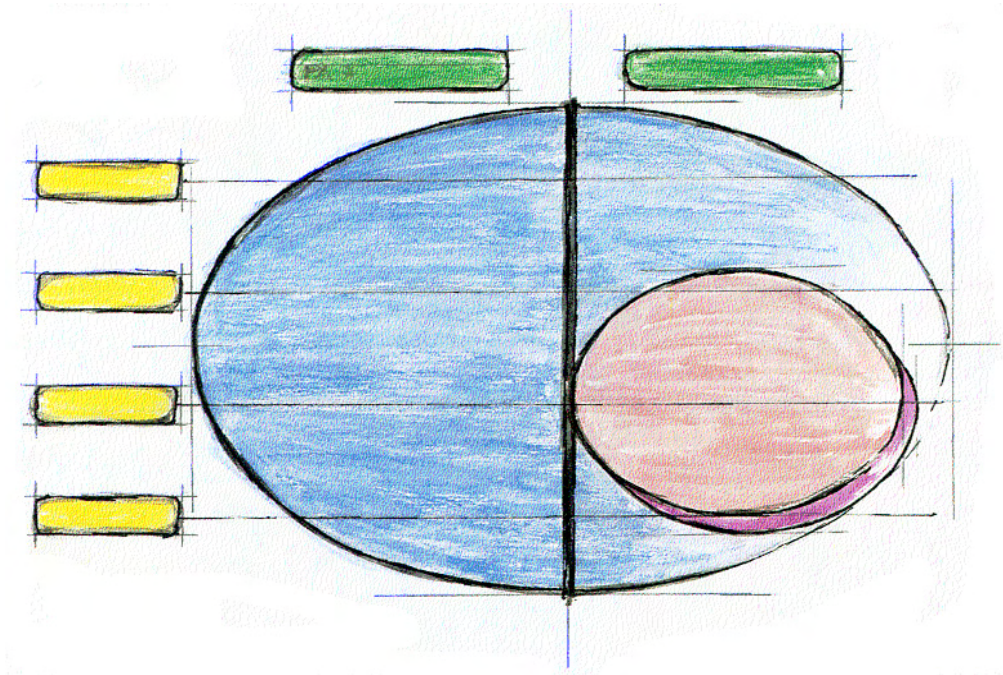


The Elements of Command & Control

The general principles of command & control
in fire and rescue operations



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& control in fire and rescue operations**

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Preface

The Swedish Rescue Services Agency is a government authority directly under the Swedish Ministry of Defence. It is responsible for matters pertaining to fire and rescue operations, in peace as well as in wartime. An important mission is to, develop through education and training, the capability of the fire & rescue service to manage rescue operations.

The Elements of Command & Control presents a new perspective for command of fire fighting and rescue operations. This book was written by Erik Cedergårdh of the Göteborg, Mönldal and Kungsbacka Fire & Rescue Service and Olle Wennström of the Stockholm Fire Service. The project leader for this undertaking was Ingrid Almgren from the Swedish Rescue Services Agency's College in Skövde.

The organisational theoretical aspects of this book were taken namely from Stafford Beer, Peter Gomez and Fredmund Malik. The research leader, Per Johansson of the Swedish Defence Research Establishment adapted the models to suit the environment of the fire & rescue services. Niklas Zetterling of the Swedish War College contributed with valuable discussions on command & control principles. Johansson and Zetterling have strongly influenced the structure of this book.

Räddningsverket
Swedish Rescue Services Agency

Introduction

The Elements of Command & Control was written with the purpose of providing a platform from which the various fire & rescue service organisations would be able to form their own command & control systems with consideration to their local conditions and needs. This work is based on the presumption that the fire & rescue services lack a common basic view on such a platform. However, this is not a handbook on how management of such a unit should be exercised. Leadership from a psychological perspective is therefore not discussed.

The Elements of Command & Control describes an approach, which to a certain extent, is new to the fire & rescue services. This then means the usage of a partially new nomenclature. Traditionally, each fire fighting or rescue operation was managed individually with the incident commander at the top of the decision-making hierarchy. In many countries, fire & rescue services have merged thus creating larger interrelated systems. Hence, the probability for multiple and simultaneous operations competing for available resources is increasing, and as a result thereof, the need for the system to be able to handle priority decisions.

The intended target audience for this book is fire & rescue service commanders. This material demands active study as it covers a large and complex area. Ultimately, this study should be complemented with instructions and/or lectures.

This book was written to provide the reader with a deeper understanding of the basic principles of command & control. Hopefully, the reader will be able to apply system thinking in the fire & rescue service and thus form the basis for a command & control system relevant to his own organisation.

In order to simplify reading, some sections are given previews that are later further elaborated upon in the following paragraphs. After each chapter, these key sentences are once again enclosed in a box with the same title as the chapter. This is intended as a repetition and will be of help to those readers who will eventually apply local organisational principles in forming their own command & control systems. Moreover, it will also enable the reader to easily answer the question, “What should be included in every chapter when I formulate my own organisation’s principles for the command & control system?”

In the text, references are made to different sources, which are compiled at the end of the book.

Below are a number of definitions, which the reader needs to be familiar with in order to profit by the material in this book.

Command & control

Command & control is a conscious influence on a system of humans and methods.

System

“System” refers to as an organisation with a common command & control system. e.g.

- The fire & rescue service.
- A fire & rescue service association, of several independent services with an internal agreement on joint operations, as well as for establishing preparedness for emergency units that are commonly managed. (Such as two fire & rescue services with a common command & control system for emergencies)

Fire & rescue operation

A “fire & rescue operation” is defined as an operation for saving lives, property or the environment.

Unit

A unit is defined as a part of the fire and rescue force. A unit need not be solely defined as “vehicle”. A unit in this context could be defined as one or several personnel, with or without vehicle and equipment. In some cases it could mean a complete force, for example a section in an operation. A unit is however, always a part of an organisation, to whom he who exercises command & control in its operative component (see chapter 4) will direct his tasks.

Timescale

Timescales appear in many parts of this book. This could simply be defined as a measurement of time on a linear scale. A timescale is not only a measurement of duration; it is also a measurement of reaction speed from alert or information through evaluation to decision. There is no actual value in short or long-timescales. Consequently, one could not state that generally it is better with a long timescale than a short one, or even vice versa. Every situation in command & control has an appropriate timescale.

Basics

In order for an organisation to develop and utilise a command system, it requires all parties affected by the system to have a common fundamental principle. *The basics in command & control* can be considered as a doctrine, that is to say, a fundamental perspective from which an “incident command system” can be moulded. With the aid of a Command & control doctrine an organisation can develop a *locally adapted command system*. The general principles of command & control presented here make it possible to:

- Develop routines
- Procure and develop technology
- Recruit and train the command & control organisation

In the absence of a theoretical platform in an organisation, serious command & control problems may arise from a system perspective. An improper routine may, in a normal case be insignificant, however, with a heavier workload or unclear conditions, it may produce serious and undesirable results.

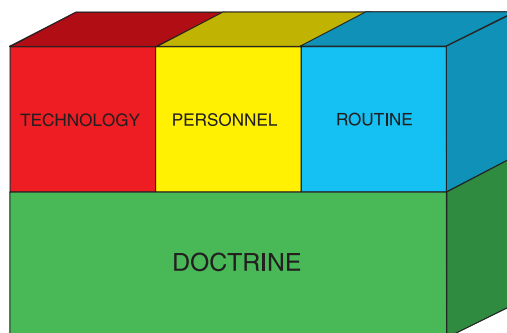


Figure 1. The command & control system can be considered as consisting of the following parts. A doctrine, setting the basic perspective from which we can develop routines for command & control, technology, and trained personnel to manage the system.

The command & control of fire and rescue operations should comply with the same principles for peacetime as in a state of unrest or war.

The basis of the rescue service in a state of unrest, or in wartime is the peacetime capability of society to manage large-scale disasters and emergencies. A Command & control organisation working in peacetime must in many cases be able to adapt and act even in a war. If this adjustment is to function without too much delay, it must be done without changes to its principles.

The command & control system must be structured according to the tasks of the units, and the need for command & control. Command should be exercised so that the commander gains control over the course of events, in order for the units to execute an effective fire fighting and rescue operation.

The development of a Command & control System is not an end itself. The need for command & control is determined by the organisations' tasks. It is therefore, important to identify the demands, resulting from these tasks, which are placed on the command & control organisation.

The importance of threatened interests in an emergency, for example, a human life, demands that rescue efforts be carried out quickly and effectively. In multiple emergencies, a further demand is placed on the need to use resources effectively. The fire & rescue service must possess the capability to – apart from distributing resources among the various fire fighting and rescue operations – prioritise between different operations. These expectations are normally stated in the legislation regulating the fire & rescue services. It is usually more important to intervene where the fire fighting and rescue operation could limit the damage than to intervene where the damage is already a fact. In order to achieve this, an organisation needs to be able to influence the course of events. Command & control should be exercised in such a way that the commanding officer, as well as the incident commander and his subordinate sector commanders, gain control over the situation and intervene in the course of events deemed undesirable, or what we call a disaster.

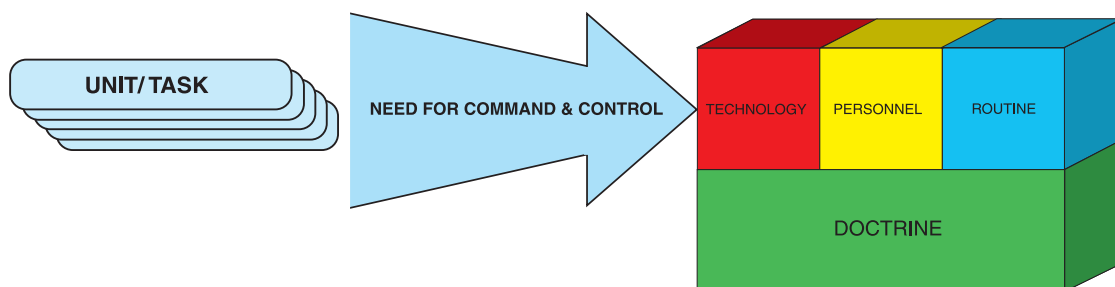


Figure 2. The Command & control System should be structured according to the units' tasks and the need for command.

In order to execute a quick and effective operation, requires the ability to identify at an early stage those factors, which influence the situation, with the aim being to be proactive instead of simply reactive.¹

If there is a lack of capability in an organisation to lead its entire activity, a culture may develop, whereby, only the current incident becomes the governing factor. Regardless of whether the resources utilised have a decisive effect on the outcome of the damage or not. Such an action leads to reduced resources for future operations.

In order to be able to influence a course of events, it is simply not enough to understand a situation correctly. The commander also needs to possess the ability to identify, at an early stage, those factors, which can influence the outcome of the situation. He must have the ability to differentiate between cause and effect.

The capacity to command, just like the capacity for action, is based in the daily work

To command an organisation, or part of an organisation, which has a duty to respond to emergencies, requires planning. The period for which an organisation needs advanced command & control is relatively short, in comparison to the total time of service. The organisation must therefore, even during periods, which do not require immediate action, be managed in such a way that good capacities for command & control are established. The organisation must often function in a predetermined way in its operations. For this to succeed, it demands that duties be constantly organised so that individuals are given responsibilities and duties, which require the same level of competence in various situations. If a higher demand on, e.g. responsibility is placed on an individual during an actual operation as opposed to his usual limited level of responsibility the situation may become unbearable for the effected individual. The organisation's capability in action is therefore, based on its daily work routines.

The fire & rescue organisation's responsibilities are normally to prevent and limit injury to people and damage to property and the environment. In the legislation there is sometimes no clear priority between duties. However, the general set of values in society suggests that safeguarding life has the highest priority. However, prioritising between property and environment is more difficult considering the level of environmental engagement in society, amongst other things. What we perceive as a clear priority scale is a function of values and interpretation. This implies that the system needs to interpret and make decisions on its role in various situations.

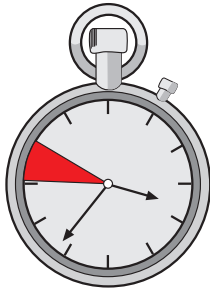


Figure 3. The capacity to command, just like the capacity to act, is based on daily work routines.

The direction of rescue operations is based on law and ordinance, as well as societal and “within profession” values.

*In Fire fighting and rescue tactics*² the values that prevail within the fire & rescue services are discussed. The cultural aspects of society are further explained in the culture of the rescue service. There are both unspoken and spoken sets of values that govern the fire & rescue services actions. Governing the incident commander’s tactical decision making is probably his intuitive use of tactical prioritising rule⁴. Prioritising rules, during fires are as follows.

- Saving life before property or environment
- Attack demands greater resources than protection
- Limit injury & damage first, extinguish later
- The quicker the action (response) the better the results

Basics

The command & control of fire and rescue operations should comply with the same principles in peacetime as in a state of emergency or war.



The command & control system must be structured according to the tasks of the units, and the need for command & control. Command should be exercised so that the commander gains control over the course of events, in order for the units to execute an effective fire fighting and rescue operation.



In order to bring about swift and effective action, it demands the ability to identify the factors, which could influence the situation at an early stage, with the aim being to be proactive instead of reactive.



The capacity to command, just like the capacity for action, is based upon daily work routines.



The direction of rescue operations is based on law and ordinance, as well as societal and “within profession” values.

Dimensioning of the command & control system

A command & control system should be dimensioned according to need for command in fire and rescue operations and be based on threat scenarios.

In order for a command & control system to develop with all its requirements, it demands that the whole organisation be structured methodically. Resources that specifically contribute to the organisation's mission must be dimensioned according to threat scenarios in society. In risk evaluation, specific threats in concurrent emergencies must be carefully observed. Both types of threat scenarios, together with the organisation of resources, influence the requirements in the command & control organisation.

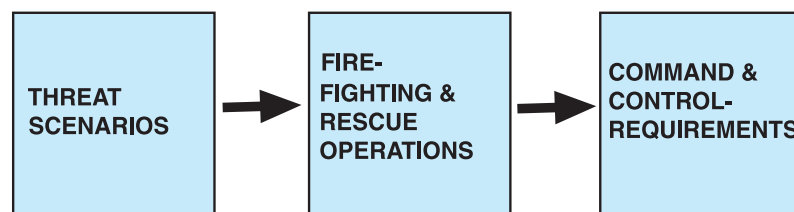


Figure 4. The command & control system should be dimensioned according to command needs at rescue operations.

The need for command & control in concurrent operations should be carefully observed.

As many rescue services are nowadays integrated and restructured into larger organisations, there is an increase in probability for concurrent operations. A similar increase in probability for concurrent operations can be expected during unrest or war. In the development of a Command & control System, special consideration must therefore be taken to ensure the organisation's capability to address concurrent operations. This is an important aspect as the different operations influence one another. Since concurrent operations are relatively rarely encountered, it is therefore not obvious that a lack of such a capability is prominent in the organisation.

Dimensioning of the command & control system

A command & control system should be dimensioned according to command needs in fire and rescue operations and be based on threat scenarios.



The need for command & control in concurrent operations should be carefully observed.

Organisational theoretical aspects

Unity in command is a management principle that should be aimed for. Every unit and every commander in the organisation should have a clearly defined chief. Activity aiming for the same goal, should as far as possible, be led by the same chief. The commanders' hierarchy relationship at every level should be clearly defined.

An unclear chain of command is a frequent problem within many fire & rescue services. Many individuals that are officers are often mistaken as commanders in the organisation. With too many commanders in a rescue operation, the consequences can be disastrous. Two important principles should be reflected in the command & control system, *unity in command* and *unity in direction*.

Unity in command means that a group only takes orders from one chief. Every individual in the organisation has one distinct commander. Who this chief is, may vary over time, but at every specific moment all individuals should know who their immediate commander is.

Unity in direction means that an activity or part of an operation with a common goal should be led by the same commander. This latter principle can be difficult to apply strictly. A more liberal interpretation of its application in a complex reality is, the principle can be used as long as it is practical and increases flexibility in the organisation.

An example of unity in direction can be found in a large fire fighting operation where the need for water for extinguishing is common to every sector. The task of supplying water to the entire operation should be led by one commander, irrespective of the fact that every sector is led by its own sector commander.

Even a chief has a chief. Command & control organisation commanders should not be regarded as a group but as internal relationships. Commanders at different levels in the organisation should be positioned in a hierarchic order, in accordance with the principle of unity-of-command.

Responsibilities and authority, just like directive-power for commanders, should be clearly defined at all levels.

Within the framework of a fire fighting and rescue operation or Command & control within the whole system (compare in chapter 4) decisions must be

made on several levels simultaneously. In order for commanders at different levels to be willing to make decisions, it requires that they are made aware of their responsibilities and the authority they possess. Lack of this awareness in the organisation may result in decisions being procrastinated, pushed upwards in the hierarchy, or decision-making being totally avoided.

Authority, as in, the power to command others, is an important instrument for commanders as the above principle illustrates. Authority may in principle be said to consist of two types:

- Total authority
- Limited authority

Total authority means that a commander with authority to command his subordinate commanders also automatically possesses direct authority over their subordinates.

Limited authority means no automatic authority over their subordinate commanders' personnel.

Examples of these principles can be obtained from the armed forces and governments of most western democratic countries. In the armed forces, *total authority* is exercised. A commander with several subordinate commanders has complete authority over their subordinate personnel at all levels. On the other hand the government's authority is limited towards the ministries. The government is able to issue a general directive to a ministry, but not directly to an individual government officer in the ministry.

Accessibility to total authority is preferred in the type of system the fire & rescue service constitutes. It must, however, be used with caution and good judgement. During a rapid course of events, it may sometimes be necessary for a commander to intervene quickly and issue orders at a level that is lower than normal. The choice of authority alternative should be based upon the principles of leadership. The advantages and disadvantages in the application of total authority should be carefully explained to those who will exercise command. The danger of applying total authority to bypass a level of command through disengaging the subordinate commander is the immense difficulty in quickly engaging that commander again. In practice it is almost impossible to engage again once a level of command has been bypassed. Moreover, a frequent misuse of total authority to bypass a mid-level commander is contrary to the principle of unity-of-command.

A commander is solely responsible for his decisions. A staff may support him in the exercise of his command & control e.g. with heavy workloads. The duties of the staff may vary, from putting forward the criteria for decision-making to the execution and follow up of decisions.

It is sometimes believed that a decision can be made collectively by several commanders or staff members. In the fire fighting and rescue organisations of most countries there are no such groups that can legally make a collective decision. All decisions within the jurisdiction of the fire & rescue service are normally made by individual commanders who are personally responsible for them. Since fire fighting and rescue operations demand quick decisions and actions, group decision-making, which is often time consuming, is less appropriate.

When the workload increases for a commander, his capacity to lead may be augmented by the support of a staff. The duty of the staff is to increase the capacity of the commander by, for example, gathering information and proposals for decision-making. The staff may even execute decisions and divide them into various tasks for the subordinate commanders. Furthermore, the staff may compile incoming reports and follow-ups on the progress of the various assignments. Problem solving, the gathering of information and proposals for decision-making may partly be considered as a staff's collective work.

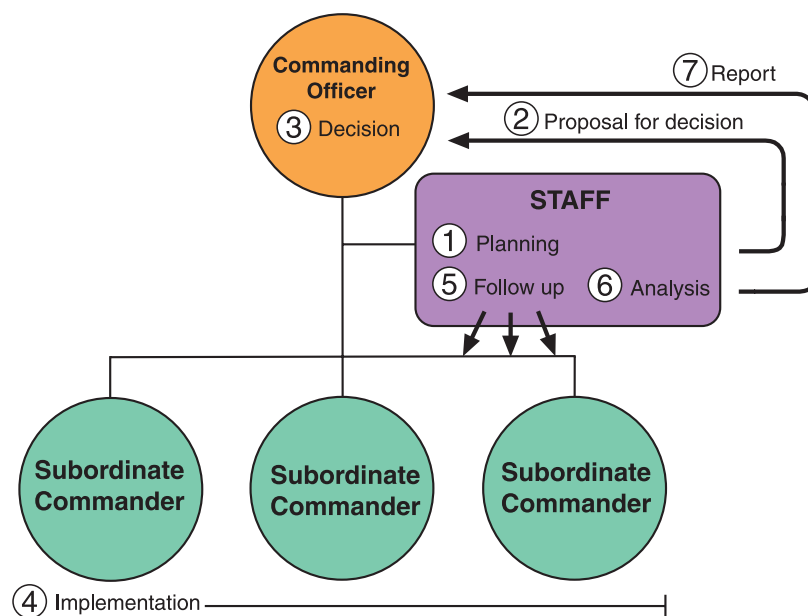


Figure 5. The diagram describes schematically the interdependence between the Commanding Officer and his staff. The interaction between Commanding Officer and his subordinate Commanders has been excluded

A staff is normally led by a Chief of Staff and should, in its composition, reflect the functions and competence of the organisation that it supports. Special competence may be attached to the staff depending on the circumstances of the situation.

If a staff is to successfully support a commander, the functions of the organisation must be reflected in the staff. In a fire fighting operation, with the aim of limiting damage to property, there must be someone on the staff unit someone who understands the problems of fire fighting. Otherwise, the work of the staff risks becoming an intermediary between incoming reports and outgoing orders, and does not significantly contribute to the commander's capacity to lead. An organisation doesn't however need to be reflected by its staff. Every position in the organisation doesn't need to have an equivalent on the staff. However, activity or competence for the operation should be represented by staff members.

The following points should be defined and known to the Chief of Staff and the staff members.

- A staff's position in the organisation
- The organisation of a staff
- The commander a staff is to support
- The role of this commander
- The responsibilities of a staff

It must be clear who commands a staff. Normally, it is the Chief of Staff. Only in exceptional cases, and only with a very small staff, should the commanding officer himself manage the staff. Directly commanding a staff reduces the capacity of the commanding officer to lead his immediate subordinate commanders.

The staff consists only of personnel subordinate to the rescue commander. In order to be a member of the staff, one has to be subordinate to the Chief of Staff. There is a difference between being a subordinate and reporting to someone. As Commander, one is "commander" in every respect for someone who is a subordinate. A person who reports to somebody only does so in certain conditions. Otherwise he retains his ordinary commander. Representatives from other organisations apart from the fire & rescue service may be seconded to the commanders who may need their assistance or co-operation. They are attached to the staff or the commanders and may therefore report to the Chief of Staff or the officer in command, depending on the assignments at the location. However, it is only the level of competence level or working ability of these

representatives that determines their secondment, for example, to the staff and under the command of the Chief of Staff. It is important to remember that an expert attached to a staff or commander is not responsible for decisions made by the commander.

Command & control Organisations should be structured with due consideration to the number of subordinates who report directly to commanders at the various levels. The limit is set in accordance with the need for interaction between command levels. Governing this need is, among other things, the choice of management principle. Large interaction needs can be compensated for by command support at its own level.

Another important organisational theoretical aspect is the width of the organisation in relation to its height. It is usually called *span-of-control* and can be simply defined as the number of subordinates who report directly to a commander.

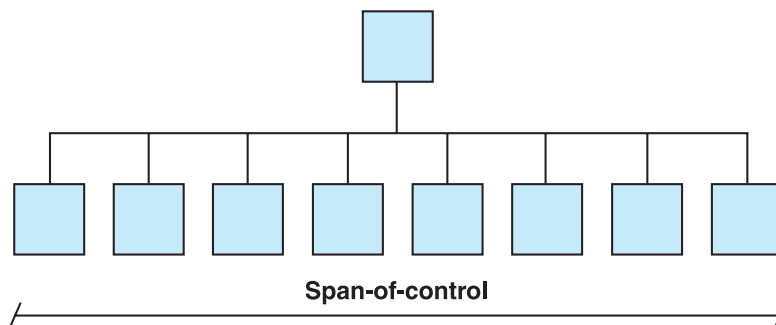


Figure 6. *Span-of-control* is a measure of the number of subordinates or units a commander controls.

Studies have shown that an average person, in an ideal situation is able to handle a maximum of 10 simultaneous incidents or problems. If the conditions are not ideal, which could be said about fire fighting and rescue operations, where the basis for decision-making is often inadequate and the pace of action is high, this ability is reduced. That is why, for example, the classic military organisation normally has a span-of-control of five subordinates under a commander. The aim of not maximising the organisation to nine subordinate commanders is to create reserve capacity in the event of unexpected circumstances. A number of factors influence the possibility of increasing or decreasing the span-of-control. In order to explain the importance of these factors, the concept of the *need for interaction* is introduced. The need for interaction implies the need to work between two command levels, for example,

the communication of reports and orders. As a rule, the less the *need for interaction* between two command levels, the greater is the scope of increasing the span-of-control without downgrading the effectiveness of the organisation. The need for interaction can be reduced in different ways. Those that are most effective are the following:

- Greater empowerment for independent actions at all levels in the organisation
- Increased delegation
- Well defined duties (tasks) for the units in the organisation
- Well functioning co-operation between subordinate units
- Limited monitoring

The factors mentioned above are actually positive secondary effects that occur in a well-developed command & control system, i.e. application of command through tactical mission assignment. This will be further discussed in chapter 7.

The staff has, as earlier discussed, the duty of supporting the commanding officer so that his capacity for command & control increases. This is yet another way to maximise the span-of-control. Command support must however be on the same command level in order to obtain the maximum possible increase in the span-of-control. In peacetime, the commanding officer of the rescue service organisation often lends out his staff to the incident commander in charge of rescue operations. This increases the need for interaction between the levels of command. The loan between the command levels, does not increase span-of control to its maximum possible size, but offers other benefits, such as a more rational utilisation of personnel on staffs.

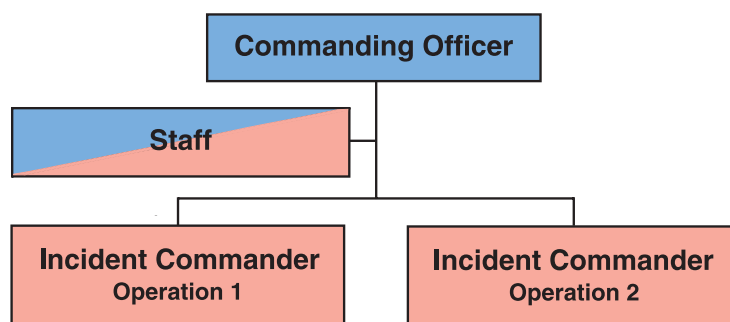


Figure 7. In a large organisation a loan transaction can, for example, consist of an incident commander who in his situation report states the duration of the operation, the methods used in the operation and how similar operations should be carried out in the future. The commanding officer's staff evaluates support needs and distributes same to the operation. It can be said that the commanding officer lends out staff personnel to the incident commanders and their current operations.

A higher-ranking commander's ability to manage many subordinate commanders directly is dependent on the subordinate commanders' training, conception and the timescale in which these commanders operate. If the senior commander feels that his subordinate commanders, acting in the same timescale, are able to manage problems of a comparable size and nature, he can increase his span-of-control. An absolute maximum value for span-of-control can however not be given as it consists of so many factors.

Organisational Theoretical Aspects

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Responsibilities and authority, just like directive power for commanders, should be clearly defined at all levels.



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The duties of the staff may vary, from putting forward the criteria for decision-making to the execution and follow up of decisions.



A staff is normally led by a Chief of Staff and should, in its composition, reflect the functions and competence of the organisation that it supports. Special competence may be attached to the staff depending on the circumstances of the situation.



Command & control organisations should be structured with due consideration to the number of subordinates who report directly to commanders at the various levels. The limit is set in accordance with the need for interaction between command levels. Governing this need is, among other things, the choice of management principle. Large interaction needs can be compensated for by command support at its own level.

Elements of command & control

Command & control is a deliberate influence on a system of humans and technology, through planning, implementation and review.

In the command & control of a fire & rescue service, a system should be established for safeguarding life, property and the environment. The system consists of individuals in different positions, and technology in the form of equipment or an entire technical system.

Command & control may be defined in many ways. It is, however, important to understand it as a deliberate influence and not an influence in a general sense. This is not to say that the outcome is deliberately brought about.

In a fire & rescue service command & control deals with the capabilities of

- Selecting the missions to be executed
- Accomplishing the selected missions
- A review of the accomplished missions

In order for a command & control system to function continuously, it should be organised according to the Classic Model's so-called planning cycle. The planning cycle is a continuous cycle of planning, implementation and review. The model is built on the assumption that Command & control is a continuous process that progressively steers the organisation towards its objective.

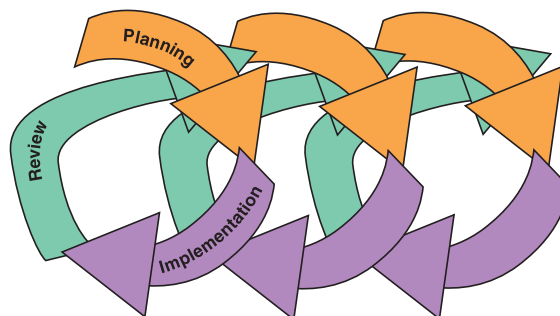


Figure 8. The planning cycle is a model that clarifies command & control phases. It could be said to consist of planning, implementation and review, then it returns to planning for the next cycle and so on. The cycle is continuous, and as such the length of the phases may vary from cycle to cycle. Planning of a new phase can begin before implementation is fully completed. Review is a continuous parallel process.

In a fire & rescue service, as in most organisations, it is important to define who makes the decisions on what action is to be taken. Further, the objectives of the organisation must be clearly defined. Since fire fighting and rescue operations often occur in parallel with the participation of the police and ambulance services, co-ordination with these organisations, and others must be taken into consideration as an important aspect in command & control. Likewise, in-house co-ordination must be carefully observed.

What are the essential elements that make a command & control system a whole? In order to answer this question, a model is required. The model explained below, aims to clarify the elements of a command & control system and the internal relationships, between them. And to provide the reader with a tool by which the different “parts” of the command & control system can be compared and discussed.

The system in the model does not include the administrative command & control system, in general referred to as the administrative management system. Several organisations without a common command & control system but with a co-ordinating system are not included either. A fire & rescue service and the emergency medical services might act concurrently in the same place but under different commands, and can therefore, not be considered as one system either. These are rather, two separate systems in co-ordination with each other.

Consider for example, command & control in one or several simultaneous operations, together with maintaining emergency preparedness for society, as a quantity. In the model below, an area in the form of an ellipse or an egg represents that quantity. The whole organisation’s command & control system must be taken into consideration, not simply the command of individual operations. A fire and rescue operation influences the organisation’s capacity to manage subsequent operations just as it does its capacity for emergency preparedness.

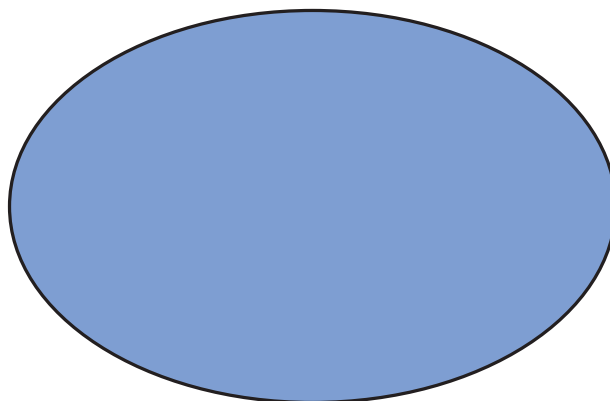


Figure 9. The CW egg is a model for discussion in the elements of Command & control. Let the ellipse above represent the entire Command & control system, which the organisation exercises in all concurrent operations together with maintaining preparedness.

Organisational theory defines a *Viable System*. Such a system has the capacity to maintain its functions in a changing environment. The fire & rescue service organisation is an example of such a system, which is expected to maintain its functions even in a changing environment. This is obvious, as the number of emergencies requiring to be attended to, change over time. Sometimes there are several simultaneous fire and rescue operations in progress within the municipality, at other times, none at all. The environment changes constantly. Thus, a well functioning fire & rescue service organisation must always be a viable system.

If an organisation is to maintain its functions in a changing environment, it must, be able to exercise normative, strategic and operative command, as well as the simultaneous command and co-ordination of several individual units. An ascending hierarchy order exists between these components.

Normative command interprets and decides on the roll of the organisation. *Strategic command* decides on its preparedness and the rescue operations' framework. *Operative command* exercises the integrated command of the operations within the framework. *Co-ordination of the individual units* manages friction and conflict between the units' assignments. *Command of individual units* manages these by executing the assignments.

For the system to be viable it demands a capacity for different forms of command & control. This could be considered as a part of the CW egg model. In the following chapters they will be referred to as components. Five components must exist to render the system as viable. These components are:

- Normative command
- Strategic command
- Operative command
- Co-ordination of individual units
- Command of an individual unit

Below is a further explanation of the different components

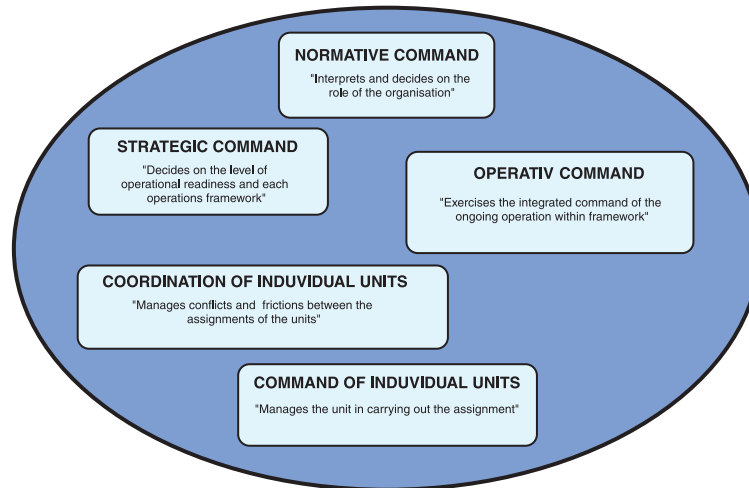


Figure 10. In order for a system to be viable, i.e., having the capacity to maintain its function in a changing environment, it requires its leadership to be comprised of five components.

Normative command interprets and decides on the role of the organisation based on current applicable laws and ordinance, societal and “professional in-house” sets of values (refer to chapter 1). Normative Command is even influenced by other organisations. Normative Command could be said to consist of decisions on how the entire organisation should function, as well as the application of concepts in setting the direction of the organisation.

Strategic command decides on the level of preparedness and operational frameworks. A framework in this context implies prescribed limits concerning time, resources and geographical boundaries. Strategic command also focuses beyond its own organisational area. What happens in the environment and how it impacts on operations is also studied. Most of all, strategic command manages the prioritising of resources between operations and the level of operational preparedness that must be maintained. Strategic command plays a minimal role if the system only has to execute one operation and the level of operational preparedness doesn’t need to be maintained. During longer operations or several simultaneous operations, the strategic command may experience a heavier workload. If there is a lack of capacity within the strategic command, the resources to be prioritised will then be on a first come first served basis. Thus, the system is without its self-governing capacity to optimise its resources.

Normative and strategic commands are separate, but each common to the whole system. It is the role of the system as a whole, just like total system priorities, that matters.

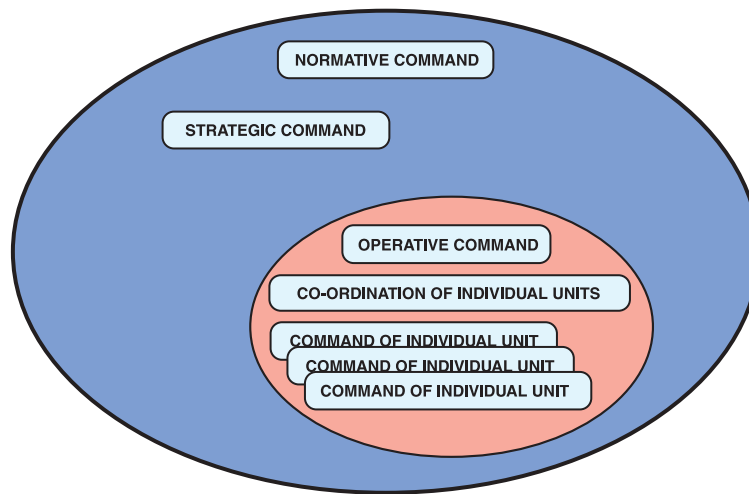


Figure 11. Normative and strategic commands should be separate and always common for the whole system. It is the system's role as a whole, just like total system prioritisation, that matters.

Operative command exercises the integrated command of the ongoing operation within the framework. The operative command must set the objective, as well as the assignment for individual units in the operation. The system must have the capacity to command & control every operation in the organisation. Since the operations may take place in different geographical locations and be of varying types, they must be led by one integrated command. One commander commands each operation.

The operative command interprets the nature of the problems and assigns individual units in the operation. In a best-case scenario, these actors perceive the situation in a similar way. During an operation however, this perception will certainly change as the actual situation itself changes at the same time. The tasks of individual units need to be constantly revised and adapted to the situation so as to harmonise the entire operation. This capacity to adapt is part and parcel of Operative Command.

The co-ordination of individual units prevents and manages conflict and friction between the units' tasks, through adjustments and corrections between these units. This happens by co-ordination and may comprise, for example, minor adjustments of resources between the individual units. Co-ordination of individual units could be said to be the part of command & control, which continuously seeks to adapt all activities with each other. This adaptation should happen within the framework of the assigned duties as well as in the aim of the operation.

The operative command and the co-ordination of individual units should be separate but common for every operation. If the same operative command manages several operations in different locations, it is a question of one common operation, not several.

Command of an individual unit means to lead an organisational unit (e.g. a unit in the field of operation) in its performance of the tasks assigned. How large a unit should be, varies with the size and nature of the operation, just like the system's organisation and its job routines. To command an individual unit in its assignments implies carrying out an order. The order is given by the person exercising operative command and is co-ordinated by the person exercising command in the co-ordination of individual units. Every unit should have its command capacity.

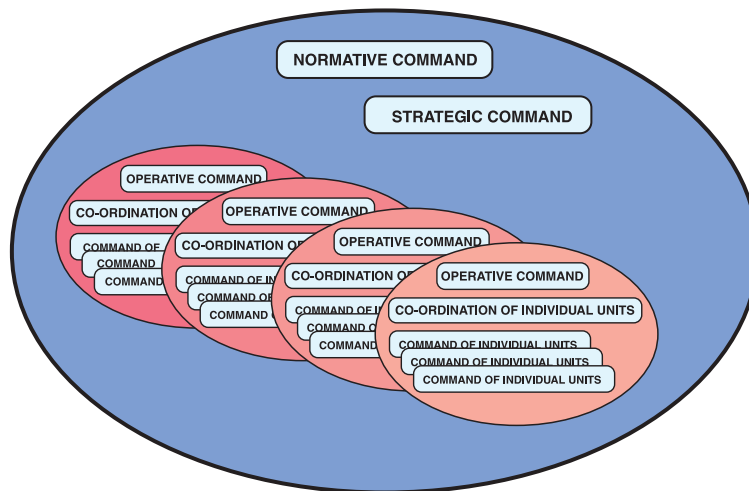


Figure 12. Every operation should have an operative command common to the operation. The same applies to the co-ordination of individual units. Every unit should have its own command.

The five components are internally related to one another. They govern each other in a certain order and are arranged in a hierarchy. The normative command interprets and decides upon the role of the organisation. This governs the prerequisites for the other four components. Strategic command decides on the level of operational preparedness and the operational framework. It ultimately governs the distribution of resources between the different operations and the level of operational preparedness for every aspect and time period. It also governs the area of responsibilities to be assigned to each operative command. The operative command assigns duties to the units in a rescue operation. In the same way, the co-ordination of individual units exercises co-ordination within its own system, mainly by exercising command over the individual units.

The discussion on components as constituents of command & control, and the criteria for system viability can be summarised in the so-called *principle of vitality*.

In order for an organisation to be able to maintain its functions in a changing environment, it must possess the capacity for normative, strategic and operative command, as well as the capacity for the co-ordination of its different components, together with the command of the individual units³.

A higher component sets the limits for a lower, with reference to the timescale.

The components in a well-functioning system have their specific timescale, that is to say, the length of time each planning cycle takes, predetermined in the above order. Normative command manages problems with a much longer forward planning period, while command of an individual unit manages problems within the shortest possible timescale.

Higher components set the limits for lower components with reference to the timescale, i.e., if a component manages a timescale of a certain proportion, it will also set the limits for the lower components. Thus, a component could never manage with any certainty, a timescale longer than the one the nearest higher component manages. At anytime, the prerequisites for command in the lower component may be changed through decisions made by the higher component.

Absolute values for an appropriate length of time for the different timescales can certainly not be given. They depend on the fire and/or rescue operations, which the system manages, and they may vary within a very wide span. However, normative command, as with strategic command should always act in timescales that are significantly longer than the longest expected duration of current fire and/or rescue operations.

Example: If the person exercising operative command, i.e. integrated command over the operation and within the framework, plans for an hour, a subordinate commander, e.g. a commander of an individual unit, cannot plan for a period longer than one hour. If he does, it is simply guesswork, as he does not know the prerequisites, in the form of orders and assignments that he will be given after an hour.

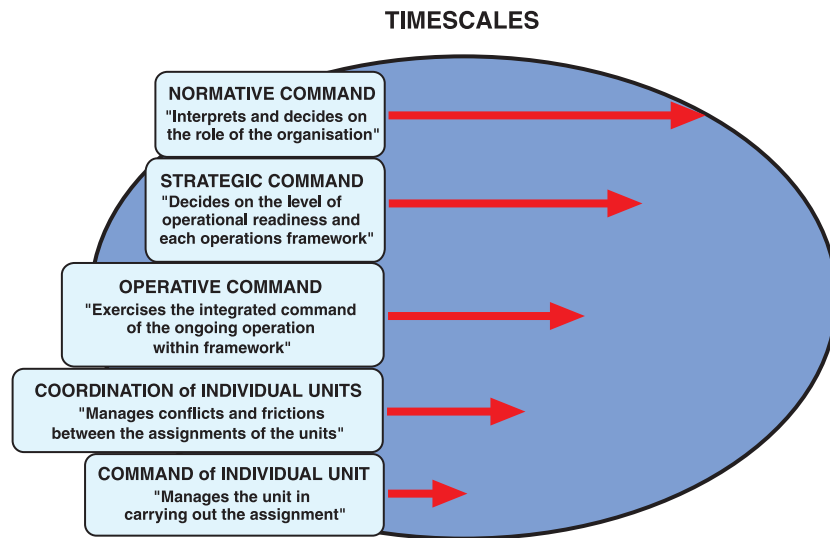


Figure 13. The components have an internal relationship to each other. They are arranged in a hierarchy. Their timescales, in a well functioning system, are in the order according to the diagram.

Elements of command & control

Command & control is a deliberate influence on a system of humans and technology, through planning, implementation and review.



If an organisation is to maintain its functions in a changing environment, it must, be able to exercise normative, strategic and operative command, as well as the simultaneous command and co-ordination of several individual units. An ascending hierarchy order exists between these components.

Normative command interprets and decides on the roll of the organisation. *Strategic command* decides on its preparedness and the rescue operations' framework. *Operative command* exercises the integrated command of the operations within the framework. *Co-ordination of the individual units* manages friction and conflict between the units' assignments. *Command of individual units* manages these by executing the assignments.



A higher component sets the limits for a lower, with reference to the timescale.

System Perspective

In this chapter, the model for the content of command & control is attached to the levels of the organisation and its geographical area. In a well functioning system, two principles prevail.

In order to manage the more complex and extensive situations we often conduct command & control from different levels. This type of specific level of command & control is normally conducted simultaneously.

In a command & control organisation the different levels of command have separate and adjusted duties, as well as working methods.⁴

In order for the CW egg model to be able to illustrate this, the term “level” has been introduced. The “levels” are normally represented by officers in the organisation.

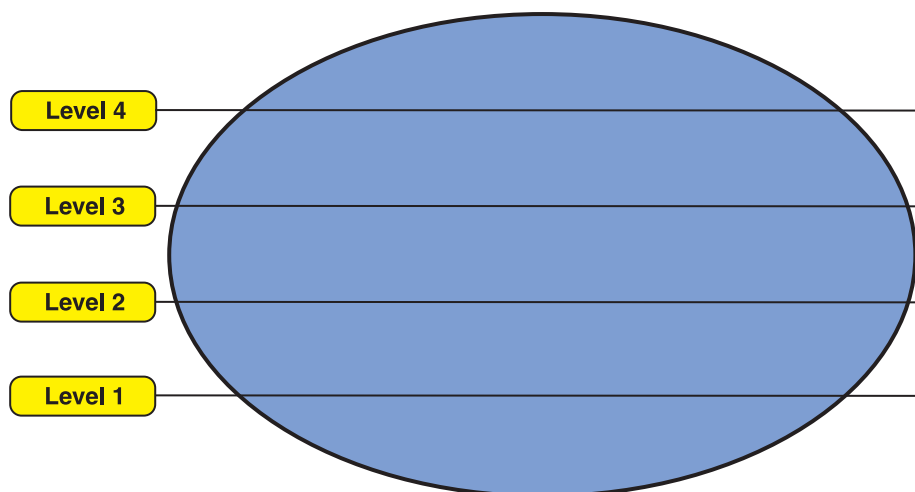


Figure 14. Command & control of the system is normally exercised from many levels simultaneously. These levels are usually comprised of officers within the command & control organisation.

Simultaneous command & control on several levels can moreover, be exercised from different geographical locations. In order to be able to illustrate this, geographical segmentation is introduced into the model. The segments are termed “area of operations” and “other areas.” The relevance of geographical segmentation in command & control will be further discussed in chapter 10.

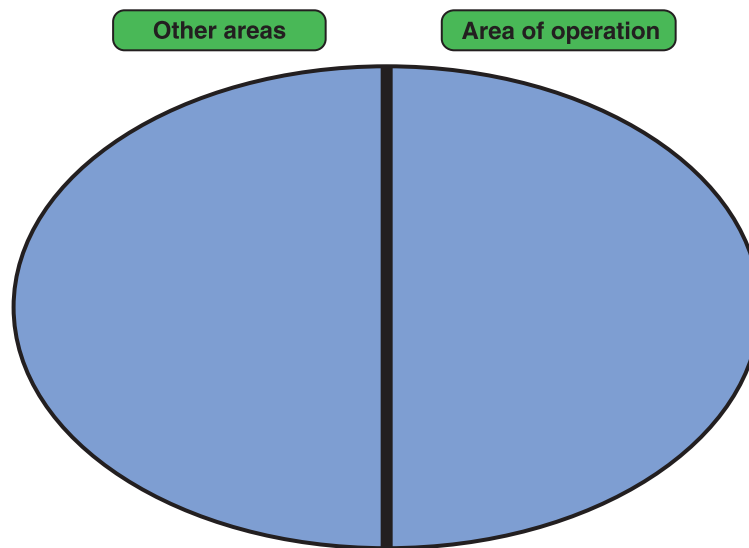


Figure 15. A geographical dimension is introduced into the model.

A fundamental prerequisite for an effective command & control system is that the different levels of command operate on different timescales. This is applicable in the planning and implementation of the operations, as well as a way to react to different disturbances. The levels of command & control should utilise clearly defined and distinctly separated terms in describing the situation as well as in asserting its decisions and objectives. The terms should be familiar to everyone within the system.

The components are attached to the levels of the command & control system, based on the competence of the levels and on the effectiveness of the system as a whole. A level can operate in several components; however, a component can only be attached to one level in each fire & rescue operation.

Command & control should at all times be exercised from the levels needed.

The level-specific command & control system can be put into practice to command fire fighting and rescue operations. Officers at different levels exercise command & control in different parts of the system simultaneously. It is important that command & control is continuously exercised in all of the components described in chapter 4. *Several commanders should never simultaneously exercise command in the same component.* Normative and strategic command should only be present in one place within the system. Operative

command and Co-ordination of individual units should only exist in one place for each operation, just as the command of an individual unit should only be in one place for each unit. The probability that contradictory orders and unclear directives are given is most likely to happen in a situation where the same component appears on several levels in the same operation. Different commanders might have different objectives that are impossible to achieve at the same time. This can result in ineffective command.

The number of command levels in the system is determined by the need for command & control. The greater the needs, the greater the number of levels required. In a small organisation, with minor resources and a low probability for concurrent emergencies, the workload of command & control in a component is relatively small. The need for command & control can therefore be said to be small. This implies that the commander in a small organisation can command in several components simultaneously. In the following example, the role of incident commander is simply an illustration.

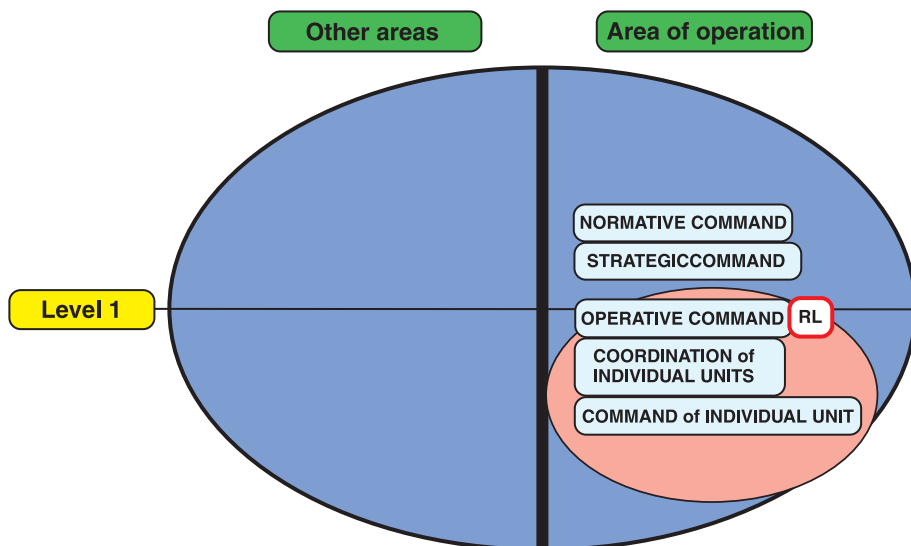


Figure 16. This is an example of the components in command & control attached to the levels geographically segmented (Area of operation/Other areas). The positioning of the incident commander is an illustration obtained from a very small organisation with only one level, which exercises command alone, for the whole system.

On the other hand, it becomes extremely difficult for the same commander to simultaneously execute command & control in several components in a large organisation. More levels are required here.

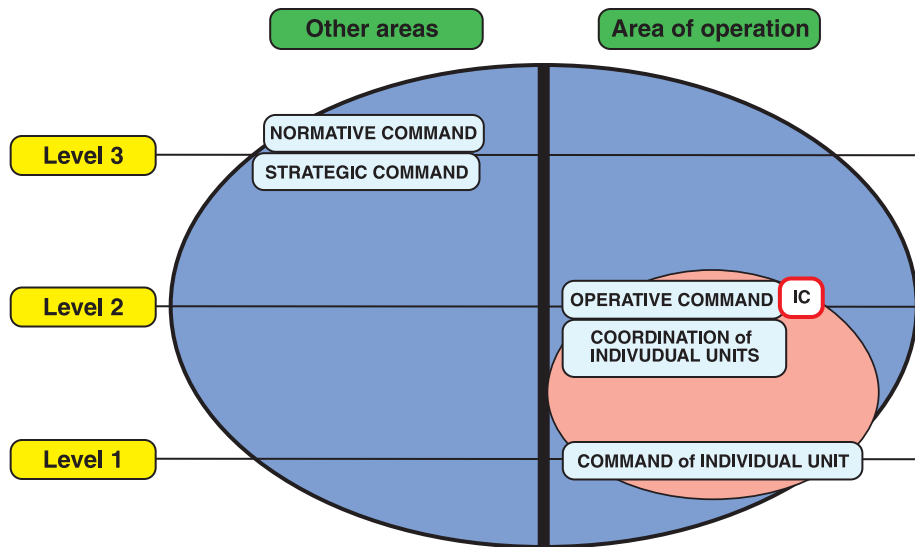


Figure 17. A larger organisation demands division on several levels. Command & control in the system is exercised from different levels simultaneously. Moreover, in the example above it is exercised from different geographic areas.

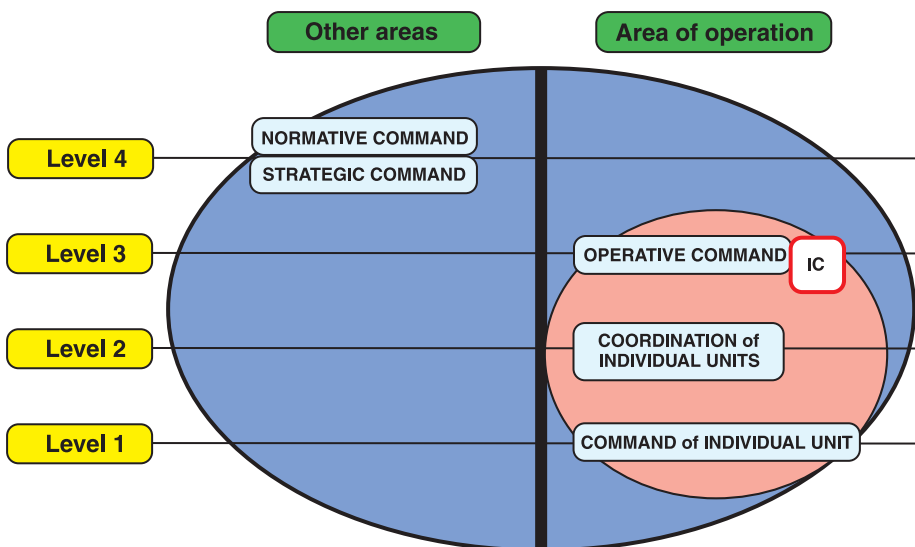


Figure 18. In a very large organisation, a further division of the components in command & control into several levels is required.

Autonomy in command & control, i.e. the capacity to exercise command & control independently should be the goal for all levels of the organisation, to such an extent, that the operation can begin without being dependent on the establishing phase of the command & control organisation.

Autonomy in command, i.e. the capacity to act independently in the direction that is desirable for the operation, may be developed for several reasons. Besides an increase in the maximum span-of-control, it could contribute to the capability of the system to execute its duties even when it is interrupted or impeded from interaction with the different levels. Further, the concept of autonomy in command facilitates command & control in an eventual expanded operation. When an operation is in its incipient phase it has special needs from the viewpoint of command & control.

For a small fire & rescue service organisation, it is important to be able to start immediately even if it may be a large operation, e.g. a forest fire, so as to be able to successively build up the command & control organisation later. Every new additional step must be able to take over from the previous step that had that function. The units engaged in the operation should not, if possible, notice the step by step built up, more than as an improvement to the command & control situation. The units should in other words, not experience any change in command methods.

Expanding operations is a common occurrence in the fire & rescue service. The initial phase in a large emergency is often unclear and happens quickly. Damage occurs faster in the beginning than does the expansion of the operation. If the damage is severe, long-lasting and happens quickly, the difference between damage and the contribution of the operation is significant. It is important that the expansion of Command & control in this situation does not become a load for the system. A similar phenomenon could be expected if a peacetime organisation, due to a state of war, has to turn into a war time organisation. The process could be expected to take at least a few days.

The initial phase of command & control must never become a burden to the operation. This applies both for the individual expanding operation during peacetime as well as total expansion, in a war scenario. The build-up must be implemented autonomously and broad enough to harmonise with the different parts of the total operation.

Activation of the command & control organisation should be early and offensive with the aim of creating the necessary capabilities for commanding a quantitative as well as qualitative expanding operation. During the successive activation of additional command levels, the components' internal relationships must be compatible with the organisation's hierarchy. Here, basic leadership aspects ought also to be considered.

The expansion of an operation may vary in nature. The operation could become larger and more extensive, or it could also maintain its size and become more complex and difficult to manage. Operational expansion could therefore be of a quantitative as well as of a qualitative type.

It is ineffective to initiate the command & control organisation cautiously and only on the basis of certainty. In relation to fire and rescue operations, this initiation tends to be secondary and a reactive expansion. In order to counter such undesirable developments, initiation of the command & control organisation must be proactive and far-sighted. Such action would certainly activate the organisation more often than necessary. However, the consequences are trivial in comparison to the constant backsliding of command & control capacity due to late activation. Just as important as the need for activation on time, is the need to realise when the time is right to wind things up.

Thus, the command & control organisation must be able to adjust its capacity accordingly. In order for the expansion to take place swiftly and smoothly it should occur in firm and well planned steps. This applies both to the part of the organisation, which commands the individual operation, as well as the part that commands the whole organisation. Also command & control support in the form of staffs, who are sometimes required, must for the same reason if possible, be activated in succession.

During the successive initiation and build-up of the command & control organisation, it is important that the internal order, which exists between officers in the organisation is compatible with the components of command and its internal hierarchy relationship. To put it simply, it implies that higher-ranking commanders lead the higher components. The relationships of the components hierarchy are first and foremost governed by its timescales (refer to chapter 4.). From a leadership viewpoint, due consideration must be given to personnel who constitute the command & control organisation during the expansion. Commanders without experience of commanding operations should not, for example, suddenly step into operative roles⁵. By the same token, commanders who normally command small units can not simply be expected to step into new roles during a large operation. To command a new component often demands a different type of leadership and methodology. It requires education, training and experience for the job at hand.

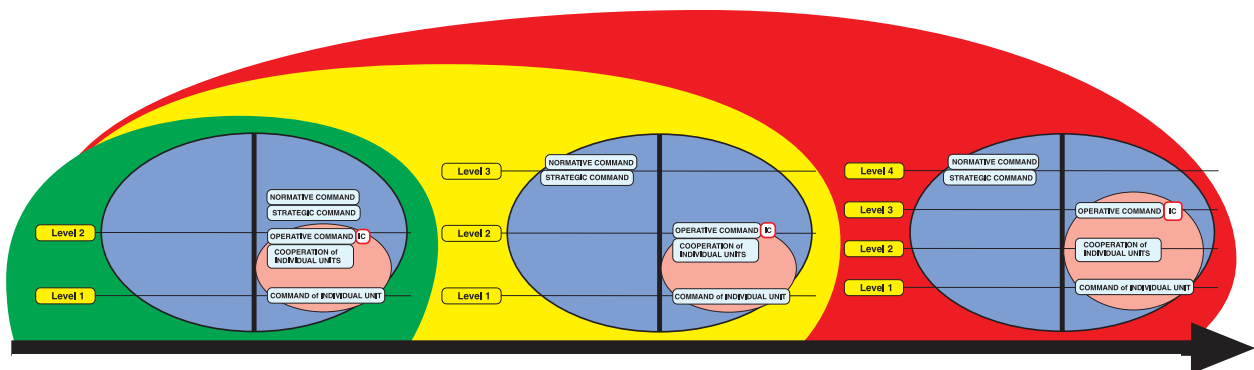


Figure 19. Initiation of the command & control organisation should be proactive and far-sighted.

Adjacent command levels should be able to act temporarily as reserves for one another.

During the initiation and build-up phase of the type described above, just as in a fully developed organisation, the possibility of “losing” a command level must be carefully thought about as a real risk. The loss could be of a technical character, e.g. disrupted communications. Disruptions can even be of a personal nature, e.g. an individual in the command & control organisation who is totally or partly incapable of discharging his duties. Such disruptions must not impede the organisation in its execution of command & control. Adjacent levels in the organisation must always be able to act as reserves for one another. If one level steps in as a reserve for another, it ought to occur clearly so that the others in the organisation understand that it is a reserve measure. There must never be any doubt about who exercises command at a given level or component. Adjacent levels should not discreetly try to take over a non-performing level.

The system as we discussed in chapter 3, must ensure that command & control is constantly exercised in all five components. If this does not happen during the reinforcement phase of the operation, and is compounded by disruptions, the system will lose its ability to maintain its functions in a changing environment. It is precisely during the initial stage that the environment is considered to be changing, on short timescales.

System Perspective

The components are attached to the levels of the command & control system, based on the competence of the levels and on the effectiveness of the system as a whole. A level can operate in several components; however, a component can only be attached to one level in each fire & rescue operation.



Command & control should at all times be exercised from the levels needed.



Autonomy in command & control, i.e. the capacity to exercise command & control independently should be the goal for all levels of the organisation, to such an extent, that the operation can begin without being dependent on the establishing phase of the command & control organisation.



Activation of the command & control organisation should be early and offensive with the aim of creating the necessary capabilities for commanding a quantitative as well as qualitative expanding operation. During the successive activation of additional command levels, the components' internal relationships must be compatible with the organisation's hierarchy. Here, basic leadership aspects ought also to be considered.



Adjacent command levels should be able to act temporarily as reserves for one another.

Decision-making theory from a system perspective

This chapter discusses the rudiments and the origins of decision-making within a system. It also deals with the reciprocal impact of the decisions on the system.

The command levels must be able to operate in various timescales harmonised with the components they manage. For a command level that manages several components, a timescale limit must be set, with respect to the higher-ranking component.

A higher command level must operate in a longer timescale than that of the lower levels, as its timescale sets the limit for the lower levels. If the opposite occurs, the commander and therefore the command level in which he operates, loses its ability to command the component whose timescale is shortened. As a result, a component in command & control fails and the system loses its ability to maintain its functions in a changing environment. If the system loses this ability, it will give rise to limitations for the level, which commands the operative component. The level that commands the operative component normally plans fire and rescue operations on the basis that certain units are available at a specific time. Imagine if the level, which commands the strategic component, does not plan with the same prerequisites as the level that commands the operative component over a longer period. Then, eventually there will not be enough resources available later on in the operation.

In order for the person who commands the strategic component to operate on a longer timescale, an evaluation of several factors is required, e.g.

- How long will each operation take?
- How will the damage for each disaster change over time?
- What resources are required for the respective disasters?
- How will the threat scenario develop over time?

The relationship as described, between the level that commands the Strategic component and the level that commands the Operative component, is similarly applicable between the higher and lower levels in all parts of the organisation.

That the same command level, in certain circumstances can execute command in several components has already been discussed. This could be the case in a

limited operation or in an organisation during expansion. In order for Command & control in several components to function it demands, apart from those requirements mentioned earlier, that this command level is capable of simultaneously managing two or more timescales.

Those who have the responsibility of commanding several components simultaneously need to develop their capability for swift changes in perception. In this way, the different components and their interactions can be managed. It is extremely important to make the timescale of the higher order component sufficiently long.

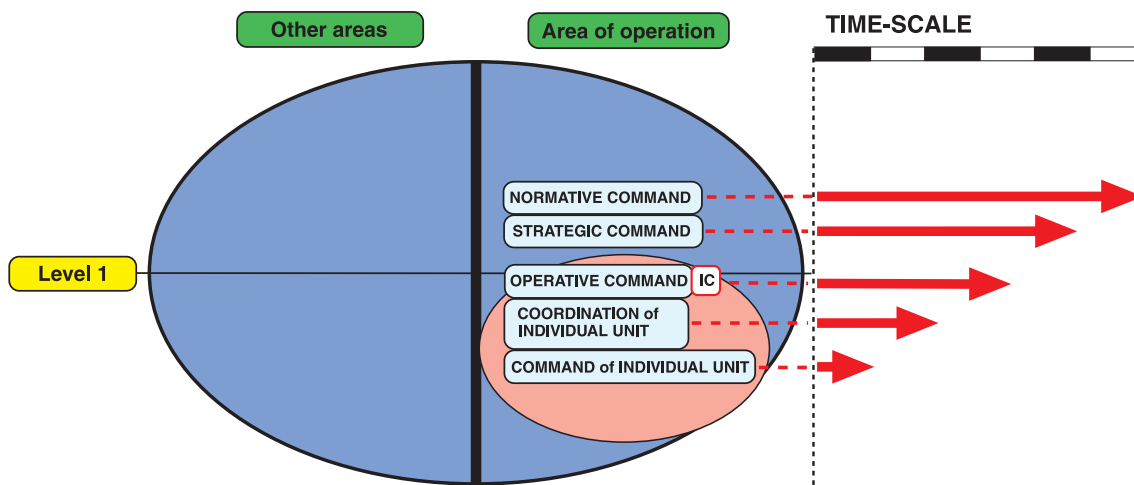


Figure 20. To a level executing command in several components, it is essential that the timescale of the “highest” component, which also should be the longest, is allowed to set the boundaries.

Unity in decision making in the command & control organisation demands a common understanding of the operation objective, the situation and its development as well as the capacity of its own resources.

Command under intense pressure and changing situations, demands unity in decision making i.e., decisions made at different levels by different commanders but with the same objective. This unity in decision-making must, depending on the conditions of the operation, occur simultaneously at different levels and in different areas within the system. There is often little prospect for coordination. Unity in decision-making establishes the condition for partial decisions to be in harmony with the overall direction of the operation, despite the fact that decision-making occurs on various levels.

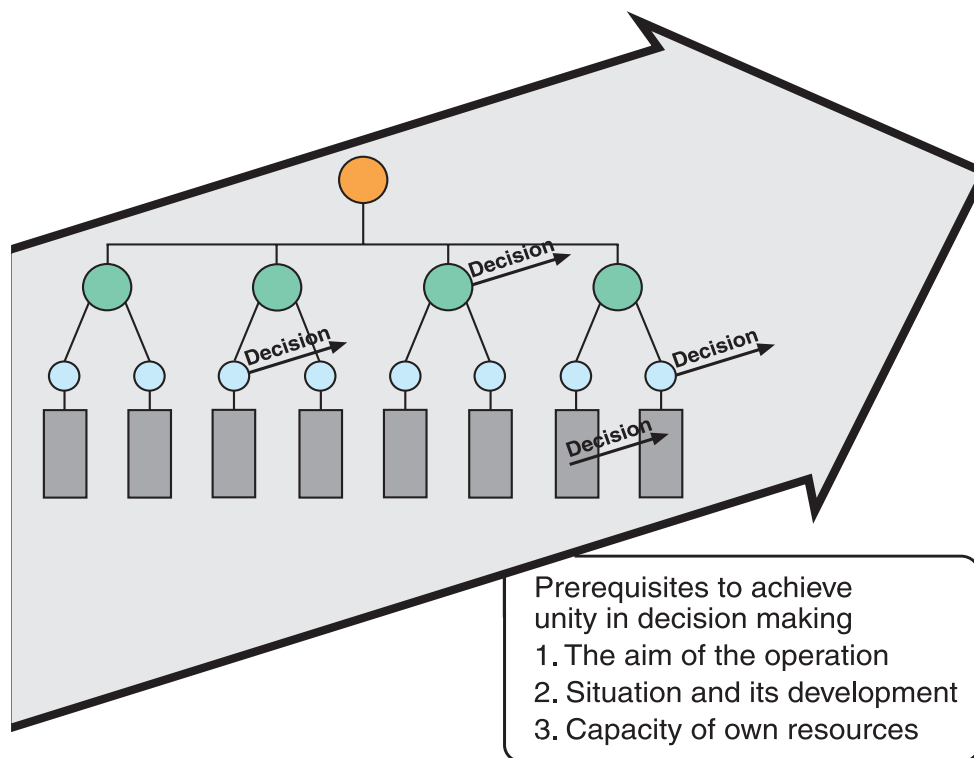


Figure 21. In order that the different decisions made at different levels in the Command & control organisation shall have a common direction, certain prerequisites are needed.

A clearly defined objective makes it possible for improvisations and independent actions in a direction that generally benefits the whole operation. This is a basic requirement in “mission oriented command & control”. A commander cannot have absolute control over the whole situation. Moreover, there are many good ideas that come about in the organisation. When the organisation is focused and shares the same objective, it is important that the objective is familiar to all in the organisation. A well-stated objective encourages local initiative. The tool used in advancing the objective during an ongoing operation is the General Decision (GD). This should comprise of two parts, objective and execution. In the objective part, the commander expresses his objective, i.e. what he wants to achieve with the operation. The execution part describes in general terms how this objective can be achieved. An early, well formulated, easy to understand GD known to all participants in the rescue operation is one of the main aspects in unity in decision- making. This creates the conditions for mission oriented command & control. Similarly, it requires that the levels that exercise normative and strategic command in the system state in general terms their decisions on all organisational activities.

Unity in decision-making also demands a good common understanding of the situation and its development. That the “truth is in the eye of the beholder” is probably a good summary of the phenomenon. A picture does not contribute to our basic understanding, but the picture, which we perceive, does. Therefore, unity in command and unity in decision-making demands that all “beholders” adopt a similar perception of the situation, and thereby a basis for their actions. Since, the entire situation cannot be communicated, it is important to understand what elements are the most important for the decision-making process. The actual current situation is of little importance high up in the command & control organisation, whereas, intention, motive and development are important factors. On the contrary, the current situation is of greater relevance to the lower levels of the command & control organisation. Since all reports on the situation are descriptions of past events they must be considered as history. Only a report on the situation combined with a description of its development could be considered as relevant.

Moreover, unity in decision-making demands that everyone in the command & control organisation share a common understanding of the capacity of their own resources. The magnitude of an assignment can be disproportional to its capacity and strength if the comprehension of the command levels is not in agreement. Likewise, capacity can vary from case to case. Thus, the person who commands and the person who executes the assignment must communicate with each other regarding capacity.

Example: If a unit is assigned to an operation that requires breathing apparatus (BA), the unit’s capability can be described as: The unit is equipped with BA for a BA team to carry out search and rescue activities up to a specific maximum time period. Similarly, two BA teams can be assigned together. However, this would shorten its staying power as more personnel are simultaneously activated.

The need for information as the basis for decision-making should determine the reporting routines during an operation. It should be the duty of the superior command level to actively seek the specific information required for decision making. Subordinate command levels should report with predetermined periodicity. Interaction between decision-making, implementation and its effects is to be closely monitored.

The information flow in a command & control organisation during operations is immense. The flow and velocity tend to rise exponentially as a result of advances in information technology. There seems to be a problem with finding and processing the right information. As information becomes more readily available, it creates new information customers with new needs. When neither

access nor transmission of information set boundaries governing parameters must be defined.

In order to avoid the reporting routine from becoming a burden to the system, it must be governed by the need of information, as a basis for decision-making. Other information requirements should, if possible, be arranged in such a way that the system is not stressed during operations. Examples of secondary needs are information on evaluations and lessons learnt. A superior level should actively seek the specific information, which is needed for decision-making in an operation. Information in quantity, with no relevance to the immediate decision-making process, impedes command & control by burdening the system. The habit of delivering “tips” from a higher level to subordinates normally contributes to an increase in burdening the system, rather than improving it. The superior level should never wait for a subordinate level to report as this can often contribute to the organisation’s reactive character. The reporting level cannot always know the type of information the superior level needs. A question could, contrary to its purpose, be a burden. By frequently asking, “How are things?” is such an example. It is better to be specific and request a formal report on the situation. The question “How many rooms are there in the workshop area?” specifies the type of information that is important.

Reporting should take place periodically and with special criteria. Those levels reporting to one another should agree on periodicity. This agreement can be predetermined on a long-term basis or adapted for each operation. Predetermined long-term agreements can, for example, be in the form of a *Situation Report on Arrival*, which is always transmitted immediately on arrival and a *Situation Report*, which is delivered as soon as possible after the initial stage of the operation. An optional reporting interval is later determined, with respect to the size and intensity of the operation. It should be structured so that the impact of each decision can be monitored. In other words, something should be achieved between these report intervals.

The importance of the language used in command & control was highlighted earlier. The language is especially essential in reporting. The sender and the receiver must share the same conception of the expressions. The reporting language should be simple, clear and realistic. Relative terms and expressions, such as, “bigger-smaller” should be avoided. The statement “The fire is larger than expected”, can have a totally different meanings for the sender and the receiver of the information, depending on how the respective party defines a large fire. The language used should depict the reality, which the sender then perceives.

If the action is to achieve results, the decision must be made on the assumption of how the situation will develop as a result of the impact of the decision. A decision should never be made solely on the basis of the current situation, which is actually a description of history. Such a form of decision-making contributes, apart from the factors mentioned earlier, to the risk that the organisation will end up playing a reactive role.

When a decision on specific action has been communicated, it is important that it is acknowledged both when the measures are taken and when the impact of the measures can be registered. This establishes a learning system during an operation. Decision-making command levels need to have a sense of “time spent” for both the implementation of the measures and the results obtained. In this way, the command level learns how the damage appears.

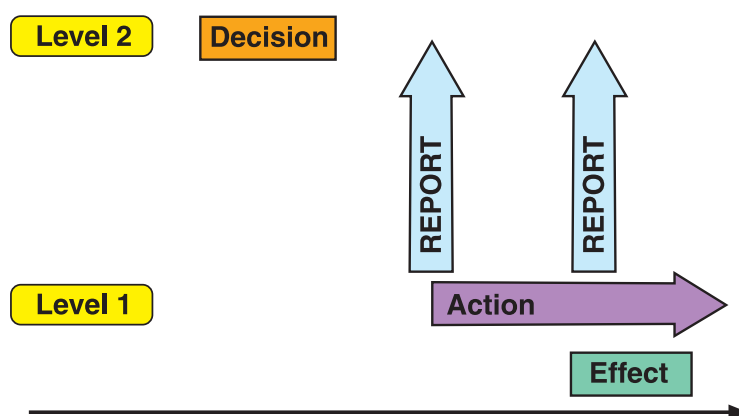


Figure 22. When a decision on a specific measure or action has been communicated, it is important that reports are delivered, both when the measure is implemented, and when the effect of the action can be registered.

A higher-ranking command level should avoid making demands on information to be refined to a higher degree other than what the reporting level needs for its own use.

Any eventual processing of information, for example, the counting of the number of assigned units in an operation as a percentage of the total strength of the organisation, should take place at the level where the processed information is required. The sender should only be demanded to process the information that is required for his own use. Otherwise, the sender is compelled to carry out staff duties for another command level than his own. This could lead the sender to omit reporting the part of the work which his command level has no use for in the execution of its duties. The consequences in a worst-case

scenario could be that certain important duties for the whole operation end up falling into the space between two staff members, neither of them, albeit unwittingly, realising that one of them needs to take responsibility for those duties.

The fire & rescue service should use its fire prevention as well as operational experience as a reference point.

Management of an effective fire & rescue service demands a functioning feedback system between preventive and operational activities. The feedback between them is especially important because both types of activity are, in most countries legislated by law. There is immense knowledge available within the various government services, for example, the fire technical characteristics of buildings and dangers they might pose. This knowledge base, such as experiences from earlier emergencies and accomplished operations within and outside the country, should to be used in the command of fire & rescue operations. Similarly, the knowledge of other organisations should be easily accessible in the course of operations.

Decision-making theory from a System Perspective

The command levels must be able to operate in various timescales harmonised with the components they manage. For a command level that manages several components, a timescale limit must be set, with respect to the higher-ranking component.



Unity in decision making in the command & control organisation demands a common understanding of the objective of the operation, the situation and its development as well as the capacity of its own resources.



The need for information as the basis for decision-making should determine the reporting routines during an operation. It should be the duty of the superior command level to actively seek the specific information required for decision making. Subordinate command levels should report with predetermined periodicity. Interaction between decision-making, implementation and its effects is to be closely monitored.



A higher-ranking command level should avoid making demands on information to be refined to a higher degree other than what the reporting level needs for its own use.



The fire & rescue service should use its fire prevention as well as operational experiences as a reference point.

The command & control process

The command & control process describes how command & control is exercised within the system. The process consists of many elements, such as,

- The principles of command & control
- Leadership
- Analysis and the capacity to choose
- Control, e.g. giving orders

The choice of command principle should be clear. command & control should first and foremost be exercised through *mission tactics*. The commander, in discharging his daily duties, should have a long-term perspective and lay the foundation for a mission orientation.

The command & control process is driven by one or several command principles. Most commonly exercised are *detailed command* and *mission tactics*. The word “tactics”, in this context, should not be confused with tactics in the general sense. A more appropriate term is therefore, *mission oriented command & control*. However, the term, mission tactics is well established and therefore used in the key sentence above. Nevertheless, it should be pointed out that both detailed command and mission tactics lay claim to the issuing of orders. However, the contents in the order vary depending on the choice of command principles. Direct command is about what should be done and how it should be done. Mission tactics is about objectives and the means to achieve them.

Mission oriented command & control should be considered more as a reflection of the organisation’s character and philosophy rather than as a method of accomplishing an assignment. In order to achieve success in mission tactics, it requires that all participants within the system observe with interest the objective and purpose of the operation set fort by the superior command level. Detailed command, on the contrary, is more about the superior level looking downwards to see what happens and monitor how the assignment is carried out. Commanders in a system based on mission tactics should not have too high a demand on monitoring. The monitoring should focus on the results rather than on how the assignment has been carried out. The commander should also execute control in a proactive manner. “*Mission tactics requires a dialogue on the units’ capacity so that the assignment is in proportion to their capacity*”.⁶

*“Mission oriented command & control cannot be ordered – it is earned”.*⁷ Commanders at all levels must take a long-term perspective and establish a climate conducive to mission tactics. Mission tactics can be considered as a part of organisational behaviour. The more developed the culture is for mission tactics in an organisation, so the more subordinate units can function all the more effectively within the system.

A fire and rescue operation is often characterised by a high pace and unclear situation at the outset. Because of this, action is often taken on ambiguous grounds. Corrective actions must therefore be taken gradually. Much flexibility is required. Mission tactics is an appropriate command principle in situations that are typical for fire and rescue operations. However, other command principles may be more appropriate under certain circumstances, for example, when a commander with especially detailed knowledge in the current situation may opt to lead by tactical command. Nevertheless, this option should not replace the continuous training of personnel. Another example is in a particularly risky operation, where the different tasks are required to be co-ordinated with high precision so as not to circumvent the safety aspects.

The command principle, which the organisation practises, must always be known to all. A default principle should be established so that if the need arises, the commander need only state his intention to apply another principle. A commander should always make known the type of command he intends to exercise in the absence of an established default principle.

The ability to project events with the aid of models is a prerequisite at the higher levels of command.

Being able to make decisions, communicate one’s desires, and accept responsibilities are some of the most important qualities of a commander in fire and rescue operations. The ability to understand the level specific and the interaction between its components is essential to the ability to command at all levels in the command & control system.

Higher levels of command & control should, according to what has been discussed earlier, operate in a longer timescale. Decisions made on these levels must therefore be based on a picture of how the situation is likely to be, rather than how what it is currently. The time aspects in decision-making are dependent on the determined measures and their effects. The decision-maker ought to ask himself the following questions:

- What is the required time for preparation of the measures decided upon?
- What amount of time will pass before the measures begin to take effect?

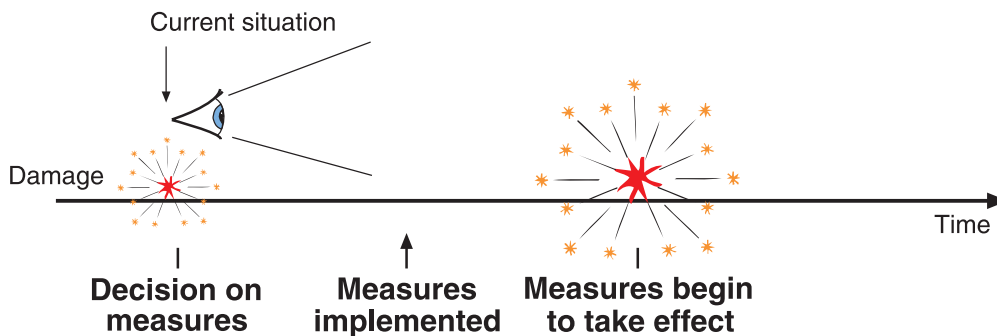


Figure 23. The expected damage at the time a measure is expected to show results should be the basis for decision-making. This demands the ability to create models of the events.

The commander should imagine that he is in the future when he makes his decision. The point of time should touch upon the sum of time of both questions above. In order to succeed in this, the ability to create a model over the events is immensely important⁸. By understanding the factors, which influence the development, the foundation for a good ability to project the events of the future state is created. To act solely on the basis of the current situation, can result in a higher probability of measures being taken too late.

Command & control will never be better than the commander that exercises it. The commander, as an individual, is of great importance to the ability of the command & control organisation to successfully accomplish its mission. Therefore, it is crucial for the fire & rescue service to be aware of the qualities of leadership needed, when choosing commanders. The commander should, with the help of the Command & control system, manage the organisation to achieve its results. The criteria that ought to govern the selection of commanders at all levels are:

- The ability to make decisions, communicate his wishes, and accept responsibility.
- Understand the level specific and the interaction between the components in the command & control system.
- A high-level increasing ability for conceptual thinking, and the ability to create models of the course of events.

Regarding the interplay between the components, the understanding of the level specific leads to a greater respect for each other's role. Furthermore, a commander must be aware of his responsibility to make decisions. It is important for decision-makers in the higher-level components to create an environment conducive to the subordinate levels, thus, enabling them to make correct decisions. Awareness of this interdependence is important.

Strategic command should be able to handle more operational alternatives than the total for which the system is dimensioned.

In chapter 2, we discussed how the command & control organisation should be dimensioned, i.e. the assignments the organisation is expected to have in a threat scenario. A method employed to augment the organisation's capability in a situation where it is pressed to its maximum capacity is to augment the capability of strategic command. Strategic command should be able to select from a larger number of operational alternatives than the total that the organisation is capable of carrying out. The following example illustrates this.

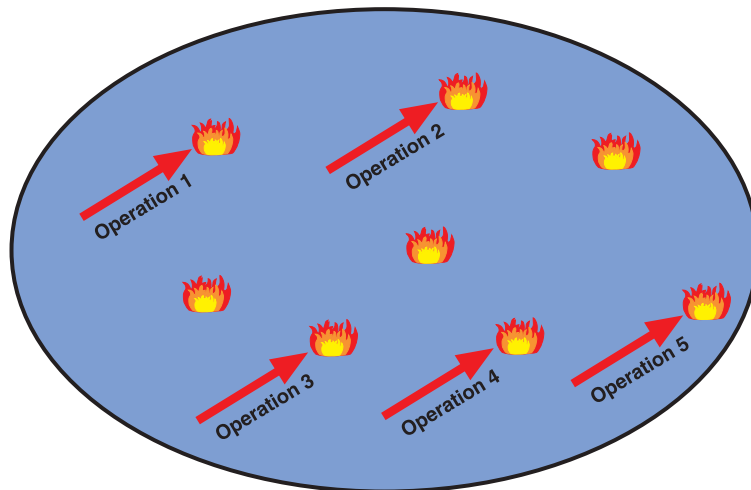


Figure 24. Strategic command should be able to select from a larger number of operational alternatives than the total that the organisation is capable of carrying out. Not all emergencies automatically lead to an operation.

Example: In a fire & rescue service with the capability of managing five simultaneous operations of a certain size, the strategic command must be able to select from more emergencies than the total that the organisation is capable of handling. With proper analysis of all the emergencies, the system can select the five to prioritise. Without this prioritising capability, the sixth emergency would automatically not lead to action, as strategic command would not be able to manage it. A method to augment the system's capability of managing more emergencies than the total that it is dimensioned for is to expand the capacity of strategic command.

Orders should be formulated and communicated in an appropriate fashion in order to ensure that the receiver fully understands the message throughout its period of validity.

Commanders at all levels, manage their organisation by giving orders. An order may vary in its content, due to, among other things, the type of command principle applied. The order must, however, always be formulated and communicated in such a way that the receiver is able to fully understand the message throughout the whole period of its validity. If the order is meant to apply only for a shorter period a verbal description can suffice, with a possible confirmation of the understanding of its contents. However, for a longer applicable period, the order must be documented to ensure that the message is not misinterpreted or lost. This is especially important when the intended target of the message is several people who may not share a common understanding of the situation, such as, replacement and relief personnel.

The warning signals from a level in the command system should be analysed within the defined maximum time limit by the higher command and the necessary decisions made.

Beyond the established or temporary agreements on reporting, signals could penetrate the command system. These signals, which consist of extraordinary information, could sometimes be considered as warning signals.⁹ It could be a sign that all is not well in the organisation or that the command & control organisation does not have the correct picture of the situation. Commanders at all levels should have a contingency plan, mental as well as physical capabilities in order to input and analyse such signals. To merely manage the organisation, based on these warning signals, is nothing more than reactive behaviour towards the occurring circumstances.

The Command & control process

The choice of command principle should be clear. Command & control should first and foremost be exercised through *mission tactics*. The commander, in discharging his daily duties, should have a long-term perspective and lay the foundation for a mission orientation.



The ability to project events with the aid of models is a prerequisite at the higher levels off command.



Being able to make decisions, communicate one's desires, and accept responsibilities are some of the most important qualities of a commander in fire and rescue operations. The ability to understand the level specific and the interaction between its components is essential to the ability to command at all levels in the command & control system.



Strategic command should be able to handle more operational alternatives than the total for which the system is dimensioned.



Orders should be formulated and communicated in an appropriate fashion in order to ensure that receivers fully understand the message throughout its period of validity.



The warning signals from a level in the command system should be analysed within the defined maximum time limit by the higher command and the necessary decisions made.

Co-ordination

Co-ordination augments the effectiveness of the whole operation. Responsibility should be clearly regulated in this respect. Co-ordination needs, which cannot be solved by exercising command, are met through co-operation.

Co-ordination of the different activities within an organisation is an important element in Command & control and prevails in several parts of the system, for example, in the co-ordination of different fire and rescue operations, between different units in the same operation and between different organisations. Co-ordination implies that the different parts are harmonised. Boundaries between tasks and responsibilities are defined; actions and measures, which should take place in a certain sequence or simultaneously, are synchronised. The aim of co-ordination is to augment the effectiveness of the total operation, through the optimal utilisation of resources in the organisation. Duplication of activities and unresolved partial issues should be avoided. The responsibilities for co-ordination must be clearly defined in order to ensure that co-ordination occurs. It should be evident who on each level bears this responsibility.

Co-ordination can take place in the following two ways:

- *Exercising command* means that a commander accepts his responsibility, makes the necessary decisions and communicates them as orders. By these orders, e.g. division in sectors and other types of task-divisions, the commander then co-ordinates their activities.
- *Co-operation* means where different commanders on the same lateral level, in the absence of an internal hierarchy between them, co-ordinate directly among themselves. Neither level commands the other, they co-operate instead.

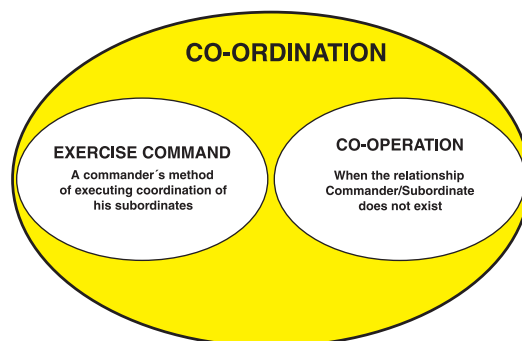


Figure 25. A commander co-ordinates the activities of his subordinates by making decisions and giving orders. If nobody is in command because they are laterally of the same rank, then co-ordination is achieved through co-operation.

A commander always has the responsibility for co-ordination among his subordinates. This responsibility follows a hierarchic pattern and is a part of Command & control. In the case where there is an absence of a hierarchic structure, the responsibility for co-ordination should also be defined, that is to say, no command position exists and giving orders is not possible under such conditions. Another example, this time with two different systems, the rescue service and ambulance service carrying out parallel operations in the same disaster area. The responsibility for co-ordination in this case should rest upon the person whose area of responsibility contains “the most critical factors”. “The most critical factors” are those factors that have the highest significance in the escalation of damages at that moment. To be responsible for co-ordination through co-operation means to establish the appropriate conditions, i.e., to actively seek contact and communication with the parties concerned and create the necessary prerequisites for co-operation.

A commander can co-ordinate his subordinates by ordering them to co-operate with each other. However, this does not relieve the commander of his responsibility in co-ordination. If the ordered co-operation does not take place, the commander must intervene with clear orders and establish the co-ordination that the ordered co-operation was meant to give.

A good capacity for co-operation between individual units relieves the higher-ranking command levels.

On the contrary, a well-developed ability of the individual units to co-operate with one another without being ordered to minimises the workload of the commander. This happens when co-ordination is set against an objective, e.g. as stated in the GD (General Decision) put forward by the commander. This ability is often considered as a bonus effect of well-developed mission tactics in the organisation. It is, in conformity with mission tactics, a question of behaviour towards the surrounding parts of the organisation as well as the surrounding organisations.

Co-ordination

Co-ordination augments the effectiveness of the whole operation. Responsibility should be clearly regulated in this respect. Co-ordination needs that cannot be solved by exercising command are met through co-operation.



A good capacity for co-operation between individual units relieves the higher-ranking command levels.

Time factors

The command & control organisation must be able to activate rapidly to the necessary level.

The organisation's command & control capability can be augmented by two main methods. Firstly, by increasing the number of command levels among which the components are distributed. Secondly, by command support in the form of an increase in staff capacity, contributing to the existing levels' capacity to command.

Irrespective of the method chosen, what is important is that it must be applied sufficiently quickly. Just how do we define "sufficiently quickly"? The answer to this is governed by several factors, among others:

- Acceleration of the scenario. The escalation in damage over time.
- The autonomy that is built into the system, i.e., the time available, during which the whole or parts of the system can act independently.
- The ability for early activation of the command & control organisation, so that precious time is not lost during the initial stage of the operation.
- The ability for improvisation "in the right direction", as a reflection of the organisation's capability in mission tactics as opposed to detailed command.

The command & control organisation ought to have the sustainability relevant in proportion to the scenario's expected duration.

In dimensioning the organisation, (as pointed out in chapter 2) it is not only the system's capacity to begin operations that is considered, its capacity to sustain and accomplish the whole mission must also be included. The command & control organisation must be given the sustainability relevant in proportion to the expected duration of the scenario, which is the basis for dimensioning. It is therefore, as earlier pointed out, imperative to obtain an understanding of the time factor in the respective scenarios. Otherwise the organisation risks becoming reactive in its approach.

Time factors

The command & control organisation must be able to activate rapidly to the necessary level.



The command & control organisation ought to have the sustainability relevant in proportion to the scenario's expected duration.

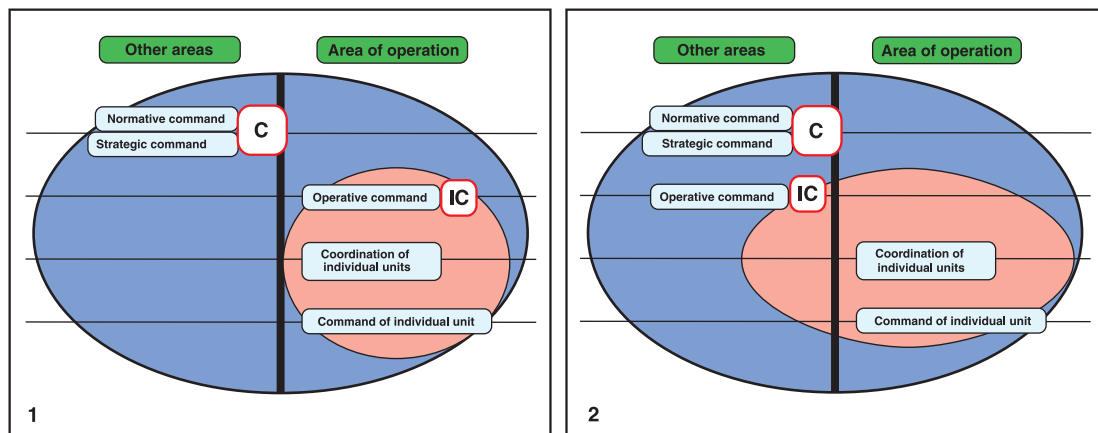
Geography

Operative command is, as far as is possible, executed in close proximity to the operation.

A common recurring issue within the fire & rescue service is the geographical positioning of incident commanders. It appears that appointment to incident commander coincides with the component in the command & control system that exercises “*the integrated command of the operation within the framework*”, i.e. the operative command. The person that commands the operative component ought to be able to select a location that enhances the overall picture of the events.¹⁰ In order to do this; consideration must be given to several factors (see chapter 7). However, visual impression is regarded as a significant factor in understanding the course of events. The operative command must even have the ability to act in a short time perspective, which can be easier if the command is exercised in close proximity to the scene of the incident. In most fire and rescue operations, the incident commander usually has personal contact with his subordinate commanders. The personal contacts between them improve communication, e.g., the possibility of receiving simple reports and giving verbal orders. Thus, operative command ought to have close contact with the operation; in other words, it should be exercised directly from the scene of the incident. The entire area of responsibility of operative command falls within the framework of operational activities.

In a geographically wide spread accident or in a very large disaster area, it is practically impossible to be close to the whole disaster area. The advantages stated above might not apply in such cases and the disadvantages of a temporary command post prevail. The disadvantages and advantages must be weighed against each other, for example, the lack of communication, access to AV equipment and the influence of the weather. In these cases other parameters than proximity to the disaster area should be decisive in the choice of command post.

Figure 26



In the example above, the incident commander exercises operative command at the scene of the accident. The commanding officer exercises normative and strategic command from another location

If the incident commander moves to another location, he is still able to hold his position as incident commander and execute operative command.

Normative and strategic command should be executed from a location where the most suitable conditions prevail.

The area of responsibility for the normative and strategic components in command & control covers the entire fire & rescue service organisation's activities. Any geographical limitation to a particular disaster area does not exist. The level that exercises command in these components should act from a location where conditions are most appropriate, e.g., in the form of premises, communications and other technical systems.

Commanders are supported by a staff from a location with the most suitable conditions.

Particular locations for a staff can not be defined. Normally, commanders need to have their staff in close proximity to their command post. Therefore, in practice, the choice of command post also determines the choice of the staff's location. Whether the staff can perform from this location is determined by, e.g. access to premises and communication. Good access to high quality communication increases the choice of establishing a staff location, from which a commander can be supported.

Geography

Operative command is, as far as is possible, executed in close proximity to the operation.



Normative and strategic command should be executed from a location where the most suitable conditions prevail.



Commanders are supported by a staff from a location with the most suitable conditions.

Technical systems

Technical systems should be developed with respect to the needs of the command & control system.

The needs of the command & control system should determine the development of technical systems, which are used as tools during operations. Demands on technical systems are determined by, for example, the following factors:

- The capacity for autonomy of the command & control system
- The capacity of the command levels to temporarily stand in as reserves for one another
- Report routines
- The choice of command principle, and methods for monitoring and follow up
- The formulation of orders
- The choice of command posts, the location of commanders and staff
- The interplay between humans and technology.

Special solutions, which are only used in special situations, should be avoided as far as possible. Commanders and staff members should always be familiar with the technical systems. Technical systems must, in other words, be compatible with the command & control system in general.

Technical systems should provide accessibility, reliability and be protected in accordance with the threat that is defined in the local threat scenario. A balance between physical protection and redundancy should be observed.

Fire & rescue service organisations are dimensioned according to the local threat scenario. (As discussed earlier in chapter 1.) The demand for accessibility, reliability and physical protection for technical systems should be similar to the demand described in the threat scenario. A technical system can never be protected to a hundred percent, even if many safety measures are taken with the aim of preventing damage to and malfunction of technical equipment. Providing maximum protection to a technical system can result in very high costs without receiving a one hundred percent guarantee of reliability. Instead of protecting a technical system, technology can be quantitatively over-

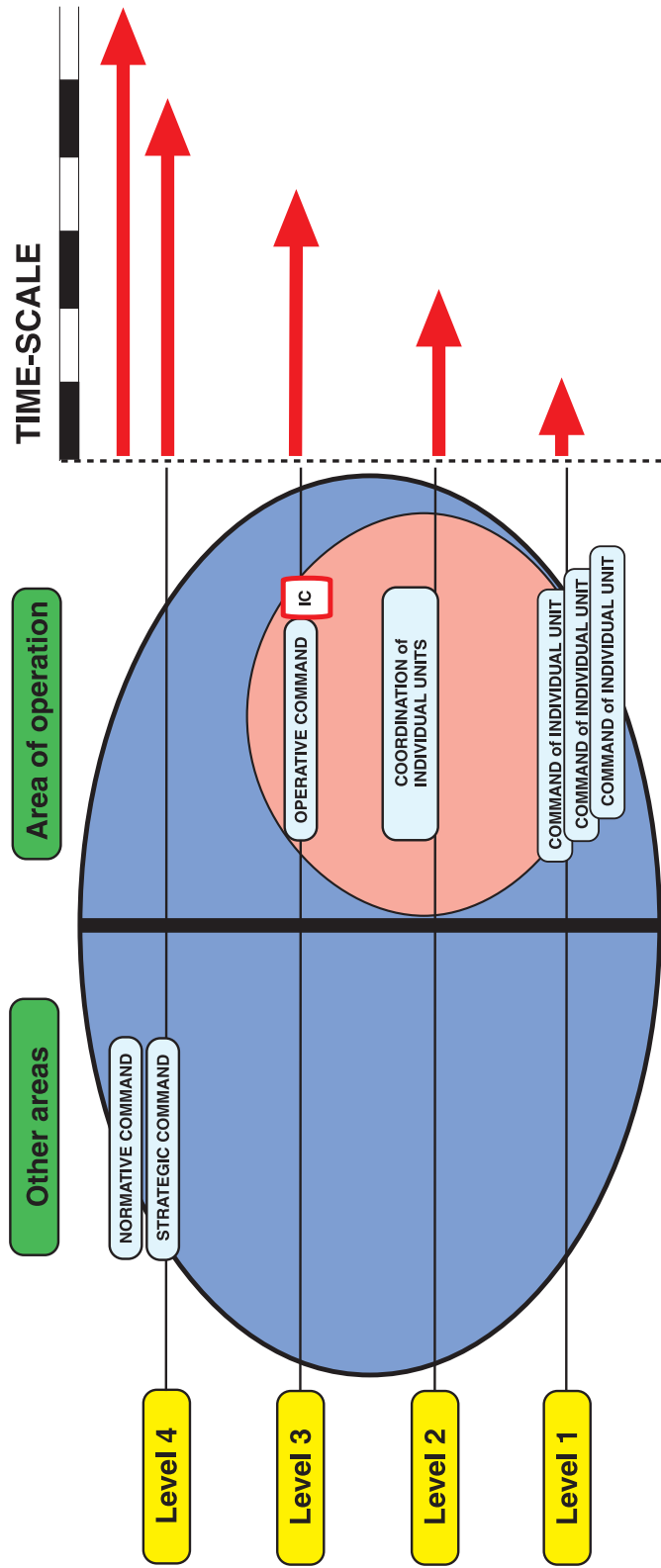
dimensioned and divided into independent parallel systems. This however, entails a certain over-capacity or slack resources. If such over-dimensioning and division of systems can result in a system being able to replace another then the system is redundant. The two alternatives, protection and redundancy should always be compared with the aim of acquiring an optimal economic balance. It can be beneficial to have disposable equipment or to acquire new equipment after a while, instead of holding an exaggerated protective standard.

Technical Systems

Technical systems should be developed with respect to the needs of the command & control system.



Technical systems should provide accessibility, reliability and be protected in accordance with the threat that is defined in the local threat scenario. A balance between physical protection and redundancy should be observed.



Notations

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