

Integration of Climate Change Effects in Local Models and Urban Planning Processes

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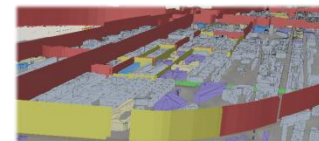
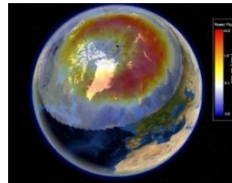
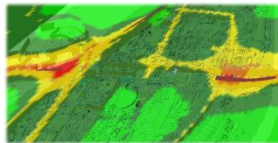


Topics

- SUDPLAN Focus
- From GCM to Urban Planning
- Benefits for Urban Planners
- Software approach
- Climate data
- Pilot Applications
- Summary

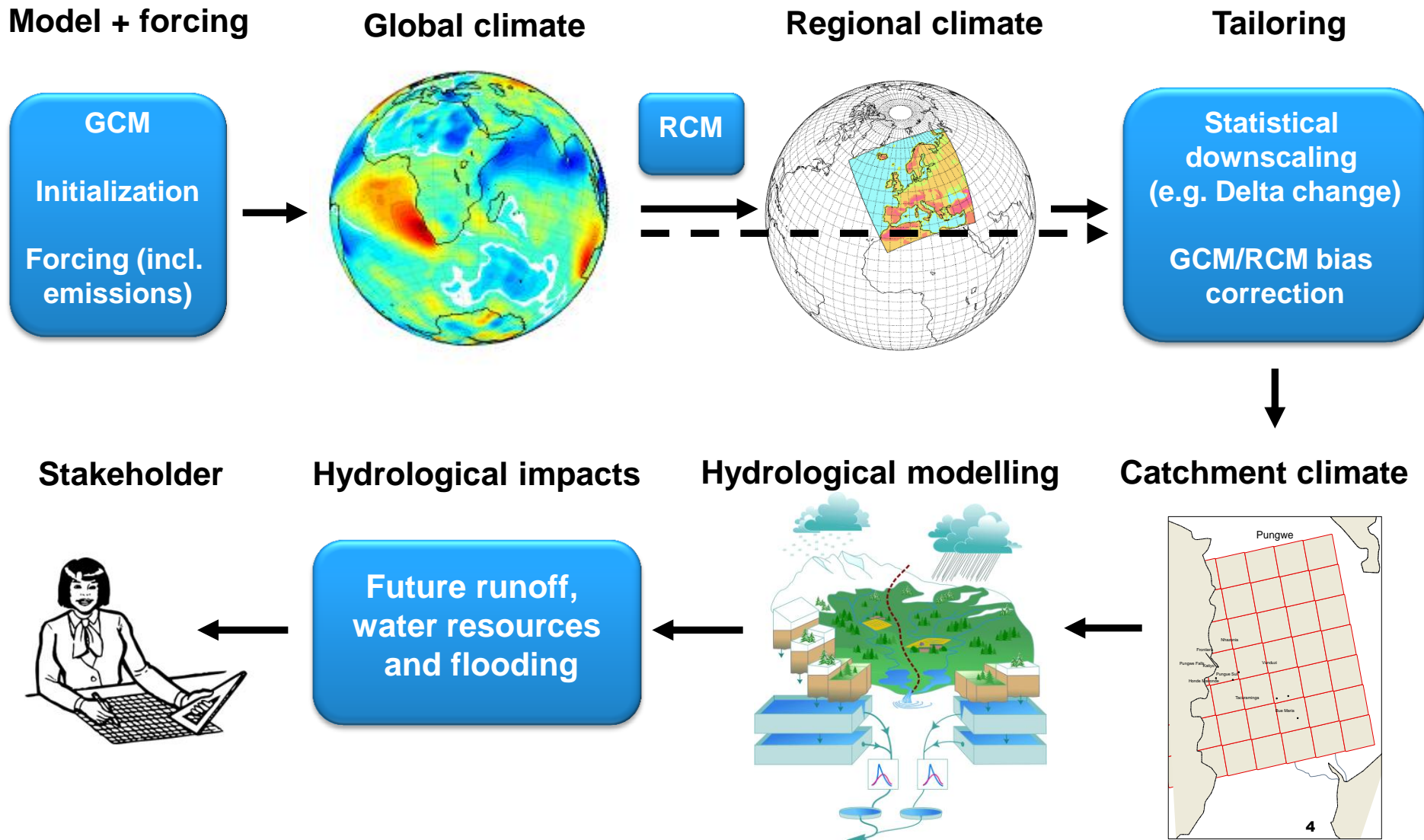
SUDPLAN FP7 Project

- Climate is changing!
 - But how will this change affect our lives in the city?
 - How can urban planners infuse the effects of climate change in their planning processes?

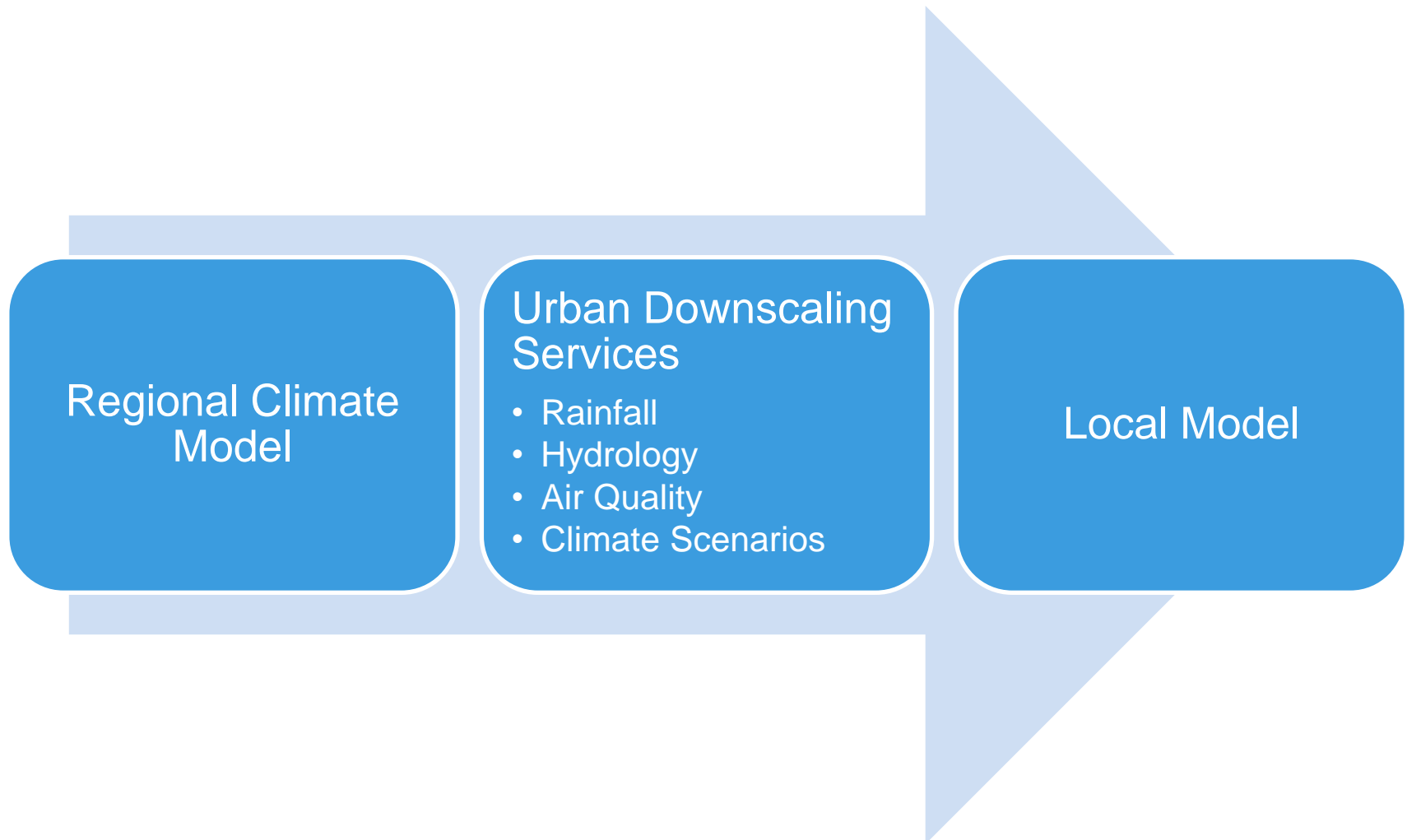


→ develop a web-based **planning, prediction and training tool** to support **long term urban planning** including the **effects of climate change**

From global climate to local stakeholder

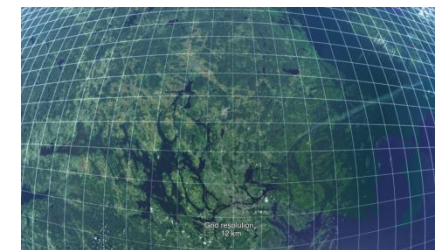
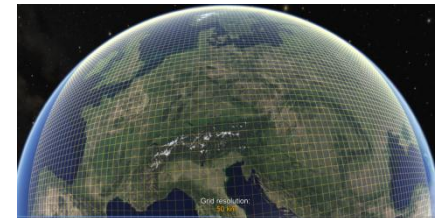


Climate Change Infusion



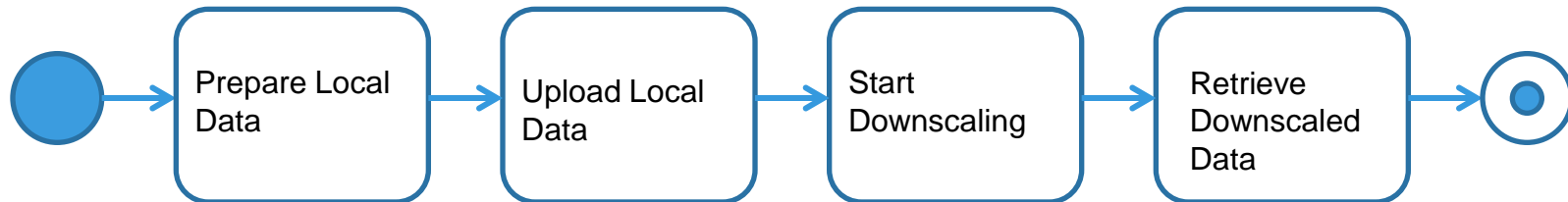
Urban Downscaling

- Downscaling to local scale is required
 - Local scales may vary
 - Process is computationally expensive
 - Other requirements from local data
- do it **interactively for a selected region** with **known local conditions** that can be used to **increase the local resolution**



Retrieval and use of urban scale data

- Local data is used to improve the downscaling model results



- The downscaled data can be used just like the regular local data e.g. local models can be fed with downscaled data



→ This infuses the effect of climate change into the local model

Urban Planners perspective

SUDPLAN provides the means to:

- Downscale **rainfall**, **hydrological conditions** and **air quality** taking climate change into consideration
 - Use this data as an **input for local models**
 - Support the integration, visualisation and information management of local planning scenarios
- ➔ **Integrate the effect of climate change in urban planning processes** on all levels from Master Plan to the individual permit

Benefits

- Planners can use their conventional local models to produce local climate change dependent model experiments (local scenarios)
- Local scenarios can be used for urban planning purposes (*Just like the conventional model results*)
- Downscaled data based on different climate scenarios can be used as input to local planning scenarios to illustrate the uncertainty of the climate change effect
- Possible climate change effects can be identified and thus sound adaptation strategies can be considered in the plan

Software Approach

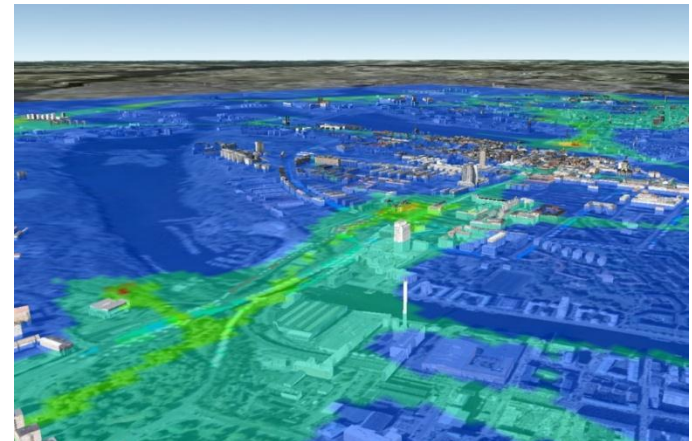
Provide 2 Building Blocks

- Services providing climate change information on an Urban Scale

→ Common Services

- Scenario Management Platform to support tasks involved in Urban Planning

→ Scenario Management System

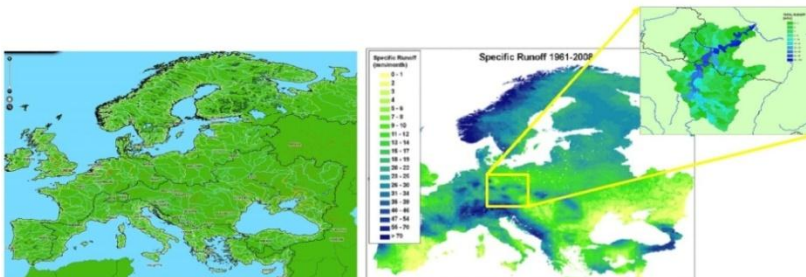


Common Services

- Provide Climate Scenario data on an European scale, available for every city. Also provide access to models capable of downscaling data to city level
- All models and results are accessible through OGC service interfaces (SWE)
- City specific input improves the accuracy of the results

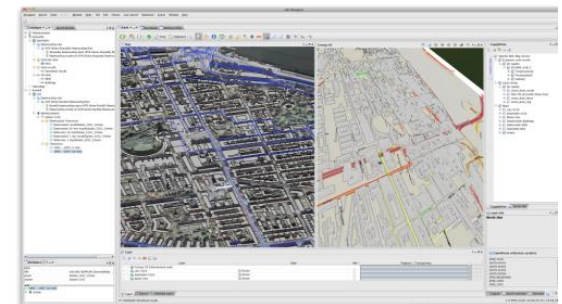
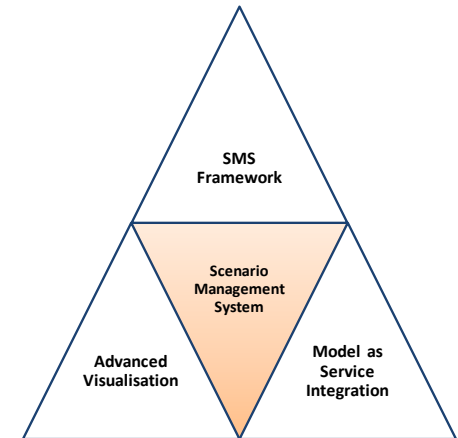
Functionality provided

- **Rainfall time** series and IDF downscaling
- Storm water generator
- **Hydrological conditions** and river runoff downscaling
- **Air quality** downscaling

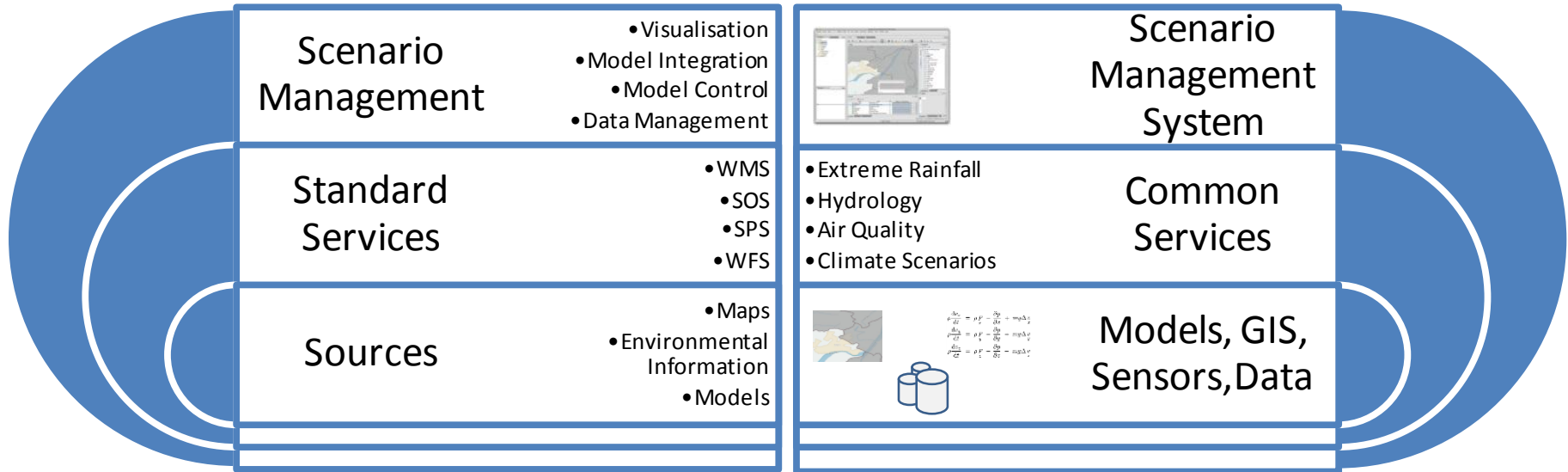


Scenario Management System

- highly interactive, 3D/4D graphics-based, DSS-environment (scenario management system)
- Users define, manage, execute & explore different decisions & simulate decision scenarios
- visualisation, comparison & documentation of different decisions
- Provides UI for Common Services



SUDPLAN Layers



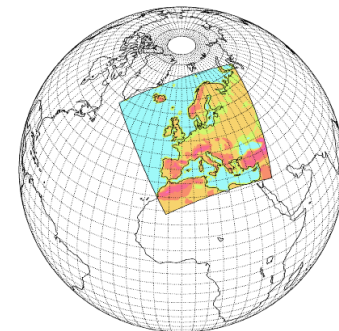
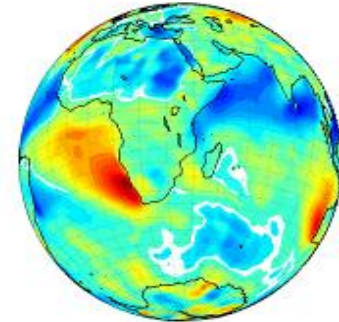
Climate scenarios

- Generally, the major sources of uncertainty in future global climate simulations are 1.) the type of model used and 2.) the assumptions used to estimate future GHG emissions
- SUDPLAN uses an ensemble of four scenarios representing three leading global climate models:
 - ECHAM5 (Max Plank Institute, DE)
 - HADCM3 (Hadley Centre, UK)
 - CCSM3 (UCAR, USA)and two IPCC emission scenarios:
 - A1B (used in all models): Integrated world with balanced emphasis on all energy sources.
 - A2 (used in ECHAM5): Divided world.

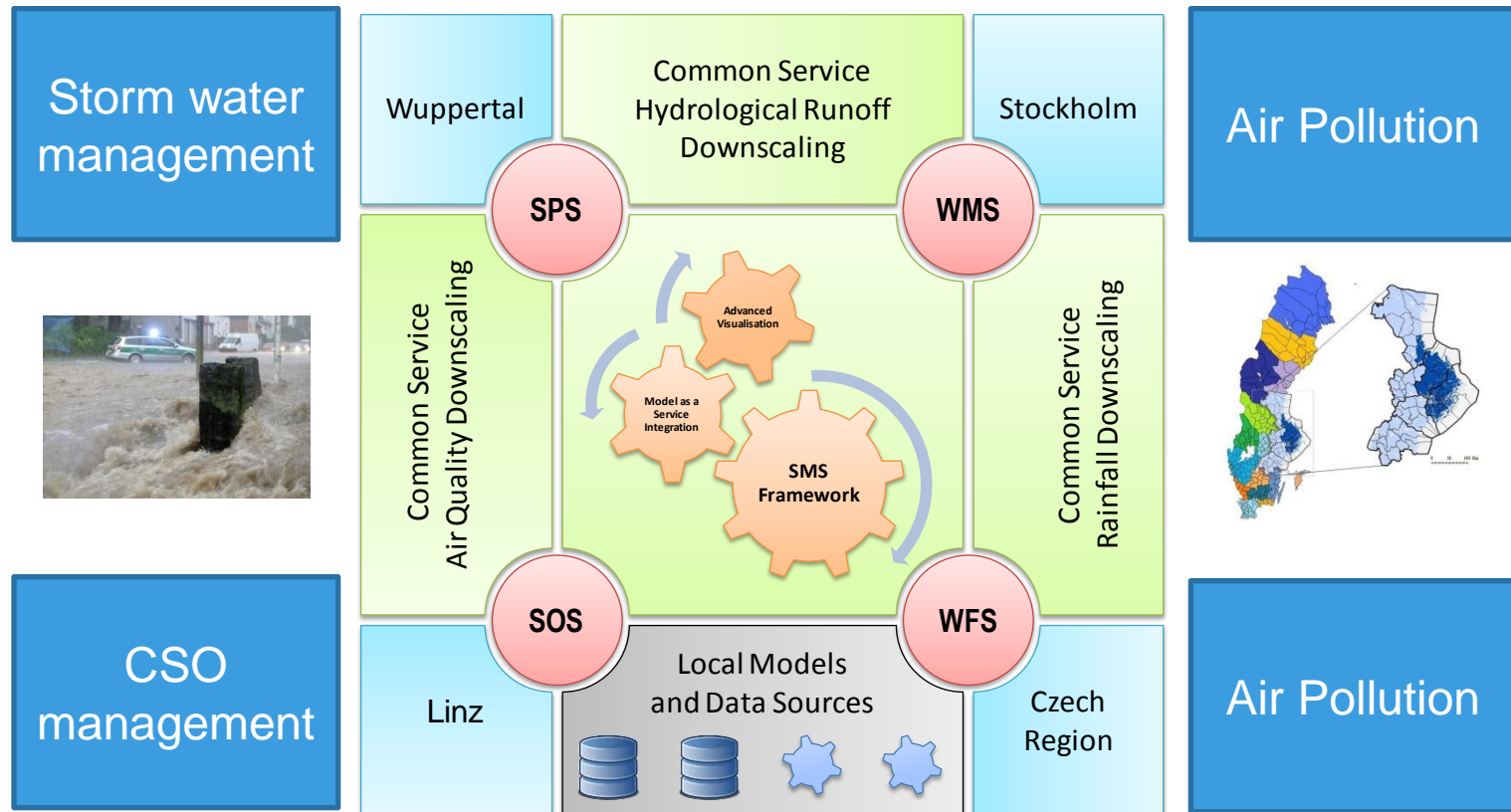
Climate scenarios

- Total ensemble of global scenarios:
 - ECHAM5 forced by A1B
 - ECHAM5 A2
 - HADCM3 A1B
 - CCSM3 A1B

- Regionally downscaled over Europe by RCA3 Model (SMHI, SE):
 - Total period: 1960-2100
 - Grid size: 50×50 km
 - Variables: precipitation and temperature
 - Time resolution: 30 min (prec.) and 1 day (temp.)



Pilot Applications



Benefits of the approach

Common Services

- Urban planners can easily include climate aspects in their planning process
- With the models they are using anyway
- Without the need to develop a specific model

Assumption:

cost(integration) << cost(development of specific model)

Summary

We aim to ...

- Improve the integration of climate change into urban planning decisions
- Improve the link between climate change research, local modelling and urban planning
- By providing downscaling functionality for environmental variables and tools to access/integrate

Thank you for your attention
For more information please visit www.sudplan.eu

SUDPLAN

Start About SUDPLAN Results Partners Contact

A changed climate will require European cities to environmental protection. The SUDPLAN project - Sustainable Urban Development Planner for Climate Change Adaptation - aims at developing a web-based planning, prediction and training tool to support decisions in long-term urban planning. This will help to assess population's health, comfort, safety and life quality as well as sustainability of investments in utilities and infrastructure within a changing climate. With it a open nature and architectural design, SUDPLAN will contribute to a shared information space in Europe.

ADAPTATION TO CLIMATE CHANGE

Planning for environmental factors
SUDPLAN has integrated an integrated planning approach. SUDPLAN can also show the assessment of risks of the main predicted environmental factors: climate change, coastal erosion and sea level rise. The tool can also assess the impact of sea level rise for different climate change scenarios, the characteristics of coastal erosion and the impact of sea level rise on the environment, infrastructure and the urban system.

Future climate in Europe
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Storm water flooding and CSD management
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River flooding
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Air pollution
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THIS IS SUDPLAN
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SUDPLAN RESULTS FOR
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SUDPLAN COMPONENTS
Business Management System
A highly integrated, SUDPLAN comprehensive data management system. It is the first of a series of modules for the SUDPLAN project.

Common Services
The common services, temperature, humidity and precipitation data for visualization in the SUDPLAN system. It is the first of a series of modules for the SUDPLAN project.

Pilot applications
The pilot applications are the first of a series of modules for the SUDPLAN project. It is the first of a series of modules for the SUDPLAN project.

PARTNERS
SMHI, AIT, cismet, TU Braunschweig, APERTUM, E.ON, cenit.

Contact SUDPLAN
For more information on SUDPLAN, please contact us. We are happy to help you in your project.

Partners

1. Swedish Meteorological and Hydrological Institute
2. Austrian Institute of Technology
3. cismet GmbH
4. Czech Environmental Information Agency
5. Apertum IT AB
6. Deutsches Forschungszentrum für Künstliche Intelligenz
7. Stockholm Uppsala Air Quality Management Association
8. City of Wuppertal
9. Technische Universität Graz

