Incident Information Management Tool

Abstract:

Flaws of current incident information management at CMS and CERN are discussed. A new data model for future incident database is proposed and briefly described. Recently developed draft version of GIS-based tool for incident tracking is presented.

29th of June – 21st of August 2015

Vladimir Pejović, University of Montenegro, Faculty of Electrical Engineering
Supervisor: Niels Dupont, CMS LEXGLIMOS, CMS Safety Office

Contents

1. Introduction

The project I have been working on is related to incident information management, in particular, building a centralized tool which would be used to collect, store, analyse and use incident data. The reason for building this tool is that a number of issues are faced due to the fact that incident related information is stored in various locations (databases, local hard-drives, email boxes, websites, etc.), in various file formats (pdf, word, excel, photos, etc.). This makes very difficult accessing the information when needed: during risk analysis/assessment, accident analysis, training courses, meetings, etc. Moreover, one of the sources of information is CERN members' personal memory, and it is impossible to obtain necessary information if the person possessing the information is not at CERN anymore or doesn't share the information during meetings. In order to solve these issues, we are aiming to provide a mean of systematic, effective and efficient collection of all incident data to CMS people, and eventually to extend it to the whole CERN. Goal is to increase and maintain collective memory and safety culture of CERN personnel, and to apply lessons learnt in the day-to-day work.

After several meetings with different stakeholders from different CERN departments, and considering a lot of different approaches to our idea, conclusion was that there is no need for building a new tool from scratch. Extending existing tools in order to fit our needs is much more efficient. By consulting experts from various fields, my supervisor and I were understanding and realising more and more importance of data model design, which I have been mainly focused on in my work.

2. Data Model

One of the important issues in dealing with accidents is the language used to describe them. When speaking about an accident, it is not a rare case that description vary significantly depending on speaker. Terms and expressions used, and subjective point of view can very often lead to misconceptions. In order to avoid this, it is crucial to build a "common language". The idea is to make a tool such that restricts as much as possible a creator of a new accident report to type a free text, but instead to offer a lot of choices for a particular piece of information. This feature requires thoroughness and exhaustiveness, but it provides efficiency when storing and withdrawing information. A number of various accident reports and statistics have been examined to insure that data model contains all necessary fields for any piece of information relevant for the accident. All fields are divided in five main categories, which are connected with a unique ID (a six digit number): who, accident, activity, consequences, and external references. All these categories will be described briefly.

2.1 Who

Category "who" contains fields for all people involved in some way in the accident: casualty, supervisor of the casualty, witness, alert, HSE on-call, analysis responsible, safety officer, creator and last modifier. Each person has fields such as: name, first name, group, role, CERN ID, contact number and company/institute name. Casualty requires additional fields such as: gender, professional class and category of personnel.

2.2 Accident

In the category accident there are six major fields: "date", "time", "type of the accident", "nature of the accident", "cause" and "category of the alarm".

- "Dates" are written in international format – yyyy/mm/dd. Dates relevant for the accident are accident, analysis, creation and modification date.
- "Time" is written in format hh/mm and only the time of the accident is required.
- "Type of the accident" can be personnel, environmental or installation/equipment. For the type of the accident personnel, there is a subfield which determines the type more specifically. Personnel type of the accident can be accident at work, commuting, external or non-professional.
- "Nature of the accident" is a very extensive field. It can be chosen among twenty two different natures. For some natures of the accident one field is enough, but for some one or two additional subfields are necessary in order to describe a nature properly. For example, noise doesn't require any subfields, but fall from height requires one subfield to choose place of fall (stairs, roof, platform etc.) and one more if the place of fall is stairs to determine whether stairs were more or less than five meters long. Also, some natures require additional fields where values must be filled manually. For example, electricity

nature of the accident requires information about current, voltage, frequency or power. It is important to highlight that one accident can have more than one nature of the accident.

- "Cause" is closely related to the nature of the accident. For the selected nature of the accident, one or more causes should be selected from a very exhaustive list of all potential causes. It is important to have this list completed as much as possible in order to insure that any cause can be found in it. This list is partially completed right now.
- "Category of alarm" can be chosen among four different values: level 1, 2, 3 and crisis, depending on the seriousness of the event. It is colour coded – certain alarm corresponds to a certain colour (shades of yellow, orange and red).

2.3 Activity

This category contains six major fields: "location", "type of the activity", "system", "equipment used", "work package number" and associated "work permit".

- "Location" has several fields in order to determine location of the accident precisely. Location can be recorded using official names, buildings and rooms numbers, or using specific names. Also, there is a possibility to use GPS coordinates.
- "Type of the activity" contains information about activity that was being performed when the accident occurred.
- "System" refers to the part of the experiment for which the activity was taking place. There are two subfields: sub-detectors (ECAL[1], HCAL, Tracker, DT, CSC, RPC, ZDC, Castor, etc.) and sub-systems (DAQ, gas, cooling, electricity, cryogenics, etc.).
- "Equipment used" refers to protective equipment used when the accident occurred, both personal and collective.
- "Work package number" represents a six digit number automatically generated when the work package is created in the activity planning tool.
- There are several associated "work permits" such as VIC, IS37, fire permit and lock-out. Information about them is filled in form of logical values (yes/no), the Id. of the permit, hyperlink, etc.

2.4 Consequences

Category "consequences" contains four major fields: "severity", "injured parts of body", "intervention" and "lessons learnt".

- "Severity" of the accident can be defined according to several parameters. Depending on the type and nature of the accident, different parameters can be used such as number of days off, number of hours off, external consequences, money lost or physics data lost. Information in these fields is filled manually.
- "Injured parts of body" gives good insight in severity of the accident. Specific part of body or multiple locations can be selected.
- "Intervention" field gives detailed description about the type of intervention that was performed upon the accident. Different types of intervention are emergency team (FB, ME and external services), first-aider and safety systems (fire and safety equipment).
- Lessons learnt is one of the most important fields. It serves as a summary of gained knowledge with intention to prevent similar accidents to reoccur. Filling this field is rather complex and sensitive task and requires detailed analysis of whole accident.

2.5 External references

This category is used to record links to relevant documents for the accident stored in existing CERN's tools and databases: EDMS, CDS, INDICO and EDH.

[1] Acronyms and specific terms are defined in the glossary at the end of the report

3. Draft Version

After the meeting with Youri Robert from GS Department, we realised that it would be convenient to have a visual representation of all accidents occurring at CERN – a map with different pictograms that point on locations where accidents occurred. Each nature of the accident should have corresponding pictogram. After providing pictograms for each nature of the accident and sample fields from our data model to GS Department, a first version was delivered. It has functionality that appropriate pictogram can be chosen and placed on the accident location in the map (Figure 1).

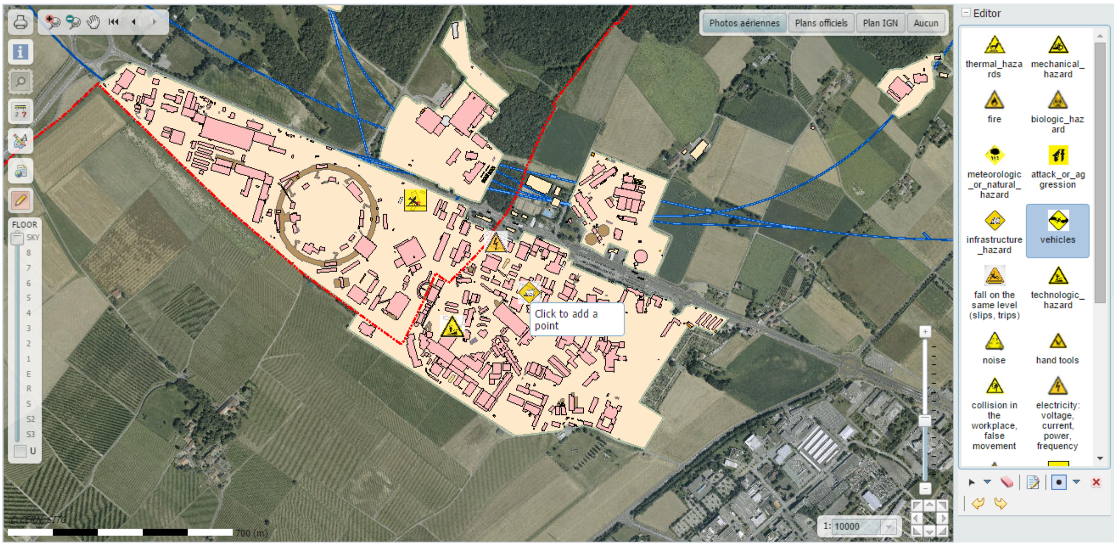

Figure 1: CERN map; pictograms pointing on accident locations

After choosing the point, a block pops up with several fields for the accident information to be filled in (Figure 2). By filling this fields, a new accident is recorded in the database. Plan is to expand this tool so that all necessary accident related information can be filled in, and also to have a possibility to modify database regardless the GIS. Goal is to have an effective, efficient and friendly user GIS-based tool which would serve to collect, track, analyse and use all accidents.

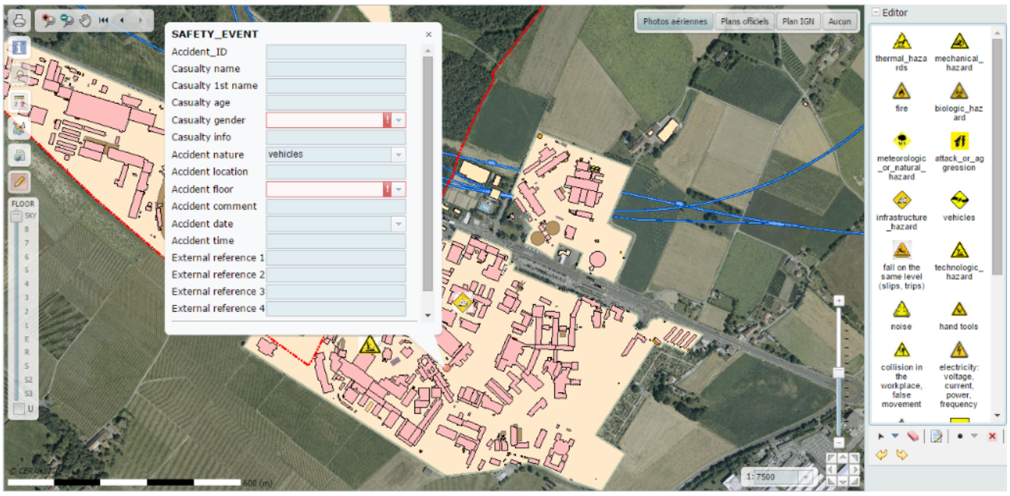

Figure 2: Adding a new accident record

4. Conclusion

There are a lot of drawbacks in the present way of tracking accidents and especially use the lessons learnt at CMS and CERN. Process is not systematic and efficient. Although only draft version of the incident information management tool was developed, with very limited functionalities, I think its potential is obvious and that there are plenty of reasons for further development.

What I would like to point out is that this tool could be very useful in tracking new accidents, but old accidents can't be neglected. One of the important issues to be considered in the future is how to record old accidents in new format. That process requires a lot of time, patience and thoroughness, but nonetheless, I think this tool has a great potential to impose a new, systematic and efficient way of dealing with accidents, with ultimate goal of increasing safety in CERN.

5. Glossary

CASTOR - Centauro And Strange Object Research; calorimeter of the CMS experiment
CDS - CERN Document Server
CERN - Organisation Européenne pour la Recherche Nucléaire (The European Organization for Nuclear Research)
CMS - Compact Muon Solenoid
CSC - Cathode Strip Chambers
DAQ - Data Acquisition
Data model - organizes data elements and standardizes how the data elements relate to one another
DT - Drift Tubes
ECAL - Electromagnetic Calorimeter
EDH - Electronic Document Handling
EDMS - Engineering Document Management System
FB - Fire Brigade
GIS - Geographic Information System
GPS - Global Positioning System
GS - General Infrastructure Services
HCAL - Hadron Calorimeter
HSE - Health & Safety and Environment
IS37 - an IS37 request is a request for disabling a "alarm level 3" detection system in a given area; the IS37 procedure is followed when a level 3 safety system - like ODH, smoke detection, and AUG - needs to be disabled
ME - Medical Service
Permit - apply for both persons and for work activities; a permit explains how to protect against a danger, and it should describe how to limit the damages if there should be an accident; an example is a fire permit, it describes how to protect against fire and how to stop a fire if it should start
RPC - Resistive Plate Chambers
Tracker - CMS detector; reconstructs the paths of high-energy muons, electrons and hadrons as well as see tracks coming from the decay of very short-lived particles
VIC - Visite d'Inspection Commune (Joint Inspection Visit)
Work package - a subset of a project that can be assigned to a specific party for execution; a work package is defined by brief statements of activity description, resources including skills and expertise, estimates of duration, schedule, and risks; work packages are assigned a work authorization or control account; the abbreviation WP is often used for work packages
ZDC - Zero Degree Calorimeter