



Supporting Middle Managers' Contribution to Safety

Corinne Bieder (Airbus) & Tiziana C. Callari (TCD)

Short abstract: Future Sky Safety is a Joint Research Programme (JRP) on Safety, initiated by EREA, the association of European Research Establishments in Aeronautics. The Programme contains two streams of activities: 1) coordination of the safety research programmes of the EREA institutes and 2) collaborative research projects on European safety priorities.

This deliverable is produced by the Project P5 Resolving the Organisational Accident, and concerns understanding the Middle Manager's role in safety. 48 Middle Managers were interviewed from a range of organisations, and a descriptive and an explanatory model were developed, to lead to guidance on how best to harness this key resource for organizational safety.

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Acronyms

Acronym	Definition
MM	Middle Manager
SESAR	Single European Sky ATM Research

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INTRODUCTION

1.1. The Programme

FUTURE SKY SAFETY is an EU-funded transport research programme in the field of European aviation safety, with an estimated initial budget of about € 28 million, which brings together 32 European partners to develop new tools and new approaches to aeronautics safety, over a four-year period starting in January 2015. The Programme research focuses on four main topics:

- Building ultra-resilient vehicles and improving the cabin safety
- Reducing risk of accidents
- Improving processes and technologies to achieve near-total control over the safety risks
- Improving safety performance under unexpected circumstances

The Programme will also help coordinate the research and innovation agendas of several countries and institutions, as well as create synergies with other EU initiatives in the field (e.g. SESAR, Clean Sky 2). Future Sky Safety is set up with four years duration, and started on the 1st of January 2015.

FUTURE SKY SAFETY contributes to the EC Work Programme Topic MG.1.4-2014 Coordinated research and innovation actions targeting the highest levels of safety for European aviation in Call/Area Mobility for Growth – Aviation of Horizon 2020 Societal Challenge Smart, Green and Integrated Transport. FUTURE SKY SAFETY addresses the Safety challenges of the ACARE Strategic Research and Innovation Agenda (SRIA).

1.2. Research objectives

This report presents the results of research aiming at understanding how Middle Managers from the aviation industry take safety into consideration in their daily activities¹, and identifying the various aspects that play a role/influence in the way they do it. The emphasis is not on safety managers themselves but mostly on Middle Managers who don't have safety as a core focus.

The specific goals of the current report are as follows:

- To present an up-to-date literature review regarding the Middle Managers/Management definition, roles and responsibilities, and their contribution to safety.
- To advance a model describing the way Middle Managers take safety into consideration in their daily activity.
- To advance a model explaining what influences Middle Managers practice in relation to safety.
- To derive ways forward to better support Middle Managers contributing to safety.

¹ Two cautions: (1) We don't want to focus on their activities that are obviously related to safety. We also want to understand whether they ask themselves whether safety can be impacted by any of their activity. (2) We don't want to focus exclusively on decision-making but want to address all the activities of the MM. Thus, understanding the range of MM daily activities would be a kind of pre-requisite.

1.3. Approach

The approach adopted combines a bottom-up research strategy, based on interviews and literature review and a qualitative content analysis to process the qualitative data collected.

1.4. Structure of the document

This document divides into several sections:

- **Section 2** presents the current state of understanding of Middle Manager roles, responsibilities and contributions to safety.
- **Section 3** presents the methodology and process adopted to perform this research.
- **Section 4** presents the descriptive model of Middle Manager safety related practices.
- **Section 5** presents the model explaining what influences the way Middle Managers take safety into consideration.
- **Section 6** presents possible ways forward to support Middle Managers' contribution to safety.

2 WHY FOCUS ON MIDDLE MANAGERS?

Top managers and front-line operators' positions or place in the organisation are clearly defined. Likewise, their contribution to safety has been extensively studied. Conversely, there has been much debate about how to define the Middle Managers and very few studies about their role in safety.

As Jansen and colleagues state (Jansen Van Rensburg, Davis, & Venter, 2014), *despite the fact that the term 'Middle Manager' is well established in the literature, one would not commonly find people with the job title 'Middle Manager' in organisations* (ibid, p.167). They argue that the role of a Middle Manager can rather be described **in operational terms** (such as the 'assistant of authority' (Mills, 1956); 'functioning as mediators between the organisation's strategy and day-to-day activities' (Nonaka, 1994) and 'managing a set of team leaders' (Osterman, 2008)) or **hierarchal placement** (such as 'any manager below the CEO and one level above line workers and professionals' (Huy, 2001), or 'managers who operate in the "middle" of the organisational hierarchy' (Floyd & Wooldridge, 1992: 157), or those 'actors who act as both subordinates and superiors' (Jansen Van Rensburg et al., 2014). In this research the definition proposed by Mintzberg (Mintzberg, 1983) was used in which the *Middle Managers constitute the middle line, 'having managers reporting to them and also requiring to report to managers at a more senior level' and added the condition that they hold budget responsibility.*

The perception and acknowledgement of the Middle Managers role have changed over time. In the 1990s research, the Middle Managers were usually neglected, and often seen as 'dinosaurs', defending the status quo against improvement change, and impeding organisational efficiency (Floyd & Wooldridge, 1994; Huy, 2002). Nowadays researchers agree that Middle Managers are a valuable asset for organisations and central to supporting key organisational outcomes (Glaser, Stam, & Takeuchi, 2016; Wooldridge, Schmid, & Floyd, 2008). As Middle Managers operate at the intermediate level of the organizational hierarchy, they act as horizontal integrators who support the distribution of knowledge-based resources throughout the organisation, having "their fingers on the pulse of operations" (Dutton, Ashford, O'Neill, Hayes, & Wierba, 1997, p. 407). Their role is diverse:

- *Role model* – to promote safety-related practices and influence key-stakeholders when certain critical decision-makings are to be taken.
- *Innovator* - the Middle Manager's background experience has a positive impact on Middle Managers' divergent thinking. Behrens and colleagues (Behrens, Ernst, & Shepherd, 2014) suggested that personal experiences impact project innovation and divergent thinking more on Middle Managers than senior/top managers. This happens thanks to the learn-by-doing experiences gained by Middle Managers who eventually see increased confidence in their abilities on exploiting different opportunities in projects in the relevant domain. Further, Middle Managers able '*to see new events as rare or unusual and in need of careful attention*' (Beck & Plowman, 2009, p. 915). Experience (that is work, education, and training) can support Middle Managers' understanding of tasks and situations, and the ability to successfully implement an exploitation strategy.

- *Influencing actor*, promoting upward (i.e. to champion alternatives and shape the top managers' strategic agenda contributing to the organisational strategic direction), downward (i.e. to facilitate adaptability at the operating level, from the one side, by adjusting the planned organisational strategies at the operational level to fit with the current specific operational state/situation and, the other, strengthening their sense of identification and commitment towards the organisation's goals) and lateral influence (i.e. by exchanging information from formal and informal activities with peers and their respective departments).
- *Facilitator* to work process, managing employees, development and sustainability of teams and solving problems (Harrington & Williams, 2004).
- *Agent of change*, able to detect, critically handle, and filter information between the different organizational layers, by translating the top managers' explicit knowledge and the day-to-day reality of tacit and contextual knowledge at the operative frontline (Balogun, 2003; Huy, 2001). They may also make use of their networks to keep up-to-speed with and make sense of all possible strategic changes (Bäckvall & Englund, 2007; Conway & Monks, 2011).

Despite this effort in revitalising the Middle Managers' organisational capabilities, **little** is still known about the role played by Middle Managers in the civil aviation industry in supporting safety in their daily activities (Rezvani & Hudson, 2016). Hence, this study aims to shed light on the crucial contribution Middle Managers provide in keeping up the organisational safety objectives, and what influences - positively or negatively- the way they do it.

3 METHODOLOGY

In the period 2016-2017, an extensive field research has been carried out that involved Middle Managers from different organisations of the civil aviation industry. Overall, 48 Middle Managers agreed to undertake an in-depth interview on the way they take safety into consideration in their daily activity, and the challenge they face daily in so doing. The data collected supported the definition of both a *descriptive model* of Middle Managers practice in relation to safety and their surrounding conditions, as well as an *explanatory model* able to highlight what facilitates or hinders the Middle Managers' practice in dealing with safety.

The Middle Managers were representatives of organisations from different key segments of the air transport system: manufacturers (3), airports (1), air traffic organisations (3), and airlines (2).

The table below provides information about:

- Type of organisation in which the Middle Managers operate
- Proximity to operations
- Specification whether the Job Title includes 'Safety Managers' – this is indicated with a 'plus in red' – e.g. **+1**

Table 1: Overview of the interviewees' profiles

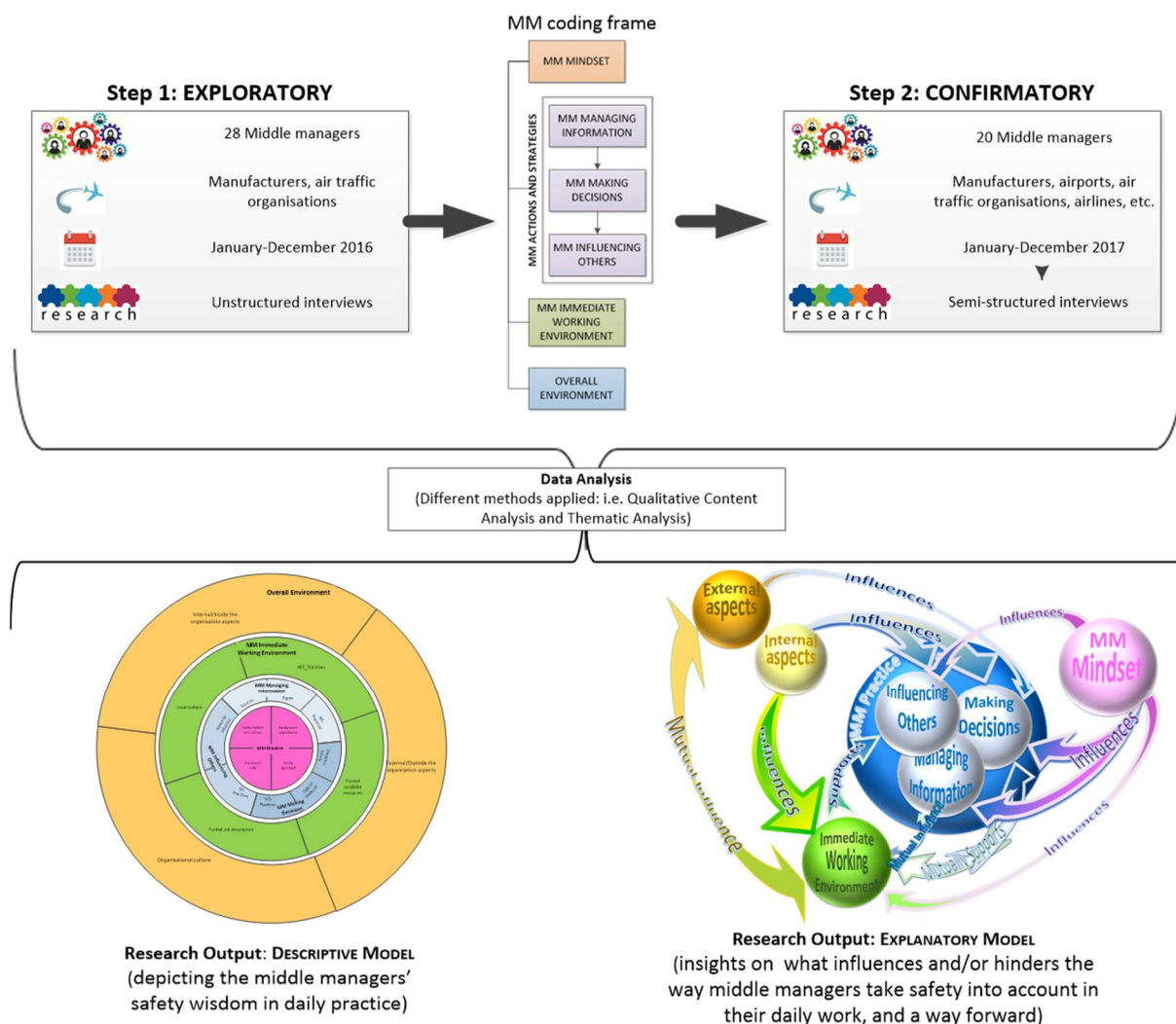
	Manufacturer	Airlines	Airport	ATC	TOT
Closer to ops	3	1	0	3	7
Remote to ops	16	1 + 3	1	19 + 1	41
TOT	19	5	1	23	48

Two waves of interviews were carried out. In 2016, an exploratory research approach was used, to explore the overall phenomenon (i.e. – the way Middle Managers take safety into consideration in their daily practices, and the challenge they face in so doing) free from any pre-constituted models and theories. 28 Middle Managers were involved in unstructured interviews in which they talked about their current job and the actual activities they carry out daily, and how these are likely to have an impact on safety. The analysis conducted on this first strand of data helped identify recurring themes and patterns across all interviews, put together the recurring themes to specify a 'coding frame' through which to make sense of the gathered material, and develop a provisional model to describe the safety related activities carried out by middle managers. At this stage, there was the need to further explore phenomena and confirm the model. Hence, the coding frame, supported by an extensive literature review, was the basis to outline a more 'structured' interview guideline, to administer to a second wave of interviews. In 2017, 20 additional Middle Managers from a variety of organisations were interviewed. The semi-structured interviews revolved around (a) their mindset/values and approach to safety, (b) the consolidated practices managing safety related information / making decisions / influencing other people with regards to safety - top executives/peers/staff/customers in relation to safety, (c) their unit/department environment -

resources, culture, practices, (d) the overall environment -culture and practices-, within the rest of their organisation and outside their organisation.

All the interview transcripts as well as the literature material were analysed using the qualitative content analysis method (QCA) (Schreier, 2012). The very rich and extensive material was analysed along two different processes to come up with two outputs:

1. a **descriptive** model depicting the Middle Managers' safety approach in daily practice, and the overall best practices in place in the interviewees' organisations i.e. across the aviation industry.
2. an **explanatory** model providing insights on what influences and/or hinders the way Middle Managers take safety into account in their daily work, and what ways forward could be envisaged.



4 DESCRIPTIVE MODEL

The model intends to provide a representation of the aspects characterizing the Middle Manager's 'safety wisdom' – i.e. their ability to embed safety in their daily job and act accordingly. The model includes four high-level dimensions, represented by four concentric rings starting from the core (i.e. the Middle Manager's mindset), and broadening up to the Overall Environment.

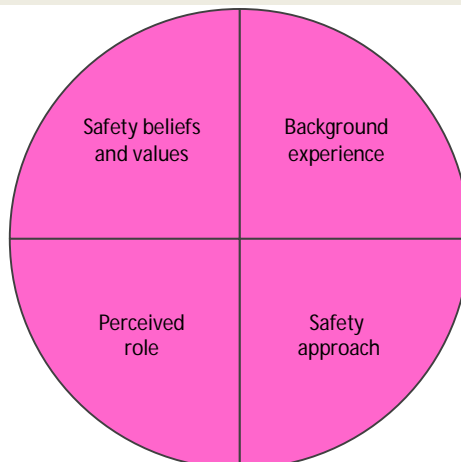


Figure 1 : The MM Descriptive Model

4.1. Middle Manager's MINDSET (the core)

The **Mindset** is at the core of the descriptive model. Here, the Middle Manager is referred to as a person with specific educational and professional background, with a peculiar 'wisdom' regarding safety, and the way safety has to be embedded within the organisational operations. Thus, these aspects are (to a certain extent) independent from the Middle Manager's current professional position, and the tasks and activities he or she is charged to perform. The 'Mindset' dimension combines a set of personal Middle Manager's attributes and characteristics that may affect their sensitivity to approach and implement safety in their daily activities. This set includes:

Table 2 : Breakdown of the Mindset dimension's subcategories

Breakdown of the dimension's subcategories	Overview of the dimension from the Model
<ul style="list-style-type: none"> (1) The MM fundamental values & beliefs (2) The MM background and experience (3) The MM perceived role as a manager (4) The MM personal approach to safety 	

4.1.1. Fundamental values & beliefs

The values and beliefs are the stable attributes in every person. Serving as broad guidelines in all situations, they refer to the assumptions and convictions that an expert may have on a topic/concept, and consequently have an influence on his behavior and attitude. Within this sub-dimension the statements that reflected the MM state of mind/stance when talking about safety as a broad concept were collected. Statements like "*Safety is part of my DNA*" or "*Safety is a big part of our raison d'être*" were shared by the majority of our interviewees; but also opinions on the Safety concept – e.g. how to approach it, how to make sure it is correctly spread throughout the organization, etc., - were advanced. Overall, the following was shared:

- Being part of organisations that carry a significant operational risk, safety is not something to be treated 'on top' of the daily activities. It is embedded in everything the organization does. Further, being the Middle Managers, the ones who deliver and support key organisational safety outcomes, safety becomes an indissoluble aspect of the Middle Manager's professional identity that guides their actions and shapes their practices. [e.g. "*I have been in aviation for so long, it goes into the blood, it becomes a reflex*"; "*Safety becomes second nature, you think about safety all the time*"; "*Safety is the holy grail. We don't touch it as soon as we have understood what the*"]

safety impact is''; ''Safety is genuinely in our DNA''; ''Managing safety has become the backbone and core of everything. It's subliminal''].

- Safety should remain as much as possible independent from political, market-driven, and/or economic implications. Money shouldn't interfere when the safety margins are challenged. [e.g. ''Whenever it is safety, money is not on the table''].
- Acting as 'vertical integrators' between the strategic and operational levels, Middle Managers have to count on/leverage personal credibility as a key factor when safety-related decisions are to be approved. This involves taking stand-up and brave actions when the situation requires it. [e.g. ''I believe personal influence is really important. This is a very social organization, people stay here for many years, and they trust each other. We rely on safety cases, previous experience, etc.''; ''I can't remember any instance where safety did not go the way I wanted it. I simply would not allow it! It know this sounds arrogant but this is not the case, this is really how I feel''; ''Sometimes you just have to stand up and fight''; ''For a good safety, you have to lead by example''].
- Safety is a complex concept, which requires clear and transparent priorities for its adoption. Safety at 'any cost' – as some would say – doesn't make sense, but safety as an entry-point could be a way forward. Further, with the challenges offered by the continuous implementation of new technologies and changes of team members, safety could be called into question. Hence, Safety has never to be taken for granted! [e.g. ''Safety is genuinely in our DNA but should not be taken for granted; with new technologies and new teams, safety could be called into question.'']

4.1.2. Background and experience

The educational and professional backgrounds provide the MM the experience with which to frame and address safety in their daily work. Some Middle Managers agree that their past experiences (either in the same or in a different organization, and/or same or different role) have given a consistent scaffolding to deal with safety-related events. Overall, the following was shared by a number of Middle Managers:

- A certain proximity to operations at a certain point in their career, witnessing a safety related event or its consequences, or emblematic mediatized accidents appear as triggers or amplifiers of Middle Managers' sensitivity to safety. [e.g. ''In the past I have also been, ad interim, the Responsible for Ops Safety in another bigger airport Unit – so I am perfectly aware of the importance of safety''; ''What makes the difference is the airside experience and the proximity with aircraft.''; ''The other one is as well from my ground handling experience. We always learned Safety first, before on-time-performance (OTP). It very early showed me the importance of safety''; ''What triggered my interest in safety was the National Geographic Air crashes investigation series. Everything was explained in very simple words''].
- Likewise, an inspiring (or sometimes negative) experience through a senior's behavior or reaction in relation to safety when they were young professionals has a lasting impact in terms of their own sensitivity to safety and reflexivity of their practice. [e.g. ''What drives me is what I experienced when I arrived as a young engineer at XXX. My boss kept repeating safety first. Everything was negotiable BUT safety. It was clearly expressed''; ''A common denominator to all

the experiences that contributed to my taking safety into consideration is the amount of pressure put by management on maintenance technicians to be faster, cope with bad weather... I come from maintenance. I have experienced situations where because the management was adding to the stress with pressures, it created the perfect environment for errors like a technician forgetting a tool in the aircraft”].

- The role of peers and/or colleagues in growing as safety-related expert is also a key factor in the Middle Manager’s background experience. The shared stories and practices become part of the Middle Manager’s action and approach. [e.g. “In my earlier job, I learned from my colleagues. There was a great focus on telling stories about what went wrong”].
- The sensitivity to safety can also be developed through the educational background where safety is continuously addressed as the Holy Grail.

4.1.3. Perceived role

This concerns the perception that Middle Managers have/attribute to their role as managers and in promoting safety in the daily practice. It includes the non-formal aspects that Middle Managers believe are crucial to get the job done. Overall, this regards putting in place a number of transversal skills able to frame a positive environment for considering safety. As also confirmed in Rezvani and Hudson’s work (Rezvani & Hudson, 2016) the informal roles and actions of Middle Managers include:

- i. an ‘*Interpersonal*’ role with related actions – e.g. looking for information, clarifying, defending, emphasise, argument, control, arranging with other departments/central organization, etc.
- ii. an ‘*Information*’ role with related actions – e.g.: transferring information, propose a problem, report, etc.
- iii. a ‘*Decision-making*’ role with related actions.

The main aspects perceived to be part of the Middle Manager’s role in relation to safety were the following:

- Influencing others.
- Making decisions.
- Dictating ‘the pace’ of safety-related decisions –e.g. stay cool if there is no real safety issue and at the same time, react quicker than the team if there is a safety issue.
- Broadening the team members’ horizons by giving meaning to decisions.
- Providing recommendations.
- Mediating within the team members, and taking care of possible issues that can be solved ‘together’.
- Creating the right trust environment within the team – so that safety-related issues can be raised without fears of personal repercussions. Motivating the team members – building their confidence, letting them know it is safe to report and backing them up when they are conservative.
- Reminding the team members that safety-related issues are on top of the ‘to-dos. Prioritizing aspects that are critical to get the job done.

- Protecting team members from pressures that could ultimately affect safety.
- Managing a variety of aspects apart from the operational one (e.g. technical, administrative, etc.). This also includes matching business requirements and safety requirements.
- Capturing inputs that may be related to safety.
- Anticipating decisions that can ultimately affect safety.

[e.g. "My role is to avoid adding noise to the system i.e. to cool my teams by explaining why there can be contradictory opinions, by giving meaning of the decisions"; "A significant part of my job consists in influencing: other divisions (programs...), my team...I also have to make decisions myself"; "Part of the activity is also about motivating people and communicating"; "One third of my day is dedicated to talking to the team leaders, planning future activities"].

4.1.4. Personal approach to safety

This concerns the way Middle Managers consider safety, and what they perceive safety is/means for the organization. This involves the declared statements about 'what safety of operations means' for the interviewed Middle Managers. Overall, the following was shared:

- Some Middle Managers informed that Safety is permanently improving. Safe tools and good-quality design of tools go hand in hand. One can see it in the number of safety-related committees, workshops, events that take place regularly. [e.g. "It is not the role of a different department to ensure safety – it is part of design and operational requirements. In the past Safety was not always invited to attend design reviews – but that has now changed. That said the Safety Department needs to be engaged, and to assess and participate throughout the development process".].
- 'Safety of operations' means everything. Safety protects the way business is done. It involves taking safety as a starting point to access every business' capacity, efficacy and efficiency. This includes going beyond one's scope of responsibility to address safety. If safety is improved, then there is a direct link/impact on the environment. [e.g. "Anyway, in my culture, it is always the rest that comes after safety"; "Safety is not another department's job. Safety has to be part of what we do, not 'the big thing on top of daily business'"; "From my point of view, safety assessments are similar to audits: they might be perceived as additional obligations, a waste of time, but if you look at the positive side of them, they help you in identifying what you can do better, more efficiently, and this is beneficial for the system"; "To me, everybody knows that Safety is a primary goal in our organization [...] Somehow safety protects our business."].
- 'Safety of operations' should be inbred in every team member. Safety related issues should always be addressed and not avoided, or dismissed to another team. [e.g. "Safety (like validation) has to be inbred to the team, project managers should not get rid of a task 'because this is safety and I'm passing it onto the safety expert'"].
- In the event of new product releases, some Middle Managers would take a cautious approach, starting off with a limited deployment to assess how safety works in real operational conditions before going for a large-scale deployment. Every novelty brings uncertainties and related threats: 1) if the existence of this safety-related threat doesn't become blatant at the time the decision is

made, the weakness might build up over time; 2) there is not a unique solution or approach when safety is concerned; hence one might look at the event with fresh eyes to find an appropriate way forward. [e.g. “To me, safety assessment is not just a time consuming process or a requirement by law. It’s an owned process to identify in advance all the critical situations or potential issues that can be generated by the proposed change. [Safety assessment] It’s needed to protect against underestimated risks or neglected issues, to identify in advance all the actions to be taken to operationalize the changes and to identify the needs that, if spotted too late, may generate delays or additional costs”].

- Safety needs multiple viewpoints, angles, and cultures to be addressed. It is not sufficient to have a bottom-up approach to safety. In the same way, pure numbers without the context are meaningless. Everyone should be involved in the safety assessment and have the right attitude. In case of doubt, it is good to take a conservative approach (and backing up the ones who take one). [e.g. “It is not sufficient to have a bottom-up approach to safety. Sending people from my team to the product safety team for a while so that they have an occasion to be scared a bit and become more safety alert could also be an idea”; “For me, the main competence required is common sense. People tend to rush to processes. <Why did you write this? Because it’s written in the template>. But without understanding why it is so. Standing back requires some time and to have experienced some challenges. It is key to confront several viewpoints and validate together with other people. What is important is not to leave someone work on his own on safety. We need to have a multi-culture, multi-viewpoints approach »; “ATCOs know that they can apply more conservative procedures in case of increased perceived risk – and they know we always back up a decision of this kind.”].
- Safety needs to remain independent from the economic and political sides. However, it often is very difficult to prove the value of safety compared to the cost of the safety solution. [e.g. “Independence between the people who bear the financial responsibility and the ones who make a clear technical assessment is very important”; “safety is not something we want to save money on and we all try our best to follow safety needs”; “Of course, this means higher costs because of extra-time, but I do not care because safety comes first, even though control of extra-time is another target of mine”].
- One needs to find a balanced approach to safety. Not everything is safety-related, and systematically considering the worst-case may be counter-productive. If performed by expert-enough persons, safety may be seen as an investment. Safety requires challenging one’s own thinking to make sure it is not a safety crusade but a rationally-argued and needed safety enhancement. [E.g. “My role is not to let people say there is a safety issue and rush to do modifications without making sure it is a real safety issue”].
- Serenity is necessary on safety matters. And so is not having overloaded staff. Sometimes it is important to stand back – it requires some time and to have experienced some challenges. [e.g. “Sometimes this does not happen as the guy is overloaded. For him it has no consequence; for us it affects safety a lot, as if we do not have that information - or we have an erroneous information”; “We need to learn serenity, how to stand back, perform a cold analysis”].

- Humility is essential as well for safety. [e.g. “Capitalizing is essential. One day, we can come across the topic we would have overseen whereas it is a bomb”. “For safety, one needs to remain humble. A safety issue at the beginning is the analysis of multiple small cases that don’t lead to fame”.].

4.2. Middle Manager’s PRACTICE (the first outer ring)

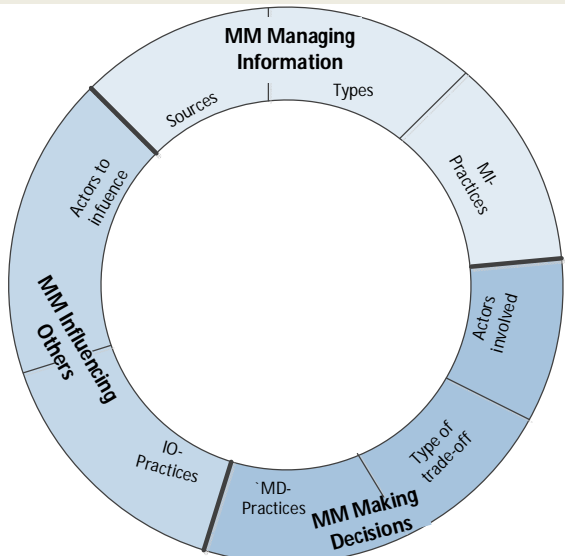
Practice refers to the set of organizational ‘routines’ – i.e. *repetitive patterns of activity* (David, Joanne, Stuart, Gillian, & Paul, 2000; Zamarian, 2010, 2011), carried out by the Middle Managers within their organizational contexts. ‘Practice’ may be defined as the “*recurrent, materially bounded and situated action engaged in by members of the community*” (Orlikowski, 2002, p. 256). First, practice is *recurrent*, as the agents repeatedly and regularly act in certain ways, and they contribute to the enactment of social organizational structural properties; then it is a *materially bounded and situated action* as it is embedded in its context of occurrence (Suchman, 1987). This dimension suggests a recursive dynamic relationship between agents’ practice and their situation. Finally, members of a community *engage in practice*. This involves the notion that practice is socially shared (Wenger, 1998).

‘Practice’ here describes the distinctive and idiosyncratic competences that the Middle Managers put in place to get the job done when safety-related events are involved. This also includes elements characterizing the context, e.g. *people to influence* refers as much to the organizational structure as to the Middle Manager’s strategies. The overall Practice comprises the following specific practices:

- (1) Managing Information
- (2) Making Decisions
- (3) Influencing Others

Each of the above includes a number of sub-dimensions.

Table 3: Breakdown of the overall Middle Manager's Practice dimension

Breakdown of the dimension's subcategories	Overview of the dimension from the Model
(1) Managing Information <ul style="list-style-type: none"> Managing Information Practices Type of information Sources of information 	
(2) Making Decisions <ul style="list-style-type: none"> Decision-Making Practices Type of Trade-off Actors involved 	
(3) Influencing Others <ul style="list-style-type: none"> Influencing Others Practices Actors to influence 	

4.3. (1) Managing Information

This includes the overall safety-related information that the Middle Managers receive, have access to, look for, or would like to receive/have access to in practice, to support their decisions or influencing practices. The focus here was to detect the 'independent' management of information – i.e. what the Middle Manager deliberately refers to when dealing with (safety related information). Access to information places Middle Managers in a unique position where they can use information as an input to play major decisional roles. In their recent work, Rezvani & Hudson (op cit) recorded – over a period of one month – the actions and activities performed by one Middle Manager. The daily interactions that the Middle Manager had with organisational members were tracked, and hence the different tasks mapped. The taxonomy reveals the frequency of information-related roles that the Middle Manager performs. The 'informational' role includes 'monitor', 'disseminator' and 'spokesperson' roles within the organization. Accessibility to information in short time intervals and more informational sources enhance the identification of safety risks, consequently, they can make better-informed safety related decisions.

4.3.1. (1)/a Managing Information Practices

This includes the specific actions and strategies that the Middle Managers adopt to ensure that the safety-related information is managed within the unit/department and throughout the organization. Overall, the following was shared:

- Middle Managers often refer to formal and informal channels for safety-related information. This includes looking for information in their personal network or listening to peers and/or staff and/or field operators, and actively screening information coming from outside the organization. [\[e.g. "informal information from my personal network and from my manager's personal](#)

network"; "My main source of safety information – and the most effective one – is the people. I get safety information from my staff, my team members and whoever has key responsibilities here"].

- Middle Managers believe that creating personal relations is critical to get information sooner than through the official means, and from people who wouldn't come to you otherwise. [e.g. "Anyone can come and see me easily or send an email [...] Some people won't come to you. It's important to get a personal relation"].
- Knowing people well and getting information from trusted ones is a way to receive selected information and overcome the challenge of too much information. [e.g. "We have too much information but I try to know my people. In the case mentioned before, I relied on people who are true pilots"; "90% of the information I have comes from discussions with my team members. It is my approach to cope with too much information".].
- Attendance to safety conferences, participation in meetings, workshops where safety is discussed is considered critical for the Middle Managers to be up-to-speed with the latest information and news. [e.g. "I also request to participate in the yearly safety conference to understand the weaknesses encountered by the airlines and the things to be corrected"; "I do follow the safety evolution through written reports or my participation in a number of committees".].
- The issue is not only collecting the information, but challenging the received one, to assess if it is consistent and relevant, if it reflects the reality of what has happened (for example, if it is told by operators), or if it comes from outside the organization, *wondering if it could happen to us?*). [e.g. "For me the main input is the information coming from personnel, even though I have to be good at filtering it – because controllers could tend to exaggerate things a bit"].
- The use of and involvement in internal workshops/meetings is a way of creating the right atmosphere to speak up and share everyone's safety-related concerns. [e.g. "Apart from the work I've described, I'd like to think that people feel free to speak up. If anyone has an idea, it's taken seriously. The atmosphere is such that if they would have something to say they would say it"; "During the internal safety action group meetings, the events of the past month are discussed. Everyone is given a chance to comment on events (coming from daily operations). If an event is recurring, it becomes a safety issue"].
- Discussing and analyzing safety data (mainly reports or operational problems) with safety managers and connecting the data to the operational context - *Pure numbers without the context are meaningless*. [e.g. "For example, in the past we had a high number of Missed Approaches. Per se, the high number of missed approaches was not a safety issue, as Missed approach is a published procedure part of the normal business. However, this number was an indication of something that was not going in the expected way"].
- Dissemination activities regarding safety lessons/results are to involve a wider public, as the more you inform, the more the threats can be anticipated and addressed. [e.g. "Communication activities are systematically undertaken to ensure safety results are disseminated (article in Hindsight, conference papers, etc.)"].

- For Middle Managers in operational functions, encouraging their staff to report even low-level stuff is a must. It can be done by means of explicit behavioral objectives (challenging, speaking up), making sure Just Culture is implemented.
- Time is an issue when you have to go through all information available.
- How to determine that you have all critical information/data needed to take a decision? [e.g. “do we have the necessary data to support decision making? When / how do we decide we have enough data to justify a decision?”; “The more information you have, the harder it is to make decisions. The data are so segmented that it is sometimes not clear what it all means”.].

4.3.2. (1)/b Type of information

The type of information refers to the nature of the information used by the Middle Managers, being either official or not, quantitative or qualitative. Middle Managers make use of both informal communications with peers/staff or technical groups, or formal – using official reports, and written information (e.g. statistics, figures, etc.) from data-bases. There is a shared feeling that Middle Managers are asked to refer to quantitative indicators for getting their job done. The qualitative information regards mainly hazard analysis, expert judgement, and/or Integrated Risk Picture. Middle Managers report that there is not a preferred choice between the two types of information, as one completes the other [e.g. “I discovered there is a quantitative approach and a qualitative one. It is not black and white”]. Further, they comment that the increase in information and speed to get the information pose some issues.

Discriminating between important and non-important information becomes the real challenge [e.g. “We are data-rich but not necessarily information-rich”; “The more information you have, the harder it is to make decisions. The data is so segmented that it is sometimes not clear what it all means”; “We’ve got tons of information, dashboards, etc. I do not need more”].

4.3.3. (1)/c Sources of information

Sources of information refer to the formal or informal means through which the Middle Manager gets their safety-related information. Information about whether the Middle Manager proactively seeks information or more passively receives it, was provided. Overall, there is no ‘one shop’ for all safety and other relevant data (i.e. the data and information needed to take safety into consideration is not exclusively ‘safety data’ or ‘safety information’ but can be data/information on other aspects). ‘Numbers’ are valued in the Middle Manager’s work, thus all parameters, including the ones from other operational units and centres and contexts, reports, etc., are monitored and analysed. In addition, the informal sources are a necessary complement and they cover a consistent part of the Middle Manager’s information management. This is summarised in the matrix below:

Table 4 : Sources of information

Formal	Informal
<ul style="list-style-type: none"> Technical groups/ departments [e.g. “[...] making calculations for us”; “I read a lot of data coming from the Performance Department, Safety Department and other Departments”] Panel of key experts/stakeholders to collect current needs [e.g. “The safety dimension is however addressed collectively by a panel involving: systems design, multi-program people, test pilots, customer support, the chief engineer, the safety department”] Customers All published safety information [e.g. “capitalizing all the time, including what happened elsewhere, the FAA/EASA recommendations, identifying the state of the art, the in-service experience...”] Specifically, SSAs, FMEAs, Zonal safety assessments, written reports from accidents/incidents, ISOs, inputs from other industries, Safety conferences [e.g. “[...] to understand the weaknesses encountered by the airlines and the things to be corrected”] Local/organisation database (for key-statistics, like statistics number of SMI, missed approaches etc.) Published success stories Corporate safety bulletins [e.g. “We have a monthly internal report issued by our Air Safety department”]. Figures provided by selected suppliers [e.g. “MTBF, in-service events, etc.”] <p>Exchange data from partners [e.g. “maintenance logs from airlines that accepted to share them”; “statistical analysis of systematic data recording (DFDR, Maintenance data...) from airlines that agree to share their data”]</p>	<ul style="list-style-type: none"> Personal/ manager network Peers from other units/departments Staff /Staff Supervisors [e.g. “Most of the safety issues I’m aware of come from Ops room ‘rumours’, not from safety reports”; “My main source of safety information – and the most effective one – are the people. I get safety information from my staff, my team members and whoever has key responsibilities here. Also, the front line operators are a good source of information, and sometimes we realise we need to introduce safety and operational changes thanks to the controllers’ spontaneous reports”; “I’m usually pre-warned by the staff supervisors about the events, before receiving it formally. Staff supervisors communicate with me very often, via any means (email, SMS or face-to-face), to inform me when something didn’t go as expected, could be improved or if an issue happened, regardless the severity of the issue”] Key-informants/ experts [e.g. “pilots”; “safety engineers (i.e. “they warned us that these - MTBF, in-service events -were theoretical figures”.)] Meetings/ committees [e.g. “weekly Extended Progress Review meetings with Chief engineers”] Lessons learned from in service experience Exchanges with suppliers [e.g. “[...] since they do research as well”]

4.4. (2)Making Decision

This refers to the way Middle Managers make decisions in practice i.e. what they rely on, who they interact with, etc. Researchers now agree that the Middle Managers’ critical role is their involvement in the strategy process (Ouakouak, Ouedraogo, & Mbengue, 2014) and in improving decision quality while achieving the organization’s goals.

4.4.1. (2)/a Making Decisions - Practices

This includes the specific actions and strategies that the Middle Managers put in place to create the right information-based environment to make decisions. Overall, the following was shared:

- It depends on the decisions: some decisions are made individually, some are made by one department, and some are made collectively.
- In case of individual decision, Middle Managers tend to inform and warn stakeholders who may be impacted by the decision, and explain/discuss/negotiate with them there are different views.
- In some cases, for some decisions, decision-making is guided by a precise framework. [e.g. "For decisions to launch new developments, we have a fairly precise framework to support our decisions"].
- The rationale is based on risks, not only safety risks but also other kinds of risks e.g. to business, at short, medium or long term. Qualitative considerations are taken into account as well. "Evidence-based" decisions i.e. evidence and background to sustain a decision involving safety.
- Conservative decisions are made in case of doubt.
- In case of individual decisions, decisions are deliberately made by a single department to avoid interference with other matters, more distant from safety (e.g. commercial, budget), but then these are explained to the other departments that (even if not happy), they need to respect the role in safety. [e.g. "Usually the decisions are agreed, but in case of disagreement, all the pieces of information are reported to the Management and the Management choose the action(s) to put in place"].
- Confronting several viewpoints is a key to successful decisions. Middle Managers involve people/experts with different backgrounds to debate safety-related issues, and in some cases, the decision can be reviewed or even made collectively. [e.g. "We make the decision collectively. I invite experts both involved in the development and out of my domain when need be to have 'fresh eyes' because it is never black or white"; "The safety dimension is however addressed collectively by a panel involving: systems design, multi-program people, test pilots, customer support, the chief engineer, the safety department. I make up my mind on safety based on the panel's discussions"; "This organization has forums involving different viewpoints allowing debating and collectively deciding"; "It is key to confront several viewpoints and validate together with these other people".].
- Sometimes standing back can be the right decision to make. [e.g. "Standing back requires some time and to have experienced some challenges"].
- Beyond formal meetings and forums, informal discussions happen to share safety-related doubts. [e.g. "Whenever it is for feasibility studies or launch of a product we make decisions in forums/panels"; "There is also an informal one. Since at our level we know each other in the various departments, we can share doubts but eventually, the ones in charge of the topic (e.g. programs) make the decision"].
- If there are potential safety concerns, Middle Managers approach the decision through an understanding of the problem and its implications first. It all starts with making sure that it is actually a safety concern and in that case, that it is understood and managed.

- Middle Managers are involved in formal decision-making processes and thresholds (e.g. safety meetings, safety analysis, risk index...), but where grey areas occur, other strategies are put in place (see above). [e.g. "I sign from 6 to 8 technical work plans per day covering from daily operations to long-term projects in each technical or operational area"].

4.4.2. (2)/b Types of Trade-off

This refers to the dimensions taken into consideration in the decisions the Middle Managers have to make.

- Some of the trade-offs involve safety and other business priorities such as budget, delay, other types of resources... [e.g. "Whenever there is a safety issue, we will resolve it before any budget or other priority issue."; "there is a trade-off between capacity and safety"]
- Some of the trade-offs are more subtle in considering the various aspects at longer time horizons, including safety. They balance immediate considerations with sustainability of the safety performance or more generally short-term with long-term overall impacts. [e.g. "there was a risk that the activity would not be sustainable"; "I knew that in the long term this would cause health & safety problems but, there was of course a cost issue in re-designing. I chose to solve the long term health & safety issue"].
- Several difficulties to value the safety impact or argue a safety investment is needed against economic indicators. Indeed, money expenditure on something new to assess (e.g. a hazard) is always a challenge, as you have to decide that it is the right investment to do amongst many others. The challenge is to make 'rational' choices.

4.4.3. (2)/c Actors involved

This regards the actors involved in the Middle Managers' decision-making process. This includes the following:

- Peers, staff, and other internal (from same organization) stakeholders, safety managers supporting and/or contrasting the Middle Managers' decisions. [e.g. "Such decisions are well prepared by the design teams. We make the decision collectively. I invite experts both involved in the development and out of my domain when need be to have "fresh eyes" because it is never black or white"; "Stakeholder consultation is also used to ensure safety assessment is correct"].
- Ongoing consultation with top management. [e.g. "I regularly inform my manager on my activities"; "If I have not been able to fix a safety issue myself, I'd raise it to my manager"].
- Decisions are taken collectively, in a panel/workshop where key stakeholders are involved. Further, communications with staff help the Middle Managers make up own mind.
- There are situations in which Middle Managers will not involve any actors for their decision-making. [e.g. "I made this decision on my own because I knew that otherwise it wouldn't be possible to go this way"].
- It might be a challenge to understand who you should refer to when a decision has to be made, when there are different competencies and accountabilities within the same organization. [e.g. "Another area is: understanding how responsibility and accountability (decision-making) for

safety is distributed across the business. There are safety experts, chief engineers, the product safety organization, etc. all of them having to do with safety. It would be useful to know who do you need to engage with when you are trying to make a decision or escalate a decision”].

4.5. (3) Influencing Others

Researchers have studied the extent to which Middle Managers can influence strategic change through the different organisational layers (i.e. promoting upward, downward and lateral influence). Dutton and colleagues suggested that *‘it is the Middle Managers rather than the top managers who have their hands on the ‘pulse of the organisation’* (Dutton et al., 1997, p. 407). They explored how Middle Managers use upward influence to champion alternatives and shape the top managers’ strategic agenda (Floyd, & Wooldridge, 1994, Dutton & Ashford, 1993; Dutton, Ashford, O’Neil, Hayes, & Wierba, 1997; Dutton, Asford, O’Neil, & Lawrence, 2001; Ling, Floyd, & Baldrige, 2005). The information exchange and mutual influence affect the strategic decision quality and organizational performance. By so doing, Middle Managers play a pivotal role in contributing to the organisational strategic direction and influence its effectiveness. The effectiveness of this issue-selling depends on how issues are framed, who is involved and the timing. In addition to this, Middle Managers use their divergent behaviour to facilitate adaptability at the operating level (downward strategic influence) by adjusting the planned organisational strategies at the operational level to fit with the current specific operational state/situation (Ahearne, Lam, & Kraus, 2014; Pappas & Wooldridge, 2007). Thus, this could include taking into account ideas and propositions from the operating employees and strengthen their sense of identification and commitment towards the organisation’s goals. Such facilitating adaptability will help the organisation cope with market uncertainty and remain competitive (Ahearne et al., 2014). Further, Middle Managers exchange information from formal and informal activities with peers and their respective departments (Bamford & Forrester, 2003), and make use of their networks to keep up-to-speed with and make sense of all possible strategic changes (Bäckvall & Englund, 2007; Conway & Monks, 2011). In this framework, Middle Managers provide *‘a necessary point of observation from which to study the organizational process associated with building and renewing capabilities’* (Wooldridge et al., 2008, p. 1191) and consensus around the change initiative (Conway & Monks, 2011; Floyd & Wooldridge, 1992).

This dimension explores the influence acted by Middle Managers in having safety considered and addressed as part of doing the job.

4.5.1. (3)/a Influencing Others Practices

This includes the specific actions and strategies that the Middle Managers put in place to influence key-stakeholders. Overall, the following was shared:

- Explaining the implications, the associated safety stakes, the broader safety picture, potential consequences (safety, time, resources, on customers...) is a key aspect of the influencing-process. [e.g. “I explained to them [all chief engineers, safety managers...] why I had made this decision”; “It was difficult for me to explain these contradictory decisions to my teams, to explain the impossible”; “In case one of these actions has an impact on other centres, I’m the one who

contacts all the areas / people affected, in order to guarantee a successful implementation of the work plan".].

- Overall, having excellent interpersonal skills is crucial – this includes explaining in clear, simple and pragmatic way; explaining the underlying reasons and vision, etc.
- Demonstrate to all stakeholders their own interest in it. Understand each party's stakes, identify the important questions. [e.g. "I invested some time and effort to try and understand each party's stakes, identify the important questions."].
- Get credibility: show that the Middle Managers raised the safety flag when there was a real safety concern and not overreacted to a situation irrelevant to safety. [e.g. "the managers want to be sure, that is trust the fact that we didn't 'cry wolf' when there was none. The most important thing is to be credible!"].
- Become trusted: especially through experience, role, position, personal influence.
- Regular collaboration, discussions and exchanges (meetings or work or informal networking) with people from different horizons and background (finance, project manager, stakeholders) facilitate the influencing process. [e.g. "However, it is based on regular progress meetings involving in the same room people more sensitive to financial aspects and other more sensitive to safety aspects. Every 6 months, there is also a steering meeting involving the project manager who represents the program, senior experts from the domain, representatives from the chief engineer and a safety director. The safety director can declare a no-go. What helps a lot is the daily work between the different people: project manager, technical deputy of the chief engineer and safety representative"].
- Improving understanding of other stakeholders' work to alleviate tensions [e.g. to be completed or deleted.].
- An open/communication approach is used to explain the rationale of decisions to the staff. [e.g. "My role is to avoid adding noise to the system i.e. to cool my teams by explaining why there can be contradictory opinions, by giving meaning to the decisions"].

4.5.2. (3)/b Actors to influence

This regards the people and entities, etc. that the Middle Managers aims to influence – e.g. top managers (upward influence), peers (lateral influence), and staff (downward influence), and external influence – e.g. customers and external stakeholders.

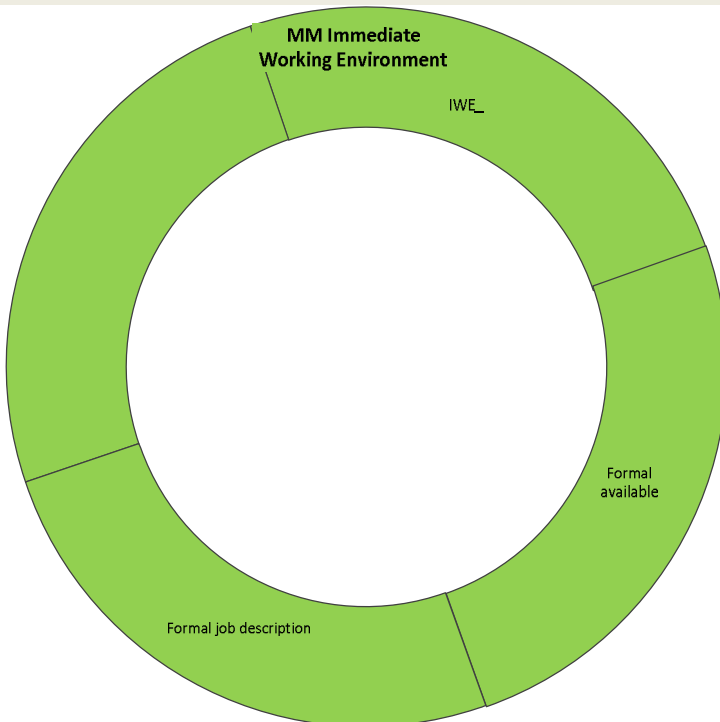
- Upward influence. [e.g.; "I can influence my bosses but I do not sit around the decision table"; "I would be comfortable voicing safety concerns to my managerial line and trust they would act upon my concerns".].
- Lateral influence. [e.g. "A significant part of my job consists in influencing: other divisions (programs...), my team..."; "My responsibility is to remind my teams that understanding everything that is safety-related is key"].
- Downward influence. [e.g. "What I need is that the 70 persons in my department take safety into account. It is very easy to explain to them that in their trade-offs, they need to take safety into account"].

- External influence. [e.g. “It will require as it always does negotiations with our programs clients”; “In this case, I had to persuade the airport company to look more after the issue, even though it is true that the airport company always demonstrate to be sensitive to safety and willing to spend money if needed”].

4.6. Middle Manager’s IMMEDIATE WORKING ENVIRONMENT (the second outer ring)

The Immediate Working Environment dimension refers to the job specific context/environment within which the Middle Managers operate. This includes both all formal organisational aspects and all the actual practices and culture in place within the Middle Manager’s specific unit/department.

Table 5: Breakdown of the ‘Immediate Working Environment’ dimension’s subcategories

Breakdown of the dimension’s subcategories	Overview of the dimension from the Model
(1) Immediate Working Environment Practices (2) Formal Job description (3) Formal available resources (4) Local culture	

4.6.1. (1) Immediate Working Environment Practices

This includes the specific actions and strategies that the Middle Managers put in place when managing their unit/department. This differs from the formal tasks (i.e. ‘Formal Job Description’ and ‘Formal Available Resources’) that are expected by the organisation. Overall, the following was shared:

- Safety is discussed as a cross-cutting topic; it is an embedded element in the agenda, not a specific topic for discussion. [e.g. "Usually safety is an embedded element of the discussion not a specific topic for discussion"; "Safety issues are tackled systematically as part of the debriefing after each project. Safety is rarely the main topic of a dedicated meeting; it is usually one element among others"].
- Safety-related issues are discussed in formal meetings, but they are also discussed informally by Middle Managers with peers and/or staff.
- Safety is considered the 'Holy Grail'. It is on top of every action, before any budget or priority issues. [e.g.; "Safety initiatives have the priority in terms of timing"; "On another topic, we did take the time to clarify and explore the consequences of an identified discrepancy. The team appreciates these initiatives that allow them to stand back and think further"].
- Some Middle Managers have in place procedures and methodologies to ensure the team operates in a quality way. [e.g. "People within the teams address the topics in depth. They don't want to be put in check by reviewers. We have several independent "justices of the peace"; "If my staff discovers something, they will tell me. I've put in place an action follow-up activity (there's one guy responsible for that) for the recommendations agreed in the agreement meeting"; "What I train my team to is how to report an event. Any event, we should report, no matter the consequence. I tell them: for you it may be nothing but it adds up to the rest, so don't judge or analyze as an isolated event".].

4.6.2. (2) Formal Job description

The Middle Managers' formal job title and description were collected. In this research the following criteria were considered: managers 'having other managers reporting to them (but not belonging to the executive level) and holding budget responsibilities (Floyd & Wooldridge, 1994; Huy, 2001; Mintzberg, 1980).

The Middle Managers' job description enabled to understand the Middle Managers' formal boundaries within their own organization and the extent to which the boundaries could affect/contribute to the Middle Managers' actual practices.

4.6.3. (3) Formal available resources

Here are reported the formal available (human and material) resources that the Middle Manager can count on. Overall, the Middle Managers commented that:

- The availability of human resources is adequate (both qualitatively and quantitatively). The competences reflect the department mission. Specific skills are sometimes required and subcontracted externally. This brings flexibility, but on the other hand the organization loses qualified competency.
- The detailed resources are specific to the Middle Manager's job.
- Time availability is a big challenge within the teams; cost reduction is something imposed by the organization that needs to be tackled. As already mentioned, when safety is concerned, money is never 'on the table'.

- The formal processes supporting safety. These processes are part of the resources made available to them. Likewise for official sources of information.

4.6.4. (4) Local culture

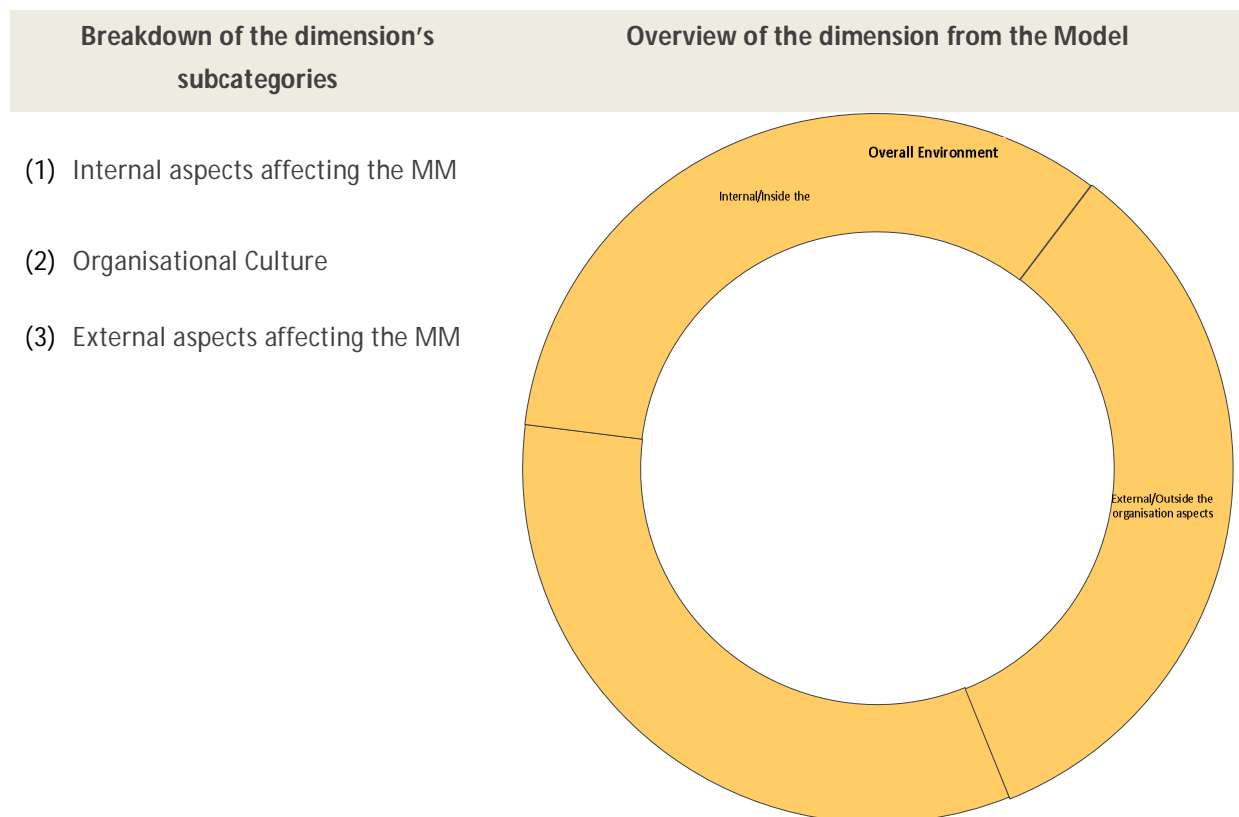
This refers to the specific culture in place in the unit/department in which the Middle Manager operates. The 'Local Culture' may reflect the overall organizational culture promoted from the top, or have a distinctive connotation given by the Middle Manager.

- Middle Managers all agree that they receive support from the management whenever it's safety-related, before any budget or other priority issues. The management may challenge the Middle Manager to check the safety boundaries, but at the end they will always support. [e.g. "There has never been a push from management to hide safety issues, quite the contrary"; "In this case, it was not necessary to involve my boss, but if needed, I am certain he would support me. Other cases showed that we share the same values on responsibility, liability and air safety"; "There are cases where my manager will challenge me for example in the case of the recruitment in my certification & safety team. He will check if it is not for comfort but he will not block the decision"; "If I go to my boss, he backs me up when it's safety related. The culture and example come from the leadership"; "I never had constraints coming from above on safety"].
- Middle Managers are committed to the Just Culture approach. Within the teams, to ensure there is no self-censoring to report safety issues, statements and assumptions written in the report are challenged. Overall, a trust climate is promoted, in which they push the staff not to hide anything safety related, maintaining very open communication channels [e.g. "I am confident my staff would report any safety issue as I have a very open communication channels with my team"; "People from my team inform me if there is a problem but there is no difference between safety and other aspects. It is a matter of developing a trust climate. I proceed in a similar way for all aspects"; "I have a high level of trust with my team"; "I encourage reporting within the team, even with small stuff & low level. I'd rather know what's going on. I do not interfere with the low level stuff to give them local empowerment, but on major investigations I'm heavily involved".].
- No need for formal documents to feel accountable.

4.7. Middle Manager's OVERALL ENVIRONMENT (the third and last outer ring)

The Overall Environment refers to the context and environment in which the Middle Managers' department is embedded and that can influence the Middle Managers in their job/actions/decisions. It encompasses both the overall organizational aspects within the Middle Managers' organization/company, including the organizational culture, structure, processes, etc., and the environment external to the organization itself but that can as well influence the Middle Managers' consideration of safety... e.g. regulatory environment, clients, etc.

Table 6 : Breakdown of the Overall Environment dimension's subcategories



4.7.1. (1) Internal aspect affecting the MM

This refers to the resources (qualitatively and quantitatively) made available to the Middle Managers by the organization (human, technical, financial, time, information, processes/procedures, best practices/lessons learned...) or the framework/environment defined by the organization that influences the way the Middle Managers take safety into account in their daily activities.

- Some Middle Managers raise issues in relation to the visibility the top managers have with regard to the Middle Managers' activities. [e.g. "Do these top managers know how to distinguish between what is necessary and what is not? They don't have the visibility over all the requests that we receive, i.e. on the accumulating workload.].
- Middle Managers refer to dealing with organizational budget cuts, time pressure, resourcing, but they agree to a lesser extent when Safety is concerned.
- Organizational processes to address Safety in specific projects/initiatives.
- The organisational structure may impact the way information is managed. [e.g. "In particular, I notice unnecessary complexity in the management of safety improvement proposals (emerging from safety investigations), where I have to handle actions that are not under my responsibility and which could be better managed at central level. Sometimes this decentralisation may impair

the achievement of all the proposed safety goals”; “The current safety organisation in the overall organisation (split between different units) does not help the Middle Manager’s daily work”].

- Internal meetings help share common goals and project achievements. [e.g. “Once a month we have a staff meeting with the “Local Safety Manager”].
- Having experts in different domains, including in safety, helps. [e.g. “When people who are doing safety are not expert enough, we do more than needed. We are more conservative, we consider the worst case. This precaution principle may cost a lot. But if the analysis is performed by the right persons, we don’t need to do it. It’s an investment, experts in safety”].
- Issue related to staff turnover, with direct consequence of losing organizational competencies. [e.g. “From an internal organizational viewpoint, what would help as well is to let people stay, develop their experience or become experts. In design, experience is key. It is a concern for the future because today, mobility is encouraged fairly quickly after taking up a position. When we see the consequences of our errors, we are more likely not to repeat them. Today, people change jobs too quickly to see it, they only see a very small part. Even more so since the V itself has become longer than in the past, processes are heavier. One cannot benefit from the lessons from his/her own experience. We are lacking people with a diverse experience”].

4.7.2. (2) Organisational culture

Organizational culture includes an organization’s expectations, experiences, and values that hold it together, and is expressed in its self-image, inner workings, interactions with the outside world, and future expectations. It is based on shared attitudes, beliefs, customs, and written and unwritten rules that have been developed over time and are considered valid. The following was shared:

- Safety comes from the top. [e.g. “This sensitivity to safety comes from the top. Presentations made by senior executives always mention safety. We have safety objectives in our jobs. There is a safety communication”; “What helps also is the competence management. In my department, we try and have people that are mature in certification and safety. We are encouraged to do so by the hierarchy”; “There is a strong message from the top management on safety. It makes it easy to transfer it within the teams”].
- Safety is still an important concern but other aspects like costs tend lately to gain importance. It is important to watch out with evolution of technologies, people...
- Safety is integrated in the organizational operations. [e.g. “Safety is integrated into the operation. It is not the role of a different department to ensure safety – it is part of design and operational requirements. In the past Safety was not always invited to attend design reviews – but that has now changed. That said, the Safety Department needs to be engaged, assess and participate throughout the development process”].
- Safety at all cost doesn’t make sense but Middle Managers share the feeling that people don’t play with safety. Not by philanthropy but the stakes are too high (image, financial, emotional within the company because people feel involved). Safety culture is not for altruistic reasons. It is a key condition for business. [e.g. “It’s much easier when there’s a proven safety concern. We don’t talk budget or weight or lead time first. This comes after safety”].

- Strong safety culture: they even go beyond safety requirements if they feel it is needed.
- Sometimes, safety is used as a flagship and things are said to be safety critical to be addressed (even if they are not).
- Middle Managers share the opinion that people in supporting functions (HR, Finance...) might not have the same concern when safety is involved. They don't seem to consider safety to be a part of their business. Strong safety culture in most organizations involved especially at operational or close to operations functions and for people having this kind of background. More doubts for other so-called "business" or "supporting" functions.
- Perceiving the necessity to do a risk assessment as annoying: time consuming, inducing delay
- Just culture and reflexive practices. [e.g. "We have an open culture there is no problem voicing concerns"].

4.7.3. (3) External aspects affecting the MM

This refers to the characteristics of external stakeholders that may affect the way the Middle Managers take safety into account in their daily activities. The following was shared:

- Pressure from customers, regulators, new market needs, new technologies.
- Use of subcontractors to perform specific activities
- Involve stakeholders to include their needs in the product/service development
- Regulatory requirements and the relationship with the authority – i.e. EASA as a partner. Time and effort to obtain Certifications
- Pressure (e.g. time, financial, etc.) from customers, etc.

4.8. Conclusions

The MM descriptive model presents the 'WHAT' the Middle Managers put in place to take safety into account in their daily practices. To understand the 'WHY', a different model is needed – an explanatory one. This model explains the enablers (and blockers/barriers) to the Middle Managers' actions. This is presented in Section 5.

5 EXPLANATORY MODEL

In order to support Middle Managers in taking safety into consideration in their daily activities, it was important to understand the drivers, enablers and barriers or obstacles to their safety related practices. Therefore, beyond the descriptive model, an explanatory model was developed to identify and characterize the aspects influencing the Middle Managers' practice when it comes to safety. This model is more focusing on the levers that could be used to change the organization than on the understanding of what it is to be a Middle Manager taking safety into consideration (purpose of the descriptive model). In this respect, it could be seen as a transformational model targeted to the ones having the power to make the changes, namely senior managers.

In order to develop this model, a systematic analysis of all emerging relationships between the high-level dimensions/categories specified in the descriptive model was performed. It allowed for the identification of possible 'levers' to support the Middle Managers' actions to take safety into account in his daily practice, or barriers hindering it.

The analysis results presented in the following are exclusively coming from the data. Therefore, *if an aspect came out as a lever from the interview analysis, the opposite of this aspect is not mentioned as a barrier or an obstacle unless it was explicitly mentioned in some interviews.*

5.1. What are the middle managers safety related practices influenced by at a glance?

The analysis highlighted that the **Middle Managers' practice with respect to safety is not only resulting from the Middle Managers' background and experience or safety knowledge**, but is also significantly influenced by the Middle Managers' working environment, both the immediate one and the more distant one.

In particular, **Middle Managers practice in relation to safety is greatly influenced** by the overall environment, especially **by a number of organizational aspects** (organizational structure, culture...) as well as by their immediate working environment. Indeed, it turns out that for a Middle Manager, taking safety into consideration requires not only a will to do so, but also surrounding conditions making it possible, encouraging to do so. As a consequence, **supporting Middle Managers practice in relation to safety also involves measures or actions at a global organizational level** beyond actions targeted to Middle Managers themselves.



Figure 2: Explanatory Model of Middle Managers Practice in relation to Safety

5.2. The various influencing factors of MMs' practice in relation to safety

As mentioned above, Middle Managers' practice in relation to safety is influenced by both the MMs' own mindset as well as external aspects such as organizational characteristics. One cannot isolate an overriding driver or consider that these influencers can work independently from one another. During the interviews, they were mentioned as part of a whole, the overall Middle Manager's context: the person in their job in their organization in its environment. In other words, what was mentioned during an interview as a driver or a barrier is to be considered as such in the environment of the interviewee. The aspects that were mentioned by the Middle Managers also have some influence on one another beyond the influence they have on Middle Managers' practice.

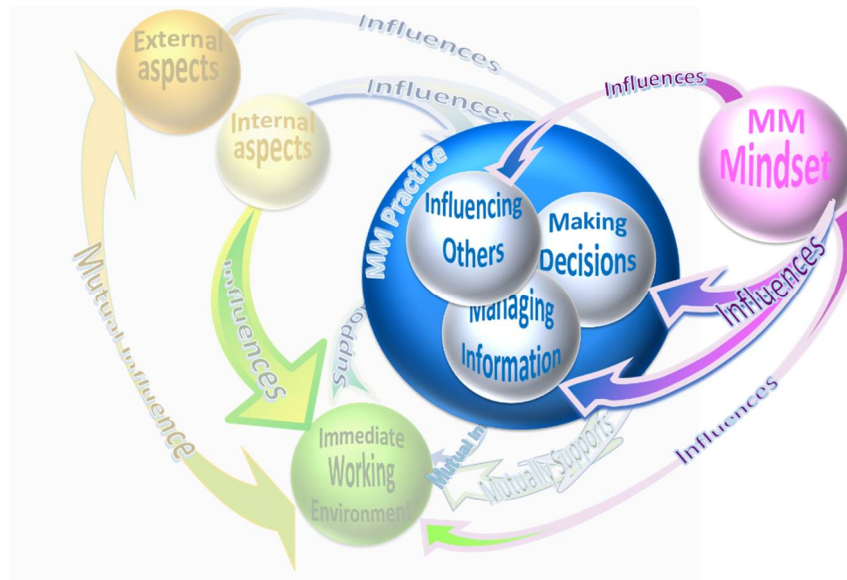
However, for the sake of clarity, they will be presented one by one below. The sequence does not reflect any priority, for no priority could be established.

5.2.1. Middle Manager's Mindset

As explained in the previous section, the Middle Manager's mindset combines:

- Their background and experience
- Their personal approach to safety
- Their perceived role
- Their fundamental values and beliefs

Middle Managers' mindset influences not only MMs' practice but also their immediate working environment, which in turn may influence their practice.



Regarding their practice, the detailed influence can be characterized as follows:

Influence on Making Decisions

The sensitivity to the possible safety impact of a decision seems to be increased for managers who have **(had) a certain proximity with operations**, be it through their current job or past experience or specific interest in operations. (To illustrate the fact that influencers work in combination with one another, organizational aspects leading certain managers to be driven by performance indicators related to budget or time can have an opposite effect as it will be detailed later). [e.g. [Project managers' safety mindsets are different whether they are working airside \(...\) or working landside & office \(...\)](#) What makes the difference is the airside experience and the proximity with aircraft."]. It can also be increased by an **inspiring experience through a senior's behavior or reaction in the past** – e.g. (a) Having experienced a manager standing up for safety during a meeting or (b) asking engineers what they really think about their solution knowing how they will feel if it goes wrong, or (c) having had a manager always considering the safety impact of whatever decision or action as a young professional has a lasting influence on Middle Managers' sensitivity to safety. These experiences are inspiring and increase the reflexivity of Middle Managers' practice when it comes to safety. [e.g. ["These experiences contribute to ring a bell in such case and help me step back and respect the time it needs to find solutions."](#); ["This experience as Head of Safety & Reliability in the early 2000's was a formative part of my safety thinking."](#); ["I have one inspiring experience that I still remember and that guides me sometimes. In the 90's, there was a presentation on the safety nets available on a system further to an accident. Someone explained a solution and said: it will pass the certification. The Technical Director asked him "but what do you think about this solution because in case of an accident, I go to jail. In other words, as an engineer, what do you think of such a solution? Should something happen, you may regret to have contented yourself with certification""\]\].](#)

- The weight associated with safety in Middle Managers trade-offs is also influenced by their mindset. The best practices aim at **putting safety at the forefront but making the safety argument more rational with respect to operational and economic arguments**. [e.g. “Whenever there is a safety issue, we will resolve it before any budget or other priority issue.”; “Some people use the safety argument too easily. I am engaged in an effort to make the safety argument more rationale with respect to operational and economic arguments.”; “Even when you are talking safety with the highest priority, we need to adopt pragmatic solutions. You can’t compromise safety, but you can’t implement any technical solution, some solutions require too much effort.”].
- **Acknowledging** the uncertainty when it comes to safety, namely **that safety is never black or white, that anticipating as much as possible all the implications of a decision** even if it is acknowledged that one cannot anticipate everything, **leads Middle Managers to confront several viewpoints, involve several profiles and rely on several sources of information to make decisions**. Even if the decision has to ultimately be made by one person only, Middle Managers had rather go through a collective approach to come up with the best trade-off considering as many aspects and inputs as possible. [e.g. “I invite experts both involved in the development and out of my domain when need be to have ‘fresh eyes’ because it is never black or white.”; “It is key to confront several viewpoints and validate together with these other people. <<Science without conscience is the soul’s perdition >>.”].
- Considering that **nothing can be left to chance** when it comes to safety leads Middle Managers to prefer to **be conservative in their decisions in case of doubt**. [e.g. “If the situation involves releasing an aircraft into service, it draws my attention to safety, it puts me into “safety mode”. We need to make sure of what we are doing.”; “We try our best not to leave anything to chance for what concerns report that we deem to be important.”; “Once, an aircraft had a problem. We changed some parts, but I wanted to change the whole system even if it was at our own cost. I wasn’t confident because we were not able to reproduce the problem, we couldn’t understand 100% the problem. The engineers would run the risk index. It was OK, but I didn’t feel comfortable.”].

Influence on Influencing Others

The way MMs perceive their role as managers significantly influences their perception and practice of their influence.

- Perceiving the management role as that of a middle-man leads MMs to value informal channels and talking directly to people to influence them. [e.g. “Request of collaboration are at personal levels with “sorts of gentle agreements” and availability among people”].
- Likewise, perceiving the management role as giving meaning and broadening people’s horizon leads MMs to explain decisions and give the bigger safety picture to influence others. [e.g. “I try to broaden their (the team’s) horizons and give a bigger safety picture.”].
- In the same line, it leads MMs to invest time and effort to understand each party’s stakes and identify the important questions as a basis to be able to influence others.

Influence on Managing Information

Whether they **consider safety as a complex and dynamic issue** or rather see it as complying with rules significantly influence the way Middle Managers manage information. Indeed, in the first case, it leads them to:

- **Looking for information from the field/operators and staff** as a key source, complementary to top-down safety-relevant information even if it is then needs to be challenged to discriminate perceptions from facts. [e.g. "Also, the front-line operators are a good source of information, and sometimes we realize we need to introduce safety and operational changes thanks to the controllers' spontaneous reports."; "90% of the information I have come from discussions with my team members. It is my approach to cope with too much information. People are put in a situation where it will always be possible to blame them for things they are supposed to know. People from my team inform me if there is a problem but there is no difference between safety and other aspects. It is a matter of developing a trust climate. I proceed in a similar way for all aspects."].
- Looking for and processing as much information as possible on safety related aspects including from other organizations, thus **diversifying the sources of information**. [e.g. "I asked for 2 people to ensure full time capitalization on what happens elsewhere, FAA/EASA recommendations..., identify the state-of-the-art, monitor in-service experience on our equipment. "; "I keep a close eye on Skybrary and EVAIR to detect problems whether in airspace design or procedural issue"; "for safety related aspects, the information can come from any source as well."].
- **Challenging the information** they gather to **make sure it refers to a real safety issue in their organization** as opposed to for example a theoretical case that is not realistic operationally or a perception. [e.g. "My role is not to let people say there is a safety issue and rush to make modifications without making sure it is a real issue"].

As mentioned earlier, beyond a direct influence on their practice, Middle Managers' mindset also influences the immediate working environment, thus indirectly influences back the practice. The influence of the MM's mindset on the immediate working environment can be characterized as follows:

Influence on Immediate working environment

Middle Managers having a safety-oriented mindset create certain conditions in their immediate working environment, especially:

- **Encouraging their team to resolve safety issues before any other priority issues** (e.g. budget) and **pushing them to adopt** an appropriate approach vis-à-vis safety, in particular **a reflexive attitude, including making sense of what they do, challenging the impact of what they do**. [e.g. "My responsibility is to remind my teams that understanding everything that is safety-related is key."].
- **Encouraging** their team and other people **to speak up and listening to them**. [e.g. "I encourage reporting within the team, even with small stuff & low level. I'd rather know what's going on. I do not interfere with the low level stuff to give them local empowerment, but on major investigations I'm heavily involved."; "I have direct relation with my staff at each level, and personal problems can be faced together, looking for a reasonable solution for everybody."; "We have a speak-up culture i.e. everybody has the feeling that s/he

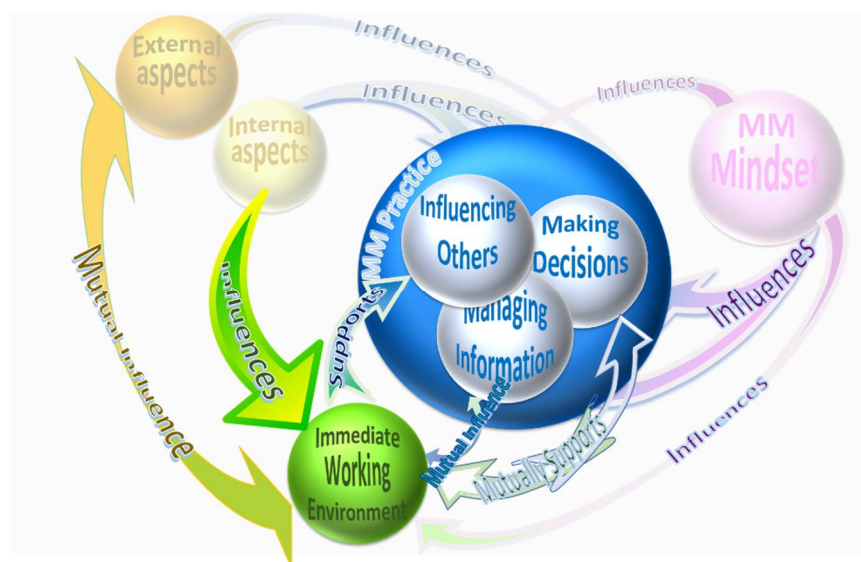
can speak of any topic (HR, safety...) with you and s/he'll get feedback. We are very much collocated (excepted for a small part in Spain). Anyone can come and see me easily or send an email. (...) We go through the teams from time to time. Some people won't come to you. It's important to get a personal relation."].

- **Supporting** their team **when** they take a **conservative approach** when safety is at stake. [e.g. "I had to validate decisions from my certification & safety people that stopped things on the program to make sure documents were updated or other things were done. This induced additional work or pressure on Programs. But I always told them "I support you""].
- **Giving them a bigger picture** to understand safety stakes, especially making them aware of other stakeholders' objectives, problems, and constraints.

5.2.2. Immediate Working Environment

The characteristics of the immediate working environment that influence MM's practice are essentially the local culture and local practices more than formal aspects (job description, formal resources available). Yet, the easy direct communication (i.e. opportunity to have direct exchanges, thus geographical proximity) between the MM, his/her own manager and staff plays a role.

The relationship between Middle Manager's Immediate Working Environment and the MM practice mostly varies depending on the activity: Making Decisions, Influencing Others, Managing Information. For each activity, it can be characterized as follows:



On Making Decision

The relationship between the **Middle Manager's immediate working environment** and the **MM's making decision** is to some extent symmetrical and can be characterized as **mutual support**. It mainly relies on the **support provided by** respectively the MM's immediate working environment, **especially the MM's manager, to the MM**, and the **by the Middle Manager to his/her staff especially in two areas**:

Taking a conservative decision if there is a safety impact. Indeed, if the Middle Manager's team knows that they will be backed-up if they do something conservative safety wise, they will have a tendency to stay on the safe side. Likewise, the Middle Manager him/herself will more easily stay on the safe side if there is a similar support from his/her own manager. The Middle Manager may be challenged (e.g. by his/her own manager) regarding the decision to make sure it makes sense and is not for comfort but if there are real safety implications, s/he is supported. [e.g. "we never encountered obstacles when we said we do this, it is safety-related. I never had a boss who would said no, we don't do it on safety"; "For example, when mechanics have to undergo a long drive to reach the aircraft site, if they are asked to start working right away, I jump in and say they need some rest."; "We can easily make a decision. If I go to my boss, he backs me up when it's safety related."; "There are cases where my manager will challenge me for example in the case of the recruitment in my certification & safety team. He will check if it is not for comfort but he will not block the decision."].

Considering there is a need for better understanding some aspects/cases likely to affect safety. If they feel supported, Middle Managers' staff are encouraged not to leave anything to chance (as far as possible). The same applies to Middle Managers if there is support from above. If someone in the immediate environment notices something in relation to safety or doesn't feel comfortable because s/he considers there a need for better understanding some aspects/cases, he may be challenged to check if it is a real safety concern, but the decision will go in the safety direction. [e.g. "Towards the end of the latest big development, there were budget cuts, tests were reduced. But we never encountered obstacles when we said we do this, it is safety-related. I never had a boss who would said no, we don't do it on safety. By the way, I wouldn't have accepted it."; "I feel very much supported by my boss. He is a safety champion. He encourages safety beyond standards. He will sponsor reviews, studies. He will challenge other parts of the business for safety."; "My team insisted to make tests with erroneous information provided by the system. It induced some delay to the project, but it proved that the erroneous information had an unwanted impact. I was pleased that we insisted since it led to modifications."].

On Influencing Others

The Middle Manager's immediate working environment may support the MM's practice in influencing others if it **encourages and makes it easy to have direct exchanges and discussions with others and develop personal relationships**. One of the enablers is the geographical proximity, ideally co-location for it helps developing credibility thus trust, one of the basis for influencing others. If formal meetings are also a way for discussing with others, they don't appear to be as powerful as informal channels when it comes to influencing others. [e.g. "I give the information I have during our Monday meetings and then I go and see the people involved."].

In addition, a working environment **facilitating open communication channels and encouraging reporting** supports the MM's influencing others practice. [e.g. "I encourage reporting within the team, even with small stuff & low level. I'd rather know what's going on. I do not interfere with the low-level stuff to give them local empowerment, but on major investigations I'm heavily involved."].

On Managing Information

The relationship between the MM's immediate working environment on his/her managing information practice is a mutual influence that can be either positive or negative whether the following conditions are met or not:

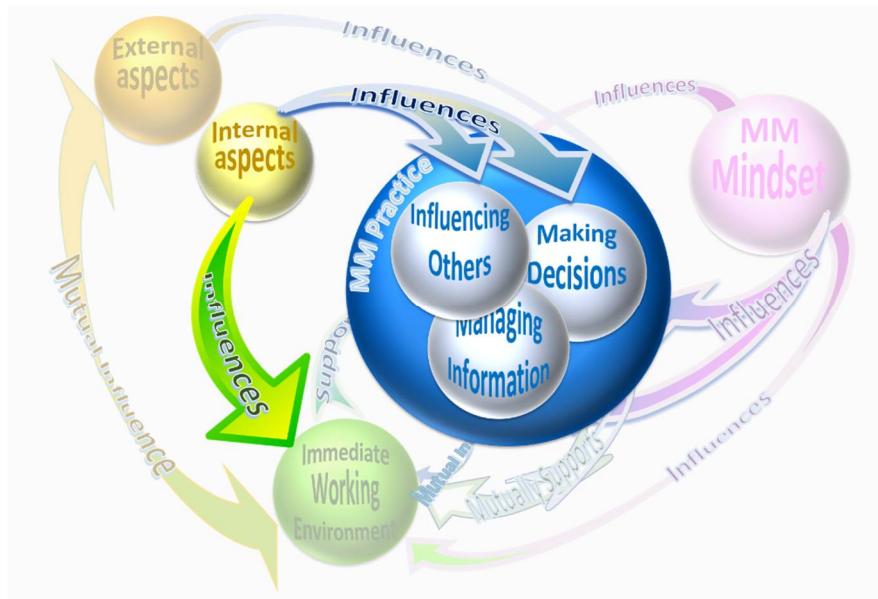
- An immediate working environment where **safety is part of meetings discussions**, for it helps receiving and disseminating information needed to make safety wise decisions/work. [e.g. "In addition, there is an on-the-job awareness and training. We spend a lot of time discussing safety aspects during meeting. For a new comer it helps getting this mind-set."].
- An immediate working environment where there is an **easy access/open relationship with people**. Here again, this requires an effort to discriminate between facts and perceptions. [e.g. "For me, safety comes up mainly in conversations."; "Anybody can provide information outside of any process and we take it seriously."; "We are data rich but not necessarily information rich. There is currently no individual reporting of fatigue but we know from informal discussions & anecdotal feedback there is fatigue. So you have to go to people and talk to them and listen to them. We're not overly busy but getting out that information is difficult (and cutting out the rubbish is difficult as well). Is what we are being told true or perceived to be true? »].

5.2.3. Overall Environment: INTERNAL aspects i.e. ORGANIZATIONAL ASPECTS BEYOND THE MM'S IMMEDIATED WORKING ENVIRONMENT

The distinction was made between the Middle Manager's immediate working environment and the overall environment of the MM's organization itself **because the culture, resources and practices may vary from one group/department/division to another**. For example, as mentioned earlier, the proximity of people to operations increases their sensitivity to safety and the safety impact of their decisions and actions. However, the distinction between immediate working environment and overall environment – internal aspects was not necessarily interpreted in similar ways by Middle Managers depending on the size of their organization. In small organizations the boundaries between the overall environment and the Middle Manager's department may be 'blurred' and it may not be of high significance to distinguish between the two. But it becomes highly relevant for big organizations. The organizations involved ranged from a few hundreds of employees to several tens of thousands of employees.

The **organizational aspects** beyond the MM's immediate working environment (called organizational aspects in the rest of the text) **have a significant influence on Middle Managers' practice**. This influence can be **either positive or negative** depending on the characteristics of the organization. It can also be **direct on the Middle Managers' practice** or **more indirect through** the influence it has on **the Middle Managers' immediate working environment**.

For the direct influence of organizational aspects on Middle Managers' practice, although most characteristics influencing the MM's making decision and influencing others practice are common, they are first presented separately.



On Influencing others

The organizational aspects having a **POSITIVE INFLUENCE** on Middle Managers' practice in relation to safety are of a different nature. As mentioned earlier, they are to be considered in combination with one another as opposed to independent aspects that are individually sufficient to have this positive effect. They include:

- **Regular meetings or ways of working involving people from different functions/departments, with different profiles and perspectives.** Indeed, through the discussions taking place, the recommendations Middle Managers make and the explanations they may provide, they have an opportunity to influence other participants. At the same time, it also allows them to better understand the different perspectives. These meetings or ways of working can be supported by formal procedures and processes facilitating these multi-functions discussions. [e.g. " , it is based on regular progress meetings involving in the same room people more sensitive to financial aspects and other more sensitive to safety aspects."; "What helps a lot is the daily work between the different people: project manager, technical deputy of the chief engineer and safety representative."].
- As a complement, organization where **direct exchanges and discussions with others** are part of the practice support the Middle Manager influencing others role. [e.g. "There is also an informal one. Since at our level we know each other in the various departments, we can share doubts but eventually, the ones in charge of the topic (e.g. programs) make the decision". "I believe personal influence is really important. This is a very social organization, people stay here for many years, and they trust each other."; "We know how to meet at 4 to 5 people and make a decision that does not undermine safety."].
- Another beneficial influence from the organization is the **safety culture**, the **organization's safety mindset** that helps the Middle Manager influencing others for safety related matters. It makes it even easier when there is a strong safety message coming from the top. [e.g. "I have no example

where the business didn't follow us when related to safety."; "I very often have to make that kind of decision with impact on cost and time. Sometimes, there is a very high business impact. Organizationally, we are very well supported."; "When it's safety related, the bell rings quickly at all levels."; "My boss agreed immediately. It was the same for the customer support manager at Headquarters. I explained to them: we still have a small chance that the problem is in the aircraft. It was immediately agreed."; "In our company, we have a strong safety culture. We go beyond the requirements. We don't like to take safety risks. Once, the Chief Engineer decided to go for a more expensive option to further enhance safety although the other option was compliant with regulation. It's part of the culture here. Whenever we see something that could impact safety, there is no question."].

- The **support from experts, including safety experts, throughout the organization** also has a positive influence through the development of the arguments and their presentation that make a difference in influencing others. This is also the case when it comes to influencing external stakeholders. [e.g. "With the customers, I explain the why of the Service Bulletin, the underlying vision and reasons. I get support from the Headquarters with presentations and documentation."].

The organizational aspects having a **NEGATIVE INFLUENCE** on Middle Managers' influencing others practice in relation to safety are partly the opposite of some of the previous aspects but also include new ones:

- **Middle Managers not co-located with the people they need to influence** makes it more difficult for them to make their safety arguments get across. Indeed, proximity and frequent exchanges, including informal ones, helps building credibility which is a key ingredient when it comes to influencing people. [e.g. "The lack of proximity to some people is a challenge. People are in different sites. The local Chief engineer is here but the more central ones are not, so we don't see them often. It takes time for him to understand us and for us to understand him. It takes time to develop credibility."].
- An **organizational culture and practices focused on "business" indicators** make it very difficult to influence managers on safety related arguments. Indeed, managers who are not in operational divisions may have a tendency to be driven by these indicators e.g. delivery, milestones, costs, etc. [e.g. "In the operational environment, I try influencing peers for them to adopt this style of management. It might be more problematic for others because they may have a tendency to be driven by delivery, milestones, costs, etc. So their focus is different from mine."; "The necessity of doing a risk assessment is an example: it is just annoying for our colleagues. It is time consuming, induces delay"].
- Another organizational characteristic that affects negatively the Middle Manager's practice is **too high a volume of administrative tasks (HR, financial...)**. Indeed, it leads to **less time to understand things, thus develop the right arguments** to influence others on aspects related to safety.

On Making Decisions

Most organizational aspects influencing the Middle Managers making decision practice are partly very close if not similar to those influencing the Middle Manager's influencing others practice. However, since they were formulated or illustrated slightly differently in relation to making decision, they are presented again here below:

Organizational aspects having a **POSITIVE INFLUENCE** on Middle Managers' making decision practice in relation to safety:

- **Regular meetings or ways of working involving people from different functions/departments... with different profiles and perspectives.** Indeed, they allow discussion and debate around solutions and ultimately, support decision-making. All the safety viewpoints are considered. Safety is not the only aspect discussed. All the implications are considered. It helps build the overall picture. These meetings or ways of working can be supported by formal procedures and processes facilitating these multi-functions discussions. [e.g. "This kind of decisions (...) is based on regular progress meetings involving in the same room people more sensitive to financial aspects and other more sensitive to safety aspects"].

Note: The organization's safety culture plays an important role as well in the outcome of Middle Managers' decision-making (more than on their practice of decision-making itself). This influence is therefore analyzed into details in the previous section i.e. influence on the organizational aspects on the influencing others practice)

Organizational aspects having a **NEGATIVE INFLUENCE** on Middle Managers' making decision practice in relation to safety:

- **Having product and "business" as primary (if not sole) drivers and indicators of the organization performance.** It makes it then difficult to push for a safety oriented decision because it is difficult to trade-off safety for business.
[e.g. "Having better information on the operational baseline and intermediate KPIs would greatly improve the way safety is taken into account"; "Organizational decisions are always more on product and business. It is very difficult to trade off safety and business. You always need evidence and knowledge supporting the leverage of safety argument against operational arguments"; "The weighting of the economics is still more relevant than safety criteria."].
- **Significant organizational pressure induced by bureaucracy, cost, delay and resources.** It doesn't allow taking sufficient time to understand all the aspects and impacts and properly inform the decision. What may counteract this pressure though is the MM mindset (his/her view of what needs to be protected most between safety and the rest). [e.g. "Technology has to be the most advanced and the company is helping us with the procurement of the right equipment (...) but we have delays due to bureaucracy and they can have an impact on safety"; "We are overwhelmed with HR & financial tasks to the detriment of time spent to understand things."; "They help me take a step back and protect the mechanics from the upper management and people, even the customers, who could push them too hard."; "Rather than dumping tasks on a team with insufficient resources, help us make the right trade-off!"].

On Managing Information

Having access to information is a necessary condition for Middle Managers to take safety into consideration. **Formal and informal channels** are used, making **open communication, direct access to information and people** factors influencing **positively** Middle Managers practice.

However, it is not sufficient. What may **negatively** affect the Middle Manager's managing information practice is the **lack of time to process it due to** either **organisational bureaucracy and related administrative tasks** as mentioned earlier, or the **amount and pace of information received**. [e.g. "The increase in information and speed to get the information is a challenge. Discriminating between important and non-important information becomes a real challenge."].

On Immediate working environment

Beyond their direct influence on Middle Managers practice in relation to safety, **organizational aspects have a strong influence on the Middle Manager's immediate working environment, thus**, ultimately, although **indirectly on his/her practice** as well. To anticipate on one example, the implementation of Just Culture in the organization supports open communication and reporting, thus creating favorable conditions for Middle Managers' safety related practice for these two aspects support Middle Managers' managing information and making decision as explained before.

The influence of organizational aspects on the Middle Manager's immediate working environment may be either positive or negative again, depending on the characteristics of the organization.

The organizational aspects having a **POSITIVE INFLUENCE** on the MM's immediate environment as regards safety are the following:

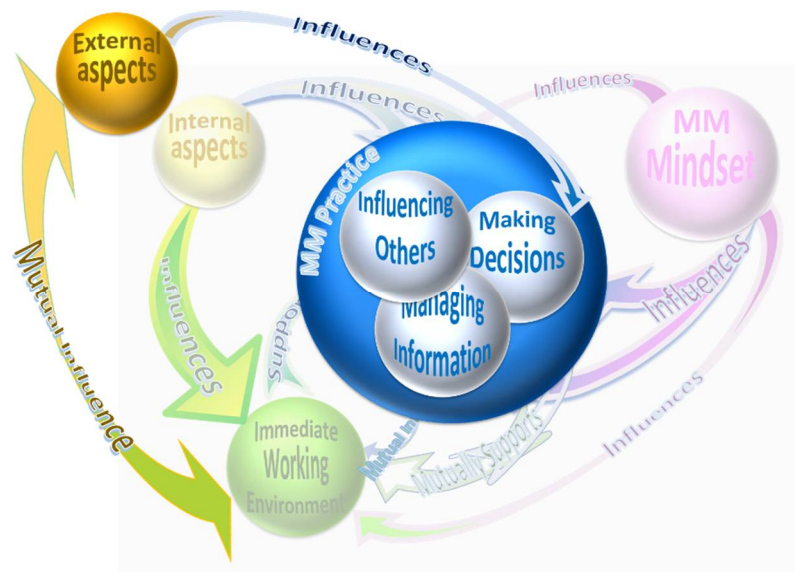
- The **understanding by other functions of the potential impact on safety of teams' overloading**. This understanding is **higher when experience has illustrated this impact**. [e.g. "Team overloading is well understood by programs because we unfortunately demonstrated *ad absurdum* that we could make mistakes by lack of time and of validation"].
- The **support from safety experts** and the **contacts of the people holding this expertise**. The safety expertise needed in each project can come from a safety department outside of the MM's group. [e.g. "Z can also obtain support from the Network Manager safety experts (operational experts) for live trials. These experts ensure his projects benefit from a strong safety case and ensure their deployment has at least no negative impact on safety and most probably can demonstrate an improvement of current safety of operations."; "there is no real safety resource issue as A calls upon safety expertise outside his own team (dedicated team of safety experts available for A's projects)."].
- The **competence management allowing for having people mature in certain domains where it is necessary**. [e.g. "What helps also is the competence management. In my department, we try and have people that are mature in certification and safety."].
- **Just culture** for it creates the conditions of open communication and direct exchanges.

The organizational aspects having a **NEGATIVE INFLUENCE** on the MMs immediate environment as regards safety are the following:

- **HR policies encouraging frequent turnover** make it difficult for people to develop sufficient expertise and face sufficient challenges on the job and in the area to be able to stand back and properly consider safety. [e.g. "There is the expert path but we cannot make everything rely on them. It is a pity then that the ones who are staying in the same job do it by default. (...) Sometimes it is not so easy with the HR when we want to do it. They [the HR] have good reasons but there is too big a distinction between the talents and the rest of the employees. The ones who bring experience and do a good job are not so easy to reward."; "From an internal organizational viewpoint, what would help as well is to let people stay, develop their experience or become experts. In design, experience is key. It is a concern for the future because today, mobility is encouraged fairly quickly after taking up a position. When we see the consequences of our errors, we are more likely not to repeat them. Today, people change jobs too quickly to see it, they only see a very small part of the V. Even more so since the V itself has become longer than in the past, processes are heavier. One cannot benefit from the lessons from his/her own experience."].
- An **organization having a lot of processes**, for people tend to rush to processes and think less by themselves, pay less attention to understanding the reasons why the processes involve such steps. [e.g. "My perception of the cultural evolution is: with the increase in size of the company, there was a tendency to formalize and develop frameworks through processes, procedures... This may have diluted reflection and reduced the sense of responsibility a bit too much. (...) People tend to rush to processes and think less by themselves. "Why did you write this? Because it's written in the template." But without understanding why it is so."].
- **High-level management not wanting to hear bad news** for it creates conditions detrimental to raising possible safety concerns or making conservative decisions by fear of not being supported.

5.2.4. Overall Environment: EXTERNAL aspects

Middle Managers are part of a wider organization that is itself embedded in a wider environment: regulator(s), customers, suppliers, partners... Whether they interact directly or not with this external environment, their practice is affected by external factors. This **relationship** may even be **direct** when it comes to **making decisions** or **more indirect through the relationship between the external environment and the Middle Managers' immediate working environment**.



On Making Decisions

The nature of the relationship between the external environment and the Middle Manager's making decision practice varies in nature as follows:

- **Working together with external stakeholders** helps better understanding their work and perspective as it **supports safety related decision making**. [e.g. "Collaborating with the customer in improving safety measures inside the common workspace."; "We have been expanding knowledge & appreciation of how work is done on the other side. They now understand simple things (the fact that we use callsign instead of squawk ident – because we do not have the squawk!). Just to learn how the other works can really improve understanding & alleviate tensions."; "To actually see how ZZZ do things was very useful. I'm keen we develop the relationship with the airfields as well. This type of communication tends to be done through networking rather than formally."].
- Through the **consideration of the implications (safety and others) of a decision on external stakeholders**, the external environment influences the Middle Managers' decisions for those who consider a wide range of impacts (see Mindset section). It may lead them to additional decisions to minimize this impact. [e.g. "My goal is to maintain the aircraft in a good flying state, keep it available, even if I don't maintain it directly. We explain the limits to the customer, we provide spares to expedite the change and minimize the impact on time & money."; "In the case of a product enhancement (vs a safety issue), trade-offs are made considering the fleet implications i.e. is there a need to retrofit? At whose costs? Is it a difficult design change, a software evolution, an evolution of manuals? Would the change be effective? Weight can be another dimension. The trade-offs involve multiple dimensions. The main question is: is the proposed action going to make a difference to be worth the hassle to all impacted?"].
- The **identification by a MM of an external stakeholder's hazardous practices** leads to making specific decisions to try and reduce the risk. External stakeholders may be suppliers or airlines or other aviation actors. [e.g. "We decided to withdraw the delegation from the supplier. As practical implications, it induced additional workload and budget that had not been anticipated"; "The airline

was keen to dispatch the aircraft because it was a small leak and they wanted to go back to their home base to fix it. On the first call, I decided that I wouldn't let them go. It was a fire of unknown origin and a fuel leak of unknown size."; "Customers put a lot of pressure. They are the most difficult ones especially in executive aviation. I have to remind them that they need to take safety into account."].

Regulation may also influence Middle Managers' decisions, but the best practices are Middle Managers who are more driven by what makes their activity safe than by compliance. Indeed, they then go beyond regulatory requirements if they consider it is needed. [e.g. "The Authorities have an influence. In one case, they were more stringent than we would have liked in the interpretation of the requirements. It was easier to comply & deliver the aircraft to the waiting customers than argue they were overly prescriptive."; "we discussed with them [the Authorities] for we thought their proposal was uneconomic and bringing no benefit. We engaged into a lengthy discussion process to explain our solution."].

On Immediate Working Environment

The relationship between the overall environment – external aspects and the Middle Manager's immediate working environment can have an indirect influence on Middle Managers practice through the conditions they contribute to creating around the Middle Manager. From the organisations involved in the research, it turned out that there is a **mutual influence between the external aspects of the overall environment and the Middle Manager's immediate working environment**. It translates especially through the **influence of suppliers and Authorities. This influence can be either positive or negative**.

The role of Authorities, *a priori* **positive** by **setting targets and monitoring** what organizations do can turn out to have a **negative** influence on the Middle Manager's immediate working environment in some cases. Indeed, it may lead to **too much reliance on the Authority** as a front-line actor to ensure safety ("tell us if what we've done is fine") as opposed considering the Authority as a redundancy or an ultimate independent safety net ("just checking because we already convinced ourselves that it is fine"). [e.g. "I sometimes regret that some engineers consider the Authorities as a referee. "We will ask the Authorities""].

Conversely **sometimes, the targets or requirements set by Authorities are considered not beneficial to safety or uneconomic**.

The **safety mindset and performance of suppliers** also influences the immediate working environment. If **positive**, it **supports the immediate working environment** and may even lead to too much reliance. If **not deemed sufficient**, it **leads to additional workload and budget** and ultimately specific decisions as regards the suppliers, like changing suppliers.

Beyond Authorities and suppliers, **having exchanges with external stakeholders allows Middle Managers' immediate environment to share lessons, better understand the interfaces of operational aspects** and have new ideas to manage them including in relation to safety. In short, it helps **broadening all stakeholders' picture on operations and safety**.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

If each organization is specific and no absolute/universal recipe would work for all of them, some general lessons can nevertheless be derived from the interviews regarding the ways forward. A key result is that it is **not only by focusing on the Middle Managers themselves, their personal skills and competence**, that safety wisdom can be enhanced at middle management level. Improving how safety is taken into account at MM level **also relies on a number of organizational characteristics that need to be addressed**. Supporting Middle Managers in better taking safety into consideration in their daily activity combines two axes:

- Developing Middle Managers safety mindset;
- Creating the conditions both at the level of the Middle Manager's immediate working environment and at a wider organizational level that not only make it possible but also encourage Middle Managers to consider the safety dimension.

Defining a set of detailed practical actions for a given organization requires internal workshops involving the appropriate stakeholders, to customize them to the actual organizational settings and practices and also to the external context.

However, the following sections give some indications of what possible ways forward could look like.

6.2. Recommendations

6.2.1. Developing Middle Managers' safety mindset

Beyond the "standard" managerial competences having a safety mindset for a Middle Manager relies on:

- The **acknowledgment of the potential impact on safety** (whether direct or indirect) of one's actions and decisions (or absence of). Proximity to operations appears as an enabler. Among the **possible options** to move in this direction are: development or **career paths** for Middle Managers that include (a) position(s) in an operational function; **regular exposure to operations** with possibly an associated safety related coaching; development **of awareness programs and/or role game sessions** based on real cases Middle Managers can identify to.
- The **understanding of the complexity and dynamics of safety** (as illustrated by most accident analysis highlighting a build-up of relatively small events, decisions...). Among the possible options are: **Training courses** including some theoretical inputs on safety, uncertainty and complexity as well as practical cases; **On-the-job coaching**; **Practical training/coaching sessions** where safety is debated among several stakeholders from different hierarchical levels (Boccaro, 2017)....

6.2.2. Creating the local and global conditions making it possible for Middle Managers to consider the safety dimension and encouraging them to do so

As mentioned earlier, supporting Middle Managers' contribution to safety in their daily activities also depends on a number of organizational characteristics, both locally in the Middle Managers immediate

environment and globally throughout the organization and even outside. The key objectives as well as possible options to achieve them will be presented, keeping in mind that they make sense in a global context and need to be adapted to the specific context of each organization.

- **Creating the conditions to allow and encourage everyone at all levels to make a conservative decision when safety is at stake** or a there is a doubt regarding a safety impact. This involves being assured to be backed-up by the management, not being assessed in terms of individual/collective performance based on indicators that could be in contradiction with conservatism. Possible options that can complement one another would include **reviewing KPIs and/or the way they are used**, developing the organization's safety mindset/culture through for example **training sessions/role games involving people from various hierarchical levels/debates around success & failure cases**, **strong safety messages coming from the top**, **high-level management welcoming bad news...**
- **Creating the conditions to facilitate open communication channels, direct exchanges and personal relationships between employees from different functions and different hierarchical levels. Co-location or regular occasions to meet and work together** (including time from informal exchanges) **with a variety of people**. These regular occasions can be partly created by organizational processes including these kind of cross-functions/cross-levels meetings. **Just culture** is also a key facilitator for encouraging open exchanges on real practices.
- **Creating the conditions for Middle Managers to have sufficient time to gather and process relevant information, understand the possible safety stakes and develop adequate arguments to inform decisions**. This involves limiting the volume of resources dedicated to administrative activities and more generally **limiting the organizational pressure that can be induced not only by bureaucracy but also by pressure on cost, delay and resources** thus by current performance indicators and the way they are used.
- **Having safety expertise within the organization and creating the organizational conditions for Middle Managers to have access to and get support from this expertise**.
- More generally, having **HR policies** (especially career path management, turn-over, rewarding) **facilitating the development of competence in some areas and allowing to have people mature in certain domains**.
- Including a safety dimension in **the choice of suppliers** through for example a **closer cooperation between procurement and other functions at all levels**.
- Creating the conditions to **facilitate regular exchanges with external stakeholders** not exclusively through formal processes but also through occasions to work together and meet informally.
- **Creating the conditions for people to think by themselves, challenge themselves, make sense of what they do rather than rely on others to review what they do**. This may involve **reviewing the organizational processes** (e.g. the multiplication of very detailed ones), **individual appraisal practices, empowerment...**

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