

# Integration Methodology for Smart City Design

## —Application of CHORA's Urban Gallery in the Case of the SSD-Project ,EU.

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**Abstract.** Factor 4 improvements represent a critical leap forward in district planning and management in the future. SSD is an innovation project comes from EU, and holds workshop in Technology University of Berlin, Germany. It is an innovation plan helps us achieve Factor 4 improvements in a range of climate change and sustainability measures for the Cities. SSD can provide a platform to offer important digital tools to better understand current states of the urban environment. The platform would also include tips for leading more sustainable lifestyles and inform about innovations in the district, resulting energy and resource reduction through behavior change and awareness. Its main differentiator to general available offerings is the integrated and interlinked data and tool core while being open and modular. The Urban Gallery lays a strong theoretical foundation for it.

### Introduction

SSD means Smart Sustainable Districts. It is a large-scale urban design project financed by bodies of the European Union. Its partners with some of the highest profile and aspirational district level developments in Europe to help them achieve Factor 4 improvements in a range of climate change and sustainability measures.

The focus of SSD will be on three things: first, collating the tool box of Climate-KIC partner products and services; second, developing new ways of integrating the tools and services to provide factor 4 improvements; and third, co-developing and applying these innovations with the six selected districts of Europe (Morbit in Berlin, Nordhaven in Denmark, Johanneberg in Sweden, QEOP in UK., St. Ouen in France, and Utrecht in Netherlands). The project added value comes primarily from the second and this is where most effort is focused. It will provide added value in areas where significant investment is already delivering or planned to deliver, exemplar developments. It will focus on both a dramatic level of integration, across much of the Climate-KIC portfolio, and substantial co-development with the most significant district projects in Europe. It will be used as a test-bed for replication of sustainable smart city systems delivery in other cities.

### Integrated Implementation Method of SSD

SSD partners with some of the highest profile and aspirational district level developments in Europe to help them achieve Factor 4 improvements in a range of climate change and sustainability measures. SSD aims to capture and integrate new products, tools, services and capabilities that enable districts to boost resource efficiency and reduce energy consumption.

The project addresses climate change and mitigation needs specific to individual districts and works with them to co-develop bespoke solutions.

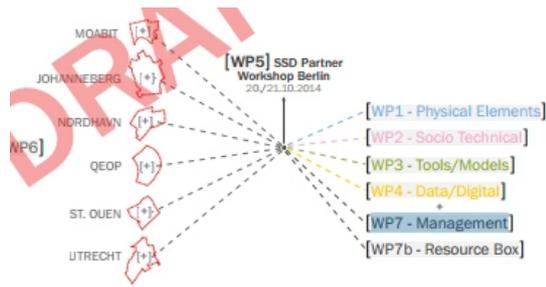


Fig.1. Work Package 1-7

Developers, planners, and city system operators in each of the districts have access to the best innovations from across Climate-KIC’s 200+ partner network of climate change experts working in the private, public, and academic sectors. Partners apply their industry experience and integrate the most relevant innovations, entrepreneurial, and educational solutions and strategies at district level.

The Integration methodology and key instrument of the SSD project for establishing and applying ‘Integrated Solutions’ from the offerings of the Resource Box to the selected districts. Whilst each and every SSD resource available on its own has the capability of positive impact on the issue of climate change. It is believed that only integrated solutions will start to deliver innovation for the kind of savings set by the Factor 4 principle.

Work Package 1-7 are the main components of SSD integration vehicle.(Fig.1.)They will provide much of the Climate-KIC added value as it will take a holistic view of where the market opportunities are to integrate existing pockets of excellence to support high impact systemic approaches to smart, sustainable districts. This innovation begins with the Integration Vehicle informed by the Districts and SSD requirements. It acts as a catalyst initiating the development and delivery structure for integrated solutions in the core districts. The components of the Integration Vehicle are made up of a curatorial group of partners, the Resource Box as a filter, and the four layers of SSD resources available to the project.(Fig.2.)

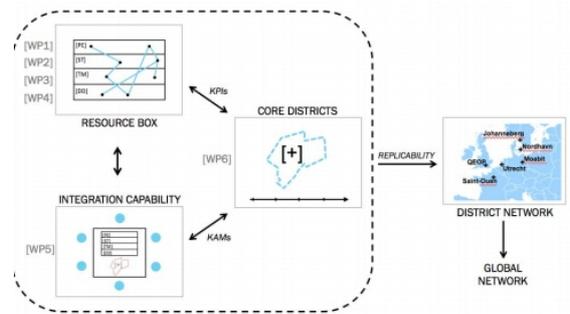


Fig.2. the Integration Vehicle Development

This approach forms the main competitive edge for the SSD to make real and significant impacts. The Integration Vehicle will guide the application process for different kinds of integrated solutions and steer any opportunities for these to be reapplied both within the project and through external tenders. The initial progress of integration is dependent on the progress of the districts and the collaboration of the resource box layers represented by Work Packages 1-4 and 6 in order to establish co-working delivery mechanisms within and outside of SSD.

SSD and all the Work Package will innovate by demonstrating that Factor 4 in urban development can be done, and it creates a form of business model through the combination of Integration Vehicle and Resource Box that can lead to increased financial sustainability by creating new capabilities.

**Integration Protocol**

Integration Protocol is a practical implementation and deepening of the initial Integration Workflow Diagram. This is a step-by-step description of an integration workflow. The protocol is work in progress and is a follow-up on the two integration dry-run workshops at TU-Berlin. The Integration Protocol is a main guide for the execution of the final SSD workshop on integration. They consist of a

business as well as an energy efficiency section, were added as a new game element to capture specific information about the integrated solutions and to better curate the outcomes of the workshop.

## Integration Workflow

The contents of the resource box will be filtered selectively according to specific Use Cases that apply to districts. The work-flow of this process is very iterative.

### Stage 1- Populating Resource Box

The purpose is to populate the Resource Box with as many partner resources as possible. We want to create a diverse database of resources in order to maximise the flexibility and applicability of the Resource Box in relation to district needs.

### Stage 2-Keyword Search& Resource Assessment

The next stage is to filter out resources from the Resource Box that are most relevant to specific Use Cases. Use Cases are identified from an analysis of the current medium list of districts. The first Use Cases to be tested on will be the most common ones from the medium list. A keyword search is applied to the Resource Box database to filter out all relevant resources to each use case. This gives us a long-list of possible resources that could be used to solve the use case.

This long-list is then analysed in order to establish testing criteria to further filter the resources. A template is formulated and sent out to the partners. This template will test the resources according to performative criteria, resulting in a short-list of resources. The short-list resources are then scrutinised by committee, and the final resources are selected to take forward to the integration process.

### Stage 3 – Iterative Integration

During the integration process, we may find that one of the resources is not really suitable for this particular use-case, perhaps because it does not integrate well with the other resources. In this case, a feedback loop is introduced to go back to the short-list (or even the long-list) to find an alternative resource. This iterative process continues through the development of an integrated solution for the given Use Case.

### Stage 4 – Implementation

Once an integrated solution has been developed, it will be implemented in one or more districts that are applicable. Tweaks are likely to be needed for the integrated solution to be moulded to the specific conditions of each district. Eventually the implemented solutions will be tested for factor 4 performance. The testing result can be fed back to further develop the integrated solution. (Fig.3.)

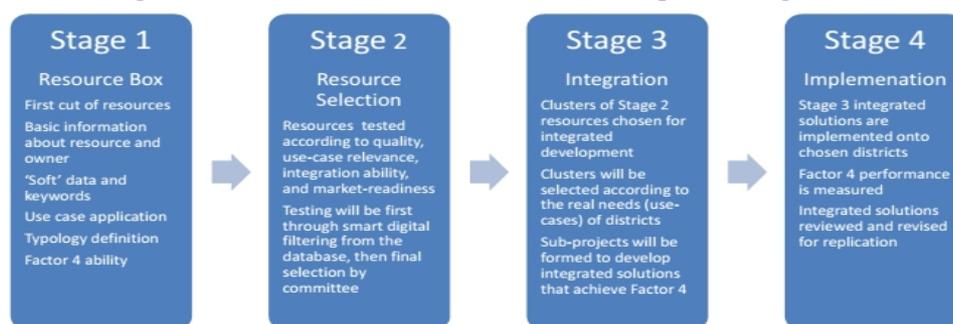


Fig.3. the Initial Integration Workflow Diagram

## Integration Game

The Integration Game reflects the methodology as a training exercise for all attendees to participate with, bringing different opinions and expertise together matching their roles as District representatives, SSD resource box layer specialists or integration curators. It is a game designed to create a simulated environment of the real challenges that are being faced during the SSD project.

The ingredients and rules of this simulation were derived and adapted jointly by Work Package 5 during the two dry-run workshops. The Integration Cards (District Opportunity Cards, Challenge Cards and SSD Resource Box Cards) are essential elements in this simulation.

They were collected before the workshop in a joint effort between all Work Packages and contain an overview of information brief enough for a flowing game and detailed enough to make the integration process meaningful and close to real life scenarios. The format and content of these cards has adapted after each dry run and is likely adapt further as part of this process. They have an inherent relationship with the Resource Box architecture and work of WP7b, which acts as a filter, facilitating the work of the Integration Vehicle and its related processes. (Fig.4.)

### Workshop Berlin,Germany

The need for ‘dry-runs’ was established at the first SSD conference in December 2013, to ensure that the consortium internally practice the work-flows of the project before working directly with real district stakeholders.

The first Dry Run Workshop( TU-Berlin, 19.08.14) focussed on introducing the clustering process and the working materials.The second workshop (TU Berlin, 09.09.14)introduced a greater level of detail with further improved metrics and an emphasis on the actual process of clustering relative to potential implementation periods. The second Dry Run Workshop already launched a first draft of the so called “Table Games”. WP5 attendees agreed that the approach needed greater definement and a protocol was developed to sit alongside the Integration workflow diagram shown overleaf.

One of the greatest challenges after the dry runs and in preparation for the SSD Partnerworkshop in October 2014 was to increase both the number of Resource and District cards and the level of detail on each card.The SSD WP5 Integration Workshop on the 20th and 21st of October was the first step towards achieving these goals, a dry-run of the real-life situations that we will face in the districts. The workshop outcomes include business as well as resource efficiency aspects and already start to form tangible propositions for the near future. The approach to these was loosely based on the Business Model Canvas adopted on various other Climate KICs and remains a potential next step for initiating real projects.

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### Summary

Non-SSD solutions tend to be serving only specific markets and industry segments. Through this strongly emphasis on the individual verticals and overall system view is barely possible. Further these solutions mainly focus on professional users, sharing content with end-users, such as stakeholders or tenants where SSD aims at delivering almost instant public engagement from the very start. Its main differentiator to general available offerings is the integrated and interlinked data and tool core while being open and modular. As Europe's forefront research project of smart city, Urban Gallery-based SSD will provide the innovated ideas for the future of Chinese smart city design.

### References

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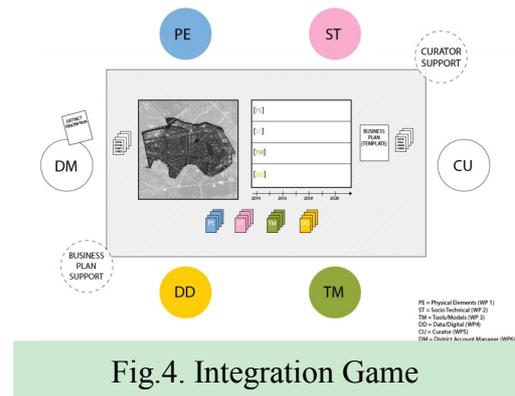


Fig.4. Integration Game

[2] CHORA City& Energy,TU-Berlin, Integration Vehicle Manual-Smart Sustainable Districts, December.(2014)