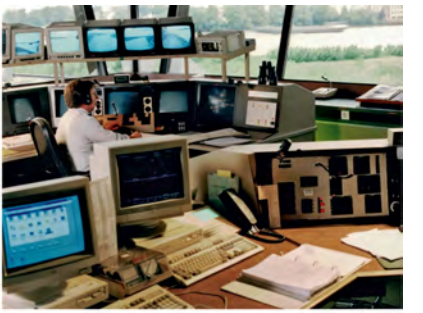
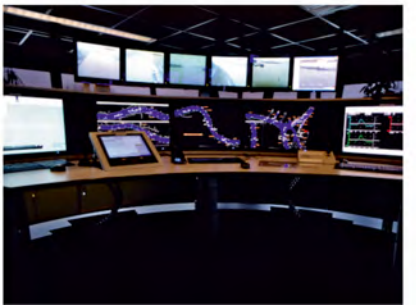
Chapter 2 – The Mediatisation of Work

Figure 1: Photograph of Dordrecht control room, taken in 1986 by the now retired operator Dirk Zwijnenburg. Figure 2: The same control room in 1995, taken by Rijkswaterstaat. Figure 3: 2018 photograph of still the same control room, taken by author during a field visit.





As I write these introductory words, in the late summer of 2020, Rijkswaterstaat has abandoned Devil's Island. The operators were the last to work in an otherwise empty building. The others have moved to a new office in the old town of Dordrecht, within walking distance of the train station. Much of the work done by the outdoor department on Devil's Island had long since been outsourced, and many of the workshops were already unused. The operators moved to a nearby building, also on the Oude Maas, between the two crossings. Before the renovation, it was the control room for the tunnel under the river, with most of its windows facing away from the river, on the side of the tunnel opening. The view from Berlin, where I am writing

this, is that they seem quite happy with their new workplace. Rolph has been providing regular updates on the renovation via Twitter. At the inauguration, several Rijkswaterstaat patrol boats and a police boat stood in formation on the Oude Maas just below the control room window, honking their horns. Rijkswaterstaat's communications department had used drones to capture the event, which Rolph tweeted (2020). The regional newspaper paid close attention to the move. In the article, Rolph said they were happy to be back on the water: "When push comes to shove, you still want to be able to see for yourself. Nothing beats the naked eye" (Koster 2020).

This move would then be a great opportunity to tell the story of Rijkswaterstaat's work on Devil's Island from start to finish. I had heard rumours that Rijkswaterstaat was keen to sell the large piece of land, which is well placed for industrial and nautical activities. This could be the story of Rijkswaterstaat moving from water engineering to infrastructure management to property investment. Others, however, were not so sure that it was Rijkswaterstaat's land to sell in the first place. If you focus on the scandalous, you can get sucked into a quagmire and lose sight of more mundane but more meaningful changes.

Moreover, to reduce it to a Rijkswaterstaat story would be to ignore the fact that there was another agency working there: the Directorate of Shipping and Maritime Affairs (DGSM). In the early days of the Dordrecht control room, two operators worked in shifts: the radar operator was employed by DGSM, and the other, who assisted skippers on a different marine VHF frequency and was not qualified to use the radar, was employed by Rijkswaterstaat (Interview 5.1.18). The DGSM was, now DGLM, the state organisation for nautical policy, also concerned with piloting,[1] and for people in the field historically linked to the Dutch navy.

Although I cannot do justice to the organisational rivalry between DGSM and Rijkswaterstaat, it is part of a larger theme that connects much of the work of the operators on Devil's Island and the changes that this work has undergone. This is linked to what Rolph said in the local press. From talking to Dordrecht operators over the years, I know that operators have fought long and hard to keep a direct view of the water. In a private email, one operator, when asked how he likes the new control room, mentioned the "very beautiful view of the Oude Maas." (Email 4.9.20)

Phrased this way, it sounds like a senior manager coveting a corner office and praising the view once it has been achieved. In fact, the head office of Rijkswaterstaat's shipping department is right on the Maas in Rotterdam, on the umpteenth floor. Whenever I have been there to interview senior staff, I have been impressed by the view of the port and the city. But for the operators in the Dordrecht control room, and for many of the operators I met in other Rijkswaterstaat control rooms, a direct view of the water is not associated with power or luxury, but with their former work as skippers. From the wheelhouse, a panoramic view of the water enabled

1 "Lotsen" in German, "loodsen" in Dutch.

them to observe the river, the weather and the traffic. Although today's wheelhouse has large consoles packed with interfaces, I have seen older skippers only turn on the radar display at night or in fog.

This is not to say that skippers-turned-operators are averse to media, but they have learned to navigate and understand the variables that guide shipping by looking outside. The first generation of Dordrecht operators were almost exclusively former skippers, and they still make up the majority. It has often been argued by operators that this experience, together with a direct view of the waterway, is crucial to the successful coordination of traffic. Knowing the local conditions is one thing, understanding how a vessel behaves and what information a skipper needs is another.

However, one operator in the control room at the port of Antwerp disagreed when we mentioned the need for maritime experience: "air traffic control is not done by ex-pilots either" (Field note 7.4.17). In fact, none of the German, Dutch or Belgian state organisations that operate control rooms for coordinating traffic between Duisburg, Rotterdam and Antwerp—the world's busiest inland waterways, as is regularly claimed—require their operators to have shipping experience. But in Rijkswaterstaat's control rooms, operators find it difficult to take anyone seriously who is not a former skipper. Almost every work-related utterance, usually from one of their superiors, can be legitimately dismissed, at least in the eyes of the operators, with she or he 'has never sailed'.

A direct view of the water is also no longer guaranteed. Many operators have no view of the area they monitor other than CCTV and radar, overlaid with nautical charts and a geolocative system called AIS (Automatic Identification System). This is because different crossings, called 'sectors', are often centralised under one roof and operators rotate between them every few hours, changing consoles. All the control rooms still have a direct view of the water, usually a magnificent panoramic view, and are located at the heart of busy ports or busy intersections, but only one sector has a view that actually corresponds to its interfaces. In practice, the view of the water is still used: binoculars are plentiful, operators use them every shift, often huddling together, looking across the water and discussing the event that has caught their attention. Operators say the view allows them to consider many variables at once—draft, visibility, wind, cargo—to assess a vessel's manoeuvrability. However, when I followed a cohort of future operators through their formal training, neither binoculars nor a direct view of the waterway were ever mentioned, as training is done on simulators.

The difference in understanding of operator work—what an operator should know and be able to observe in order to do the job—between those doing the work and their superiors is remarkable. So instead of trying to explain how Devil's Island was abandoned again, I looked for an explanation for the different understandings of operator work. This would best explain the publicly expressed tensions between

operators and management that drew me to the field in the first place.[2] How did skippers become operators, what changed for them when they did, why did the organisation recruit skippers in the first place and, most importantly, how could this experience be declared irrelevant? I found out the answer lies in the informal training of skippers, the efforts of skippers-turned-operators to professionalise, their rivalry with pilots at DGSM, the rise of managerialism, much of which comes together in what I call the mediatisation of work.[3] The three photographs that open this chapter (Figures 1, 2 and 3) illustrate how the number and size of screens increased, shifting the operator's gaze more and more towards the interfaces and away from the control room windows.

This chapter is divided into six parts: the first has a methodological focus and introduces the diversity of sources and their materiality as part of the field, which is more than an anthropological projection and reflects how actors were historiographically active even before I mobilised them for this project; in the second part, former skippers tell how they became operators (now retired), which highlights the community of practice they were part of and the mode of learning they brought to the control room. The third part then discusses early control room work—with a special focus on the control room kitchen—and how what appeared to be start-up problems actually persisted for decades; the fourth part describes and analyses the professional rivalry with pilots that manifested itself early on; then, in the fifth part, the formalisation of control room work, from the early autonomy afforded by the media setup, to how the mediatisation of control room work allowed the locus of training to shift to simulators, unsettled the community of practice, and undermined the relevance of the direct view of the water, allowing for the centralisation of control rooms; finally, the sixth part discusses the role of managers, both by looking at how Rijkswaterstaat became managerialised and how the professionalisation of managers automatically excluded operators from achieving the same status, a fate sealed when scandal-hit Rijkswaterstaat decided to become a 'network manager' and needed operators to fall into line.

2.1. The anthropological interest in historiography

From an anthropological perspective, historiography has never been far away, or should not have been a separate entity in the first place (cf. Evans-Pritchard 1962).

2 Although I understand it as the main, underlying cause of the conflict, there are different aspects to it. I will highlight those along the way, but do not claim to fully cover all the dimensions of the conflict.

3 Parts of this chapter were taken from my article "Mediatisation of Work" (Boersma 2018) and reworked and elaborated upon.

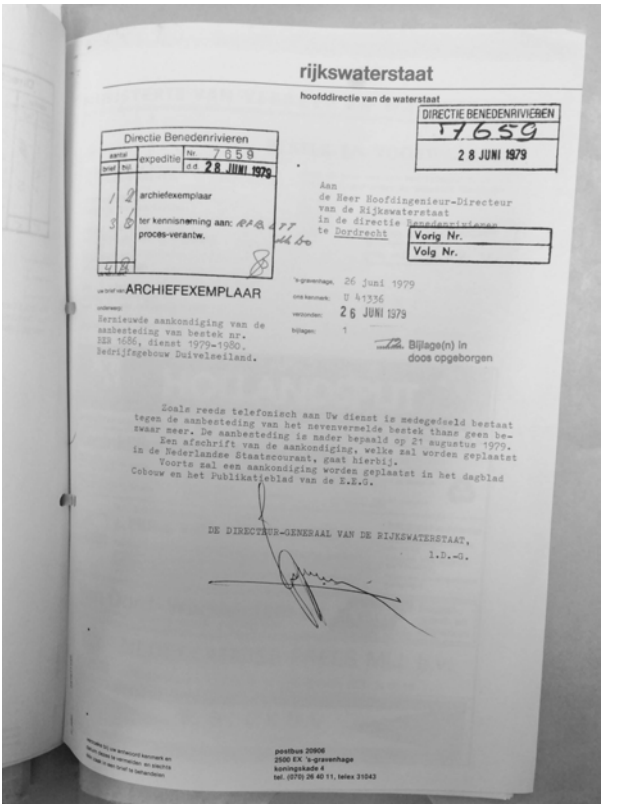
The previous chapter began with Jens Wietschorke's emphasis on how the past is present, and how the past itself was once a present. Here we continue in that vein. Diane Vaughan wrote that historical anthropology "studies the way ordinary people in other times and cultures made sense of things" (Vaughan 1996: 61). For me, to study history anthropologically is to engage with a variety of epistemological sensibilities. Classically, the anterior interest of anthropology was about "the before", a colonialist dream of times untainted, also by anthropologists themselves (Cohn 1987: 19). Although the context is different, the credibility of the source is not necessarily enhanced by the perceived absence of the researcher during its production. To you, the reader, I, the researcher, am very much present in these documents when I present them. One must therefore be sensitive to the present from which the past is being researched and by whom. From this it follows that when one embarks on an oral history project (as we are about to do), one must be aware of the presence from which the past is remembered. The third sensibility is to account for how the past has tried to give shape to how it is understood in the present. What follows is an overview of the sources I have worked with in the light of these three points.

Archives: structured absence

As far as I could tell, there were two archives, both state-funded, that held documents that could provide evidence of organisational meaning making. Before the documents ended up in these archives—mainly from the 1970s and 1980s, as the 1990s are not yet available—they passed through many different hands. The journey of these documents includes at least three moments of storage—1) by an employee who filed them in a cabinet, then 2) handed them over to the central archive of the agency for internal use, and 3) the handing over of parts of the archive to a public archive as part of a Dutch law on the keeping of public records—three moments in which someone wondered what to do with them, which implies that they had an idea of for whom they were keeping the documents. It is safe to say that none of them had an ethnographer in mind. In my experience, to borrow from Tracie L. Wilson, archives are more attuned to the historian's why question than the ethnographer's how question (2012).

Another source of historical documents is the public online database of the Ministry of Infrastructure and Environment, to which Rijkswaterstaat belongs. The selection of Rijkswaterstaat documents for publication appears to be made, among others, by the historian working for the "Corporate Service" of Rijkswaterstaat, whose task it is to promote the production of historical knowledge that "can be learned from in the light of organisational development" and to prioritise public disclosure (Toussaint 2010: 33). Through the database, official reports are made public, such as the 1976 proposal to build a control room in Dordrecht (Benedenrivieren 1976).

Figure 4: A letter approving the public tender for the construction on Devil's Island, with the original signature of the head of Rijkswaterstaat, made for archiving, processed two days after it was sent to the head of the local division responsible for the Dordrecht control room.



Harold Garfinkel once researched "Good Organisational Reasons for 'Bad' Clinical Records" (1967)—he could do this while he was close to the fire, the people who made the records were around. Years before he had helped conduct experiments that highlighted, as Michael Lynch puts it, the "interpretative flexibility of retrospection," as it was claimed that the experiments showed that any narrative could be found in random documents as long as the participants wanted to (Lynch 2009: 92). I could certainly manage to find a narrative in the six per cent of all documents, which is the percentage that the National Archives has passed on, through the intermediary of the State Archives, an archivist told me. Garfinkel suggested, according to Lynch, 'that such flexibility was anticipated and to some extent prospectively managed when the records were written and assembled' (ibid.).

My impression from what I found in the government archives is that they are a testament to the achievements of the government organisation and the particular regional department to which the Dordrecht control room belongs. Important decisions seem to be those with significant financial or organisational consequences. Most documents are signed with a (senior) function, not a name, or by people with academic titles. This idea of top-down accountability is manifested in individual documents (Figure 4). In the letterheads of the central board of Rijkswaterstaat in the 1970s and 1980s, the archive is one of the standard options for the recipients of the letter. The archive is addressed directly at the top. The "hegemonically inflected nature of the surviving evidence" (Uricchio and Pearson 2002: 75) refers both to the documents and to what remains of them as a whole.

However, it is still quite difficult to assess what was left out and how the records were managed prospectively. Ironically, this would depend on the interpretive flexibility of retrospection, of which the notion of 'accountable achievements' introduced above is a manifestation. This in turn invites speculation about the motives for recording: Is it a form of transparency that serves both the public and careers? A genealogy of this particular inherited order thus remains elusive. But it is clear that the control room story that can be told with these archives hardly covers the operators' perspective, because there were no records of anything that looked like daily control room work. There is a structured absence.

Situating oral history

Some of the now retired operators who worked on Devil's Island for decades kept private archives. I was lucky enough to find Dirk Zwijnenburg's archive still relatively intact, mainly covering the period from the late 1970s to the late 1990s (the latter being a decade not yet available in official archives). The decisive factor in whether such archives survive or shrink drastically, apart from the death of the archivist, seems to be whether or not the now retired operator has (yet) moved from a family home to an apartment—in the Netherlands, as elsewhere, many retired people choose to live on a smaller scale. Several times I was simply too late and there was not much left. Frans Heijlaerts, another retired operator, and his wife returned to live on the water, which they had left three decades earlier for a family life on land, including a job as an operator. They renovated an old barge into a house and now sail the European waterways (Interview 4.1.18).

The remaining archive was generously made available to me. Dirk and I went through it together and what I was interested in I was able to take home with me. Dirk is now in his 70s. He was a skipper for the first 15 years of his working life, then moved to the control room and is now retired, although he has continued to work as a captain on a cruise ship on the Rhine. Pictures of old ships fill the walls of his house, and an anchor lies in the front garden. Someone who has collected,

partly (co-)produced and ordered the documents for the historiographer is quite a luxury—at least for the kind of bottom-up, practice-oriented research I am aiming for. I was free to roam, but I was also alerted to documents of interest that I might otherwise have missed. Dirk had archived photographs of older control room setups (Figure 1). The value of these photos was greatly enhanced by the fact that the person who had worked there could describe what was actually depicted. More than identifying the equipment or giving details of the manufacturer, Dirk remembered how it was used. He had also kept many newspaper clippings in his control room over the years.

At first it seemed that Dirk's private archive was less prospectively managed than the official archives: Dirk's archive did not automatically have an audience. After I had interviewed Dirk, he called to ask if he could come by my hotel and bring me a book he had mentioned. It was early January, but Dirk came by bike—he had told me that he had commuted by bike all his life, and that the money they saved by not having a car allowed them to visit their family in Australia every few years. On a blank page he had written a short text and signed it. The history of the Dutch vessel traffic service, as described in the book, was based on material provided by Dirk and other former operators' archives. This is not to say that they knew all along what they were archiving for, but there is a clear correspondence between the operator's perspective of Dirk's archive and the book, which the operators financed themselves, because otherwise their perspective would not have been made public.

The book, which translates as *The Past as Building Block of the Present*, is written by Goffe Halma (2004), a former operator in the port of Rotterdam. As the title suggests, it is an attempt to explain the inherited order in which operators work today. It is also about the struggle the operators went through to try to pass it on on their terms. Halma, to invoke Lindqvist, dug where he stood and Dirk helped him. Lindqvist's book was translated into several languages, but never into Dutch, and the History Workshops[4] that emerged in Sweden in the 1970s and in Germany in the 1980s never really reached the Netherlands, where amateur historiography, like so many things, rarely became a real site of social action. Lindqvist believed in the authority of ordinary workers: "working experience is the platform on which they can stand," and "when they are talking about your job you are the expert." (1979: 26) Lindqvist further points out that "most documents need an oral complement to tell their whole story" (Lindqvist 1979: 28).

In its representation on these pages that voice is lost, as paper only allows for transcripts, as Portelli has noted (1981). Similarly, variations in rhythm, "thus ex-

4 These go back 1967, when Samuel organised the first History Workshop at Oxford's Ruskin College, which would continue to pursue a history from below for over two decades (cf. Samuel 1981; Davin/Parks 2012). From the 1970s onwards, participants, who could be non-academics too, were invited to start their own local history workshops (cf. Parks 2012).

pressing variations in the narrator's attitude towards his or her material (…) can only be perceived by listening, not reading." (ibid.: 97–8) Later in this chapter, I have sometimes included my "response tokens" to show the "interactional home" of the utterances (Silverman 2017: 149–53). It is clear that Dirk is inviting them, but I am also encouraging him. Where possible, I try to show what made an interviewee speak the way he did, rather than erase my presence, especially when there was a ping-pong kind of interaction. However, readability is hampered by such inclusive presentation. The challenge, therefore, is to strike a balance between what I want to cover and how I present it. The result is increasingly concise quotations as the analysis becomes more abstract as the chapter progresses. This inevitably brings me close to the classic pitfall of ethnography: speaking for the field and positioning myself as an expert, as opposed to letting the field speak for itself. One way out is to highlight the divergent interests and languages of the field and the researcher. The terms in which I study the conflict and the discussions to which I want to contribute are academic, largely alien to the field.

Portelli also emphasises that "oral sources are narrative sources", which require sensitivities developed in literary studies, as the difference 'between the duration of the events described and the duration of the narration' varies (98). In general, "there is a relationship between the velocity of the narrative and the meaning the narrator has in mind". (99) These narratives do not "reveal" the self, but "create selfhood through narrative or biographical work" (Atkinson and Silverman 1997: 320). So, a degree of caution towards the "revelatory power of the narrative" is in place (317). Through my questions aimed at reconstructing a working life, I invited participants to construct biographies.[5]

"Oral sources from non-ruling classes are linked to the tradition of the folk narrative," which might result in "narratives where the boundary between what takes place outside the narrator and what happens inside, between what concerns him or her and what concerns the group, becomes quite thin" (Portelli 1981: 99). In the case of this study, this is a slippery slope as it places the author in a delicate position. All the operators I spoke to had previously been skippers, and although all had some formal education, they often started sailing at a young age, a profession that relies heavily on oral communication. All are literate, but none is as comfortable with written language and academic jargon as former senior manager Ruud Filarski. Some were said to have struggled at school.

It may seem that placing the operators in a folk tradition devalues the claim to truth in their statements and is condescending. This is not my intention. One contrast that became apparent when talking to operators in the field, beyond the oral

5 Of course, Bourdieu contested the validity of the biographical narrative as the basis for identity (2004).

histories reported in this chapter, was that operators spoke much more of a collective work history than those in higher positions, who tended to emphasise individual career paths, including changing roles. Furthermore, a distinction often made, not only by operators but also by skippers, is that between "practitioners" and "theorists", with anyone with a university degree who is not involved in carrying out practical, physical tasks being labelled a theorist (Field notes 6.2.16, 12.10.18). No field provides a neutral position, and in this field, actors laboured actively to win me for their cause. Although I have always tried to deflate such expectations and to remain at arm's length, I can now say that I felt and feel more aligned with the operators than with the managers and policymakers, as is perhaps evident from the references to the history workshop. It is the responsibility of the researcher to be perceptive of the pressures those with less power are exposed to. Nevertheless, I was heavily reliant on the operators to share their knowledge and work with me. I had little to offer in return. Their superiors, on the other hand, were less welcoming and had their own access to researchers, mostly from technical universities, who could validate anything they claimed, or at least offer neat quantified results.

While I had found Halma's book only after I had started the oral history, I knew about the official history of Dutch inland navigation and waterways from a Dutch academic colleague who had recommended it. It was written by Filarski and commissioned by the Corporate Service of Rijkswaterstaat. Filarski—already mentioned in the previous chapter, trained as an engineer and with a distinguished career at Rijkswaterstaat—was directly involved in the development of control rooms in the 1970s and 1980s and obtained a doctorate in history in the 1990s. After retiring, he devoted himself entirely to the history of transport. Almost everyone in my field knows who he is, especially within the Agency, but also within the inland navigation industry. His commissioned study is called (in translation) *Against the Current: Inland Navigation and Waterways from 1800 Onwards*, a 439-page full-colour book that seems to have the breadth and authority of a standard work. I spoke to skippers and operators who had bought it; once I even gave a copy to a couple of skippers as a thank you for letting me spend days on board without having met me beforehand. One retired operator described Filarski as "Rijkswaterstaat royalty".

Filarski devotes a section, less than a page, explicitly to inland navigation control rooms, including a picture of a control room from the 1980s with a detailed caption (2014: 313–4). He mentions Dordrecht as the first control room, the other fifteen control rooms remain anonymous and are collectively credited with "an important contribution to traffic safety" (313). I wrote to him, saying that I had read his book and had come across his name in archive material from the 1970s, and asked if he would like to take part in the oral history I was conducting. He replied that he was willing,

> although I warn you for oral history. After 35 years, every memory has gaps. Historiographical research shows that memories are sometimes based more on wishful thinking than on reality. Also in my case the surviving documents (so nice that they are still there!) are much more reliable than my memory. However, when you help me along with your knowledge of the factual material, I can perhaps tell you something about the background of those events. (Filarski 2017)

Filarski was not alone in emphasising the limitations of his memory—several others also mentioned this during the interviews and sent minor corrections and additions afterwards—but apart from Filarski, no one made it a methodological issue. No one except Filarski asked to read the quotations from the interview in this text so that he could approve them. I agreed to show them to him, mainly because I was curious to see what he wanted to change, but I did not promise to automatically adopt any of the changes he requested.

One significant difference between Filarski and all the others was that the history of the Dordrecht control room was only one episode in his career: as new projects arose, he changed positions. Then, after his retirement, he became an academic. This was in contrast to the operators who lived in the control room for decades, just as they had lived in the wheelhouses before. Where Zwijnenburg had handed over (parts of) his private archive, Filarski was able to tell me where to look in the State Archives and put me in touch with the historian at Rijkswaterstaat's Corporate Service, who promised to keep an eye out for any relevant documents they were digitising for their online database.

When I visited Filarski in his stately home, he wondered, even before I had started recording, whether my topic was interesting enough to warrant a dissertation (Field note 7.1.18). When I explained what I was doing, he seemed convinced. He does not reference the book of Goffe Halma, the former Rotterdam operator, although it appeared ten years before his book. When I interviewed him, I was also unaware of the existence of Halma's book, although I had been researching the subject for years. Halma's inconsistent handling of sources suggests that he was not trained as a historian, although the intention to work transparently is obvious. The typesetting and graphic design are also nowhere near as controlled as in Filarski's book.

Beforehand, I had thought of a task to give the interviewees: to draw an organisation chart of Rijkswaterstaat. This would serve two purposes. The first derived from observations in the field, where operators today feel quite lost in the Rijkswaterstaat organisation: it is large and has a complex structure, a legacy of its long history. In addition, their workplace is isolated from the offices where thousands of their colleagues work. So I wondered how they would portray the organisation and their position within it. Secondly, I knew from archive material that when the Dordrecht control room was built, the relevant departments were reorganised and

relocated, so I hoped they would familiarise me with past structures. No one felt confident enough to draw an organisation chart when asked, but Filarski asked for my notebook before I could ask him, and drew a chart to explain a reorganisation four decades ago.

So making sense of other times is done from the present and has to deal with a structured absence. This can be circumvented to some extent through private archives and oral history. Approaching historiography as a field means taking into account how actors have been historiographically active and reflects old dynamics between well-connected individuals and an isolated group. In addition, the tendency at Rijkswaterstaat is to look up rather than down, which makes it easy for those at the bottom to be overlooked. The aim here, however, is to include the bottom-up perspective and to write a history with the actors as much as about them. To this end, a number of actors read and commented on an article of mine in which I presented the main findings, which I was then able to incorporate into this chapter.

2.2. (Former) skippers with nautical media skills

It is important to know the biographies of the first generation of operators, as there was little training when they started working in the control room, meaning that they had to rely on skills acquired elsewhere (which brings previous work to the fore). Both the skills and the learning experience they brought to the control room explain how they shaped the operators' work. It turns out that the mediatisation of work, central to the development of control room work, was already happening on board their ships.

Joining and (never really) leaving a community of practice

Being part of the post-war 'baby boom' meant that Dirk Zwijnenburg (1945) sat in a crowded classroom in Rotterdam where he "learned little, nothing profound" (Interview 5.1.18). Later, at high school, he realised that he had missed the basics, and had to repeat a year twice before deciding, at fifteen, that he wanted to work. He had uncles who were sailors, "two of whom had drowned or something", so his parents were lukewarm about such a career choice (ibid.). So he started work in a margarine factory, but made sure he did not survive his probationary period:

> So that is when I started sailing on the Rhine, first on a tugboat as a deckhand, Rotterdam-Basel, there I climbed the ranks, until one day I was captain on a push boat, so I could sail with four barges lashed onto it. And there I left, until, yes, I did that till 1976. So I have been a captain for, say, seven years. (…) Already in 1961

> I sailed on ships with radar, as a sailor, and of course they let you take the helm, at night, and then you would master it, from the bottom up. (ibid.)

Learning on board is different. According to Lave, learning is "constituted in the experienced, lived world, through legitimate peripheral participation in ongoing social practice; the process of changing knowledgeable skills is subsumed in processes of changing identity in and through membership of a community of practitioners" (Lave 1991: 64). Radar was a novelty in inland navigation in the 1960s, allowing ships to sail around the clock. This provided many opportunities for young crew members to take over the helm—being in the wheelhouse would inevitably lead to such opportunities. Normally this would take time, but with push boats, one of the growing branches of shipping at the time, steep career paths were possible. "Newcomers become oldtimers through a social process of increasingly centripetal participation," writes Lave (1991: 68), and for Dirk Zwijnenburg, as for others, this centripetal movement happened quickly.

> Newcomers and old-timers depend on each other: newcomers to learn and oldtimers to carry on the community of practice. At the same time, the success of both new and old members depends on the eventual replacement of oldtimers by newcomers who become oldtimers themselves. (Lave 1991: 74)

The 'tensions' involved in this 'displacement' must have been eased by the expanding shipping industry—Lave's examples are much less affected by capitalist dynamics. Though things did not always move fast enough, at least not for Fokko Boersma (1956), another skipper-turned-operator whom I spoke to in his study in Zwijndrecht, on the opposite side of the Oude Maas from Dordrecht, with a direct view of the Dordrecht railway bridge.

He "came from an inland navigation family, both on my father's and mother's side" (Interview 4.1.18). When he was eight years old, he went to a boarding school for skippers' children—for decades these children had been exempted from compulsory schooling, staying on board and attending school whenever and wherever the ship docked (cf. Filarski 2014: 249–251). He later trained as a mechanic, but only worked as one for a few months.

> Then I went on board with my parents and sailed there for two months. My father and mother were actually somewhat passive entrepreneurs. They sailed on the skipper's exchange [a state-regulated market where skippers get their freight allocated, which was dismantled in the 1990s] and yes, that meant long waiting times and then a nice trip, but I soon had the idea that 'if you go into shipping, the ship has to sail, but it can't lie still, because then you don't make any money'. And so I went to Rhine shipping. I started as a sailor, but of course I already had a lot of knowledge, because you are born into this profession. (…) That was in 1973

> or so, 73, 74. I sailed first on freighters, as a sailor, on a few different ones, and afterwards I went into tanker shipping, because I just wanted everything, I wanted to gain experience. And um, then I went to work for a Swiss company, also first as a sailor, well, slash helmsman. I just had a lot of experience, I was able to do a lot and I was allowed to do a lot (...). I was twenty-one and had my Rhine patent up to Basel. (ibid.)

Being born into a community of practice gave Boersma a significant advantage, but he did not necessarily have the patience to wait for the old-timers once he felt competent. Shipping on the Rhine was considered the most prestigious: it had the biggest ships and the most respected skippers. Boersma told his Swiss employer: "I have my papers now, I want to grow now, I want to earn more and I want, I really want to become a captain" (ibid.). But "they replied: 'You can become a captain, but stay here for a while and develop yourself, and then when a place becomes available, you can take it.'" (ibid.) Boersma wanted to get ahead. His parents' ship was called Vios, short for 'vooruitgang is ons streven', 'progress is our ambition', which he adopted as a sort of personal motto (ibid.). Within two months, he left the Swiss shipping company to become captain on a tanker, aged 21.

One level up was owning your own ship. Dirk Zwijnenburg felt that in the local club for retired skippers he was somewhat looked down upon by the Rhine skippers who owned their own ship (Interview 5.1.18). When his father had to give up sailing due to deteriorating eyesight, Frans Heijlaerts and his wife ended up owning their own tugboat. When they retired, they moved back to live on the water. On board their self-renovated barge, moored in the old port of Woudrichem on the Waal, we spoke at the kitchen table in the ship's former hold, while his wife read on the couch within earshot.

> Asher Boersma: I usually start with a simple, sort of rough idea of your working life.
> Frans Heijlaerts: Yes.
> AB: Well um, um also because people have often also sailed before [they became operator], so that is relevant for um, for my insight into the occupational group, so to say.
> FH: Yes, yes, yes.
> AB: So um, yes, perhaps you can tell what your first job was and um, or maybe training, or um..
> FH: Well I was born on a steam tugboat.
> AB: Ah, when was that if I may ask?
> FH: Um 1952 and um, yeah, the first years of my life I was on board until I had to go to school, well, actually until my sister had to go to school. Then my mother went ashore and my father continued to sail and (...) yeah, so I had a life ashore.
> AB: Hmm, and where did you grow up?

FH: In Dordrecht. Well, yeah, as soon as I saw a chance I went on board, so I actually went on board all my holidays, school holidays, I worked [on board]. And um, so I got into the tugboat life. So I permanently sailed along since my eighteenth? Mieke Heijlaerts. H: Sixteenth.
AB: So that was 1968.
(Interview 19.2.18)

When asked about his first job or education, Heijlaerts says that he was born on a ship. He and his wife used to sail together. As discussed in the previous chapter, families began to live on board at the end of the 19th century in order to save on accommodation and personnel costs. Although Mieke Heijlaerts was present during the interview, I did not realise how much this was also her working life, and was too ignorant to ask how this changed for her once they sold the ship, their enterprise ended and Frans went to work for Rijkswaterstaat. Worse still, I did not even write her name in my notebook and had to ask by e-mail when I wrote this.

Ad van Zanten (1944) later became a control room supervisor, but also a skipper, although he had grown up on land. I spoke to him in his apartment in the old town of Dordrecht, overlooking the Oude Maas.

Asher Boersma: May I ask what kind of work your parents did?
Ad van Zanten: My father was the manager of a branch of Kruideboer (...), which was a men's fashion store. They had about twenty-five, at that time, twenty-five shops all over the country, one of them in Vlissingen [south-western coastal town on the Western Scheldt, important port]. (...) And my mother was a skipper's daughter.
AB: And what kind of shipping?
AvZ: Inland navigation. (...) I have a cousin who sailed at sea and the rest [of the family] nothing but inland navigation.
AB: So you grew up with people in your family who sailed.
AvZ: Yes. I, of course you don't remember yourself, I never said anything else when they asked me what I wanted to be when I grew up, other than 'I'm going to sail'.
(Interview 17.4.18)

He started sailing at the age of sixteen, but it took him a while to find an employer who would support his ambitions. Three years later, in 1963, he found a job where he could climb the career ladder. The shipping company Van Ommeren was a key player in the growing push boat industry (and the same company where Dirk Zwijnenburg worked). Van Zanten had to start at the bottom as a sailor, but by the age of twenty-five he had become skipper of a crew of fourteen, which in retrospect was "too early", as he had not yet combined his skills as a skipper with the authority of a captain (ibid.). He learnt a lot, "though I went through the school of hard knocks" (ibid.). (ibid.)

Jan Timmer (1961), the only operator not yet retired, also ended up working for another company specialising in push towage. When asked about his working life, he replied: "I am a skipper's son", an occupation that has been in the family for generations (Interview 20.2.18). Did this mean that he grew up on a ship?

> No, (…) my father and mother then lived on the shore, because my father is actually, um, my mom comes from an inland navigation tradition, but my father did (…) do sea shipping school. He had sailed with my mother and then the brother and sister who came before me went to boarding school. When I came, well, (…) my father then started at Nationale Nederlanden [insurance company], he went to shore from the coaster [a sea freighter sailing along the coast]. Then he became an inspector at Nationale Nederlanden, an insurance inspector. Then they offered him a house and a car in Spijkenisse [west of Rotterdam]. (…) And I went to the Rhine and Inland Navigation School in Rotterdam. And then sailing, first just on a single barge, a motor freighter, but then, um, then crossed over to push boat shipping. (Interview 20.2.18)

Timmer's parents had left the mobile shipping life behind before he arrived, although he still identifies as a skipper's son and has returned to it. He had made it to first mate on a push boat when he looked for a job that would allow him to be more at home, sailing one week and home the next. In 1983 he started working on a patrol boat for Rijkswaterstaat, where he had to start at the bottom again, as a sailor.

Only Van Zanten said he was done with shipping and wanted to move on; the others cited family reasons. Zwijnenburg switched in 1976, after the birth of his second child, and went to work on a lock for Rijkswaterstaat near Utrecht, as well as working shifts as a captain on a patrol boat, on a bridge and at the signal post overseeing the junction of the Lek and the Amsterdam-Rijnkanaal. Looking for work on land, he sought for something that "still had to do with shipping," but "it was very hard to find something." (Interview 5.1.18) Being a captain on a push boat paid well, and Rijkswaterstaat was suspicious of anyone willing to take such a big pay cut: "Here in Dordt [short for Dordrecht] I went to talk, tried to talk, didn't get past the receptionist. (…) And luckily in Utrecht I was able to convince the bosses that I really wanted to go ashore and that finances weren't an issue." (ibid.) Frans Heijlaerts started working in 1982 for Rijkswaterstaat, initially on a patrol vessel. They had sold their ship because they were suffering from an economic downturn and decided that they wanted to live on land as a family—by now they had children. "I was my own boss, of course, and I didn't have any papers and (…) in those days you had to start at the bottom," Heijlaerts explained (Interview 19.2.18). Fokko Boersma started on a lock when he moved to Rijkswaterstaat—his wife, who was "from land", demanded that he live on land, where they were looking for people with "practical insight" (Interview 4.1.18).

Although all skippers had to make financial sacrifices to become operators, none were as financially tied down as Heijlaerts. Owning a ship, as will be seen in chapter four, exposes skippers to market fluctuations, leading to a growing fleet in good times and overcapacity in downturns. The ability to sell a ship at a profit or with limited losses depends on when in these cycles the ship was built or bought and when in the cycle it was sold. Boersma, Zwijnenburg and Timmer were able to change employers far less dramatically.

Mediatisation

Van Zanten, Zwijnenburg, Timmer and Heijlaerts mentioned their experience with radar as a key competence for Rijkswaterstaat. Push towage was one of the few branches of inland navigation that was dominated by shipping companies rather than privately owned vessels. The pioneering work in the calibration (adaptation of a maritime technology to a different environment) and formalisation (establishment of formal training for crews) of radar for inland navigation was carried out to a large extent by these shipping companies. Meeting the needs of German industry for iron ore and coal was a round-the-clock business, requiring large crews to work in the engine room, on deck lashing barges on and off, and in the wheelhouse. Sailing at night was not possible without radar, but even in daylight, Van Zanten put the radar on an equal footing with the rudder and propeller (Interview 17.4.18). As we learned in the previous chapter, the limited manoeuvrability of push boats was also due to the lack of rudders up front, 160 metres (give or take) from the wheelhouse. This was most noticeable in bends, where they took up most of the space while drifting. As a result, the limited manoeuvrability required better situational awareness and therefore earlier detection of traffic. The view of the water from the wheelhouse was no longer sufficient, and the skipper's field of vision was widened through mediatisation.

Mediatisation is defined here as the process in which information pertaining to one's immediate surroundings is increasingly brought to the observer through mediation, in which this information is represented by electronically powered interfaces to the observer. In the process, media become embedded in the sensory perception of one's environment by translating and extending the human sensory capabilities. The result is a complex interplay between senses and media (cf. Willkomm 2014, 2022).

The prevailing understanding of mediatisation, or "mediatisierung" (Krotz 2017), emphasises communication (cf. Krotz and Hepp 2013), and is rather broad:

> Generally speaking, mediatization is a concept used to analyze critically the interrelation between changes in media and communications on the one hand, and changes in culture and society on the other. At this general level, mediati-

> zation has quantitative as well as qualitative dimensions. With regard to quantitative aspects, mediatization refers to the increasing temporal, spatial and social spread of mediated communication. Over time we have become more and more used to communicate via media in various contexts. With regard to qualitative aspects, mediatization refers to the specificity of certain media within sociocultural change: It matters what kind of media is used for what kind of communication. (Couldry and Hepp 2013: 197)

In another definition, it becomes clear how much ground it is meant to cover:

> Thus, mediatization is not only a process of upcoming new media and the coming into existence of an increasingly complex individual media environment. It is not only a process of 'more and more' media used in communicative action, but also and especially it is a metaprocess that consists of a changing everyday life, of changing identity constructions and social relations, of a changing economy, democracy and leisure, of a changing culture and society as a whole. (Krotz and Hepp 2013)

My understanding of mediatisation still addresses a significant change with media at its centre, but differs from the above in three ways. First, it captures a situated historical trend rather than a meta-process. Second, it focusses on the way in which we observe our environment and how media make us focus more on the interior, on the interfaces, if we want to understand what is around us outside. Third, this does not mean that our senses play no role in registering what is around us, while being in the wheelhouse or in the control room. It means that we learn to hear and see what is outside differently through the media. Yet, we also learn to verify what the screen tells us by looking outside, something operator Rolph emphasised about the location of the new control room in the introduction.

We will return to the practice of mediatisation later in this chapter. For now, it is important to know that, at least for Dutch inland navigation, it preceded the control room. And that it is no coincidence that a certain group of skippers who were about to become operators were no strangers to the process. We will now turn to the early days in the control room on Devil's Island and the working conditions the operators had to face.

2.3. Dordrecht control room (start-up) problems

Some of the difficulties of working on Devil's Island could be described as growing pains, but others, as we now know, persisted throughout. This is not to say that they were never addressed or experienced, but that they persisted or reappeared.

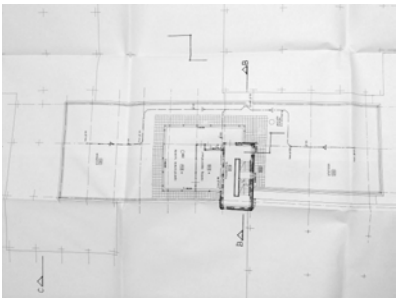
The planning and construction of the facilities is well documented in the National Archives. As an extension to this dossier, there are a number of documents relating to issues in 1981, when the building was complete but the radar coverage for the control room was not (which would be operational from 1982). They can be divided into 1) minor problems with the building that required minor adjustments, 2) infrastructural challenges such as intermittent mail delivery and parked vehicles blocking the entrance to the site, 3) staffing problems that persisted in one way or another.

Staffing the control room was a challenge from the start. DGSM resorted to hiring temporary staff, but was immediately informed by the union that this was against the collective agreement, and DGSM conceded this point (cf. Levenbach 1981). The collective agreement for Rijkswaterstaat staff also included a guaranteed number of Sundays off. This meant that the control room sometimes had to operate at reduced capacity and patrol boats did not go out. Internally, this was seen as embarrassing for Rijkswaterstaat's "image" (Eijk 1981). The organisation had long been sensitive to public perception and, as discussed in the previous chapter, it was not as favourable as it once was. This particular episode fits into the rivalry with the National Police over who was the main authority on the water, which lasted until Rijkswaterstaat gave up this ambition in the early 1990s (Interview 5.1.18).

During the outbreak of the operator-management conflict in 2015, the Dordrecht operators complained about the use of temporary workers to deal with staff shortages. The temps were not allowed to work on any of the consoles, except for one where they maintain the central freight database. Previously, this console had been used by operators to wind down in the rotation schedule of the busier day shifts, as this task was less intense and challenging. In addition, during the same outbreak, one of the two radar consoles was sometimes unmanned. Ships calling in went unanswered. This made headlines in shipping magazines and was embarrassing for the operators (Field note 8.6.15, Interview 29.4.16).

From these early days, one issue stands out as seeming to be a start-up problem, not directly related to control room work, but in fact becoming a nagging issue elementary to control room work. It concerns basic human needs: sociality, food and sanitation. The basic elements to provide these were not entirely in place when construction was completed. The inadequacy of the facilities highlighted and sometimes exacerbated the labour issues discussed above. This is not to say that everything went wrong from the start, but it is often the case that the everyday experience with a building depends on "inwiefern die architektonische Umgebung als widerständig erfahren wird" (Neubert 2018: 29).

Figure 5: Photograph of Dordrecht control room early 1980s, from Zwijnenburg's private archive. Figure 6: Plan of the upper floor of the same building, where the control room was located.



A kitchen and bathroom in the control room

The canteen smelled old, unused. We came down from the control room—this was the room where Jan Timmer was sure we could talk uninterrupted. When he brought me my tea, he saw how I took in the room. It was filled with tables and chairs for about 50 people, and in one corner there was a stainless steel counter from which food could be served. Once the canteen was closed, which happened quite recently, the social cohesion in the building was gone, Timmer noted. The two floors below the control room on Devil's Island, consisting of offices, laboratories and workshops, were largely abandoned when we sat down to reconstruct the history of work at the site in the winter of 2018. The operators had never been entirely dependent on the canteen for food or social interaction.

Rijkswaterstaat quickly realised that it had forgotten to install a stove in the small kitchen in the control room (Figure 6, cf. Stoppelenburg 1981). A small electric stove was installed. The canteen on the ground floor catered for people working normal hours, not 24-hour shifts, so meals were prepared or heated elsewhere.

Dirk Zwijnenburg, who started as an operator at DGSM in 1983, recalls that in the early years, a kitchen upstairs in the control room had its shortcomings. The control room staff consisted of a radar operator, like Dirk, and an operator who directed the patrol vessels by listening to the marine VHF radio frequency for a much larger area than there was radar coverage. The radar operator initially worked for DGSM and the other operator worked for Rijkswaterstaat. The latter was not qualified for radar work, but would take over when a radar operator had to use the bathroom, which was one floor down. Zwijnenburg recalls:

> When I went to work there, you actually had a console, right, and the kitchen and a table. Then in the mornings they had so little to do at [Rijks]waterstaat that the telephonists and the like came upstairs then and they would sit there,

> chattering, before they went to work, drinking coffee nice and cosy, you know, but there was someone from DGSM of course behind his console working very concentratedly, during fog or something. So, there were people who said: 'Well, we need a glass separation,' you know (chuckles), 'we want nothing to do with that jabber.' (Interview 5.1.18)

Apparently the smaller kitchen was preferred to the larger canteen for informal meetings. The room, famous for its exclusive and "colossal" (Nanz 2016) view, had an open-door policy, at least initially. Much later, tinted, reinforced doors controlled from the inside became the norm.

Whether it is a pantry (cf. Van Hulst 2013) or a canteen (cf. Fielding 1994), for police officers working the beat, as for detectives (cf. Reichertz 1992), these are crucial places to regroup. For Dutch police officers the

> space where team members had their coffee breaks, lunches, dinners, midnight snacks and celebrations was actually not a catered canteen. It is a space of 20 square meters (…), with a kitchen on one side and a big table with 12 chairs around it on the other. It was a place to talk about all aspects of police work and about more private and general matters, such as how one spent the weekend or a holiday, or even the national or local news. (Van Hulst 2013: 633)

For German detectives, hanging out in the *Teeküche* meant exchanging contingent knowledge while blurring the boundaries between work, breaks and private life (cf. Reichertz 1992: 143). The whole point of these places is that direct colleagues can drop in at any time to discuss work and everything else. The Dordrecht control room did not initially have such "protected sociability" (Wacquant 2004: 26). From my fieldwork I know that long after the "telephonists" stopped visiting the control room, the patrol boat crews continued to come. Not only are they much more sensitive to the work of the control room, but they also have work-related insights to share. Observing the outside world in the control room is done by staying inside, which meant that in the first installation in Dordrecht there was no (acoustic) space for people to enter. Thus, Rijkswaterstaat and DGSM did not seem to fully understand the requirements of control room work when they designated the control room kitchen for general use.

The comparison with various forms of police work is justified firstly by the fact that they also work shifts, secondly by the fact that they are representatives of the state, and thirdly by the banal fact that their stations are some of the most ethnographically recorded workplaces. Both Reichertz and Van Hulst write that these communities steer clear of the catered canteen for work-critical interactions. Jan Timmer seemed to suggest that the cohesion of the larger organisation was established in the canteen, during breaks. Dirk Zwijnenburg recalled that in the

early years they worked 12-hour shifts. The radar operators had little time to relax, as they were tied to the radar screen, which amounted to an "unbelievably high work pressure" (Interview 5.1.18)—leaving little time to socialise with the wider organisation, either in the canteen or when the organisation came to their kitchen.

For a number of years there was no kitchen, as the space was needed when the control room moved from two to three consoles in 1987. A cargo database called VMVS was introduced, maintained by a Rijkswaterstaat operator, to which tankers and ships of exceptional size reported via a separate marine VHF radio frequency (cf. Halma 2004: 283). Radar coverage was extended further west on the Oude Maas to include the Heerjansdam bend, which was notoriously difficult for seagoing vessels to navigate. During the day there were now three operators—one at the radar console coordinating traffic at the two Dordrecht crossings, one as contact person for all waterway users and one to monitor the dangerous bend and work on the database—while the night shift was carried out by two operators (Interview 5.1.18).

Figure 7: The upper half of a photocopied article that appeared in a trade journal. Above is a photograph of Zwijnenburg, below one of Van Zanten. The former had kept this copy, and corrected the marine VHF radio frequencies of the two radar sectors, above is my handwriting, indicating that I can keep this copy.

5 MAART 1996 Scheepvaartkrant PAGINA 31

Regionale Verkeers Centrale Dordrecht gemoderniseerd

Hun werkdruk is normaal al hoog, maar tijdelijk hebben de verkeersleiders van de RegionaleVerkeersCentrale Dordrecht te maken met een extra hindernis. Vorig jaar zomer is namelijk begonnen met de verbouwing en uitbreiding van de verkeerspost op het Duivelseiland. Terwijl om hen heen gebroken en gebouwd werd, ging de verkeersbegeleiding op de drukst bevaren kruispunten van Nederland gewoon door. Met dank aan de speciaal daarvoor aangeschafte geluiddichte koptelefoons en ettelijke dozen oordoppen. Inmiddels is de ergste overlast achter de rug. 'Achteraf is het allemaal ontzettend meegevallen. De enige last die we nu nog hebben, is als één van de timmerlieden of technici de housemuziek op de radio hard zet,' zegt Ad van Zanten. Hij is Hoofd van de RegionaleVerkeersCentrale in Dordrecht.

De bouwwerkzaamheden aan de Regionale VerkeersCentrale Dordrecht vorderen snel. Er wordt al druk gewerkt aan de inrichting van de verkeerstoren. De eerste consoles staan er, maar ze zijn nog niet aangesloten. Toch werkt één van de nieuwe radarsystemen al. Daarop krijgen de verkeersleiders hun tweedaagse cursus om te leren omgaan met de nieuwe apparatuur.
Het VTS-systeem (*Vessel Traffic Service*) wordt geleverd door Holland Institute for Traffic Technology (HITT) uit Apeldoorn, een verzelfstandigd onderdeel van het voormalige Holland Signaal. Er wordt gebruik gemaakt van de door HITT onder de naam Aramis ontwikkelde beeldschermpresentatie *de de* Terma-ra-

len (sector Dordrecht) en 28 (sector Heerjansdam).
'Vroeger wisten veel schippers niet waar wij zaten,' herinnert Van Zanten zich. 'Dan dachten ze dat de telpost van de Dienst Verkeerskunde die vroeger bij het Slobbengors stond, de verkeerspost was. Of het tunnelgebouw van de Drechttunnel.'
Anderzijds hebben de verkeersleiders straks ook een beter zicht op de vaarweg. 'Voor het gevoel blijft het zicht op een stuk van de rivier belangrijk,' weet Van Zanten. 'Je zou een VTS-centrum ook op de Mookerheide kunnen bouwen en alle posten, Dordrecht, Wenjeldingen, Volkerak, noem maar om, daar bij elkaar zetten. Technisch is het geen enkel probleem, maar in de praktijk werkt dat niet.
Niet alleen het ruimtegerelateerde concept

• Verkeersleider Dirk Zwijnenburg, met op de achtergrond de nieuwe contouren van de verkeerspost. (foto's MGR)

wijzingen geven - vroeger noemden we dat nog bevelen. We gaan ervan uit dat de schipper zelf heel goed weet wat wel en niet kan tijdens de vaart. Hij is ook te allen tijde verantwoordelijk.
Maar als blijkt dat men elkaar niet verstaat, of elkaar niet wil verstaan, of als er een vergissing plaatsvindt, mogen wij een verkeersaanwijzing geven.' De bewuste vaarweggebruiker is verplicht die aanwijzing op te volgen.
'Vaart iemand in dichte mist aan de verkeerde wal, dan wijzen wij hem erop dat hij stuurboordwaarts moet

bij een overtreding. Afhankelijk van

In 1991, the DGSM radar console with the double crossing was split: now two operators each coordinated one crossing, each on a separate frequency (Interview

5.1.18). This meant that a fourth operator was required. It was not until 1996 that there was a toilet and a decent kitchen on the control room floor again. By then, construction work was completed, which made the control room at least twice as large. It had five consoles, with one added as a backup and for training. In an interview with the specialist magazine De Scheepsvaartkrant in 1996, control room manager Van Zanten and operator Zwijnenburg explained the changes in detail (cf. MGR 1996). The latter kept a copy and gave it to me (Figure 7). With a solution in sight—the renovation of the control room was not quite complete when the article appeared—both are quite frank about the situation the operators were in: working there with four operators in just 50 square metres was against Dutch labour law (ibid.). The new control room also addressed the disregard for ergonomics until then, Van Zanten conceded implicitly in the article, when discussing the inadequacy of the radar devices. From 1982 to 1996, the operators worked with the same British Decca radars built for ships, which gave a very rudimentary picture (more on these radars in a moment). In addition, operators had to deal with significant gaps in their radar coverage. In our conversation, he said that ergonomic improvement had been his top priority ever since he got involved in planning the control room renovation (Interview 17.4.18).

Having sketched out the working conditions of the early years, the question remains as to what explains them. It could be said that what applies to architecture also applies to the Dordrecht control room: "social relations and meanings materialised in (…) built surroundings" (Stender 2017: 31). What exactly had materialised here, and how did certain relations continue to materialise in certain ways?

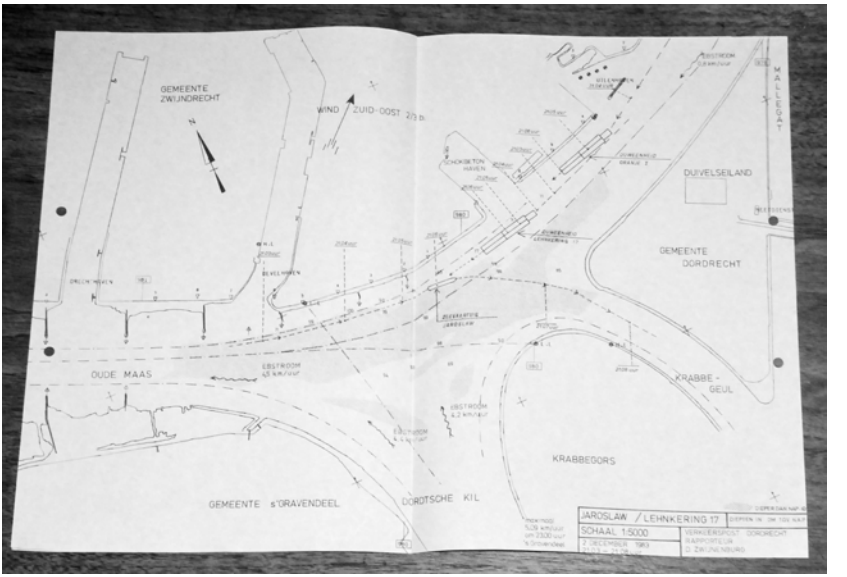
While it cannot be ruled out that similar persistent symptoms may have different causes, most of the explanations discussed in this chapter are long-term processes. A form of ignorance within the Rijkswaterstaat organisation about what their ambition to have a hand in waterway traffic round the clock would entail is only a valid explanation for so long. The question also arises as to what the operators did to give shape to the work under these physical and organisational conditions. In other words, what constrained them and what enabled them to influence the way in which the work was defined and could be carried out?

2.4. A first professional rivalry

These are big questions that require several steps to answer. One such step is to understand how the authority and legitimacy of operators was linked to other actors with similar ambitions. We have partly discussed how control rooms as such are part of organisational legitimacy and authority, but not yet what this looks like in terms of the work itself. Here, the relationship between pilots on ships and control room operators is presented from both a practical and professional perspective.

Despite the overwhelming visuality of the control room, listening is a key part of the job, as communication between the control room and the ships is by marine VHF radio. When entering a sector, skippers tune in to their frequency and inform the control room of their intentions. From my fieldwork both on ships and in control rooms, it is clear that skippers and operators are talking very differently these days. Operators are trained in what is known as conversation discipline. The capacity of VHF radio is such that it is impossible to send and receive at the same time. When many vessels are involved, passing arrangements must be communicated quickly so that the frequency is open for 1) alternative proposals, or 2) confirmation of arrangements by all involved, and then 3) a new wave of traffic can come in. Skippers tend to be more chatty and informal than operators, often requiring more words. Given the current contrast between the use of VHF radio between operators and skippers, I assumed that records of communications between operators and skippers, their former colleagues, in more informal times could be highly valuable historical sources. In the official archives I found no records of anything that looked like daily control room work, and therefore no transcripts of operator-skipper communications.

Figure 8: Map of the 1983 incident as documented by Zwijnenburg, showing Devil's Island in the upper right corner, left of which two pusher boats are drawn, and the Jaroslaw and its course into the Krabbegeul are drawn. The wobbly arrows represent the riptide, the wind direction and speed are also indicated.



Fortunately, Dirk Zwijnenburg's private archive contained a report on an incident in 1983, which included a transcript of a conversation between the control room and the *Jaroslaw*, a seagoing vessel (cf. Zwijnenburg and Zanten 1983). Because of its size, the *Jaroslaw* was obliged to take a pilot on board before entering a port or, as in this case, venturing further inland up the river. A pilot advises the captain on all matters of navigation and communicates with the local authorities. What was transcribed was a heated interaction between a Dutch pilot and Zwijnenburg. The pilot had asked to use the middle of the fairway to turn the corner and enter the Krabbegeul—at the junction of the Dordtsche Kil, the Oude Maas and the Krabbegeul, the currents and riptides (which vary at the confluences) are considerable—and was finally granted permission. Afterwards, Zwijnenburg carefully plotted the ship's movements on a paper map, using radar data, so that the spatial aspect of the manoeuvre can still be understood today (Figure 8). By the time the *Jaroslaw* had reached the port side, it was on course for a collision with two barges travelling downstream in the opposite direction and keeping to starboard (as is the rule). Zwijnenburg tried to persuade the pilot to change course. While seagoing vessels, due to their size and draught, have the right of way as they are tied to the shipping lane, inland vessels can often pass a buoy on the wrong side, but not in this case. The two pushers each had four barges tied in front of them, making them 180 metres long, more than twice the length of the ocean-going vessel. In order to avoid a collision, both had to put their ships into reverse, as ships cannot brake, and as they travelled downstream, stopping would take forever. Zwijnenburg's intervention would have had consequences for the pilot's liability if things had actually gone wrong—if Zwijnenburg had done nothing and things had gone wrong, he would probably have been accused of negligence. At that time, the pilot and the operator still had the same employer, the DGSM, which meant that its formal report for reckless navigation ensured a reprimand for the pilot (Interview 5.1.18). What I had encountered here was not so much an example of the everyday interaction between operator and skipper, but a manifestation of the rivalry between operator and pilot, which was recorded because of the escalation.

Retired operator Halma (2004), in the self-published book mentioned above, describes how pilots had difficulty recognising the authority of the control rooms. This illustrates how professions function in a system, as Andrew Abbott understood it, a system in which "jurisdiction is the defining relation in professional life" (Abbott 1988: 3). This is because "[p]rofessions develop when jurisdictions become vacant, which may happen because they are newly created or because an earlier tenant has left them altogether or lost its firm grip on them" (ibid.). The rivalry took place mainly in the ports, where the pilots had a monopoly on navigation as a service, but occasionally spilled over into Dordrecht's territory. Dirk Zwijnenburg explained that the incident illustrated the inferior position that inland navigation skippers held, who

were always expected to accommodate sea traffic, never the other way around (Interview 5.1.18).

In everyday life, being a professional has become synonymous with competence and authority, and being paid for one's work is generally enough to claim the label. From a sociological point of view, however, a profession is a particular social arrangement of expertise. Expertise is controlled and curated by a group whose exclusive right to perform the work is granted by law. It enables one to work autonomously, with authority and within the safe space of a shared set of values, excluding rivals. This makes clients dependent solely on the expertise of one group, which is generally a relatively secure way of earning a comfortable income. Admission depends on qualifications: completion of formal education, often an apprenticeship, and both are traditionally extensive, as in medicine for example (cf. Susskind and Susskind 2015: 16). Shared values bind the profession, often including the aspiration to work in service of the public (ibid.: 17–18). A profession is "seen as an autonomous 'bastion,' which entails certain risks [liability for instance,] but also offers advantages." (Noordegraaf and Schinkel 2011: 100) The public plays an important role in this system. It is referred to as the "grand bargain" (Susskind and Susskind 2015: 21) or the "regulatory bargain" (Noordegraaf and Schinkel 2011: 100), which can also be understood as a social contract between the public and the profession, in which exclusivity is granted in return for "affordable, accessible, up-to-date, reassuring and reliable services" based on "expertise, experience and judgement" (Susskind and Susskind 2015: 22–23). In 2015, operators sounded the alarm that cuts had left control rooms dangerously understaffed. This could be seen as a desperate attempt to hold up their end of the bargain.

Professionalisation has long been a public notion and to attain the status of profession has been a goal (often never attained) for occupational groups. Harold Wilenksy, the author of one of the most cited texts on professionalisation, written in 1964 and called "The Professionalization of Everyone?", was asked to look back on the article in 1980. He wrote: "I was astonished by the number of professional association leaders who read it and asked me to solve their problem of achieving professional status – an invitation I have resisted" (Wilensky 1980: 9). In the sociological literature, classic "pure" professions such as doctors, lawyers and professors are often seen as distinct from "new" professions (Noordegraaf and Schinkel 2011: 102), although in practice they are often "hybrid" (Noordegraaf 2007). The point is that they use professionalisation strategies to gain recognition and autonomy. Operators knew that there was a difference between seeing themselves as professionals and receiving public recognition for it (cf. Halma 2004: 59).

A classic step towards professionalisation is to form an association. In 1975 the operators of Rotterdam and other maritime traffic control centres formed a 'guild' called Racon (Halma 2004: 49–65). Until 1990, Racon worked closely with a trade union and at times sounded like one. Over the years, the guild focused on four goals:

improving working conditions, standardising nautical communications, establishing centralised training, and gaining internal and public recognition for the profession. Many Dordrecht operators joined the guild, which lobbied for early retirement in recognition of the intensity of the work. Racon knew that nautical operator work was still in its "infancy" compared to piloting, which "since Roman times has been a recognised occupation." (Halma 2004: 60)

Compared to the operators in inland navigation control rooms, the operators in port control rooms, who actually founded Racon, struggled with a reverse problem: their knowledgeable skill was rooted in their navy days and was deeply connected to and afforded by their nautical media. The pilots on board of the sea vessels in the port structurally questioned their legitimacy. When in 1987 a Racon report was criticised in a maritime trade journal for operators' dependency on "advanced equipment" instead of "more severe training and experience" like the pilots, these former navy men were the ones targeted. Racon countered that this type of criticism lacked an acceptance of "normal developments in this modern technological world" in the interest of "HUMANS, ENVIRONMENT [sic] and above all Economy" (Halma 2004: 60–61). To qualify as a pilot, one must first climb the maritime ranks to become a captain on a seagoing vessel, directly responsible for and knowledgeable about the way a ship moves, much as the skippers-turned-operators had done.

The transcript of the 1983 dispute between a pilot and the Dordrecht control room ends with a conversation on a separate frequency, to leave open the frequency used for traffic coordination. Here Ad van Zanten, the most senior operator present, has taken over and is talking to the pilot on board the *Jaroslaw*, who had forced two larger push boats to make an emergency stop:

> Van Zanten: To me it appears richly overdone to have ships of over 200 meters go in reverse, because you with your 4-meter draft can't in an orderly fashion enter [the Dordrecht port]
> Pilot: You have no idea how this ship steers! You know nothing about the draft dimensions of this ship! You know nothing about this ship!
> Van Zanten: No, sir. We know that. You only know that. But I am telling you, we have made a video recording of it [...]. That is clear enough.
> Pilot: But you are judging things of which you have no knowledge (Zwijnenburg and Zanten 1983: 5–6).

The authority of the operator as a professional, and thus the authority of the control room, depends on the exclusivity of the operator's knowledge and thus on the client's dependence on this knowledge. Here, the pilot has his own knowledge and therefore thinks he does not need to listen, or at least that he can judge the information given by Dirk Zwijnenburg on its merits.

In his book, Halma has included a report that Heijlaerts wrote when, more than a decade later, he accompanied a pilot on a ship coming in from the sea towards Dordrecht (cf. Halma 2004: 286–289). He was amazed at how the pilot could embody the dimensions of the ship, which he had not known before. Heijlaerts was also impressed by the coordination with several crew members to make the navigation possible. In this sense, the argument described above was also about the ability of Zwijnenburg and Van Zanten to embody the navigational dimensions of the push boats approaching the *Jaroslaw*, while the latter was foreign to them.

2.5. Formalisation of work

The major change and challenge for the skippers-turned-operators was the formalisation of work, which took place in four interrelated stages: 1) the regulation of inland navigation and the formulation of control room tasks, 2) the formalisation of knowledge, 3) the relocation of teaching, and 4) the mediatisation of work. The first is the very basis, the mandate of the control rooms; the second and third are closely related: knowledge that was spread orally now ended up in textbooks, but another sense of relocation here concerns skill. At first, it was primarily available to the newcomer through mimesis, by working alongside someone who had put it into practice. Then a control room simulator was developed that took the transfer of knowledge and the training of skills outside the confines of the control room. This, in turn, became intertwined with the mediatisation of work, making the co-presence with the waterway and the observational skills that come with shipping experience less important as the interface became more important. All of this occurs in cycles, so that stages occur more than once, in more than one direction: new laws have led to further formalisation of knowledge, but initiatives to further mediatise work needed regulatory backing and also solidified the relocation of teaching.

Initial formalisation left room for operators

The formalisation of control room work depended on the formalisation of shipping, which for a long time followed convention rather than law. The first formalisation measures left operators with a degree of freedom with which they felt comfortable.

It is worth noting that the regulation of inland waterways took place at international level before national regulation. The Central Commission for the Navigation of the Rhine (CCR) had been in existence since 1815, and the Treaty of Mainz (1831) required skippers to obtain a patent for each section of the river, which could be obtained through proven navigation experience. Other Dutch waterways were not regulated until 1897, and ambiguities were not removed until 1965 (cf. Filarski 2014:

310). It was not until 1984 that a new regulatory code formalised the use of traffic signs (ibid.: 310).

As reported in the previous chapter, in 1979 a communiqué from the agency informed shipping that the "post is at the service of shipping on the waterways around Dordrecht" (Hoofdingenieur-Direkteur 1979). It would concern itself – not yet around the clock and without radar – with the compliance with shipping regulations and act as a "control post from where, in order to enhance safety, shipping will be assisted with information and advice, possibly with sailing instructions" (ibid.). A 1983 report by Ad van Zanten defines the work: "[w]ith help of radar […] and TV […] traffic information is supplied to the waterway user and permanent surveillance of the traffic development takes place within the coverage area" (Zanten 1983: 1). The goals are "guarding and accommodating a swift and safe traffic development, in cooperation with the patrol boat" and "to contribute to preventing shipping accidents and reducing the harmful consequences for passengers and ships" (ibid.). The tasks are categorised and defined, but in such a way as to leave room for them to be carried out in different ways.

Dirk Zwijnenburg recalled the informal days: "when you knew a period of high water was coming due to rain or meltwater, the local wool shop was warned that they had to clear their basement, farmers were warned to move their cattle" from riparian land (Interview 5.1.18). Fokko Boersma insisted that the operators were not inclined to interfere with other people's work (Interview 4.1.18). They appreciated being left alone—management rarely set foot in the control room—and operators still do not like to tell a skipper what to do. Although they had the authority to intervene, they were reluctant to do so when professional skippers were involved. They could resort to giving an order called a "traffic instruction". There are operators who have never given a traffic instruction in their entire career, others have given one or two, and they are proud of it, because a skilled operator should be able to get skippers to do what they want, while the skippers think it was their own idea (cf. Interviews 4.1.18 and 5.1.18; Field note 14.11.16; Field note 3.4.17; Halma 2004: 25).

Loose learning on board in a formal structure

Reading Marcus Popplow on the role of formalisation in technology-related knowledge in early modern Europe (2015), it occurred to me that in my field the formalisation of work had already occurred before formal education and the disembodiment of knowledge. Before the sedimentation of formal training—which guarantees the spatial and temporal separation of work, teaching and learning—the skippers who became operators were already shaped by formal arrangements. Apart from the occasional course they attended, most notably one to obtain a radar certificate, their (work) biographies show how the formal arrangement of actual work on board formed a curriculum in itself. Before they could become skippers, they passed

through at least three different positions on board, each of which had to be mastered before progression to the next job was possible—mastery being determined by the length of time the job had been performed and by the approval of colleagues who had progressed further in the system. The history of the formalisation of control room work thus has its roots in the inland navigation practices of the 1960s and 1970s in the Netherlands, but often the learning started even earlier, as many of the skippers-turned-operators were born into a community of practice.

During a four-day voyage on a 135-metre barge through German, Dutch and Belgian waters, I was able to observe and participate in a slice of learning as an ongoing loose practice. The ship was owned by Rebecca and Rob, a couple in their late fifties/early sixties, with the husband spending most of the time at the helm. They employed a Czech sailor called Leo, with whom they spoke German.

> Leo […] is now at the helm, 'eben festhalten', Rob had said and instructed him about the course. Leo doesn't sit down, stands behind the skipper's chair, doesn't have to change speed, just hold course. After a few minutes Rob is back (Field note 27.11.16 to 30.11.16).

Rebecca is also qualified as a skipper and spent time at the helm too. When she had to go to the toilet and Rob was asleep, she asked me to take over. The first time I had very little to do. The second time was different:

> We were on the Hollandsch Diep [a wide waterway in the south-west of the Netherlands] when Rebecca asked me to take the helm again. This time, I really had to steer, but had less clear instructions and now it was dark. Got a better sense of the helm by trying and seeing how the ship reacted. She invited me to sit this time, but felt more comfortable standing like Leo did. (Field note 27.11.16 till 30.11.16)

Learning comes with being on board and starts before anyone declares the lesson to have begun, or with the idea of teaching at all. Before holding the helm—an almost horizontal steel stick of about ten centimetres long with a black synthetic knob at the end—I already developed a sense of its kinetic and tactile dimensions through observation, which I only realised once I was using it. But there are also formalised elements: I saw that the captain's seat was off-limits to Leo, which would surely be the case for me. This would have been a normal situation for those born into the shipping community of practice, as both Rob and Rebecca were.

The first to leave the ships were the children. Skippers' children were exempted from compulsory schooling until 1966—after the war, specialised boarding schools were set up. From the 1980s, it was mainly mothers who made long cross-border journeys at weekends to pick up their children. Now most parents have followed

their children, and the floating houses have been replaced by brick ones. Boarding schools are being closed. Skippers work in shifts, about a week on board and a week off. It has become increasingly unlikely for skippers' children to share the wheelhouse (long enough) for them to master the work through mimesis. Shipping is still primarily learned by starting out as a sailor, with occasional time at the helm. At present, there is a shortage of inland navigation personnel—no wonder, as there is no one else in the wheelhouse except the skipper.

As several of the first generation of operators confirm, their experience with both radar and marine VHF radio was sought after by Rijkswaterstaat and DGSM. The advantage they had over naval radar operators looking for a job on land was their knowledge of the waterways and their lived experience with the much narrower spatial margins typical of inland navigation. All this they had learnt at the helm (cf. Halma 2004: 279).

Early media technology affords autonomy

Many skippers-turned-operators encountered their first computer in the control room. In 1984, perhaps 1985, the first one was introduced, called Birgitte by the operators, which "nobody knew how to use", according to Fokko Boersma (Interview 4.1.18). Frans Heijlaerts thought that it was mainly the 'old school' that had problems with it. Around 1982, he had bought a Commodore 64, when he and his family moved to shore, and had programmed games with it (Interview 19.2.18). He recalled that in his first report, which was written on a computer rather than a typewriter, one operator actually "proudly" mentioned in the report what medium it was written on (ibid.). There was also resistance to the introduction of computers—eventually not only new operators but also experienced ones had to take a course to learn how to write their shift reports on the computer (ibid.). A document written by Van Zanten shows that standards were eventually developed to bring uniformity to these reports (1989). With this computer, they began to store their knowledge of various aspects of the waterway infrastructure externally, each shipping company, quay or jetty was given an entry, and the heights of bridges were documented (Interview Zwijnenburg 5.1.18).

The leeway that could be interpreted as professional autonomy in the control room work was also an affordance of the media they worked with. The logs made on Birgitte could be corrected later, when an operator discovered his mistake, without anyone ever noticing (Interview 5.1.18). Radar was not yet recorded automatically; recording was started manually when a dangerous situation seemed to arise, as in the case of the altercation with the pilot mentioned above.

Initially, the operators worked with the same type of radar as on board. In contrast to the development of many other media, the first radar was mobile (cf. Bauer 2005) and later became stationary. The Decca radars were located one floor

below, with cameras above them connected to screens in consoles in the control room above. One of these machines now stands in the corridor of the control room in Dordrecht. I passed it many times before I saw how the layout of the Dordrecht intersection was burned into the screen as a testimony to its not entirely afforded immobile use. These radars did not yet have concentric circles to indicate distance and were so rudimentary that "you were looking at nothing but dots, the actual picture you made in your head", as Zwijnenburg recalls (Interview 5.1.18). This embodied practice clearly positioned the operators within the agency as masters of traffic coordination, but the difference with Lave's model is that newcomers could not acquire the operator identity through training alone, as this had to be partly acquired beforehand while sailing. Furthermore, the limited view provided by radar meant that the exclusivity of their knowledge derived from their time at sea, as 1) local knowledge of the waterways had to compensate for the abstraction, and 2) scoping the waterscape as they had done in the wheelhouse—recognising vessel type, draught and manoeuvre—complemented what they had already assessed from the given traffic situation using radar and marine VHF radio.

Simulatable

From the outset, Racon had advocated centralised training in order to 1) reduce dependency on the local control room manager to control training and examinations, 2) raise the status of the profession by introducing official qualifications, 3) increase the competence of the workforce by introducing foreign languages into the curriculum, 4) standardise and discipline VHF communication (cf. Halma 2004, 49). The first part of the training was indeed soon centralised, which was an important step in the relocation of learning. To this day, the second part of the training is still carried out locally.

Inland navigation skippers are considered stubborn, but when it gets foggy, operators often explain, everyone suddenly becomes very obedient. On board well-equipped vessels, I have seen the nervousness that dense fog causes. As fog cannot be ordered, operators trained in the control room had to wait for this most critical weather condition to occur (cf. Halma 2004: 77). "Newcomers become old-timers through a social process of increasingly centripetal participation," says Lave, "which depends on legitimate access to ongoing community practice" (Lave 1991: 68). However, compared to a girl born as the daughter or granddaughter of a Yucatec Mayan midwife, a case quoted by Lave (ibid.: 70), or compared to someone born on a ship, operators have little time to master their work. One way to manipulate the events that contribute to centripetal participation, a way to manipulate what is going on, is the Vessel Traffic Services Simulator that the agency has built.

The first ideas for the VTS simulator date back to 1975, the contract with the Dutch developer Marin was signed in 1983, and by 1986 it was ready (reportedly the

first in the world) and inaugurated by Neelie Kroes, the Minister of Transport, Public Works and Water Management. It had cost a small fortune (cf. Halma 2004: 88–90). The simulator seemed to be modelled on the control rooms of the port of Rotterdam. No wonder, since the operators involved were mainly people with a naval background who had worked in maritime control rooms. They had co-developed the simulator, managed the training programme, written the training scenarios and set the learning objectives (cf. ibid.: 89–91; Interview 20.7.18; Interview 21.7.18).

In the simulator, old-timers and newcomers sat in separate rooms behind a console, each with a radar screen, a monitor connected to a shipping database, and a radio link between them. The simulation consisted of what can best be described as contingent events played out on a stable map (cf. Gekker and Hind 2016) of a port and its environs, with a river and a tributary—a situation that mostly resembled the layout of Rotterdam. A scenario, or 'run' as it is still called (Field note 23.3.17), would last about thirty minutes, with ships moving on the radar screen, the old-timer impersonating all the different ships calling in, or the newcomers calling in ships that they could identify by touching them with the pen on the radar screen, which then made their names, dimensions and cargo appear on the second screen. There were enough consoles to run four simulations simultaneously—each on its own or all together in one, each controlling its own sector and also communicating between sectors (cf. Halma 2004, 89–91; Interview 4.1.18; Interview 21.7.18).

Jan Timmer remembers the simulator as an experience "indistinguishable from reality", also because the old-timers were so good at impersonating different skippers ("a fisherman or an Eastern European skipper in broken German") (Interview 21.7.18). He had been a skipper on a push boat before moving to an agency patrol boat. His transfer to the control room in 1987 coincided with the start of simulator training. It is difficult to say where Timmer's legitimate peripheral participation began; from his patrol vessel, his participation was mediated by VHF radio, and his visits to the control room were certainly legitimised. However, there is a stark contrast between his assessment of the simulator and that of Dirk Zwijnenburg, who had already become a Dordrecht old-timer through his presence in the control room.

Looking back, Timmer felt that Rotterdam had always set the bar higher and considered them the benchmark. Zwijnenburg felt that the simulator—the type of radar, the training scenarios and the standards—deviated too much from the standard they had established locally in Dordrecht. Because they "took inland vessels just as seriously" (Interview 20.2.17). The use of the VHF frequency in Dordrecht was more intensive, which meant that the way the Rotterdam operators understood conversation discipline was not precise enough for the amount of calls the Dordrecht operators made in roughly the same time frame (ibid.). The translation of the dominant sociomaterial assemblage of the control room into centralised training made it, for some Dordrecht old-timers, a dislocation of teaching, but it was also a reloca-

tion of learning: the simulation enabled a kind of legitimate peripheral participation in the Rotterdam control rooms.

In the simulator, the fog became permanent, as the direct view of the water landscape disappeared. The weather conditions became what the scenario said they would be. The old-timers now acted out the nervous skipper. Newcomers learned to rely on their interfaces, the window pane no longer part of their scope of observation from the outset, as it had been for the first skippers-turned-operators. With the help of a research report from a consultancy firm, the Dordrecht operators succeeded in adding a stable map of one of the Dordrecht sectors to the simulation (cf. Verschoor and Giessen 1990; Interview 23.7.18). However, the fictitious Rotterdam-inspired map remained dominant. When I followed a cohort of newcomers in 2017 during their central training, all the runs I witnessed were made in the fictive port (simulating the typical traffic of such an area), even by those training for inland waterway intersections, which have distinct traffic patterns.

The continued mediatisation moved the action towards ever larger and more numerous screens, and subsequently made control room work increasingly simulatable. Over the years, the control room has been equipped with 1) AIS (name, GPS position, departure and destination of a ship are exchanged via radio signals) overlaid with radar on the digital chart, 2) Automatic Radar Plotting Aid (ARPA) was added as a function in this overlaid interface (with which potential collisions, but also time and distance between the current ship position and e.g. an intersection can be plotted), 3) more accurate gauges (such as wind speed, current, visibility, water level), increased resolution and light sensitivity of CCTV cameras, 4) internationally linked databases with detailed cargo information, and 5) ergonomic gains in the screens and consoles that bring all these interfaces together.

These developments allowed control rooms to 1) cover more ground, 2) without having to build new control rooms, and even 3) to centralise control rooms. Rijkswaterstaat's network of AIS transponders filled the black holes between control rooms. Until then, skippers had been geographically lost between the sectors covered by several control rooms. They could still contact the nearest control room, which could send out a patrol vessel and check the database to see what kind of cargo they were carrying, but otherwise they had to work things out among themselves. Ruud Filarski told me that the Tiel control room, built in 1984, was so expensive that it was impossible to build new control rooms (Interview 7.1.18). It had been designated as critical infrastructure, which in Cold War times meant that it had to be built of thick reinforced concrete, which Filarski found rather ridiculous (ibid.). So building new control rooms was not really an option, not financially, but eventually mediatisation allowed for expansions of existing control rooms that made building new ones unnecessary. Today, all three control centres along the Dutch-German waterway axis—Nijmegen, Tiel and Dordrecht—cover more intersections than are optically visible from the control centre.

The Port of Rotterdam, which is a separate organisation from Rijkswaterstaat, has centralised its control rooms much more radically. The Botlek control room combines six sectors. During the day I spent there, no one complained about this, including the Rotterdam operators I met during the simulator training (Field note 17.3.17).

2.6. Managers contesting professionalisation of operators

The operators' quest for professional status was to a large extent a matter of intra-organisational rivalry, due to Rijkswaterstaat's extensive role in the waterway infrastructure. The introduction of the operators had relegated the river masters to a subordinate position, although I found little to suggest that this was accompanied by much discord, possibly because of the operator-centred perspective I had within Rijkswaterstaat. Operators and pilots both worked at DGSM. When piloting as a service was privatised at the end of the 1980s, all the operators came to work for Rijkswaterstaat. Here they had to deal with managers: a group that stubbornly resisted anything that looked like the professionalisation of operators, partly as a strategy for their own professionalisation. They too were interested in formalising the work of operators, but on their own terms.

To understand this dynamic, we first look at the place of operators in the organisation of Rijkswaterstaat and the larger managerial trend from the 1980s onwards. We then look at the managerialisation movements from three angles: 1) the move from the control room to a managerial position, 2) how engineers in managerial positions within Rijkswaterstaat had to become managers, and 3) how the formalisation of operator work was managerialised and how mediatisation was used to serve managerial interests. This subchapter benefits from Mirko Noordegraaf's work on management in the Dutch public sector (2007) and the articles he subsequently wrote with Willem Schinkel (2011; 2011). They combine a much better command of the sociological debates on professions from a specifically Dutch perspective.

The managerial trend

Filarski wrote that "in the mid-1980s the state apparatus began to shrink, and this continues to this day" (Filarski 2014: 332). Whether this ambition has actually led to a reduction in the net number of civil servants is doubtful, as bureaucracies in Western Europe have survived largely untamed despite (or even because of) numerous efforts to achieve the opposite (see Graeber 2015a). While "post-bureaucracy" was the goal, it led to a "neo-bureaucratic state" (Farrell and Morris 2003). Perhaps Filarski is more describing a historical ambition that he, as the manager of Rijkswaterstaat, was called upon to help realise.

If the question was 'how to maintain the service with fewer staff', the answer was mainly felt by those with little education at the bottom of the hierarchy. The uniforms of the operators changed in meaning as a result of these changes. It once placed them at the higher levels of the Outdoor Division hierarchy. Fokko Boersma recalled that when he first entered the control room in the early 1980s, "all that gold leaf really made an impression", referring to the operators' shoulder straps (Interview 4.1.18). At that time, the department still included repair and maintenance crews, which also had their own hierarchical layers. The near disappearance of the layers below the operators was a significant change, Dirk Zwijnenburg felt (Interview 5.1.18). When in 2016 I asked an operator what the gold stripes on his shoulders indicated, he explained them and added that "when you have enough stripes you can take off your uniform" (Field note 4.11.16). Referring to a senior policy adviser, the same operator said: "You can see he's high up the ladder because he dresses so shabbily" (ibid).

Thus, as the bottom fell out, a managerial layer above the operators grew and changed. In general, in the 1980s, "managerial trends" were "biased in favour of financial management" (Duménil and Lévy 2011: 84). From the mid-1980s, under the banner of New Public Management, market logic was applied to the public sector. This also meant cutting back on the work that the market was thought to be able to do more cheaply, so that contractors were found for most physical work.

Becoming a manager

The transformation from captain to operator to manager, and from engineer to manager, is illustrated here by the experiences of Ad van Zanten and Ruud Filarski.

Van Zanten recounted how an old-timer, with whom he took shifts as captain of a push boat, had taught him how to understand the dynamics of a crew. From the way Van Zanten spoke—resolute, confident, comfortable with being listened to, explaining the way things are—it was not hard to imagine him as a captain. As a rule, "the captain is always right" (Interview 17.4.18). The push boat had a crew of 14. The old-timer captain told him that every crew always had a "bastard" and that the trick was to find out who it was. Van Zanten said he would find out, and after three shifts he sent one crew member home, with almost two weeks to go. At the change of shifts, the old-timer came to the wheelhouse:

> Ad van Zanten: And then my colleague said: 'Have you stopped or something, have we anchored, what is going on?
> AB: Did you what?
> AvZ: I was not sailing where I was supposed to be.
> AB: Oh yes, you were behind.
> AvZ: Those guys [the oldtimers] saw it immediately, so yeah, you should have been 10 kilometres further or something. But I said 'no, we got rid of the bastard'.

> The old captain said to me: 'You didn't listen carefully: (…) there's always a bastard on board—we still have one now. I said: 'No, he's gone. He says: 'No, we still have a bastard on board, but now we don't know who it is.
> AB: Laughs.
> (Interview 17.4.18)

Van Zanten then linked this anecdote to his work at Rijkswaterstaat, where "you also meet people like that [bastard]" (ibid.). There he "always tried to see what they were good at" (ibid.). Here he seemed to move from discussing character flaws to discussing competence. It is not clear whether a 'bastard' is someone who messes up or sabotages things. He then seemed to switch to the perspective of Rijkswaterstaat as a manager when he went on to talk about a former secretary. He told her that she would not be happy to remain a secretary: "This is such a shame. You could go far." (ibid.) Together they determined a "career path" (ibid.). Eventually, she became the control room manager, of which Van Zanten is "a bit proud." (ibid.) When I asked for access to the control room in Dordrecht for long-term participant observation, this manager and her colleagues repeatedly refused.

Van Zanten had to follow management training, more than he "cared for", because it professed to avoid conflict and was "much too theoretical," yet theory did not cover the diversity of the 24 characters he had to manage (ibid.). He felt he was in "a robot factory, both for managers and for staff" (ibid.). To a degree, Van Zanten seemed to stuck to his old ways. He stood firmly behind his staff to protect them from pressure from above and told his superiors that "if necessary, I will be the one to give them a knock on the head" (ibid.). He recounted an incident in the 1990s when he did just that:

> Ad van Zanten: There had been a collision, only because of his [the operator's] negligence. And then he started telling this story, you don't want to know. And then I [makes a movement with his arm]. The operator says: 'What is this?' I said: 'You can't believe that I'm such an idiot that I believe your stupid rubbish? That you hold me in such contempt. This is what you get hit on the head for.
> AB: (chuckles)
> AvZ: That minute and a half that he didn't pay attention, I think it cost me at least twenty hours to get it right with the prosecutor. Because there were people who were injured, and then it becomes a matter for the police. (…) I had told the operators many times before: 'Remember, you are responsible for the information, not, again, when two ships decide to collide you won't stop them, but when you haven't made a call, you will be the mug. You have to call, you can prevent it, just with your trap: 'Ship ahead 600 metres, ship ahead 400 metres'. And then you shout louder, at the end: '[name of ship 1] you have to stop, [name of ship 2] you have to stop'. And if you haven't done all that, you're the fool. I said [to the operator, whom he slapped]: 'And what you are forgetting, one thing, if it is negligence,

> then you are liable, legally speaking, and uhm, if you, uhm, then this employer, this organisation will let you hang. (Interview 17.4.18)

My laughter (like my laughter in the previous fragment) probably spurred Van Zanten on, which in this case makes me somewhat complicit, as it may have given Van Zanten the idea that I appreciated his violent behaviour. He also told the prosecutor that he had hit the operator and that the operator had indeed made a mistake:

> Ad van Zanten: I said: 'This is a wonderful operator, but he made a terribly stupid mistake. I've known this man for 15 years already, and I have not once caught him making a mistake and now he does this, because he is not watching the radar images, but because he is playing a game of cards on that thing [computer] during fog, which is unacceptable.' (Interview 17.4.18)

This is not the sort of thing that is taught in 'too theoretical' management courses. The honesty and loyalty that Van Zanten demanded may have made him the captain of the control room, and as on board, he saw a community that meant that problems were not solved by expelling the deviant crew member. The work had to be done anyway. In this sense, the 'bastard' present in every group, according to Van Zanten, is a matter of character and competence. He seemed to have a keen sense of risk, as do most skippers, but on board at least the physical risk is more collective.

However much Van Zanten seemed to resist what Rijkswaterstaat tried to teach what a manager should be like, he did remain the control room manager until his retirement. He must have done some things 'right'. He proudly told me how he had managed the reconstruction of the Dordrecht control room in 1996 well within budget: he spent only two thirds of the budget (Interview 17.4.18). At the time, he did not oppose the prospect of privatising Rijkswaterstaat (ibid.), which was discussed in the early 2000s after the organisation was hit by a massive scandal. He sat on a commission that screened the entire organisation for redundant staff. He never supported the operators' claim that sailing experience was a prerequisite for control room work. He did, however, support their demand for a direct view of the water, although not with the same motivation as the operators: he asked a senior manager if he liked having windows in his office and said that the operators "should not feel cloistered" (ibid.) Van Zanten did not cling entirely to a skipper's knowledge and identity as the root of his authority, which probably contributed to his modest organisational rise.

Noordegraaf and Schinkel (2011) describe how, since the 1980s, the strategy of managers, especially in the public sector, has been to professionalise both in the classical way through formal education and associations, but also in a new way. The focus lies less on stressing autonomy and more on stressing interdependencies between them and other, more established professions (ibid.). By obstructing the efforts of

others to professionalise and by breaking up professional bastions, managers professionalise themselves (ibid). Van Zanten's role seems ambivalent in this respect. He frustrated the strategy by which operators tried to manifest their authority, which could then grant them professional autonomy, but he did not adopt the managerial identity through formal education, having mastered a way of leading before he ever became a manager.

Filarski spoke like an academic, much less colloquially, but in a way not unlike Van Zanten in that he too seemed used to being listened to, to explaining how things worked. By comparison, what he said was less wrapped up in anecdote and sometimes more like a grand narrative. Perhaps this was what I expected from him, given our shared academic background, having studied his publications and steered him in that direction. It seems that there were three roles Filarski played at Rijkswaterstaat: the classic civil engineer/servant (generally a role Rijkswaterstaat had fostered), the manager (when technical competence no longer cut it) and the historian (enlisted by the Corporate Dienst, but a way out nonetheless). He too did not seem to have fully embraced managerialism.

Filarski is the son of an entrepreneur, but he resisted the pressure to work in the family business and studied civil engineering at what is now the Technical University of Delft between 1965 and 1969—he was the first in his family to do so (Interview 7.1.18). Rijkswaterstaat is at the root of this discipline and study programme, and so studying there is the classic foundation for a career at the agency—where Filarski started in 1969. He considered himself, if not a member of the 1968 generation, then at least influenced by a sense of freedom and openness that motivated him, like many of his contemporaries at the agency, to sometimes defy hierarchical structures (ibid.). Over the years, he took on many tasks: he worked on the modernisation of the locks, where communication technology was introduced; he built up the nautical knowledge needed to change the course of the waterways or to understand the behaviour of the ever larger push boats; he mediated between the central board of Rijkswaterstaat and the minister responsible; he headed a department that studied waterway traffic. As already mentioned, he became a historian in the 1990s, obtained his doctorate in 1995 and has been publishing as an independent transport historian since his retirement in 2004. The fact that he has changed roles relatively often is significant when compared to Van Zanten and especially when compared to operators.

As quoted in the previous chapter, in the 1970s Rijkswaterstaat "saw that the civil engineering solution was no longer working" (Interview Filarski 7.1.18), which, I concluded, led to both a behavioural turn in infrastructure and a burgeoning awareness that local publics needed to be addressed differently in order to legitimise decision-making. Filarski saw up close how the then head of Rijkswaterstaat, Van Til, though a competent engineer, was not cut out to do this (ibid). Eventually, from the 1990s onwards, the public was involved in parts of the decision-making process, al-

beit reluctantly (cf. van den Brink 2010). Filarski recalled that in the 1980s they received "ukases from above that we had to think customer-oriented", but did not seem to identify much with New Public Management (Interview 7.1.18). Although he did not shy away from hiring consultancies from the start, he valued the days when the agency had most of the critical knowledge in-house. He did, however, wholeheartedly embrace one element of management professionalisation: formal training. Unlike van Zanten, Filarski felt he lacked the skills to manage a department. Or, more generally, that the Rijkswaterstaat engineers who occupied management positions (which was almost all of them until the 1990s) lacked the appropriate knowledge and skills. At first, they dealt with this informally. Through his supervisor, he got hold of tomes on organisation and management, which he found too rigid and "static", with hardly any mention of "human interaction" (ibid.). They were written by Van der Schroeff (1900–1974), who was one of the founders of business administration as a course of study in the Netherlands. The books only told him "how to organise an enterprise in a way that you had sufficient information" and "how to make people do the things they should be doing (…), although when managing, human interaction is of course very important." (ibid.)

On board, Van Zanten had learned through human interaction (in a community of practice), while Filarski had learned how to apply the laws of physics from books and lecturing professors. In the late 1980s, early 1990s, he said,

> Rijkswaterstaat sent us to all sorts of management courses where we just, er, yes, er, saw our own behaviour in the reactions of others. And around that time, a significant part of the top management of Rijkswaterstaat changed in a very short period of time. In the sense that, um, only people with good communication skills got to the top. And that communication skills were given priority over technical skills. (…) The courses were quite intensive. Over a period of a few months you would go out into the countryside four times for a week under the supervision (…) of two or three trainers. (…) Yes, an important part for some [participants] was just the human interaction that took place and the feedback on the human interaction. Sometimes there was also, um, yes, some things were done by acting out certain situations. We also did some survival training in the [Belgian] Ardennes. I for one learned a lot from those courses and I know a number of colleagues who felt the same way. (Interview 7.1.18)

The embrace of management courses seems to be rooted in a desire to treat people well, to be open and honest. I gathered from our conversation that this was not only a moral conviction, but also a pragmatic insight into how to get other people to be productive. Learning through formal education was a pattern Filarski was comfortable with. However, given Filarski's description of the didactic setup of the management course—acting out situations, introspection—the courses themselves

sound less formal and perhaps would not have been the same as the "too theoretical" courses Van Zanten had to attend.

For Filarski, formal training was an important indicator of competence. He was not involved in staffing the Dordrecht control room, but he was closely involved in staffing the new locks south of Dordrecht. Like control room operators, lock personnel (also called 'operators' by Filarski) were often selected on the basis of relevant experience rather than formal education. This was partly, he believed, because Rijkswaterstaat did not pay enough to attract formally trained people. Lock operators were used to working autonomously, but the new lock complexes built in the late 1960s and 1970s were designed for greater coordination between several operators and with the outside world via telex and marine VHF radio. Many of the lock operators were former bargemen, whose mistrust of policies designed by people without such experience was an obstacle: "This also explains why it was so terribly difficult to successfully implement restructured operations at the Volkerak locks" (Interview 7.1.18).

Running a lock complex was no easy task. One incompetent lockmaster in particular stood out in Filarski's mind.

> Because the work was paid poorly, severely underpaid for running a small modern enterprise, because of that you would not of course get the organisation skills needed from those guys. The lockmaster simply wasn't up to the task. He had his primary school education and his skipper's training and, er, yes, nowadays you would expect someone with a university degree to be in a position like that. And he treated his staff in a way that you would think 'that's just not smart, you don't get people to excel at their jobs like that'. He lived opposite the lock and in the mornings he would watch the shift change with his binoculars to see if people weren't late, and yeah, then you thought 'listen, you only have to shout at somebody once if they're late and that's it, but they should have the intrinsic motivation to be on time'. (Interview 7.1.18)

For his next major lock project, the Haringvliet locks, Filarski arranged better pay for the lockmasters, which allowed him to choose from a different pool: those with experience of deep-sea navigation. He considered those with deep-sea experience, mostly helmsmen, to be a cut above inland waterway skippers.

Part of Filarski's reluctance to fully embrace the managerialism of the post-1980s is reflected in the fact that he managed to escape the role when he became a historian, becoming productive himself rather than overseeing the productivity of others. Although he often had managerial responsibilities, he did not speak overtly in managerial terms, did not mention 'targets', 'clients', 'business cases', perhaps also because he wanted to be addressed primarily as a historian (and felt free to question the legitimacy of my research topic and the epistemological stability of my method). He

did, however, mention that he had tried to 'implement restructured operations' and was familiar with major organisational changes. He explained the demise of DGSM, which was involved in a power struggle with several government organisations, including Rijkswaterstaat, by saying that "people who have too many staff usually start fighting with each other" over jurisdiction (Interview 7.1.18). Here he implicitly combines the dynamics of Dutch bureaucracy with managerial notions of efficiency and redundancy.

Managerialised and mediatised work

Operators experienced the rise of managerialism in roughly three different ways: 1) they became increasingly isolated within the organisation, but gradually had less autonomy; 2) this was the result of formalisation through protocols, through the measurement of work (intensity) by both consultancy firms and the operators themselves, which was part of a wider trend for non-managers to adopt managerial language and thinking, and managerial strategies also materialised in the mediatisation of work; and 3) at a later stage, after 2004, the traffic control rooms became a focal point of Rijkswaterstaat's 'network management' ambitions.

The first point is somewhat ironic. The outdoor divisions were stripped when Rijkswaterstaat started to prefer outsourcing maintenance and repair work. With the control rooms located in riparian land, close to the waterway, these were the colleagues operators were closest too. Only the river masters and their crews were left, but they had been reduced in numbers when the control room afforded a manoeuvre instead of a patrol strategy. In both Tiel and Nijmegen the managers have their offices elsewhere, and in Dordrecht they were downstairs but left before the operators and have not moved to the new control room location.

While in the organisational periphery, operators learnt to read the signs. Fokko Boersma mentioned—when asked about his general impression of the agency where he worked for almost three decades—that the degree to which operators were allowed to contribute depended on the economic tide: during downturns, you had to do what you were told by management and policy advisors (Interview 4.1.18). Similarly, Jan Timmer deduced that when access to the control room was more restricted and only agency hotshots visited, budget cuts were imminent (Interview 20.2.18).

The second point, formalisation, was the cause of the loss of autonomy. The work was defined more narrowly, to which Van Zanten also contributed, and accounting became more important. Dirk Zwijnenburg felt that, in contrast to the early, informal days, "everything had to be accounted for and arranged long in advance" (Interview 5.1.18). The materiality of the formalisation process is crucial here, as managers were not present enough, especially during night shifts, to monitor the control room operators. So it matters that, in addition to VHF radio conversations, radar images were also permanently recorded; it matters that operators made entries in a national

database for ships with special cargo or size; it matters that the shipping log was kept in a digital format that could not be altered once it was saved; it matters that operators later on knew that whatever else you were doing on digital devices, for example playing a card game, could also be reconstructed. Surveillance was an element of formalisation.

A persistent site of contestation was the intensity of the operator's work. At the beginning of this chapter, we learned that operators initially worked twelve-hour shifts, often with little time to go to the toilet, let alone eat (Interview 5.1.18). In order to prove this, the operators began to keep meticulous records of their work activities. In 1984, Dirk Zwijnenburg wrote a report detailing the average number of actions per hour, which amounted to one minute and twenty-one seconds per action. He concluded that "the operators in the control room in Dordrecht are very intensively occupied" (Zwijnenburg 1984: 11). This meant that they needed a separate marine VHF frequency to communicate with ships, rather than the standard frequency used everywhere. A second, equally modest, demand was an overlap of 15 minutes during shift changes. He also concluded that it would be impossible to take on more responsibility in the current set-up. To quantify work in this way is to translate it into a format that can travel within the organisation, it was to adopt the managerial "evidence-based" logic (Noordegraaf and Schinkel 2011: 106). Not only does this potentially plant the seeds for later accusations of inefficiency, but it also fundamentally allows for conversations about work without having to discuss the work itself, just the numbers.

It was not until 1990 that Berenschot, a renowned Dutch consultancy, was commissioned to carry out a study of work intensity. It largely agreed with what operators had been saying for almost a decade and would eventually lead to a renovated control room with better equipment (cf. Verschoor and Giessen 1990). However, it also meant that the intensity could not be accurately determined until the control room mandate and job descriptions were more precisely defined (ibid.). Acknowledging the harsh working conditions would therefore also lead to less autonomy, since we know that formalisation has not been on the operators' terms by and large.

During my days in the field, I rarely spoke to a Rijkswaterstaat employee who had not adopted some of the managerial vocabulary. During my first visit, one operator said that "our customers should complain" about the understaffed control room (Field note 8.6.15). More than just language, this implied a logic: the expectation that this is how Rijkswaterstaat works, that it wants satisfied customers, and that their dissatisfaction would prompt Rijkswaterstaat to act. Neoliberalism teaches both managers and professionals, in both the public and private sectors, to "see the world from the perspective of investors" (Graeber 2015b: 75). A senior policy advisor in the agency's nautical department whom I interviewed spoke casually of 'business cases' when he meant policy proposals (Interview 29.4.16).

The mediatisation of control room work, of which simulator training is both a cause and an effect, allowed management to ground operator work in something other than the elusive experience of sailing the north-west European waterways. It demarcated training and made it more evidence-based, i.e. skills were expressed through test scores, through formal assessments by an external training institute. Many oldtimers went along with this shift, partly because they were given a prominent role as 'coaches', which conveniently gave them an informal role in a formal process. The veterans could see themselves as the authority on the progress of the newcomers, while the examination of the newcomers was carried out by an accredited course funded and controlled by the operators' main employers.

When operators in inland navigation control rooms base their expertise on shipping, they draw on tacit knowledge, which is knowledge "embodied in people rather than words" (MacKenzie and Spinardi 1995: 44). In a study of nuclear weapons designers, the reliance on tacit knowledge "might even be seen as the self-justification of an elite group whose profession is under threat" (MacKenzie and Spinardi 1995: 44). By comparison, operators are not an elite group, and while it is impossible for an outsider to say whether the nuclear scientists were right, I have observed many instances where tacit knowledge in shipping appears to have underpinned successful interventions in waterway transport. This is not to say that these situations would have led to disasters without this knowledge.

In contrast, managers do not invoke tacit knowledge, and at times not even any knowledge of shipping. A person in a senior position in the field of inland navigation who was a skipper several decades ago, worked as an operator and has had several managerial roles—told me that there are hardly managers at Rijkswaterstaat with practical knowledge of shipping and control room work. On condition of anonymity, he told me that he had recently confronted the head of the department's nautical division with this shortcoming. The reply he received was that this was deliberate, as expertise only hinders organisational change. In this way, the management's ignorance of shipping, which is seen as a shortcoming by the operators, is also a deliberate distance.

This brings us to the third and final point, where the work of the operators is further intertwined with the objectives of the organisation. In 2001–2002 Rijkswaterstaat turned out to be one of the main victims of fraudulent tender procedures in major public construction work, known as the Bouwfraude. This triggered a reorganisation of Rijkswaterstaat, a long-term process that began in 2003. The head of the organisation deemed Rijkswaterstaat "inward and financially out of control" (Keijts paraphrased by Metze 2009: 21). To fend off a privatisation, the agency wholeheartedly embraced corporate principles: further centralisation, cost-oriented, more efficiency, customer-driven, more outsourcing (cf. Metze, 76). In came a management guru and his consultancy firm, who said he "believed deeply in financial incentives and the pillory effect: who is the best and who is the worst?"

(Samhoud in Metze: 59) The main mission was to become 'public-oriented', a Rijkswaterstaat translation of the customer-oriented principle. Both a national audience and those directly affected by Rijkswaterstaat's work were seen as relevant publics (cf. Metze, 78–79). One element of this was the to have "more yellow on the road and the waterway," as one member of the board put it (Aalbersberg in Metze: 91). Just as blue is the colour of the police, yellow would be the colour of Rijkswaterstaat. The police version of the phrase has been a mainstay of Dutch political discourse for at least the last 20 years, and is both a reaction to a deeply bureaucratised organisation and a light version of US 'broken windows' policing.

But there is a more important element to this public-oriented approach. The Nijmegen control room, inaugurated in 2004, became an early symbol of this new approach (cf. Metze: 77). Although the inland navigation control rooms had not been without prestige and publicity, as shown in this and the previous chapter, the aims in Nijmegen were more ambitious. The architects wrote that they had been encouraged to design a "recognisable, reliable and unique" building (Meer 1999) rather than the usual pragmatic design (Figures 9 and 10). The in-house magazine, then called Netwerk, celebrated the Nijmegen achievements; "About 165 thousand ships pass this point every year, transporting about 160 million tons of goods from A to B. The amount of accidents on this difficult stretch of the river is minimal. And that is quite an achievement." (quoted in Metze: 77)

Rijkswaterstaat began to describe itself as a "public-oriented network manager", and the new motorway traffic control centres, which were also architecturally striking, were celebrated for similar reasons in Rijkswaterstaat's in-house magazine (cf. Metze: 172–5). Like motorway traffic management, where the focus is increasingly on traffic flows and less on individual junctions and incidents, the waterway control rooms were also supposed to zoom out. In addition, Rijkswaterstaat's nautical department was given a new slogan: "Dependable on the waterway", which did not seem to impress the operators very much. One is quoted as saying: "It's a nice slogan, but it was obviously thought up in an office. In practice it doesn't make any difference to us" (Metze: 185). This confirms the distance between the control room and the main offices, where the slogan probably originated. Initially, the new ambitions were accompanied by investment, but when the financial crisis hit in 2008, this was followed by more than a decade of zealous austerity in the Dutch public sector. Large infrastructure projects, traditionally the showpieces of Rijkswaterstaat, became even less likely.

One prestige project after 2008 was the Maasbracht control centre, where Rijkswaterstaat centralised the control of six lock complexes along the Meuse and the Juliana canal, which bypasses the difficult section of the river. The design of the building (Figures 11 and 12) responds to the desire for more visibility, and much more so than the Nijmegen control room, it is built to receive visitors (although the Nijmegen control room also has a meeting room available to non-operating staff).

Figure 9: Artist's impression of Nijmegen control room situated in riparian land west of the city. Figure 10: For comparison, the Tiel control room, Cold War-proof.

Figure 11: Entrance to the Maasbracht control room. Figure 12: Courtyard of the Maasbracht control room, with the curtains of the control room on the first floor closed.

A manager I knew from the Dordrecht control room, Marc, was working there at the time of the 2015 conflict and refused to allow me long-term access there. His departure had not been entirely voluntary, it was said. He promised that I could visit the brand new control room in Maasbracht, where he would be transferred. When

I tried to take him up on his offer, he backed down (Email 13.10.16). He pointed out that part of the problem was that my research had not been commissioned by Rijkswaterstaat (ibid.). At the very last minute, Marc allowed a more limited visit than originally agreed.

Figure 13: Two parallel locks, one for upstream and one for downstream traffic, operated remotely from Maasbracht in 2016.

Marc and his subordinate, the floor manager of the control room, welcomed me and said that they expected the operators to be "hostile" to me, that they would just be annoyed to have a researcher around (Field note 19.10.16). The same was said of the Dordrecht operators. But whenever I was there, the Dordrecht and Maasbracht operators were, on the whole, friendly and accommodating to me. Later, the floor manager gave me a tour:

> These people have a low stress tolerance,' he says, adding: 'They come from the locks and could do without the distraction. By the latter, I think he means my visit. The room is large enough for the operators not to hear what he says. 'We have been operating for two years and have pretty much mastered it now.' He explains that the system is designed to follow the water downstream, which is the order in which they set the consoles. Within a console, the lock is always on the left for upstream vessels and on the right for downstream vessels. In reality, it is the other way around at some locks (Field note 19.10.16).

The perceived limited capacity of operators is quickly followed by the admission that they have significantly redesigned the way they work because of centralisation. Not only do the operators have to make do without a direct view of their locks and local conditions, some of them also have to operate mirrored locks, although in the event of a system failure all the locks have to be operated locally again. Rijkswaterstaat has vehicles on standby for this eventuality.

I ended up spending a couple of hours with the operators at their consoles (Figure 13). One, a former skipper on the Maas, said that they had been "driven into this tower", referring to the new central control room, and added that "we all dreaded the prospect" (Field note 19.10.16). As he finished planning the next lock in a digital interface, he said, "It's important to know the waterway, because then you can judge if you can still wait for a ship" (ibid.). Before I left, I was debriefed by Marc in his office downstairs as the final preparations were made for the grand opening of the control room, which was attended by EU dignitaries. I was excited, partly because I found the place genuinely fascinating, partly because I wanted to escape the atmosphere of negativity and obstruction to ensure future access to the site. Marc was single-minded: "Operators are easily distracted, he said, "and have an opinion on everything." (Field note 19.10.16) When Filarski later told me about his search for a more sovereign manager for his lock complex (as discussed above), I immediately thought of this field experience.

2.7. Conclusion

Three levels need to be distinguished in order to understand how navigation experience became irrelevant to the work of operators: profession, mediatisation and organisation. First, skippers-turned-operators failed to achieve professional status on their own terms. They got caught in the system of professions, first in the rivalry between pilots and port operators. Where the former had claimed ships and water as their domain, the latter had claimed the interface as their synthesis. The skippers-turned-operators were more like the pilots, having grasped the many variables involved in the sustained manoeuvrability of a vessel after years of living on it and rising through the ranks, but they were grouped with the port operators, mainly former Navy radar personnel, who had already been working as operators for twenty-five years when the inland navigation control rooms appeared. The operators did not succeed either in acquiring the authority that comes with exclusive control of professional knowledge. Their experience of navigation has always remained intangible, unformalised, which has made it easy for managers, the other professional competitors, to make the operators sound irrational; a classic move (cf. Noble 1977).

Many different managerial roles have been reviewed in this chapter: the captain and the engineer acting as managers, the manager monitoring and gatekeeping,

and non-managers internalising managerial thinking. Although the manager may have previous expertise, it is perfectly legitimate, even desirable, to have no expertise at all, except perhaps knowing how to prevent others from capitalising on their expertise and gaining autonomy.

In contrast, the skippers-turned-operators had an existential approach to work. Work as a domain of masculinity (think of the first computer called Birgitte) was transferred to the control room. Men at the helm became men behind the console and stayed there for decades. Nowadays, the old-timers see new operators seeking upward mobility and pursuing careers outside the control room, which requires pragmatism rather than idealism to overcome the isolation of the control room. The Racon Guild was disbanded in 2016 after failing to find new members for the board—it had been in hibernation for a few years. "Operators are no longer crazy about the job," Dirk Zwijnenburg said (Interview 5.1.18).

Second, mediatisation (itself to a large extent made possible by digitalisation) has allowed the locus of observation to change. One might expect that when technology is used to control the way work is done, automation would be a key concept in this chapter. However, not much has been automated in the work itself: mainly administrative tasks and, most importantly, the identification of ships. Mediatisation has changed the social conditions of learning; the intimacy of expertise has given way to training that is repeatable, measurable and therefore accountable. For example, the operator in the Antwerp control room quoted in the introduction could make the comparison with air traffic control and point out that former pilots do not become operators—in his understanding, knowledge of software and protocols is more important than an understanding of aircraft.

The practices and standards of the port control room operators were reflected in the simulator training. As a result, admission to local control room training, to legitimate peripheral participation, which is now the second level of training, was no longer based on maritime or naval experience, but on simulator experience. The formalisation of work led to clearer and more narrowly defined tasks, with nautical media at the centre. A complex understanding of the needs of the users of the waterway, the waterway itself and the other creatures around it was no longer required. Improved accuracy, new affordances layered in interfaces, and the centralisation of information moved the action to the screen and gradually reduced the relevance of access to the waterscape through the windowpane.

At the third and final level, we find the organisation capitalising on mediatisation. It gives the agency access to an accountability that sounds rational compared to the emotional operators. Operators blew the whistle on their agency in 2015, saying that austerity had left the control room exposed. National and regional media and trade journals reported on operators breaking ranks. Questions were asked in parliament, but the responsible minister denied any danger and reassured the public that the work could be done more efficiently, and therefore with fewer people,

thanks to 'technological innovation' in the form of AIS (cf. Schultz van Haegen 2015, 2). What was once the exclusive perspective of the control room, initially through its elevated perspective on the water, has increasingly moved to the screen and has now travelled to the ships that the operators once left. Mediatisation made the operator's perspective mobile.

Since then, this pattern was used as a strategy to limit the Dordrecht control room when again local politicians, after several incidents, pressured Rijkswaterstaat to control the Dordtsche Kil and the Hollandsch Diep intersect, south of Dordrecht (cf. Koster 2020). Operators would also find it useful to extend the radar network, according to operator Rolph (ibid). Rijkswaterstaat has communicated publicly that it could meet these demands without extending the radar network of the Dordrecht control room (cf. Rijkswaterstaat 2016; Rolph 2017). What was not mentioned was that more radar coverage would have meant an expensive additional sector for the control room. Centralisation was once a cost-saving strategy for Rijkswaterstaat, but distributing the control room perspective seems to be more economical.

Rijkswaterstaat again communicated that skippers have been equipped with AIS, which enabled them "to anticipate to dangerous situations earlier in order to avoid undesirable altercations." (Rijkswaterstaat 2016) As an extension of this strategy, Rijkswaterstaat stated that it was developing "dynamic apps for recreational skippers" with which they could 'improve traffic awareness' for recreational skippers (ibid). In response to local concerns, the VHF radio coverage of the control room has been improved. Furthermore, the focus on "route-oriented information" enabled operators at locks and in control rooms to "proactively inform skippers" (ibid.). Thus, the role of the "network manager", and the similar pet project of nautical policy advisors called "corridor management" (Interview 8.6.15), is to zoom out and to gradually disengage from coordinating passings.

Coincidentally, this probably means less intervention by the operators and thus less intensive work. Only in 2002, after many years of lobbying by the operators, did an early retirement scheme enter into force. This was obviously a very costly arrangement for the Agency, which it succeeded in overturning in 2015. So, while the ambition of 'network management' or 'corridor management' may require investment in media technology infrastructure, it also keeps staff costs in check.

Some operators have returned to skippering after taking early retirement. Their skills are in demand now that the inland navigation communities of practice have been hollowed out. Ad Van Zanten explained that he tried it for a while, but could not cope. In the 1970s, he noticed that he always struggled during night shifts between three and four o'clock—that's when his body seemed to give up. In those days he had company in the wheelhouse, a game of chess was played, stories were told. If necessary, someone else would take the helm and he could get some fresh air on deck. Now he had to work twelve-hour shifts alone (Interview 17.4.18). Wheelhouse dashboards have come to resemble control room consoles, all relevant information is

centralised—this is where mediation began, the first generation of operators transferred mobile media to the control room. With action moving to the screen, the skipper can work on his own, having to pee out of the window if push comes to shove.