Operational drawings for the Paris Fire Brigade: The improbable story of an organizational resource

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An improbable story: the unusual collaboration that lasted nearly fifty years between a draftsman and a military organization in charge of protecting goods and persons in the Paris area, the Brigade de Sapeurs-Pompiers de Paris (BSPP). Light is shed on how this draftsman and his operational drawings gradually changed from being a peripheral resource to a core input for the work of firefighting. This draftsman's foreseen departure raised questions about the transfer of his knowledge and skills, and their appropriation by the brigade.

During empirical fieldwork on the management of extreme situations at the Paris Fire Brigade (BSPP: Brigade de Sapeurs-Pompiers de Paris, a unit of the French Army), we repeatedly happened upon, while studying feedback from experiences, sketches and drawings in fire reports (DIETRICH *et al.* 2016). Made on location or reworked as models afterwards, these freehand drawings were used to keep track of fires and interventions, and to analyze and share information after a fire — actions at the core of the BSPP's "culture" that range from methods for making operations more reliable to a joint learning experience. This practice of making sketches at the Paris Fire Brigade has no equivalent. Emergency and rescue services (whether from French departments or from outside the country) have tried it out in order to improve the reliability of their own operations.[1]

What surprised us was that these sketches played an important part in decision-making both during rescue and firefighting operations and afterwards, during the phase of *retex* (performance appraisal).[2] These sketches were not made in execution of the many rules that regulate firefighters' interventions. Instead, they sprang out of the imagination of a talented draftsman-illustrator enthused, since childhood, by the world of firefighters. Successive officers at the brigade came to have confidence in his talent, thus enabling him to live out his enthusiasm and imagine how to make sketches more useful for the BSPP. While many studies made of high reliability organizations (HROs) have drawn attention to the importance of formally defined procedures being followed by all actors (BEGLEY & ROBERTS 2001), the case of this draftsman, a free spirit in a military organization, attracts attention — all the more because, for more than thirty years, he had no employment relation with, nor any rank in, the Paris Fire Brigade. Adopting the point of view of Siggelkow (2007) and Eisenhardt and Graebner (2007), we thought that analyzing this special case might provide original insights of theoretical interest.

The peculiar story of this unusual form of collaboration — which lasted nearly fifty years — between a draftsman (whom we shall call "RD") and a military organization raises questions about what constitutes a resource for an organization. Studying over time how an organization is conducive to developing an "*individual's aptitudes for using the resources at his disposal and converting them into concrete realizations*" (FERNAGU-OUDET

[1] his article, including any quotations from French sources, has been translated from French by Noal Mellott (Omaha Beach, France).

[2] ranslator's note: *retex* is a syllabic abbreviation of *retiour d'expérience*: feedback from experience (hence, a performance appraisal or project postmortem).

2012:10) means focusing on what people do, how they do it and what they use to do it (MUSCA 2007). Although the resource-management current of thought (SIRMON *et al*. 2007 & 2011) has emphasized the importance of actions on and with resources, few studies have yet been made that cross a historical perspective with a resource-management analysis (BARNEY & MACKEY 2005, LEIBLEIN 2011, DEMIL & WEPPE 2012). This is the approach adopted herein to explain how a draftsman and then the things (operational sketches/drawings) he made would gradually pass from being a peripheral to a key resource for the BSPP. To study this passage, we have paid attention to the phases during which the Paris Fire Brigade learned to explore this resource's potential (PENROSE 1959), to combine and refine the possibilities of using it, and eventually formalize these uses.

Our methodology has been based on a biographical approach that retains the subjective grounding of what the draftsman told about his life story, the meaning he gave to it, and the way he analyzed his talent (as an innate aptitude, the intention to be creative or an offhand action) in the course of his interactions with members of the Paris Fire Brigade.[3] A dozen semidirective interviews (recorded and then transcribed) have been used as sources for qualifying this subjective approach. They were conducted with firefighters whom the draftsman trained, commanders of emergency operations (CEOs) with whom he worked, the editor-in-chief of the BSPP's magazine, and the head of the Operational Graphics Service as well as the persons involved in creating it. We have consulted several documents both internal (regulations about employment or operational drawings, the minutes of meetings for setting up the Operational Graphics Service, educational materials made by RD, and performance appraisal forms for reporting feedback) and external (articles in newspaper and the Brigade's magazine, online videos, interviews, books on the BSPP's history and about operational drawings).

After recounting the origin of this unusual, long-lasting collaboration between this graphic artist (RD) and military organization (BSPP), this article describes how this draftsman, initially used for ancillary activities, would gradually, through his initiatives, become a key resource for fire management. Before concluding, we shall analyze the institutionalization process whereby the BSPP sought, belatedly, to "appropriate" the resources brought by RD, an appropriation that entailed formalizing their uses.

An uninvited draftsman drops in at the firehouse

RD liked to trace his story back to his childhood, when the education he received in drawing from his father (a cabinetmaker and alumnus of Boulle School of Applied Arts in Paris) was mixed with his fascination with the fire engines that came to his quarter in Paris, a neighborhood, near the Bastille specialized in furniture-making with a concentration of craftsmen and combustible products. "*In the courtyards, there were shops for working wood, varnishing, upholstery. And there were often enough fires. So kids in the neighborhood often saw fire engines going by; and me, when I was ten, I already knew how they laid out their hoses, the trucks they used, because we saw them working in the street.*[4] Admitted to a graphic arts school, he continued drawing fire engines until his teacher, who lived near a firehouse, encouraged him to go ask for permission to draw fire trucks in the courtyard: "*These very beautiful trucks with copper and waxed wood were next to being works of art. They weren't at all like the industrialized engines nowadays.*"

After obtaining permission from the colonel, RD came to have, though a chain of happenstances and opportunities, a definitive relationship with the Paris Fire Brigade. Intrigued by his regular presence in the barracks courtyard and by his "*fabulous drawings of trucks*", an officer pointed him out to the captain in charge of communications and of the BSPP's official magazine with six issues per year.[5] At the age of 18, RD was asked to draw "*big fires*" for the magazine. To retain his services, the BSPP asked him to accept an assignment to the fire brigade when he was drafted into the army. This was his introduction to the occupation of firefighter. The colonel would later invite him to continue working together: "*If it interests you to continue with us, I'll take you on as a reservist, while you pursue in parallel your career — if you find a boss accommodating enough to let you leave when we call you. But we'd like for you to continue.*"

So, RD chose work as a freelance graphic designer in order to be available when called for a fire. Over the years, he managed to have his presence as a civilian draftsman to be accepted in the midst of soldier-firefighters, of dangers and rescue operations. This was the start of collaboration with the Paris Fire Brigade that would last more than 47 years and end, after 50 years, in an official position as "operational draftsman".

Equipped with firefighter gear and a pass, but with neither (at the start) a driver's licene nor a car, RD managed to free himself at any time of day or night to go to fires, where he took notes and made sketches that "*could then be used for a pretty illustration of the fire's progression*" (DOSNE 2012:3). During his first

[3] Centering an article on the "subject" does not bar a "*situational logic*" (DUMEZ 2013), since the "*biographical method serves to situate the network in which the narrator is staking out a position*" (PRUVOST 2010).

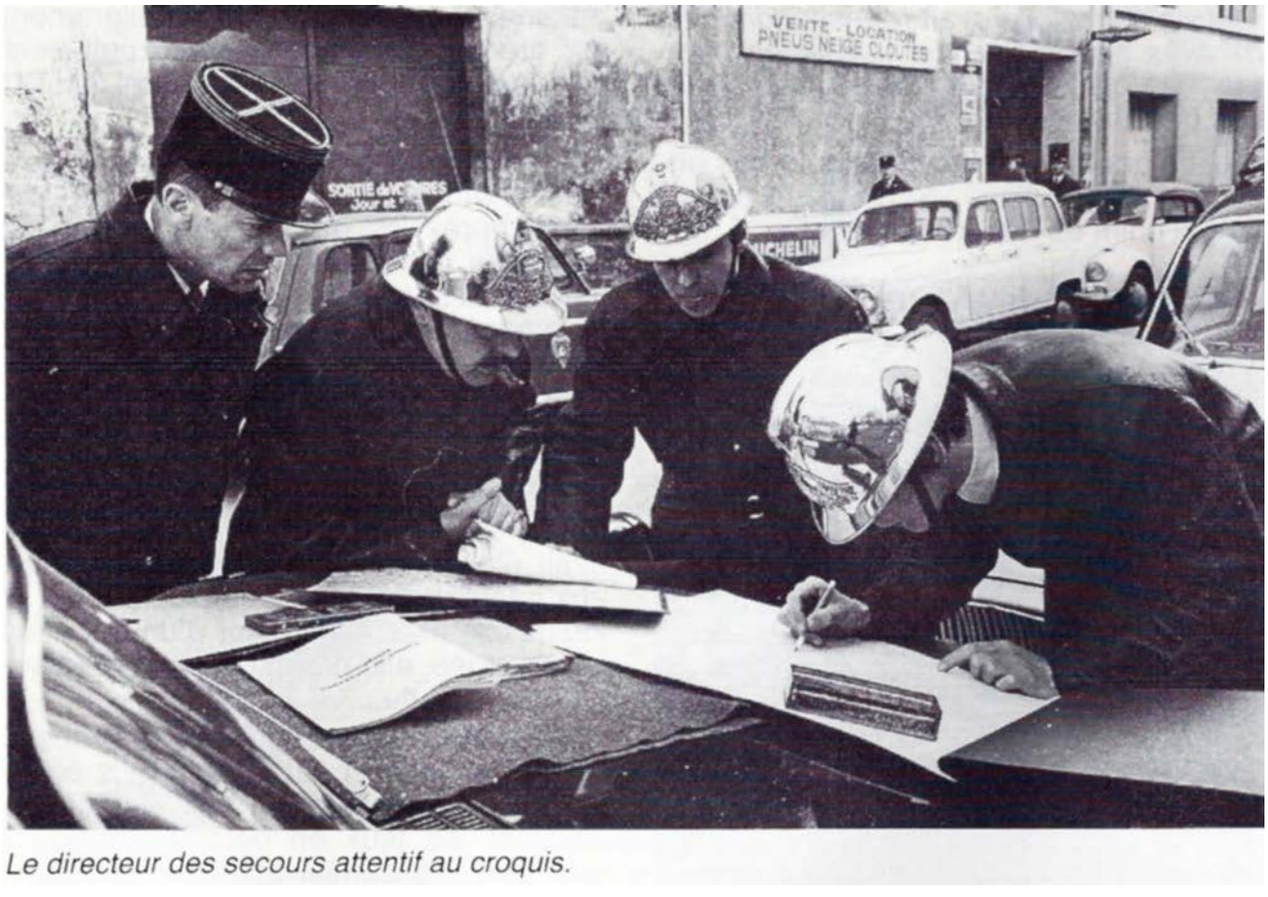
[4] Unless indicated otherwise, the passages set in italics are RD's words.

[5] Since 1947, *Allo 18* was circulated in France and abroad; it had 17,000 subscribers.

"*big fire*" at a toy warehouse in July 1964, the commander of emergency operations (CEO) asked for his sketches in order, during the debriefing, to trace the spread of the fire from the basement. This was the draftsman's first interaction with a CEO. It signaled that the sketches could be used not just for an artistic or illustrative purpose but also for operational and organizational reasons, namely: to have a record of events that for understanding the fire and analyzing operations afterwards during the phase of feedback. Performance appraisals were organized to describe what happened (the circumstances of the fire, sorts of damage, phases of intervention, difficulties encountered), understand the series of events, identify problem areas and draw lessons for future operations. Thus the "*drawings, at first for illustrations, gradually came to have a practical content*" (DOSNE 2012:2).

Receiving more and more requests from officers intrigued by his presence at fires and by his sketches, RD came to realize what CEOs needed to know to fight a fire and that his talent could potentially help them. The objective was not just to make illustrations for *Allo 18* or for use during a debriefing after a fire, but to make sketches on location that would provide CEOs with information for planning the maneuvers to be performed during actual interventions. RD was used to coming to the scene after the fire, but the BSPP was now more often asking him to be on location during the fire in order to make sketches for the CEO. This was no minor change. The atmosphere was different: he faced the fire, the smoke, the danger under conditions of low visibility — the radical uncertainty stemming from the fire's kinetics. Letting the officers guide him, RD learned from their firefighting experience to better understand types of fires and their spread: "*The officers were more often saying, 'Show me your sketch, so we understand one thing or another'; and I would then go over to the command center, which was a car, a Peugeot 404, where we would lay out maps and documents on the hood*" (*cf*. Figure 1).

RD soon realized that accurately portraying "*volumes in space, a talent with which some draftsmen are innately endowed, undeniably represents a plus for understanding how a fire spreads*" (DOSNE 2012:3). To be able to use this skill as a resource on location during a fire required a period of reciprocal learning during which RD discovered the key variables for fighting a fire and the CEOs came to better realize the potential usefulness of RD's sketches. A dozen years were necessary to learn to make sketches that could be recognized and used in real time for operational purposes. At the start, RD had to carve out a place for himself and sometimes had to justify his presence on location. He listened, observed, stayed out of decision-making and was "*satisfied with handing over his sketches while leaving commanders decide whether or not their contents were of use*" (DOSNE 2012:2).



Le directeur des secours attentif au croquis.

Figure 1: Planning interventions on location: The command center
Source:©BSPP.

Gradually becoming used to RD's regular presence on location during fires, more and more CEOs began asking for his help: "*Could you go to such and such a place where we just don't understand [what's happening …], could you take notes… Over the years, they oriented me toward their needs; and I eventually no longer made the same sort of sketches. I was no longer making artistic drawings but sketches that actually provided them with information*". RD became an increasingly used resource during "big fires", as his "operational sketches" better made visible information that CEOs could use to make decisions.

Operational sketches, a resource for controlling fires

To better understand why RD came to play an ever more central role in the Paris Fire Brigade, we need to ask several questions. How was a draftsman and his sketches a resource for this firefighting organization? How did RD's talent lead him to "see" a scene differently? How did his sketches let firefighters "see" information that they could not otherwise obtain?

3D-sketches for "seeing" what is hidden

RD drew on his skills for portraying volumes, his knowledge of architecture and the perspective drawing techniques that he had learned in graphic arts courses. He also drew on his experience of fires and on the procedures followed by CEOs. Combining these two sorts of know-how enabled him to depict verticality, the most important dimension since it helps firefighters understand how a fire spreads: "*Firefighters have always worked in 2D; and me, I said to myself that a fire spreads in three dimensions, and that the most important of the three for firefighting is the vertical one. That's not shown on maps and floor plans. That's why, from the start, from my first interventions, I wanted to show this third dimension. When you have a floor plan, you don't know whether a staircase going down to street level has a landing at the second storey or whether it runs all the way up to the fifth floor, or whether there's another stairs that starts on the third floor and goes up to the sixth. You don't know any of that. But when you have a 3D-drawing, you understand that right away." BSPP officers had overlooked this third dimension because verticality calls for seeing a scene in a unique way related to the innate talent of a draftsman, like RD: "Me, I preferred working directly in the third dimension because, since whenever, I had that in my head. Since the age of 6-8, I saw in 3D when drawing.*"

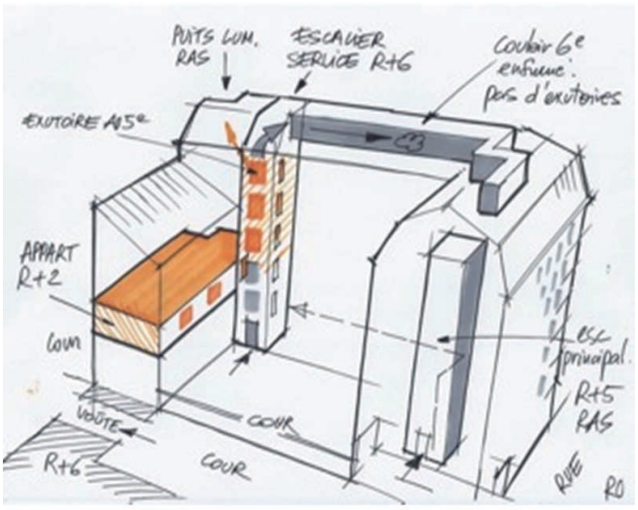


Figure 2: Sketch provided by René Dosne.

Whereas firefighters ordinarily saw what was in front of them, RD did not draw the buildings in front of himself as he saw them. To better depict a fire's dimensions and the possibilities of its spread, he made sketches as if he were 30 or 40 meters above the fire. He claimed that the sketch in Figure 2 was better because it sifted through information and made visible a building's facade, structure and general layout. This sketch showed how buildings or parts of them were distributed and interconnected, the "concept of the building", which had to be understood to fight a fire. Out of what he saw, RD selected only what would be of use to CEOs. This is what the "operational draftsman" made visible. He let them see what was hidden behind the flames and thick smoke, under nightfall, or down in the basement. He showed how the building was aligned with the street. He signaled the paths for reaching the center of a fire, which is not always easy to detect.

On location during a fire, the purpose of looking at the scene would determine what was (to be) seen; and this differentiates a sketch from a drawing: "*In fact, the operational draftsman does not draw what he sees. This is a particularity compared with a normal draftsman.*" For the purpose of "making visible" (transparency in the BSPP's current jargon), RD recommended simplified, schematic geometric forms for volumes so as to portray buildings as boxes piled on top, or laid inside, each other, interconnected by places of circulation (courtyards, stairwells, air shafts — firestops or firetraps) that help or hamper the spread of a fire.

A resource for rapidly understanding the situation and sharing ideas

To better understand how an operational sketch came to be a new firefighting resource, it is necessary to examine the characteristics of the situation — all at once, uncertain, moving and dangerous — during a fire. Paris firefighters are well trained, but danger is always on the prowl: 300 firefighters are injured every year, and a dozen of them have been killed during a 10-year period.

When arriving on the scene, firefighters and rescue services do not already know what conditions they will encounter: the intensity of the fire, the architecture of buildings (the location of stairwells, elevators, courtyards), the degree of destruction, the number of persons injured or killed, the behavior of people at the scene (defenestrations, hostility toward emergency responders…), etc. What fuels this uncertainty is that the situation is moving owing to the kinetics of the fire, which can spread through hallways or across poorly sealed partitions and balconies. A simple fire in a room or kitchen might set the building ablaze, depending on the layout or other parameters of the situation (e.g., day- or nighttime). So, the arrival on the scene of a fire presents firefighters with a rather chaotic situation.

To (somewhat) restore order in this chaos, the CEO adopts a military procedure, which, to make the explanation simple, has three steps: taking stock of the situation (gathering and analyzing information), planning maneuvers (setting goals and distributing the means for reaching them) and executing decisions. During this procedure, the ability to see, to rapidly visualize the situation, is of capital importance. In a captain's words, *"It is necessary to take stock of the fire fast in order to see how smoke, hot gases and flames are moving, where they do and don't escape."* In an extreme situation of confusion and emergency, RD learned to identify the relevant elements of the place and to put them into a space, the operational sketch that enabled a CEO to have a global view of the situation. In contrast to emergency responders (who are assigned to a geographical or functional sector and only have a local, partial view), RD moved freely from place to place on the scene of a fire. He "circuited" the fire so as to make seen, on his sketches, all information for understanding the fire and its probable spread.

According to RD, the operational sketch was a graphic medium for "*seeing to it that everyone had the same image; and in this occupation where everyone is rushing about and no one has the time to make a long explanation, a sketch is actually the surest vector for conveying information.*" The sketch thus seemed best suited to a situation where extreme conditions limited verbal exchanges since, as a captain said, "*During an operation, you don't have the time to spin words.*" For an operational sketch to be a genuine resource for action, it had to be drawn fast, in fewer than ten minutes for the first version. As RD emphasized, "*The value of a sketch to the CEO is directly proportional to the speed of drawing it.*"

The draftsman's talent combined with the CEOs' experience

In the course of RD's interventions, the operational and cognitive pertinence of operational sketches came under discussion. His growing experience with various fire situations and their risks, his ability to graphically make seen how a fire might spread, all this came together to make him a recognized and rare resource.[6]However his expertise was not just a matter of his innate talent. It came out of the combination of this talent with the BSPP's knowledge of firefighting and experience with commanding rescue operations. Drawing an operational sketch in fewer than ten minutes required a mastery of the rules of engagement and of the right postures for circuiting the fire fast (scaling ladders, walking on rooftops, squatting in smoke-filled buildings to see as far as possible) while learning to be watchful and detect risks (unstable ground, walls out of plumb, petroleum products on the scene, etc.). Alerted to these points during his stint of service in the army with the BSPP, RD learned on location in contact with seasoned firefighters. Like them, he was capable of adapting so as to handle contingencies: "*I even brought back to the command center the frame of a door pulled off its hinges.*"

Beyond his interventions, when he drew operational sketches fast, RD benefitted from the BSPP's know-how about, for instance, the categories of fires and their kinetics. He used this knowledge to gradually make sketches adapted to each category (house fires, industrial fires, fires in high-rise buildings, etc.). His sketches made visible key points of information because he had both internalized the knowledge of BSPP officers (about the architecture of buildings, categories of fires, risk management, etc.) and come to understand how CEOs reason and what information would help them make decisions about any additional means to be put to use.

An ever more useful resource and the advent of electronic technology

While freelancing as a graphic designer, RD's services were increasingly in demand during big fires. Although he had to take in stride "*short periods of semi-activity when a CEO sometimes wondered about his apparently anecdotal activity*" (DOSNE 2012:90), he was considered to be a full-fledged part of operations.

His sketches proved even more useful after 1990 when, thanks to the first fax machine on board vehicles, he was able to transmit them to the staff of command. The staff thus had a simple picture that could be understood in a cinch and used to assess the situation from a distance, provide backup for decisions made in a complex situation and plan requests for reinforcement. From then on, RD's sketches were ever more often used during all rescue operations (explosions, train accidents, building collapses) in order to evaluate conditions (*e.g.*, for extracting casualties): "*I was even sent into the rubble of a building to make a sketch for telling how the casualty was blocked, so that emergency responders outside could realize the problems encountered.*"

(6) A video (2012) on YouTube has called him the "*man with 700 reinforcements*".

During an average year, RD intervened in forty or so emergency situations. Although doubts had long been dispelled about the usefulness of his operational sketches, it was not till 2003 that General Debarnot made the position of draftsman official. RD was then assigned to the BSPP as a reservist with pay who had the rank of lieutenant colonel and, for the first time, a staff car for reaching the location of interventions. This official recognition of his rare qualifications at the service of firefighting was, for RD, belated. His reputation had spread among public and private professionals, even outside France, who work in safety and emergency services.

Meanwhile, the first mobile telephones equipped with a camera had come out on the market. The camera could be used to take photos on location and send them right away to the CEO and command center. This new technology could have made RD's job obsolete. However an operational sketch is more than a photo: it sorts, ranks, aids the making of a diagnosis, and makes seen what is important for successfully conducting maneuvers, while oversha-dowing what is ti be spared importance. But on the other hand, such a telephone could make a sketch more useful by delivering it faster to CEOs, thus gaining precious minutes: "*From up on a ladder, I didn't need to climb down and go to the car to hand over my sketch. Up there, I just held on, drew a sketch, made a photo of it; and by the time I came down, the command center had already received it .*" A few years later, aerial views via smartphones would provide applications that RD could use to circuit the fire more efficiently and form more rapidly an idea of the volumes of buildings. Profiting from the freedom allowed to him, he always managed to seize the opportunities offered by technology in order to optimize his service at the Paris Fire Brigade.

A major change came with computer-aided design. Keyboard, mouse and screen replaced pencil, eraser and sheet of paper. When he heard a firefighter quip, "*We understand fires so well when we see your sketches that we'd like to have them beforehand*", RD realized that 3D-models of buildings would respond to this need. Returning to the conception of a 3D-plan of interventions that he had worked out in the early 1980s (and which had received an award as innovation from the DGA, the French Army's procurement and technology agency), RD developed an offer of 3D-plans for prevention work. These plans were intended for big firms or public places (historic buildings, theaters, train or subway stations, hospitals, etc.). This work was done through his agency (RD & Fils); but it was made available to the BSPP, since these 3D-models made it much simpler to organize plan and facilitate emergency and rescue operations. Nearly fifty building plans are currently on computers at the BSPP's command center; they depict the most important elements of a building: its outer form, stairs, elevators, courtyards, horizontal and vertical areas of circulation, etc. (*cf.* Figure 3).

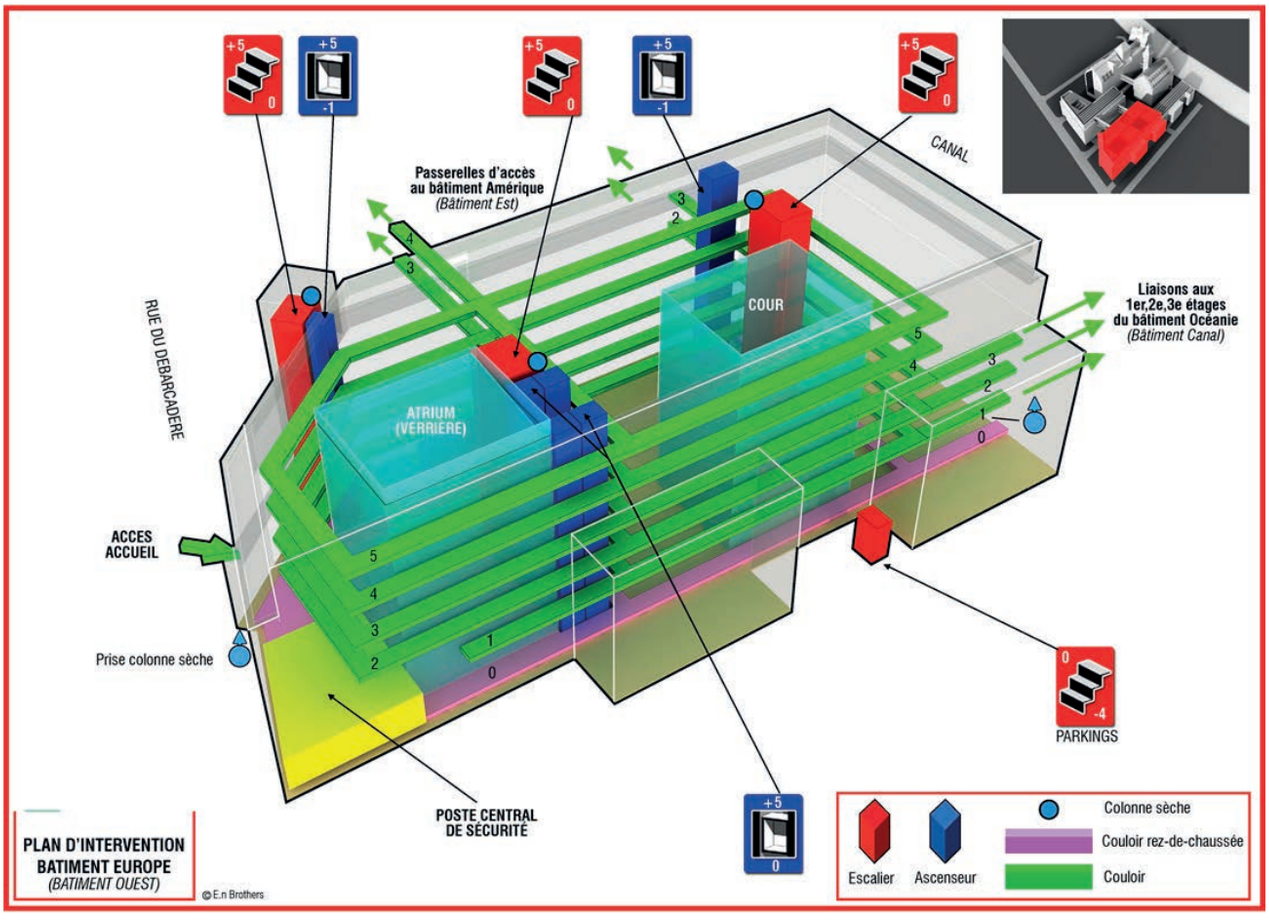


Figure 3: Document provided by René Dosne.

These 3D-plans are used during all phases of fire management, since they can be "*used before, during and after an intervention. Take the example of Garnier Opéra [in Paris]. Before starting to look at plans and blueprints, which are not fit to read and people have trouble understanding, because traditional plans are complicated, a guy is first going to look at the 3Ds and say, 'Ok, I see the big blocks that shape the opera house, I see the place of stage machinery, the auditorium, the basement, the administration area behind.' […] He already sees things simply, an overview. When the command station vehicle arrives, we have a touchscreen that can display 3Ds of the opera house. Depending on where the fire is, we can turn the building, move its image on screen, capture screen shots. Afterwards, a SITAC*[7] *can be made on it; and then, we can, after the fire, reuse these images for the performance appraisal.*"

For these buildings with 3D-models, a service of augmented reality is now being proposed: "*It suffices to target a facade to see the whole building in 3D. In other words, you see through facades, and then see the fire, the burning windows, the windows where smoke escapes. So, you target them and see behind them; and behind, there's a hallway without partitions that does not cross other hallways. That's how I use augmented reality.*" Digital technology makes places and events transparent, makes it possible to see through walls. Furthermore, the objects that appear on a screen are images that can be moved, rotated; and a simulation can be made of how to move inside a building, how a fire can spread, how operations by third parties can be conducted.

Institutionalizing the resource

For nearly 47 years, the Paris Fire Brigade provided the conditions in which RD honed his talents and placed them at the service of the BSPP, but it did not try to formally define the procedures for making or using operational sketches. During this period, the trust built between these two parties allowed RD to be relatively free, a privileged position but without official recognition. The BSPP staff all knew RD, and many of them acknowledged the utility of his sketches. His activity was not, however, mentioned in the BSPP's documents. His position did not figure in any set of regulations. Nor did his interventions follow any specific procedure. In a military context with everything compartmentalized and regulated, RD's role expanded thanks to his talent and activities in the organization's interstices. The freedom granted to him and the absence of formal procedures were major conditions for the emergence of an occupation unique in the world: the job of "drawing fires". These conditions also made it easier for the BSPP to experiment with the resource he offered, namely his operational sketches. Nevertheless, the absence of institutional recognition also jeopardized this job, since it relied on a single man's talent and the trust he had bred.

The turning point was 2009. Realizing that RD would not be indefinitely available, General Prieur began asking about RD's eventual replacement. This question implied another: how to appropriate the skills and qualifications embodied in a talented, remarkable individual? The military machine soon came up with an answer. After much paperwork, RD's informal activity was turned into an official position: operational draftsman (DO). Institutionalizing the resource entailed two steps: transferring RD's knowledge and developing an *ad hoc* organization for a more intense use of future draftsmen.

How the BSPP appropriated operational sketches

In 2009, a general asked RD to train firefighters to make sketches so that the BSPP could appropriate the skills of operational draftsman. For two years, RD recruited, trained and coached a dozen firemen from the ranks and accompanied them to fires. It was not obvious how to pass his skills on to others: "*I had to teach them everything: Haussmanian architecture, perspective… I had never trained someone to work like I do. So it was an odd situation. It was very complicated because I had done what I did without thinking about it, for dozens of years […] Some people are more perceptive. For myself, once I've had the impression of a location, a room, if you ask me to draw it as if I were in a corner, at the level of the carpet or up on the ceiling, I can draw it right away.*" To teach how to make an operational sketch, RD drew on a stock of standard situations from his experience: how to geometrically portray parts of a building, what are the best observation points (from above, from opposite, depending on the place) to have a panoramic or a targeted view of a fire.

The task of formalizing more than forty years of experience led, in 2009, to a regulation about operational sketches (BSPP 2009). In these 36 pages mostly written with regard to the major categories of fires where the BSPP intervenes, RD formulated a method with the points essential for an operational sketch, the procedures to follow on location (from arrival on the scene to the transmission of the sketch) and the strategies adapted to each type of fire. This document borrows from officers' knowledge about types of fire and the ways they spread, but it also abounds with pragmatic advice drawn from experiences on location: "*Besides his own reconnaissance of the situation, the draftsman must put to use evacuation plans, which he will find in the lobby or on landings (rip one off the wall), in order to locate the building's stairs, elevators and general layout.*"

Parallel to these plans for formalizing and transferring RD's know-how, the Paris Fire Brigade tried to Institutionalize and regulate this new activity. In compliance with the requirements of a bureaucratic structure under the Ministry of the Armed Forces, the BSPP resorted to "performative speech acts", namely

[7] The SITAC (tactical situation) is a plan of the zone of intervention that has symbols representing the means to be used and depicts sectors of responsibility, the missions under way, etc. A glance at it suffices for realizing how the zone of intervention has been organized.

administrative and regulatory measures. The phrase "operational drawing", patented by the BSPP, replaced "operational sketch", which was RD's property. The category of "operational draftsman" corresponded to a new position, specific to the BSPP, which planned to have it recognized by the ministry and listed among official job specifications.

At the start, recruitment to the position of operational draftsman was open to anyone at the BSPP who was attracted to drawing; but the results were disappointing. Whereas RD had gained experience and insight about firefighting thanks to his enthusiasm, his interactions with CEOs and his freedom of action on location, the Paris Fire Brigade soon realized that it would not find his job profile in its ranks. The ability to make visible the important elements in a fire (to "problematize") required an experience with the command of firefighting operations. For this reason, the BSPP decided to open recruitment to persons occupying a position as chef de garde incendie or higher (i.e., at least six years of seniority).

The new draftsmen say they are no longer bound by RD's conception of the job, and they do not have the same stroke of a pencil. Nonetheless, the category "operational drawing" undeniably replicates the features, purposes and methods of the operational sketch as defined by RD in what he called his "*doctrine*" or "*breviary*". The words used for operational drawings have a more military ring: a list of the operational and postoperational uses expected of these drawings, an insistence on "problematizing" related to the idea of maneuvers (BSPP 2017).

How the BSPP put operational drawings to a more intensive use

Once regulation BSPP 501 (2009) formalized the decision to institutionalize operational drawings and confer on RD the task of passing on his know-how, the process of appropriation sped up. An occupational duty was specified: "search for the causes and circumstances of a fire"; and a service was set up to group all units with activities related to postoperational fire management: operational draftsmen, performance appraisal (*retex*), investigations after a fire, and the new unit for searching for the causes of a fire. In this new organization, operational draftsmen and the drawings they made on location as well as the computer graphics produced afterwards have become part of an ongoing process of fire management, from before till after actual interventions. This was done to meet the stricter requirements for traceability made by public authorities and insurance companies. The goal is to optimize the contribution of operational drawings to performance appraisal, the ongoing improvement of procedures and regulations, the operational preparedness of firefighters and the capitalization of the lessons learned following events and of the knowledge drawn from graphical representations of scenes.

RD, whose engagement stemmed from his enthusiasm, remained a "free spirit" authorized to circulate on location during a fire and, too, a party in a variable partnership with the Paris Fire Brigade. In contrast, operational draftsmen come from the BSPP's ranks. They have an assignment and are part of a "*squad of operational draftsmen inside the Renseignement et Synthèse unit at the command center vehicle*" (BSPP 2016). They follow this unit's definition of their activities on location, obey a code for departure, etc. This organization of activities allows for a more intensive use of drawings and graphics as a resource for operational purposes. Whereas RD's interventions numbered forty per year, the operational draftsmen carried out 200 interventions their very first year (2010), and nearly 500 in 2016.

This institutionalization of the position of operational draftsman has reinforced the *ex post* uses of operational drawings (following interventions). This resource (whether drawings or computer graphics) is more than ever being tapped for educational purposes within the BSPP (the operational preparedness of firefighters), for organizational purposes (improving regulations and the feasibility of operations) and for the purpose of "knowledge capitalization" (the creation of a database). Given the formalization of the datasheets containing the information to be entered, this database — now the BSPP's "memory" — has systematized and reinforced the functions of performance appraisals and of operational drawings.

Conclusion

How were the activities of a draftsman from outside an organization and the things he made (in particular, his operational sketches) gradually integrated into an organization as their status gradually changed from being a peripheral to a central resource? As the diachronic approach adopted herein has shown, the potential services that the draftsman proposed were very gradually enhanced and broadened in the course of a reciprocal learning process involving the BSPP and RD. This case study with its historical approach helps us better understand the dynamics of using resources within organizations (KRAAIJENBRINK *et al*. 2010) and offers us a new look at core processes in resource management (HOLCOMB *et al*. 2009, SIRMON *et al*. 2007 & 2011). We have come upon the three processes of this management, namely: ACQUIRING and developing resources; COMBINING them to form new capacities; and DEPLOYING these capacities. As shown herein, these processes sometimes necessitate a long period of learning, and they are not always in phase with each other. RD's recruitment and training during his stint in the army, when he was assigned to the BSPP, is not by itself original. What was original was the phase of combining resources.

The Paris Fire Brigade granted wide freedom to RD for more than forty years, this being evidence of its openness to an individual's initiatives. This freedom might come as a surprise in an army organization where everything is carefully timed, tightly compartmentalized, strictly calibrated and made subject to rules and regulations. A line of command, the obedience to orders and the following of rules are requisites in dangerous situations and emergencies. Concerned with the ongoing improvement of its regulations and procedures,

the BSPP's management is more participatory, staff-driven; it pays attention to firefighters' resources and motivations. Leadership thus closely articulates discipline (in the sense of an optimization of individual and collective resources) and trust (built up by sharing life in the barracks and ordeals on the job; and sustained by firefighters' admiration of those who command them in dangerous situations and by a shared awareness of the risks run by colleagues) (DIETRICH *et al*. 2016). The BSPP and its commanders, by confirming the trust they placed in RD, created the conditions for him to be accepted by officers; and this facilitated the many and various interactions that would then take place between the draftsman and firefighters.

In studies that emphasize the importance of managerial actions on resources (ADNER *et al*. 2003, HOLCOMB *et al*. 2009), the presupposition is often made that organizational resources are put to an optimal use. However the BSPP apparently did not anticipate the potential utility of RD and his services. After all, his talent and traits seemed to place him at a far distance from the organization's principal mission. For various reasons (lack of time and attention, limited rationality, cognitive biases, etc.), managers might have a relatively low understanding of the potential to be drawn from available resources (PETERAF & BERGEN 2003). Knowing the capabilities of an individual or imagining all the possible uses of an artifact is far from self-evident. This complex operation requires successive iterations, as during the learning process described herein. This learning process took place because the BSPP accepted RD's experimentation and trial-and-error approach. It led to combining RD's talent with other organizational resources (knowledge of the types of fire and their spread, the experience of commanders of emergency operations, the knowledge acquired in prevention work and risk management, etc.) and with resources outside the organization (in particular, the advent of digital technology). This combination of resources created two new aptitudes recognized by the BSPP: the ability to "see in 3D" as RD did and the ability to "make seen" as objectified in RD's operational sketches and then, as time passed, through successive improvements in 3D-plans and computer-aided tools (augmented reality). Formal recognition was, finally, granted to these new aptitudes for seeing and making seen in a way that helps firefighters understand the situation fast and share their understanding.

With regard to the use and deployment of these new resources, our analysis of a period nearly fifty years long has discerned two phases. During the first 45 years, the BSPP gradually came to use these resources but without trying to put them to an optimal or systematic use. They would be intensively used much later — once the BSPP tried to formalize RD's know-how by institutionalizing his "operational sketches" as "operational drawings", officially recognizing the position of "operational draftsman" (a gain in terms of visibility and legitimacy) and setting up a new service that enabled the BSPP to tap this new resource hundreds of times per year.

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