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Methodological Basis for Information Management – The DIAMONT Database for Indikators, Data and Instruments as a Contribution to the Alpine Convention

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Abstract

In the year 1991, seven Alpine states and the EU signed the Alpine Convention, an international agreement dedicated to ensure sustainable development in one of the ecologically most sensitive regions of Europe. The Alpine Convention aims to safeguard natural and cultural diversity as well as the life quality of citizen and strives within the EU context for a balanced competitiveness of regions. For almost 10 years the Signatory States of the Alpine Convention struggled for the development of appropriate indicators and instruments to monitor and assess the main processes of regional development as well as Alpine-specific problems. The INTERREG IIIB project "DIAMONT" (Data Infrastructure of the Alps. Mountain Orientated Network Technology) supports the Permanent Secretariat of the Alpine Convention in the development of "SOIA" (System for Observation of and Information on the Alps).
The database has been developed in different modules addressing indicators, data and instruments of regional development. Details on both indicators and instruments are given in accordance with data and meta data requirements as regulated by ISO19115; they are stored in the xml data base. This technology enables to maintain consistent relations between indicators, instruments and data for entering and maintaining in the database. Besides data storage, the database is also used within the project as communication platform between eight partners from six countries. For that reason, the database is equipped with a sophisticated comment field, allowing authorised users to comment and discuss each entry. Given this structure the database might also contribute to the INSPIRE-initiative which aims to compile geographical information from local to EU level in an inter-operable way (http://www.ec-gis.org/inspire/).

1. Introduction

The core tasks of the Interreg IIIB project DIAMONT (Data Infrastructure of the Alps. Mountain Orientated Network Technology) include the development of relevant indicators for the purpose of monitoring regional development, the establishment of a database of available statistical data at Alpine-wide and national level and the compilation of appropriate instruments to improve sustainable development at regional level. Beyond these tasks, "DIAMONT" is also supporting the Permanent Secretariat of the Alpine Convention in the development of "SOIA" (System for Observation of and Information on the Alps).

The project has so far compiled indicators from existing databases and has proposed some specific indicators for the Alpine area. These indicators are documented as fact sheets in the database. In the next steps, Alpine-wide data has been identified for nearly 100 indicators at LAU 2 – level (municipality). These data sets of different countries have been harmonised as far as possible to allow cross-country analyses and will be uploaded step by step to the database. Apart from that, instruments for regional sustainable development have been collected and are being analysed. They will be disseminated through the database to regional and municipal stakeholders.

The project is carried out in close collaboration between private enterprises, public administrations and scientific institutes from universities. The project will include a grounding of its results in test regions in five Alpine countries.
Further information may be obtained from http://www.uibk.ac.at/diamont/home.htm

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2. Framework of indicators, data and instruments

In the DIAMONT project the complexity of interactions in regional development has been organised in a hierarchical framework of "trends", "dimensions" and "phenomena". Indicators take the function of describing and characterising the phenomena of regional development concerning ecological, economic and social aspects (cp. Schönthaler, von Andrian, 2007). Effects which occur due to changes or impacts in this framework are often too manifold and too complex to be measured completely and directly, and therefore can be measured in many cases only in an indirect manner: indicators allow the estimation of not "directly" measurable effects or relationships. Therefore indicators are a measurable substitution, an exemplary model, with relevance in regard to the characteristics of a selected phenomenon. Often the result is derived from a calculation.

To make the discrimination between direct measurement and indication more explicit: if some issues are indicated only by algorithms this does not mean that the real effects can be measured. Besides technical reasons, real measurement can be limited also due to accruing costs, privacy protection and various other restrictions. Of course, the pure measurement of effects in regional development does not mean any change of the conditions causing the effects by itself. However a clear analysis of data and the interpretation of data considering policy objectives builds the framework for decision support and prepares the ground for action. Then policy action can start using appropriate "instruments".

In the context of the DIAMONT project, the term "regional development instrument" is referring to any instrument which is designed for intentional stimulation and steering of regional development. Examples for such instruments include among others regional planning, economic incentives and public participation processes.

The careful analysis of conditions and trends in a region with indicators can support the selection of appropriate instruments and give also a rationale for the implementation of instruments. If feasible, the implementation of instruments and their effects may again be measured by indicators.

However indicators come to life only if they are fed with data. This data may be derived or calculated from primary or secondary data, or even from other indicators.

3. A major precondition – meta data

A close intertwined relation exists between data sets, single data, indicators, instruments and meta data. The consistency of the technical data description with help of meta data has to be safeguarded as these are the basis for the indicator calculation. As the calculation of indicators is often based on data, which is heterogeneously collected across the different Alpine regions, the technical description, consultation and documentation of indicators and their calculation methods on the basis of differing data sets is becoming increasingly important. The same holds true for the instruments, which might support the implementation process of the Alpine Convention and which equally rely on indicators.

The transparency of the indicator calculation requests a documentation extending the duration of the project. This documentation displays a consistent record from data source to indicator and allows their future update.

DIAMONT as an international project uses English as project language, the alpine space however is multilingual. Therefore options have been discussed and are prepared to upgrade the database to multilingual one by using different language thesauri. The cooperation and consultation process requires the differentiable access and update of single documents, e.g. through the commenting function. Furthermore, the budget for establishing and maintaining the database has been limited, which required a cost-saving approach.

4. Implementation in the DIAMONT database

Indicators, data and instruments are consistently described as meta data following ISO 19115. Meta data are briefly defined as "data about data", in which the former shall describe the latter. In most cases this refers only to numeric data, which according to ISO 19115 are often delimited in spatial terms.

The question of whether we are dealing with "real" meta data depends on the perspective, from which the data are looked at. The NO_x-value derived from data of traffic related air quality measuring stations represents a technical data for the traffic expert. From the point of view of the measurement it represents the meta datum of a chemical/physical process. The same applies to address data. From the perspective of address management they are technical data, while according to ISO 19115 they are to be considered as meta data, e.g. of the data owner. One can conclude that there is no distinct delimitation between meta data and technical data. The description of instruments and indicators is equally regarded as meta data as the description of files and data objects, since in both cases information is provided "about" the issue.

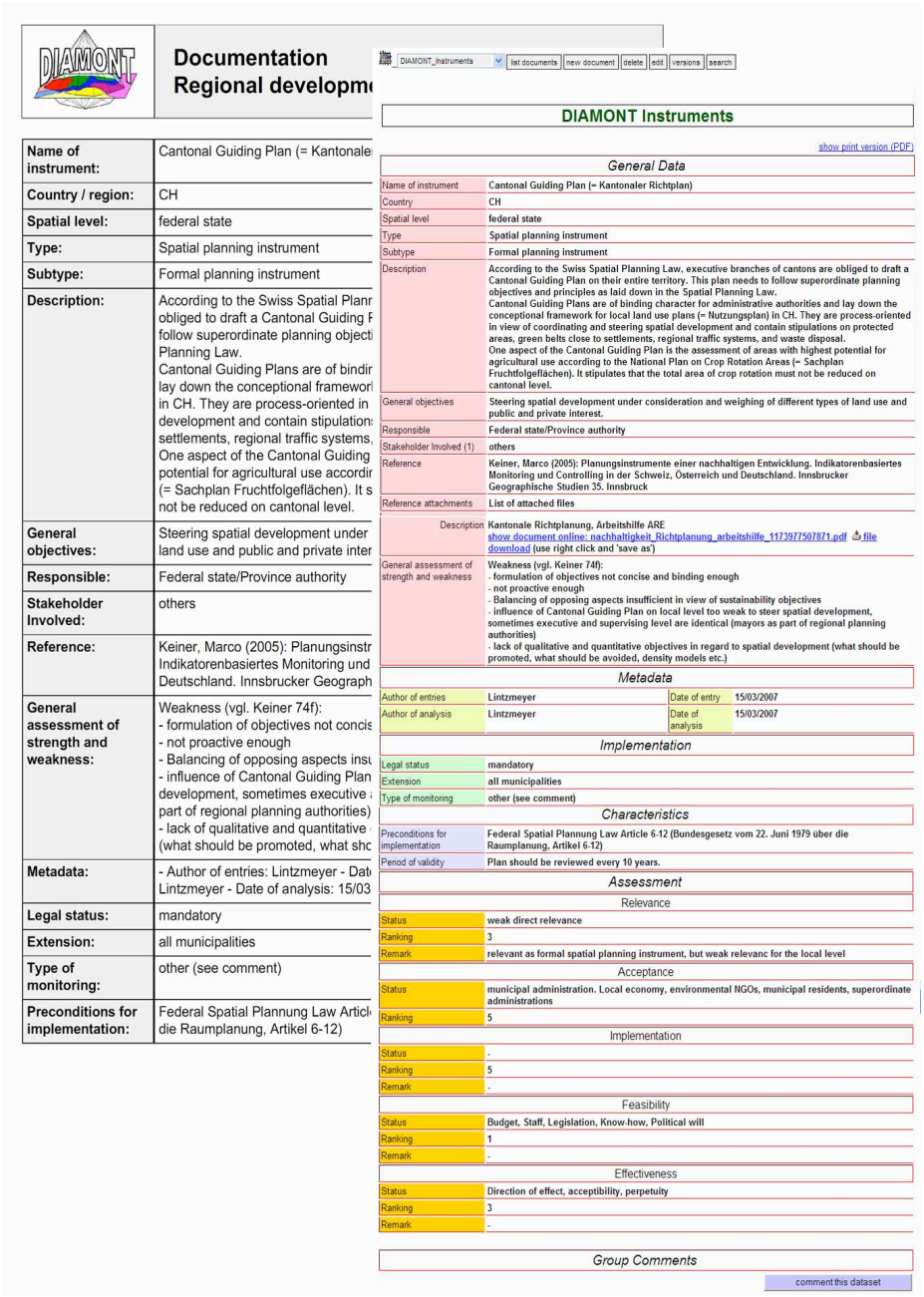
To illustrate and to administrate the different levels of indicators, data and instruments, the meta data description in DIAMONT is differentiated according to the classes below:

1. Instruments (cp. Figure 1) serve for the description of the tool kit within the framework typology of Legal codes, Laws, Formal planning instruments, Informal planning instruments, Access fees / supply fees, Consumptive fees, Steering taxes, Subsidies and local business development, Liabilities, Creation of markets / regional marketing, Regional management, Voluntary, but binding contracts, Voluntary cooperation and commitments, not legally binding, Conflict prevention and resolution, Public relation / awareness campaigns / information campaigns and Research and technology.

2. Indicators (cp. Figure 2) are differentiated according to:

   - main trends in the Alpine area including Local centres and fringes between competition and cooperation, Marginalisation of rural areas, Congestion of transport system, Innovation and competitiveness - modernisation of agriculture in favoured areas, Innovation and competitiveness - increasing importance of innovative technologies, Tourism: towards the Alpine experience, Impacts of climate change, Increasing generation of renewable energy.,
   - pillars of sustainable development (economy, society, culture, environment) with the dimensions Matter exchange, Water exchange, Energy balance, Human health, Aesthetics, Economic performance and infrastructure, Public and private financing, Labour, Production and consumption, Innovation, technology and information, Population, Social equity and family, Income and wealth, Public services and security, Social participation and freedom, Culture,
   - phenomena within the main trends such as loss of water absorbing capacity, fragmentation of natural biotopes by construction, etc.
   - type of indicator: identification and/or evaluation. Further detailed information on this framework used in Diamont is provided in Schönthaler & von Andrian (2007).

Additional information in the database informs about a more detailed description how indicators can be calculated or on background information.



Documentation Regional developm

Name of instrument:	Cantonal Guiding Plan (= Kantonale
Country / region:	CH
Spatial level:	federal state
Type:	Spatial planning instrument
Subtype:	Formal planning instrument
Description:	According to the Swiss Spatial Plan obliged to draft a Cantonal Guiding F follow superordinate planning objecti Planning Law. Cantonal Guiding Plans are of bindir lay down the conceptional framewor in CH. They are process-oriented in development and contain stipulation settlements, regional traffic systems, One aspect of the Cantonal Guiding potential for agricultural use accordi (= Sachplan Fruchtfolgeflächen). It s not be reduced on cantonal level.
General objectives:	Steering spatial development under land use and public and private inter
Responsible:	Federal state/Province authority
Stakeholder Involved:	others
Reference:	Keiner, Marco (2005): Planungsinstr Indikatorenbasiertes Monitoring und Deutschland. Innsbrucker Geograph
General assessment of strength and weakness:	Weakness (vgl. Keiner 74f): - formulation of objectives not concis - not proactive enough - Balancing of opposing aspects insu - influence of Cantonal Guiding Plan development, sometimes executive part of regional planning authorities) - lack of qualitative and quantitative (what should be promoted, what sho
Metadata:	- Author of entries: Lintzmeyer - Dat Lintzmeyer - Date of analysis: 15/03
Legal status:	mandatory
Extension:	all municipalities
Type of monitoring:	other (see comment)
Preconditions for implementation:	Federal Spatial Plannung Law Articl die Raumplanung, Artikel 6-12)

DIAMONT_instruments | list documents | new document | delete | edit | versions | search

DIAMONT Instruments

show print version (PDF)

General Data

Name of instrument	Cantonal Guiding Plan (= Kantonaler Richtplan)
Country	CH
Spatial level	federal state
Type	Spatial planning instrument
Subtype	Formal planning instrument
Description	According to the Swiss Spatial Planning Law, executive branches of cantons are obliged to draft a Cantonal Guiding Plan on their entire territory. This plan needs to follow superordinate planning objectives and principles as laid down in the Spatial Planning Law. Cantonal Guiding Plans are of binding character for administrative authorities and lay down the conceptional framework for local land use plans (= Nutzungsplan) in CH. They are process-oriented in view of coordinating and steering spatial development and contain stipulations on protected areas, green belts close to settlements, regional traffic systems, and waste disposal. One aspect of the Cantonal Guiding Plan is the assessment of areas with highest potential for agricultural use according to the National Plan on Crop Rotation Areas (= Sachplan Fruchtfolgeflächen). It stipulates that the total area of crop rotation must not be reduced on cantonal level.
General objectives	Steering spatial development under consideration and weighing of different types of land use and public and private interest.
Responsible	Federal state/Province authority
Stakeholder Involved (1)	others
Reference	Keiner, Marco (2005): Planungsinstrumente einer nachhaltigen Entwicklung. Indikatorenbasiertes Monitoring und Controlling in der Schweiz, Österreich und Deutschland. Innsbrucker Geographische Studien 35. Innsbruck
Reference attachments	List of attached files
Description	Kantonale Richtplanung, Arbeitshilfe ARE show document online: nachhaltigkeit_Richtplanung_arbeitshilfe_1173977507871.pdf file download (use right click and 'save as')
General assessment of strength and weakness	Weakness (vgl. Keiner 74f): - formulation of objectives not concise and binding enough - not proactive enough - Balancing of opposing aspects insufficient in view of sustainability objectives - influence of Cantonal Guiding Plan on local level too weak to steer spatial development, sometimes executive and supervising level are identical (mayors as part of regional planning authorities) - lack of qualitative and quantitative objectives in regard to spatial development (what should be promoted, what should be avoided, density models etc.)

Metadata

Author of entries	Lintzmeyer	Date of entry	15/03/2007
Author of analysis	Lintzmeyer	Date of analysis	15/03/2007

Implementation

Legal status	mandatory
Extension	all municipalities
Type of monitoring	other (see comment)

Characteristics

Preconditions for implementation	Federal Spatial Plannung Law Article 6-12 (Bundesgesetz vom 22. Juni 1979 über die Raumplanung, Artikel 6-12)
Period of validity	Plan should be reviewed every 10 years.

Assessment

Relevance

Status	weak direct relevance
Ranking	3
Remark	relevant as formal spatial planning instrument, but weak relevanc for the local level

Acceptance

Status	municipal administration. Local economy, environmental NGOs, municipal residents, superordinate administrations
Ranking	5

Implementation

Status	-
Ranking	5
Remark	-

Feasibility

Status	Budget, Staff, Legislation, Know-how, Political will
Ranking	1
Remark	-

Effectiveness

Status	Direction of effect, acceptibility, perpetuity
Ranking	3
Remark	-

Group Comments

comment this dataset

Figure 1: Description of instruments (screen-shot and pdf-document for download)

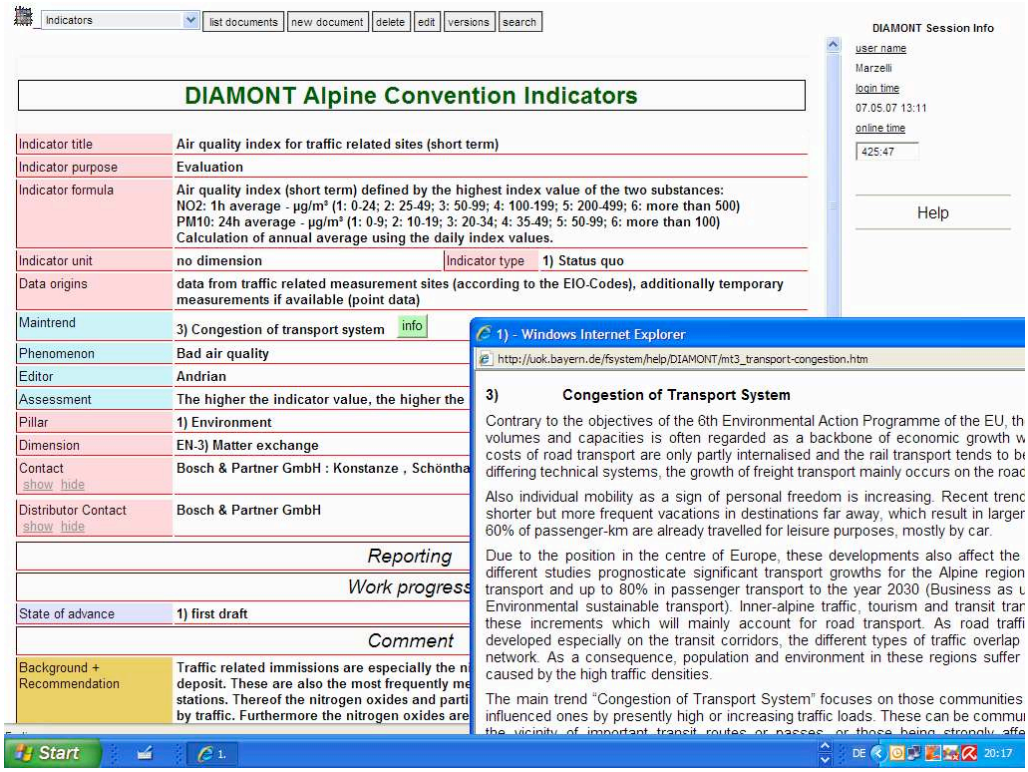


Figure 2: Class ""Indicator" in the DIAMONT data base

3. Meta data for the description of data sets and/or data according to ISO 19115. Meta data offer the possibility to describe technical data sets according to the different attributes (such as NOx-measurements, socio-demographic data). Through this process, the consistency between the contents of the technical data set (containing its attributes) and the meta data description can be ensured.
4. Data used within the Diamont project, which will be uploaded after the metadata have been described sufficiently.
5. Address data which are differed into data providers, technical users, public etc., which are used in other meta data categories according to ISO.
6. User administration for the administration of the usual access routines of project partners as a mandate of the Bavarian Object Catalogue for Environmental Data UOK (WEIHS 2005, 2006). The description of meta data and address data will not be discussed in the following, as this is extensively dealt with in literature. The meta data sets contain comment fields, which can be created in dialog by the project partners. The comments are updated and are visible for the participants comparable to an internet forum. Once uploaded, each comment automatically releases an information email to the author of the data base entry, allowing the respective person to immediately resolve ambiguities and modify database entries.

4 The data model

In figure 3 the data model of the DIAMONT project is presented as a scheme. For each category (indicator, instruments, …), the meta data feature coherent XML-schemes according to W3C and they are – as far as possible –encoded according to ISO 19115. The storage is carried out native, which means that the XML data are stored and managed as XML in the XML data base (software: tamino of the software AG). All attachments (e.g. word files, pdf files,) are stored in the tamino software as well.

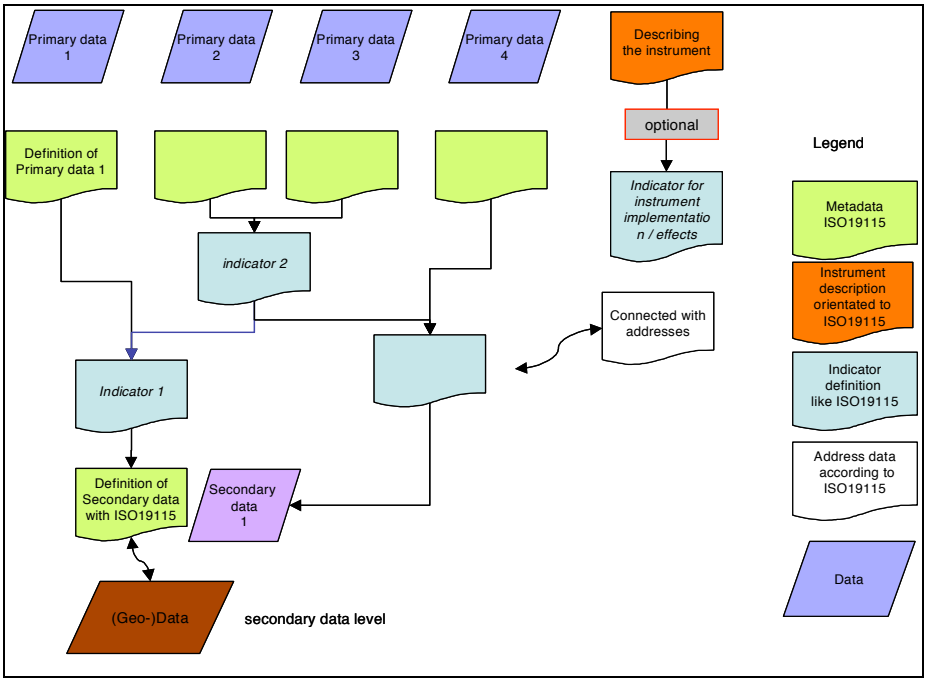


Figure 3: Data flow in the DIAMONT project

The DIAMONT database is a pure JAVA-based internet XML application. Development costs have been quite low (below 20,000 EUR), as the function of the services in the Bavarian Environmental Object Catalogue ("Umweltobjektkatalog, UOK) could be used.

The application is operated as a mandate of the UOK system of the Bavarian State Ministry of the Environment, Public Health and Consumer Protection. But it can be operated as an independent system on most open-source platforms (UNIX, Windows X, Linux). Besides the database, which is subject to license conditions, only the open software JAVA based on the W3C standard is used.

Figure 3 schematically illustrates how meta data descriptions, indicator definitions and address data are linked to guarantee the consistency between the meta data of the evaluation, address data and indicators. Consistency checks are carried out upon registration and update.

The search can be carried out either for each field separately, as free text search or as a combination of both methods (Figure 4).

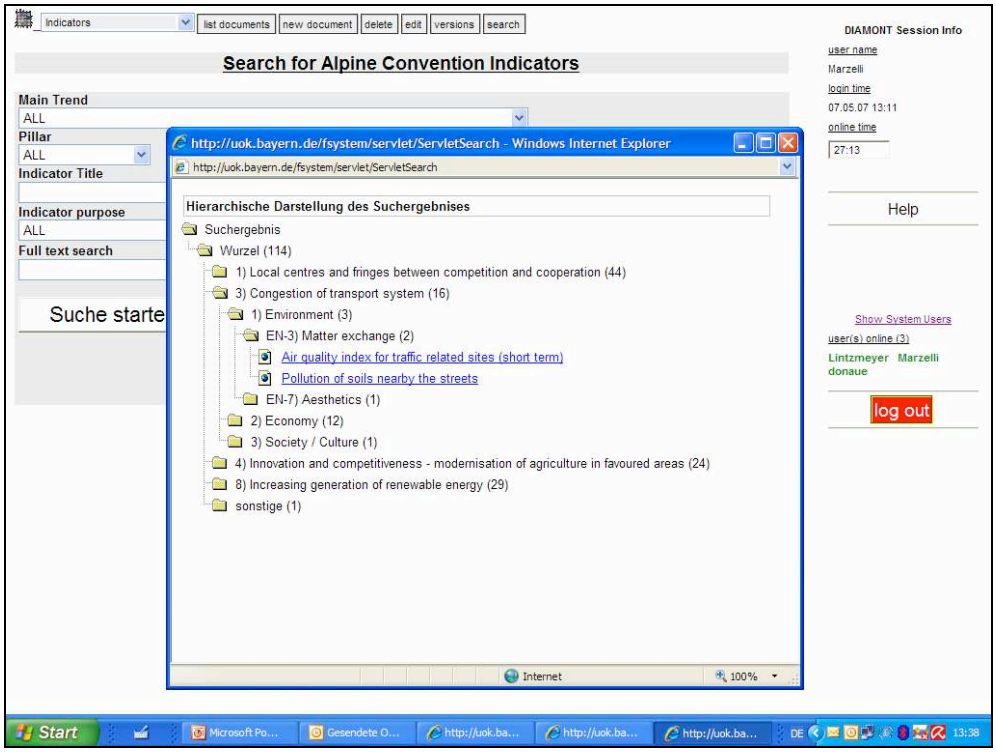


Figure 4: The result is presented as an individually selectable tree structure leading to the meta data

5 Outlook

For the time being the database structure has been developed and first data sets have been uploaded. In the next steps further use of the data base for scientific purposes and for the public will be discussed within the project consortium.

The development of the DIAMONT data base has been funded by the Alpine Space Programme, the Bavarian State Ministry of the Environment, Public Health and Consumer Protection and the German Ministry for the Environment, Nature Conservation and Nuclear Safety.

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