CEDR TRANSNATIONAL ROAD RESEARCH PROGRAMME
Call 2018

BIM

CEDR Transnational Road Research Programme
funded by
Austria, Belgium – Flanders, Denmark, Finland,
Germany, Netherlands, Norway, Sweden

Description of Research Needs (DoRN)

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1 General Introduction

This Description of Research Needs (DoRN) relates to a Call for Proposals entitled CEDR Transnational Road Research Programme Call 2018 launched by the Danish Road Directorate on behalf of the Conference of European Directors of Roads (CEDR). CEDR is an organisation which brings together the directors of 27 European road authorities. CEDR provides a platform for cooperation and promotion of improvements to the road system and its infrastructure, as an integral part of a sustainable transport system in Europe. The website www.cedr.eu contains a full description of its structure and activities.

CEDR recognises the importance of research in the development of sustainable transport and has established a Working Group (WG) to monitor European research activities and to advise the CEDR Board on issues relating to research. WG Innovation responsibilities include dissemination of research results as well as initiating research programmes that support CEDR members in current and future situations.

The Governing Board of CEDR (CEDR GB) has given a mandate to WG Innovation to identify opportunities for transnational road research programmes on an annual basis. CEDR also requested that:

- WG Innovation only proposes suitable research topics and identifies good research proposals;
- WG Innovation presents research proposals, when appropriate, to CEDR GB for decision; CEDR GB will decide what programmes are taken forward;
- All call procedures shall be open and transparent and organisation from all European countries shall be invited to participate, with no advantages given to preferred suppliers or groups of suppliers; and
- The costs of developing and managing the transnational calls shall be supported only by those CEDR members taking part in the programme.

2 Introduction to Call 2018

The CEDR Transnational Research Road Programme was developed initially within the framework of ERA-NET ROAD and was then taken forward by CEDR WG Innovation to fulfil the common interests of the National Road Administration (NRA) members of CEDR. The participating NRAs in this Call are Austria, Belgium - Flanders, Denmark, Finland, Germany, Netherlands, Norway and Sweden. As in previous collaborative research programmes, the participating members will establish a Programme Executive Board (PEB) made up of experts in the topics to be covered: the PEB will act as a steering committee for the programme. The research budget will be jointly provided by the participating NRAs: the participating NRAs will also nominate the individual member of the PEB. The PEB will designate one of its members to act as PEB chair.

WG Innovation has, on behalf of CEDR, appointed a Programme Manager (ProgMan) to take over the administration of this Call for Proposals. For this programme, the ProgMan will be the Danish Road Directorate, Denmark. The responsibilities of the ProgMan include preparation of the Call for Proposals, financial management of the programme and setting up and managing the contracts with the research providers. These responsibilities will be conducted by the ProgMan in its country under its law and regulations under the direction of WG Innovation. The terms under which the ProgMan and PEB will operate will be set out in a Collaboration Agreement, signed by senior representatives of each participating NRA.
Applications are invited from suitable qualified consortia in response to this Call for Proposals. Consortia must be led by a legal entity from a European country and consist of at least two legal entities from two different countries. Individuals and organisations involved in the formulation of the Call specification are prohibited from any involvement in proposals. Applications should focus on the sharing of national research, knowledge and experience at all levels as an important prerequisite for achieving the goals of CEDR and its members. This will accelerate the development of faster and durable methods and techniques for road maintenance and management. It is particularly important that the results be easily implementable by road authorities across Europe, and applicants are encouraged to include case studies and demonstration projects in submissions so as to contextualise the research and illustrate the benefits of transnational collaboration.

Applications will be evaluated by the PEB in relation to:

- Extent to which the proposal meets the requirement of the DoRN
- Technical quality of proposal
- Track record of consortium members
- Management of project
- Value for money.

Details of these evaluation criteria and how they will be interpreted and applied by the PEB are presented in the Guide for Applicants (GfA) which accompanies this Call for Proposals.

3 Aim of the Call

The aim of this research programme is to better understand how to free and enrich data to and from asset management systems.

Looking from a broad perspective to the use and actualisation of data from infrastructure assets like roads a number of relevant needs can be considered.

1. In a project situation the contracting party needs to get information out of the asset management system as a basis for their specific task (plan, design, build, maintain, inspection). This work may result in a new set of asset data which need to be delivered in such a way that the data in the asset management system can be enriched. The open information exchange standard IFC, and especially IFC Road which is under development, can/will be used in the design phase as a neutral and open data exchange format. Parts of the IFC model may be relevant to enriching the current dataset in the asset management system. However, there are also other relevant exchange formats from other domains for instance CityGML, InfraGML, XML, etc, which are widely used and may contain relevant information for the asset management system from an NRA. In summary, the challenge is how to free and enrich data coming from various sources expressed in various formats in a contractual situation in a real infrastructure project and visualize the data in a combined environment.

2. Gaining additional information about the actual state of the asset is another need. Modern sensor and scanning techniques are becoming rapidly more powerful. The datasets coming out of this step need to be processed and organized in a standardized way so that they can be used to build and enrich the current data in the asset management system so that data can be integrated and used for advanced data analysis methodologies. The challenge is how to achieve this.
3. The current asset management systems in use by the CEDR members does not consist of one system but in many cases of several systems which are poorly connected or not connected at all or even duplicating each other with conflicting information in it. These systems are not interoperable. This results in a landscape of islands of data, hardly accessible from other applications and difficult to integrate with other data. This makes that the data may be trapped and is not easy to liberate. The need is to transform this landscape of islands of data into a connected archipelago of data which allows data to be free from its individual application and to integrate with data from other parts of the archipelago. The challenge is clearly how to come to a manageable set of master data and to provide suggestions content-wise for such a set of master data and what kind of structure such a master data set needs to have in order to be independent of individual applications. The challenge is how to connect and integrate existing information within existing IT infrastructure (databases and software tools) making use of modern techniques introducing linking and semantics.

4. Delivery to other legacy systems, European or national, may be an obligation for a CEDR member. It requires that data can be freed from its individual application and delivered in an information structure which can be used by other legacy systems. The use of international standards like IFC is one step towards becoming vendor neutral. The challenge is to know how to proceed when on a national base there is a need for more information in depth and how to interact within the legacy systems. A practical approach should be taken into account.

4 Reasons for the Transnational Road Research Programme

Information is of vital importance for CEDR members in order to manage their network appropriately. CEDR members are responsible for the management of their network across the lifecycle of the network ranging from planning to design, construction and maintenance and asset management. CEDR members commission activities within these stages to market parties where information is a key asset for the market parties to deliver good quality of work and to deliver good quality results which generates new data about the network to be delivered to the asset management system. Incorrect information about the assets leads to extra costs, delays in the planning and less quality. Hence the CEDR members invest in better information management to overcome this hurdle.

As a result, it is required that the data about the assets is:
- **Accessible** i.e. not trapped in an application or part of the asset management system,
- **Reliable** i.e. the quality of the content is good,
- **Interoperable** between stakeholders and their IT systems in an efficient manner,
- **Integrable** with other data coming from various sources in different formats,
- **Publishable** in a structured and vendor neutral fashion based on international standards.

Since the upcoming and widely available advanced IT technology and digitalization of the sector it becomes more and more desirable to benefit from this development. The challenge for the CEDR members is twofold: firstly, to create a level playing field for all parties to establish a landscape where digital information coming from various sources flows efficiently across the parties in infrastructure via software tooling which is capable of assisting the processes in infrastructure in a vendor neutral fashion; secondly, to change the current set of islands of data in the asset management system of CEDR members into an archipelago of
data, a well-connected set of islands of data, where the data is appropriately linked together and temporal and spatial comparability is assured. New techniques are nowadays available to free data from its individual applications and link data from various sources. These are very promising techniques but are not widely available and implemented yet. A market needs to be created, the CEDR members can play an important role in that since they can define the demand for it within their contracts. The suppliers will follow soon as they see the demand is there.

5 Research Objectives

As a result of the CEDR Call 2015 a framework for a European road OTL is available. It provides a framework how to set up a consistent and modular approach for linking data based on modern, proven IT techniques which can be implemented step by step according to the requirements and wishes of an individual CEDR member. The framework is also of use for national or organizational aims regarding connecting data from various sources for a more efficient dataflow. The CEDR Call 2018 builds on this result and aims for a wider implementation among individual CEDR members with practical results in different use cases. It also explores new territories which are of interest of CEDR members such as scanning and sensor techniques.

Generally speaking there are two main topics of interest of CEDR:

1. Information management over the life cycle
2. Extensibility to legacy assets

More specifically the following areas of research are of interest:

A. How to incorporate national classification systems into the framework of the European road OTL and how to benefit from these classifications on an individual CEDR member level. The results from the Interlink project should be considered in this approach.

In many countries classification systems are well designed and the backbone of a number of knowledge systems on national level for construction regulations. These classifications may be of interest to use as a framework for the modernised asset management system of the CEDR member or as a kind of entry point semantically for the European road OTL. How this could be done is an area for further research.

B. How to benefit from open standards like IFC and IFC Road throughout the lifecycle considering the European road OTL.

IFC is often used as an open standard data model in the design phase of the asset. Many applications support this open standard. Contractors responsible for the design often deliver their design in an IFC format as a handover to the client. Parts of the model might be of interest for transfer to the asset management system. How the data extracted from the IFC model can be transferred into the asset management system is an area for further research and how to deliver more detailed information needed on a national base.

C. How to benefit from scanning/censoring data to enrich asset management systems with legacy data.
Scanning and sensor techniques are an area of interest of many CEDR members. These techniques are used to gain information about the actual state of the assets, which may be a source of information to build and enrich the existing dataset of the asset in the repository of the CEDR member. Research is necessary on how to process and organize raw sensor data into an object-based project- or asset information model following the European OTL in an efficient manner or transfer the information into instances of object types defined internationally, European or nationally.

D. How to combine the strength of traditional techniques with the strength of Interlink approach based on Linked Data/ semantic web techniques.

All the available BIM tooling and asset management systems are based on traditional technology such as XML, etc. That means there is a wide range of software companies offering their tooling which may consist of a whole suite of products to serve the processes relevant for infrastructure. Visualisation is often very well developed and a feature that is indispensable for CEDR members. However, integration of data from various sources can be improved. This is a strong feature of the linked data/ semantic web technology. How to benefit from both worlds and stimulate the IT industry to adapt this new technology in order to come up with practical solutions is an area for further research in this call.

E. How to engage software industry to align their roadmap for development with the needs of CEDR members

See also D.

These areas of interest are of definite interest to CEDR members and might be described as quite broad. It is therefore recommended that the proposals should contain a practical approach. The challenges should be solved with real data and software tooling. Proper visualization of the assets and its data should be showed together with the power of semantics.

The German speaking countries, Austria, Germany, Switzerland, aim to set up a parallel project aiming for implementation of the findings. Dissemination to this project should be incorporated in the dissemination plan of the proposal.
6 Overview of current and previous activities

A general overview of current and existing relevant research projects undertaken across Europe and other sources of information are outlined in Appendix A. These resources and subsequent reports will provide the starting point for proposals submitted in response to this Call and proposals will be evaluated on this basis. Applicants must not duplicate existing results or ongoing projects. Proposals should be based on the outcomes and state-of-the-art identified in these projects listed below. Failure to take account of available research conclusions will disqualify proposals from this call.

7 Additional information

The aim of this Transnational Road Research Programme is to provide applied research services for the benefit of national road administrations in Europe. The Call is open to any consortium that is led by a legal entity established in Europe. Applications using the templates provided must be submitted by a coordinator of a consortium of at least two independent organisations from different countries. A maximum 75% of the workload can be assigned to one partner.

The expected duration of this programme is 36 months. The target dates within this programme are as outlined in the Guide for Applicants.

The duration for individual projects can be up to 24 months within the programme timescale.

The programme language is English: only proposals submitted exclusively in English are acceptable.

The budget provided by the participating national road administrations for this research programme is EUR 1,450,000.

Please refer to the Guide for Applicants (GfA) for full details of how to submit proposals in response to this Call. Submissions using the templates provided must be made electronically using the iBinder. Submissions received after the deadline cannot be considered.
Appendix A: Existing projects and resources

Europe wide

CEDR Call 2015 BIM – INTERLINK Project:


- [www.roadotl.eu](http://www.roadotl.eu)


EU BIM Taskforce program for EC


The following EU-projects and Building Smart projects are relevant:

- V-Con project co-financed by the EC 2012-2017. The aim of this project is to put a tender on the market asking the IT sector to develop innovative IT solutions based on open BIM standards and capable of working with object-type-libraries.

- Projects in the Infraroom of Building Smart International like IFC alignment, IFC bridge and IFC roads.

- EU proposal Eurodicti

Other relevant information sources:

- National Building Information Model Standard Project Committee (USA)

- Published in PAS1192.2. See [http://www.bimTask group.org/pas11922-overview](http://www.bimTask group.org/pas11922-overview)

- OGC for Geostandards and CEN Technical Subcommissions on BIM (CEN/TC 442) and AM

- ISO standards on Asset Management like ISO 55000, 55001 and 55002

**National programmes**

Several governmental programmes on BIM by UK BIM Taskforce, Infra FINBIM, BIM Alliance Sweden, MIND-project France, Building Information Council Netherlands, Introduction BIM in large projects in Germany, Danish OpenBIM study (source “DTU Byg Rapport SR 12-06)

Benefits UK Government Cabinet Office BIM Strategy and NBS Report 2013
BIM Maturity model (UK BIM Taskforce)