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Acronym: SYNER-G

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**DELIVERABLE INFORMATION**

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1  Web - portal

In the context of Syner-G, the main tasks to be performed by the Web-portal are:

- To develop a knowledge representation of information types pertinent and useful in the frame of the Syner-G project and how to collect, classify, manipulate, store, retrieve and disseminate these information
- To design and implement a documents repository (Syner-G Database) allowing the sharing of experiences from all the WPs and providing support
- To develop, design and implement procedures and tools based on the stored data

2  Data Management and Infrastructure - Concept

1.  Principles

Data of relevant tests should be accessible for further elaboration even long time after a campaign has been finished. This requires procedures with supporting IT tools allowing that. Scientific experiments are almost of arbitrary nature. This excludes a management system that fits all. The data management system has to be first of all a help and not a burden to the engineer and scientist.

Valuable fragments of such a system exist in every organization. Special practices have been developed. Any new joint system shall allow continuing these best local practices. Ideally everyone is allowed to work as practiced so far. Data shall be safe and secure over a long time period with a clear regulation on confidentiality issues.

The system to be developed shall support the participating researchers finding similar cases, related knowledge, existing standards and shall allow re-evaluating data whenever new knowledge allows another promising approach.

2.  Objectives within the Syner-G Project

The necessary IT infrastructure shall be conceptually designed and demonstrated within the project. It is not feasible to install a functional system within this project. Reference is given to NEES IT where the probably simpler objectives to create an install a centralized database did not really succeed after an investment of over 20 million US$. Nevertheless it seams to be feasible to create a prototype of such a system and to recommend it for implementation through other programs.
3. Elements of the System

The system is in principle de-centralized and data and tools remain with the responsible institution. Translator programs allow communication between the various systems. The following list is not complete and requires further discussion and decision making:

- **Portal:** It provides all necessary features to operate the system. It might be also de-centralized with a summary index to be created. It will also function as a document exchange platform and utilizes eventual data transfers.

- **Translator Programs:** They allow individual systems to communicate on the same basis. The simplest function would be the translation of one data format into another. They shall also allow data viewing regardless of the format behind it.

- **Databases:** All existing databases will remain. There will be no need to install a uniform system. Nevertheless within the project a recommended quality and function of the databases will be elaborated.

- **Metadata Protocol:** To achieve full understanding of the objectives, results and conditions etc. of any test structured information is required. A standard metadata protocol will be elaborated which contains all this information. It will be offered that existing metadata from existing systems will be translated into this format. This might require limited additional information to be given within each campaign.

- **Data Format:** Any available data format may be used. The translator programs will offer format transformation of any kind. The format itself should not be of concern for the user. Nevertheless there might be useful proposals for a joint format which requires less storage capacity and speeds up data handling.

- **Knowledge Base:** Considerable knowledge exists in any of the participating institutions. Sharing of this knowledge and easy application is desired. This includes search engines and automatic indexing. Among others the knowledge base will contain standards, literature, links, case histories, representative results, documentation, etc.

- **Data Evaluation Tools:** The many individual approaches to evaluate the data shall remain. Nevertheless the translator programs will allow comparing data of entirely different campaigns. This would ultimately lead to optimised tools that could be subsequently developed.

- **Tele Presence:** A module for that will be developed within the project. Usefulness and strategy shall be tested throughout the process.

- **Remote Testing:** It shall be enabled through the system.

4. Required Infrastructure

In principle this concept will not require a change in the IT infrastructure at the participating institutions. In case that the approach turns out to be very successful bandwidths and security issues might require investment in future.
5. Required Maintenance

The best IT solution does not survive long if nobody takes care of it. Data curation is a widely neglected activity. The current practice in most institutions does not have the personnel capacity to carry out this important task. This will require a change in strategic orientation and institutional concepts. Strong attention has to be paid to this subject.

6. Perspectives

The approach to be taken in Syner-G will be based on the partner’s experience, the information of the NEES approach and the ideas developed within other European research projects. It has to be an approach which concludes everything that is already available, but leaves sufficient flexibility for future development and adaptation. An as open as possible concept shall be designed with the necessary supporting manpower to operate and maintain it also after termination of the Project.

The vision is that the participants enjoy working with the system and experience added value to their own work.

3 SYNER-G Database

The SYNER-G Database is accessible at the Address:
https://syner-g.jrc.ec.europa.eu/

![Figure 1: First page of the web – portal](image-url)
Documents can be uploaded in the respective Work Packages. There are separate archives for events and deliverables. Under Documents there are separate archives for publications, work documents, minutes of meetings, contract documents and templates.
For every archive sub-archives (e.g. Periods, years or types of documents) can be created for a better overview.

There is a possibility for filtering / searching documents according to period, document type and work package.

4 Centralized vs Distributed Database concepts

4.1 CURRENT SITUATION

There is a large spreading over Europe of the laboratories contributing to Earthquake Engineering. In fact, from a recent overview of the main facilities, it is possible to enumerate 18 shaking tables, 6 reaction walls, 9 centrifuges and 1 in-situ test area.

Most of these laboratories have already their own databases and the data are stored in such a way that they are not isolated of their context. In fact the data relate in general to one “experiment” (this includes the nature of the data, its unit, the location of the associated sensor, etc.).

The “experiment” is performed on one “structure” (this includes the geometry, the material, the known properties, etc.). The “experiment” is performed within a project (this includes the why, who, how and when of the project).
The current political and research trend is to limit experimentation and increase the capacity of numerical modelling. This trend is general in physics (think for instance to the so-called “numerical wind tunnel”). The experimental data are thus more and more precious, and need to be more easily accessed and retrieved.

The problem is that each database has its own internal format and also a different user interface. A user confronted to a specific problem (for instances develop a global model describing the behaviour of a masonry wall with low aspect ratio) will be faced to a difficult work: to trace the origin of the published experimental results and connect every database; to become familiar with the user interface; to get an accreditation and finally to download the expected results.

The organisation of the experimental research in Europe is becoming more and more collaborative in order to benefit from the funds provided by the European Commission for the execution of collaboratory projects. This implies also the need, within the same project, to exchange a huge amount of experimental results among the partners.

The lack of organisation of the databases thus appears to be a limitation for the research, both in terms of organisation and outcomes for model identification. It appears that there is a strong need, both at the level of the test operators and the test users to rationalize the data approach.

This need is not specific to Europe; as a matter of fact, the same difficulties arise in all the countries dealing with seismic and dynamic experimental activities (USA, Japan, Korea, India, China, Taiwan, etc.).

5 The actual implementation of the Syner-G Database

The JRC released a first functional version of the Syner-G Database which can be accessed at the address: https://syner-g.jrc.ec.europa.eu/login.php

The access page of the Portal is shown in Figure 5 and the representatives of the Syner-G partnership have been authorized to enter the Database as Super Users while their collaborators have been authorized as Standard Users (allowed to read the entire Database but to modify only their own folders). The Home Page after the login is shown in Figure 6 and is organized in two columns:

- The column on the left shows the last updated documents;
- The column on the right shows the list of past and future events.
- The actual implementation includes the following functions:
- The Document Exchange Platform;
The Events Management Tool.

All what is related to the repository of the consolidated Documents shall be developed because of lack of definition of data categories and structures by the IT Group.

5.1 STATE OF THE DATABASE FUNCTIONALITY

Preliminary functionality tests have been completed and the Document Exchange Platform is fully functioning as Share Point for the Partners of Syner-G.