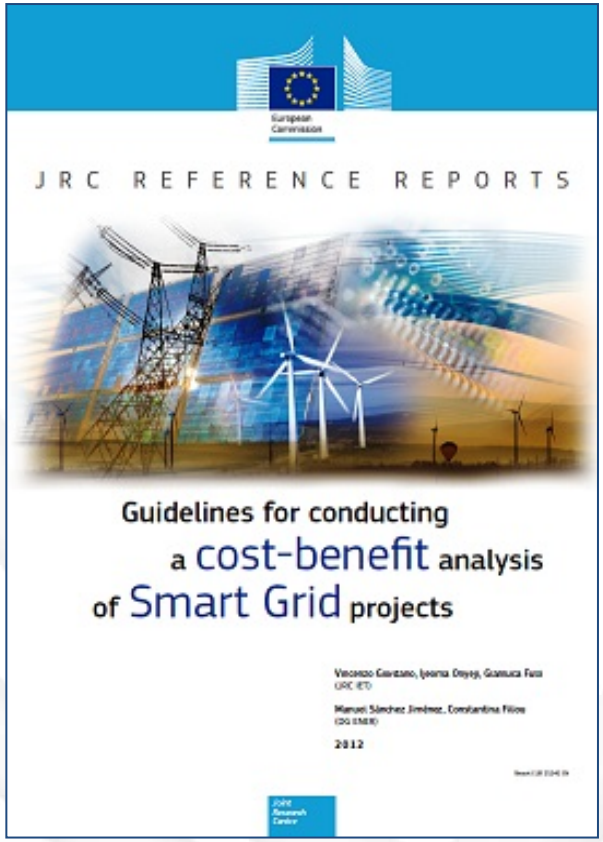
New original methodology to evaluate benefits generated by the implementation of innovative technologies within smart cities.

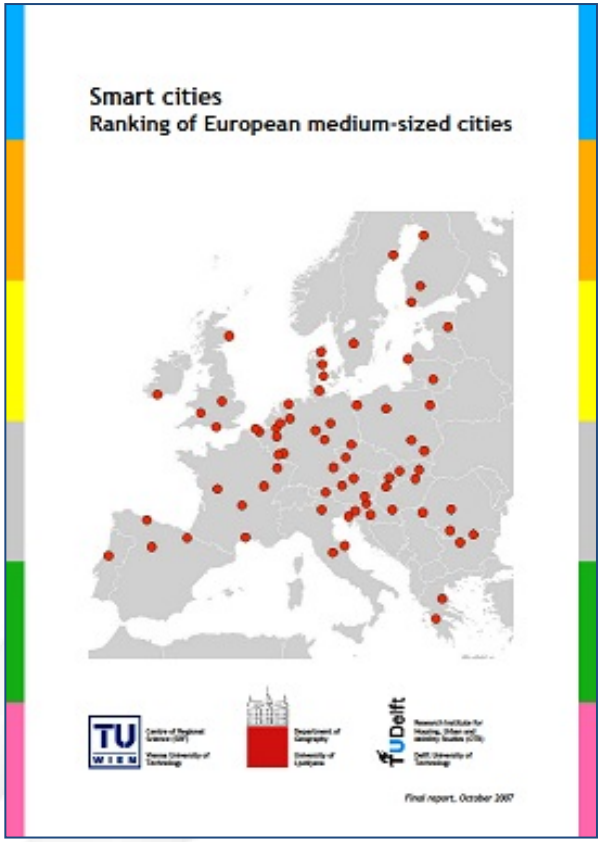
Benefits quantification is realized considering the difference between the performances of innovative technologies and traditional ones.

Smartainability allows to assess technological solutions enabling “smart” functionalities which improve environmental, economical and social conditions within urban districts or whole cities.

Methodology introduction

Smartainability methodologies



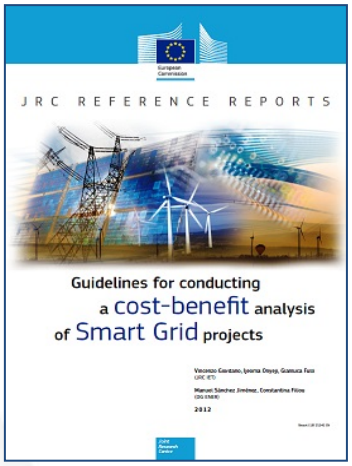


Smart Grids assessment

Smart Cities ranking

Methodology introduction

Smartainability approach

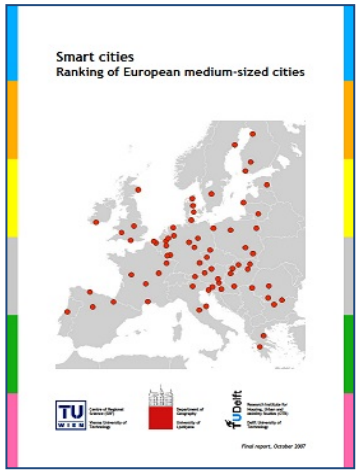


ASSETS

FUNCTIONALITIES

BENEFITS

KEY PERFORMANCE INDICATORS - KPI



Analysis dimensions:

- **Environment**
- **Economy**
- **Energy**
- **Living**

Methodology introduction

Assets-Functionalities-Benefits-KPIs Matrix

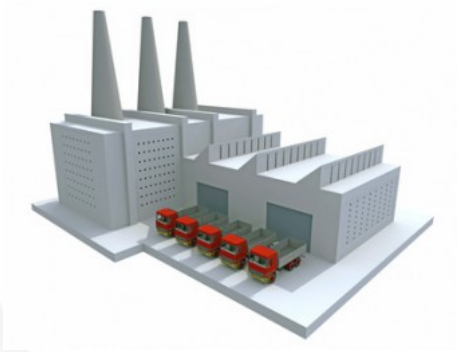
ASSETS	FUNCTIONALITIES		
	Functionality 1	Functionality 2	Functionality n
Asset 1	✖		✖
Asset 2	✖	✖	
Asset n	✖		✖

FUNCTIONALITIES	BENEFITS		
	Benefit 1	Benefit 2	Benefit n
Functionality 1		✖	✖
Functionality 2	✖	✖	✖
Functionality n			✖

BENEFITS	KEY PERFORMANCE INDICATORS - KPI			
	Environment	Economy	Energy	Living
Benefit 1	✖	✖		
Benefit 2		✖	✖	✖
Benefit n			✖	

Methodology introduction

Life Cycle Perspective



PRODUCTION

USE

DISPOSAL

Case study: Expo Milano 2015

Goal of the analysis

Assess with quali-quantitative indicators the sustainability of innovative technologies, enabling smart functionalities, deployed within the Expo Milano 2015 Digital Smart City

Case study: Expo Milano 2015

Technology clusters

Energy distribution network and Lighting system

Telecommunication network and Telepresence

Mobility

Case study: Expo Milano 2015

Overall results

Dimension	KPI	U.M.	Energy distribution network and Lighting system	Telecommunication network and Telepresence	Mobility
Environment 	Greenhouse Gases	t CO_2-Eq	-20761	-702	-132
	Acid Gases NOx	t NOx	-34.31	-1.67	-1.76E-01
	Acid Gases SO_2	t SO_2	-60.29	-1.77	-2.60E-01
	Particulate PM10	t PM10	-5.19	-0.14	-1.11E-02
	Particulate PM2.5	t PM2.5	-3.92	-0.11	-1.73E-02
Economy 	Costs	€	-5425432	-838843	-69651
	Costs variation by energy service suspension	-	-58%		

Case study: Expo Milano 2015

Overall results

Dimension	KPI	U.M.	Energy distribution network and Lighting system	Telecommunication network and Telepresence	Mobility
Energy 	Energy used	MWh	-28580 ÷ -36580	-836	
	Primary fossil energy used	MWh			-1488
	Renewable energy used	%	+5%		+798%
Living 	Service suspension number	-	-25%		
	Service suspension duration	-	-45%		
	Saved time	-		High	+3.3%
	Information points	-		High	
	Foiled cybernetic attaches	-		High	
	Simultaneously connected users	-		High	
	Services and applications availability	-		High	
	Effectiveness decisions growth	-		+9.7%	
	Exposure index	-		High	
	Customer engagement	-			High
	Driving stress level	-			Low

Guidelines

What's inside

Methodology consolidation in guidelines to repeat the assessment in other «real» case study

Definition of the main terms of the analysis

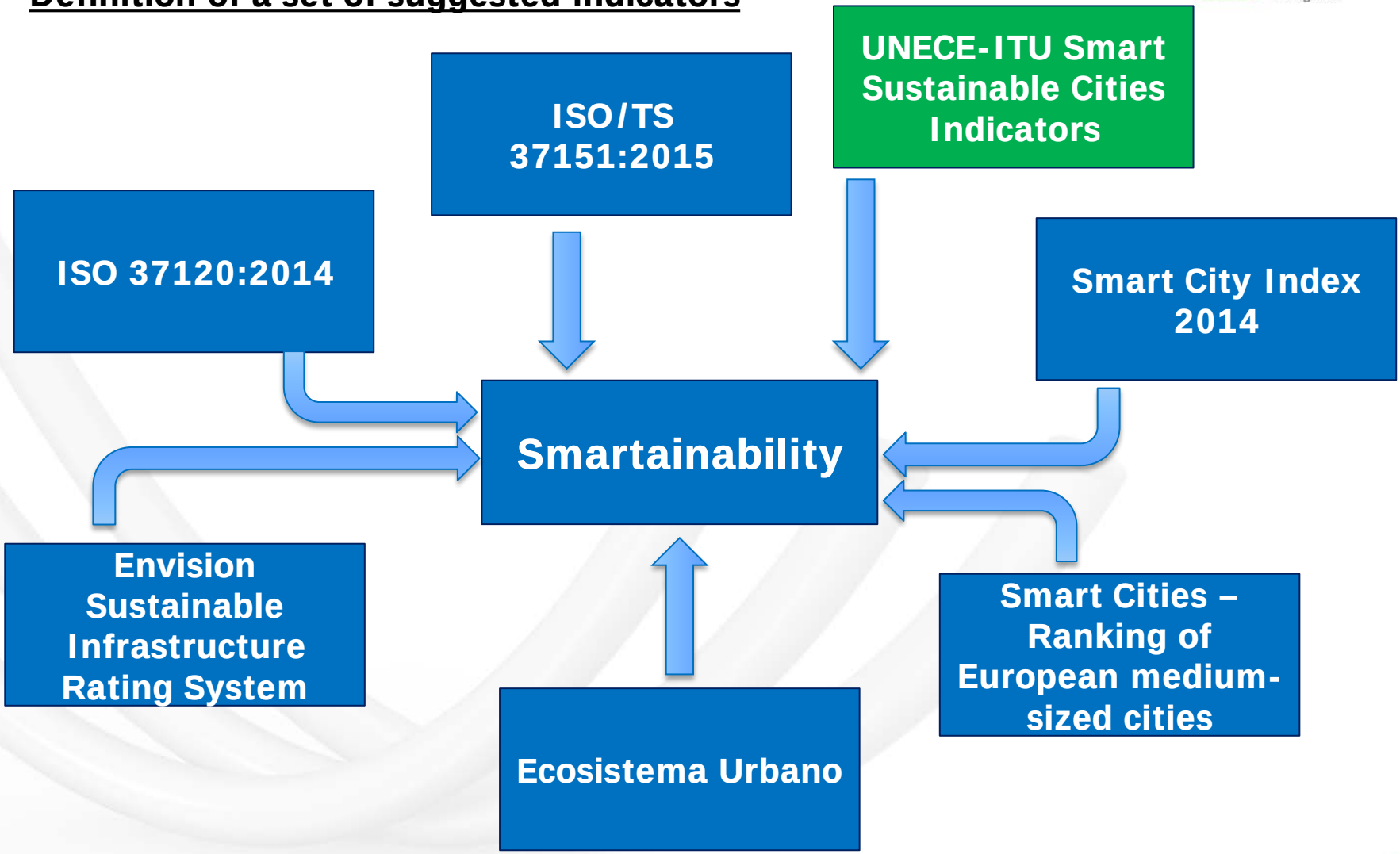
Identification of further analysis dimensions

Creation of a set of suggested indicators

Detailed description of all the steps of the analysis

Guidelines

Definition of a set of suggested indicators



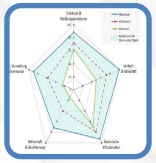
UNECE-ITU and Smartainability

Opportunity of integration

Many sustainability indicators sets

Many smartness indicators sets

UNECE-ITU smartness & sustainability Indicators



City profile: based on a set of development indicators , containing specific policy recommendations for “smartening” the cities

Based on Assets-Functionalities-Benefits-KPIs approach

Focus on benefits quantification rather than assets

Able to integrate other KPIs sets

Able to support ex ante evaluation and not picture of existing situation

Support in city planning towards sustainability by means of smart city paradigm

Conclusions

Smartainability features

- New original methodology
- Ex-ante evaluation of innovative technologies
- Aimed at support planning rather than city evaluation
- Quantitative indicators consolidated in guidelines

Thank you for your attention

“Smartainability® is a project financed by the Italian fund “Ricerca per il Sistema Elettrico Nazionale”, decree of Italian Economic Development Ministry November 9th 2012 and following”

Next steps

Sharing Cities project – SHAR-LLM

ENERGY
- **Public and private buildings energy retrofitting**

MOBILITY
- **E-car sharing**
- **E-bike sharing**
- **E-Log**
- **Smart Parking**

ICT
- **Data collection**
- **Data analysis**

Milano

Comune di Milano

Strength and weakness points

- Ex-ante evaluations
- Indicators evaluate benefits, not functionalities / assets
- Sustainability and smartness combined evaluation
- Monitoring / evaluation ex post thanks to KPI

- Partners provide data without impartiality
- KPI assessment based on estimated values and hypothesis

Smart technology features

It's able to communicate, even in both directions (obtain and provide information)

It's checked in remote or provided of local intelligence which allows to adapt to several situations (adaptation)

It predicts market tendency waiting for economies of scale