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0.4	2012-11-29	Lars Gidhagen	Co-ordinator approval

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1. Management Summary

This document D8.3.3 Product Validation Report V3 validates the usability of the SUDPLAN product from the Czech pilot's point of view. Validation against technical detail requirements is not in the scope of the validation process; this is done as part of the state-of-the-art software development.

A total of 11 persons worked out the Lime Survey simplified (pilot) questionnaire, representing SUDPLAN staff (3 persons), experts from CENIA, Czech Environmental Information agency not directly involved in the project (3 people), one representative of the Ministry of Environment, Air Quality Unit, one representative of the City Development Authority of Prague, one representative of a private consultation company and the chairperson of the Technology Agency of the Czech Republic. The last eight people represented potential end-user groups of the SUDPLAN product.

According to their specialization, the people responded mainly to air quality downscaling part (11 people), graphical user interfaces (11) and the part dealing with the completeness of functionality of the system. One IT expert from CENIA evaluated technical aspects of SUDPLAN concerning model integration and the requirements of system managers. All people responded to the last part of the survey dealing with general impressions about the SUDPLAN product.

The complete results of the Lime Survey questionnaire for the Czech pilot after project's third year (2012) are collected in Annex A of this report and in particular are dealt with in the D2.2.3 Validation and evaluation report V3. The following conclusions can be drawn based on the Czech product validation V3:

- Comments and answers have shown that SUDPLAN has the potential to support decision making processes in spatial planning and infrastructure development and significantly contribute to climate change adaptation in cities.

- The survey participants particularly appreciated the SUDPLAN product in terms of visualization capabilities including 3D visualization, giving the potential to use the tool for creation of reports and other information products.

- The use of local emission and activity data in the downscaling model as well as the use of SUDPLAN as the input to other modelling systems were assessed as quite complicated which may limit the use of the product after the project completion.

- The user friendliness for those who are not IT experts and who have not been involved in the product development has received lower ratings and some more comprehensive contextual help and user manual were asked for.

- SUDPLAN is unique in the Czech Republic because of its ability to simulate future development of air quality including secondary pollutants and to take climate change background conditions into account. Therefore, it offers an excellent tool which can be

used to improve air quality assessment and management in the Czech Republic. However, further development and improvement is desirable.

- All participants of the survey from the Czech Republic have agreed that SUDPLAN deserves some follow up activities on the national level which would further support its usage in real urban development projects.

2. Methodology

The common methodology for all V3 Product Validation Reports is described in detail in D2.1 Product Validation Plan (revised after 1st ATR) document dated June 15, 2011; hereafter only referred to as D2.1 Product Validation Plan. The validation procedure is summarised here below. All technical developing staff members participating in the pilot work have contributed to the validation by filling in a questionnaire.

With the purpose to increase the number of external end-users participating in the validation procedure, the third and final validation of the SUDPLAN project includes simplified version of the full validation questionnaire. This simplified version contains only questions which can be responded by any interested person that has participated in a seminar and/or demonstration of the SUDPLAN tool. Also the pilot staff members characterized as end-users have used the simplified validation survey.

2.1. Documents involved

D2.1 Validation Plan describes the methodology used to produce the four pilots deliverables D[5-8].3.3 Product Validation Report and the project overall validation of deliverable D2.2.3 Validation and Evaluation Report.

The objective of the D8.3.3 Czech Product Validation Report is to validate the usability of the SUDPLAN product from the Czech Pilot point of view.

For the D2.2.3 Validation and Evaluation Report the main focus is the potential usability of the SUDPLAN product beyond the project and for an arbitrary city in Europe, which means that the comments given by external end-users will be especially important. As in the V2 validation the SUDPLAN product is also assessed against the impacts expected by the call which are defined as SUDPLAN objectives in the DoW.

A table of all documents used or referenced in this document is given in Chapter 6 at the end of this document.

2.2. Validation aspects

2.2.1 Fulfilment of the pilot goals

Validating the level of fulfilment of the pilot goals as defined in D8.1.3 Czech Pilot Definition Plan V3 is out of the scope of this document (instead given in D8.2.3 Czech Pilot report V3).

2.2.2 Professional profiles taking part of pilots product validation

The pilot validations are performed in two steps. The first is for WP leaders to assure that all pilot staff members fill in the validation questionnaire and to encourage as many external end-users as possible to fill in the simplified LimeSurvey web questionnaire. The second step is to merge all individual answers into this pilot product validation document.

There is a formal SUDPLAN classification, valid for both project staff and external end-users, in which they are defined as:

- Analysts – primary users: End users of SUDPLAN output, e.g. city planners or their technical staff, working directly with the system.
- Analysts – secondary users: End users of SUDPLAN output, e.g. city planners or their technical staff, using SUDPLAN results but without working directly with the system.
- Modellers: Developing, integrating and configuring the different models of the type used in SUDPLAN applications for a city. They are considered secondary end users, as they normally do not work directly with the system.
- System Managers: Installation, maintenance and system administration. They are considered secondary end users, as they normally do not work directly with the system.

The results of the validation LimeSurvey questionnaire should include impressions from all four professional profiles; however one individual can only belong to one professional profile.

2.2.3 Interaction between WP3 and WP4 and usability of the SUDPLAN Product

This deliverable assesses and documents the usability of the main results of WP3 Scenario Management System and WP4 Common Services for the SUDPLAN pilot applications.

The summary and generalization of the pilot validations are compiled as a part of the WP2 work, and reported in D2.2.3 Validation and Evaluation report. That document also draws conclusions on the pilot validations to provide feedback to WP3 and WP4. It is essential for WP3-WP4 to know whether they are on track and where improvement or even changes have to be implemented to allow an ex-project use and exploitation. Furthermore, this document also assesses the independence of the implementation of the SUDPLAN product from the specific pilots and the usability for an arbitrary European city.

2.2.4 Technical requirements of WP3 and WP4

The fulfilment of the technical requirements of WP3 (Scenario Management System) and WP4 (Common Services) is validated by unit and integration tests done during the product development. This purely technical validation is out of the scope of the present document.

2.3. Rating

SUDPLAN product validation contains questions of the following types:

1. Rating starting with 1 for lowest (not fulfilled at all) to 7 for highest rating (fulfilled beyond expectations, which should be awarded only in exceptional cases and explained in the text), or NA (not applicable). ***Example where 5 persons related to this pilot have filled in the questionnaire:***

	1	2	3	4	5	6	7	NA
Define scenario:			2		1	2		
Execute scenario					1	3		1

2. Rating from 1 to 7 indicating the comparison with e.g. state of the art solution, with 4=on pair with the state of art, 1=way below state of the art, and 7=way above the state of the art. NA can be used to indicate that the comparison is impossible, useless or beyond the evaluator's knowledge.

Example where 5 persons related to this pilot have filled in the questionnaire:

	1	2	3	4	5	6	7	NA
Compared to state of the art solutions					2	2	1	
Compared to SUDPLAN project objectives					1	4		

3. Yes|No|NA type of questions. ***Example:***

Dynamic workflow composition supported by	**Y**	**N**	**NA**
Pilot application:		5	
SUDPLAN product:	4		1

4. Multiple choice questions used to confirm that specific requirements are met. These types of questions are normally responded by persons involved in SUDPLAN development. Each single question can have only a limited number of answers (with or without NA). For example, in Q 2.2.1 the users are asked to list the SUDPLAN service interfaces and indicate their type (OS = Existing Service Interfaces with open standard specifications, re-used in the SUDPLAN; P = Existing proprietary Services with no open specifications, re-used in the SUDPLAN (if any); (N) New service Interfaces defined in the SUDPLAN (if any):

Service interface	**OS**	**P**	**N**
Dummy 1:			
Dummy 2:			
Dummy 3:			
Dummy 4:			

5. Free text fields are used to collect overall impressions and comments beyond the simple yes/no or rating level, giving the evaluator the opportunity to explain the way a requirement has been fulfilled. In case of partial fulfilment or failure to fulfil the requirement, the description could also explain e.g.:

    - Which part of the requirement was not fulfilled?

- Why the requirement was dropped/not fulfilled?
- What are the consequences of not-fulfilling the requirement?
- Will the requirement be fulfilled later (e.g. “planned for development beyond the project”)

3. Validated components and aspects of the pilot product

The following table indicate what components and aspects have been validated during the V3 period, as well as how many individuals that have given their opinion. A complete list of the validated requirements is given in Annex A (pilot validation questionnaire).

A summary of the validation results is given in Section 4. The table below gives the number of persons that have contributed with validation of the Czech Pilot after the third year of its implementation.

Components and aspects evaluated in the simplified pilot validation:	**V3**
Graphical User Interfaces	11
Visualisation	11
Common Services: Rainfall	8
Common Services: Hydrology	9
Common Services: Air Quality	11
Local models	9
Completeness of functionality	10
Conclusions	11

4. Summary

For this V3 validation of the WP8 we managed to reach a wide scope of experts and high level officials who are involved in urban planning, financing and implementing of regional development projects, protecting of air quality and cross-cutting environmental assessment. Six people from CENIA, Czech Environmental Information Agency took part in the survey including the IT expert who participated in the project and the head of department responsible for the annual production of the Report on the Environment of the Czech Republic. Moreover, one high level representative of the Ministry of the Environment from Air Quality Unit, one representative of the Institute for Urban Planning and the chairperson of the Technology Agency of the Czech Republic which is in charge of allocation resources for applied research and development in our country contributed to this validation.

All participants of the survey have been provided with the detailed demonstration of project results achieved in SUDPLAN and in particular in the Czech Pilot. Some of them, especially high level representatives mentioned above, took part in the final project seminar held in Wuppertal aimed at introducing and presenting the product to end-users.

In this section the characteristics of the validation participants are given, followed by summaries of the most important conclusions concerning each of the validated components and aspects. A complete list of all questions and answers of the LimeSurvey validation is available in Annex A of this report. The results of full validation including purely technical issues are outlined in the D2.2.3 Validation and evaluation report V3.

The following table summarises the professional profiles of the persons that completed the LimeSurvey simplified questionnaire (Annex A). Persons that have indicated that they do not want to appear with names in the SUDPLAN public deliverables have been indicated as “Anonymous”.

1	Jan Mertl	jan.mertl@cenia.cz	CENIA	Czech Republic	Team member
2	Vladislav Bízek	vladislav.bizek@gmail.com	Environmental consultant	Czech Republic	Team member
3	Mária Kazmuková	kazmukova@urm.mapnet.cz	City Development Authority Prague	Czech Republic	Urban planner
4	Anonymous		Ministry of the Environment – AQ Unit	Czech Republic	AQ unit
5	Anonymous		CENIA	Czech Republic	Team member
6	Jan Pokorny	jan.pokorny@cenia.cz	CENIA	Czech Republic	Deputy Head of EA Unit
7	Rut Bizkova	bizkova@tacr.cz	Technological agency of the CR	Czech Republic	Chairperson

8	Pavlina Slavikova	pavlina.slavikova@cenia.cz	CENIA	Czech Republic	Head of EA Unit
9	Anonymous		CENIA	Czech Republic	EA expert
10	Anonymous		CENIA	Czech Republic	EA expert
11	Ludek Pasek	pasek@ekosystem.cz	Ekosystem ltd.	Czech Republic	Project manager

The particular interest and profile of the participants filling in the simplified questionnaire have been classified according to the following table (note that one person can be interested in more than one environmental risk):

Type of environmental risk	Analyst primary	Analyst secondary	Modeller	System Manager
Urban stormwater flooding during intense rainfall				
Dimensioning of sewage water systems		1		
Risks of flooding of rivers		1		
Hydrological conditions		2		
Air pollution	3	6		
Other				

SUDPLAN deals with both long term and short term planning. All survey participants are interested in long term planning where climate change is of high importance while 4 participants are interested in assessing present conditions and planning in short term horizon

Temporal planning interest	Y	N	NA
Present conditions and short term (<10 years) planning	4	7	
Long term planning (>10 years) planning	11	0	

This report is based on persons that marked interest in the Czech Pilot.

Application	Y	N
Stockholm pilot		
Wuppertal pilot		
Linz pilot		
Czech pilot	11	
Overall application		

The professional profiles have been classified according to the following table:

Type of user	Y	N

SUDPLAN team member	3	8
Urban / regional planner (analysts)	1	10
Modeller	0	11
System manager	0	11
IT expert	1	10
Climate change expert	1	10
Have seen presentations and documentations	7	4
User of the SUDPLAN / model results	3	8
Working with the actual system	4	7
I participated in a SUDPLAN workshop	4	7

4.1. Summary for Graphical User Interfaces

A total of 11persons gave input to this aspect.

The user interface is considered an advanced utility designed especially to experts. The visualization functionalities of GUI were given very high ratings while the respondents awarded lower rating to the capability of the system to share results, define and analyse scenario and export data to be used by another application. Furthermore, they pointed out to the fact that the use of functionalities is not intuitive, it is hard to get familiar with the system operation so some contextual help or manual were asked for.

Based on the survey, the menu structure, browsing in space and comparing the data sets is considered very important whereas alerts when finished the task are of lower importance.

In general the GUI received above average ratings, it was regarded as very useful application. However, the interaction of the interface with other national information systems (uploads and downloads of data) and the possibility to integrate SUDPLAN to the national modelling systems is limited. Due to the complexity of the system better user support is highly recommended.

4.2. Summary for 3D visualisation

A total of 11 persons gave input to this aspect.

The overall impression on 3D visualization tool is very good; in particular the usability of 3D tool for presenting and comparing scenarios was given high ratings. Similarly to the graphical user interface, however, the tool is considered complex and difficult to get familiar with for non-experts.
The users highlighted the added value of the tool in identifying large point sources of air pollution.

4.3. Summary for Climate scenario information

A total of 11 persons gave input to this aspect.

The survey respondents appreciated a wide range of climate scenarios used as well as a pan-European scope of the project and spatial and temporal coverage of visualization. The usability of climate scenarios was given high ratings; with the exception of the availability of scenario documentation.

The main added value of SUDPLAN results was attributed to the long term assessment while for the evaluation of current conditions other systems may have more extensive functionality.

Export of results is missing and would be very beneficial for an analytic work. Description of uncertainties of climate scenarios was found insufficient.

4.4. Summary for Common Services: Rainfall

A total of 8 persons gave input to this aspect.

The usability and the ease of use of precipitation prediction in SUDPLAN in terms of temporal resolution, IDF curves and rainfall time series received higher ratings. Nevertheless, the upload of historical data to calibrate the results is considered to be a bit more complicated. The main added value of the system is seen in its ability to predict long term precipitation volumes as well as to identify the risk of extreme precipitation events for the selected place.

4.5. Summary for Common Services: Air Quality

A total of 11persons gave input to this aspect.

According to the survey, AQ downscaling is the new and potentially very useful tool which has not been available in the Czech Republic before. The main added value of the system was attributed to its ability to predict air quality on local level while taking into account climate change forcing. Therefore, the SUDPLAN system and the Czech Pilot results in particular can support regional development projects and decisions upon these projects both in the phase of preparation and implementation. Having such a tool available is highly relevant for Prague, as the concentrations of pollutants, which are emitted mainly from transportation and small point sources, are higher compared to the average in other European cities.

The usability of the SUDPLAN tool as the basis for assessment of the future air pollution was given high ratings (5-7) especially as regards downscaling and visualization of results while the complicated upload of local emission data is considered as the weakness of the application.

Looking at the level of support which individual functionalities of AQ downscaling can provide to regional development processes the highest ratings acquired the prediction of long-term air quality and temperature trends as well as the functionality to assess the impact of local sources, activities and land uses changes on air quality in future. On the other hand, the usability of SUDPLAN results in local dispersion models is regarded as quite complicated and needs further support from the SUDPLAN developers. Surprisingly, usability of SUDPLAN in evaluating the achievement of air quality objectives received just average ratings which confirm the local focus of the project instead of the wider national scope.

Possible improvements of the tool have been identified in description and minimization of projection uncertainties and in the improvement of emission inventories. Furthermore, the integration of national air quality modelling systems with SUDPLAN was identified as quite complicated. The limitations of CS air quality downscaling regarding spatial resolution (up to 1x1 km) have been pointed out so the identification of hot spots in cities is limited. Nevertheless, external local models can help overcame this problem.

4.6. Summary for Common Services - Hydrology

A total of 9 persons gave input to this aspect.

The usability of SUDPLAN tool as the basis for river-flooding assessment application received above average assessment (5,2), in particular the presentation of the results from simulation was given high ratings. In general, the main added value of SUDPLAN hydrology downscaling is seen in river discharge simulation, the soil moisture simulation received slightly lower rating.

The ability of the model to reproduce realistically hydrological conditions is dispersed – some catchments in the territory of the Czech Republic are described better by the model than others. Geographical layers should be corrected as some mistakes and inaccuracies occurred. In order to enhance the usability of the tool for water management planning a new functionality was suggested which displays the information about area of the basin.

4.7. Summary for Local Models

A total of 9 persons gave input to this aspect.

With regard to the survey results it can be concluded that the integration of SUDPLAN downscaling services with local models is quite complicated. The possibility of running local models from the GUI would have been highly appreciated but actually it received only average ratings.

4.8. Summary for Completeness of functionality

A total of 10 persons gave input to this aspect.

Based on the survey, the completeness of functionalities of the product is sufficient in general, nevertheless, the ratings significantly vary depending on the user group and the usability aspects which are being assessed.

The usability of SUDPLAN with regard to the requirements of urban planners has received above average rating, in particular SUDPLAN is considered suitable for report generating and for creating information products. Regarding requirements of system managers, user management and security and rights management were given higher rating whereas data source integration and model integration does not belong to strengths of the product according to assessors.

The most valuable functionalities of the system are as follows:

- Air quality downscaling and visualization with higher resolution in cities
- Generation of time series of temperature/precipitation/air quality for the selected place.
- Visualization of temporal development of climate and air quality over long time period in the whole Europe.

Nevertheless, some missing functionalities or possible improvements of the existing ones have been pointed out in the survey, for example:

- Possibility of using real climate data when dealing with current conditions.
- Better resolution (e.g. from regional climate models) of climate data entering into the AQ downscaling.
- More flexible visualization of emission changes between two time slices or two scenarios including the possibility to display decrease of emissions.

4.9. Summary for the Conclusions part of the LimeSurvey

A total of 11 persons gave input to this aspect.

SUDPLAN provides advanced and complex modelling system to be used in urban planning and regional development covering either air quality or hydrology issues including flooding and soil moisture. Regarding air quality component the system is unique in the Czech Republic because of its ability to simulate future development of air quality including secondary pollutants and to take climate change background conditions into account. Therefore, SUDPLAN offers an excellent tool applicable to improve air quality assessment and management in the Czech Republic which can be highly useful in supporting decision-making processes in spatial planning and infrastructure development.

The survey participants particularly appreciated the SUDPLAN product in terms of visualization capabilities including 3D visualization, giving the potential to use the tool for creation of reports and other information products. The tool is seen as potentially useful in supporting infrastructure development projects or environmental impact assessment processes providing that it can be incorporated somehow in current modelling systems.

Nevertheless, the system possesses also some weaknesses raised in the survey. The user friendliness for those who are not IT experts and who have not been involved in the product development has received lower ratings and some more comprehensive contextual help and user manual were asked for. Moreover, the flexibility of the system regarding the use of local emission and activity data in the downscaling model as well as the use of SUDPLAN as the input to other modelling systems were assessed as quite complicated which may limit the use of the product after the project completion.

The last evaluation (V2) pointed out that the system is focused on experts and that some simple self-explanatory application should be developed in order to support dissemination of the SUDPLAN project outputs to wider public. In response to this requirement CENIA has developed an application presenting Czech Pilot´s results, which is freely available on web (see http://sudplan.cenia.cz). Consequently, last validation did not tackle publicity and dissemination issues any more.

Almost all respondents (10 out of 11) assume, that compared to the previous available information SUDPLAN results are of better quality and more useful. 6 persons (65 %) would use the SUDPLAN product as a base for future city planning, 4 people declared that they would use it to the certain extent because they still miss some information or functionality. None of respondent answered that he/she would not use the product at all.

Further comments (positive):

- I like the 3D visualization and its possible use to visualize more variables at the same time, which could be used for the interpretation of results.
- Long time scale up to the year 2100 is almost unique amongst similar systems
- Assessment of what-if scenarios as a great benefit of the system
- Complexity of the product for urban planning, taking into account either air quality or hydrology issues including flooding and soil moisture.

- Very innovative tool which significantly contributes to air quality protection on urban level. It can support decision making processes on city development projects, mainly in terms of city infrastructure.

Further comments (negative):

- Better manual and application support system after the project end is essential.
- It is only the first step and some follow up is necessary.
- Uncertainties of projections are not handled in a sufficient way
- It´s hard to display differences of emissions between two time slices or two scenarios. In particular, it is hard to display negative values (decrease of emissions).
- Better export possibilities of data (shape files, xls files) would be beneficial
- Better integration of SUDPLAN with national information system and tools is needed.

5. Conclusion

The following conclusions can be drawn based on the Czech product validation V3:

- A total of 11 persons worked out parts of the Lime Survey simplified questionnaire, representing SUDPLAN staff (3 persons), experts from CENIA, Czech Environmental information agency not directly involved in the project (3 people) and the representatives of the Ministry of Environment, City development authority in Prague, the Technology Agency of the Czech Republic and the private consulting company Ekosystem. These eight people represented the end-user groups.

- Comments and answers have shown that SUDPLAN has the potential to support decision making processes in spatial planning and infrastructure development and significantly contribute to climate change adaptation in cities. To attract users, however, the user friendliness and flexibility of the system should be improved.

- The pan-European character of SUDPLAN was highly acknowledged as the product can provide background conditions data for national/regional air quality model assessments. In addition, the downscaling results of SUDPLAN for the Prague area provide information not available up to now, data that will be useful not only for urban planners but also for air quality and hydrology experts as well.

- The survey participants particularly appreciated the SUDPLAN product in terms of visualization capabilities including 3D visualization, giving the potential to use the tool for creation of reports and other information products. Moreover, long time scale up to the year 2100 is almost unique amongst similar systems, even the modelling in decade scales were recommended as more valuable for end-users.

- The main disadvantage identified within the survey relates to the complexity of the system and to its limited suitability to be incorporated into currently existing modelling systems which would enable SUDPLAN´s wider use after project completion.

- Ministry of the Environment (MoE) considers project results to be potentially useful for supporting strategies and policies, better usability of project results according to the MoE can be expected on the regional level of public administration.
- All participants of the survey from the Czech Republic have agreed that SUDPLAN deserves some follow up activities on the national level which would further support its usage in real urban development projects.

6. References

This is the list of documents and software deliverables that have been be used as input for this document.

Table 1: List of documents and software deliverables that has been referenced or used for this document

Document	Version
DoW	2009-12-01
D2.1 Validation Plan (revised after 1st ATR)	2011-06-15
D3.1.3 Requirement Specification V3	2011-11-28
D3.3.1 Integrated Scenario Management System	2011-07-20
D8.1.3 Czech Pilot Definition Plan V3	2011-09-27
D8.2.3 Czech Pilot V3	2012-10-31
D8.3.2 Czech Pilot Validation Report V2	2012-04-27

7. Glossary

2D	Two-dimensional, typically a field that varies in east-west and north-south direction. The field may also vary in time –this is typical for e.g. air pollution and population density. The former varies from one hour to another while the latter maybe varies from one year to another.
3D	Three-dimensional, typically a field that varies in east-west and north-south direction as well as vertically. The field may also vary in time.
4D	Four-dimensional. Most often 3D field that explicitly also varies in time. It could also be when a certain 3D parameter (e.g. a particular air pollutant) also varies according to another 3D parameter (e.g. temperature). It will then be possible to study the variation of the first 3D parameter as a function of space (x,y,z) and the second parameter.
Airviro	Air quality management system consisting of databases, dispersion models and utilities to facilitate data collection, emission inventories etc, see http://www.Airviro.smhi.se/
Climate scenario	*Climate scenarios* mean the resulting climate evolution over time, as simulated by global (GCMs) and regional (RCMs) climate models. Climate scenarios are products of certain emission scenarios that reflect different economic growth and emission mitigation agreements.
Common Services	*Common Services* is the climate downscaling services for rainfall, river flooding and air quality, developed in the SUDPLAN project and accessed through the SUDPLAN platform (Scenario Management System)
Common Services server	*Common Services* models will be executed at a SMHI server, accessible through OGC communication.
Emission scenario	These are of three types, of which the first one is behind the climate scenarios used in all SUDPLAN Common Services. The two remaining emission scenario types are only relevant for air quality downscaling.

- *IPCC emission scenarios*	*IPCC emission scenarios* are estimates of future global greenhouse gas concentrations based on assumptions about global development (economic growth, technical development, mitigation agreements, etc). During the first two years of the SUDPLAN projects, the climates scenarios based on SRES (Special Report on Emission Scenarios) A1B scenario from the 4th assessment have been used. The SRES emission scenarios do not include emissions of the pollutants of interest for air quality. If available the climate scenarios based on the 5th assessment RCP (Representative Concentration Pathways) emissions scenarios will also be used within the SUDPLAN project. They include emissions of air pollutants.
- *European tracer gas emissions (air pollutants)*	*European tracer gas emissions (air pollutants)* thus may or may not be included in IPCC emission scenarios. For creating Pan-European air quality fields under climate scenarios driven by the SRES A1B emission scenario, SUDPLAN uses tracer gas emissions from the more recent RCP emission scenarios. This inconsistency will be solved when climate scenarios based on RCP emission scenarios are available.
- *Local emission scenarios*	*Local emission scenarios* (to the atmosphere) are those of a particular European city. These will to a large extent influence future air quality in the city, but have little influence on global climate, nor do they influence air pollution concentrations in incoming long-range transported air. SUDPLAN will typically need gridded emissions with 1x1 km or finer spatial resolution as input to its urban air quality downscaling model.
Hind cast	A simulation of a historical period. Often done to compare model simulations with data which is available during that period.
Hot spot	Point (or small area) which is very different from its surroundings. In the present context, most often high concentrations of air pollutants, or extreme meteorological conditions.

Information Produkt	Raw data, such as the results of mathematical modeling, and the analysis thereof, will often need to be packaged in such a way as to be accessible to the various stakeholders of an analysis. The medium can be one of a wide variety, such as print, photo, video, slides, or web pages. The term *information product* refers to such an entity.
Mock-up	A model of a design used for demonstrating the functionality of a system.
Model	A *model* is a simplified representation of a system, usually intended to facilitate analysis of the system through manipulation of the model. In the SUDPLAN context the term can be used to refer to mathematical models of processes or spatial models of geographical entities.
PM_{10}	'PM10' shall mean particulate matter which passes through a size-selective inlet as defined in the reference method for the sampling and measurement of PM10, EN 12341, with a 50 % efficiency cut-off at 10 μm aerodynamic diameter;
$PM_{2.5}$	'PM2,5' shall mean particulate matter which passes through a size-selective inlet as defined in the reference method for the sampling and measurement of PM2,5, EN 14907, with a 50 % efficiency cut-off at 2,5 μm aerodynamic diameter;
Profile	Within SUDPLAN a *profile* is a set of configuration parameters which are associated with an individual or group, and which are remembered in order to facilitate repeated use of the system.
Regional downscaling	A climate scenario may be downscaled to a higher spatial resolution, typically 25-50 km, by a Regional Climate Model (RCM). The regional downscaling in SUDPLAN will be performed by SMHI's RCM (RCA, see below) and will generate climate scenarios at 44 or 22 km resolution.
Report	A *report* is a particular type of information product which is usually static and might integrate still images, static data representations, mathematical expressions, and narrative to communicate an analytical result to others.

Scenario	A *scenario* is a set of parameters, variables and other conditions which represent a hypothetical situation, and which can be analysed through the use of models in order to produce hypothetical outcomes. In SUDPLAN a scenario is an individual model simulation outcome to be used in urban planning. The model simulation may or may not include Common Services downscaling (with specific input) and may or may not include a local model simulation (with specific input and parameters).
Scenario Management System	*Scenario Management System* is synonymous with SUDPLAN platform
Scenario Management System Framework	The *Scenario Management System Framework* is the main Building Block of the Scenario Management System. It provides the Scenario Management System core functionalities and integration support for the other Building Blocks.
Scenario Management System Building Block	Scenario Management System Framework is composed of three distinct *Building Blocks*: The Scenario Management System Framework, the Model as a Service Building Block and the Advanced Visualisation Building Block.
Street canyon	Volume between high buildings in cities. Due to poor circulation (and high emissions) prone to poor air quality. Street canyons have unexpected circulation patterns, thus dedicated models are needed to study air pollution here.
SUDPLAN application	A *SUDPLAN application* is a decision support system crafted by using the SUDPLAN platform and integrating models, data, sensors, and other services to meet the requirements of the particular application.
SUDPLAN platform	The *SUDPLAN platform* is an ensemble of software components which support the development of SUDPLAN applications.
SUDPLAN system	*SUDPLAN system* is synonymous with SUDPLAN application

Urban downscaling	This refers to further downscaling of the regional climate scenarios for Europe to the urban scale within SUDPLAN. This will be possible for a) *rainfall/precipitation* where the temporal resolution will be 30 minutes or less. The spatial resolution will be that of a precipitation gauge, i.e. representative for a point rather than a certain area. b) *hydrological variables (river runoff, soil moisture etc*) where the temporal resolution is daily and the spatial resolution linked to catchment areas which presently count approximately 35000 and with average size 240 km^2. *c) air quality (PM, NO2/NOx, SO2, O3, CO).* The temporal resolution will be hourly for gridded output fields and the spatial resolution typically 1x1 kilometres.
User	The term *user* refers to people who have a more or less direct involvement with a system. Primary users are directly and frequently involved, while secondary users may interact with the system only occasionally or through an intermediary. Tertiary users may not interact with the system but have a direct interest in the performance of the system.
Web-based	Computer applications are said to be *web-based* if they rely on or take advantage of data and/or services which are accessible via the World Wide Web using the Internet.

8. Acronyms and abbreviations

Acronym	Description
A1B	Emission scenario used for global climate modelling in IPCCs Fourth Assessment Report (AR4)
Airviro	Air quality management system to facilitate data collection, emission inventories etc, see http://www.airviro.smhi.se/
CS	Common Services
AVDB	Airviro Time Series database (used for storage in Common Services)
AR4, AR5	Fourth and Fifth Assessment Report of IPCC
AQ	Air Quality
C API	Application Programming Interface written in C
CMIP5	Coupled Model Inter comparison Project, phase 5 (coordinated model exercise in support to AR5)
CS	Common Services (SUDPLAN functionality)
CTM	Chemistry Transport Model
CTREE	FairCom CTREE database (Index database, core of AVDB)
DBS	Distribution-Based Scaling, a method to bias-correct (i.e. remove systematic errors in) the temperature and precipitation of the RCM output
DoW	SUDPLAN Description of Work
DSS	Decision Support Systems
ECHAM5	GCM developed at Max Planck Institute for Meteorology, DE
ECMWF	The European Centre for Medium-Range Weather Forecasts (also co-ordinating FP7-SPACE project MACC)
EDB	Airviro Emission database
EEA	European Economic Association
E-HYPE	Hydrological Predictions for the Environment (European set-up), hydrological rainfall-runoff model developed and used by SMHI
EM&S	Environmental Modelling and Software
ESA	European Space Agency
ESDI	European Spatial Data Infrastructure
EU	European Union
GCM	Global Climate Model or, equivalently, General Circulation Model. Physically based computer model that simulates the global climate on a 200-300 km resolution. Can be used both to reproduce historical climate and estimate future climate, e.g. in response to changes in greenhouse gas concentrations.
GHG	Greenhouse Gases
GTE	Georeferenced Time-series Editor
GIS	Geographic Information System
HadCM3	GCM developed at Met Office Hadley Centre, UK

HIRLAM	High Resolution Limited Area Model, numerical weather prediction model developed and used operationally by SMHI
ICT	Information and Communication Technologies
ID	Identifier
IDF-curve	Intensity Duration Frequency-curve, a curve (or a table of values) showing the rainfall intensity associated with a certain duration (i.e. time period) and frequency (i.e. probability, generally expressed as a return period). Calculated from short-term rainfall observations and widely used in design of urban drainage systems.
iEMSs	International Environmental Modelling & Software Society
IFIP	International Federation for Information Processing
IPCC	The Intergovernmental Panel on Climate Change, the leading body for the assessment of climate change
IPR	Intellectual Property Rights
ISAM	Indexed Sequential Access Method, a method for indexing data for fast retrieval
ISO	International Standardization Organisation
ISESS	International Symposium on Environmental Software Systems
IST	Information Society Technology
MATCH	Multiple-scale Atmospheric Transport and Chemistry modelling system, a CTM developed and used by SMHI.
MODSIM	International Congress on Modelling and Simulation
OASIS	1) Organization for the Advancement of Structured Information Standards 2) Open Advanced System for Disaster and Emergency Management (FP6 project)
OGC	Open Geospatial Consortium
O&M	Observation and Measurements
ORCHESTRA	Open Architecture and Spatial Data Infrastructure in Europe (FP6 IST-511678)
OSGeo	Open Source Geospatial Foundation
OSIRIS	Open architecture for Smart and Interoperable networks in Risk management based on In-situ Sensors (FP6 IST-33799)
PMC	Project Management Committee
RC	Rossby Centre, climate research unit at SMHI
RCA	Rossby Centre Atmospheric model, RCM developed by SMHI and used in SUDPLAN
RCM	Regional Climate Model commonly used to increase the spatial resolution of climate scenarios to 25-50 km in a specific region.
RCP4.5	Radiative Concentration Pathways: A set of four emission scenarios to be used for the AR5 simulations. The scenarios are named according to their radiative forcing at 2100, e.g. 4.5 W/m^2.
RNB	Airviro Field database
SANY	Sensors Anywhere (FP6 IST-033654)
SDI	Spatial Data Infrastructure

SISE	Single Information Space in Europe for the Environment
SISE	Single Information Space in Europe for the Environment
SMHI	Swedish Meteorological and Hydrological Institute
SMS	Scenario Management System
SOA	Service Oriented Architecture
SOS	Sensor Observation Service
SPS	Sensor Planning Service
SWE	Sensor Web Enablement
SUDPLAN	Sustainable Urban Development PLANner for climate change adaptation
SWE	Sensor Web Enablement
Tbd	To be determined
UWEDAT	AIT environmental data management and monitoring system
WCC	World Computer Congress
WCS	Web Coverage Service
WFS	Web Feature Service
WP	Work Package
WPS	Web Processing Service
WMS	Web Map Service

Annex A – Simplified Lime Survey

1.1. A - Personal information

Name	1: Jan Mertl 2: Vladislav Bízek 3: Mária Kazmuková 4: Anonymous 5: Anonymous 6: Jan Pokorny 7: Rut Bizkova 8: Pavlina Slavikova 9: Anonymous 10: Anonymous 11: Ludek Pasek
E-mail address	1: jan.mertl@cenia.cz 2: vladislav.bizek@gmail.com 3: kazmukova@urm.mapnet.cz 4: Anonymous 5: Anonymous 6: jan.pokorny@cenia.cz 7: bizkova@tacr.cz 8: pavlina.slavikova@cenia.cz 9: Anonymous 10: Anonymous 11: pasek@ekosystem.cz
Organization	1: CENIA 2: Environ. consultant 3: ÚRM 4: MŽP 5: CENIA 6: CENIA 7: TAČR 8: CENIA 9: CENIA 10: CENIA 11: Ekysystem

Country	1: Czech Republic 2: Czech Republic 3: Czech Republic 4: Czech Republic 5: Czech Republic 6: Czech Republic 7: Czech Republic 8: Czech Republic 9: Czech Republic 10: Czech Republic 11: Czech Republic
Organization	1: Team member 2: Team member 3: Urban planner 4: AQ unit 5: Team member 6: Deputy Head of EA Unit 7: Chairperson 8: Head of EA Unit 9: EA expert 10: EA expert 11: Project manager

Please indicate for what type of environmental risk SUDPLANS has been used (Y= SUDPLAN used, N = SUDPLAN not used, NA= concept not applicable). For other, please indicate what other risk.

Type of environmental risk	Analyst primary	Analyst secondary	Modeller	System Manager
Urban stormwater flooding during intense rainfall		2		
Dimensioning of sewage water systems		1		
Risks of flooding of rivers				
Hydrological conditions		1		
Air pollution	3	6		1
Other				

Please indicate what is the temporal planning interest (Y= of interest, N = not of interest, NA= not applicable).

Temporal planning interest	Y	N	NA
Present conditions and short term (<10 years) planning	3	9	
Long term planning (>10 years) planning	9	3	

Please indicate what part of SUDPLAN the validation is made (Y= Yes, N = No). Only one answer per user is possible.

Application	Y	N
Stockholm pilot		
Wuppertal pilot		
Linz pilot		
Czech pilot	11	
Overall application		

Please describe the user's knowledge with respect to the SUDPLAN product (Y= Yes, N = No).

Type of user	Y	N
SUDPLAN team member	3	8
Urban / regional planner (analysts)	1	10
Modeller	0	11
System manager	0	11
IT expert	1	10
Climate change expert	1	10
Have seen presentations and documentations	7	4
User of the SUDPLAN / model results	3	8
Working with the actual system	4	7
I participated in a SUDPLAN workshop	3	8

SUDPLAN team member: You were developing SUDPLAN.

Analysts are those people who will be using the SUDPLAN applications on a regular basis to carry out analyses in order to arrive at an environmental management decision. In some cases they may be the decision makers, and in other cases they may be supporting the decision makers. This category of user would include expert planners and city planners, as defined in the DoW, and are likely to be primary users (i.e. they will use the SUDPLAN applications directly and regularly).

Modelers are those people who develop, integrate, and/or configure mathematical models to be used within SUDPLAN applications. While these users might be expert planners as well, this category is reserved for people performing specific model development tasks; if and when they work as planners, they revert to the Analyst category. Modelers may be seen as secondary users in that they will not generally, in this role, use the SUDPLAN application on a regular basis, and might not use it directly at all.

System Managers are those people who install and maintain SUDPLAN applications and carry out general system administration tasks. This would include the integration of components, such as models, into SUDPLAN applications. While this task might be performed by the same people who developed the models, when they are carrying out the integration into an application they have switched into a role as a System Manager. These users could be considered secondary users. While they will definitely use the SUDPLAN applications directly, it will only be occasionally (in this role).

IT-Experts are people working in the development or administration of IT systems. If you have some GIS and SOA background please select this also.

Climatic Change experts are people with knowledge in the Climate Change domain. They may or may not act as any of the other roles within SUDPLAN.

1.2. B - Graphical user interface

This question group is about the usability and functionality of the graphical user interface.

9 [B_1]: Please indicate the importance of key concepts used in SUDPLAN to assure the GUI ergonomics

Key concepts	*Very important*	*Important*	*Not relevant*	*NA*
Task-Oriented Menu structure	*5*	*6*		
Contextual help system	*5*	*5*		*1*
Alerts when processing finished	*2*	*8*		*1*
Panning/browsing through results (in time)	*5*	*5*		
Panning/browsing through results (in space)	*5*	*6*		
Highlighting recently changed data	*4*	*6*		*1*
Comparing two result sets	*6*	*5*		

10 [B_2] Please assess the ease of use and profiling of the SUDPLAN application

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Customization of the user interface			*2*	*4*	*2*	*2*		*1*
Define a scenario				*5*	*4*		*1*	*1*
Execute scenario with parameters				*6*	*1*	*1*	*2*	*1*
Save results				*6*	*1*	*3*		*1*
Share results with others			*1*	*5*	*3*	*1*		*1*
Visualize results				*1*	*2*	*5*	*3*	
Visualize uncertainties				*7*		*2*	*1*	*1*
Compare the results of various scenarios			*1*	*1*	*4*	*3*	*2*	
Export results in different formats			*2*	*4*	*2*	*2*		*1*

11 [B_3] Please assess the usability of SUDPLAN

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
With various output devices			*2*	*5*	*1*	*2*		*1*
Spatial visualization				*1*	*3*	*6*	*1*	
Temporal visualization				*2*	*2*	*4*	*3*	
Spatio-temporal visualization				*2*	*2*	*6*	*1*	
Contextual help			*3*	*4*	*1*	*2*		*1*
Ease of learning		*2*	*2*	*1*	*3*	*2*		*1*
Memorability				*4*	*4*	*1*	*1*	*1*

Geo-referenced data				*5*	*3*	*1*	*1*	*1*
Transparency				*3*	*4*	*3*		*1*
3D data, georeferenced, on a map				*1*	*5*	*5*		

12 [B_4] Please assess the capabilities of the SUDPLAN 3D/4D visualization framework

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Overall impression				*1*	*3*	*6*	*1*	
3D GUI interaction				*5*	*2*	*4*		
Information visualization				*5*	*2*	*4*		
Presenting of the scenarios				*2*	*3*	*4*	*2*	
Comparing of the scenarios				*2*	*6*	*2*	*1*	
Analyzing of the scenarios				*3*	*6*	*1*	*1*	

13 [B_5] Please give a short textual explanation on your experience with the capability, usability and ease of use of SUDPLAN GUI, and suggestions for improvement.

- The user experience is comparable to other similar systems.
- Really hard to work with for inexperienced user who is not familiar with the product. Fantastic 3D visualization as well as the visualization of temporal development of climate and air quality.
- Attractive and potentially very useful application but it is hard to learn how to work with it. Some manual or contextual help would be very helpful.
- Too little experience, maybe more demo on website.

1.3. C – Climate Scenario information

Climate scenario information is provided only "as is" for information about existing climate scenarios. This information can also be used for training purposes.

14 [C1_1] Please indicate the usability of the provided climate scenario information.

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Available number of different climate scenarios			*1*	*3*	*2*	*4*	*1*	
Within area of your interest over Europe			*1*	*2*	*4*	*3*	*1*	
Available time range				*5*	*1*	*1*	*3*	*1*
Available scenario documentation			*3*	*5*	*1*		*1*	*1*
Possibility for changing temporal resolution for data export			*1*	*4*	*3*	*2*		*1*

1.4. C2 – Common Services – Rainfall

The rainfall services provide prediction of

- *rain time series*
- *IDF curves*

15 [C2_1] Please indicate the usability of the SUDPLAN short-term rainfall downscaling.

	1	2	3	4	5	6	7	NA
Overall				2	4	2		3
Upload of historical/local data to improve the results				4	2	2		3
Downscaling				5	2	1		3
Visualisation of the results				1	4	2	1	3
Possibility for changing temporal resolution for data export			1	4	1	2		3

16 [C2_2a] Please assess the functionality and ease of use of the SUDPLAN downscaled continuous rainfall time series:

_	1	2	3	4	5	6	7	NA
Upload of historical data			1	4	1	2		3
Downscaling procedure				3	3	1	1	3
Results visualisation and download				2	5	1		3

2
b
1

17 [C2_2b] Please assess the functionality and ease of use of the SUDPLAN downscaled IDF-curves:

	1	2	3	4	5	6	7	NA
Upload of historical IDF curve				4	3	1		3
Downscaling procedure				4	2	2		3
Results visualisation and download				2	2	3		4

18 [C2_3a] Please assess the scientific soundness and credibility of different aspects of the downscaled continuous rainfall time series from SUDPLAN:

	1	2	3	4	5	6	7	NA
Downscaled continuous rainfall time series: General performance				2	4	2		3
Downscaled continuous rainfall time series: Long-term (annual, seasonal) volumes				1	2	5		3
Downscaled continuous rainfall time series: High and low intensities				3	3	1	1	3
Downscaled IDF-curves: General performance				4	1	3		3
Downscaled IDF-curves: Dependency on duration				3	4	1		3
Downscaled IDF-curves: Dependency on return period				4	3	1		3

19 [C2_3b] Please assess the scientific soundness and credibility of different aspects of the downscaled IDF-curves from SUDPLAN:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
General performance				*2*	*4*	*2*		*3*
Dependency on duration				*1*	*5*	*2*		*3*
Dependency on return period				*3*	*3*	*2*		*3*

20 [C2_4] Please give a short textual explanation on your experience with the usability of SUDPLANs results in the rainfall domain, and suggestions for improvement. Please state also which state-of-the art product was used for comparison.

1.5. C3 – Common Services – Air Quality

This includes projections of air pollution influenced by climate change and changes in Europe air pollutant emissions.

21 [C3_1] Please assess the usability of the SUDPLAN tool as the basis for assessment of the future air pollution:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Overall				*2*	*3*	*5*	*1*	
Upload local emission data			*2*	*4*	*4*		*1*	
Downscaling				*2*	*6*	*2*	*1*	
Visualisation of the results				*1*	*1*	*6*	*3*	

22 [C3_2] Please indicate the level of support for following functionality to assess the risk of air pollution:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Prediction of long-term air quality and temperature simulations over entire Europe				*1*	*5*	*4*	*1*	
Trends in air quality				*1*	*3*	*6*	*1*	
Year-long downscaling air quality simulations				*2*	*2*	*6*	*1*	
Impact of local sources, activities and land use on future air quality in particular European cities				*4*	*3*	*2*	*2*	
Use of the downscaled air quality grids in local planning scenarios				*3*	*5*	*2*	*1*	
Use of SUDPLAN air quality results as input to local dispersion models			*1*	*4*	*5*		*1*	

Estimate the importance of local sources of pollutants vs. long-range pollution transport for the local air quality			*1*	*3*	*4*	*1*	*2*	

23 [C3_3] Please indicate the usability of SUDPLANs air quality results

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
As information about expected future environmental conditions				*1*	*4*	*5*	*1*	
Comparing the results of future city development plans			*1*	*3*	*3*	*3*	*1*	
Assess the feasibility of fulfilling national air quality standards and environmental objectives, in a climate change perspective				*3*	*5*		*2*	*1*

24 [C3_4] Please give a short textual explanation on your experience with the usability of SUDPLANs results in the air quality domain, and suggestions for improvement. Please state also which state-of-the art product was used for comparison.

- The results are satisfactory and sufficient.
- New tool which has not been available in the Czech Republic before.
- Results could be used on regional or local scale for urban planning. I find possible improvement in minimization of projection uncertainties and improvement of emission inventories.
- I compared Sudplan results with my personal knowledge of situation and scenarios currently available for Prague.
- Sudplan tool is able to provide decision makers with the insight to the future state and development of air quality in urban areas in the climate change perspective. Moreover, it is able to predict what will happen with air quality if some infrastructural and socio-economic changes take place. This is the main added value of the product which can contribute to adaptation of cities to climate change.
- The results are very useful and can effectively support decision making processes on regional level. What I particularly appreciate is the incorporation of climate change factors into the future development of air quality. However, I think that the integration of national air quality modelling systems with the Sudplan tool would be very complicated; moreover, it seems to be hard to upload national and regional emission and activity data into Sudplan system. Unfortunately, unless having this issue fixed, the usability of the system in real urban development projects is limited.

1.6. C4 – Common Services - Hydrology

Questions about prediction of river runoff

25 [C4_1] Please assess the usability of the SUDPLAN tool as the basis for river flooding assessment applications

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Overall				*1*	*5*	*3*		*2*
Upload of local river discharge time series			*1*	*3*	*3*	*1*	*1*	*2*

Local calibration				*6*	*2*	*1*		*2*
Presentation of the results from local calibration				*5*	*2*	*1*	*1*	*2*
Presentation of the results from simulation				*1*	*4*	*4*		*2*

26 [C4_2] Please assess the usability of SUDPLAN hydrological application

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Preparation and staring a local calibration				*7*	*1*	*1*		*2*
Starting a local climate simulation				*4*	*3*	*2*		*2*
Download and further exploration and use of the results				*4*	*4*	*1*		*2*

27 [C4_3] Please indicate the usability of SUDPLAN hydrological results for assessing

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Changes in river discharge				*2*	*4*	*3*		*2*
Changes in soil moisture				*2*	*5*	*2*		*2*
Changes in available ground water levels				*5*		*3*	*1*	*2*

28 [C4_4] Please give a short textual explanation on your experience with the usability of SUDPLANs results in the hydrological domain, and suggestions for improvement. Please state also which state-of-the art product was used for comparison.

1.7. D - Local models

This part deals with the usage *of local models. Local means the model is typically pre-existing and developed outside SUDPLAN. This model is now integrated to be used from within the SUDPLAN GUI. These models are typically not usable outside the context of this specific city.*

29 [D_1] Please assess the ability of SUDPLAN in the field of model integration

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Ease of integration of models as a service		*1*	*2*	*3*	*2*	*1*		*2*
Running models directly from the SUDPLAN GUI			*1*	*4*	*3*	*1*		*2*
Specifying parameters for model runs			*2*	*3*	*1*	*3*		*2*

Using model results as input for another model (Service chaining)			*2*	*3*	*2*	*1*	*1*	*2*
Configuration of models			*2*	*5*		*2*		*2*
Model validation			*1*	*4*	*2*	*2*		*2*
Model calibration			*1*	*4*	*3*	*1*		*2*

1.8. E - Completeness of functionality

30 [E_1] Please assess the usability of SUDPLAN for the creation of reports, publications and data export with respect to the requirements of planners

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
Creation of information products				*2*	*2*	*5*	*1*	*1*
Report generation				*1*	*5*	*3*	*1*	*1*
Coordinate conversion				*4*	*3*	*2*	*1*	*1*
Export			*1*	*2*	*3*	*3*	*1*	*1*
Information/result sharing			*2*	*3*	*3*	*1*	*1*	*1*

31 [E_2] Please assess the usability of SUDPLAN with respect to the requirements of system managers

	1	*2*	*3*	*4*	*5*	*6*	*7*	*NA*
User management				*1*	*9*			*1*
Security and rights management				*1*	*9*			*1*
Data source integration				*6*	*3*	*1*		*1*
Sensor service integration			*1*	*4*	*4*	*1*		*1*
Model integration			*4*	*2*	*4*			*1*

32 [E_3] Please indicate the functionalities you find in SUDPLAN, that are particularly useful

- Air quality modelling in the long-term perspective.
- Production of time series of temperature/precipitation/air quality for the particular place. Visualization of temporal development of climate and air quality over the whole Europe and zoom in to the area to be dealt with.
- Generation of time series for the particular place. Possibility to visualize development of climate and air quality in time over long time period. 3D visualization.
- Unfortunately, I cannot assess, I have only a little experience with the product .

33 [E_4] Please indicate the functionalities you miss in SUDPLAN, that might be particularly useful

- Using of real climate data instead of model results for current year´s simulations.
- Low resolution of climate change data downscaled regional climate model data are not incorporated into the system. It´s hard to display delta of emissions between two time slices or two scenarios. In particular, it is hard to display negative values (decrease of emissions). Ease of downloading national emission data - the system is not flexible and user friendly.
- Upload and display local activity and emission data on the map. Better export possibilities of data (shape files, xls files).
- Unfortunately, I cannot assess, I have only a little experience with the product

34 [E_5] Please give a short textual explanation about key advantages of SUDPLAN functionality, usability in the city management scenarios and urban planning, and give suggestions for improvement.

- Better resolution of data used for modelling.
- Air quality modelling takes into account climate change, which is crucial in the long-term perspective. Complexity of the product for urban planning, taking into account either air quality or hydrology issues including flooding and soil moisture.
- The biggest benefit of the Sudplan tool I see in evaluation of the impacts of city development projects on air quality carried out either before or after project implementation.
- Unfortunately, I cannot assess, I have only a little experience with the product.

1.9. F - Conclusions

Please, give your final impression on SUDPLAN!

35 [F_1] Compared with the previous available information, SUDPLAN results are:

	Y	N	Cannot assess	NA
New	11			
Better quality	11			
More useful	11			

36 [F_2] Would you use the SUDPLAN output as a base for your future city planning? Please choose all that apply and provide a comment

	Comments
Yes, I would (4 times)	
Yes, it is useful for most cities (2 times	Especially for bigger cities

yes)	
Yes, to certain extent (3 times yes)	If I need to concern climate changes in air quality modelling See above mentioned. It is an innovative product. I would use it if a good support (manual, contextual help) were provided and if the upload of national data was easier.
Yes, but I still miss some information (3 times yes)	There are still big uncertainties in this kind of projection.
Maybe for a few specific cases (once yes)	
I would recommend to my colleagues in other European cities (once yes)	
No, I would not use it at all. (none yes)	

129 9/Q7a: How did you find the graphical presentation of the SUDPLAN results? Choose one of the following answers.

	Not useful	**Ordinary**	**Excellent and contributing to a better understanding**
Excellent and contributing to a better understanding			11
Ordinary			
Not useful			

Please enter your comments here.

- I like the 3D visualization and its possible use to visualize more variables at the same time, which could be used for the interpretation of results.
- Results are great; however, it is a bit more difficult to work with the system.
- Very nice and comprehensive presentation.

38 [F_4]: What is in your opinion the strength of SUDPLAN output?

- Visualization, combination of air quality and climate change modelling/projections
- Visualization, combination of climate, air quality and hydrology modelling.
- Integration of climate change, air quality and hydrology modelling. Long time scale of results up to 2100. Assessment of what-if scenarios. Advanced visualization techniques used.
- Already mentioned in previous answers.
- Comprehensive and understandable presentation of results.

39 [F_5]: What is in your opinion the weakness of SUDPLAN output? What should be improved?

- No idea.
- Uncertainties of projections
- It is only the first step and some follow up is necessary.
- User friendliness of the product for someone who has not been involved in its development. Complicated upload of local data - it should be easier as the product is aimed at supporting regional development. Better manual and application support system after the project end is essential.
- Already mentioned in previous answers.
- I don´t know how to upload national data into the Sudplan modelling system (emission, transportation etc.).
- I have no comments.
- Too little information about input.
- Insufficient contextual help of application and limited possibilities of integration with national modelling systems.

40 [F_6]: Please give a short summary of your impression of the SUDPLAN product:

- Excellent tool applicable to improve air quality assessment and management in the Czech Republic
- As my occupation is air quality I focused mainly on air quality part of the project. I appreciate the tool developed within the project, in particular the visualization. Results of pilots could be used for regional and local urban planning.
- Good idea, well done, quite a lot of work in front of authors.
- Please see the assessment above.
- Very innovative tool which significantly contributes to air quality protection on urban level. It can support decision making processes on city development projects, mainly in terms of city infrastructure. The main limitation of the system I see in a difficult "adjustment" of the tool to national conditions, namely I mean upload of local data into the system and its integration with already existing models.
- The project results can support infrastructure development projects and the

Environmental Impact Assessment processes. However, better integration with national information system and tools is needed.

- I have no comments
- Very advanced product, needs more publicity
- I think that the temporal range of modelling up to 2100 is too long and that the capabilities of model are exaggerated. I would recommend focusing on modelling by decades, which is, from my point of view, more accurate and valuable for end-users.