

# Cooperation challenges to public safety organizations on the use of unmanned aircraft systems (UAS)

Tuomo Tuohimaa, Ilkka Tikanmäki and Jyri Rajamäki

**Abstract**—This study deals with the importance of networking for co-operating authorities and their duties. As an example, we will dissect unmanned aircraft system (UAS) utilization for improving and speeding up a situational awareness and a real-time picture. Networking is emphasized between cooperation with national authorities, because the players are under the supervision of different ministries. Inter-ministerial co-operation is already in a good shape, but given the relevant persons in the mutual interaction may be scarce. In this point of view, the challenge for UASs use include ministries fragmented budgets, a lack of common practices of the new system of exploitation and the lack of cultural activities. It has revealed a need for networking between the authorities in cooperation of implementation of UAS. Different levels of networking means to cooperation between organizations: performing a similar task teams to cooperate, or individual experts formed a collaborative network. UAS cooperation with the authorities will act in all of the above (sectored, regional, level) mention areas.

The importance of cooperation between authorities has discovered an important subject to be developed. The Finnish Government's Security and Defense Policy states that the close cooperation between the authorities achieves synergies between overlap functions by cutting and support functions to enable efficient use of. Situational awareness and government collaboration will be developed both nationally and internationally. Efficient use of resources in society is a sensible, economical and appropriate. Therefore, in UAS development activities, must participate many part-sides (Police, Fire and Rescue Services, Border Guard, Customs, etc.). Strategy work requires a new perspective and you must be able to see large complexes. Different entities interact with each other and strategic decisions require courage. Successful organizations create a successful strategy, implement it and they are able to renew their strategies with the latest requirements.

**Keywords**—Public safety, UAS, UAV, Unmanned aircraft system, Unmanned air vehicles

## I. INTRODUCTION

THIS paper deals with the cooperation challenges in public safety organizations for improving situational awareness and real-time pictures. As an example, we dissect unmanned aircraft systems (UASs). At the moment, the unmanned types of planes are mainly used for military purposes. There are several reasons why unmanned air vehicles (UAVs) role has recently received more attention and interest; uppermost being the development of new technology,

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which was not available a few years ago [1], [2], [3].

In the past years, UAVs have extensively been applied in such areas as reconnaissance, intelligence and border security. In those specified missions, UAVs are required to operate at a high accuracy. The dynamic modeling and especially the automatic control system design are playing very important roles [4].

Scientific and technological developments in mobile communications, sensors, drive systems and other areas are rapidly making it possible to develop UAVs with advanced technology [5]. In the past, UAVs might have received more attention, if crisis should be addressed by enforcement and intelligence during the conflict. The absence of such crises, together with the paradigm change needed to happen before UAVs were adopted, meant that the advanced technology for UAVs has become available [6].

UAVs classification with regard to altitude and weight is presented in Fig. 1. Depending on the maximum weight and altitude, UAVs can be divided into five categories; micro, mini, tactical, medium altitude and high altitude [7].

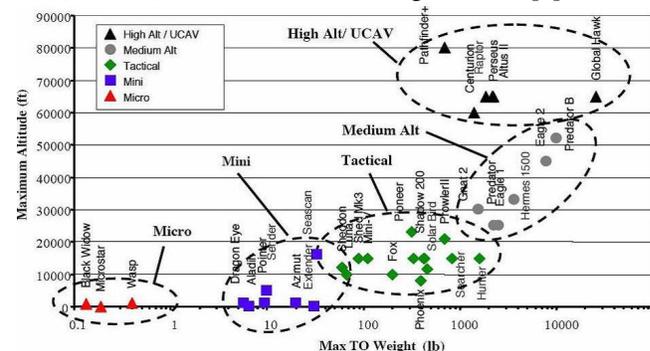


Fig. 1. Altitude and Weight Classification of Current UAVs [7].

The outline of the paper is as follows. First, the issue is presented and the theoretical framework is formulated in Chapter II. Then, in Chapter III the method applied in this paper is presented. Chapter IV presents problem formulation and Chapter V shows the problem solution. Chapter VI illustrates developing cooperation between public safety authorities and Chapter VII presents the results. Finally, on Chapter VIII the most important conclusions are drawn.

## II. THEORETICAL FRAMEWORK

Strategic management represents a prioritization of key success factors in the selection of strategic objectives, indicators, and the use of objective awareness, flexibility in structure and adaptability to environmental changes, which will be closely monitored, and in which react in advance [10].

As shown in Fig. 2, end-users of UASs can generally be divided into two sections; private and public. This study

concentrates in using UASs on public sector. Naturally, private and public sector already cooperate in many ways and development of that cooperation continues growing.

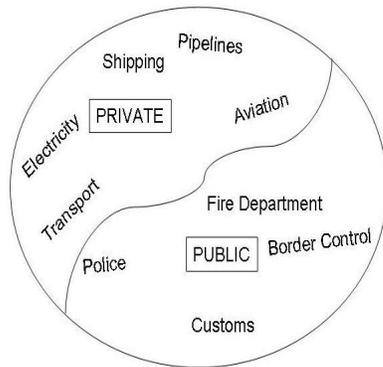


Fig. 2. Examples of UAS End-users.

The importance of cooperation between authorities has discovered an important subject to be developed. The Finnish Government's Security and Defense Policy states that the close cooperation between the authorities achieves synergies between overlap functions by cutting costs and support functions. According to [11], situational awareness and government collaboration will be developed both nationally and internationally.

In network of multilateral cooperation, companies are looking for cooperation in providing solutions to challenges and problems when their own resources are insufficient [12]. Networking is the process where the knowledge, values and skills of corporate combine the added value of productive activity, aiming at the promotion of competitiveness in the longer term [13]. Good experiences create confidence. Confidence is paving the way for information exchange, joint projects, especially joint learning [12]. Trust, however, requires a lot of open discussion. The key to building trust is a gradual increase in transparency. Transparency applies to all activities. Subjects must learn to consider both by your company's as well as network's point of view.

Networking means multilateral cooperation, with joint work to seek solutions to the challenges and problems which can solve their own resources are insufficient. The initial operation of the network is based on precise rules while later will be needed flexibility enabled by trust [12]. Networks of two or more independent companies for the long-term cooperation relationship with the companies will jointly implement the business to achieve stronger competitive positions. Networking is the process where the knowledge, values and skills of corporate combine the added value of productive activity, aiming at the promotion of competitiveness in the longer term [13].

A network construction is simpler when there is a focal company available. Such action, however, requires a common understanding of the advantages of the network; develop mutual trust and a common way to understand the issues and a shared vision [12]. Processes like networking cooperation are planned together with networked companies. Key elements of activities are trust, commonly recognized values and flexibility [13]. Key Network Management (KNM) is a systematic way to manage key networks. According to [14],

key network is a set of actors mobilized by the focal company to realize an opportunity. In the case of UAS use within several authorities for their needs, it is necessary to designate the focal organization which takes control of managing the UAS.

Already long time, networking has been one of the key elements of Finland's defense construction. Networked defense know-how and performance abilities will be utilized in cooperation with partners. Interagency cooperation is essential that various actors have sufficient knowledge of others concepts, measures, resources and plans [15]. Collaboration is central to the local and regional settlement. Interagency co-operation aims at the cost savings that increase the efficiency [16].

For example, large public events in support of the police leadership have been set up command centers for general and field management. Command centers have liaison officers of different actors that allow coordination of actions. Command centers have usually represented by the police, event organizer, rescue services, border guards, customs and military representatives. Depending of the nature of the event design and operation also other public authorities may be presented. Authorities in the future will join the increasingly interconnected. For example, law on the Defense Forces, Rescue act and the Police act define the cooperation between the authorities and other authorities to support very important tasks [16].

External and internal securities are linked closely together. Preparedness and response for security threats require Finland to a strong national and international co-operation, a pre-agreed arrangements for cooperation between the authorities, business and NGOs [17]. One of the statutory duties of the Defense Forces is to support other agencies.

Assistance is requested from another authority in situations where the responsible authority in the resources for the performance to be reached or is missing from a particular sub-region. In addition to Defense Forces' normal development of capabilities related tasks, Defense Forces develops the ability to support other agencies. Defense Forces provide assistance of about 500 times a year to other authorities, so the ability to cooperate and manage leadership develop as well [18].

Vital functions of society and the responsibility of division between ministries and sectors is defined in the functions vital to society security strategy. The Homeland Security program sets a cross-administrative targets, strategic guidelines and measures in different sectors of government to achieve the objective [19]. A Cross-administrative entity in principle is shown in Fig. 3.

Condition is influencing the future development of cooperation, because individual operators have limited ability to influence global and diverse in society [19]. Each administrative domain is responsible for the administration in the exercise of its functions. Resource sharing, fraud coordination and authorities' joint planning are prerequisites for the wide comprehensive security concept under the new threat images [19]. Important issue is the flow of information between the authorities and availability of the mobile real-time picture.

Functioning management system is based on a reliable real-time picture. In addition to real-time situation picture it is

needed to a proactive and comprehensive environment for analysis. Securing the Functions Vital to Society as part of the implementation of the strategy will be a real-time picture of the Government in parallel with the sectorized development of a real-time situational picture [19]. The Ministry of Finance, Ministry of Interior, Ministry of Defense, Ministry of Transport and Communications and the Ministry of Foreign Affairs are co-developing safety net, which will be used for military, police, border guard and rescue needs. Developing network environment allows for a later stage the development of the common real-time picture for the authorities [18].

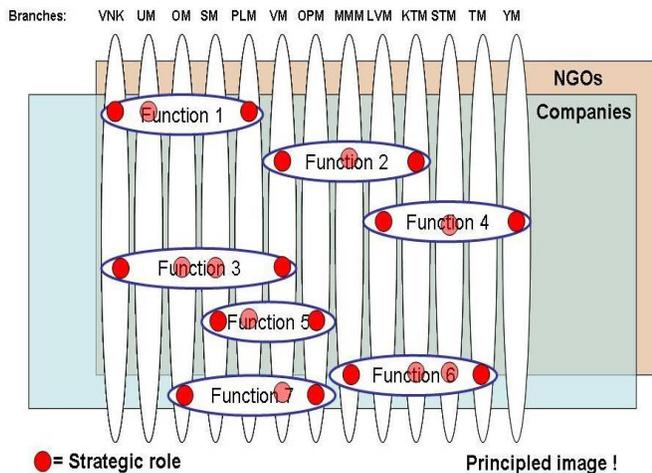


Fig. 3. A cross-administrative entity [19].

### III. METHOD

Design science often takes a simplistic view according which designed artifacts must function. Designing of an artifact, assessing of its utility and comparing it with competing artifacts are essential tasks of design-science research [8]. The applied technological logic of the rule is that if you want to achieve Y in situation Z, then do X action. X is a general solution concept for a type of field problem. Solution concept can be an act, a series of acts, but also a process or system. In construction problems this can also mean building a new artifact out of previously unrelated materials [9].

In this study, we apply case study research method. The research report has an attempt to generate new theory on the basis of existing theoretical constructs to meet organizational needs. As we noted in the literature review, our specific research aim has been a relatively new one. Therefore, we apply a case study approach, which is generally recommended as a suitable research design for theory-building [20], [21]. Design knowledge is to be applied by people who have received formal education in that field [22].

Case study can be descriptive in its nature but it can also test theories. Information can be obtained by survey, interview, observation and the use of archival material. Collected information may be either quantitative or qualitative. A case study will examine one case or multiple cases [23].

The development is learning by doing. The information obtained by development process, can be integrated into case study. Researchers who construct case study often participate

in the development or implementation of the system they are researching [24]. The constructive research approach is a research procedure for producing innovative constructions, intended to solve problems faced in the real world and to make a contribution to the theory of the discipline in which it is applied [25].

The result can be theory which is very rich in detail, but poor in the overall perspective. Second weakness is that building theory from cases may result in narrow and simple theory. Case study theory building is a bottom up approach such that the specifics of data produce the generalizations of theory. The risks are that the theory describes a very simple phenomenon or that the theorist is unable to raise the level of generality of the theory [21].

There are six sources of evidence for case studies; documentation, archival records, interviews, direct observation, participation-observation and physical artifacts. All mentioned case study sources have their weaknesses and strengths. It is recommended to researchers to use multiple sources of evidence in case study [20].

Interesting research topic in the information system (IS) field is how to effectively develop new systems. This is interesting because information technology (IT) is developing and technical knowledge is growing. IT is applied to new areas, for example UASs, which were not previously believed to need IT support. In this process, new kinds of systems and development methods are created [26].

Case study research is a research to study one or at most a few carefully selected cases. The essential thing is to examine the case. The case study is the most common qualitative research method in business economics. In the case study is recommended to use a variety of sources, including interviews and written materials. All qualitative research is not a case study, but a case study may be greatly influenced by other trends in qualitative research [27], [28].

Case study has mentioned to be one of the least systematic research methods methodologically. There are three areas where case study researchers should pay attention to. These areas are; design issues, data collection and data analysis. They also highlight the apparent lack of rigor that is one area where qualitative, including case study, research should improve [29].

The process of building theory from case study research is a strikingly iterative one. When an investigator may focus on one part of the process at a time, the process itself involves constant iteration backward and forward. Analyzing data is the heart of building theory from case studies and in the same time it is the most difficult and the least codified part of the process [21].

Researchers see the advantages of doing research in team. In our case team-work adds value and brings different point of views to research [29]. Examiners' prejudices should be avoided. The investigator must be ready to receive and identify the opposite and contradictory information. In this sense, it is constructive to work with the researcher colleague [23]. Unit of Analysis in our case study was expert's best perceptions of the situation awareness and UASs role in it. In the other hand, experts give their own opinion not the organization's official position or vision.

#### IV. PROBLEM FORMULATION

The SWOT analysis is a typical strategic planning process. Strategic planning is a part of strategic management [10]. Strategic planning constitutes the framework for the design aspects, tactics, to identify the criteria or the constraints that must be taken into account in operational planning.

Public organizations can be generally divided into three categories, how they see their future: (1) drifted into the future. (2) adapted to the future and (3) the future makers [30]. Future management is based on the conclusion that the future can be created. All, what you do affect in the future. The future can be created and it can be influenced by own efforts, the future can be made, and action requires the organization to a proactive approach. Public organizations have traditionally alienated this approach, especially independent strategic flexibility and individual responsibility in its creation and its exploitation. Strategy is an essential part of the future. Public organizations should continuously evaluate their strategic position and it should be a natural part of normal activity [30].

Being a good strategist might not be enough. Leadership is more than a strategy to match action with the environment. It is self-adjustment to social environment [31]. Strategic management problems and, above all obstacles to the realization of strategies in public administration are [30]:

1. strategies are in the air and do not interfere with everyday life, because it is not known, propagates the organization in the direction of strategy
2. lack of vision and action ideas
3. management of the budget process is over exaggerated, a strategy process is not connected to the annual operational and financial planning and monitoring
4. management systems and attitudes do not sufficiently support the implementation of the strategy required for the interaction, but rather daily reactive management
5. loose strategy elements (personnel, communications, information management, service, quality strategies, etc.) that are linked to common strategic disadvantage
6. the majority of staff and middle management internalizes badly strategy and its importance
7. staff participation in the strategy process is the exception rather than the rule
8. implementation of the strategy are not monitored or revised systematically.

Learning and growth strategy deal with the intellectual property which is needed in organization's activities and customer relationships for continuous improvement. This aspect relates to three areas [32]:

1. Strategic knowledge: strategic knowledge and skills that workers need to support the strategy.
2. Strategic technology: information systems, databases, tools and network required to support the strategy.
3. Operating Atmosphere: corporate cultural changes that are required to carry out a strategy to motivate staff, to empower and to adapt.

The vision and aim of the Finnish aerospace and

aeronautical engineering professionals is to provide an ability to develop and maintain UAS systems, and process the ability to refine international business. Prerequisite for this kind of activity include, inter alia, its own mini-systems development, subsystem development (sensors, data flow) and research involvement in international development programs [33].

Unmanned aircrafts are currently used mainly for various military purposes. On the civilian use of UASs is restricted by the lack of legislation. Government activities and the civilian side of the UAS could be used for many different purposes of use. UAS international aviation regulations might be ready 2012-2015, after which the scheduled tasks as a government, as well as scientific research work can probably be implemented.

There are numerous of organizations where the needs of UAS can be utilized. Mass events and various events described below could be improved by using UASs. In case of security in various public events like football matches, demonstrations and other public safety issues, operational management as well as maintaining of situational awareness enhances by using UAS.

In major disasters overview of the creation of the situational picture, monitoring and management support to the activities is important. In massive fire and building fires, UASs can observe the fire area size and allow the exact location of fire detection. Terrain and forest fire emergency observation is by law organized, when fire danger is obvious or other legitimate reason. UAS can be used for example, to search smoke or to locate oil and to support leadership. Intelligence task can be, for example storm damage and flood damage detection or any other similar task.

#### V. PROBLEM SOLUTION

It is required that researchers understand the implications of their research perspective, and act in ways that reflect that knowledge [35]. Everlasting interesting research topic in the IS field is how to effectively develop new systems [26].

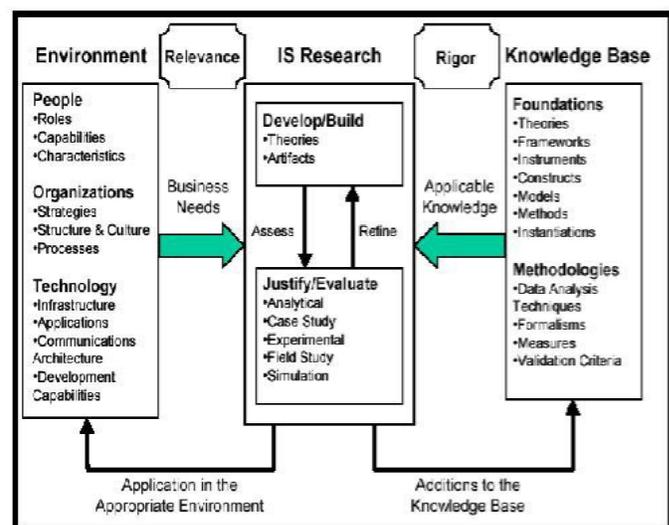


Fig. 4. IT Systems Research Framework [8].

Information systems research framework is shown in Fig. 4. Reference [8] considers as a basis for research the business

environment which consists of people, business organization and technology. The targets of research in their view are human form of roles and competencies as well as the organization's strategies and processes, and technologies which support these.

Unmanned aircrafts are currently used mainly for various military purposes. On the civilian use of UAVs is restricted by the various instruments lack. Government activities and the civilian side of the UAS could be used for many different purposes of use.

Unmanned Aircraft System (UAS) international aviation regulations might be ready 2012-2015, after which the scheduled tasks as a government, as well as scientific research work can probably be implemented. An exception is the United Kingdom, which has prepared the provisions of unmanned aircraft for the purpose. Military aviation authorities have national regulations for the use of UAVs, including Finland [36].

Visions and objectives of the Finnish aerospace and aviation fields of technology professionals as UAS / UAV-systems will create the ability to develop and maintain these systems, and marketing abilities profitable international business. Prerequisite for this kind of activity include, inter alia, its own mini-systems development, subsystem development (sensors, data flow) and research involvement in international development programs [33].

There is a need for a new kind of strategic thinking, and -working tools, which emphasize the following starting points [30]:

1. Instead of drawing analysis of strategy attention should move to it, how to create strategies for action in practice.
2. Strategy must be based on the organization's right to exist and to express the common will of the desired future.
3. The strategy process must be geared towards strengthening the organization's skills and continuous learning.
4. Strategy process must be based on participation and interaction.
5. Successful process of strategy requires constant communication.

Learning and growth strategy of intellectual property are needed in organization's activities and customer relationships for continuous improvement [32]. This aspect relates to three areas

1. Strategic knowledge: strategic knowledge and skills that workers need to support the strategy.
2. Strategic technology: information systems, databases, tools and network required to support the strategy.
3. Operating Atmosphere: corporate cultural changes that are required to carry out a strategy to motivate staff, to empower and to adapt.

Fig. 5 shows how the knowledge helps doing things also in strategic management. Exporting strategy into practice mean that the management and staff are committed into following issues [30]:

4. Vision and strategy are communicated to staff and it is connected to learning, action planning, rewarding and performance evaluation as part of management and values in implementation.
5. Set a strategy for the operational objectives, the coordination of development projects, ensuring resources and define milestones unit-level strategies.
6. Clarify connection of strategy and our own work to your personal level of performance and development discussions.
7. Strategy objectives will be monitored regularly and respond quickly for good and poor accomplishment.

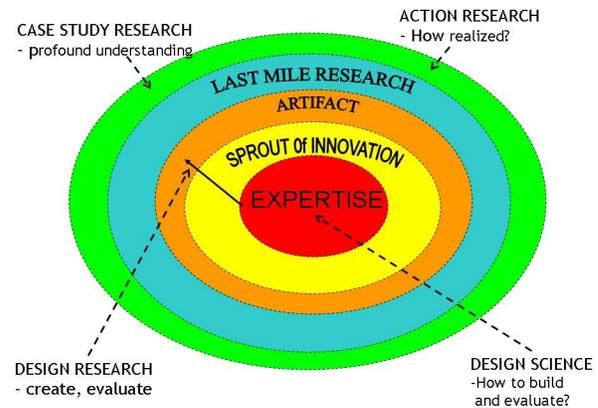


Fig. 5. Body of Knowledge [34].

Learning and growth strategies are a prerequisite for long-term and lasting change. Management teams are a prerequisite for long-term and lasting change. Management teams are ready to recognize the importance of this aspect, but they are not usually very well aware of how these objectives will be defined or achieved. Careful planning of more opportunities increases learning and growth strategies successfully [32].

## VI. DEVELOPING COOPERATION

Developing a multi-authority security circumstances tactics and training by adding to the exploitation of common resources and expertise in the use of various authorities in identifying opportunities and means to support the goal should be taken in the account. The actions are based on extensive, real-time picture. Real-time picture is a basis for designing, dimensioning and coordinating the various authorities in the same complex tasks. It is carried out by activating the authorities to participate by using the shared resources.

By identifying various authorities' opportunities and means to support operations, the best results are achieved. When establishing a national strategy for UAS, this defines and clarifies the responsibilities of authorities and their roles of UAS operations. Developing and expanding operational cooperation aims practical co-operation and mutual interaction between the authorities, which will improve the situational picture. By exploring official actions and academic efforts factors that influence a real-time picture and current situation in Finland, government may organize authorities' training and a wide-ranging co-operation between authorities.

Inspection of various terrains, in case to find the target of

interest, is a task that can be combined for example with various civil and military activities. Possible applications are the search and rescue mission, which aim to find the missing, injured or persons who have been in any kind of danger. These operations can last several days and they require a large and diverse group of technical support. Therefore, also the need for substantial funding exists [37].

It can be said that an image processing subsystem is a necessary and important part of an efficient and complete search and rescue system. It is surprising, that there are not many articles or literature about this area of interest [37].

Management should be an effective expression of will, cooperation, collaboration, interaction, operability and interoperability in depressed or disaster areas of trans-national extent. Modern crisis are difficult to predict and plan. All surprises are possible. This intuition provides improvement of situation awareness, because technological capacity may be not sufficient for all situations. International, crisis- and emergency response management preparedness is possible, in information exchange. Successfully solved interoperability brings more positive effects in cooperation and collaboration of operational entities. Operational processes must act integrally in different tasks and in different sectors [38].

E.g. Cofin project was carried out in Italy in 2004. The project aimed to design and develop a platform for environmental monitoring, involving fire detection and prevention, industrial areas reconnaissance, and natural disaster monitoring. An aerial platform of as small size and weight as compatible to mission requirements was chosen to carry on-board sensors and cameras to provide the user real time picture and information about the area. The mission requirements included capability of remotely piloted flight and autonomous flight [39].

There are many scenarios, where wireless access to heterogeneous information sources would be very valuable. For example law enforcement, access to medical information from an ambulance and major disaster management such as Tsunami. The disaster management personnel need a fast and reliable access to many information sources already before crisis occur. Not to mention what kind of need for different kind of information exists during the crisis and afterwards [40].

## VII. RESULTS

We will use UAS as an example of the use of networking in order to bring out the importance of interagency cooperation and a need for common real-time situational picture. The need for collaboration and networking among many actors exists.

A real-time situational picture is used to form a picture of the threat or disaster situation. A picture of the system is geared to produce pre-analyzed information on accident persons acting on decision-making. Grammatically situation awareness refers to the awareness of the situation and situational awareness refers to awareness that only happens sometimes in certain situations [41].

Nowadays different authorities have their own situational pictures for their own purposes. For example, rescue authorities use the picture of the situation to guide the rescue

operations; police may by the situational picture help determine evacuation areas and efforts to limit the right places. Authorities are developing their own systems; instead they invest in the common and workable system. Equipment should be concentrated to one user group to maximize the benefit of the devices. Networking benefits of government activities are emphasized, because the authorities do not need a duplication of resources.

Authorities mention as weakness several operators scattered budgets, which are limiting issue of UAVs implement. They are also concerned that UAVs are too expensive for one organization for their own use and they suggest that UAVs should be concentrated to one user group to maximize the benefit of the devices. The economic challenges are the development and dissemination costs. Procurement and development have been tried to do in previous years, but the government financial situation prevents to invest in development projects [30].

A network management develops knowledge for the professionals in its field. Networking can be understood in different sectors, areas and levels to take place. Sectoral networking means in the same field of networking. Regional networking refers to particular geographic area cooperation. Different levels of networking means to cooperation between organizations: performing a similar task teams to cooperate, or individual experts formed a collaborative network. UAS-cooperation with the authorities will act in all of the above (sectoral, regional, level) mention areas [42].

The work culture related to networking is called the confidence and expertise working culture. Networked professional skills are emphasized collaborative skills, independent decision making and continuous development. Previously, expertise was enough a versatile and robust sense of reality, now is also needed to sense of prospect. The expert must be able to overcome both organizational and discipline boundaries [42].

Specific pressures, direct to management: the former issues and the management of people have raised alongside different knowledge management and knowledge management ideologies [42].

We need a new approach, the networking, which ensures rapid flow of information and expertise in the unification. Organizational boundaries are blurred, services and products in a multi-enterprise collaboration. These generated virtual networks, capable of individual companies (authorities) are more competitive because of its speed and its real-time [43].

Network-like organizational action creates the necessary flexibility and speed, as well as the opportunity for continuous data integration, a new creation, and foster innovation [43]. The networks activity is based on partnership, which means the actors, organizations and individuals' co-operation and new forms of co-design. Networked co-operation relates to the strong principle of reciprocity. All these partners will prosper and develop. Common context and objectives provide a framework to stimulate experience-sharing [42].

Network management will play an increasingly important role in interagency cooperation. The manager has a key role of a development and change management. Network Management and modification are not only a leader role; it is a common task and then it has the potential to succeed [42].

### VIII. CONCLUSION

The major focus of strategy will be in the future and it is the most important and most essential thing to seek and find. Strategic thinking requires the ability to think by using of different concepts, but the final strategy must be very practical and applicable. A good strategy will ensure that the right things will be done and by doing different kind of operations, will ensure that things are done correctly. You could say that the strategy is eternal and it must be controlled. Finding the truth is the beginning of wisdom also to the strategies.

The importance of cooperation between UASs in use is highlighted because the services are needed when a number of different industries such as the Ministry of the Interior under the auspices of actors, including police, rescue, customs and border control authorities. The service provider must be familiar with the various actors needs to be able to meet the demand of the right way. Selecting a product for many different needs of operators should therefore be given special attention.

None of the authority is solely responsible for certain activities, because there is an exemplary cooperation between public authorities. For example, police, securing international meeting does not need to acquire tanks or airplanes. Police may ask for official assistance from Defence Forces when in need of special equipment or expertise. When something happens, it is decided the responsible party who is responsible for operations, but which receives support from other public authorities.

The government should plan to take into account the existing research dealing with UAS and if necessary initiating new research projects. The aim is that the requirements and opportunities to pursue UAS activity to improve a real-time picture and support the UAS-based activities will strengthen.

For example, the Ministry of Interior could set up a cross-administrative co-operation center that concentrates for maintaining the real-time picture. Center should be responsible for coordination and monitoring of progress and support for other authorities. Securing an adequate amount of resources, who have skills required for the task to manage UAS? Verification on Aviation Legislation and authorities' adequate and up-to-date means for the use of UAS in operations must ensure. Ministries will prepare the plan for implementation for their own responsibilities in respect. Ministry of Interior collects the plans, reconcile and coordinate the implementation-related issues. Plans will be updated at regular intervals.

Strengthening cooperation for ensuring comprehensive real-time situational picture, and to removal of barriers to cooperation, which are based on broad cooperation with the traditional security authorities, other public authorities, industry and NGOs confidential co-operate under the same goals is essential. Joint research, education and training activities related to authorities' communication, as well as the authorities' partnerships between the public authorities by ensuring management, situational picture and messaging systems for compatibility and possible integration contribute to the goal.

Developing a multi-authority security circumstances tactics and training by adding to the exploitation of common resources and expertise in the use of various authorities in identifying opportunities and means to support the goal should be taken in the account. The actions are based on extensive, real-time picture. Real-time picture is a basis for designing, dimensioning and coordinating the various authorities in the same complex tasks. It's carried out by activating the authorities to participate by using the shared resources.

By identifying various authorities' opportunities and means to support operations, the best results are achieved. When establishing a national strategy for UAS, this defines and clarifies the responsibilities of authorities and their roles of UAS operations. Developing and expanding operational cooperation aims practical co-operation and mutual interaction between the authorities, which will improve the situational picture. By exploring official actions and academic efforts factors that influence a real-time picture and current situation in Finland, government may organize authorities' training and a wide-ranging co-operation between authorities.

On this basis networking and common management is very important for the development of UAS to the use in a small country like Finland with limited resources. One player is unable to cope on their own for systems implementation and use of it. Funding for such a large system of the whole does not succeed in a one public organization measures. That is why it is vitally important to create network, and thereby obtain synergies from a wide-scale deployment of the UAS.

*We believe* that the development of UAS for operational activities and to maintain situational awareness constitutes strategic network management in many respects. The importance of networks and networking in the world today can not be overstated. A smooth and seamless cooperation between different spheres of government contributes UASs implementation for public needs for improving and speeding up situational awareness and creation of real-time picture. Our environment and the whole world are constantly changing and that's why there is a growing need for authorities common UAS-system and command center.

*We believe* that the UASs future implementation activities will benefit both the situational awareness and real-time picture improvement, not to mention the importance of appropriate expertise. We can wait promising results in the future in creation of strategic network between authorities.

*We also believe* that it has not been paid enough attention to common management between different authorities and experts concerning UASs use in public safety duties. We understand the importance and the meaning of strategic networking and cooperation between authorities. Challenge is to reconcile the needs of different authorities under common management. In the future, this topic is covered much more to explore, and it will be interesting to watch, will developing and the use of UASs raise or what will happen.

Balanced success strategy, a key value and goal, is the participation of different parts of the organization's various departments and personnel [30]. Critical success factors of strategy must be to communicate, to be discussed and

questioned. Participatory and inclusive strategy work is a challenge for the entire organization. Balanced success strategy is a journey - not a destination.

Future success is not based on the same kind of operation than today's success. In strategic knowledge and leadership must be able to combine the strategic success factors for each other. The future must be established – not expected.

#### REFERENCES

- [1] R. Austin, Unmanned Aircraft Systems: UAVS Design, Development and Deployment, *American Institute of Aeronautics and Astronautics*, 2010.
- [2] A. Finn and S. Scheduling, *Development and Challenges for Autonomous Unmanned Vehicles*. Springer-Verlag, 2010.
- [3] T. J. Mueller, J. C. Kellogg, P. G. Ifju and S. V. Shkarayev, *Introduction to the Design of Fixed-Wing Micro Air Vehicles Including Three Case Studies*, American Institute of Aeronautics and Astronautics, 2006.
- [4] K. Turkoglu and E. M. Jafarov, "H inf. Loop Shaping Robust Control vs. Classical PI(D) Control: A case study on the Longitudinal Dynamics of Hezarfen UAV", in *Proc. 2nd WSEAS International Conference on Dynamical Systems and Control*, Bucharest, Romania, 2006, pp. 105 - 110.
- [5] M. Lundell, J. Tang, T. Hogan and K. Nygard, "An Agent-based Heterogeneous UAV Simulator Design", in *Proc. 5th WSEAS International Conference on Artificial Intelligence, Knowledge Engineering and Data Bases*, Madrid, Spain, 2006, pp. 453-457.
- [6] C. Crouch, Master of Science Thesis in Systems Technology, "Integration of mini-UAVs at the tactical operations level: Implications of Operations, Implementation and Information Sharing", Naval Postgraduate School, 2005.
- [7] R. Weibel, J. Hansman, Safety Considerations for Operation of Different Classes of UAVs in the NAS, in *Proc. AIAA's 4th Aviation Technology, Integration and Operations (ATIO) Forum 20-22 September 2004*, Massachusetts Institute of Technology, 2004.
- [8] A. R. Hevner, S. T. March, J. Park and S. Ram, Design Science in Information Systems Research, *MIS Quarterly*, Vol.28, No.1, 2004, pp. 75-105.
- [9] J. E. van Aken, Management Research as a Design Science: Articulating the Research Products of Mode 2 Knowledge Production in Management. *British Journal of Management*, Vol.16, 2005, pp. 19-36.
- [10] I. Lumijärvi and J. Jylhäsaari, *Laatujohtaminen ja julkinen sektori*, Tampere: Tammer-Paino Oy, 2000.
- [11] Prime Minister's Office Publications 2009, Finnish Security and Defense Policy 2009, ISBN 978-952-5807-31-8. 5.2.2009.
- [12] S. Niemelä, "Menestyvä yritysverkosto; Verkonrakentajan ABC", Helsinki: Edita, 2002.
- [13] T. Toivola, "Verkoitettava yrittäjyys; Strategiana kumppanuus", Helsinki: Edita, 2006.
- [14] J. Ojasalo, Key Network Management, *Industrial Marketing Management*, Vol. 33, Issue 3, 2004, pp. 195-205.
- [15] Ministry of Defence, "The Defense Management Future Review", Helsinki: Puolustusministeriö, 2010.
- [16] Taitto et al., *Viranomaisyhteistyö – hyvät käytännöt*, Kuopio: Pelastusopisto, 2007.
- [17] Finnish Government, "Suomen turvallisuus- ja puolustuspolitiikka 2009", Valtioneuvoston selonteko, 2009.
- [18] Finnish Defence Forces, *Annual Report 2009*, Pääesikunnan viestintäosasto, Helsinki: Edita Prima Oy, 2009.
- [19] Finnish Ministry of the Interior, "The Strategy for Securing the Functions Vital to Society. Yhteiskunnan elintärkeiden toimintojen turvaamisen strategia", Valtioneuvoston periaatepäätös, 2006.
- [20] R. Yin, *Case Study Research. Design and Methods*, London: SAGE Publications, 2009.
- [21] K. M. Eisenhardt, "Building Theories from Case Study Research", *Academy of Management. The Academy of Management Review*, Vol. 14, No.4, 1989, pp. 532 - 550.
- [22] J. E. van Aken, Management research based on the paradigm of design sciences: The quest for field-tested and grounded technological rules, *Journal of Management Studies*, Vol.41, No. 41, 2004, pp. 219 - 246.
- [23] P. Järvinen and A. Järvinen, *On research Methods*, Tampere: Opinpajan kirja, 2004.
- [24] C. Nunamaker, M. Chen and T. Purdin, Systems Development in IS Research, *Journal of Management Information Systems*, No.3, 1991, pp. 89-106.
- [25] L. Ojala and O-P. Hilmola (Editors), *Case Study Research in Logistics*, Turku: Turku School of Economics and Business Administration, 2003.
- [26] M. L. Markus, A. Majchrzak and Gasser, A design theory for systems that support emergent knowledge processes, *MIS Quarterly*, Vol.3, No.26, 2002, pp. 179-212
- [27] P. Eriksson and K. Koistinen, *Monenlainen tapaustutkimus*, Kerava: Savion Kirjapaino, 2005.
- [28] I. Koskinen, P. Alasuutari and T. Peltonen, *Laadulliset menetelmät kauppatieteissä*, Jyväskylä: Gummerus Kirjapaino, 2005.
- [29] L. Dubé and G. Paré, "Rigor in Information Systems Positivist Care Research: Current Practices, Trends and Recommendations". *MIS Quarterly*, Vol. 4, No.27, pp. 597 – 635.
- [30] S. Määttä and T. Ojala, *Tasapainoisen onnistumisen haaste. Johtaminen julkisella sektorilla ja balanced scorecard*, Helsinki: Edita, 2000.
- [31] R. Whittington, *What is strategy - and does it matter?* London: Thomson Learning, 2001.
- [32] R. Kaplan and D. Norton, *Strategialähtöinen organisaatio. Tehokkaan strategiaproessin toteutus*, Helsinki: Talentum Media Oy, 2002.
- [33] *Aviation Industry and Aviation Technology Program (ILO) Criteria*, Finnish Defence and Aviation Industry Association (PIA) Aviation Group, 2010.
- [34] T. Tuohimaa and I. Tikanmäki, "The Strategic Management Challenges of Developing Unmanned Aerial Vehicles in Public Safety Organizations" in *Proc. 9th WSEAS International Conference on Applied Electromagnetics, Wireless and Optical Communications (ELECTROSCIENCE '11)*, Meloneras, Gran Canaria, Canary Islands Spain, March 24-26, 2011.
- [35] W. J. Orlikowski and J. J. Baroudi, Studying information technology in organizations: Research approaches and assumptions, *Information Systems Research*, Vol.1, No.2, 1991, pp. 1-28.
- [36] *Aviation Industry and Aviation Technology Program (ILO) Criteria*, Finnish Defence and Aviation Industry Association (PIA) Aviation Group, 2008.
- [37] V. Papić, H. Turic and H. Dujmic, "Two-stage segmentation for detection of suspicious objects in aerial and longrange surveillance applications", in *Proc. 10th WSEAS International Conference on Automation and Information*, Prague, 2009, pp. 152-156.
- [38] J. F. Urbaneck, "Application Modelling & Simulation of Data Flow in Disaster Events Management", in *Proc. 8th WSEAS International Conference on Simulation, Modelling and Optimization*, Santander, 2008, pp. 256-260.
- [39] A. Sanna and B. Pralio, "Simulation and Control of Mini UAVs", in *Proc. 5th WSEAS Int. Conf. on Simulation, Modelling and Optimization*, Corfu, Greece, 2005, pp. 129-135.
- [40] R. B. Patel, N. Mastorakis and K. Singh, "A Platform for Device and Computation Management", in *Proc. 7th WSEAS Int. Conf. on Mathematical Methods and Computational Techniques in Electrical Engineering*, Sofia, 2005, pp. 86-95.
- [41] I. Astrov and A. Pedai, "Situational Awareness Based Flight Control of a Three-Rotor Mini-Aircraft", in *Proc. 12th WSEAS International Conference on Automatic Control, Modelling and Simulation*, Catania, 2010, pp. 71-76.
- [42] S. Helakorpi, 2005, *Verkostot ja muuttuva asiantuntijuus*, Kever 4/2005.
- [43] P. Stähle and K. Laento, *Strateginen kumppanuus*, Porvoo: WSOY, 2000.