

## Collab-Net version 3: Technical Report

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## Technical Report of Collab-Net Project Version 3

### 1. Introduction

Social network analysis produces an alternative view concerned with the relationships and ties among actors within the network, not minding with emphasis to the discrete units of analysis. Actually, it focuses on how the structure of ties affects individual nodes within the network. Such individual nodes represents an actor, which can be persons, organizations, states and their relationships. Social network analysis can provide insights into both interaction patterns and network statistics [1]. Its power mainly stems from its difference from traditional social scientific studies [2-3].

Several types of social networks are present in the literature between them collaboration and affiliation networks. This type of network can be seen as an individual connected by common membership in membership in groups of some sort, such as clubs, teams, or organizations [4]. Usually, data from affiliation networks are more reliable than data stemming from other social networks, since membership of a group can often be precisely determined as a relationship. Similarly, scientific collaboration networks are typical social networks with vertices representing scientists and edges representing collaborations among them [5]. Tangible and well-documented forms of collaboration among scientists include co-authorship and co-citation [4, 6].

Over the years, the EURO Working Group on Decision Support Systems (EWG-DSS) of the Association of the European Operational Research Societies has identified the need to better structure its collaboration dynamics, in order to provide its members with better chances for joint research work. Since its foundation in 1989, a number of well-qualified research co-operations within group members have been established, which have generated valuable contributions in the DSS field such as journal publications. More recently, these publications have been extensively encouraged by the organization of the EWG-DSS annual research events. Evidences of these editions can be found in [7-15]. Since 2008, the EWG-DSS Co-ordination Board has been undertaking a network analysis project, called Collab-Net project, defining a publication co-authorship network structure, which has been subject of further enhancements and updates up to date.

Recently, the EWG-DSS Collab-Net has advanced in its development and an online platform was deployed linking the collaboration data of the EWG-DSS members, through their publication relationships. Initially, this platform will collect data from the Google Scholar publication database. The Collab-Net platform aims to investigate these publication relationships in an automatic way, allowing researchers to analyze their own collaborative network. Moreover, also allows possibilities for future collaboration among EWG-DSS members only using a Web-based platform, anywhere at any time. Another relevant feature of the Collab-Net system is to enable two kinds of end-users profiles (administrator and member) with their specific access permission in the system.

This report describes the specifications, versions, and recent web-based platform developed of the EWG-DSS Collaboration Network Project (EWG-DSS-Collab-Net),

showing its new trends and advances. The following section introduces shortly the EWG-DSS-Collab-Net project (versions 1 and 2). It is also demonstrate and explain the technologies used in software development process and after the web-based platform resulted of such process. All features and functionalities of the web-based platform also presented. Finally, a brief comment is presented to the new trends and proposals of the current developments of the EWG-DSS collaboration network. In the conclusion section, a final consideration of the work with future work will presented.

## **2. The EWG-DSS and Project EWG-DSS-Collab-Net**

Recently, the evolution of Collab-Net project has deployed a web-based platform to support the linking collaboration data among the members of the EURO Working Group on Decision Support Systems (EWG-DSS), on a social network perspective of DSS-research collaboration in Europe. This online platform extends and implements some concept and models proposed by earlier versions of the Collab-Net project, version 1 and version 2. It focuses on automating the data input via online publication database, specifically the google scholar database.

### **2.1 EWG-DSS-Collab-Net Project Version 1 and Version 2**

Earlier version of the Collab-Net project has tackled the structure for providing collaboration analysis among the member of EWG-DSS group and other external researchers. In the first version, all the affiliated members of EWG-DSS group was requested by the coordination board to submit relevant information, concerning their publications since 1989, stating for each of them the main areas of research, apart from the co-authorship and edition details. Therefore, the acquisition process of this information was the responsibility of members who usually did it manually, which takes a long time to complete all data acquisition. Furthermore, lack of data and imprecise information could hinder both extraction and transformation process.

The second version of the Collab-Net project extends the original implementation of Version 1. However, had significant evolutions on the methodology, model of the publication relationship structure, ontology structure model, and collaboration relationship structure. A hybrid methodology was proposed to the input data collection (manual and automatic), using web mining of electronic databases to automatically detect relationships of members and collect such information. Besides, a refined model of the publication relationship structure has also been proposed, taking into account “author title journal/conference-multiple keywords-multiple topics”. Other improvements were related to an ontology-based data structure model and a more refined model of the collaborative relationship structure.

All advances in the Version 2 aims to perform collaboration trend analysis, showing co-authorships and co-citations to further illustrate the dynamics of EWG-DSS publications overtime. Furthermore, plans to promote continued new research and collaboration among the academic members of the group and attract new members for further fruitful collaboration. Nonetheless, the development of a Web application is essential to the success of these objectives, supporting data collection automatically based on the new publication relationship structure and aggregating the other features proposed by the current version of the Collab-Net project.

## **2.2 New advances in the EWG-DSS-Collab-Net Project**

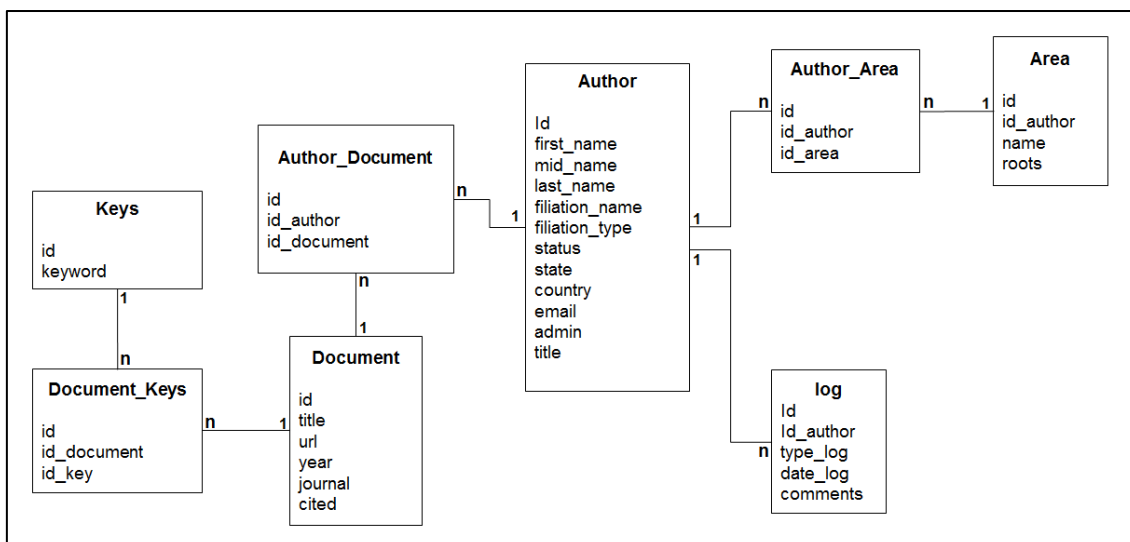
Based on the previous assumption about the Version 1 and Version 2, a new version of the Collab-Net project has been released. This version brought the automation of data collection via google scholar database publication, interactive environment to support members search by name or knowledge area, tools for export the collected data, and a local database for the collected data. Such improvements are the first steps of development of web-based platform that could be aggregate several databases and all features required in the Version 2.

In the current version of the Collab-Net, the proposed platform aims to enable the affiliated members to investigate the publication relationship of the collaborative interaction among papers authors within a publication database. It performs in an automatic way by the selecting either one or more affiliated member. All data about the selected members will collect from the google scholar database, imported to the local database and can be exported as Excel format.

### **2.2.1 The Database Model and Software Development Technologies**

Initially, the Collab-Net platform uses the google scholar database for the purpose to collect members' publication data, as well as provide inputs to investigate the relationship collaboration among the EWG-DSS group members and external researchers. The collect process captures information for open members' profile information in the google scholar database as a feed of authors' publications data. Each publication data is composed of title of document, published journal, year of publication, amount of document cites number, and the list of coauthors. These data are processed and stored in the Collab-Net database for export and/or future consultancies.

The elaboration of the entity-relationship model to data storing was the first step of the Collab-Net platform. The Information relating to authors, areas of knowledge, document published, keywords and logs of the system entities could be stored in their specific table with some relevant data. Once developed the conceptual data model, all feature were implemented in the MySQL database using Structured Query Language (SQL). It will responsible for all interaction involving data management either of the captured data or from retrieving stored data. The Fig. 1 shows the conceptual entity-relationship of the Collab-Net Platform.



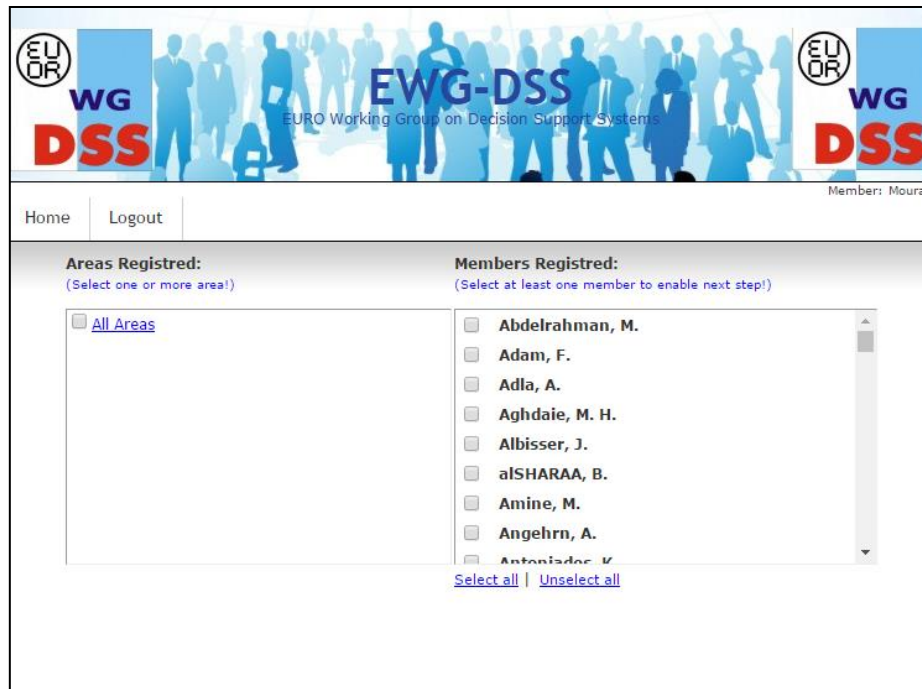
**Fig. 1. Conceptual Entity-Relationship of the Collab-Net Platform**

Once the database was ready, the web-based system can be started. First, the Eclipse Integrated Development Environment (IDE) was used to develop the Web application, incorporating the Java development language together with Java Servlet Page (JSP). Tomcat server also used to run the web application. Therefore, all platforms of software development and database system are free, which means that are not limited use or constraints. Despite it was the main motivation of these technology usages, other key motivation also be relevant, such as: easy integration these technologies, reliability and portability of Java framework, further online support and established technologies.

### 2.2.2 The Web-Based Collab-Net Platform and New Functionalities

As a resulting from the software development process, a web-based system to support the needs of Collab-Net project was available to the affiliated members. This system offers a simple environment to allow affiliated researchers to analyze their own collaborative network, as well as possibilities for future collaboration among EWG-DSS members. It can be accessed and used as two end-users profiles: Administrator and Member profiles.

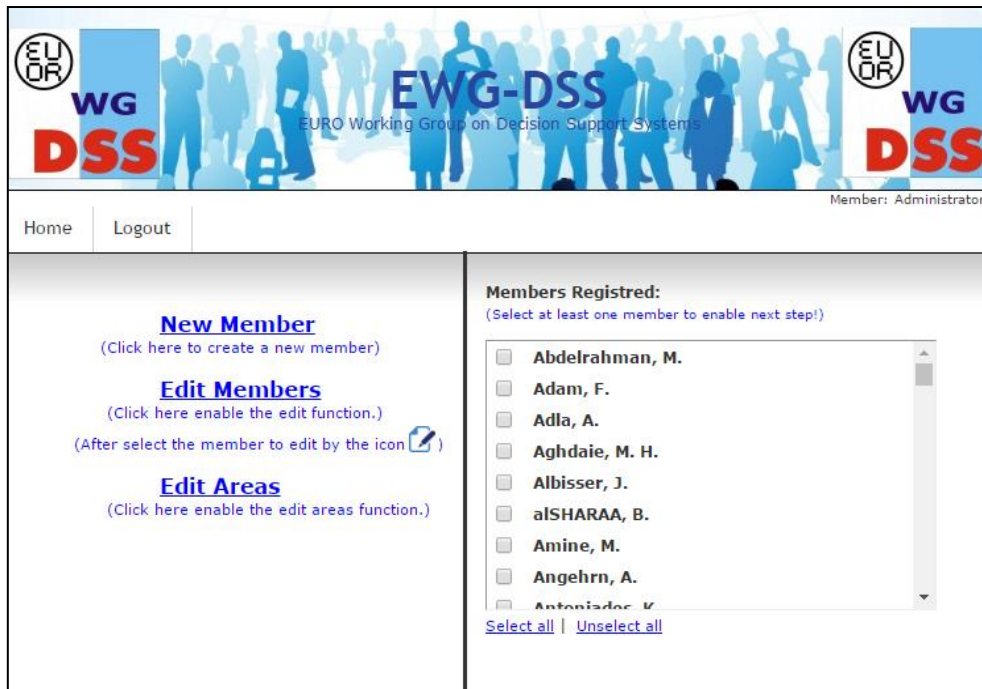
For system login of the affiliated members' profile, any registered member may select "As member" as an access system option and fill out a required field with their registered email. After validated the member's email, the web-based EWG-DSS environment it's available to find all registered members by the knowledge area or members' name. The logged members also can update their own profile information, as well as change their personal email used to login in the system. In order to search publication information of members, one or more members can be checked at the initial screen, and then execute the "Run" option on the follow screen. At the end of researching process, the logged member can export the results related to checked members by selecting "Export" option, which will perform the download of that information in Excel format with title, journal, year, cite number, and coauthors data. The Fig. 2 shows the main screen of logged member profile.



**Fig. 2. Member Profile Screen**

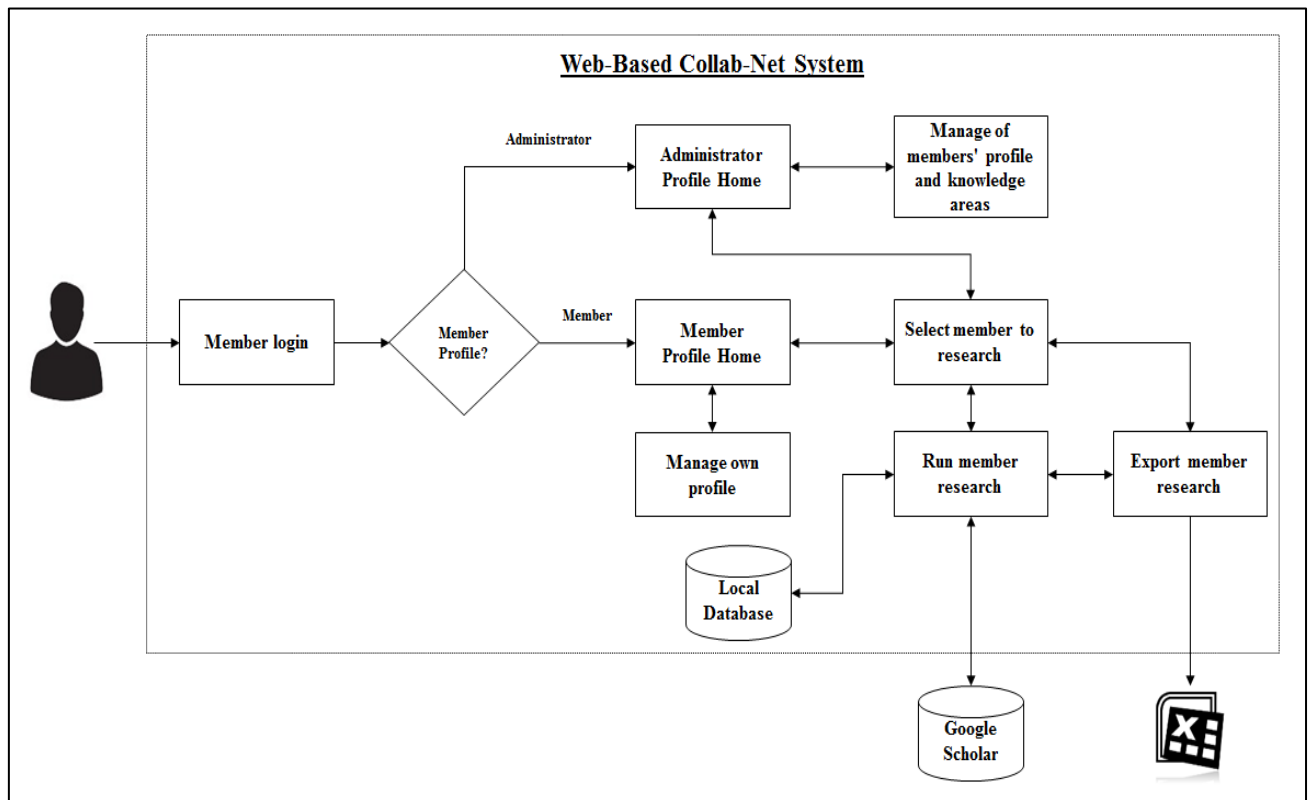
Differently of the affiliated member's profile, the administrator profile is restricted to some members who are in the coordination board of the EWG-DSS group. The system login is allowed by a required token that must be filled when the member selecting "As administrator" as the access system option. Once logged as administrator profile, the member may manage all registered members; editing members profile information, create a new, edit or remove the knowledge areas, and register a new member. Furthermore, the administrator profile also has the same tools of the affiliated members' profile, which allows it to run searches of members' publication information and export the results via download of that information in Excel format. The Fig. 3 shows the main screen of administrator profile.

Administrator Login : admin@2016



**Fig. 3. Administrator Profile Screen**

As a way to present the navigability in the web-based Collab-Net system, the Fig. 4 shows the flow of both administrator and affiliated members' profiles when using the system. It shows from the member login until the possible results of the searches, as well as all functionalities of the system.



**Fig. 2. Web-Based Collab-Net System Flow**

### 3 Conclusion

In this report, we revisited the earlier versions (1 and 2) and describing the new advances of the Collab-Net project in a current extended version with a web-based system. Its improvements aim to support the research collaboration network for the EURO Working Group on DSS on a web-based platform. Some details of this current version were presented here, including improvement requirements of the Collab-Net project evolution based on earlier versions, new requirements for data collection automatically, conceptual entity-relationship model to support data storage locally, technologies used in the software development process, and main features and functionalities of the web-based platform. These last improvements carried out by the current version of Collab-Net project provides to DSS community in Europe with more accurate and up-to-date information about research projects and co-authorships automatically from the data stored in google scholar. Furthermore, it also provides an interactive environment, which encourages the affiliated members in generating better future collaboration opportunities.

In terms of future work, new features still need to be implemented in the web-based platform and will be focused in the future versions. Although the present platform brings a new perspective of the collaboration analysis, its focus is on the acquisition and extraction process in one publication database. Therefore, a new version could develop new features, such as: mechanisms to filter and transform the collected data; support the data collection process in more than one publication database; provide an intra-communication mechanism to encourage members to interacting via the available web-based platform; enable the sending of invitation to affiliation; and offer an environment to proceed the network analysis with textual and graphical information about the nodes connections of own member or other member network.

To proceed with the planned and pending developments, the EWG-DSS Coordination Board needs the support of all researchers within the group and the DSS Community, via their participation in access the Collab-Net web-based platform by the link [www.collab-net.com](http://www.collab-net.com). After access the system, selecting the option “As member” and fill in the requested field with the email registered EWG-DSS database. Their constructive feedback and help are fundamental as development force.

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**Annex**

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