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Learning in complex public systems: The case of MINUSMA's intelligence organization

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Abstract

Public systems are facing increasingly complex challenges such as poverty and terrorism. In this paper, we seek to demonstrate the theoretical as well as practical value of complexity science, by investigating how key characteristics of a Complex Adaptive System (CAS) work out in practice within the intelligence organization of the ongoing nation-building mission in Mali (MINUSMA). Our main finding is that the learning properties of the CAS suffer when its structural properties are not sufficiently developed. In MINUSMA, major improvements can especially be made in (re)developing the minimum specs—in which strategic and operational demands, ideally, converge.

Key words: complexity theory; complex adaptive system; grand challenges; United Nations; triple-loop learning

Word count: 9007

Introduction

Public organizations and their managers are facing societal challenges with high levels of complexity and uncertainty—such as climate change, poverty, income inequality, obesity, refugee streams, and terrorism (Head 2008). As a result, novel types of public management systems that can deal with high levels of ambiguity and complexity are required (Ferraro, Etzion and Gehman 2016). Public management scholars have argued that complexity theory serves to analyse and address societal conundrums, in which common assumptions about the relationships between means and ends no longer apply (Castelnuovo and Sorrentino 2018; Meek and Marshall 2018; Teisman and Klijn 2008). However, the use of complexity theory has also been criticized because concepts such as self-organization and emergence, which originated from the natural sciences, may have been too easily transferred to social settings (Cairney and Geyer 2017).

In a special issue on complexity theory and public management, Eppel and Rhodes (2018: 957) suggest that substantial progress can be made by “developing complexity-based models of agent interactions, behaviour, and change over time that demonstrably produce/predict real-world outcomes of any kind.” Accordingly, Joosse and Teissman (2020) developed a practice-based decision-making methodology that can help public managers mitigate the risk of over-simplification under conditions of task complexity. In this paper, we use existing organization and management theory on Complex Adaptive Systems (CAS) to make the discourse on the value of complexity science (for public management) more practically grounded. Using CAS theory will help demonstrate how aggregate constructs, such as self-organization and co-evolution, can be organizationally and practically operationalised in response to major societal challenges.

More specifically, we apply five key CAS characteristics to study the interplay of structural and learning properties in the context of public systems addressing grand societal challenges. It is critical to fathom this interplay: on the one hand, tackling grand challenges mostly translates into

establishing a varied structural network of institutional partners (Head and Alford 2015), and on the other, despite the intricate collaborative arrangements of the network, it has to be able to learn in order to adapt and innovate (Brook et al. 2016). As such, we raise the following research question: *how do the structural properties of a large multi-stakeholder organizational constellation, operating in conditions of extreme environmental complexity, influence its learning ability?*

The case studied is the intelligence organization of MINUSMA, the ongoing United Nations (UN) nation-building mission in Mali. This is an exemplary setting for studying how a public system deals with grand societal challenges, one in which the UN via a multi-actor approach seeks to support and rebuild a country that has no, or hardly any, public institutions—such as democratic elections, taxation, educational infrastructure, military defence, police, various kinds of (e.g. land, birth, marriage) registry, and financial institutions (Mylonas 2012).

In our study of the intelligence organization of MINUSMA, we collected multiple sources of evidence, including 93 interviews with both military and civilian UN representatives on site. We find that the combination of centralized and distributed agency substantially complicates organizational learning in MINUSMA. Our findings especially signal the pivotal role of strategic agents' heuristics in enabling this UN mission's operations (Sillince, Jarzabkowski and Shaw 2012), and conversely, the capability of strategic agents to process structural learnings that arise from operational experiences (Helfat and Martin 2015).

The next section reviews the literature to introduce and characterize a CAS in terms of five key constructs. Subsequently, the Methods section explains how these theoretical constructs were used as sensitizing concepts in studying MINUSMA. We then describe the main findings, and finally, discuss the theoretical and practical implications.

Conceptual framework

Complexity theory originates from efforts in the physical and natural sciences to answer fundamental questions about the emergence of life and consciousness; a key insight here is that various complex natural systems exhibit a similar recurrent pattern in which order cyclically emerges from chaos, based on seemingly random local behaviour (Axelrod and Cohen 2001; Waldrop 1992). Complexity theories have subsequently also been emerging in the business administration literature (Brown and Eisenhardt 1997; Iñigo and Albareda 2016) and the public management literature (Castelnuovo and Sorrentino 2018; Joosse and Teisman 2020; Teisman and Klijn 2008). In this respect, scholars in both fields particularly emphasize the complexity theory principle of local agents self-organizing in response to their environment, thereby often developing unpredictable collaborative patterns (Bettis and Prahalad 1995), also known as co-evolution (Maguire and McKelvey 2011). Brown and Eisenhardt (1997) argued that the cumulative effect of frequent, locally initiated, small improvisational interventions by individual agents lies at the heart of organizational adaptability and innovation. Five CAS properties appear to stimulate self-organization and co-evolution.

Near decomposability (whole in the parts)

A key CAS principle was coined ‘near decomposability’ by Simon (2002) and ‘building the whole in the parts’ by Morgan (2006). Simon (2002: 587) defines *near decomposability* as the key characteristic that increases the fitness and survival chances of a CAS: a nearly decomposable system “consists of a hierarchy of components, such that, at any level of the hierarchy, the rates of interaction within components at that level are much higher than the rates of interaction between components. Systems with this property are called nearly completely decomposable, or briefly, nearly decomposable (ND).” In this respect, ND systems involve fractal structures that reproduce themselves at different organizational levels to create holistic units or teams formed around complete processes (Morgan 2006).

The notion of ND also resonates with the principle of loose coupling (Simon 1962; Weick 1976), referring to a state of interaction that represents the middle way between over and under-connection, or in Weick's (1976) terms over- and under-specification. Moreover, loosely coupled (modular) organizational systems have a distributed character that enable self-organization at local or decentral levels (Eisenhardt and Piezunka 2011).

Requisite variety

A CAS needs substantial slack in information processing capabilities and skill sets to decrease dependency on the actions of a single local entity. In other words, "the internal diversity of any self-regulating system must match the variety and complexity of its environment if it is to deal with the challenges posed by that environment" (Morgan 2006: 10). The CAS literature draws on Ashby's (1956) famous 'law of requisite variety' which implied that, in any viable system, the number of states of its control mechanism must be greater than or equal to the number of states in the system being controlled. Later, Beer (1981) redefined variety as the total number of *possible* states of a system, or of an element of a system, and reformulated Ashby's law as 'variety absorbs variety'. The principle of requisite variety underpins several studies of organizational slack, as a key condition for growing and sustaining the viability of public and other organizations (e.g., Dolmans et al. 2014; O'Toole and Meier 2010; Jessop 2003; Tenbenschel 2005).

Minimum specs

The third CAS construct addresses the pivotal role of management in avoiding both over- and under-specification, as argued earlier. Here, Weick (2004) argued that managers should identify and specify a minimally required 'bare-bones' framework, which would offer the organizational vitality required to deal with uncertainty and ambiguity. Such a bare-bones framework is also known as the minimum specifications, or *minimum specs*, involving those essential rules and constraints that offer ample opportunities for distributed action (Morgan 2006). Empirical work

in this area suggests that minimum specs encourage professionals to find creative means to achieve their goals, resulting in more variation among activities and more opportunities to learn better ways of doing things (De Zegher, Iancu and Lee 2019; Zimmerman, Lindberg, Plsek 2001).

Enactment

A CAS involves ongoing sensemaking and learning processes arising from complex information exchanges and communication webs that provoke decision-making and organizational action (Glynn and Watkiss 2020; Weick, Sutcliffe and Obstfeld 2005). Weick (1979) argued that organizational *enactment* is the cornerstone of sensemaking, implying that an organizational system and its environment are not separate entities but interact in a symbiotic manner. Managing a CAS thus implies ‘embracing complexity’ (Haynes 2015) by means of enacted sensemaking in dynamic, interactive, and reciprocal cycles (Farooqi and Forbes 2020).

Learning-to-learn

Finally, the *learning to learn* notion emphasizes that key agents in and around a CAS need to build and sustain the capability to engage in single loop, double loop *and* triple loop learning (e.g. Argyris and Schön 1978; Kwon and Nicolaides 2017). Learning is absent (cf. zero learning) when agents fail to reflect on major challenges or problems that may arise, and do not take corrective actions.

Single loop learning refers to agents making simple adaptations and taking corrective actions, whereas *double* loop learning involves reframing, that is, learning to see things in novel ways (Argyris and Schön 1978). *Triple* loop learning, also called deuterio-learning (Bateson 1973), entails agents developing new processes or methodologies for arriving at such re-framings (McClory, Read and Labib 2017; Snell and Man-Kuen Chak 1998). Triple loop learning seeks to enhance the fullness and depth of learning about very complex issues and dilemmas. To this end, first, all agents need to be linked together in an overall learning infrastructure; second, these

agents have to develop the competencies and skills to use this infrastructure (Romme and Van Witteloostuijn 1999; Johannessen et al. 2019). Evidently, the higher the learning level is, the more complex it is. As a result, single loop learning is widespread, but double loop and especially triple loop learning are rare in organizations (Kwon and Nicolaides 2017).

Sensitizing themes

This section outlined five constructs for understanding and shaping a CAS: near decomposability, requisite variety, minimum specs, enactment, and learning-to-learn. Drawing on Morgan (2006) and Weick (1979), these five constructs can be divided in structural and learning properties. Accordingly, near decomposability, requisite variety and minimum specs can be conceived as structural properties that facilitate enactment and learning-to-learn. In the remainder of this paper, we use these five constructs as sensitizing concepts (Glynn and Watkiss 2020) to study the interplay of structure and learning in a nation-building constellation.

Methods

Research design and case selection

We adopted a qualitative research strategy to study the complexity of a contemporary phenomenon (Cornelissen 2017; Yin 2009). We draw on an in-depth case study of the UN's ongoing Multidimensional Integrated Stabilization Mission in Mali, better known under its French abbreviation MINUSMA. At the heart of these UN missions is continual learning and adaptation, because getting a country (back) on its feet requires strategies and interventions that provide actors at different organizational levels with the discretion to engage in learning-by-doing (Bourgon 2010; Wimmer 2018). In studying MINUSMA as a CAS, we focussed on its internal network of military and civil units tasked with the process of gathering, analysing, and disseminating intelligence within MINUSMA. The main reason for this choice is that this

intelligence process fuels MINUSMA's daily activities, and as such, it is a pivotal process in facilitating adaptive behaviour at various organizational levels.

Case setting: MINUSMA

An insurgency in March 2012 led to a French military intervention in Mali. This resulted in peace negotiations between the government and the rebels. In early 2013, an African Union (AU) mission was temporarily deployed, before MINUSMA took over AU's peacekeeping duties. In broad terms, MINUSMA's task was to promote the stabilization of key population centres and guide the political peace process in Mali.

In total, 52 participating nations contribute various resources to MINUSMA. Most western European countries provide high-tech systems and other state-of-the-art resources to MINUSMA's peacekeeping force. These resources include advanced information systems, unmanned aerial vehicles (UAVs) and attack helicopters which are mostly embedded within the intelligence units, the special forces, and the helicopter detachment. The African countries participating in MINUSMA provide its military force, supplying motorized infantry battalions to the West, East, and North sectors.

To further enhance the complexity of this organization, many different civilian agencies of MINUSMA are active at the national as well as regional levels of Mali. These agencies include the UN Department for Safety and Security, Protection of Civilians, Political Affairs, Civil Affairs, the Human Rights Division, and the Stabilization & Recovery section, a Joint Mission Analysis Centre, and a Joint Operations Centre (JOC). MINUSMA's organization chart in Figure 1 illustrates the entire constellation.

< INSERT FIGURE 1 HERE >

Figure 2 depicts MINUSMA's force structure, which serves to provide an overview of the units led by the force commander (see Office of the Force Commander in Figure 1). The U2, G2,

and S2 codes in this figure involve international military standards, in which the number 2 refers to intelligence units. The Force Headquarters is thus supported by a U2 intelligence unit and each sector headquarters and battalion respectively include a G2 or S2 cell. These units are expected to provide MINUSMA's commanders at the various levels with current intelligence on pressing security issues, to be used for the protection and tasking of their operational units. The All Sources Information Fusion Unit (ASIFU) is not part of the regular chain of military intelligence activity. ASIFU is organized as a separate functional unit (see Figure 2), exclusively assigned to gather, synthesize, and disseminate medium to long-term intelligence on macro-level societal developments in Mali.

< INSERT FIGURE 2 HERE >

Data collection

Empirical data was collected between March 2014 and December 2015. Data was collected primarily in Mali, at the MINUSMA compounds, during a field trip of three weeks by the two lead researchers. Before and after the field work in Mali, they also had numerous interactions with military and civilian experts outside Mali. Multiple sources of evidence were collected, drawing on the data collection protocol that is described in Appendix A. First, we interviewed 93 people in MINUSMA and had numerous informal conversations when mingling at the compounds. The interviewees either had a military (78) or civilian (15) role, representing 14 different nationalities and covering the entire spectrum from work floor to strategic apex (an anonymized list of interviewees is available upon request from the authors). The interviews were semi-structured; each interview took between one and four hours, was recorded, and fully transcribed. The interview protocol focussed on the key process of gathering, analysing, and disseminating intelligence within MINUSMA. Thus, interviewees were not explicitly asked about their perceived ability to learn and adapt; instead, their daily working practices were discussed.

This created a setting in which people would freely talk about the work they did, how their work related to the overall intelligence chain, and which issues they encountered.

As a second source, we collected and analysed a large number of relevant documents, such as intelligence reports, standard operating procedures, and minutes of meetings. Third, the two lead researchers collected data, as participant-observers, at various events and meetings. These two scholars have a combined academic and military background, which helped them to ‘go native’ (O’Reilly 2009) within MINUSMA. They attended several pre-deployment exercises of ASIFU personnel and participated in two evaluation days in which a group of 25 (former) MINUSMA participants discussed their experiences. As mentioned, they also conducted a field visit of 3 weeks in November-December 2015, during which they stayed at multiple MINUSMA locations in Mali. In this period, the two lead researchers held numerous informal conversations, participated in a substantial number of meetings, and joined several patrols.

Data analysis and quality

The transcribed interview results were coded, using the five CAS characteristics outlined in the previous section (Gioia, Corley and Hamilton 2013). More specifically, the data structure was built using an iterative process in which we continually used, adapted and (re)interpreted the initial five constructs—as aggregate dimensions and second order themes—in view of the empirical data collected. Multiple researchers compared and discussed the results of their independent coding efforts. This process served to refine our conceptual focus by identifying specific patterns and themes, in the form of (preliminary) first-order concepts. The internal validity of our (initial) findings was further enhanced by obtaining feedback from five insiders in the MINUSMA mission (cf. Holstein and Gubrium 2000), and by triangulation across various data sources (i.e., interviews, documents, and notes by participant-observers). Appendix B presents the final data structure arising from this iterative process: it depicts the aggregate

dimensions and second-order themes, based on the conceptual framework, as well as the first-order concepts illustrated by representative quotes and observations.

Findings

We discuss the main findings in terms of the second-order themes described earlier. They provide a structure that is instrumental in exploring the richness of the MINUSMA case study. In addition, these five themes inform our theorizing about the case. This section follows the sequence derived from the coding process (Appendix B).

Requisite variety

Establishing MINUSMA involved a process of mixing and matching organizational elements, which served to create a composite system deemed necessary for addressing the diversity of challenges in Mali. This resulted in a ‘mother’ organization with many different organizational units being grouped in a *mutually exclusive* manner. As such, MINUSMA’s intelligence organization consisted of many different military or civilian actors, originating from western and non-western countries, and assigned to a wide range of functional domains. However, while MINUSMA’s intelligence organization displayed a substantial internal diversity, it was not able to adequately self-regulate this network to match the variety and complexity of its environment. The data analysis points at several underlying reasons (see also Appendix B).

First, MINUSMA’s intelligence process was organized along *functional boundaries*. A deliberate distinction was made between (gathering, synthesizing, and disseminating) current and mid/long-term intelligence. The former follows the traditional military intelligence approach, where frontline units push the military intelligence up the hierarchical ladder by means of specialized staff structures (S2-G2-U2 in Figure 2). The responsibility for the mid/long-term intelligence chain was allocated to a separate organizational unit, named ASIFU. This unit would send its comprehensive intelligence products directly to MINUSMA’s force commander, without any direct (formal) interaction between ASIFU and the SHQs or their battalions.

Second, MINUSMA's military units were organized along *national lines*. Except for several staff units, almost all operational units consisted of only a single nationality or at best a few nationalities. As a result, there was an enormous variety between mandates from national governments, leadership approaches and cultural backgrounds. For example, the European countries brought in advanced intelligence capabilities—in the form of so-called Technologies, Techniques and Procedures (TTPs)—which were heavily based on NATO procedures and standards, also in information security. These TTPs, thus, involved classified NATO intelligence systems, implying that staff from non-NATO countries did not have direct access to them. By contrast, the operational intelligence units of MINUSMA's main forces were populated with African soldiers, who were more familiar with the Mali setting and often spoke one of the local languages. These national boundaries within MINUSMA undermined its capability to deal with environmental challenges, by stimulating 'ingroup' interaction at the expense of collaboration with other units within MINUSMA. The combined effect of functional and national boundaries is best illustrated in the distinction that several interviewees made between "skiing nations" (i.e. Western European countries) and the African troops. For example:

“The skiing nations were the only personnel that were allowed to access that information. The rest of these guys were Africans and it was like divided information and divided race, that's how we managed it.”

Third, our findings also point to the lack of *redundant* (or slack) resources. The common military approach is to keep forces in reserve, to either exploit offensive opportunities or counter (unexpected) defensive threats. Accordingly, this type of slack was built into the military part of MINUSMA. In addition to its main reconnaissance role, the Special Operations Land Task Group (SOLTG) served as the force commander's dedicated strategic reserve. In case operational requirements asked for immediate action, the SOLTG was called upon. When in the fall of 2015, MINUSMA's combat troops started facing hit-and-run assaults and attacks with improvised

explosive devices, the SOLTG was increasingly used as a quick response force. However, whereas this strategic reserve role was clearly defined, the required assets were not. For example, the SOLTG had to share its interpreters, unmanned aerial vehicles (UAVs), and medical evacuation capabilities with ASIFU's sister units that were co-located with SOLTG at SHQ-East in Gao. Consequently, ASIFU's Intelligence Surveillance Reconnaissance Team could not properly execute its own assignments when the quick response force was deployed, because critical assets were temporarily used by the SOLTG. As such, the redundancy of key resources was negatively affected by an efficiency-based measure of pooling resources.

Overall, while MINUSMA's intelligence network was composed of mutually exclusive components and displayed substantial internal diversity, the resulting institutional constraints affected its requisite variety. Especially the functional and national boundaries incorporated in MINUSMA's design, combined with few slack resources, created a suboptimal CAS from the perspective of requisite variety.

Near decomposability

MINUSMA's military structure was to a large extent based on the principle of near decomposability. Most of its units consisted of all the elements needed for military engagement: manoeuvre elements (e.g., tanks and infantry), fire support elements (e.g., artillery, mortars, anti-tank systems), support elements (e.g., supply and transportation, maintenance, and medical support), and a command-and-control element. Combined, the functionalities of each of these elements made it possible to complete nation-building tasks. MINUSMA's military units varied in size, and their interrelationships followed a cascading, nested order (from large to small): each sector formed a unit of around 4,000 troops, composed of battalions of approximately 800-1,200 soldiers, and each battalion consisted of multiple companies of roughly 150 people each. SHQ-North was considerably smaller, consisting of just one battalion. Each of the companies

incorporated all traditional military functionalities, that is, manoeuvre, fire-support, general support, and command and control capabilities.

However, building the intelligence chain within MINUSMA resulted in major tensions and problems. The ND nature of the mission's structure implied a structural deficit in horizontal communication across units, coded as *stove piping*. For example, an officer of the Joint Mission Analysis Centre observed:

“Instead of sharing intelligence, most people keep information to themselves, due to the competition to bring the most accurate information to the senior management of the mission.”

Here, the notion of stovepipes refers to isolated vertical communication channels that inhibit or demotivate people to share information (intelligence) directly with colleagues elsewhere in the organization. In this respect, there was a strong need to share current intelligence on security matters, such as the direct threats along MINUSMA's main supply routes and the presence of armed groups. This need was underpinned by the fact that in the 2013-2015 period more than 50 members of MINUSMA's staff died in Mali and another 200 were injured (BBC 2015; MINUSMA 2015).

Meanwhile, the nation-building mission of MINUSMA also implied a strong need for medium to long-term intelligence on macro-level societal developments. From missions in Afghanistan and Iraq, the UN had learned that a (traditional) security-oriented intelligence chain is not sufficient in the context of nation-building (Rietjens and De Waard 2017). That is, knowledge on macro-level societal developments was needed to develop a broader societal awareness.

However, those in charge of command and control at the sector and battalion levels missed the capacity to independently gather and process intelligence with a longer time horizon – which was exclusively embedded in ASIFU. The UN's decision to make ASIFU a distinctive building block was largely informed by Western pragmatism. For one, Western countries did not want to

jeopardize their own information security position by giving many unfamiliar UN partners access to their advanced information and sensor systems. In addition, ASIFU's autonomy made it more convenient for these countries to rotate and hand over this unit's responsibilities to successors.

As a result of this strict separation, operational units (e.g., on patrol) were often largely unaware of relevant macro-level contingencies. Relevant information collected by either ASIFU or the operational units was stove-piped and had to travel all the way up and down the hierarchy, before it reached the front level. One of the interviewees of U2 (i.e. the commander's intelligence staff) observed:

“ASIFU did not share much intelligence. They told me: we do the medium and long term intelligence. You are not allowed to access our database and you just figure out yourself how you will get this intelligence.”

To streamline the connection between the operational and mid/long-term intelligence activities, ASIFU assigned liaison officers to the intelligence staff of several battalions (cf., Figure 2). The role of these liaisons was threefold. First, they had to strengthen the intelligence process by sharing relevant knowledge developed by ASIFU staff. Second, they had to train the intelligence personnel of the combat battalions to professionalize their intelligence capability. Third, they introduced and tried to implement standard procedures and reporting tools, to create a better fit between the two detached intelligence chains. According to several interviewees, a lot of energy went into this organizational intervention, but these efforts proved beneficial for the intelligence process at large. Nevertheless, ASIFU was eventually forced to withdraw these liaison positions, because it needed to prioritize its own primary tasks. One of the liaison officers reflected as follows:

“Often people did not appreciate the work of NIGERBAT [i.e. battalion from Niger], but I have come to know them as very professional, except for their intelligence processes. But

after some time, we started to share our formats with them and, in the end, we received village assessments that were not bad at all.”

Overall, the MINUSMA organization was to a large extent configured as a near decomposable system, except for the strategic intelligence process in ASIFU, which was set up as a central unit. Moreover, the phenomenon of stove-piping undermined and demotivated people to directly share intelligence across units. Stove piping and the centralized nature of ASIFU together created substantial noise and tensions between ASIFU and the operational intelligence activities conducted by decentral units. These tensions were initially reduced by assigning liaison officers, but these extra resources were withdrawn when priorities shifted.

Minimum specs

Our data suggest that MINUSMA’s top management had great difficulties in defining its ‘bare essentials’, or minimum specs, in Mali’s highly ambiguous context. Almost all interviewees explained that the recent NATO mission in Afghanistan (ISAF) served as the dominant frame of reference for the Western units in MINUSMA. A liaison officer commented:

“We always look back to the Afghanistan mission in which we aligned our operations with other NATO countries. Such alignment is unthinkable within the UN.”

Yet, the majority of MINUSMA’s participants, while part of the UN, were not members of NATO and had not taken part in the earlier ISAF mission. This situation made it even more difficult to determine the mission’s minimum specs. Evidently, all contributing countries appeared to agree on the overarching goal of promoting peace and political stability in Mali, but it proved to be rather challenging to reach a consensus on how to actually achieve these goals. Whereas interviewees from Western countries referred to their nation-building experiences in Afghanistan, others stressed that the situation in Mali was unique, asking for a more customized approach. For example, a military interpreter said:

“In Mali, women just walk on the streets. Having been in Afghanistan, some western soldiers think: huh? But this is just accepted here. It’s not the same as in Afghanistan. In Afghanistan, there are hardly any women on the street and they are separated from the men. Within Tuareg communities [in Mali], women are often even considered the leaders.”

The position of Western countries in this discussion was further weakened by the fact that, prior to MINUSMA, Mali had hardly been on their security radar. Mali thus was a geo-political blind spot for most of them, resulting in a lack of knowledge and appreciation for the complexity of the conflict in Mali, including its history and ethnic sensitivities. At the same time, the African troops participating in MINUSMA had extensive contextual knowledge and language skills, but they did not have hands-on nation-building experience. Moreover, a dilemma emerged because Mali’s neighbouring countries, contributing military forces to MINUSMA, were also relevant players in the regional security conundrum. This further complicated the discussions and decision-making about MINUSMA’s minimum specs.

Focussing on the intelligence process, a compromise was found in a general set of specs informed by experiences in Afghanistan. These minimum specs for the intelligence activities would need to drive the intelligence efforts throughout MINUSMA. The specs were therefore not centrally determined, but an initial plan for intelligence collection was developed by means of several top-down and bottom-up iterations between the Force Commander and his staff and the intelligence units in the field. An analyst at ASIFU HQ:

“We formulated the Information Requirements ourselves. In theory, the Force Commander should task us via an OPORDER [Operational Order], but the OPORDER has never officially been published. There was also no mention of ASIFU, which meant that officially we did not have a task in the command structure of the Force Commander and the SRSG [Special Representative of the Secretary General]. Therefore, we mainly

operated according to the vision of ASIFU's commander, who formulated a task description and several (Priority) Information Requirements that were later approved by the Force Commander. Instead of a traditional top-down this was more a bottom-up process.”

Soon after the arrival of MINUSMA's second Force Commander in May 2015, several attempts were made to better focus the intelligence process. The new Force Commander and his staff updated the information priorities and requirements. Nevertheless, the aim of developing a shared set of minimum specs never materialized. As a result, frontline workers kept struggling with basic questions about what to concentrate on and how to deploy their scarce resources. As a result, each new rotation of troops started to newly discuss the existing set of minimum specs and developed its own improved version. One interviewee observed:

“With the best of intentions, ASIFU headquarters created an Intelligence Collection Plan (ICP) of 75 pages that was not workable in any way. In their ICP, they deconstructed the entire Malian society along the lines of each of the PMESII [Political, Military, Economic, Social, Infrastructure and Information] factors and presented that as their information need, very much in line with the traditional intelligence officer sending a request saying ‘give me everything about’ ...”

ASIFU's headquarters thus provided its frontline agents with a far too comprehensive and overly detailed set of specifications, also resulting from an inadequate framing of intelligence efforts in terms of an earlier (NATO-led) mission in Afghanistan. The lack of structural clarity arising from ill-defined specs also impacted MINUSMA's learning ability, as discussed in the next two subsections.

Enactment

Our data depict many instances of frontline enactment, the most prevalent being: (1) embedding liaison officers in the African combat battalions; (2) changing the target area for the collection of

intelligence; (3) re-ordering and re-formulating the priority and specific information requirements that made up the ICP; (4) increasing medical evacuation capacity and force protection in order to extend ISR company's operational reach; and (5) continually experimenting with new tools to strengthen the intelligence collection process. Appendix B provides (additional) data illustrating these instances of frontline enactment. In particular, the interviewees pointed at the use of UAVs and an Open Source Intelligence unit, capable of tapping web-based communities and user-generated content; gaining insight in these digital footprints thus turned out to be highly effective. A member of this unit argued:

“The different local groups are immensely active on social media. They post everything on Twitter and Facebook. It is their place to share information, to generate new networks, and to express their feelings. It is even part of their strategic communication, propaganda perhaps.”

A key factor in all these instances of frontline enactment is the high level of flexibility at the individual and team levels. Overall, enactment by frontline and other local agents appears to be critical. The combat support team provides a good example of distributed agency. Initially, this team was assigned to ensure protection for other troops. However, having a reconnaissance background, the team members soon discovered ways to directly contribute to the intelligence collection process. New team members brought GoPro cameras they had purchased themselves back home. One team member recalls:

“We've made approximately 70,000 pictures in three and a half months' time. We made many of these with GoPro cameras that we brought in our vehicles. These cameras produce a picture every 5 seconds. As a result, we could see the relationships between armed groups and certain type of companies that were present in Gao. What are the locations they visit regularly? Where do they stay?”

Learning-to-learn

Despite various local initiatives, many interviewees were rather critical about MINUSMA's overall learning behaviour. They complained about the fact that frontline interventions were often not followed up, or sometimes even blocked by MINUSMA's headquarters and/or decision-makers in the capital cities of the contributing countries. For example, most interviewees advocated the integration of ASIFU and the commander's intelligence staff (U2) for operational reasons, but national governmental representatives effectively prevented this integration.

Our analysis of the data regarding this disconnect between strategic apex and frontline points at a disagreement (within MINUSMA) about the top's main role. Interviewees at the office of the Force Commander conceived their role to be a strategic orchestrator that needs to balance political considerations and organizational capabilities. As a result, the Force Commander accommodated many countries (contributing troops) in having their own national caveats. These caveats were widespread and included, for example, not sharing intelligence reports or refusing to operate in an area where there was only medical back-up from African countries. As a respondent of the Force Commander's staff expressed:

“You know, we're not going to change it. I would much rather have the assets here with caveats, than to not have them at all. So, that's the price for having them.”

By contrast, many frontline staff members expected MINUSMA's strategic apex to play a strategic facilitation role. This group of interviewees argued that supporting local initiatives should be the key task for top managers. We noted that top management modified the mission's capabilities several times, for example, by sending additional force protection and medical personnel to increase freedom of manoeuvre for the intelligence collectors. At the same time, many frontline workers remained critical and argued that the strategic apex did not allocate sufficient resources to support local initiatives. As a result, these frontline workers could not sustain many of these initiatives. Attempting to show some understanding for top managers, an

interviewee of the ISR unit said: “Participating is more important than winning. I can understand that.”

A related data pattern involves two co-existent learning cycles. On one hand, top management appeared to be primarily engaged in acting upon strategic stimuli, such as international agreements and obligations, national political decisions (e.g., about mandates for the mission) and resource allocation issues (e.g., availability of troops or financial constraints). Every time something in MINUSMA’s strategic context changed, the intricate balance between political considerations and managerial action was affected and possibly disturbed, which then triggered efforts to re-establish this balance – which apparently consumed almost all time and attention of top management.

On the other hand, troops deployed in Mali engaged in a learning-by-doing approach to deliver on MINUSMA’s main goal of getting the country back on its feet. Aiming to close the learning cycle at the operational level, frontline agents acted as much as possible upon the feedback received during their operations in the field, relying on the resources they had at their disposal. An example of the Swedish-led ISR Task Force in Timbuktu illustrates this:

“We realized that we did not have expertise on religion, which was needed to get a comprehensive understanding of the area. We then tasked the priest of our unit to do a study on the religious groups in the area of Timbuktu.”

At times, however, closing the cycle was problematic, if not impossible, because it would require strategic interventions. An example raised by many interviewees was the sudden increase in hit-and-run attacks, resulting in a growing number of MINUSMA casualties. Given the deteriorating security situation, the SOLTG advocated a temporary shift of resources, with the mid/long-term intelligence capabilities being temporarily re-directed to expand the operational intelligence capacity of the three sectors (see Figure 2). However, ASIFU fiercely resisted this proposal because it involved ‘fighting symptoms’ of terrorism, arguing that the strategic

intelligence efforts on broader societal problems aimed at taking away the root cause of terrorism. The Force Commander decided to stick to the extant division of tasks, and thus tensions between SOLTG, ASIFU and operational units continued to inhibit the efficacy of the intelligence chain.

In sum, MINUSMA's *learning-to-learn* capability appeared to primarily involve single and (ad hoc) double loop learning, as defined earlier. The relatively low triple-loop learning capability arose from various disconnects between the strategic apex and the frontline within MINUSMA, and a related disconnect between two co-existent learning cycles at these two levels.

Discussion and conclusion

In this paper, we explore how the structural properties of a large multi-stakeholder organization, operating in conditions of extreme environmental complexity, influence its learning ability. Our findings demonstrate that five key CAS characteristics provide a lens to unpack the organizational consequences of multi-stakeholder engagement, adding to the practical value of complexity theory in public management (Eppel and Rhodes, 2018). Moreover, the findings from the MINUSMA case study have resulted in a level of generalization that can be useful for those designing, operating, and studying other complex multi-stakeholder structures addressing grand societal challenges. In this respect, two main insights stand out.

First, public management scholars argue that elaborate institutional arrangements are required to tackle grand challenges (Klijn 2008). However, empirical studies in this area have mainly focused on challenges at the national level within the same country, such as large-scale infrastructural renovation in the Netherlands (Joosse and Teisman 2020) and administrative reform in Italy (Castelnuovo and Sorrentino 2018). Although the network of actors involved in such cases is extensive and varied, it involves a moderate level of complexity compared to MINUSMA's international nation-building context. Interestingly, the extremely high level of institutional complexity of the MINUSMA case sheds a novel light on the conclusions of earlier studies. Joosse and Teisman (2020) introduced the notion of complexification to open up gridlock

situations, caused by simplification and path-dependency in public decision-making. Castelnovo and Sorrentino (2018) emphasized the need for pragmatic public enactment, that is, balancing centralized control and decentralized customization by using public values as a compass. Both studies refer to a fertile reciprocal relationship between strategic decision-makers and front-level actors. Such a relationship can help to either successfully shift the system on the simplification-complexification continuum, or to determine the generic values that foster pragmatic decentralized action. Our study shows that developing a fruitful interaction between apex and frontline may be the most critical activity in a large multi-stakeholder organizational constellation facing grand challenges. In MINUSMA, the strategic and frontline agents followed different decision-making and enactment logics. The confrontation of these logics raised substantial tensions because strategic goal-setting deviated too much from operational practices and requirements. Instead of one overall learning cycle, two separate cycles thus emerged. These addressed different aspects of the nation-building endeavour but failed to align with each other.

Second, our findings suggest that creating and sustaining a coherent framework of minimum specs is critical for a productive interplay between the two levels. In MINUSMA, the top echelon as well as the frontline consists of various professionals coming from many different countries, cultures, disciplinary communities, and ideologies (cf. Purdy and Gray 2009). This typically results in negotiation processes in which specifications (regarding e.g. chains of command, grouping of units, coordination mechanisms) are accumulated in response to the inputs and strategic considerations of the participants -rather than being deliberately and collectively converged in a minimum set of key specifications. The difficulty of developing and fostering such a ‘bare bones’ framework is reinforced by frequent adjustments in mandates and obligations of national governments and other institutional actors involved. Our study suggests this accumulation of specs over time incurs the risk of ‘emptying’ the meaning of these specs for many agents within a nation-building mission—from the high-level diplomat to the military in

the field. Ideally, one needs to converge towards a set of minimum specs through which “macro level structure can grow out of micro level action and, thus, is tightly coupled with action” (Li 2017: 521), and vice versa. The key assumption here is that all agents share a (small) number of interests, from which a collective set of specs can be developed (cf. Orlikowski 2002). Such a cascading set of broadly shared specs would facilitate adaptive enactment as well as learning, which both are critical properties for dealing with the environmental volatility of grand challenges.

Practical implications

Evidently, the political and institutional context of a nation-building mission substantially restricts the space for fundamental organizational (re)design and change. Moreover, the involvement of many stakeholders in mission design and legitimation makes adjustment politically cumbersome. None the less, our findings resonate with earlier studies of multi-stakeholder constellations and grand challenges, which suggest that organization-wide learning, also known as triple loop learning, could provide a viable point of departure for reflecting on the alignment between the strategic and operational level (Clement and Smith 2009). Triple loop learning may be critical in developing new processes and methodologies for re-framing problems in and around the incumbent organization (Johannessen et al. 2019; McClory et al. 2017). Also in view of the critical assessment of the triple-loop-learning literature by Tosey, Visser and Saunders (2012), we outline two triple-loop learning practices that have been tested in practice and appear to be rather promising for any organizational constellation facing extreme levels of environmental complexity.

One learning practice is to create a network of *double-linked circles* alongside the extant structure. This learning network, involving linking-pin positions that connect different hierarchical levels and functional domains, has been tested in many organizations in the Netherlands, Canada, US, and elsewhere (Romme and Endenburg 2006). Accordingly, a limited

number of face-to-face or online meetings of each circle per year provide sufficient opportunities for any employee and manager to signal problems, voice concerns, and propose solutions (Romme and Endenburg 2006).

Another organization-wide learning practice is the *appreciative inquiry summit* (Ludema et al. 2003). Powley et al.'s (2011) study shows that applying this approach facilitates an open discussion and search about highly ambiguous and complex policy issues, including those involving organizational design and governance. The appreciative inquiry summit appears to fit the complex political context of nation-building and other grand challenges, and may thus help to facilitate the required interaction between strategic apex and frontline.

Concluding remarks

This study seeks to demonstrate the added value of complexity science for public management, by investigating how key characteristics of a CAS work out in practice within a large multi-stakeholder organizational system facing extreme levels of environmental complexity. Our study of MINUSMA's intelligence organization shows that when the structural properties of a CAS are not sufficiently developed, its learning properties will suffer. Developing a shared framework of minimum specs, in which strategic and operational demands and considerations coalesce, appears to be a major challenge within the institutional framework of a nation-building mission that draws on national and functional demarcation lines. But the minimum specs also appear to constitute the pivot around which major improvements can be made. We argue that triple-loop learning approaches, such as double-linked circles and the appreciative inquiry summit, may help in bringing the strategic and operational echelons closer together.

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