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Extended abstract

Situational awareness in big data environment: Insights from French Police decision makers

Since 2019, the Indian city of Hyderabad has been facing an unprecedented wave of terrorist attacks. To combat this threat, a massive plan to relentlessly track down criminals is being deployed (Amnesty, 2021). Nearly 70% of the total area of certain neighborhoods is now covered by video surveillance. The data captured by the cameras is automatically cross-referenced with the country's internal police databases containing photographs of key wanted criminals. Through facial recognition, police officers in the field are immediately alerted when an actively wanted individual is spotted by the device.

In France, although experiments are underway, police officers do not have systems that can automatically cross-reference the data captured by the terminals deployed in cities with those stored in their internal files (Godé, Lebraty, & Vazquez, 2019). Nevertheless, these actors' informational context has been greatly enriched over the last few years. That is why we consider they are now evolving within a dense and heterogeneous informational environment, made up of a set of information systems (and/or technologies) that are not, or only slightly, integrated, which we call the big data environment. Within this environment, it is up to the police officer in the field to identify, analyze and cross-reference the clues that will lead to the application of a decision to respond to the situation encountered.

The literature on the effects of Big Data on decision-making processes has grown considerably in recent years. Numerous analyses are performed around the interest of big data for business intelligence and Decision Support Systems (DSS) (Davenport, 2017; Gurău & Ranchhod, 2020; Vitari & Raguseo, 2017). Existing work, however, has studied this phenomenon only from the perspective of firms already equipped with automated processing systems. The big data environment brings new challenges for decision-makers who do not have these solutions. The information it provides is numerous and varied (images, video, messages, etc.) and cannot be processed comprehensively.

The theoretical framework of this research is linked to the situational awareness model (Endsley, 1995; Notaker, 2022). It highlights that decision-makers intuitively identify and select information (step 1 of the SA model) from their informational environments in order to construct a mental representation (step 2 of the SA model) of the situation they meet. This construction conditions the decision implemented afterwards. We believe the big data environment and the new information made available to decision-makers are likely to affect decisions upstream of their implementation, during the information selection and situation understanding phases highlighted by the situational awareness model (steps 1 and 2). The objective of this research work is to propose a model of the decision-making process in a big data environment in order to answer the following research question: *how does big data environment impact situational awareness?*

This qualitative study, carried out in an information and command center (CIC) of the French National Police (PN), is based on the observation and analysis of three decision-making situations urging for rapid decisions (table 1). They involve a decision-maker acting as a supervisor with more than 10 years of experience in the police force. The technologies that make up his/her big data environment are numerous and generate continuous information (Table 2).

Decision-making situations		
Robbery of a tobacco bar	Brawl in front of a school	Unexpected demonstration

A robbery is announced on the air. The supervisor observes the scene on the video protection systems. He/She quickly think he's recognized one of the robbers on the run. He no longer listens to the feedback from the teams who continue to report on the air. All his attention is focused on finding the address of the individual he thinks he has recognized. He contacts a patrol that is not on the scene to go to the home of the potential criminal. His hunch was right in this case. The individual is in front of his home and is arrested.	An altercation is reported in front of a middle school/high school. The supervisor notices a crowd via video surveillance and confirms the fight. A large number of patrols are deployed to the scene, only to realize that these are only young people leaving their school. At the same time, display errors on several technological system interfaces result in mobilizing several patrols by mistake. There is no longer a team available and tensions emerge within the CIC.	The supervisor supervises an unexpected CGT (one of the main trade unions in France) demonstration. A small group of demonstrators break away from the march and board a streetcar. The supervisor focuses his/her attention on this group and does not manage the main demonstration for several tens of minutes. The law-and-order system around the main march is weakened. It later turns out these individuals were simply going to a new meeting place of the movement (the main demonstration had left on foot). In the end, they were neither armed nor aggressive.
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Table 1 Decisional situations studied

Big data environment		
Internal sources	External sources	Human sources
FOVeS (Stolen vehicles database)	BFM TV	Informants
FRP II (Criminals database)	CCTV Cameras	Firefighters
PEGASE (patrols location, etc.)	Social networks	Other Police forces
SIV (Vehicles registration database)	Symbian (geolocation)	Tram and Metro networks
TAJ (Legal history)	GoogleMap	Hospitals
	Google	Civilians

Table 2 Big data environment of the CIC supervisor

The major theoretical contribution of this research concerns the proposal of a deepened version of the situational awareness model, adapted to big data environments (figure 1). The results of the study allow us to highlight the introduction of an anchoring bias at the very beginning of the decision-making process (step 1 of the SA model). The decision-maker has more means to confirm his initial recognition. He/She focuses his attention on looking for clues that support it (Step 2 of the SA model), which increases the risk that an inappropriate decision will be implemented (teams are misallocated in the field and patrols are mobilized unnecessarily). He ignores sources of information that do not confirm his initial recognition and cuts himself off from part of his information environment (partial big data environment): the representation he has of the situation is ultimately incomplete. The decision-maker is unable to step back from his initial mental representation (whether or not the decision applied is appropriate).

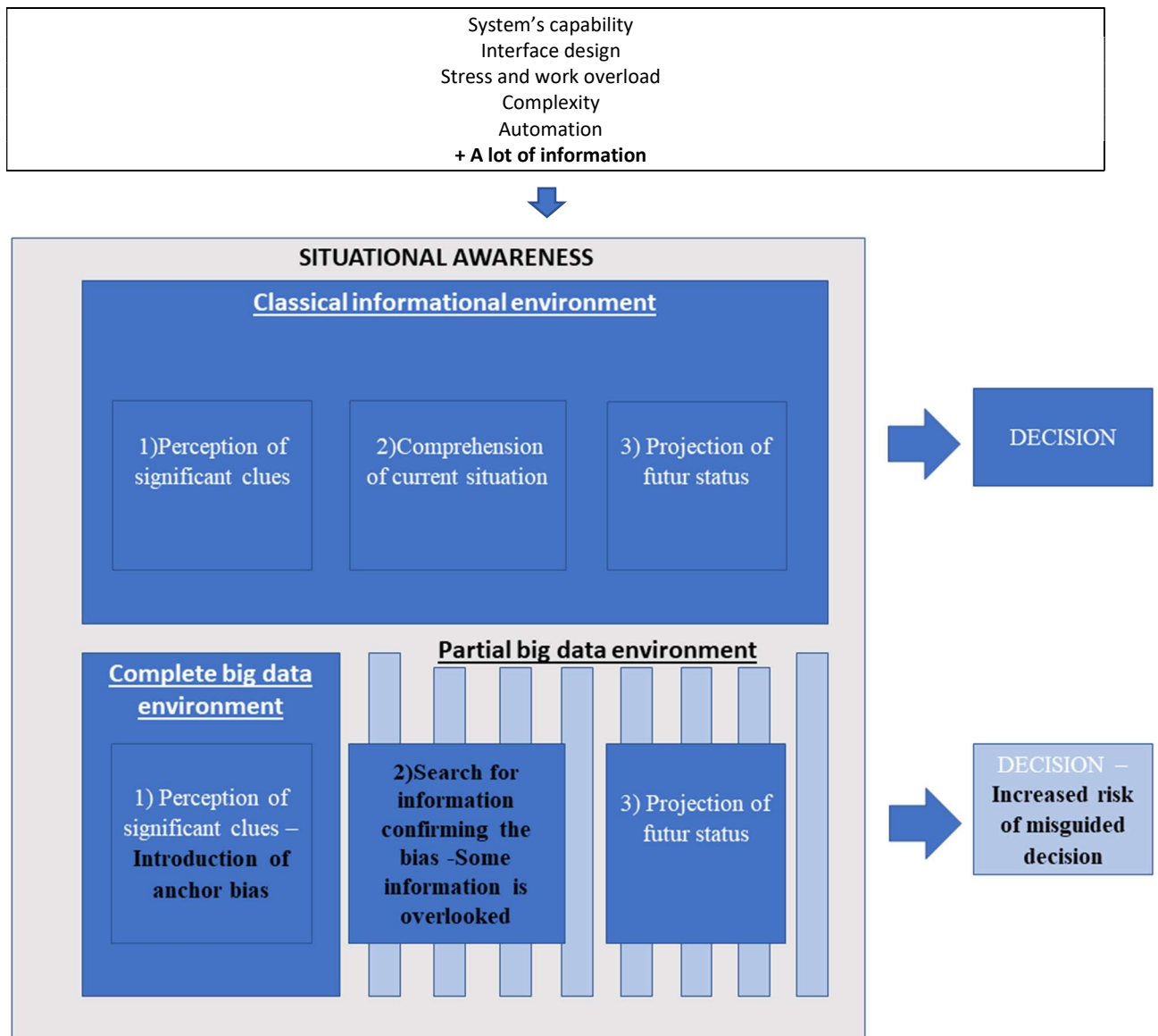


Figure 1 SA model adapted to decision-making processes in a data environment

In parallel to this theoretical contribution, the article formulates practical recommendations for expert decision-makers whose information environments have become considerably denser in recent years. Within a big data environment, the decision-maker's knowledge has proved to be not necessarily enriched by the technological experience (stored data the decision-maker has access to). The big data environment thus induces a risk in terms of experience acquisition, contrary to situations experienced directly in contact with the field of action. This problem could be solved by setting up feedback sessions for the expert decision-makers concerned, following the example of what is done in other institutions (e.g., the French patrol) (Godé & Vazquez, 2017).

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