

# Plan4all: harmonisation of spatial planning data

An eContent*plus* funded best practice network

**Velasco Echeverría, Xabier; López Sánchez, Pedro; Mildorf, Tomas *et al.***

## Abstract

The project Plan4all focuses on the harmonisation of spatial planning data according the INSPIRE Directive. It is based on the existing best practices in EU regions and municipalities and the results of current research projects. The project involves detailed description and summary of the current situation and standards, proposal, testing and implementation of spatial planning metadata profile, common data model and harmonisation procedures. The important part of the Plan4all project are networking standards of spatial planning data, based on previously collected and analysed experiences, and then defining common procedures and methodologies for spatial data sharing and utilisation of new pan-European standards for spatial planning data within the EU.

Although there are basically the same ideas and concepts behind urban and spatial planning across Europe, the legal situation is completely fragmented - sometimes down to NUTS3 or even local level. Nowadays planning laws are disjointed and even experts from one country might have difficulties to understand the planning regulations of a neighbouring country - for investors and decision makers it is almost impossible to compare (the meaning of) planning regulations across Europe. Plan4all contributes to make plans and their implications understandable.

The results from Plan4all are European forums for SDI in spatial planning, a database of best practices, and analysis of best practices in terms of organisation, sharing, and harmonisation and SDI recommendations for spatial planning.

## KEYWORDS

Plan4all, INSPIRE, Spatial Data Infrastructures, Spatial Planning, Europe, eContent*plus*

## 1 INTRODUCTION

Sustainable territorial planning and development is about the spatial, social and economic dimensions of development. It is concerned with where people live and work, the location of social and economic activity, and the way in which resources we possess in limited supply are exploited to achieve socio-economic objectives. National, regional and local authorities face important challenges in the development of territorial framework and concepts that balance-up and respect the needs of different stakeholders, guarantee economical development, environment protection, but also risk protection. Modern approaches to spatial planning emphasise the need for strong involvement of all levels of government, stakeholders and citizens in the planning process. Currently used methods of spatial planning do not make effective use of shared data and web technologies that insure the better use of geographic data and support the interoperability of planned solutions together with the active participation of all stakeholders of the planning process. Governments are generally very keen on evaluating quantifiable and qualitative goals and measures against their territorial planning processes, in order to improve the “performance” of government itself. On the other hand, spatial planning and related information are important not only for national, regional and local development, but also for the international dimension especially in Europe where the “continuum” of settlements characterises the transition between nations. The planning is also strongly related to natural disasters prevention, which has in many cases a cross border or international character. Therefore there is a strong need for harmonisation of data used for planning and there is an absolute need of some core of data sets for planning purposes to guarantee, that this information will be easily understandable across all Europe. This is important for all regions, and mainly for under developed regions, which need international investment together with the protection of natural resources which generally characterise these regions.

The objective of Plan4all is to build a network of local, regional and national public bodies, stakeholders, ICT industry, organisations dealing with planning issues and regional development, universities and international organisations to find consensus about harmonisation of Spatial Data Infrastructure (SDI) for spatial planning according to the INSPIRE Directive and also to contribute to standardisation of related Spatial Data Themes (hereinafter referred to as “Themes”) from the INSPIRE Annexes.

Spatial planning is defined as the comprehensive, coordinating spatially-oriented planning on all spatial scales (international - local). In contrast to the broad, comprehensive character of spatial planning, several sectoral planning authorities are in charge of single spatially relevant topics (e. g. forestry, water management, geological survey, landscape, transport etc.). Plan4all focuses on the implementation of the INSPIRE Directive into spatial planning processes, mainly based on building spatial planning data models for selected Themes and implementing recommendations of INSPIRE Drafting Teams for Metadata and Network services. The project uses experiences coming from previous projects such as ARMONIA, HUMBOLDT, c@r, NaturNet Redime, eSDInet+, GIS4EU and EURADIN, whose partners are present in the Plan4all team. The project team also use experience of OGC members working in the team for definition of technological standards, and take into account the recommendations of INSPIRE Drafting Teams. From the perspective of metadata standards it is expected, that a metadata profile for ISO19115/ISO19119 (implementation scheme ISO19139 respectively) will be defined. This will be an extension of the currently developed INSPIRE profile and Humboldt profile for Czech spatial planning data and services.

On the data model level the focus is on:

- spatial and temporal representations of spatial objects across different levels of detail,
- spatial and temporal relationships between spatial objects,
- unique object identifiers,
- constraints, and
- references to common spatial and temporal reference systems as well as multilingual thesauri.

Spatial planning is multidisciplinary and reflects many Themes from various fields. In order to make the project achievable, Plan4all covers only some of them, listed in Annex II and III of INSPIRE:

- Land cover  
Physical and biological cover of the earth’s surface. Includes terrestrial elevation, bathymetry and shoreline.
- Land use  
Territory characterised according to its current and future planned functional dimension or socio-economic purpose e.g. residential, commercial, etc.
- Utility and Government services

- Includes utility facilities such as sewage, waste management, energy supply and water supply, administrative and social governmental services such as public administrations, civil protection sites, schools and hospitals.
- Production and industrial facilities  
Industrial production sites, including installations covered by Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control, and water abstraction facilities, mining, storage sites.
- Agricultural and aquaculture facilities  
Farming equipment and production facilities (including irrigation systems, greenhouses and stables)
- Area management/restriction/regulation zones and reporting units  
Areas managed, regulated or used for reporting at international, European, national, regional and local levels. Includes dumping sites, restricted areas around drinking water sources, nitrate-vulnerable zones, regulated fairways at sea or large inland waters, areas for the dumping of waste, noise restriction zones, prospecting and mining permit areas, river basin districts, relevant reporting units and coastal zone management areas.
- Natural risk zones  
Vulnerable areas characterised according to natural hazards (all atmospheric, hydrologic, seismic, volcanic and wildfire phenomena that, because of their location, severity, and frequency, have the potential to seriously affect society), e.g. floods, landslides and subsidence, avalanches, forest fires, earthquakes, volcanic eruptions.

## 2 PARTNERS

24 partners from 14 UE (+Norway) countries participate in this project:

1. UWB - [University of West Bohemia](#) (CZ)
2. ISOCARP - [International Society of City and Regional Planners](#) (NL)
3. Olomouc - [Statutarni mesto Olomouc](#) (CZ)
4. TDF - [Technology Development Forum](#) (LV)
5. HSRS - [Help service remote sensing, s. r. o.](#) (CZ)
6. LGV Hamburg - [Landesbetrieb Geoinformation und Vermessung](#) (DE)
7. EUROGI - [Stichting EUROGI](#) (PT, NL)
8. ZPR - [Zemgale Planning Region](#) (LV)
9. PROVROMA - [Provincia di Roma](#) (IT)
10. FTZ - [Fondazzjoni Temi Zammit](#) (MT)
11. GEORAMA - [GEORAMA](#) (GR)
12. NASURSA - [Navarra de Suelo Residencial S.A.](#) (ES)
13. Hyper - [Hyperborea S.r.l.](#) (IT)
14. GIJON - [Ayuntamiento de Gijón](#) (ES)
15. MAC - [The National Microelectronics Applications Centre Ltd.](#) (IE)
16. CEIT ALANOVA - [CEIT ALANOVA gemeinnützige GmbH](#) (AT)
17. AVINET - [Asplan Viak Internet as](#) (NO)
18. DIPSU - [Dipartimento di Studi Urbani - Università degli Studi di Roma Tre](#) (IT)
19. EPF - [Euro Perspectives Foundation](#) (BG)
20. ADR Nord Vest - [Agentia de Dezvoltare Regionala Nord-Vest](#) (RO)

21. Lazio - [Regione Lazio - Direzione Regionale Territorio e Urbanistica](#) (IT)
22. HF - [Help forest, s. r. o.](#) (CZ)
23. AMFM - [AMFM GIS Italia](#) (IT)
24. MEEDDAT - [Ministry of Ecology, Energy, Sustainable Development and Town and Country Planning](#) (FR)

### 3 DESCRIPTION OF WORK

The work-plan of Plan4all has been structured into nine Work Packages (hereinafter referred to as "WPs") (see Fig. 1). They facilitate the proper organisation and implementation of the project. The WPs are as follows:

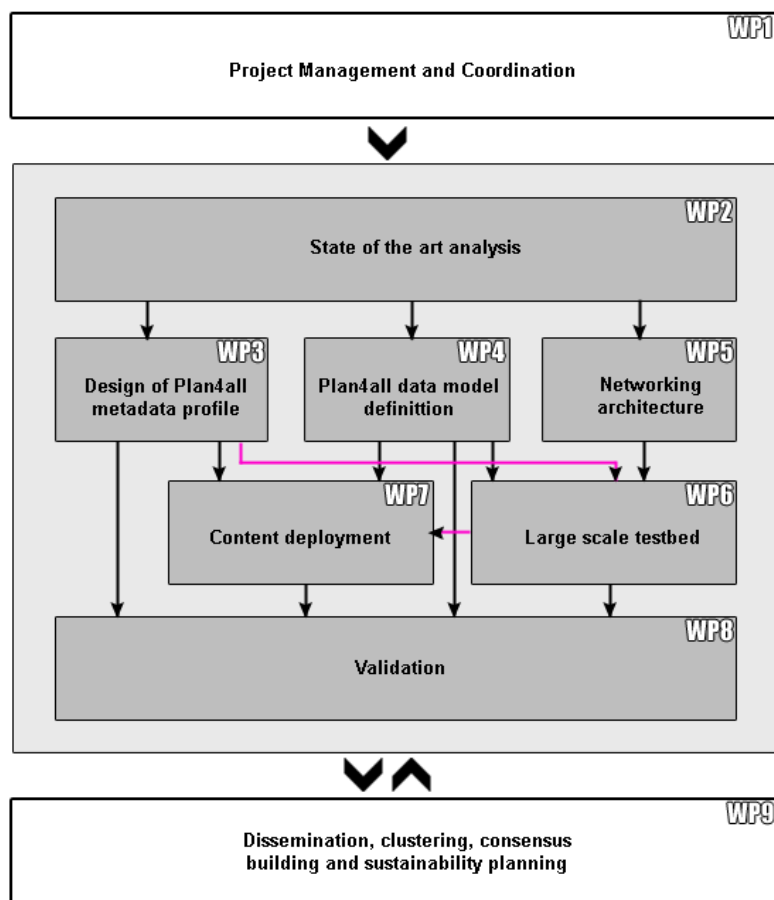


Fig. 1: organization of work packages

- WP1. Project Management and Coordination - ensure the proper organisation, implementation and orchestration of the rest of the project activities, in order to monitor and evaluate the progress of the project.
- WP2. State of the art analysis - focused on identification of leading regional and local administration, identification of innovation challenges and a framework structure for analysing relevant technology developments and trends, analysis of technology and application developments that are relevant to spatial planning SDI needs and on analysis of standard metadata, data models, networking technologies and on analysis of user requirements on planning systems.
- WP3. Design of Plan4all metadata profile - define common metadata profile for European Spatial Planning as overlapping of national legislation for spatial planning and INSPIRE profile.
- WP4. Plan4all data model definition - focused on national models and their combination and translation into common models covered by selected INSPIRE Themes.
- WP5. Networking architecture -extend the INSPIRE networking principles for the purpose of European Spatial Planning.

- WP6. Large scale testbed - aims at using existing technologies and services that are already successfully implemented and operating in some regions by the project's technical partners, in order to appropriately deploy them for the needs of Plan4all.
- WP7. Content deployment - populate the Plan4all spatial data repositories using semantically rich and multilingual metadata.
- WP8. Validation - provide the quality framework for the evaluation of the outputs of Plan4all through pilot evaluation and validation activities to be performed within the targeted user organisations.
- WP9. Dissemination, clustering consensus building and sustainability planning - include all activities planned to promote and valorise the project results. A major aim is to achieve wide dissemination at multiple levels, including publicity/dissemination activities. It also involves all activities related to creating liaisons with SDI technology standards, as well as formulating networks for future sustainability of the Plan4all network and the promotion of its results.

Each of the members of this project plays several roles in it which can be: data provider, technological provider, research and standardisation partner, validation partner, management team and dissemination partner. The project is coordinated (WP1) by Tomáš Mildorf from the University of West Bohemia in Pilsen (CZ).

#### 4 STATE OF THE ART ANALYSIS

The results of the state of the art analysis show the fragmented spatial planning systems in Europe which do not support SDI-building and that there are still gaps in SDI but also that the aims of data harmonisation and SDI-building are more and more present. More than 40 European best practices in the field of SDI-building and spatial planning data harmonisation could be identified, which is a step towards holistic planning. The projects were collected in a standardised way and analysed according to their goals, strengths, weaknesses, challenges, public/private as well as international/national/regional/local orientation and their used technology. As key factors for successful data harmonisation the increase of awareness, cooperativeness and knowledge exchange are identified. The majority of the best practices are EU funded cross-border initiatives that are compatible to international standards. With 24 partners from 15 different countries Plan4all is one of the biggest networks in this field. The structure of each country's planning system in relation to existing SDIs is demonstrated in structograms for each member state within the Plan4all project (the Austrian example see Fig. 2).

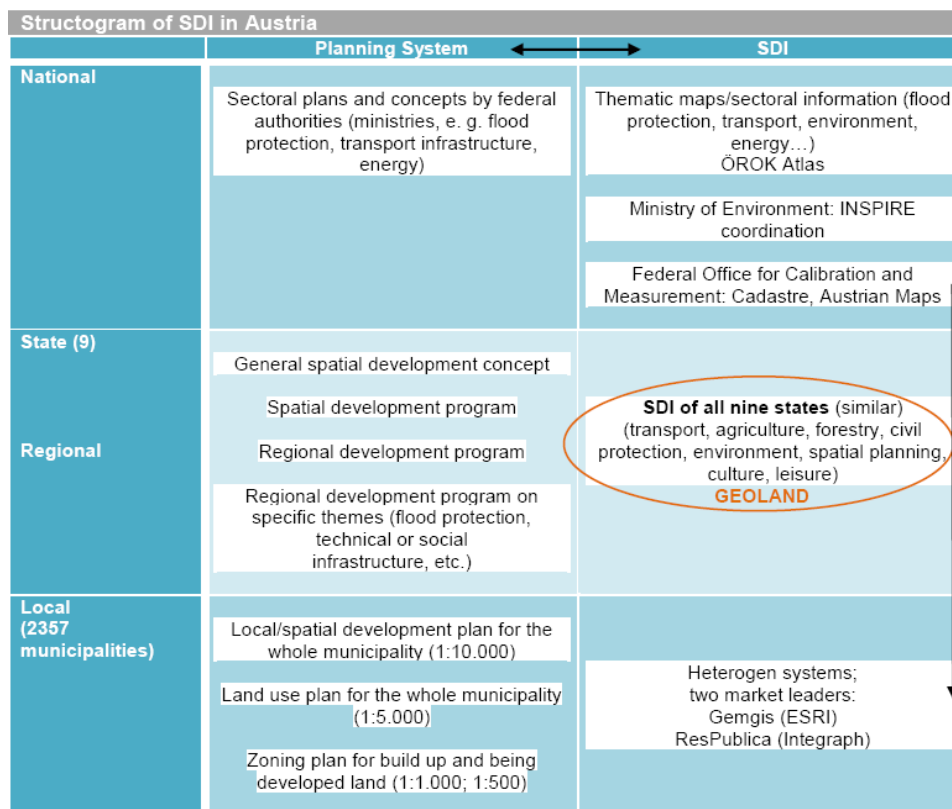


Fig. 2: structogram of SDI in Austria in comparison with the planning system. Source: Rubitzki/Vancutsem, 2009 [1].

One of the biggest challenges in data harmonisation is the complexity of the spatial planning process itself due to the fragmented legal structure, the differences in the use of terms and the high number of involved stakeholders and actors with different interests, intentions and user requirements. Plan4all integrates multicultural and multilingual partners from different European countries, with diverse backgrounds and experience in Geographic Information System (GIS)-technologies as well as spatial data harmonisation. General requirements of the users for SDIs are the vertical and horizontal interoperability of tools and methods, the implementation of web services as well as the possibility to publish own data and to use web map services from other data providers, the definition of a spatial data legend for data presentation, INSPIRE compliance, the possibility of metadata profile extension, free access to spatial planning data, the possibility to make physical data accessible in electronic format together with ensuring of digital right management and the use of UML (Unified Modeling Language) for data model description.

The state of the art analysis also includes technical aspects of SDI-building by classifying existing products and services that are used within the best practice projects. A framework for classification is established according to standards, technology (client-side, server-side, services, protocols and functionality), interactivity (simple web mapping, real web mapping, semi-interactivity, fully interactivity) and approach (graphic viewer, web cartography, web mapping, web GIS, routing, etc.). There is a wide range of available software, either commercial or open source products which on the one hand offer a lot of possibilities but on the other hand make compatibility challenging.

Holistic planning requires compatibility, mutual understanding and accessibility of spatial planning data which can be achieved by defining standards on a European level. Therefore Plan4all focuses on implementing the INSPIRE Directive into the spatial planning process. INSPIRE gives detailed requirements and recommendations for the definition of standards for metadata and data models for the seven selected data themes (INSPIRE Annexes II and III). For that reason several INSPIRE documents are analysed into detail. INSPIRE requirements claim for the definition of metadata elements according to the INSPIRE “Metadata Regulation” and the “Technical Guidelines”. Plan4all issues data modelling and application schemas according to the INSPIRE documents “Generic Conceptual Model (GCM)” and “Methodology for the development of data specifications”. The analysis of the requirements listed in those documents has produced the following general recommendations for the project. Interoperability

of spatial planning data can only be achieved with consistent efforts on all levels. Especially interoperability on terminology as well as on base and thematic data has to be achieved as planning is a holistic activity. The importance of metadata collection has to be underlined because a dataset is only as good as its metadata collection. It is recommended to explicitly express topological relationships, e. g. administrative units at the same level of hierarchy must not overlap, gaps between administrative units are in principle not allowed and boundaries of neighbouring administrative units must have the same set of coordinates. Finally, it is recommended to strengthen the connection to other projects, such as HUMBOLDT, GIS4EU and Orchestra which work on topics relevant for Plan4all.

## 5 OTHER ACTIVITIES

### 5.1 METADATA

After the task of analysis of requirement given by national legislation, a second task lead to the creation of the first version of the Plan4all metadata profile. The basis was the INSPIRE metadata profile and the table of metadata elements from the user requirements. During the process of metadata profile design the meaning of some elements had to be clarified by partners, some duplicate elements were detected and solved and finally the elements were mapped to ISO 19139 schema. Test profile (confidential access) was created in the Plan4all metadata portal. This will be the base for the release of the final version.

### 5.2 DATA MODELS

A survey on Application Schemas for selected themes was carried out in order to understand to what extent the case studies comply with the INSPIRE Generic Conceptual Model. The relevant data models of all the partner's countries were discussed by involving partners of the project as well as other institutions outside the consortium.

The collected material have been elaborated and summarized in order to prepare a first version of a simple Feature Catalogue. The responsible partners are currently working on the definition of the data models for the selected themes, starting from the information collected. Moreover, six of the experts involved in Plan4all were selected as members of the following Thematic Working Groups:

Thematic Working Group	Expert Name	Organisation
Area Management/Restriction, Regulation Zones and Reporting Units	Stein Runar Bergheim	Asplan Viak Internet as
	Tor Gunnar Overli	Asplan Viak AS
Land Use	Salgé François	Direction générale de l'aménagement, du logement et de la nature (DGALN)
	Kai-Uwe Krause	Free and Hanseatic City of Hamburg, Ministry of Urban Development and Environment, Agency for Geo-Information and Surveying of the (LGV)
Utility and Governmental Services	Frank Haugan	Asplan Viak Internet
Natural Risk Zones	Otakar Čerba	The University of West Bohemia in Pilsen, Czech Republic / Czech Center for Science and Society

### 5.3 NETWORK SERVICES

A document was produced to formalize Plan4all networking and data sharing requirements as well to make recommendations for architecture and suggest possible used components. This work is based on the analysis of INSPIRE networking requirements and previous work package collected data and survey results.

The work with translating the general and specific requirements into a tangible technical services and interfaces specification, including an implementation recommendation, has been initiated.

### 5.4 LARGE SCALE TESTBED

Large scale testbeds will be realised to demonstrate the technological feasibility of designed models from previous activities. Some partners have already deployed the system for publishing of metadata and catalogue services based on CSW 2.0.2. The other partners' implementations of metadata catalogue and metadata publishing will be published on the framework of the project. A pan european deployment has started with the first version of the Plan4all geoportal that has been installed and can be found at <http://portal.plan4all.eu> allowing the discovery and viewing of spatial data sets and services. The prototype Plan4all geoportal currently accesses a limited number of discovery and view services.

### 5.5 VALIDATION

The results of Plan4all work are continuously been validated, giving feedback to the different WPs and the project management team. This work started with the setup of a validation methodology using different techniques and analytical models and involves most all project members. The validation includes the metadata profile, data models and networking architectures on local and regional level, ensuring their consistency with INSPIRE implementing rules and technical guidelines.

## 6 ROLE OF SPANISH PARTNERS

There are two Spanish partners collaborating in this project, Navarra de Suelo Residencial (NASURSA) and Gijon Council. NASURSA is leader of the task "8.3 Validation of Platform", whereas GIJÓN is leader of work package "WP6 Large scale testbed". Both duties are relevant for the project to become successful.

Gijon council participates in Plan4All with two roles, one as a data provider and the other as a validation partner. Gijon has available many spatial planning data of the municipality in need of cataloging and processing services, appropriate to meet the interoperability requirements allowing the content deployment (WP7) in the Plan4all geoportal. The council's GIS infrastructure is heavily based on commercial software (Microstation and ArcGis), but for this project the Network services area decided to take a look at the open source components available. For the WFS service both UNM Mapserver and Geoserver -two widely known tools- were tested, choosing the last one to develop the Regional Platform.



## Technological Platform

Plan4all

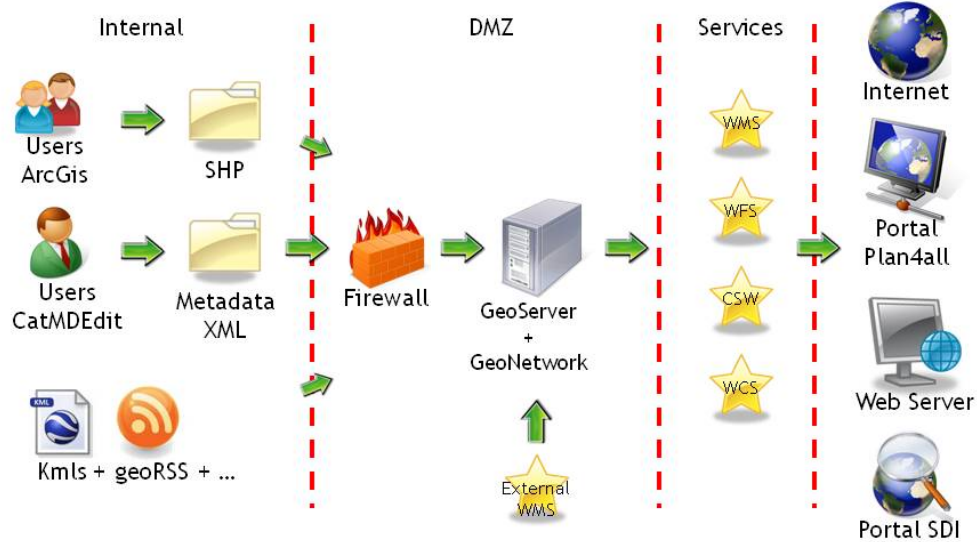


Fig. 3: A technological platform in Plan4All

Gijón has made progress in building its SDI/Regional Platform, which, although not an essential part of the project, includes a map viewer to have a more interactive interface for our potential users. This Map Viewer uses code libraries like Openlayers and GeoExt.

NASURSA, the other Spanish partner in the project has a crucial contribution in the validation work package as well as in the regional deployment. The SDI platform of the Navarre Government (IDENA) will be the base for the deployment of a Plan4all Regional Platform. This deployment will provide services as an example of best practices in the harmonisation of spatial planning data.

## 7 REFERENCES

- [1] Plan4all deliverables and materials, <http://www.plan4all.eu>
- [2] Schrenk, M., Horak, P., *et al.*: Plan4all - State of the Art in Spatial Planning Data Harmonisation and Transnational SDI-Building. INSPIRE Conference 2010.

## 8 CONTACT INFORMATION

Xabier Velasco Echeverría  
xvelasco@nasursa.es  
Navarra de Suelo Residencial, S.A.  
Observatorio Territorial de Navarra

Pedro López Sánchez  
PLopez@gijon.es  
Ayuntamiento de Gijón  
Departamento de Informática

Tomas Mildorf  
mildorf@centrum.cz  
University of West Bohemia in Pilsen  
Faculty of Applied Sciences