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Cybernetic crisis management in a federal system—Insights from the Covid 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 four waves of the pandemic, spanning a year and a half, we studied crisis management based on the case of the Swiss Federation. This research concentrates on three research questions: (1) How is the management of the Covid-19-Crisis organized in Switzerland? (2) How effective is this organization in coping with the dynamics of emergency? (3) What lessons can be learned for the design of a crisis management in the future? We apply the Viable System Model (VSM) as a framework for our study, 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 analysing federal systems. Hence, substantial insights have surfaced to orientate a future crisis management.

KEYWORDS

Covid-19 pandemic, crisis management, diagnosis, organization, viable system model

1 | INTRODUCTION

A pandemic is a threat to civilization. Therefore, its apparition is not only of interest for the natural sciences but also for the humanities. A pandemic is a social phenomenon with important human, socio-economic and cultural implications. It always affects large numbers of people. Containing a pandemic, but also smaller scale epidemics, is a management task to which many people must contribute.

This paper is an account of a research running from March 2020 to September 2021. Its aim is to diagnose the status and develop designs for crisis management, for coping with the current and future pandemics.

We have studied the efforts of coping with the Covid-19 pandemic in a confederation—Switzerland, a small country in the heart of Europe. More precisely, we have examined the organization and management of the crisis at different layers of the Federation. The work is about diagnosis and design.

Our motivation for the research is as follows: First of all, there is a need to understand the organizational dynamics to learn from this pandemic. The ways of coping with it need to be improved. Second, the crisis was mostly addressed from a natural science point of view, while organizational concerns have hardly been studied in depth. So, there is a need for reflection. The third reason was that Switzerland is the ideal-type of a federation and democracy, which raises special issues in an organizational analysis.

In this country, a sophisticated structure has been put in place to deal with the Covid 19 crisis. Our research

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question is threefold: (1) How is the management of the Covid-19-crisis organized in Switzerland? (2) How effective is this organization in coping with the dynamics of emergency? (3) What lessons can be learned for the design of a crisis management in the future?

The article continues with an introduction to the methods used. The methodological framework used is the Viable System Model (VSM) (Section 2). Thereupon a case study—the corona crisis in Switzerland in the period from March 2020 to September 2021—will be narrated (Section 3). As a basis for the ensuing diagnostic and design parts of the study, the system in focus—a Federation—is conceptualized (Section 4). This is followed by a diagnosis of the management of the Federation in coping with the epidemic in the country (which is a local embodiment of a global pandemic): In Section 5, the diagnosis is presented in broad contours. From there, in Section 6, the longest section of the article, more detailed and concrete diagnostic points of the actual organization are identified. In response, design measures are formulated, by which a desired organization for coping with the complexity of an epidemic crisis can be attained. The article is finalized with an overall reflection about Switzerland's performance in weathering the crisis (Section 7). In Appendices A and B, the VSM is documented, for readers who are not familiar with the model, to be able to understand our study.

2 | METHODS

To address these questions, we will use the VSM as a conceptual framework—the Viable System Model by Stafford Beer, father of Managerial Cybernetics. That model's focus is on organizations' coping with complexity, maintenance of viability, and development. Its theoretical claim is bold: Beer asserts that the model determines the necessary and sufficient conditions for the viability of any organization (Beer, 1979, 1981, 1984, 1985).

The VSM is by now a classical component of organization theory and an increasingly used framework for dealing with complex organizational issues. Stafford never claimed that the model is more than a diagnostic instrument. Yet, as he himself and we, his students, have tried out many times, the model also works perfectly in the design mode. Here, we will use it for both diagnosis and design.

Is the VSM the best "instrument" to tackle our research questions? If the goal is to maintain the viability and development of the system in focus—in our case: the society of a country—then the VSM is indicated as the adequate conceptual tool. Hence, we are dealing with a problem in search of a model, not a model in search of a problem.

The literature abounds with reports on applications of the VSM and also empirical tests of the model. For a detailed account, see Schwaninger and Scheef (2016). As many readers of this journal are familiar with the VSM, we will only add a brief introduction to the model, in the appendix.

As far as the data are concerned: The material of the daily press was an abundant source we had to rely on. Also, other media—radio and television were important. For example, the media conferences about the crisis situation, held twice a week in the capital, with continuing involvement of the Federal Council ("Bundesrat"). Finally, we led partially structured interviews with key managers and politicians at the three levels—Federation, Canton (Member State), and Community (Municipality).

Studies of the Covid-19-Crisis in such a way have, to our knowledge, not been realized. However, prominent voices of the Systems Approach have furnished contributions from the vantage points of Cybernetics (Espejo, 2020), Critical Systems (Jackson, 2020), and System Dynamics (Rahmandad et al., 2021).

In the following case study, we are dealing with a federation—an organized body that has a number of features of viability and development. This makes it a paragon for a VSM-based study.

3 | CASE STUDY: THE CORONA CRISIS IN SWITZERLAND

On 11 March 2020, the World Health Organization (WHO) classified the COVID-19 coronavirus disease outbreak as a pandemic.

3.1 | The story

As most other countries, Switzerland was attacked massively by the virus. Figure 1 gives an overview of the development of the pandemic with the most salient events.

In Switzerland, the first new infection occurred on 25 February 2020, the first corona-related death 8 days later. Subsequently, both infections and deaths increased exponentially. The pandemic proved to be a threat due to the relentless, rapid advance of the virus.

The Government—a Federal Council of 7 with a consensual mode of decision—took on the overall responsibility for a nationwide Covid crisis management. On the basis of emergency law,[1] a drastic "shutdown" was imposed immediately (mid-March 2020) for 3 months.

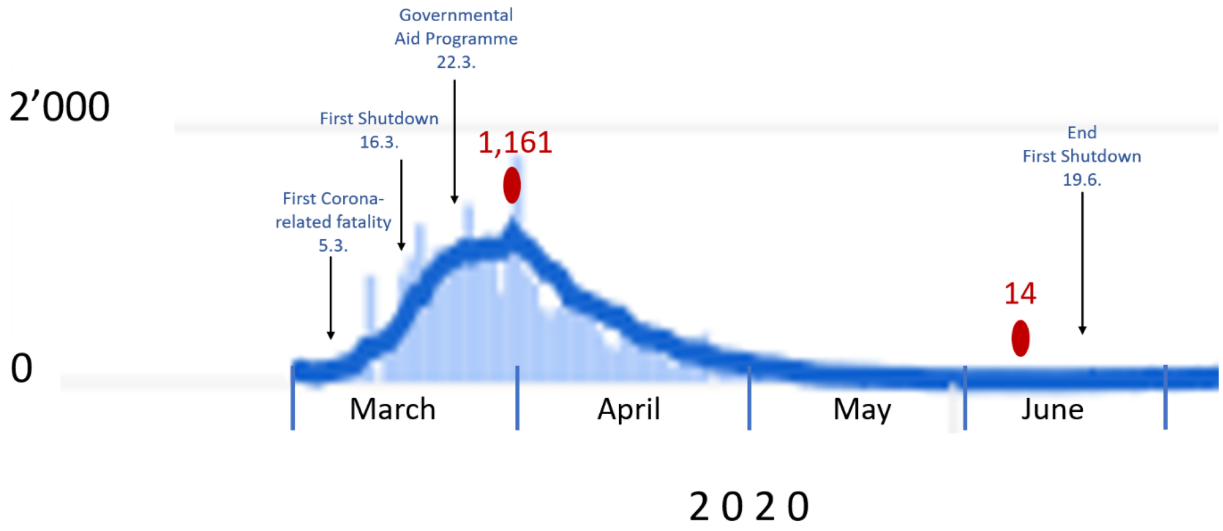


FIGURE 1 New Covid-19 cases per day (Daily confirmed new infections in Switzerland and Liechtenstein) (7-day-average), March to June 2020. Source: Worldometers [Colour figure can be viewed at wileyonlinelibrary.com]

Then, the Minister of Defense requested support from the army. This resulted in the largest deployment since the Second World War. Within 48 h, 8000 militia soldiers were available. In this country, the army is also responsible for civil protection. They performed multiple tasks, mainly logistics, transport, and medical care.

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, closure of all schools and universities, reduction of public transport to a minimum, suspension of air travel, and practical ban on foreign travel. The economy and the education system functioned exclusively virtually (home office, distance learning).

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 (as loans or à fonds perdu contributions), in an efficient and unbureaucratic manner. This way, many breakdowns were avoided.

During the shutdown, the population abided by the regulations. Hence, the infections went down (Figure 2). As of 22 June 2020, the measures to combat the coronavirus were largely lifted by the Federal Council.

In summer, infections were low, and people became sloppier: the discipline turned worse. Also, too little testing was conducted in Switzerland and thus control of the epidemic was lost (Plattner et al., 2021). A second wave built up, which was way bigger than the first one. Regulatory measures were tightened but the oscillations continued.

In January 2021, the second shutdown was realized, leading to a minimum of new infections, by March. Then, under the influence of the new, more aggressive delta variant of the virus, a third wave built up March–April and faded off in July. People abided by the regulations. However, vaccinations, since early in the year, evolved only sluggishly. Each Canton had its own vaccination strategy. Some had vaccination centers. Others, such as St. Gallen, preferred a rollout via the general practitioners. Only once enough vaccine was available, the best practice found was adopted widely (i.e., a combination of vaccination centers and medical doctors).

In July and August, the fourth wave emerged: infections rose again, to a worrying extent, and stagnated at a high level later in August. Hence, a certification requirement was decreed as of 13 September 2021, by the Federal Council, after long discussions (Gerny & Aschwanden, 2021; Schweizerischer Bundesrat, 2021). The certificate was the mandatory proof of being vaccinated, tested, or recovered from Covid. Without such a certificate, the access to large parts of public life (indoor spaces in restaurants, cultural and recreational facilities and events, etc.) was not possible.

The introduction of the Covid certificate was aimed to raise the lagging quota of vaccinated.[2] The decision was a promising step. But it did not guarantee that the predicament would be over.

3.2 | Swiss peculiarities

Much of the crisis events and many of the measures taken were similar to those in other European countries.



FIGURE 2 New Covid-19 cases per day (daily confirmed new infections in Switzerland and Liechtenstein, 1 March 2020 to 13 September 2021) (7-day-average). Source: NZZ, 2021 [Colour figure can be viewed at wileyonlinelibrary.com]

However, in many ways, Switzerland has pursued its own, peculiar path of crisis management.[3] Let us explain:

1. The sovereign is the highest authority in Swiss political life. Hence, the Confederation relied on citizens' self-control as far as compliance with rules and regulations was concerned.

For example, wearing protective masks was almost entirely optional (in the first phase). In the same vein, it was strongly recommended, but not dictated, to avoid contacts between the generations.

2. The government in Switzerland is not a Premier assisted by multiple ministers. Switzerland has a Government constituted by 7 elected members of the Federal Council, called the "Bundesrat". All decisions are made by that body consensually. The function of president rotates among them every year. In addition, there is a system of checks and balances involving the next level, – the 26 member states, called "Cantons," which have precedence over the Federation.

All of this turns political processes complicated, complex and cumbersome. Governance is slow, but effective.

3. The rule of law defines two types of situations for which special powers are granted to the government:

- *Special situation:* it exists if the ordinary law enforcement organs are not able to prevent and control the spread of the virus (Epidemics Law EpG §6), for example, in an Epidemiological Emergency. Examples from the past are H1N1, SARS.
- *Extraordinary situation:* that is a National threat situation. Should further measures be necessary in the event of an extraordinary threat to public health, the Federal Council may order such measures on the basis of the Epidemics Act and issue (police) emergency decrees without a basis in a federal law. Examples are the Spanish Flu in 1918, Covid 19 in 2020 and also the world wars.

The Federal Council was bestowed with special competences for these situations. For example, from March to June 2020 the national situation was defined as extraordinary—the Federal Council ruled by Emergency Law, determining the first shutdown.

4. Conceptually, we are keeping the terms "lockdown" and "shutdown" apart. Both designate "a period during which almost all economic and social activities are shut down by political order (e.g., to protect against infection)."[4]

However, the regime of the shutdown is less severe than the lockdown mode. Switzerland never underwent a

full lockdown. For example, no curfews were ever imposed, and regulations were mostly limited to recommendations. The borders of the country remained open all the way, with minimal restrictions (only random testing at the borders); there was no mandatory vaccination and no discrimination for nonvaccinated, and so forth.

5. The regulations decreed in these situations were harsh. But they were less severe than in most other countries. For example, in January 2021 a "full braking" was carried out: the second shutdown, because B 117—the British mutant of the virus—expanded dramatically, and it was virtually impossible to forecast the threat. Nonetheless, outdoor sports, including skiing and takeaways at the ski runs, went on in most resorts. In comparison, all other alpine countries kept their ski areas closed. These activities could only be sustained because the resorts rigorously complied with all protective measures.

Creative interpretations of the laws also occurred. For example: the ban on using tables and chairs in front of takeaways on the slopes. The solution produced in Laax, a renowned ski resort in the Canton of Grisons: overnight, a snow arena was built, where you could sit on the steps, and have your meal on your knees. This worked, and the protective measures were obeyed.

Astonishingly, the discipline of both, the cable car and lift enterprises, as well as the users, were exemplary. Over the holidays—Christmas, New Year—the infections went down, not up! See Figure 2.

6. There has been evidence and wide agreement that vaccination is the ultimate weapon against the epidemic. Yet, a large part of the freedom-loving Swiss who are used to their liberty, have had difficulty accepting interventions in their private sphere. Consequently, disputes between representatives of different views can be fierce, as has been evident in the conflict between vaccination proponents and opponents. In general, the government pursued a course of minimal intervention. But with the introduction of the Covid certificate it showed a clear line, as it had already done with the shutdowns in 2020 and early 2021.

4 | THE SYSTEM IN FOCUS: A FEDERATION

The pandemic threatened the viability of the society. Hence the focus of our study is on that society as it organizes itself to cope with the dynamics of the virus.

Before we get into the structure, let us take a look on the identity of Switzerland: it is a democracy and it is a federation.

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.

Democracy is the form of rule or form of governance. From Greek *demos* and *kratein*—the rule of the people. The sovereign makes the final decision on substantive issues, as the holder of supreme power. Obviously, the response times of a democracy versus an autocracy or a monarchy differ. In principle, an autocrat can react directly and very fast. If he will, is a different matter. A democracy can only respond that swiftly, if it creates legal conditions that enable a management body to rapid response by eliminating certain decision paths and curtailing participation.

The executive government at the federal, cantonal and local levels is vested in a committee rather than a president, and that committee must be elected. It rules by consensus, not by majority. It consists of seven members coming from currently four political parties. The country has four official languages. In Parliament everyone can speak in his or her mother tongue, and all laws are available in four languages.

All of that complicates matters and takes more time, but it provides a powerful network, some would call it "machinery of complexity absorption". And it enhances both the quality and the acceptance of decisions.

Structurally, we are interested in the Federation as a whole. We looked at the recursive levels of the Federation, Nation State, Canton, and Community. The criterion of viability is applicable to units at each one of these layers (Figure 3).

And the management of a crisis like the pandemic must not be confined to one or two levels, for example top and bottom, as often occurs. Complex issues surface at each one of these levels. They must be coped with in a layer-appropriate way, along the fronts where the complexity emerges.

In our study, we had to concentrate on the national level, where we carried out a detailed diagnosis. The relationship between whole and parts is also carefully analysed, as the core of the Federation is not the nation state, but each one of 26 Cantons. Originally, these bodies hold the power in the country. They are autonomous.

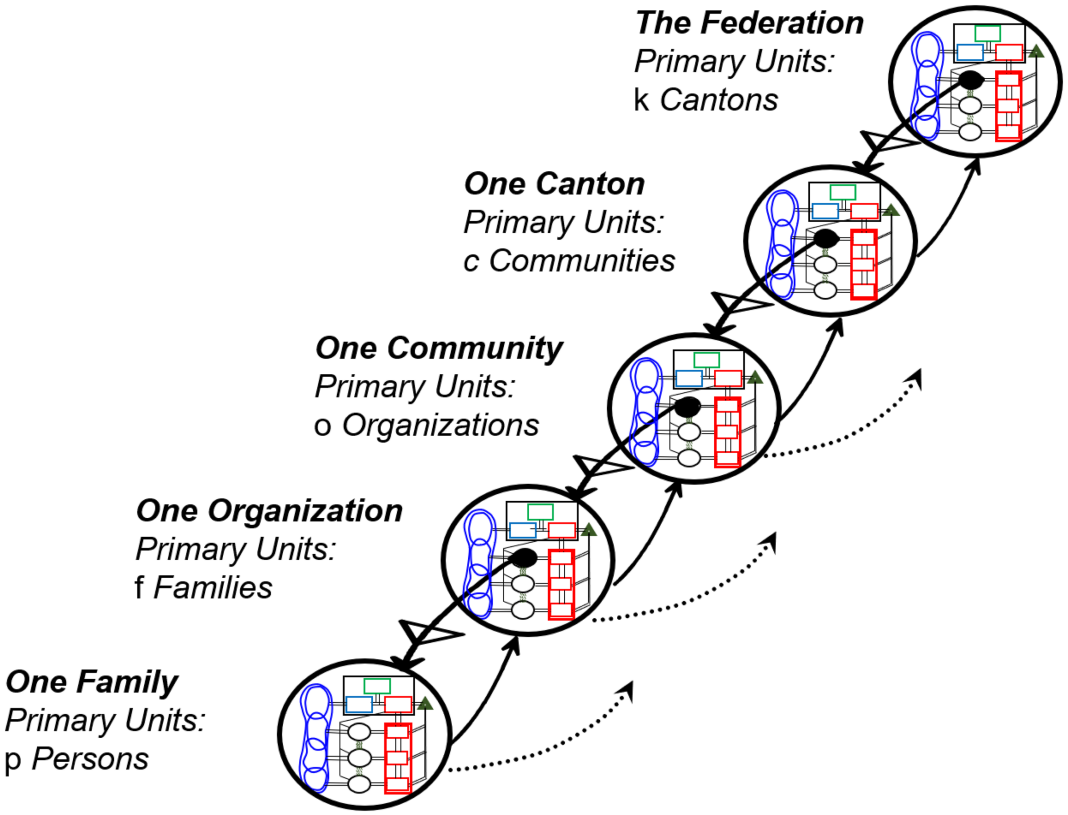


FIGURE 3 Layers of recursion considered [Colour figure can be viewed at wileyonlinelibrary.com]

The federal state can only interfere in their domain, if the law enables him to do so.

Paradoxically, it is the Cantons that delegate tasks to the Federation, tasks that they cannot handle on their own. That is the principle of subsidiarity (Nell-Breuning, 1992), which runs counter to common practice—delegation from above. Instead of top-down, subsidiarity is delegation bottom-up. That is a rather cybernetic arrangement.

To illustrate this principle, direct election is a practice in the municipalities and Cantons. Depending on the Canton, this occurs at the urn, but also the custom of election by show of hands still exists. For example, in Appenzell the famous county assembly—"Landsgemeinde"—takes place every year, on the last Sunday of April. Appenzell Innerrhoden is one of the last Cantons to retain this original form of democracy.

The Landsgemeinde is a 600-year-old tradition in which the cantonal government has to get its business through—eye to eye with the citizens. All adults fulfill their civic duty, taking part in the central place—the Landsgemeindeplatz: to appoint the supreme authorities and to decide on important matters of the Canton. The sovereign is the people, in the truest sense of the word. The Latin word *superanus*—superior—is at the origin. The people hold the ultimate power. Governor is the folk.

Coming back to our Covid topic, we need to mention that the structural principle of recursion can have more than one dimensions. For example, the primary units of a Canton are not necessarily only municipalities. In our case there are also certain hospitals which are at the same recursive level as a municipality (Figure 4).

5 | DIAGNOSIS: WHAT WORKS, AND WHAT DOES NOT

Our next step is the diagnosis: "What works, and what doesn't?"

Figure 5 shows a condensed version of our diagnosis at the national level. This is the picture of the structures as they are, the elements in italics denoting missing components or dysfunctionalities. In brief:

- The connection S3 ↔ S4: On the one hand, S3 (Executive) has powerful agents—ministers of the Federal Council ("Bundesrat") with their resources such as the Federal Office of Public Health ("Bundesamt für Gesundheit-BAG"). On the other hand, S4 (Intelligence) is essentially embodied by a scientific task force that fabricates models and writes papers for S3 (Executive). Hence, there is a huge imbalance of

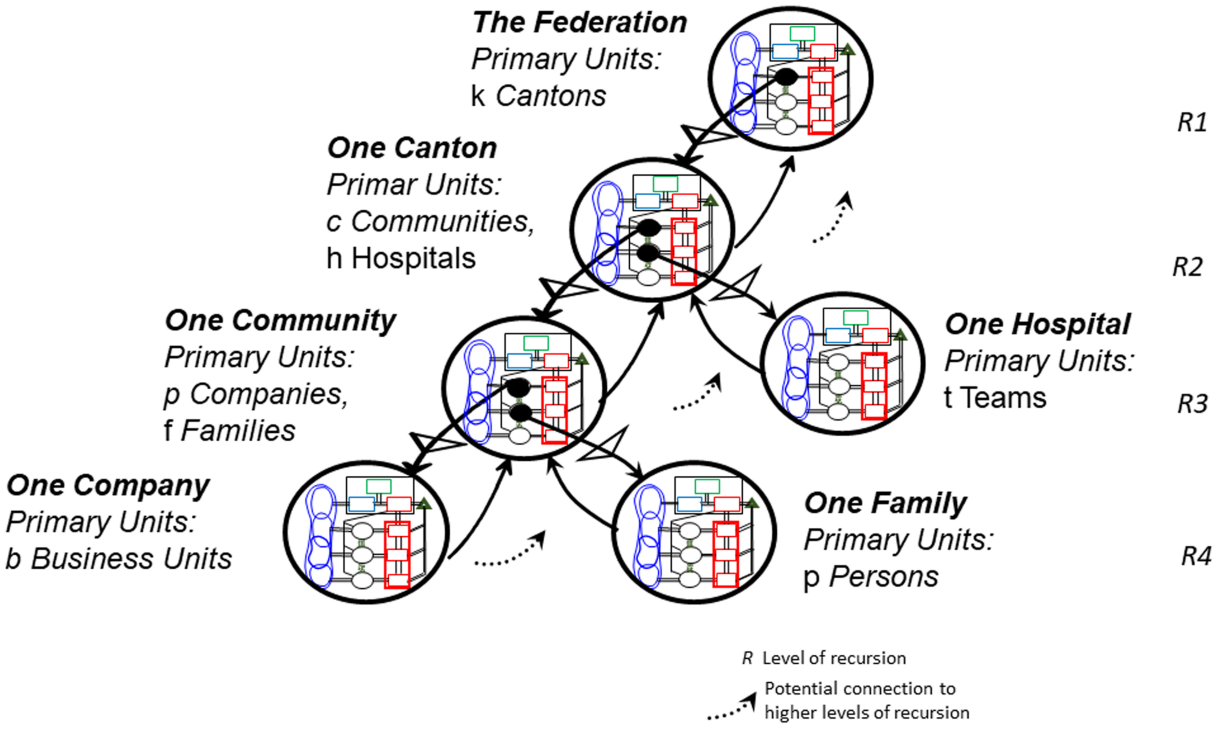


FIGURE 4 Levels of recursion—a variant [Colour figure can be viewed at wileyonlinelibrary.com]

varieties.[5] There is also a lack of a strategic process that involves both S3 and S4.

- The connection S3 ↔ S1: There is an upward movement of multiple and diverse positions and motions of Cantons (S1, the local management of Cantons, i.e., the Cantonal Governments): That variety is difficult to cope with for S3 (Executive at Federal level).
- S2 (Coordination): A coordination deficit
- S1 (Local Management Cantons): Capacity and competence shortages
- Environment: very complex and difficult to keep in balance with (e.g., the pressure groups e.g., the anti-vaccionationists, trade associations, the pharmaceutical industry, etc.).

The relationships between federal and cantonal levels (Recursions R1 and R2) need to be commented especially: During the first wave, the Federal Government played a highly active role based on emergency law. From there, the strongest steering activity emanated since the beginning of the pandemic.

However, the Federal Council took a step back after the first wave. With the downgrading from an "extraordinary" situation under emergency law, to a "special" situation, it had to relinquish what was "excessive power" by Swiss standards.

From there on, the cooperation between Federation and Cantons improved as both sides understood the workings of the epidemic. However, the federal Executive authority (S3) came under massive criticism from various parts being judged either too permissive (some called it "weak") or too authoritarian (some called it "despotic" or "dictatorial").

The state of affairs can be summarized with the help of two homeostats[6] in the management system—a stylized version of the first and second diagnostic points made above:

1. Systems 1 and 3 (Cantonal - Federal)
2. Systems 3 and 4 (Operative - Strategic)

Both homeostats exhibited recurrent disparities of varieties that led to temporary instabilities. Regarding the first homeostat, the situations come to mind in which the Federal Council did not react or reacted too slowly to the recommendations of the scientific task force. For the second homeostat, the cantons´ resistance to federal measures during the second wave come to mind. We will get back to these two types of imbalance in the next chapter.

The Cantons had reclaimed their powers to manage the crisis and were now given back their primary responsibility for dealing with it. In the special situation, there was a "back-and-forth" of allocations and reallocations between the Federal Government and the Cantons. The relationship between these authorities was thus temporarily out of balance. At times, it was unclear who was in

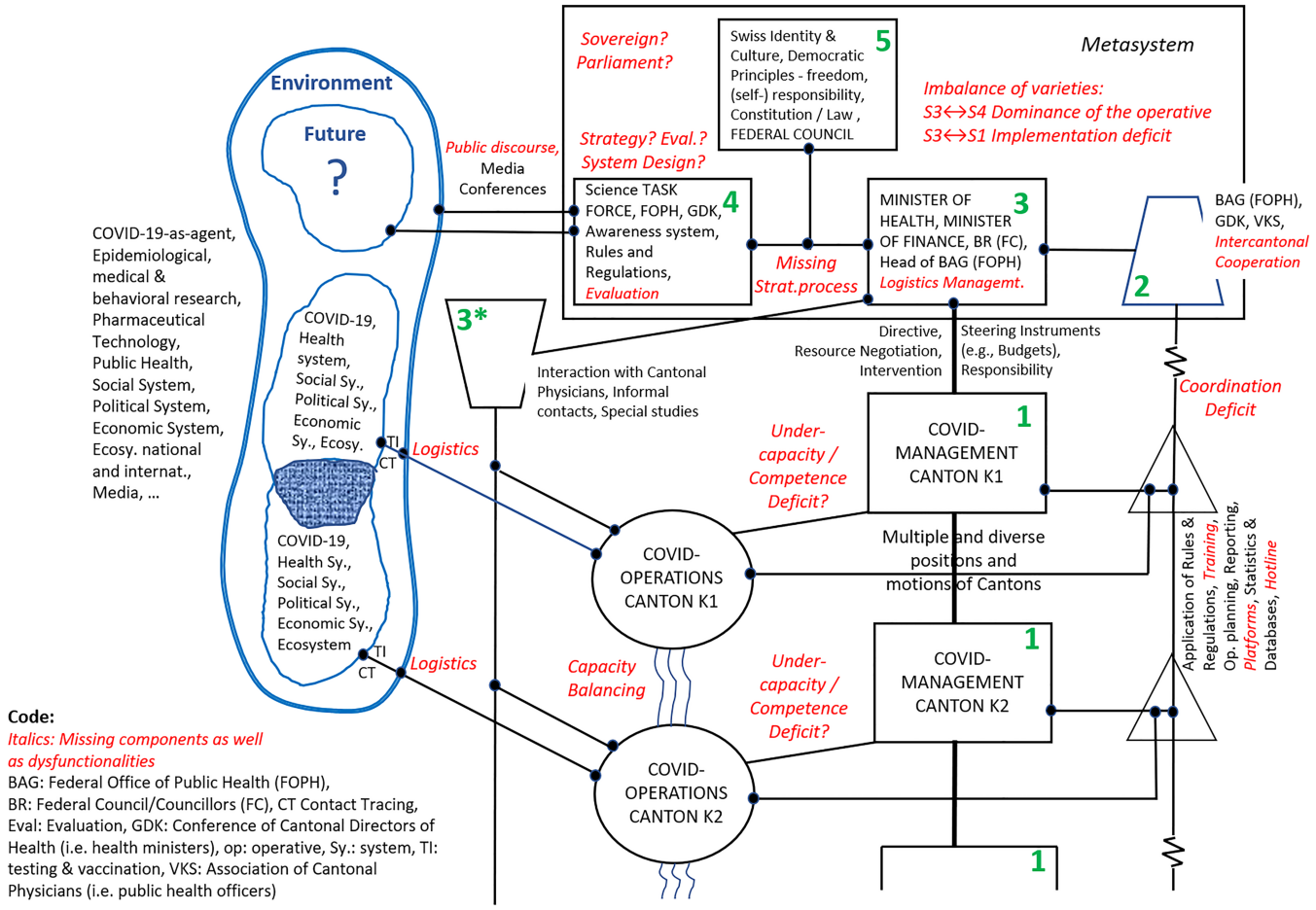


FIGURE 5 Actual structure with diagnostic points [Colour figure can be viewed at wileyonlinelibrary.com]

charge. "Instead of acting decisively, one shifted the responsibility to each other," observes Christian Rathgeb (2021), a member of the government of the Canton of Grisons and president of the Conference of Cantonal Governments (KdK).

Also, the distribution of tasks, competencies and responsibilities was not clear.[7] This manifested itself in partly missing, partly contradictory regulations, with the consequence of uncertainty among the people.

6 | FROM DIAGNOSIS TO DESIGN

We will now address more detailed facets of diagnosis versus design, for the different components of the VSM:

S0, the operative units (see Table 1):

The Cantons are extensively autonomous primary units. In general, they are very skilled in maintaining their viability. In the case of Covid, they showed some deficits of adaptation:

After the Federal Council had decided to promote mass testing and vaccination, the task was to systematically implement this strategy in the Cantons and Municipalities. Some Cantons were clearly overwhelmed with this task. They were not in a position to provide the capacities within a few weeks, in accordance with the Federal Council's proposals.

When the vaccination program started, the Cantons were slow in the provision of infrastructure (vaccination centers, qualification of personnel). The considerable

TABLE 1 S0, basic units, the Cantons—Diagnosis and design

Actual	Measures
• Highly autonomous bodies • Skilled and equipped to maintain viability • Shortcomings in the realization of strategies • Laggards in strategy realization • Short of capacity/competency. Examples: provision of infrastructure—testing, vaccination	• Take back isolationist attitude • Adopt open mindset • Enhance cooperation and coordination • Support from a national organ

delays at the level of Recursion 1 were the result of procurement failures in advance (S3) and gaps in foresight ("awareness") (S4)—besides the bottlenecks in the supply of vaccines.

Also, the tracing method for breaking infection chains was introduced very slowly and ineffectively.

Our recommendations target an enhancement of cooperation and coordination among the Cantons. Also, many stakeholders from politics, trade unions etc. need to become more open to the perspectives and concerns of other agents. Finally, the support from a national organ should be provided to compensate for local weaknesses, for example, by making the competences of the services of the federal agencies more transparent and accessible.

S1, Local Management, and the channel Environment ↔ S1 (see Table 2):

Varying forms of enforcement of national guidelines and measures are typical of the federal system. The metasystems of the Cantons did not show a uniform level of performance. Three factors are discernible: First, an insufficient functioning of the metasystems of several Cantons. Second, an insufficient coordination between the Cantons. Third, too loose guidance by the federal authorities after the period of emergency law—the extraordinary situation.

The Cantons were often overburdened, for example, in the control of protection concepts, in the realization of testing and vaccination campaigns, and in the distribution of financial resources. In particular, this is a consequence of the varying endowment of cantonal medical resources in the Cantons, which are therefore overwhelmed by a concrete crisis situation at different speeds (Rüefli & Zenger, 2018, p. 26).

TABLE 2 S1, local management, and the channel Environment ↔ S1: Diagnosis and design

Actual	Measures
• Varying forms of enforcement of national guidelines and measures are typical of the federal system • Differing performance between Cantons • Cantons are often overburdened: in implementation tasks, e.g., the enforcement of rules and regulations, control of protection concepts, realization of testing and vaccination campaigns	• Build-up of eigen-variety vis-à-vis the active virus • Attenuation of the complexity (foreign variety) of the active virus • Reinforce intervention powers of Federal Government for "special situation" • Leadership education/ organization development for cantonal politicians and staff

Hence, the challenge is: "How can crisis management at the cantonal level gain coherence and clout?"

Proposed measures include the enhancement of eigen-variety of the primary units and attenuation of the virus´ destructive potential. Furthermore, a slight reinforcement of intervention powers of the Federal Government for periods of "special situation" is probably indicated. Finally, further qualification of politicians and leading staff in the Cantons, through leadership education and organization development, is desirable.

S2, Coordination, and the channel S1 ↔ 2 ↔ 3 (see Table 3):

The Cantons largely do not make their decisions in a coordinated manner. This is an expression of federalism, which is based on the principle of self-determination. When the need to coordinate arises, this often seems out of reach.

However, the Swiss Confederation has already shown that the opposite is possible. Under the pressure of survival in the Spanish Flu epidemic in 1918/9, 16 cantonal councils responsible for health met for an intercantonal conference, the aim of which was "to solve the many major tasks in the field of sanitation and public health care, … , hand in hand with the public health department" (cited in Rostetter, 2021). This was the birth of the Conference of Cantonal Directors of Health (GDK).

TABLE 3 S2, coordination, and the channel S1 ↔ 2 ↔ 3: Diagnosis and design

Actual	Measures
• The autonomous cantons are reluctant to coordination • This is based on the federalist principle of self-determination • Coordination out of reach? • Certain organs perform some coordinative function (FOPH, GDK, VKZ[a]) • GDK is the closest to fulfilling a coordinative function,[b] but • Would not be able to decide quickly enough in a crisis • p.m.: Information systems deficient	• Strengthen intercantonal coordination & cooperation • Anchor coordination role in GDK statutes • Strengthen training → organization development with the cantonal authorities • (Re)Design/improve information and communication systems substantially, – platforms and data management in particular • Coordinative function of the warning system • Hotline for information of cantonal staff

[a]FOPH: Federal Office of Public Health: GDK: Conference of Cantonal Directors of Health; VKS: Association of Cantonal Physicians.
[b]Members seeking agreement on proposals to government.

Today, the GDK has a coordination function insofar as it serves to form opinions between the health ministers of the Cantons. It meets periodically with the federal minister of health, to be consulted. The Cantons usually do not agree on a common view; large disparities in viewpoints are common. Overall, the GDK would not be able to decide quickly enough in the event of a crisis by committing to a position unifying the Cantons.

For the time being, the information and communication systems were largely outdated.

Indicated measures: The inter-cantonal coordination/cooperation at the level of the authorities must be strengthened. The coordination role of the GDK should be anchored in its statutes. Leadership education and organizational development with the cantonal authorities need to be promoted. For the information and communication systems, a substantial improvement, indeed a major redesign from scratch (together with Intelligence (S4)), is needed, especially with regard to enabling technologies, platforms and data management. An information hotline would be a considerable relief for cantonal employees (Conference of Cantonal Governments 2020). The warning system should be used as a coordination device, in addition to its alarm function (see also Auditing (S3*)).

S3, Operative ("Executive") Management, and channel S1 ↔ S3 (see Table 4):

TABLE 4 S3, operative ("executive") management, and channel S1 ↔ S3: Diagnosis and design

Actual	Measures
• General management is with the minister of health plus FOPH-BAG • Selectively supported by minister of finance (finance and logistics) • In principle, all major decisions are taken by the integral Federal Council. • The 7 councillors are in demand also at S4 (strategic management) and S5 (normative management) • Members of government can hardly cope with the complexity • Overwhelming complexity faced in particular by minister of health • Logistics management shows weaknesses	• Reduce the time commitment to S3 (executive) for the members of the Federal Council, and • Create an operational body «crisis staff» (general staff type) with, i.a., communications, military, medical and logistics • This organ could also be headed by one of the Federal Councillors, but it would include mainly key persons from outside the council • It acts as a responsible decision-making and enforcement body with special powers of authority

Executive management is primarily the responsibility of the head of the Department of the Interior, that is, the Minister of Health, supported by the FOPH (BAG). He was the key figure during the phase of the "extraordinary situation": he decisively shaped the crisis management during the 3 months in which the leadership lay with the Federal Council (the Bundesrat) by means of emergency law. Decisions were taken on rules of conduct for individuals, measures concerning the activities of companies and institutions, the opening and closing of borders, and so on.

In principle, all major decisions are taken by the integral Federal Council. Its members must be active at both Executive (S3) and Normative Management (S5) levels; and they are also in demand for Intelligence (S4). This is the case under aggravated conditions, since none of the members of the Federal Council can have the experience of a comparable crisis. The members of government can hardly cope with this complexity.

Here is the first core problem: Vertically, in channel S3 ↔ S1 (Executive ↔ Local Management), the power to issue orders is offset by a lack of enforcement and sanctioning power.[8] Thus, the potential behavioural repertoire of the Federal Council vis-à-vis cantonal claims and political pressure from interest groups is insufficient. The variety equation is out of balance.

Indicated measures: The way out of the variety imbalance is to reduce the time commitment to Executive (S3) for all members of the Federal Council. According to the Epidemics Law, the Confederation is entitled to creating 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 in the fall of 2020 (Zenger, 2020). 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 dedication of such a unit into Executive (S3), and thus would be free for a stronger and necessary commitment in Intelligence (S4).

S3*, Auditing (see Table 5):

The federation studied here has many autonomous subsystems, the Cantons, that can take very different positions. In such a system, it is necessary that both channels, instruction (S3 ↔ S1) and coordination (S1-2-3) are complemented by effective auditing. The reason is the need to validate the information flowing through these two channels.

An example, is the interaction ("wire") between the FOPH/Minister of Health and cantonal physicians: valuable information about the situation in the Cantons can be obtained there formally and informally. In this way, also suggestions for improving crisis management can be conveyed from the periphery to the center (feedback). A

TABLE 5 S3*, auditing: Diagnosis and design

Actual	Measures
• Informal contacts with cantonal officials • FOPH interaction with cantonal doctors, i.e., information periphery ↔ centre • Early warning system—information collections, reporting obligations of physicians regarding infectious diseases • Evaluations of law enforcement	• Collect inputs for improvement of Covid crisis management (feedback) • Sampled visits to cantons • Better use of data • Adapt information & communication system • Install warning system & algedonic channel (alarm function)

possible strengthening of the auditing function might be sample on-site visits of FOPH staff to the Cantons.

The new media play a significant role in this context, as they do on the coordinative strand (S2).

An early warning system exists in rudimentary form—as information collections, and reporting obligations of physicians regarding infectious diseases. Some of these are outdated in terms of information and communication technology.

In addition, evaluations of law enforcement exist at the political level as feedback to the legislature.

Indicated measures concern improvements in the use of data, the collection of inputs for the improvement of crisis management and the adaptation of the information system. This includes the early warning system and an algedonic channel, that is, a channel by which signals of incipient instability in the system are immediately injected in the metasystem.

S4, Intelligence/Development/Strategic Management, and channels Environment ↔ S4, S3 ↔ 4 (see Table 6):

The government created a Scientific Task Force early on (31 March 2020). That organ is too clumsy with its 70 members. It is unclear if long-term trends are captured properly, but mainly the influence on S3 (Executive) is small.

The long-term perspective tends 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." Here we have the second core problem: S4 is, for the time being, primarily embodied in the scientific task force. This is purely an advisory body, and therefore it has no authority to make strategic decisions. The interaction S3 ↔ S4 (Executive ↔ Intelligence) shows a hypertrophy of the operative. There is a glaring lack of variety in S4—in the sense of too little power—and an excess of variety in S3

TABLE 6 S4, intelligence/development/strategic management, and the channels Environment ↔ S4, S3 ↔ 4: Diagnosis and design

Actual	Measures
• Scientific task force since 3/2020 • - Big, clumsy • - Powerless • Communication with public shows deficits (clarity, consistency) • Long-term perspective weak/at risk • This has improved in 2021 • Security Alliance Exercise 2014: recommendations fully neglected[a] • System design: contributions by FOPH • A holistic, long-term approach to system design is still to evolve • Lack of an ongoing evaluation	• Enhance variety (repertoire of behaviour) of S4 • Attenuate variety of the active virus and of antivaccinationists • Establish a strategy process, as a discourse of S3 with S4 • Strengthen communication with the public • Involve ministers more tightly in strategy-making • Cultivate long term orientation and holistic system design • Implement ongoing evaluation (feedback) • Assignment of the task force should be for an indefinite period of time

[a]The 2014 security exercise was a federal crisis exercise: The final report contains 16 recommendations for improving cooperation between the Federal Government, the Cantons and the other partners in crisis situations. The preparation according to these recommendations never took place.

(Executive), as a result of which S5 (Normative Management) also collapses into S3.

For the Environment ↔ S4 channel, it is imperative to systematically and regularly inform the public about the state of affairs, as has been done through the Federal Council's regular media conferences and dissemination via social media. Considering all the media used, clarity and consistency of communication were at times poor.

Likewise, it is necessary to systematically scan and evaluate environmental information.[9] Finally, a continual, accompanying evaluation which would assess the impact on the Pandemic of measures taken would be needed. In practice, the Executive (S3) suffered at times from excessive delays of information about the results of measures taken.

The primordial measures indicated are, first, expanding the variety of S4. In this vein, the communication with the public needs to be strengthened (clarity, consistency, unity of doctrine). The second imperative is to design and put into practice a functioning strategic discourse S3 ↔ S4, as a powerful absorber of complexity.

Also, a long-term orientation needs to be anchored in the culture. As for the task force, it should not be

established as a temporary body but as a permanent one. It would furnish crucial and continual inputs into the strategy process. It should be responsible for an ongoing, systematic evaluation—of the strategies, measures, and their implications—that would feed a holistic system design and provide crucial feedback to S3 (Executive).

S5, System Identity and Ethos/Normative Management, and the relationship of Systems (3 ↔ 4) ↔ 5 (see Table 7):

Switzerland's identity is expressed in its history as a confederation, the federalist and democratic form of government. These parameters shape culture in all its manifestations. The behaviour 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).

Indicated Measures: The legal equipment is very suitable and does not require significant modification. Tasks and competencies of involved agents need clarification. A sustained interlinkage of S3 and S4 in strategy-making should be enacted. The Federal Council needs stronger enforcement and sanctioning power. The Sovereign and the Parliament should be involved in a discourse about values, not in the moment of crisis, but beforehand.

Information & Communication Systems (see Table 8):

As an essential cross-function, the information- and communication systems need treatment in a separate section.

The deficits here are obvious and astonishing. Most information and communication systems were outdated, some even inexistent. Crucial tools did not function properly.

Necessary measures are ample. A fundamental redesign is necessary and has to be accomplished BEFORE the next crisis (see details in Table 8). Some of these advancements are on their way. In comparison with the

TABLE 7 S5, system identity and ethos/normative management, and the relationship of systems (3 ↔ 4) ↔ 5: Diagnosis and design

Actual	Measures
• Strong and marked national identity and local identities • Democratic principles: deeply embodied in the population • Formal legal «crystallization»: Constitution, Laws (EpG) • Coherence of citizens' behaviour • Abidance by the recommendations of the authorities (hardly any commands) • Lack of clarity about the responsibilities in S4 and S3 • Parliament and sovereign hardly involved	• Leave legal makeup as it is, but • Clarify the tasks and competencies of agents in the fight against the pandemic: federal and cantonal councils, crisis staff • Strengthen enforcement and sanctioning power of federal council in case of crisis • Enact interlinkage of S3 and S4 in strategy-making • A normative discourse about values, beforehand, not at the moment of actual crisis: in Parliament and in the public, involving education system and media

TABLE 8 Information and communication systems—Diagnosis and design

Actual	Measures
• Mostly outdated, some are even nonexistent, e.g., no central platform that makes all relevant data accessible • Availability, timeliness and quality of data suffer • Testing and vaccination campaigns are compromised • Important tools do not function properly, e.g., contact tracing/breaking of infection chains • Monitoring and control of the pandemic impaired and processes in the administration paralysed	• Fundamental redesign necessary • A central platform that makes all relevant data of the pandemic visible at a glance. • A Covid-app that is seen by citizens as a help, not as a control device: It acts quickly and reliably, warns and protects • A reliable, easy-to-use registration platform for people wanting to be vaccinated in all Cantons. • Avoid flops such as the vaccination platform "meinimpfungen.ch," which had dramatic security flaws and had to be taken offline immediately • Enhance «enabling» technologies (communication & conversation[a]) • P.M.: electronic patient record, data management

[a]Communication and technology are distinct, if the former is merely defined as "the transfer of information" (Littlejohn & Foss, 2009). Conversation is about "concept sharing" (Pask, 1980), – a very important component of the interactions in the innovative and normative domains. The apposite technology should blend analogue and digital features, to enable "conversation for action" (Pangaro, 2021), at all levels, management and beyond.

situation in early 2020, the situation has already improved.

If we synthesize these partial aspects we get to an image of the Desired Organisation, integrating Diagnostics and Design (Figure 6). It is visible that the VSM is an ideal model for pointing out and overcoming the diagnosed deficits. It shows the crucial subsystems of organizational functioning with their interrelationships. The presentation of the structure as recursive systems enables a partition—a powerful way of mastering complexity. As the representation combines a network and a logical hierarchy of homeostats, the levers for coping with the complexity become palpable. This way, deficits and measures to overcome them are highlighted and can be perceived synoptically. Note, that the design is only as good as the diagnosis.

As this article is being finished (September 2021), some of the measures proposed here have already been implemented in practice or are in the process of being realized by the authorities.

7 | REFLECTION: HOW HAS SWITZERLAND WEATHERED THE CRISIS?

The extensive analysis in the foregoing chapters has dealt with a highly complex issue, – the management of a crisis in a federal system. Along the way several findings have emerged, which we could not have found without using the VSM as a framework. Stafford Beer's model has confirmed its strength in dealing with complex organizational issues.

A key issue is the interaction of the steering functions at each of the various levels of recursion. The question is whether the principle of federalism is applicable in its entirety or must be curtailed. In a federation, the members—here the Cantons, and at the next level the municipalities—are self-contained and largely autonomous.

According to the Federal Constitution (§43a5/1, translated by M.S.), "the Confederation shall assume only

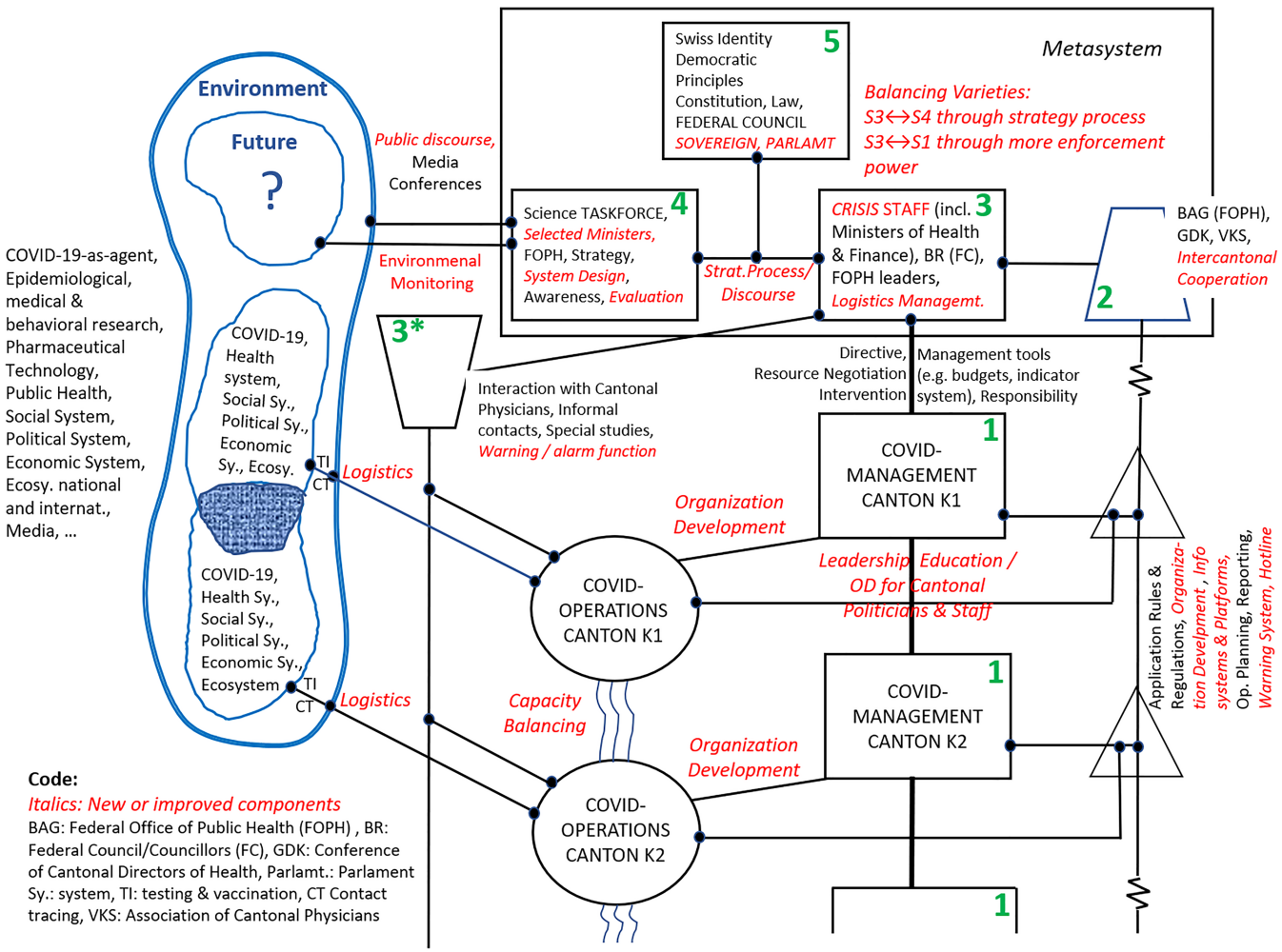


FIGURE 6 Desired structure [Colour figure can be viewed at wileyonlinelibrary.com]

those tasks which exceed the power of the Cantons or which require uniform regulation by the Confederation" (Schweizerische Eidgenossenschaft, 1999). According to this principle, a body at the upper political level may not take over a task if it can be accomplished at the lower level. Conversely, if a task excessively strains the strength of the Cantons, they should be supported in their fulfillment by the higher level, that is, by the federal government.

In the relationship between the Confederation and the Cantons, responsibilities were shifted back and forth by the parties involved at certain stages.

This has not only to do with indecision, but also with an unwillingness or inability to take responsibility. Can cybernetics help here? The VSM implies: The functions of the steering systems, especially the meta-systems $((3 \leftrightarrow 4) \leftrightarrow 5)$, have to be clarified. They must not remain undefined.

Overall, the federalist system bears some features—limitations that lead to delays and "lazy" compromises. Would not that be a big disadvantage? If we look at the scores of the European countries, we note the following.

Table 9 shows the Covid-induced deaths per 100,000 population, cumulated, per country. Switzerland performed 20% better than the European average.[10] Is this remarkable? No, that average is not remarkable. But, let us consider other factors: The Oxford Stringency Index (Ritchie et al., 2021) shows that the crisis management in Switzerland has been softer than in all neighboring countries: No curfews, no loitering restrictions, low travel drawbacks, etc. The authorities hardly issued any commands whatsoever, they always appealed to the self-responsibility of each individual towards society. This is in line with the Swiss mentality.

The behaviour of the citizens was crucial. They mostly complied with the recommendations of the authorities and adapted their behaviour. Not that there would have been no resistance in Switzerland! Criticism from interest groups (e.g., gastronomy) and certain political parties was massive, resistance to public measures often exaggerated. There were also anti-Corona demonstrations. But, hopefully the insight into the inevitability of the virus will win out.

In addition, the economy remained largely intact and showed rapid recovery as the crisis subsided (Benz, 2021;

TABLE 9 Deaths per 100,000 population, cumulative, per country, 2-25-2020 to 9-8-2021

Rank	Country	Deaths per 100'000 Inhabitants, cumulated
1	Belgium	219
2	Italy	214
3	U.K.	197
4	Spain	182
5	France	176
6	**Europe**	159
7	Sweden	145
8	Russia	130
9	**Switzerland**	127
10	Austria	120
11	Germany	111
12	Netherlands	105
13	Israel	82
14	Denmark	45

Source: Calculation based on Worldometers.

Plattner et al., 2021). According to IMD's World Competitiveness Report 2021, Switzerland's economic performance in the first Corona year was as strong as in only few countries. On the one hand, because of the comparatively less restrictive measures taken in the fight against the pandemic, but also because many companies received fast and unbureaucratic help in the crisis. Social cohesion, low public debt and a world-class infrastructure have boosted Switzerland up the rankings from third to first (IMD, 2021).

What is the role of the complicated, complex, cumbersome, slow political processes? They seem to be a disadvantage. Yet, it turns out that they are very strong in handling complexity.

The diversity is much greater in this country than elsewhere, 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. It also delivers better results because decisions are more broadly based.

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" (Interview, Keller-Sutter & Berset, 2021, translated by M.S.).

The interviewer maintains that system to be more complicated, more expensive, more long-winded and more inefficient! The Minister interjects: "On the contrary. A result that is solidly supported is more efficient. This stability may be boring, but it has something good." (Keller-Sutter & Berset, 2021). We would add: "This system is resilient."

Future crisis management in Switzerland will be challenged to probe or even redefine the line between coercion and self-responsibility. In any case, new ways must be found to sensitize the sovereign to the values of democratic society.

One should not want to force anyone to be happy. But it is necessary to keep the sensitivity of the entire population high for the democratic legacy it has been given. It is not only about structure, but about the identity of a society that masters crises!

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ENDNOTES

[1] According to §7 Epidemics Law (Epidemiengesetz - EpG) of the Swiss Confederation (Schweizerische Eidgenossenschaft, 2012).

[2] By 23 September 2021, 54.9% of the Swiss population had been fully vaccinated. In comparison: Norway 67.7% Portugal 83.6%. Source: Our World in Data https://www.google.com/search?q=impfquote [accessed 24 September 2021].

[3] Explanations of the Swiss political system can be found, for example, in: Federal Chancellery (2021) and Steinberg (2007).

[4] Proposal by Annette Klosa-Kückelhaus (2020) for the dictionary of Neologisms, Leibniz-Institut für Deutsche Sprache.

[5] "Variety" is a concept by which the term "complexity" can be concretized, for example, measured. It denotes the number of states or modes of behavior a system can assume (potentially) or assumes (actually). "Variety" is also used as a synonym for "repertoire of behavior" or for "complexity". See Ashby (1956) and Schwaninger (2009).

[6] A homeostat is a system that keeps critical variables within desirable limits in the face of unexpected disturbances or perturbations (after Beer, 1981: 402).

[7] According to Zenger (2020), the law regulates the strategic and operative options in an exemplary manner, but the organizational aspect—"which body does what in the event of a crisis"—has been neglected. See also Rüefli and Zenger (2018).

[8] The Federal Council and the FOPH cannot meet all expectations that are placed on them by the Cantons during a special situation (Rüefli & Zenger, 2018, p. IV).

[9] For example, the FOPH has created a "Fake News Monitoring". Its goal is to be able to react to the exponentially increasing false information with counter-campaigns.
Source: https://www.handelszeitung.ch/news/fake-news-monitoring-in-der-schweiz [accessed 8.8.2021].

[10] This assessment based on one study is only indicative. It could be complemented by many other rankings, such as those provided by EIU-Economist Intelligence Unit, Oxford University, Our World in Data, ECDC-European Centre for Disease Prevention and Control. To take another example, 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. Switzerland, it said, 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 (Chang et al., 2021; Oelrich & Trumpf, 2021).

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APPENDIX A: SUMMARY OF THE VIABLE SYSTEM MODEL (VSM)

The Viable System Model is based on Stafford Beer's theoretical writings, namely Beer (1979, 1981, 1984, 1985). Methodological contributions for the use of the model can be found in Clemson (1984), Hoverstadt (2008), Espejo and Reyes (2011), Pérez Ríos (2012), Malik, 2015, Lassl (2019), and Pfiffner (2020). In these sources, the model is presented both verbally and graphically. With Beer, we conceive of the attribute "viable" as "capable of living," and define "viability" as the ability to maintain a separate existence (Simpson & Weiner, 1989, Vol. XIX, p. 588). The fundamental theoretical claim of Stafford Beer is that the VSM determines the necessary AND sufficient conditions of organizational viability. These conditions are defined by three assertions:

First—Components of the model: An organization is viable if and only if it has a management system, the components of which—shortly named "systems"—are specified as follows (Appendix B contains the pertinent graph):

System 1 ("S1"): *Local Management*, that is, the regulatory capacity of the widely autonomous and mutually adaptive basic units—*Systems 0 ("S0")*—for example, a hospital, divisions, business units of a company. The basic units with their regulatory capacities are called "primary units"; they optimize the daily business—in the "here and now."

System 2 ("S2"): The *Coordination* function reduces oscillations and enhances self-regulation. Examples are the information systems, operative plans and schedules, internal service and support units, standards of behaviour, knowledge bases and a great part of communication.

System 3 ("S3"): The *Operative*, *Executive* management of the organization as a whole. It is responsible for resource allocation, fosters cohesion and warrants the realization of synergies. It assures a global performance optimum, which often deviates from the local optima in the primary units: Typically, the "executive management" with core functions such as human resources and finance.

Relationship Systems 1–3 (vertical channel): Negotiation of goals and resources—accountability, budget control/management by exception, intervention (only if the cohesion of the whole organization is threatened).

Relationship Systems 1–2-3 (horizontal channel): Attenuation of complexity, filtration of communications and information, coming from basic units, to relieve System 3.

System 3 ("S3*"):* The *Auditing* channel, in which the information flowing through the channels 1–3 (vertical command and alignment channel: resources, accountability) and 1–2-3 (lateral channels: coordination), is validated. That information is scrutinized about its quality and reliability, by means of direct access to the basic units. Examples are the "management by wandering around," social and cultural activities, informal communication, monitoring and auditing.

System 4 ("S4"): The *Intelligence* function, also *Strategy/Development* function, stands for the long-term orientation towards the future and in respect of the environment (ecological, social, economic-technological). Modeling and diagnosis of the organization in its environment, awareness, exploration. Examples are corporate development, strategic management, research and development, the creation of new capabilities and knowledge.

Relationship Systems 3–4: Interaction of short- and long-term as well as internal and external perspectives: the processes of strategizing.

System 5 ("S5"): System Identity and *Ethos/Normative Management*. Balances both present and future orientation as well as internal and external perspective. Examples include the supreme values, norms and principles, which govern the system, or the ethos of the organization, respectively the normative management.

Relationship Systems (3–4)-5: Moderation of the interactions of Systems 3 and 4, solution or dissolution of conflicts between the distinct logics of these Systems.

Systems 2–3–4-5 are called "metasystem," because they represent a higher-order function of management in relation to Systems 1.

The structure of the VSM is inspired by the organization of the human nervous system. For example, System 5 corresponds to the cerebral cortex, System 4 to the diencephalon, etc. (Beer, 1981).

Second—Diagnosis and Design: Any deficiencies in this system, such as missing functions, insufficient capacity of the functions or faulty interaction between them impair or endanger the viability of the organization.

Third—Recursion: The structure laid out above manifests itself recursively at the various planes of an organization. It comprises autonomous units within autonomous units: a viable organization is made up of viable units and it is itself embedded in more comprehensive viable units. For example, in a company, the same structural principles should be discernible at the different levels of the company, divisions, business units, etc., and on a higher rank, if extant, in the group of companies.

Each unit, inasmuch as it is producing the organization's task, rather than servicing or supporting this producing, replicates—in structural terms—the totality in which it is embedded: It has all the functions outlined above under "First-Components of the model", to be able to manage, from start to finish, the processes for the purpose of which it exists. Hence, the functions of management and governance, in the VSM, are spread throughout the organization, which gives rise to self-organization and organizational effectiveness (Jackson, 2000).

APPENDIX B: GRAPHICAL REPRESENTATION OF THE VIABLE SYSTEM MODEL

Stafford Beer's complete version of his diagram of the VSM is in Beer (1985). In our diagrams (Figures 5 and 6, Appendix B), one detail deviates slightly from the standard representations: Systems 3 and 4 are not superimposed, but placed next to each other horizontally, for the following reasons: First, the closeness of S4 to the environment is emphasized. Second, the diencephalon and ganglia embody sight, hearing, taste and smell in the human brain. Hence, S4 is located "up front," where these functions appear most. Third, the position of S4 at par with S3 precludes impressions of a superiority in terms of prestige only.

