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Deliverable D2.1

European and International Research Infrastructure online catalogue

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## Abbreviations

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<tr>
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<th>Meaning</th>
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<tr>
<td>ALT-COST</td>
<td>Accelerated Load Testing - European Cooperation in Science and Technology (COST 347)</td>
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<td>APL</td>
<td>Longitudinal profile analyser</td>
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<td>Accelerated Pavement Testing</td>
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<td>ARAN</td>
<td>Automatic Road Analyser</td>
</tr>
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<td>DETRA</td>
<td>Developing the European Transport Research Alliance</td>
</tr>
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<td>European Conference of Transport Research Institutes</td>
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<td>ERA</td>
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</tr>
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<td>ESFRI</td>
<td>European Strategy Forum on Research Infrastructures</td>
</tr>
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<td>ETRA</td>
<td>European Transport Research Alliance</td>
</tr>
<tr>
<td>EURNEX</td>
<td>EUropean rail Research Network of EXcellence</td>
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<tr>
<td>FEHRL</td>
<td>Forum of European Highway Research Laboratories</td>
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<tr>
<td>FERSI</td>
<td>Forum of European Road Safety Research Institutes</td>
</tr>
<tr>
<td>ISN</td>
<td>Integrated Safety Network</td>
</tr>
<tr>
<td>NEARCTIS</td>
<td>Network of Excellence for Advanced Road Cooperative traffic management in the Information Society</td>
</tr>
<tr>
<td>RI</td>
<td>Research Infrastructures</td>
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<tr>
<td>SRT</td>
<td>Skid Resistance Tester</td>
</tr>
<tr>
<td><strong>SWOT</strong></td>
<td>Strengths, Weaknesses, Opportunities and Threats</td>
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<tr>
<td>----------</td>
<td>--------------------------------------------------</td>
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<tr>
<td><strong>TREE</strong></td>
<td>Transport Research Equipment in Europe (FP5 Project)</td>
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Executive summary

The concept of DETRA derives from the Lyon Declaration. In 2008, the Lyon Declaration signatories, ECTRI, FERSI, FEHRL, EURNEX, HUMANIST, ISN and NEARCTIS, committed themselves to working together on the deepening of the European Research Area (ERA) objectives in transport, in order to address the Grand Challenges such as climate change, energy, water and food, public health, ageing societies and globalisation. From this commitment grew the objective to create a European Transport Research Alliance (ETRA) that would strengthen the transport domain. Key priorities of this Alliance were to examine the strengths, weaknesses, opportunities and threats (SWOT) in the domain and develop common understanding and approaches to reducing fragmentation and overcoming barriers.

The DETRA project aims to provide a detailed examination of the current status and structure of transport research, bringing together the competences of all the partners together with their networks and associated links to provide the most comprehensive assessment of all the aforementioned aspects of ERA development. The project will then set out, and begin implementation, of the next steps in developing the Surface Transport ERA.

The second Work Package (WP2) of the DETRA project called “world-class transport research infrastructures” builds on previous work undertaken in the (Transport Research Equipment in Europe (TREE¹), TRANSFORUM, ALT-COST and other projects. The WP consists of three tasks:

- European and International Research Infrastructures (RIs)
- Future demands and
- Missing gaps and opportunities.

These tasks consider hard (physical) physical RIs and Soft RIs consisting of databases, libraries etc. The WP will investigate the opportunities that exist to develop the RIs needed for strengthening the ERA of today and the challenges and opportunities faced by transport for the future. Coordination between the transport sector and the European Strategy Forum on Research Infrastructures (ESFRI) will be strengthened. The WP will also consider RIs for surface transport modes (with links where appropriate to aviation and water) and both industry and public sector research requirements.

Task 1 within WP2 is a review of European and International RIs to develop an updated catalogue of relevant RI in Europe (including an identification of how they operate) supplemented by significant International RIs that are necessary to benchmark what Europe has as well as determine if gaps can be filled internationally or need to be developed with International collaboration. The activities will include

- A review of existing catalogues and refining the scope of the updated catalogue with input from DETRA partners.
- Definition of a template to collect the information on existing RI which can be developed for website use.
- Collection of supplementary information from DETRA partner association members and related stakeholders.
- Supplementing this catalogue of existing first-class RI outside Europe (including a scanning tour of representative US RIs in the field of transport)

Deliverable 2.1 of Task 1 is to produce an online catalogue, which aims to provide:

¹ The TREE project was financed by the EC as part of the Sustainable Growth programme and was carried out from 2002 to 2004. The main target was to create meaningful and cost-intensive research installations and equipment in Europe and improve the exchange of information and developments about this topic through a network. The TREE project was carried out in close co-operation with the INTRANSNET project (Network for research installations on various transport modalities)
a) An up-to-date overview of existing world-class RIs both in Europe and internationally.
b) A tool for identifying missing RIs to address current and future needs.
c) A tool for identifying cooperation possibilities amongst researchers to exchange knowledge, optimise the use of available facilities, develop common research facilities and develop test methods and equipment.
d) An effective easy-to-search tool for identifying facilities that have capacity available for extra testing performed in accordance with a specific test method.

This online catalogue is available both through the DETRA website (http://detra.fehrl.org/index.php?m=25 – see Figure 1) and the FEHRL website (http://www.fehrl.org/index.php?m=292&page=11). The work related to the development of this online catalogue is presented in this report.

The first chapter provides general information about the DETRA RI online catalogue regarding its content and its usability, while the second chapter explains the methodology followed to develop the online catalogue. The third chapter summarises the user’s guide of the tool. In Chapter 4, the content as per 30 June 2011 is presented in a few summary tables and graphs. This preliminary analysis shows that the online catalogue has some limitations, but the potential for creating a future useful tool is there.

Currently the catalogue has over 300 entries. It will be constantly updated and expanded throughout the duration of the project, with the full version to be delivered in Month 28.
1 Introduction

The main objective of Deliverable 2.1 is to report on the work done to date to design and develop the DETRA RI online catalogue. This online catalogue currently provides details on 306 RI facilities.

The aim of the online catalogue on RIs is to provide:
   a) An up-to-date overview of existing world-class RIs both in Europe and internationally.
   b) A tool for identifying missing RIs to address current and future needs.
   c) A tool for identifying cooperation possibilities amongst researchers to exchange knowledge, optimise the use of available facilities and increase their level of capacity, as well as develop common research facilities and develop test methods and equipment.
   d) An effective easy-to-search tool for identifying facilities that have capacity available for extra testing performed in accordance with a specific test method.

The online catalogue was originally set up by the FEHRL Working Group on RIs, which predates DETRA and includes some of the current DETRA partners. It was set up during 2010 and was published on both the DETRA (http://detra.fehrl.org/index.php?m=25 – see Figure 1 on page 8) and FEHRL (http://www.fehrl.org/index.php?m=292&page=11) websites in early 2011. It is an active tool enabling the user not only to search online for information that he/she is interested in, but also to add new facilities from locations both within and outside of Europe (using the “Add new facility” button). In other words, the “search” and “Add new facility” functions are supported. It is easily accessible and does not require the installation of specific software on the user’s computer in order to make use of it.

The content of this online catalogue, which is continuously being updated, was initially collected through a detailed survey made of all partners and key stakeholders using a dedicated webpage (see http://www.fehrl.org/facilities/) based on an electronic template (see Figure 2) originally produced in Excel, which could also be exported back into Excel.

Since this online catalogue has been developed within the context of WP2, its content will be used for the main task of this specific WP, which is to investigate the gaps and needs for developing new RIs with the aim of strengthening the ERA of today and meeting the challenges and opportunities faced by transport in the future.

The methodology followed to gather data, the structure of the online catalogue and its implementation are presented in the following sections. Furthermore, the layout of the interface and its functionalities will also be described. Throughout the document, the terms “research infrastructure” (or “RI”), “facilities” and “equipment” are used. “Research infrastructure (RI)” describes facilities and/or equipment; “facility” refers to a type of unit where research is carried out and “equipment” refers to the material that is used.
### Research Infrastructure Database

<table>
<thead>
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<th>Facility Type</th>
<th>Name</th>
<th>Description</th>
<th>Country</th>
<th>Partner</th>
<th>Contact Person</th>
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<td>HERA Institute of Transport Informatics &amp; Telecommunications Institute, Greece</td>
<td>Maria P. DOLE, Ph.D., <a href="mailto:mobility@ereth.gr">mobility@ereth.gr</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acoustic equipment for noise barrier performance measurements according to CEN/TS 1793-5 and -6 (Adenröm method)</td>
<td></td>
<td>Institute of Technology</td>
<td>Manfred Haider, <a href="mailto:manfred.haider@at.ac.at">manfred.haider@at.ac.at</a></td>
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<td>Acoustic equipment for the application of the Statistical Pass-By (SB) method</td>
<td>Noise measurements</td>
<td>BRCC - Belgian Road Research Center</td>
<td>Luc Goethert, <a href="mailto:lgoethert@brcc.be">lgoethert@brcc.be</a></td>
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<tr>
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<td>Institute of Technology</td>
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<td>TNO</td>
<td>Koert de Kok / Jacob Dekker</td>
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**Figure 1** Home page of the RI online catalogue
2 Methodology

2.1 Key features of the online catalogue

During the initial phase of development, the following key features of the online catalogue were identified:

- It should contain contact information on the facility, including the contact person in charge of the specific facility and associated equipment.
- It should be possible to search for specific types of facilities and/or equipment, and hence the types of facilities and/or equipment were divided into the following main groups (note that the first five groups describe the test/facility used for analyses from large-scale society down to material):
  - Road users and Society impact
  - Construction entity
  - Surface characteristics
  - Structure characteristics
  - Layer and product characteristics
  - Material characteristics
  - Climatic and environmental tests
  - Databases and computer models

- One of the aims of the online catalogue is to identify if there are facilities and/or equipment available that could be used to address future challenges within the transport area. Hence, the intention was that each facility/equipment should be labelled with the challenges it can help to resolve. The following major challenges are listed:
  - climate change
  - limited natural resources
  - urbanisation
  - changed mode of transportation
  - infrastructure/service delivery

These challenges take inspiration from the European Commission’s six Grand Challenges of climate change, energy, water and food, public health, ageing societies and globalisation.

- The purpose of the online catalogue is to cover all relevant RIs supporting all modes of transport, and not to be restricted to the road sector. Therefore, a label has been added to describe whether the facility and/or equipment are used mainly in road, air, maritime or rail studies. An additional label has been added to identify whether the facility and/or equipment is being used for studies related to the infrastructure, the vehicle or the transport system.

- Finally, some additional features were added that will hopefully offer added value to the person looking for certain facilities and/or equipment. This includes information on the latest upgrade of the facility and/or equipment, relevant standards that are being used, and website addresses of the facilities where additional information could be sought or a picture of the test facility.

2.2 Electronic template

The first step that was taken to populate the online catalogue was the development of an electronic template, created by FEHRL, and its subsequent distribution to all project partners. This electronic template was sent out by FEHRL to all key partners and stakeholders in May 2010. The template contained the key features described in the previous section. The outline is shown in Figure 2 to 5 below.

The template can be obtained from the DETRA website at (http://detra.fehrl.org/index.php?m=25&mode=add_fac), and each facility owner is able to add their information to the online catalogue. As an initial step to create the first items in the online catalogue,
a database from the previous EU-project TREE was transferred to the new online catalogue. However, since this information was in some cases not up to date, a request was sent to both FEHRL and ECTRI members to update the information on their research facilities.

The first request for information to the online catalogue resulted in a significant number of new items being registered onto the online catalogue. The aim is to update the online catalogue continually so that it can be used as a tool for networking between researchers.

Figure 2 Electronic template - basic information about facility and host
Figure 3 Electronic template - description and management of facility

Figure 4 Electronic template - labelling the facility (Challenges, application and area of interests)
2.3 Scope

The online catalogue includes the following types of RIs:

- Initially all road-related RIs, but the scope will be broadened to include all ground transportation/surface transport, and ultimately all modes of transport.
- RIs solely related to vehicles will not be included at this stage.
- Both hard (physical) and soft (archives/libraries, databases, modelling software, etc) infrastructures.
- Both public and private sector RIs (i.e. not only RIs belonging to DETRA partners).
3 DETRA RI online catalogue manual

3.1 How to add a new facility
First you need to be a registered user of the DETRA website. If you do not have a user profile, go to http://www.fehrl.org/index.php?m=36 and register as a DETRA user. Once you have a user profile, add your Username and Password in the box at the top right hand side of the DETRA home page (http://detra.fehrl.org/index.php)

To add new facilities, go to http://detra.fehrl.org/index.php?m=25 on the DETRA website or http://www.fehrl.org/?m=292 on the FEHRL website. Click on the “Add new facility” button. Before adding a new facility, make sure that it does not already exist in the online catalogue.

![Research Infrastructure Database](image)

Figure 6 Layout of the front-page at the website for the RI online catalogue

A new window will open and there you will be asked to add information about your facility.

3.1.1 How to add basic information about the facility
First you should add all the basic information about the facility, such as the name of the facility, short name, location, type of facility, contact person and so on. You can also add a link to a related facility or a project that is already listed in the online catalogue.
3.1.2 How to add a description of the facility

The next section includes a technical description of the facility, and also a description of the unique feature(s). You can add links to relevant files. You should also define for which research application the facility may be used. We have a number of challenges that need to be resolved in the future (climate change, limited resources, urbanisation, changed mode of transportation, infrastructure/service delivery, etc). Define for which of the challenges your facility could possibly be used.
Figure 8 Description of the facility including labelling

Under "area of interest" you have four major areas to choose from:
1) Design and production
2) Environment, Energy and Resources
3) Mobility and Transport
4) Safety and Security

In addition to this you can also choose a number of sub-interest areas. If the tests of your facility are run according to specific standards, you should add the standard number under relevant standards e.g. EN 1317-1:2010. You can add reference projects and keywords. Finally, you can add a photo of your facility.
3.2 How to edit an existing facility

All facilities that have previously been added to the TREE database have been imported to the online catalogue. However, they need to be updated. Hence, it is possible to edit facilities, including the text and its attributes.

For the facilities that are linked to your organisation/partner, you will, in addition to the "view" icon, also get an "edit" icon. Click on this icon and you will get to the editing page. There you can add/change the same information as for a new facility.

Note that you will only have access rights to change data for facilities linked to your organisation. If you do not obtain the "edit" icon for the facilities related to your organisation, you might need to update the information under your profile.

3.3 How to search for facilities in the online catalogue

It is currently possible to search for entries under the following five criteria:

- Select country
- Select facility type
- Select research application (road, rail, air, maritime, other)
- Select challenges
- Select area of interest

3.3.1 Country

It is possible to search for RIs located within a specific country.
### 3.3.2 Facility type

On account of the wide range of facilities, the type of facility needs to be specified. The following keywords are grouped based on ISO 12006, covering tests from the large scale (road user impact) to the small scale (material properties of one material type). In the online catalogue it is possible to use the "quick search" button for searching between the seven main titles.

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<th>Road user and society impacts</th>
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<td>Wheel track</td>
</tr>
<tr>
<td>Driver Test Software</td>
<td>Other (please specify)</td>
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<td>Driving simulator and other simulators</td>
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<tr>
<td>On Board Observation of Driving</td>
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<td>ITS</td>
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<tr>
<td>Crash test of cars</td>
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<th>Material characteristics</th>
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</table>

Other (please specify)

### 3.3.3 Research application

By this search criterion, it is possible to find the RI that is, for example, related to rail infrastructure. The keywords for search are "air", "rail," "road," "maritime" and "other".

### 3.3.4 Future challenges

As previously described, one of the purposes of the online catalogue is to analyse whether there are any gaps where there is an urgent and actual need to invest in new, major RIs to be able to resolve the six future challenges of the transport area.

The challenges currently listed are:
- climate change,
- limited natural resources,
These challenges take inspiration from the European Commission’s six Grand Challenges of climate change, energy, water and food, public health, ageing societies and globalisation.

### 3.3.5 Areas of interest

The four major areas of interest are as described previously: (1) Design and production; (2) Environment, Energy and Resources; (3) Mobility and Transport; and (4) Safety and Security. This information is searchable in the online catalogue.
4 Preliminary analysis of the content of the online catalogue

In this chapter a preliminary analysis of the content of the online catalogue by 30th June 2011 will be discussed. In total, 306 items had been added to the online catalogue.

4.1 Results from the online catalogue

To date, 306 items had been added to the online catalogue. In Figure 10 below, the distribution between the countries that have added information is shown. The results show that there is still a lack of information from a number of countries. The facilities under “other countries” are added to the online catalogue without any additional information.

![Figure 10 Distribution of RIs between countries according to the online catalogue (30th June 2011)](image)

Only 143 of the 306 items in the online catalogue have been labelled so far with the area of interest. For some items, more than one label has been added. So in total, 202 labels have been assigned to the items, distributed according to Figure 11 below. As it can be seen, the content of the online catalogue so far is quite evenly distributed between the four areas.

![Figure 11 Number of RIs labelled with the four different major research areas.](image)
In Figure 12 below, the different types of facilities are shown. It should be noted that for some of the types with a large number of items, a wide range of facilities have been included. This is discussed further in Section 4.2 below.

![Figure 12 Type of facilities with more than six items in the online catalogue (30th June 2011)](image)

### 4.2 Discussion of the results

As mentioned in the previous section, the number of items per country in the online catalogue is still quite limited. Some countries already have a number of their major facilities in the online catalogue but still miss some important facilities. Hence, additional work is needed to increase awareness and point out the necessity in the ERA to increase the number of items in the online catalogue. It is also important to improve the geographical distribution. At present, countries from the north and centre of Europe are dominating the online catalogue.

The items in the online catalogue are pretty evenly distributed between the four major areas of research interest (Design and Production; Environment, Energy and Resources; Mobility and Transport; and Safety and Security). The driving simulators, for example, have in some cases been labelled in “Mobility and Transport” and in other cases in “Safety and Security”. This might give an indication of the main use of the specific driving simulator, but could also indicate that consistent labelling is difficult. An improved definition of each area of research interest, available to the person that adds items, might be useful.

According to the online catalogue, there are 41 items labelled “Road Surface Assessment” facilities. A closer look at these items reveals a wide array of facilities and equipment, including items such as Laser Profilometer, 3D Laser Scanning, APL (Longitudinal profile analyser), ARAN (Automatic Road Analyser), British pendulum tester (portable Skid Resistance Tester or SRT), a number of different Friction Testers, LTL 2000 reflectometer, Primal Longitudinal Profile Instrument, Qd30 reflectometer, Rolling resistance measuring trailer, Skid Resistance tester, and Walking Profiler. It is therefore important that facilities are not only classified according to their pre-defined types, but that there should be the possibility to add a more specific type of description of the facility.
It might be surprising to learn that there are 21 accelerated pavement testing equipments (APT) facilities and/or equipment already listed in the online catalogue, but that depends on the different definitions that have been used when entering the items. Reviewing the items, there are both large-scale APT facilities (such as the Nordic Heavy Vehicle Simulator) and small-scale laboratory equipment (such as dynamic triaxial testing equipment). Once again, this highlights the importance of a better description of each label so as to get more consistent categorisation.

There are a number of libraries and literature databases contained in the RI online catalogue. However, even if there are 17 items, only 11 countries have listed their facilities. Most of them are labelled “Mobility and Transport” and none are labelled “Design and Production” or “Environment, Energy and Resources”. The question is if there are available databases with information on, for example, full-scale test roads or results from laboratory testing on different types of pavements. If so, these databases also need to be added to the RI online catalogue. One example of such a database that should be added is the database developed within the European FP7 Direct Mat project, which includes information about dismantling and recycled material within the road sector.

Despite the limited number of items listed in the online catalogue and possible flaws in the categorisation of these items, the RI online catalogue already shows the potential to create networking opportunities both between partners having similar facilities (promoting knowledge and experience exchange), as well as between partners with complementary facilities. With further development, the RI online catalogue could become a valuable tool for networking between researchers.

Based on the transcript of the online catalogue available on 30th June 2011, it was not possible to make any analysis of the relationship between the facilities and the challenges addressed. This information was not included, which might be due to the fact that it has not been obvious to the user how to interpret this issue. Since this is an important aspect of the DETRA project, this dependency needs to become the focus in the months to come.

4.3 Recommendations

Based on the preliminary results of the online catalogue, the following recommendations for further development have been made. Some of the recommendations will be possible to do within the framework of the DETRA project, others will become the responsibility of the DETRA partners who would like to continue making use of the RI online catalogue as a valuable tool for networking between researchers.

The following recommendations are made:

- Additional items need to be added to the online catalogue. To reach this aim, it is necessary to improve the level of awareness of the DETRA RI online catalogue and its value for the future work to all researchers of the ERA. As a first step, all DETRA partners will need to emphasise the importance of adding major facilities to the online catalogue to their members.

- There is still a need for improvement in the search functionality and the information structure. For example, for some information in the template, it must be mandatory before the information can be saved (for example the partner’s name/organisation). This work has already started and will be finalised during the autumn of 2011.

- A better description of each label/category (e.g. type of facility, area of interest, challenges) is needed to make the labelling more straightforward and consistent for the user. For example, for the type of facility it should be stressed that the facility should not only be categorised according to the pre-defined types, but that a more specific description of the test facility is also required.
It could be convenient to change the categorisation of the “Type of facility” list because these labels are related to road (ISO12006) and create the same structure but without one selected perspective of mode. For example, writing “infrastructure” and not “road” (it could be a port, airport or rail, etc), or “driving/pilot vehicle simulator” and not “car driving simulator”. If somebody wants to specify the mode or the type of facility with more accuracy level, she/he could use the text box for this proposal.

If we intend to introduce more RIs in the online catalogue and better cover all kinds of modes, likely we need to open the RI online catalogue to centres specialised in different modes, and to extend it beyond ECTRI or FEHRL.

Evaluate whether any work is required to further align the list of Future Challenges with the European Commission’s six Grand Challenges of climate change, energy, water and food, public health, ageing societies and globalisation?