



Crisis Management in a Federation – Cybernetic Lessons from a Pandemic

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Abstract. We aim to contribute to improving the management of pandemic crises. Our focus is on federal systems, as these are particularly powerful in dealing with environmental complexity. Through five waves of the pandemic, spanning a year and a half, we study the management of the crisis in the Swiss Federation. The purpose of this research is learning for how to deal with crises of the same type in the future. We apply the Viable System Model (VSM) as a framework for our inquiry, elaborating a diagnosis and a design for the management of epidemic or pandemic crises. The VSM is a conceptual tool that is particularly strong for analyzing federal systems. Hence substantial insights have surfaced to orientate a future crisis management.

Keywords: Crisis management · Complexity · Requisite variety · Variety engineering · Organization · Viable system model · Diagnosis · Design · Covid-19 pandemic · Resilience

1 Introduction

When the Covid virus hit the world in 2020, it was broadly treated as a virological, medical or epidemiological problem. Looking at the dynamics of events, I saw a need for studying the crisis from an organizational perspective. The focus of the study is on the federal republic of Switzerland. This small country would be demanding enough for such a study. It would also be gratifying, as it is a federation, which should have special capabilities for dealing with exceptional situations such as a pandemic. My co-researcher was Prof. Lukas Schoenenberger, a Swiss expert in the health system [1, 2].

As a framework for our project, Stafford Beer's Viable System Model appeared to be pertinent. We adopted a viewpoint of complexity, not complication, and a perspective of holism, not reductionism.

The purpose of our study was

- To diagnose the Covid-19 Pandemic from the cybernetic viewpoint of complexity absorption, and
- To draw lessons for the improvement of the state of crisis management as new crises are always imminent.

Our theoretical foundation was a very abstract one: the classic Law of Requisite Variety, which stems from the eminent cybernetician Ross Ashby [3]. It posits: “Only Variety can absorb Variety”. This Law hinges on the concepts of Complexity and Variety.

We define Complexity as the ability of a system to assume many different states or behaviors. Variety is a technical term for Complexity. We conceive of it as the “amount of states or modes (or patterns) of behavior of a system”. Variety can be calculated; it expounds the characteristics of an exponential function of the relationships and elements of the system under study [4]. Variety is also a synonym for Repertoire of Behaviors. The more complex the environment the higher the necessary variety to cope with it.

The Law of Requisite Variety implies: To maintain a system under control, the control system must have a Variety (repertoire of behavior) that matches the Variety of the system controlled. This law is universal and inexorable.

2 Case Study: The Covid-19 Crisis in a Federation

In this context, the system regulated is a social system in a crisis, and the regulator is the organization that has been created to manage this crisis. Our focus is on federal systems, as these are particularly powerful in coping with environmental complexity. Using the case of the Swiss Federation, we have studied the Covid-19 pandemic in that country for nearly two years, from March 2020 to January 2022.

The Swiss Federation has been chosen as a case study, - for two reasons: First, Switzerland has built an effective response system for coping with the crisis. Second, and more important, the form of state here is the Federation; the form of governance is democracy. Both are classical approaches to enabling the survival of social systems: Federal structure and democratic participation are two pillars of their viability.

In sum, we address the question of how the crisis organization within a country must be designed for mastering the crisis. This can only be achieved if the Variety of the organization equals the Variety of the environment, which in our case is the pandemic. In other words, that organization must develop Requisite Variety, i.e., a repertoire of behaviors that matches the repertoire of the pandemic, or more concretely, the destructive complexity of a virus going wild.

Speaking about complex social systems: If Ashby’s Law is inexorable, then it must also be unachievable. Complexity can never be fully understood nor mastered in a literal sense. This contribution is not grounded in a technocratic hubris that assumes the possibility of total control of complex systems. Take a pandemic: If the virus seems under control, new mutants can emerge, which might call into question all previous successes. Yet, all that Ashby’s Law does, is discern a condition under which control can occur. It does not assert that control can occur in any case. “Mastering the crisis” then is a relative term.

3 Methodology

We apply the Viable System Model (VSM) by Stafford Beer as a framework for our study [5–7]. That model is based on the Law of Requisite Variety. It has been widely used for both diagnosis and design of organizations. It also embodies the structural concept with the most rigorous theoretical claim: The assertion that it specifies the necessary AND sufficient structural preconditions for organizational viability. These preconditions are formulated in terms of necessary and sufficient *regulatory systems* (also *systems of management* or *systems of governance*):

“Systems 1”: Basic operations with their managements

“System 2”: Coordination

“System 3”: Executive Management

“System 3*”: Auditing

“System 4”: Strategic Management

“System 5”: Normative Management.

This set of prerequisites for viability holds for both, the Federation as a whole and the Cantons, i.e., member states, of which there are 26. Figure 1 shows these two plus further recursive levels of organization, with their respective units striving for viability.

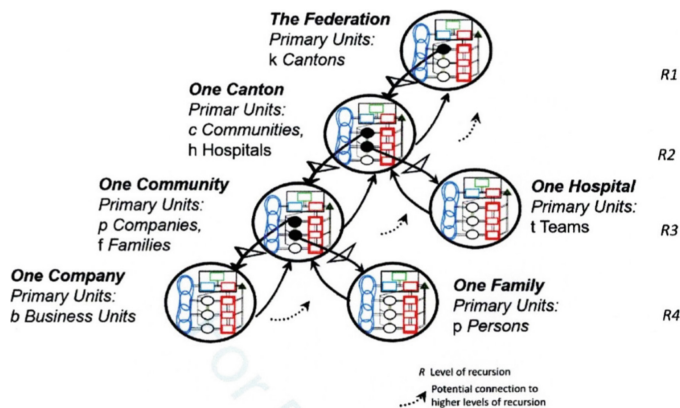


Fig. 1. Levels of recursion

We carefully elaborated a diagnosis and a design for the management of pandemic crises. Both the analysis and the synthesis of our study are based on Ashby’s Law and the VSM. Substantial insights have surfaced to orientate a future crisis management. In a nutshell, the implication is what we call “Variety Engineering”.

4 Trajectory of the Pandemic

The first wave of the pandemic came in February–March 2020. The first case of an infection in Switzerland occurred on 25 February, the first mortality on 5 March 2020. Figure 2 shows the daily new infections until early 2022. The 7-day averages of new cases (bold line), with the successive waves and the various Covid-variants triggering them, are visible in the graph.

Subsequently, both infections and deaths increased exponentially. The pandemic proved to be a threat due to the relentless, ferocious advance of the virus.

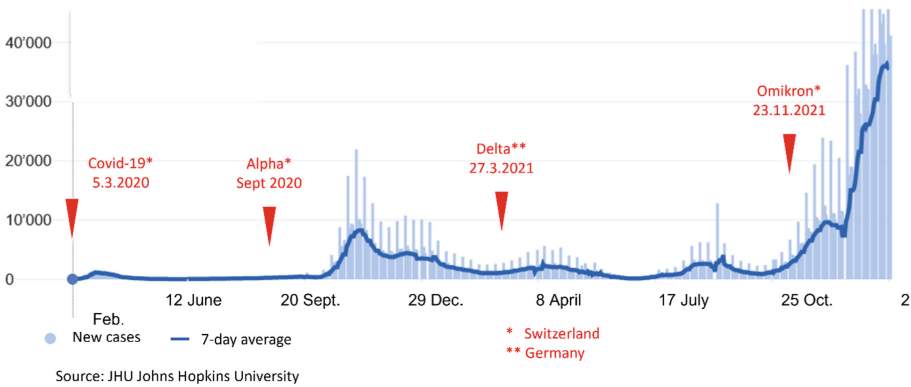


Fig. 2. New Covid infections - Switzerland 3/2020 to 2/2022

The Government – a Federal Council of Seven with a consensual mode of decision – took on the overall responsibility for a nationwide Covid crisis management. On the basis of emergency law [8], a drastic *shutdown* was imposed immediately (mid-March 2020) for three months. During the *shutdown*, far-reaching bans were imposed on the economy: closure of all businesses (except food and pharmacies), ban on all cultural and sporting events, temporary closure of all schools and universities, reduction of public transport to a minimum, suspension of air travel, practical ban on foreign travel. The economy and the education system functioned exclusively virtually, i.e., online (home office, distance learning). However, a lockdown, which would involve even more severe restrictions, e.g., curfews, was never inflicted.

Early on, the Government decided to provide financial help for companies and freelancers to alleviate the socio-economic consequences of the crisis, and enable their economic survival. Approximately 60 billion Swiss francs were allocated in March/April 2020 and distributed to the recipients, in an efficient and unbureaucratic manner. This way, many breakdowns were avoided.

Consequently, infections dropped almost to zero (July 2020). In summer, infections were low, and people became sloppier: the discipline of the population faltered. Also, too little testing was conducted in Switzerland and thus control of the epidemic was lost [9]. A second wave built up, which was much bigger than the first one. This cycle repeated itself, so that until early 2022 we had five waves of Covid infections (Fig. 1).

The same pattern was observable in many countries. A look at the behavior over time of deaths demonstrates that these react sensitively to the increases of the infections, during Waves I and II, after that the reactions are moderate, and have been running in counter direction since December 2021 [10]. This is the evidence that the Omicron variant of the virus is more infectious, but less deadly, and entails less severe disease courses than the earlier ones (Covid-19 initial, Alpha and Delta).

Due to this new situation, by 16th February 2022 the federal government abolished virtually all Covid-measures (except masks in public transport and in nursing homes).

5 Diagnosis

We must advance two things about the special nature of the Swiss state system. Federation is the form of state. A federation is a political entity characterized by a union of partially self-governing provinces, states, or other regions under a central federal government (federalism). The self-governing status of the component states, as well as the division of power between them and the central government, may not be altered by a unilateral decision of either party, the states or the federal political body. The system under study is a federation with three levels of recursion, municipal, cantonal, and federal. Our system-in-focus is the society of a federation.

Democracy the form of governance. Stemming from Greek *demos* and *kratein*—the rule of the people—, the concept of democracy implies bottom-up governance. The sovereign makes the final decision on substantive issues, as the holder of supreme power.

In Fig. 3 we have condensed the results of our diagnosis. The diagram represents the environment, to the left, and the organization, and to the right the operations with their management systems 1 (S1). These make the cantonal COVID operations and management.

The metasystem, i.e., the governance system that includes the higher management functions is constituted by:

- Coordination S2, made up of several components.
- Executive Management S3 – immediate and short-term orientation - with the Minister of Health and the Federal Office of Public Health.
- Strategy and Development S4, with the long-term orientation, namely embodied in a Scientific Task Force, which was established early on, already in March 2020.
- The Normative Function S5, which is the highest organ embracing the System's Identity and Ethos: The Swiss Identity, the Democratic Principles, The Constitution and ultimately Parliament and the Sovereign.

Across these functions we observe the following main diagnostic points or problems:

Problem 1: The role of the Federal Council in the crisis management was dominant throughout 2020 and 2021. The implementation of the measures, e.g., testing and vaccination, was the responsibility of the cantons. Often, the cantons were overwhelmed by the tasks and unable to fulfil them properly. The two following problems appear to be core (Fig. 4).

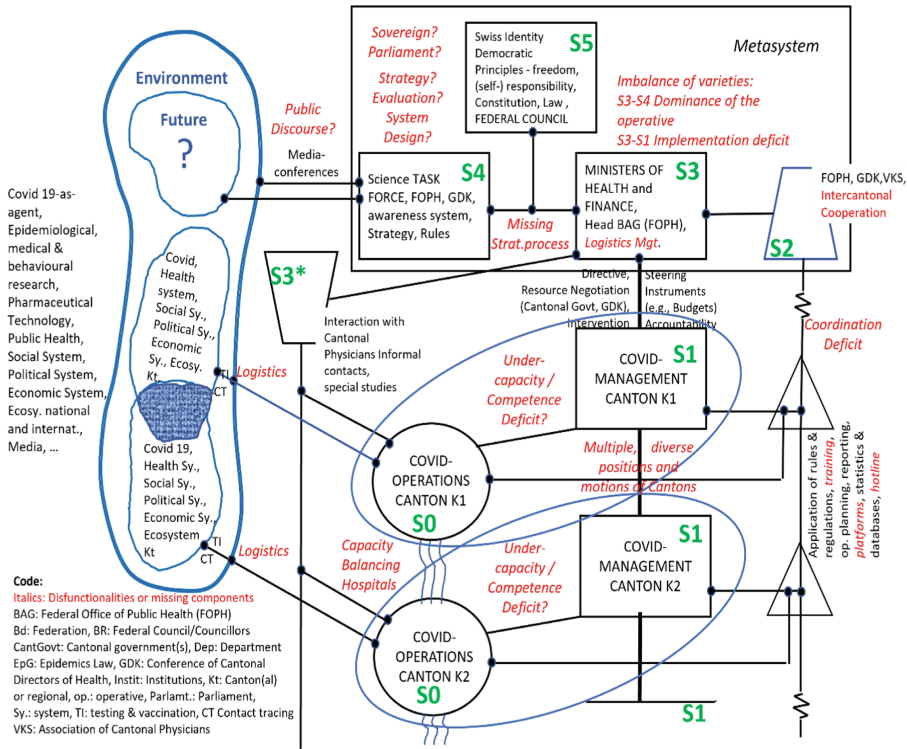


Fig. 3. Condensed diagnosis

Problem 2; see Fig. 4a. Vertically, in channel S3–S1 (Executive and Local Management), the power of the government to issue orders was offset by a lack of enforcement and sanctioning power. Thus, the potential behavioral repertoire of the Federal Council vis-à-vis cantonal claims and political pressure from interest groups was insufficient. The variety equation was out of balance.

Problem 3; see Fig. 4b, The Strategy Function S4: The long-term perspective tended to be neglected. As Pascal Strupler, former head of the FOPH, confessed recently: “We were so absorbed by the day-to-day business that the strategic part was neglected.”

The long-term perspective (S4) was primarily embodied in the Scientific Task Force. That was a purely advisory body, and therefore it had no authority to make strategic decisions. The interaction S3 & S4 (Executive & Intelligence) showed a hypertrophy of the operative. There was a glaring lack of variety in S4—in the sense of too little power—and an excess of variety in S3 (Executive). The system was therefore not in equilibrium and problematically constellated.

Problem 4 refers to System 5, i.e., System Identity and Ethos/Normative Management, and the relationship of Systems (3 ↔ 4) ↔ 5. Switzerland’s identity is expressed in its history as a confederation, the federalist and democratic form of government. These

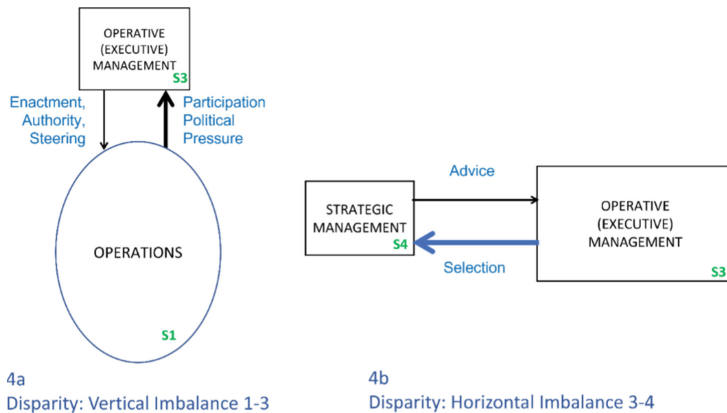


Fig. 4. Core problems of variety imbalance, vertical in 4a and horizontal in 4b

parameters shape culture in all its manifestations. The behavior of the population, groups and individuals is largely a function of this identity. The democratic principles and values unfold great power. The country's Covid management, especially the Federal Council, has consistently relied on the principles of freedom and responsibility, a sense of the common good and trust in institutions.

The normative basis for the decision-makers at this top level were thus clearly defined. But there was a lack of clarity about the responsibilities in S4 and S3 (Executive and Intelligence).

Problem 5 refers to the Information and Communication Systems. They fulfill an essential cross-function and play a crucial role in supporting most processes. These systems showed astonishing deficits. Most information and communication systems were outdated, some even inexistent. Essential tools did not function properly.

6 Lessons for Design

In our final report, suggestions for improvement were proposed. That was first in early 2021. We summarize them here in shorthand; further details are documented in publications [1] and [2].

Re Problem 1: Capacity & competence deficit of cantons. The focus was on the build-up of eigen-variety of the Cantons vis-à-vis the active virus. Attenuation of the complexity (foreign variety) of the virus' destructive potential. Improvement on vaccination campaigns and information. And: Leadership education and organization development to enhance qualification of cantonal politicians and staff.

Re Problem 2: The vertical variety imbalance. The way out of this conundrum is to reduce the time commitment to the operative S3 (Executive) for all members of the

Federal Council. According to the Epidemics Law, the Confederation is entitled to create a national operational body (type general staff) to manage enforcement in a special situation. However, such a body was never activated, and that took its revenge already in the fall of 2020, when the huge wave arose [11]. In other words, such an executive unit would enable a more effective realization of the strategy. In addition, the Federal Council would be relieved by the assignment of such a unit into Executive (S3), and thus would be free for the necessary commitment to Intelligence (S4).

Re Problem 3: Strategic blindness and debility. First, the variety of the Strategy function S4 needed to be expanded and the destructive variety of the active virus and of the antivaccinationists had to be attenuated. In this vein, the communication with the public needed to be strengthened (clarity, consistency, unity of doctrine). The second imperative was to establish a functioning strategic discourse of Executive S3 and Strategic S4, as a powerful absorber of complexity. Third, a long-term orientation and holistic system design was to be cultivated and supported by a permanent scientific body. These were ongoing concerns also after the abolishment of the measures of containment. Because the next pandemic will occur sooner or later.

Re Problem 4: The unclear distribution of tasks. Clarify the tasks and competencies of agents in the Metasystem, in the fight against the pandemic: federal and cantonal councils, and the crisis staff.

Re Problem 5: Information and communication. It was deemed important to establish a normative discourse about values, beforehand, not at the moment of actual crisis, namely in Parliament and in the public, involving education system and media. To mend the technical deficits, a comprehensive redesign of information systems was needed. This implied far-reaching reform.

So much for the diagnosis and design issues.

Over time, the quality of the Covid-management improved. Some of the deficits discussed here were mitigated, e.g., several shortcomings in the information and communication domain.

7 Final Reflection

Overall, how has Switzerland weathered the COVID-19 crisis? In answering this question, it would be insufficient to consider epidemiological criteria only. To achieve a more equilibrated view, we will consider four criteria in our assessment, even if some overlaps between them cannot be avoided. The balance is as follows. First, the death toll: on the record of cumulated, COVID-induced deaths per 100,000 population, Switzerland fared 34% better than the average of countries of the European Union, for the period March 2020 to June 2022 [12]. Second, the severity of restrictions: the Oxford Stringency Index [13] shows that the crisis management in Switzerland has given citizens more freedom than in all neighboring countries: No curfews, no loitering restrictions, low travel drawbacks, etc. The authorities hardly issued any commands, they always appealed to the self-responsibility of each individual towards society. The behavior of the citizens was

crucial. They mostly complied with the recommendations of the authorities and adapted their behavior, notwithstanding resistances such as the antivaccinationist movement.

Third, the resilience against Corona: the Bloomberg Covid Resilience Ranking measures the resilience against Corona, of the 53 largest economies with a score consisting of 12 indicators, including the economic dimension. Switzerland received high marks from that ranking. Of the 53 countries monitored, it was second only to Norway in 2021. According to the report, Switzerland stands for mild measures that do not continually escalate; the virus is tackled where this can be done with the least social and economic disruption [14, 15]. Fourth, the socio-economic damages: the economy remained largely intact and showed rapid recovery as the crisis subsided [16]. The country pursued a unique path of crisis management that has proven effective.

In dealing with the crisis, what is the role of the complicated, complex, cumbersome, slow political processes, which are characteristic of the Swiss Federation? They seem to be a disadvantage. Yet, they prove highly effective in dealing with complexity. The diversity is much greater in this country than in many other countries, but the connecting elements are still stronger than the dividing elements. A landmark is that citizens here have to vote 3 to 4 times a year on federal, cantonal and local issues. That shapes culture. In the end, the complex political-organizational system warrants requisite variety.

To quote Karin Keller-Sutter, the Minister of Justice: “One must admit that it is difficult to forge alliances across language and party boundaries. But once something has been decided, it holds. With majority governments, such as in Germany or France, more mistakes happen there, because laws are rushed through – and when the government changes, everything is changed again. Our system is a bit slow, but it saves us from making bigger mistakes” [17].

Managers and professionals of all kinds are often in deep trouble when confronted with complex organizational issues, or when bad organization is the invisible cause of dysfunctional systems behavior and bad performance.

A way out of the predicament is shown by the Conant-Ashby theorem: “Every good regulator of a system must be a model of that system.” In other words, the quality of a solution cannot be better than the goodness of the model on which it is based. That is the key to better performance. And this is the meaning of Systems thinking for professionals in Science, Technology and Management: to provide better theoretical models for the improvement of practical life.

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