

Task Allocation in Emergency Dispatch Centers

Evaluation of different task arrangements for the integration of emergency dispatching services from different organizations

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Abstract – The Emergency Dispatch Centers (EDC) of police-, fire- and ambulance are the integral hub for emergency dispatching. Emergency response is an important governmental task, requiring coordination and collaboration between and within different agencies. Because of the developments in technology it is possible to improve emergency dispatching services to civilians. This requires however new ways of working and it is unclear how in this light operational tasks should be allocated to achieve high quality emergency response services. The article aims three alternative task arrangements. Results show that no best task arrangement exists, and considerations between performance indicators are necessary. This is due to the different perspective from the operational and political level. The findings show that a key concern is with the institutional change instigated by the government. Decision makers should take into account the operational perspective when designing a suitable task arrangement. Standardization versus professionalization, specialism versus generalism and information sharing versus information divide are thereby the most prominent considerations.

Keywords – Emergency Dispatch Center (EDC), task arrangements, institutional change, scenario analysis, considerations, evaluation

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Introduction

Currently a centralization effort is being made by the Dutch government to bring back the number of semi-autonomous Emergency Dispatch Centers (EDCs) from twenty-five to ten, including one central coordinating body. Also operational roles are being redesigned to decrease costs, improve uniformity, efficiency and eventually the overall quality of emergency response. The Emergency Dispatch Center of Rotterdam-Rijnmond is one of the EDCs in the process of designing new task arrangements according to the new governmental guidelines (Ministry of Safety and Justice, 2013).

Problems can arise when institutional and technical changes to the emergency management sector are initiated as is the case in the Dutch Emergency services sector (Transitieakkoord, 2013).

Responding to emergency situations is a complex task because of the different types and consequences of emergencies. An emergency can be defined as any situation caused by nature or man, harming people or property (Shen & Shaw, 2004). There are a lot of agencies involved in the organization of emergency response services. Consequently regulation and collaboration schemes

are set up to deal with the challenge of delivering high performance emergency response services (Chen & Decker, 2005).

The EDC is the central 'hub' for emergency dispatching and thus the vital link in the emergency response process. Operators from the Police-, fire- and ambulance care department work together in the EDC to initiate the course of action in case of emergencies. They do this based on incoming emergency calls. The current Dutch emergency response services landscape is subject to institutional change driven by technology (Ministry of Safety and Justice, 2013). Although initially small and modifications were made, it becomes clear that a transformation is required. The current task allocation is not suitable and needs to be reallocated. Coase (Coase, 2015) argues that institutional (re)design governs the performance of the economy on a macro scale. Its systems should therefore be carefully designed in order to perform well. This means that in-depth knowledge is needed of the processes and tasks at the EDC to be able to make well informed decisions on the allocation. Where the government decides on rules and regulations, the way that tasks are executed is often not set in stone. This means that there are choices that can be made on how to arrange tasks on an operational level.

The institutional structure can be seen as a professional bureaucracy where different agencies cooperate to provide emergency response services (Mintzberg, 1983). The responsibility and task allocation in the emergency response services sector are a result of historic growth and fine tuning. Van Duijn (2015) describes it as the 'sunk cost of innovation' through the historic evolution of the sector. This means that new decisions are made in light of the already existing structure and not from scratch. This makes redesign difficult, because you need to deal with the existing structure, and there is a limited amount of resources available.

This article is based on the research done by van Duijn (2015) into task arrangement design considerations. Three operational task arrangement scenarios at the EDC are evaluated. Political and operational views differ to what is the best scenario. There were considerations found that need to be taken into account to design a suitable task arrangement.

This article examines which task arrangement is considered best and which considerations need to

be taken into account when designing task arrangements. Three alternative task arrangements are evaluated by quantitative and qualitative interviews of different EDC operators in a case study at the Rotterdam-Rijnmond EDC. Considerations were found concerning choices to be made. This includes deciding on the amount of professionalization versus standardization and deciding on uniformity of process outcome by procedurizing tasks or by specializing of operators (van Duijn, 2015).

An attempt is made to understand which effects different task arrangements have on the effectiveness of the system as a whole, looking from the operational perspective which is not included in the decision making process. The structure of the article is as follows. First the background of institutional change is explained to establish why issues can arise. Then the research design is presented which includes the setup of the evaluation. Next, the three alternative task arrangements are explained and results of the evaluation are discussed. This leads to conclusions and recommendations concerning the main topic.

Background

This section explains the background to answering the research question. The goal is to determine which task allocation is best. This task allocation is an institutional redesign and thus first a general analysis of organizational structure is done to give insight in institutional design. With this background knowledge possible issues are identified that show why different arrangement may or may not be preferred by different layers within the public organization.

Institutional change concerns the changing of structures, so to investigate design, knowledge of the current and future structure of the emergency service organization gives insight in possible tensions between organizational levels. In this case tensions between the operational and national (decision making) 'layer', that might arise from the transition from the as-is to the to-be institutional 'system'.

Institutions are structures that are arranged formally (Edquist, 2004) and are characterized by their stability (Goodin, 1998) and therefore predictability (Koppenjan & Groenewegen, 2005). This implies also that they are hard to change (Koppenjan & Groenewegen, 2005). It is argued that

the forces playing a role concerning tasks and responsibility allocation are important to investigate. (Van Duijn, 2015).

In the context of organizational change within a multi actor setting with interagency collaboration knowing which tensions might play a role is important. It can be reasoned which outcomes of the innovation process are to be expected, based on the approach taken, which forces play a role and how to manage these forces. Although the national government in the end is able to decide how to arrange things, intergroup conflicts can be expected, which has a negative effect on the coordination of tasks between different parts of the organization (Schermerhorn, Hunt, Osborn, & Uhl-Bien, 2010).

There are implications found for coordination and collaboration on the operational level from the strategic decisions that are made (van Duijn, 2015). A lot of the implications arise from the inherent structure of the public organization. Henry Mintzberg (1983) proposes a model to rationalize organizational structures, put them into context and identify the possible tensions. He structures organizations as consisting of five different parts and identifies dynamics that exist between these parts (*pulls*). The parts that make up the organization are the strategic apex, middle line, operating core and technostucture and support staff. Different mechanisms and tension play a role depending on the structuring of the organization.

In a professional bureaucracy the operating core consists of specialists (professionals). Operators are categorized on the basis of their skills in order to couple them with issues that need to be solved (van Aart, 2006). This categorization, or classification process is defined by Mintzberg (1983) as *pigeonholing*. The concept of pigeonholing is important because categorization in a professional bureaucracy is not perfect. Meaning that who is exactly responsible for what is not always clear nor always agreed upon.

To ensure or improve high quality of service there has to be agreement on this categorization. Possible considerations are needed to decrease the chance of innovation failure, or increase the chance of successful transition to a new system.

This article is particularly interested in the tension that the decisions have on the operational level. The operating core is responsible for primary tasks related to the organizations' products or services. They perform operations to 'transform inputs into outputs'.

The strategic Apex as Mintzberg (1983) calls it, in this case is the Dutch national government and consists of the management of the organization or government. In this case the Ministry of safety and Justice (Ministry of Safety and Justice, 2010). They carry the overarching responsibility for designing and supervising on the organizations main goals, the strategy and policies.

As said the responsibility and execution layers are divided and views upon how to arrange it too are different. Management tries to increase influence by standardization and centralization whereas operations prefer professional freedom. Political considerations are different compared to operational considerations because of the different viewpoints involved, different knowledge and because political, games play a role in decision making. This leads to compromising instead of optimizing. On the other hand operators lack a holistic view.

Figure 1 Mintzberg organizational structure model

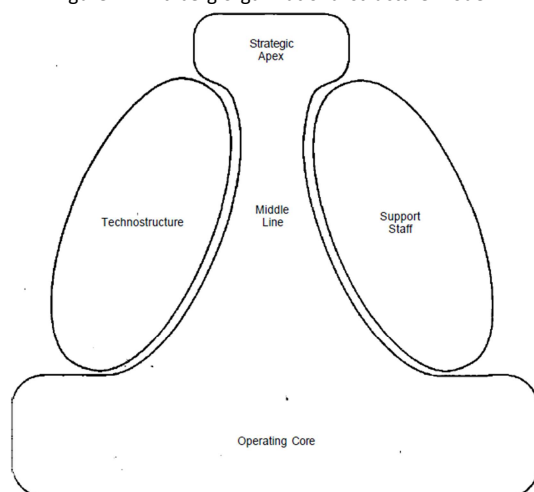


Table 1 evaluation criteria

Criterion	Description
1 One-Stop-Shop	This criterion is meant to judge the best option for handling calls in the first contact. The derivatives of a one-stop-shop include increased clarity and speed for the caller and simplicity/clarity of orchestration
2 Uniformity	It is meant the extent to which it is possible to supply a uniform service to callers (independent on the type of emergency call)
3 Quality of service provided	With this criteria it is meant the availability and reachability of the service for civilians, including the needed time and correctness of how the call is handled.
4 Costs of operations	These are the operational costs associated with the scenario, compared to other scenarios
5 Knowledge requirements	The impact of scenarios on the needed knowledge and competences of operators in the emergency dispatch center.
6 Support by information systems	The amount to which each scenario can be supported by (current) information systems
7 Support of/by regulation	Evaluation of scenarios impact on regulations or vice versa (the regulations effect on the feasibility of the scenario)

Research design

The goal of this research is to evaluate various alternative task arrangements for the Dutch EDC to find considerations to their design. This is done by evaluation of three task arrangement scenarios. A multimethod approach was used (Miles & Huberman, 1994). The tools were used to ensure a representative opinion, while limiting the amount of time needed. The amount of time was limited by the fact that operators cannot leave their post during working hours. Therefore no group session was chosen but instead within the EDC all operational roles were questioned during their work, using a quantitative survey and accompanying questions. Thirteen participants selected from the four different operational roles in the EDC were included, as was an extra supervisor role. The quantitative survey included weights to be given to investigate the opinions of operators on importance of criteria. This way priorities could be identified.

The research setup was as follows:

1. Preparation (interviews and document analysis)
 - a. Identification and analysis of current and (possible) future task arrangements
 - b. Identification of evaluation criteria
 - c. Evaluation survey setup and description
2. Evaluation
 - a. Presentation of survey
 - b. Explanation of criteria and weighing factors
 - c. Discussion on given scores, opinion about it
3. Reporting results
 - a. Combining quantitative and qualitative data from interviews

- b. Result interpretation
- c. Reporting

One researcher was present to explain the questionnaire and facilitate the questioning sessions which were held during one whole day within the Rotterdam-Rijnmond EDC.

Three alternative scenarios

The operational roles involved in the study were the police-, fire- and ambulance centralists, responsible for call issuing, as well as intakers which are currently responsible for the first contact with an emergency caller and putting them through to centralists. The main goal for investigating the three arrangements with the operators is to evaluate if the requirements from the government and the intended benefits of the changes wanted by them do in fact occur, or that different opinions exist with operators. Van Duijn (2015) defines the front office as the intakers and the back-office of centralists. The responsibility for call handling can be assigned to the front and/or back offices in different ways.

The evaluation criteria that van Duijn (2015) found were used in the questionnaire. Requirements to the system agreed upon by politics influence the outcome of how operations are (to be) carried out. In addition to this, helping clients in the first contact as much as possible is desired. From the requirements and preliminary empirical research a list of possible criteria was set up. This list had to capture the important aspects, but also be understandable and able to be put into a questionnaire. This starting point was inspired by (Janssen & Gortemaker, 2010) and it resulted in a

list of seven propositions and descriptions, depicted in table 1.

Task arrangement scenarios

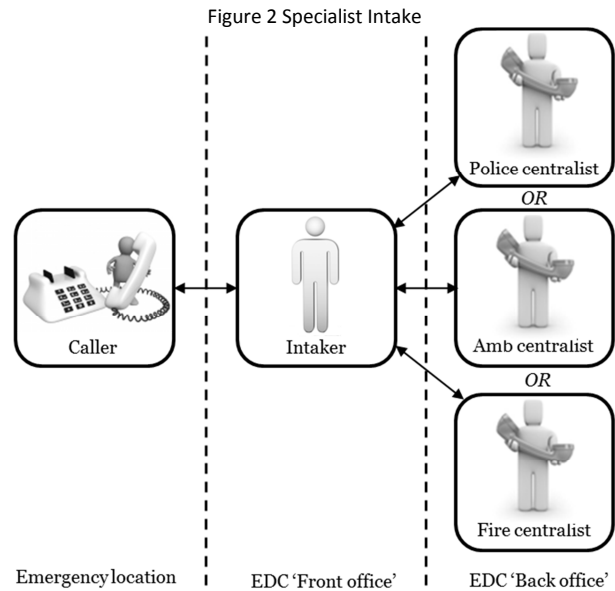
From different imaginable options three scenarios were designed to investigate different opinions about the performance of the system. Scenario 1 has been named *specialist* intake. It depicts the current situation of co-located, but not very integrated emergency call handling. Scenario 2 is called *Multidisciplinary intake*. The desired situation is depicted in this scenario. The third scenario is the true 'multi-intake' scenario without backup. It has been named *One-Stop-shop intake*.

These three scenarios have a different responsibility division and collaboration.

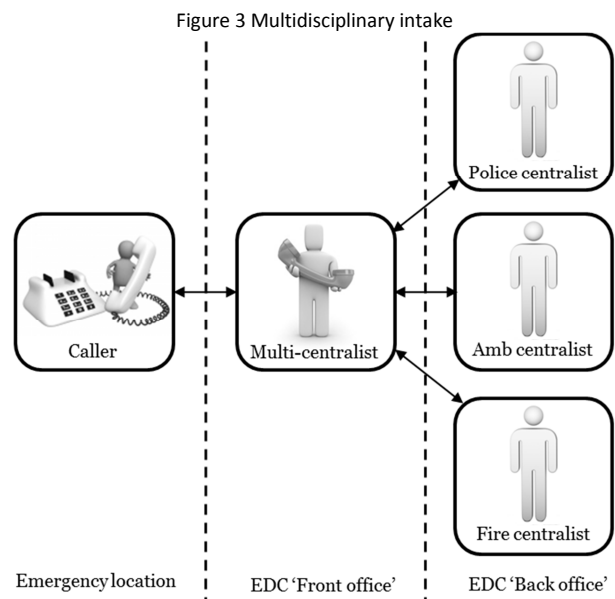
Currently the EDC consists of intakers, centralists of police-, fire- and ambulance care dept., and general supervisors. The first scenario consists of the following operational roles (figure 2);

- An intaker responsible for taking the emergency call and setting up the initial report before forwarding to a centralist. The intaker sends the call to the most knowledgeable centralist based on the request of the caller. The most knowledgeable centralist is chosen based on the emergency request.
- The centralist is responsible for further questioning and for issuing units and monitoring units on the street. There are three different centralist roles in the EDC which are the Police centralist, responsible when police is needed, Fire dept. centralist responsible for issuing calls when the fire dept. is needed and an ambulance care dept. centralist is responsible when medical assistance is requested.
- Usually one or two supervisors are also present in the EDC. They oversee/manage the processes and help out when/where necessary. This is the current situation.

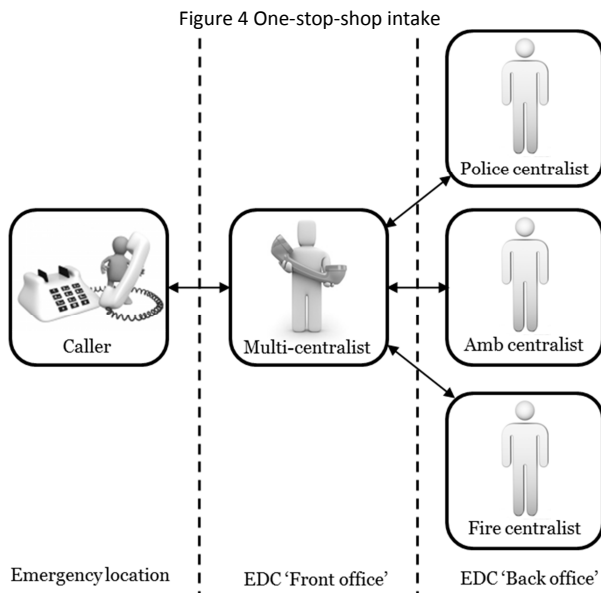
Compared to scenario 1 the second has a different allocation of responsibilities (figure 3). In this multidisciplinary intake scenario the intelligence (orchestration) lies partly with the centralist and partly with the back office specialist. Dependent on the type of emergency and its complexity a lengthened intake can be set-up.



These are backup centralists that can be involved in case a centralist cannot handle the call by him/herself. This scenario is based on the initial idea that has been designed by the government to decrease the amount of operators and improve efficiency and uniformity.



The third scenario (figure 4) resembles the second scenario, except for a distinct difference. No lengthened intake is involved. This means that no backup is available anymore for the centralist. Orchestration lies fully within hands of the multidisciplinary intake centralist. He/she handles the call in the first contact and is expected to have sufficient knowledge to handle any type of emergency call.



one-stop-shop (OSS) for example, the hypotheses is that multi-intake leads to less different contacts for callers. This does not seem to be perceived. Furthermore scenario 1 covers other scenarios except for the score on uniformity (UNI). Scenario 3 is observed as more positive, because collaboration between departments is currently found to be limited. However this criterion is ranked 5th in terms of importance compared to the other criteria.

Another result is that protocols, which are seen as part of the information system support criterion (ITS), have a lot of influence on the way of working which can have a large impact. Seemingly, more relationships exist between and within criteria that determine the feasibility of the future scenarios compared to the current situation.

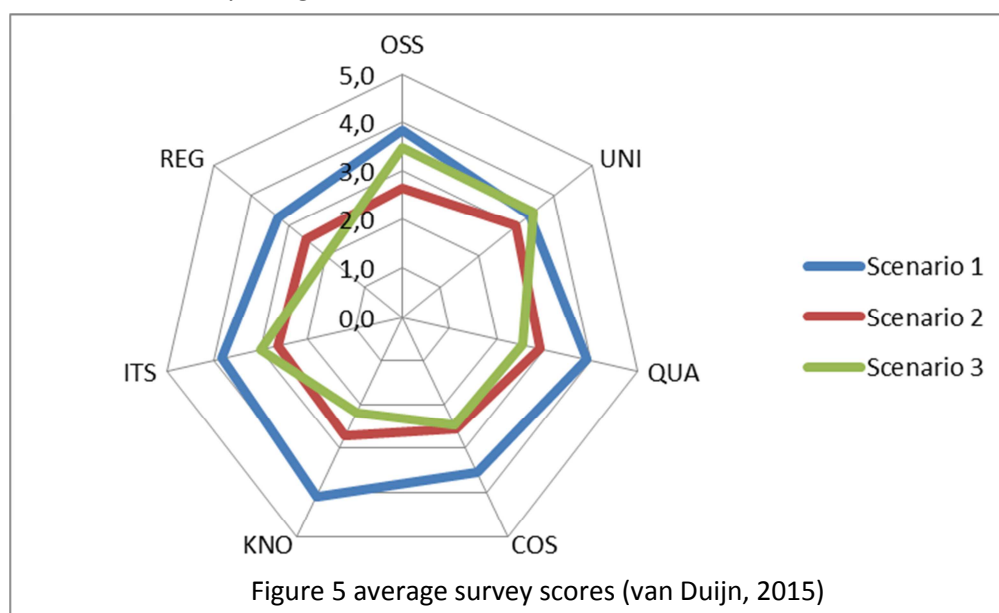
Results of the evaluation

The average results from the scores given on a five point liker-scale in the questionnaire show that the operators at the EDC have a preference towards the current situation, scenario 1. The current task arrangement scores high on the seven criteria compared to scenario 2 and 3. This means operators do not think that the desired situation wanted by the government, nor the complete multi-intake scenario (3) are an improvement on the criteria.

The average scores given per criterion are displayed in figure 5. Some surprising and interesting things are seen. First of all a lot of the expected and intended benefits stated by the government, which

Under the presumption that new protocols will be introduced to standardize the output in the desired situation, one of the respondents described the desired situation as *'assembly line work'*. This is something operators are very much against for that they lose freedom and think it decreases overall quality because it is impossible to categorize all incidents perfectly leading to mistakes. As explained thus the protocols can be related to the pigeonholing classification process that is not perfect. A balance needs to be found thus for the right amount of protocols.

Mintzberg (1983) argued that organizational tensions, that he calls *'pulls'* exist in professional bureaucracies. The effect of this is visible. The bias



have been the justification for the new organizational and task structure, do not seem to be seen as such by the operating core. Concerning a

from operators towards the current situation can be explained by the fact that operators see quality as the most important criterion, and think that it is

best in the current situation. The governmental layer has a different view than the operational layer hence, it can be concluded that transitions will be resisted by operators and thus to minimize this chance actions should be taken.

Considerations

From the results there are three considerations that should to be incorporated when designing an effective task arrangement. The first consideration or trade-off is how to decide on *Standardization versus professionalization*. There is a trade-off between standardization and getting the 'most uniform service delivery' versus the "best individual judgment". The pigeonholing process as explained is imperfect thus a trade-off exists. The second consideration is *Specialism versus generalism*. The desired situation (2) leads to more generalists and as a starting point, increasing knowledge need. Not every operator thinks it is impossible to do a multi-intake, but a lot of them think it will become too complicated. This leads to the earlier trade-off of putting in protocols, to decrease the knowledge need. It may not be expected of generalists to have as much in-depth knowledge (specialism) as the specialists, which can have a negative impact on the quality of service. The third consideration is about *Information sharing for collaboration versus information divide for privacy*. Regulatory issues are to be expected when changing task arrangements because of criminal law versus privacy (medical data) law. Releasing data improves collaboration which improves the quality of service but a trade-off needs to be made because of the rules. The consideration is how to improve collaboration without breaking regulatory boundaries and overcoming the issue of losing too much quality by non-collaboration.

Conclusion and recommendation

Apparently the operational core sees things differently than the managerial layer. Though the government believes that a new way of allocating responsibilities will improve the performance according to operators there is no scenario available that satisfies all criteria completely under the current circumstances. There are specific choices that need to be made concerning the overall quality desired, the amount of standardization and specialization and how to deal with privacy issues. These issues need to be considered in order to be able to design a task arrangement that will be suitable not only from a political perspective but also incorporates the

insights from an operational perspective. For this the glass wall between the decision making authority and operating core needs to be broken down to improve the chance of an agreement on a task arrangement that is best suitable for Dutch EDC's. Because of the political and operational view differences there is no best arrangement, but considerations are found that can aid in designing a suitable task arrangement.

The focus of this article was evaluating three task arrangements at the EDC. It is relevant to do further research into the differences between the managerial and operational layer. More insight in the differences makes sense. The current investigation could for instance be further quantified by expanding the quantitative study over other EDC's. The results show that an optimal arrangement is not feasible. The research opens the door to making better policy decisions, but further research must be done to in-depth investigate how to deal with the change process on a larger scale.

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