# Collaborative learning in the scientific Community of Practice

Case study

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**Abstract**

The paper describes research done in the scope of doctoral project. The aim of the study is to discover how to improve the process of collaborative learning in the community of scientists by the development of a community of practice. A mixed methods approach was used combining data from content analysis, interviews and questionnaires. Results show that such community helps to build relationships and network with others, it motivates to share work-related knowledge, represents an area of common interest for organization, but also that it is mainly driven by the willingness of members and is lacking instruments to share ideas.

## INTRODUCTION

The challenges in modern nuclear science require more and more collaboration of scientists from different units, different institutions, often different countries and continents. The global scale of many large-scale projects or 'big science' [1] forces scientists to start broader and more inclusive international cooperation. Scientific collaboration is a social process in which people share their human capitals to produce knowledge [2]. Collaboration takes place at organizational, national, and international levels. Scientific collaboration in all domains is increasing in frequency and importance [3]. Scientific collaborations spans fields, institutions, sectors, and countries [4]. Increasingly, public and private research funding agencies require interdisciplinary, international and inter-institutional collaboration. Many information and knowledge is embedded in collaboration networks [5]. It has the potential to solve complex scientific problems. Collaboration in science has led to scientific breakthroughs that would not otherwise have been possible [6].

## collaborative learning and community of practice

Learning is an integral component of scientific collaboration, especially interdisciplinary [7]. Collaboration is viewed as “one of the most effective forms of knowledge transfer” [8]. Scientists need to learn from each other to develop a common working understanding regarding their research project and how they can integrate their specialized knowledge to create and maintain a strong nuclear knowledge base. Learning requires time, reflexivity, disclosure, risk taking, and trust [7]. It takes time to teach and learn from others. Disciplines and specialized areas of expertise, like nuclear science, have their own concepts, methods, and languages; it is important to identify and understand these differences [3]. These challenges can be met by creating communities of practice between scientists involved in operating end utilizing nuclear technology.

Community of Practice (CoP) is “a group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (p.4) [9]. According to Wenger [10], people who want to participate in CoPs get ready to share their knowledge, sharpen their expertise, build up interpersonal networks and pursue their interest. Communities facilitate organisational learning by supporting the sharing of distributed knowledge as it is created, valued and understood [11]. CoPs often focus on sharing best practices and creating new knowledge to advance a domain of professional practice. This approach to knowledge management can lead to developing and maintaining a strong nuclear knowledge base at the organizational, national, and international levels.

## Relevance of collaborative learning for Nuclear knowledge building

Nuclear knowledge is complex, it requires significant financial commitment and government support, and it has been developed, shared and transferred over many generations. Nuclear knowledge is embedded in plant designs, training programmes, work plans or practices, and decision making. The personal skill sets and experience needed to safely apply this knowledge to real world applications is particularly scarce [12]. A way to address the challenges of managing the nuclear knowledge could be by creating and developing online networks of experts in the field nuclear technology: Communities of Practice. Knowledge of the community is larger and deeper than individual one, each one can contribute to the cognitive development of the group helping to (re)structure knowledge [13]. Crating and developing a CoP could be a method to establish and manage nuclear competencies, information and records, work processes, analysis and verification techniques, and the interpretation of data.

## METHODOLOGY

This project is a case study: a group of scientists involved into a training programme in the area of analytical chemistry. This specific case is used to provide insight into a particular case – collaborative learning in a group of scientists. This case study provides a good description about the knowledge sharing in a multinational group of scientists working in the field of analytical chemistry.

Mixed methods [14] are used: qualitative and quantitative methods, such as interviews, focus groups, questionnaires, observation grids. Actors are involved at the different steps of the work. Data was collected in 4 steps described in the table below.

TABLE 1. Steps and tasks of data collection

|  |  |
| --- | --- |
| Step | Tasks |
| Content analysis | Reviewing all documents concerning the group, to study the learning process of the group |
| Interviews | The semi structured, open-end interviews involving the programme coordinators.  the interviews were digitally recorded and transcribed and sent to the interviewees to be checked and corrected |
| Questionnaires | Online questionnaires allowed collecting data from a group spread over the Europe. The framework was developed using the information gathered in the previous phase |
| Discussion | A discussion with all present members |

## Results

Data from all the 4 steps of the research was collected and analysed. Early findings are summarized below:

(1) The studied group collaborate in a European programme for life-long learning about how to interpret the metrological requirements of ISO/IEC-17025 for chemical and bio-analytical measurements in many different sectors (environment, food, consumer protection, etc.). It is operational across many parts of Europe via national teams. These teams use shareware pedagogic tools which have been harmonized at European level by a joint effort of many experts across Europe working in an editorial board. The purpose of the group is to facilitate the training of metrology in chemistry to laboratory staff, researchers, educators, decision-makers and accreditation assessors, in order to strengthen the measurement infrastructure.

(2) The programme coordinators were interviewed. The interviews were analysed using thematic analysis approach. 71 initial codes were identified. After deeper analysis those codes were grouped into 5 defined themes:

* Purpose;
* Members;
* Participant interactions;
* Benefits;
* Communication.

(3) Community members stated that the community helps to build relationships and network with others, motivates to share work-related knowledge, represents an area of common interest of the group, provides an informal, welcoming social environment, benefits daily work from the established relationships, breaks down communication barriers among members, has a user-friendly communication platform and builds up an agreed set of communal resources over time. But also that the community is mainly driven by the willingness of members. Only one person said that it is not efficient, and that it does not really exist.

(4) A community meeting was organised, present members stated that they feel as a part of the community, they want to meet other members, they feel like a team. But they want to be updated every day, not only at the meetings. There is an idea to move part of the community’s activities from face-to-face to online environment. That would increase the impact, but there is a need to make sure there is no loss of the quality. Community members asked to keep the face-to-face events, to share the experience and learn from each other.

## CONCLUSION

Communities of practice provide a new model for connecting people in the spirit of learning, knowledge sharing, and collaboration as well as individual, group, and organizational development. It gives new possibilities which could be used in nuclear environment. It would support partnership among participants, enable easier exchange of information, share best practices and initiate joint projects and training courses. Hence there is a need to research these possibilities in the area of nuclear knowledge management.

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