

UML AND RISK ASSESSMENT TOOLS – SAFE AND SECURE FUTURE FOR INTERNATIONAL AIRPORTS

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Last decade, costs for ensuring of safety and security in aviation increased rapidly, thus airports have very tight budgets, especially small airports. A lack of funds consequences, that there are not enough of safety and security specialist at the airports; hence most safety and security requirements are met just formally. Possible solution of this situation is deploying of risk assessment tools and UML; combination of these tools can provide acceptable level of safety and security with significantly lower costs than conventional ways can provide. This work was supported by the Grant Agency of the Czech Technical University in Prague, grant No. SGS10/221/OHK2/2T/16.

K e y w o r d s: airport security, security management tools, UML, security management software

1 INTRODUCTION

Foundation restrictions of small international airports do not allow creating enough job opportunities for qualified specialists – qualified safety managers. The safety programs of airports and airports' emergency plans correspond with the minimal measures formally in most cases. The measures are set by aviation authorities and local administrative organization. It also does not seem to be perceived to ensure safety in predictive and pro-active sense. Through the emergency plans happens the re-active operation and the detective controls purpose is preventive. One of the major problems is the fact that airports' emergency plans deal with problematic concerning security together with extraordinary events resulting from operational actions (safety).

Among other aspects, which are limiting for operating, can be included the manner in which the operational manuals, safety programs and emergency plans are created. These documents predominantly comprise vast textual parts without any systematic display of the procedures and principles which would describe individual operational actions. Modern trends in the company management have shown significant pros of systematic graphical display using software tools.

Apart from graphical layout, these tools allow deeper definitions of relation in systems and procedures and they provide an outstanding output position for further analyses.

Actually, the system access allow better understanding of the system behaviour and it can find hidden dangers in operational safety and security processes which are happening at an airport.

Employees of the security sector also lack any information system specialized for the airport circumstances which would deal with emergency communication, emergency operation, and control procedures during emergency processes within an airport in more detail. The individual parts of the emergency operation (airport emergency headquarters, police, firemen) are connected through the information system, but the personnel lacks a specialized system for distribution of internal security information and commands when emergency.

2 UML AND AIRPORT PROCESSES MODELLING

Object-oriented means of system analysis have started to infiltrate the area of aviation transportation through the modeling language UML (Unified Modeling Language).

UML is a powerful tool providing a complex view of a system. This attitude has been richly exploited in software development, but it has started to infiltrate other areas as well. In contrast to the dominance of the written programming languages, it has its own graphical syntax. The syntax creates rules for formation of individual elements of the language into larger units. It is equipped with its own semantics which forms clear rules and these determine meaning to the individual syntactic expressions.

Currently, the UML language has been used mainly when proposing software applications, but it also passes through a dynamic increase in the area of modeling business

procedures which are part of business strategy and encourage process-oriented operations.

It allows using techniques which help to prove consistency of rules framework and judging accuracy of definitions of entities in individual systems. Each object-oriented proposal of a complex system and its procedures is a necessary presumption for its successful and quick understanding and eventual following analysis.

For object-oriented description of a system, it is possible to use different types of diagrams. UML is a significant tool as it has the ability to specify the content of a specific diagram which is rather important, especially, when conveying information among individual members of a working team. From the UML principle it is necessary to ensure the created graphs to have internal consistency and precisely set semantics which does not have to be the case for other kinds of graphs.

There are several types of UML diagrams which differ according to which tasks can be planned through them. These diagrams differ from each other mainly by kinds of signs used, the manner in which these signs are connected and by semantics which is relevant to them.

The major advantages of the UML language and UML diagrams are open standard, assistance of developmental and analytical cycle of the system and assistance of various application areas. For the extensive usage of the UML language in practice, it should be mentioned, that it is also encouraged by several developmental tools, whether individual applications designed for work with UML or integrated developmental environments, which allow in some cases performing transfer between an UML diagram and an algorithm written in programming language in both directions.

3 SYSTEM TOOLS FOR SECURITY RISK MANAGEMENT

Currently, an important step is to create appropriate conditions for the change of perception of security programs and emergency plans, which would suit safety measures mainly formally. The change of the security perception should be based on the implementation of security risk

management tools into the procedure of formation of the obligatory documents. The appropriate conditions for using security management tools are created by system-analysis application on security and operational procedures (safety). In the case of the operational procedures it is necessary to focus on a detailed description of the system behaviour. The objectively-oriented model language UML, which should allow identification of the potential presence of hidden dangers and safety insufficiencies, should be significantly helpful during this procedure.

The first phase of the risk analysis commences with hazard identification and verification and resulting security risks. In the case of hazard analysis, the screening methods are used (Relative Ranking, control lists, FMEA etc.). In the following risk analysis method of causal consequences (Preliminary Hazard Analysis – PHA a What If Analysis – WI) are used. Afterwards, determination of acceptability of individual risks the choice of appropriate method, which takes into consideration the character of the security part analyzed, follows. This again is followed by a procedure which determines risk consequences and their evaluation, setting the probability of occurrence and taking into account possible combination of various causes and specifying the seriousness of risks (HAZOP, ETA, FTA etc.). These evaluated risks are further analyzed in acceptability of a particular risk and in cases where the borderline of acceptability is crossed, several precautions are taken to minimize the risks to acceptable level. It is inevitable to perform financial evaluation considering the procedures leading to minimization of risks.

4 SOFTWARE TOOLS FOR SECURITY RISK MANAGEMENT

Software specialized for risk management firstly appeared in the 90s and despite its rather long development, it has been used only recently, though its development seems to be rather dynamic and it has infiltrated practice of several areas.

Nowadays there is a large offer of these tools which specialize for different areas of safety.

Software suitable for evaluation of risks and vulnerability in the area of security automates safety inquiry, analyses safety risks, recommend possibilities for minimization of risks, evaluates what effect has got the safety measure on the lowering of costs and provides information which are easy to understand and which are graphically displayed. The expert system (part of the software) is an organized methodology of security evaluation, which is divided into physical and virtual part. Each of these parts comprises areas in which security measures are included.

The methodology of this software is based on giving a large amount of questions which the respondent has to answer. Questions often cannot be deleted or added, however, there is a opportunity to re-correct answers to the questions. The majority of these software is based on the bottom-up attitude, basically planning from the lowest level.

5 CONCLUSION

Combination of UML and risk assessment tools provides acceptable level of safety and security with reasonable costs. This could help to solve safety and security issues at small airports, which could not afford employ safety and security specialist.

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