

Ges.Sic.A.: an Innovative Approach for Monitoring and Managing Health and Safety in Activities with High Variability

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Recent changes in the world of work show, in comparison with the past, a larger use of outsourcing, a higher staff turnover and new atypical contracts (Koukoulaki, 2010). This introduces new issues in H&S management. In the past, the concept of job was mainly related to a specific and well-defined set of tasks. Nowadays, instead, it is increasingly linked to a variability of activities and work typologies carried out in collaboration, by personnel of different enterprises. Often, people involved in the activities work on the basis of a plurality of formal and informal agreements. Universities represent an example of this scenario, being workplaces characterized by high variability of activities involving a multiplicity of different subjects. Universities, hence, can be considered as a point of reference for defining prototypical models of H&S management, capable to cope with the change of the world of work. In this paper, the authors illustrate the approach developed and adopted by the University of Udine (Italy) to facilitate H&S management. The approach is based on the concept of "profile of activities" and the use of an ICT-based management tool. The tool, named GESSICA, allows us to monitor and manage the high variability of activities, thanks to effective and fluent procedures. The paper illustrates the approach and the tool as well as the results obtained after two years of testing. In the work, the authors highlight the aspects that can be assumed as reference point for implementing H&S management systems in other sectors characterized by high variability of activities and a multiplicity of types of employment contracts.

1. Introduction

The European Agency for Safety and Health at Work, in the document "Priorities for occupational safety and health research in Europe: 2013-2020" underlines that globalisation has produced important consequences on the labour market and, by extension, on health and safety at work. In the same document, the Agency observes as Europe experiences great economic, social and technological change that imply also workplaces changing. In fact, globalisation and increasing competition have had a large impact on production methods and work organisation, resulting in a gradual transition from relatively standardised work organisation and working time patterns to more complex and diversified structures (Eurofound, 2012). Over the past decade, the number of workers employed under atypical arrangements (fixed-term contracts, self-employed, temporary agency workers) has risen significantly, coupled with a relaxation of legislation governing dismissal in various countries. Since the 1980s, most industrial societies have experienced a market trend towards the diversification, decentralisation and individualisation of working time patterns, driven both by companies' needs for greater adaptability in order to meet market constraints and by large changes in the gender division of labour. As new technologies and globalisation reduce the importance of economies of scale in many activities, and larger firms downsize and outsource more functions, the weight of SMEs in the economy is increasing (OECD, 2000). This process has led to a change of the world of work and of the job organization, introducing important consequences in the H&S field. In the past, the concept of job was mainly related to a specific and well-defined set of tasks. Nowadays, instead, it is increasingly linked to a variability of activities and work typologies, carried out in collaboration by subjects of different enterprises. Often, people involved in the activities work based on a plurality of formal and informal agreements. Therefore, a new and more flexible method of H&S management is needed.

In this regard, it is worth to note that universities represent, because of their organizational structure with a multitude of autonomous groups self-organized, an example of this scenario of high variability of activities and large involvement of different subjects, even external. Universities, hence, can be considered as a point of reference for defining prototypal models of H&S management, capable to cope with the challenge of the world of work. For this reason, in the following an innovative approach developed and adopted by the University of Udine for facilitating H&S management in complex organizational scenarios is presented. After the description of the methodology, some considerations on the possible applications of the approach in different fields are presented.

2. Universities workplace as reference point for H&S management in the changed work market

From an H&S prospective, universities could be considered as a complex system where there is a multiplicity of subjects working with different levels of autonomy and a multitude of goals, in a framework of common rules. Universities have an organizational structure very different from productive and service sectors, characterized by high levels of dynamism, permeability and interaction with external world.

In Europe the H&S approach is governed by laws and regulations that require the introduction of H&S management systems, based on risk assessment. In Italy in particular, the H&S management of personnel has always referred mainly to the concept of "job" ("*mansione*" in Italian). This concept, conceived for productive sectors in the 50s of the last century, facilitates the process of risk assessment and the definition of the related prevention and protection measures. Nevertheless, this approach is ineffective for universities. For example, it is easy to recognize that the job: "professor of chemistry" is not sufficient for defining the exposure at risk for H&S purposes. In fact, the exposure at risk depends from the effective activities: teaching, laboratory research, on field investigations in dangerous areas, etc. Furthermore, the manner of applying H&S measures, as examples the health surveillance and H&S training, depends on the typology of the contract: full time, part time, atypical contract, etc. Moreover, in universities there may be also the case of visiting professors, heterogeneous working groups (as the case of university hospital), international research teams, or activities abroad or in a particular environment i.e. archaeology, oceanography, etc.

This example permits to observe that activities, type of engagement, workplace environment, instead of job position, have to be considered as main driver in the characterization of the exposure at risk and in the consequent adoption of prevention and protection measures. These observations assume more and more importance especially in the current work market, characterized by high variability of activities and typologies of contracts. Therefore, universities, represent a good point of reference in terms of H&S management also for other workplaces.

3. Ges.Sic.A methodology

In the late 90s, according with the requirements of the European legislation in the field of H&S at work (Directive 89/391/EEC), the University of Udine decided to design and develop a specific H&S management system. In particular, the project "Ges.Sic.A." (University's H&S management system - in Italian: *Gestione Sicurezza d'Ateneo*) was designed with the aim of developing an innovative H&S management system able to cover all the cases characterizing the university's specificities. The Ges.Sic.A project, was developed, working on three main lines of action:

- 1) definition of a comprehensive conceptual framework;
- 2) definition of a common risk assessment model;
- 3) introduction of strategic process-phases for the H&S management.

In the following a brief description of the essential elements characterizing each line of action is presented.

3.1 The comprehensive conceptual framework

The conceptual framework of the H&S management system is based on the interaction of three main components/areas:

- a) People (targets to protect)
- b) Spaces (places of work)
- c) Activities (work-related activities).

The overlapping of the different areas defines supplementary needs and problems to manage. The framework is represented in Fig.1. The core of the picture, defined by the overlapping of the three main areas, underlines that the functional goal of the H&S management system is the definition of procedures and tools able to facilitate the management of the H&S issues in a comprehensive and coordinated manner.

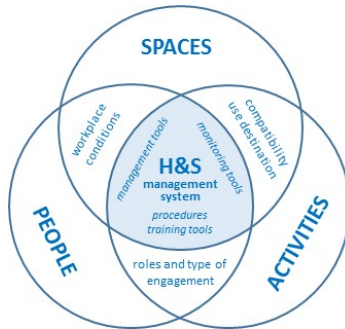


Figure 1: Three main components/areas of the conceptual framework of H&S management system adopted for the development of the Ges.Sic.A project.

The conceptual framework refers to people in general as “target to protect”, regardless if the person is a worker engaged under specific contract or simple observer or user. Each typology of contract between university and individual leads to a specific procedure for managing prevention and protection measures. The multitude of individuals operating with different type of engagements in different places and involved in a variety of activities requires a link between specific safeguarding procedures and a common risk assessment methodology. Furthermore, the high dynamicity and variability of situations introduce the need to define effective management and monitoring procedures and tools.

3.2 The common conceptual model for risk assessment

Researchers of the University of Udine have defined a common conceptual model for risk assessment, coherent with the conceptual framework presented above. The model, named SPRINT (acronym of Situation of Potential Risk resulting from the Interaction between adverse agents or conditions and a target having specific values) is depicted in Fig.2. The model, derives from the fundamental process of damage generation, presented by Grimaz et al. (2014), and permits to summarize, in a functional way, the main factors defining the risk at work, and is applicable to different sectors. In the field of H&S management, the target is the person and the values are his/her safety and health.

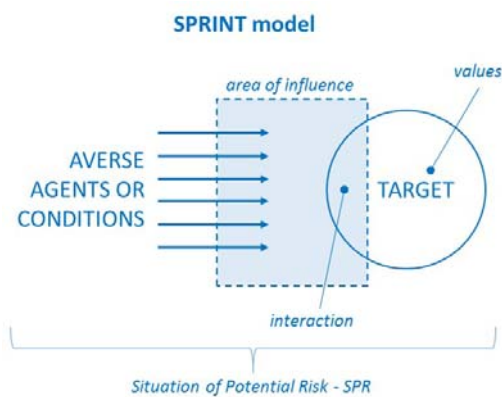


Figure 2: SPRINT conceptual model for risk assessment used in the Ges.Sic.A project.

The SPRINT model, in particular, by referring to the approach of Job Safety Analysis (JSA) (Raveggi et. al., 2010), introduces the concept of Situation of Potential Risk (in the following SPR). It is a concept related to the conditions or situation of risk depending from the characteristic of operations, the place of work, the equipment, the handling of dangerous substances, and the physical environment or working conditions. In practice, SPR could be interpreted as an “elementary work scenario” of a work activity. In this way, as in a puzzle, the risk of the work activity is evaluated considering the composition of “elementary pieces” (SPRs) characterizing specific operations or conditions of work.

Through systematic JSAs, overall, 123 SPRs were identified as significant for characterizing typical elementary scenarios of activities carried out at the university.

For each SPR the researchers elaborated a specific H&S fact-sheet organized in predefined points, exploiting the analogy between SPR-H&S and MSDS sheets (Material Safety Data Sheet). In particular, the SPR-H&S fact-sheets contain:

- a) Description of the typical operations and operational context of the SPR
- b) Analysis of risk, identifying the characteristic risk
- c) Identification of critical points and potential accident
- d) Definition of the preventive and protective measures
- e) Protective equipment
- f) Emergency procedures
- g) Recommendations
- h) H&S main contacts

The researchers carried out the risk analyses for each SPR considering as target a healthy person. The evaluations, when necessary, were customized taking into account the gender-related specifics (e.g. for the case of use of teratogen substances). The SPR approach also permits to the occupational doctor to take into account of health individual problems, starting from a risk situation defined with reference to "normal conditions" i.e. in absence of health problems (e.g. pathologies, allergies, etc.) or specific states (e.g. pregnancy).

The introduction of SPR fact-sheets permits to carry out a risk analysis simply identifying the SPRs of the specific activity. Risk evaluations, prevention and protection measures and recommendations derive directly from the SPR-H&S fact-sheets (as happens for the MSDS). SPR-H&S fact-sheets are also used for training purposes.

3.3 The process for defining a customized H&S program for the personnel

The introduction of the SPR procedure for analyzing the risk of activities within a comprehensive conceptual framework facilitates the design and implementation of the H&S management system. In fact, the risk profile is defined directly identifying the SPR linked to the "profile of activities". This identification is carried out at the beginning of the relationship between the individual and the university, i.e. during the first step named "take charge of the personnel". The aim of this step is the introduction of the individual data in the H&S system in order to obtain a customized H&S program and an individual risk profile. The advantage of this process is that the "profile of activities" of an individual allows you to define automatically specific H&S information, training and health surveillance needs. The process results in an H&S specific program for the person, defined through a standardized procedure. The doctor evaluates eventual personal problems of the worker during the health surveillance and customize the procedure, if necessary.

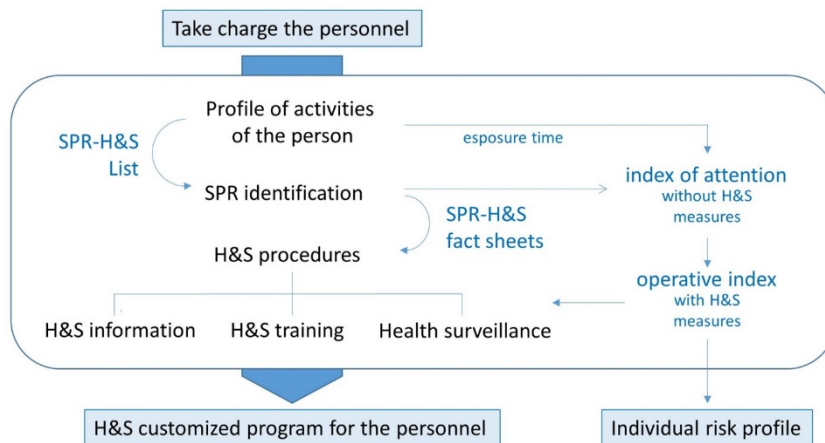


Figure 3: Process for the definition of H&S program of the personnel in the Ges.Sic.A H&S management system.

The risk evaluation process defines an index of attention (i.a.) related to the activity characteristics without any prevention and protection measures. This permits you to highlight the maximum potential damage and, therefore, to evaluate the intrinsic hazard of the activity. Then an operative index (i.o.) is defined taking into account the prevention and protection measures adopted. The gap between i.a. and i.o. expresses the importance of protective measures and constitutes a useful element of reference for prioritizing the internal audits.

4. Ges.Sic.A ICT tools

A specific ICT tool has been developed for managing the H&S system. The ICT tool is based on six main modules, directly related to the conceptual framework as showed in Fig. 4, and in particular:

- a) MAPPA that permits to manage automatically the process of “take-charge of personnel” and to manage the individual H&S program.
- b) ARTEMIUS contains thematic maps of each building and external areas. Each building is related to a specific sheet, which describes the main characteristics of facilities and safety protection systems. The thematic maps codify the spaces, identify their destination and usage and classify the homogeneous areas of risk.
- c) CAIUS with all contracts related both to buildings (property documents, location contracts, etc.) and to external subjects (partnership-agreements, services, etc.)
- d) IRIS, the database of H&S informative documents. It contains the SPR-H&S fact sheets, procedures, legislation references.
- e) PERFORMAS that is the module for managing training programs and courses. Specific e-learning courses are available.
- f) SIGEM that is the module specifically dedicated to the internal emergency system.

Furthermore, the ICT tools have a GESSICA DASHBOARD that permits to monitor the whole H&S system. The dashboard is organized in order to permit the access only to personnel authorized for the different sectors. The Rector, the General Director, and the H&S officer have the overall view of the situation. Specific queries allow you to produce predefined reports, useful for analyzing the trend of specific indicators and obtain information to support decisions in the definition of H&S improvement strategies.

Ges.Sic.A H&S management system ICT tools

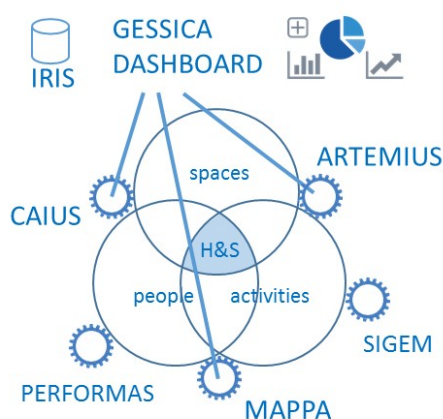


Figure 4: Structure of main modules of Ges.Sic.A H&S management system ICT tools.

The ICT system has a web-based architecture. Each tool is usable accessing to a Ges.Sic.A. home-page (<http://gessica.uniud.it>) with specific references.

5. Results of first experimentation

The Ges.Sic.A H&S management system has been tested at the University of Udine (UniUD), which is a medium size university in the North-Est of Italy. Table 1 summarizes the main characteristics of the UniUD workplaces. Table 2 shows the H&S data managed and monitored by Ges.Sic.A.

The ICT tool of Ges.Sic.A. H&S management was implemented in late 2014 and led to a gradual replacement of the previous management procedures based on paper documentation. After two years of application, the results are extremely positive. All the H&S management processes have been rationalized, simplified and made more effective and faster. The great amount of data could be managed by the ICT system permitting rapid overviews, trend analysis and focus on individual situations.

Table 1: University of Udine characteristics (situation January 2016)

Structures/spaces		Personnel/students	
Organizational structures	24	Staff	1249
Buildings	62	PhD and temporary researchers	430
	(surface) 15,672 m ²	Students	15,414
	(volume) 401,066 m ³		
Laboratories	295		
Classrooms	164		

Table 2: Number of people managed by Ges.Sic.A (situation January 2016)

Personnel charged in Ges.Sic.A.		H&S customized program	
Total of persons	2,207	Individual profiles of risk	1,690
<i>permanent full time contract</i>	1,162	<i>requiring medical surveillance</i>	649
<i>atypical or part time contract</i>	1,045	<i>no requiring medical surveillance</i>	1,041
<i>UniUD staff working externally</i>	515	<i>activities with collective protection systems</i>	388
<i>external personnel working at UniUD</i>	55		

6. Final considerations

The University of Udine has developed an innovative H&S management system in order to face the complexity of activities and variety of personnel involved in terms of type of engagement. The H&S management system was developed basing on a comprehensive conceptual framework that considers people, spaces, activities and their interactions. The methodology permits to obtain individual risk assessments using the new approach of a preliminary identification of the situations of potential risk (SPRs) related to the individual profile of activities. The H&S processes are managed by a ICT tool that permits to constantly monitor the situation. Two years of testing allow the authors to observe very positive results. The Ges.Sic.A H&S management system raises awareness and increase proactive actions for safety. The ICT tool makes more effective, faster and easier both the management and the monitoring of the situation. Concluding, the characteristic of universality and adaptability of Ges.Sic.A. approach allow you to consider the methodologies presented in this paper as a valid point of reference for implementing H&S management systems in other workplaces characterized by high variability of activities and by a plurality of types of employment contracts.

Acknowledgments

The authors would like to thank Mauro Di Cecca for the support in the implementation of Ges.Sic.A ICT tool, and to all the other colleagues of the University of Udine who have contributed for the development and progressive improvement of the methodology.

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