

VU Research Portal

Transcending boundaries

Boersma, Kees

2022

document version

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

citation for published version (APA)

Boersma, K. (2022). *Transcending boundaries: The innovative power of emergent practices*.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:

vuresearchportal.ub@vu.nl

Transcending boundaries.

The innovative power of emergent practices.

Prof.dr.ir. Kees Boersma

Inaugural Lecture given (originally in Dutch) at the acceptance of the position of professor of *Organizational and Technological Innovation and Societal Resilience* at the Faculty of Social Sciences of the Vrije Universiteit Amsterdam on December 14, 2022.

Mr Rector Magnificus, dear guests,

“We are living in what Chinese tradition calls ‘interesting times’. Times of tremendous change. And whereas we can consider them as danger, the transformations needed can also be seen as opportunity.”

That was the opening statement by Ervin László, keynote speaker at an International Society for the Systems Sciences conference here in this auditorium at Vrije Universiteit in the mid-90s. I was still a student of Technology and Society at Eindhoven University of Technology, and it was the very first conference I had participated in. And I can say: the lectures at the conference inspired me because they went against reductionist knowledge production and argued for a holistic scientific practice. The Systems Sciences Society was founded in 1954 by the biologist Ludwig Von Bertalanffy, the social economist Kenneth Boulding and the mathematician Anatol Rapoport – a multidisciplinary group that argued for a scientific practice that transcends the boundaries between disciplines.

László was a prominent member of the Club of Rome – as you may remember, this is the organization that issued the *Limits to Growth* report, which was the result of research led by MIT researchers Dennis and Donella Meadows. It is exactly 50 years ago this year that they published the report, one of the first to rely on computer models and simulations to show the limits of the earth’s ecosystems. Many more would follow. None of them were perfect, but it quickly became clear: if we have crossed one border, it is that of growth.

I am proud that I can now stand on the stage on which László and many others have lectured before. This inaugural lecture is indeed inspired by the work of many. It is an expression of my curiosity about the limits of our social-technical systems and our ability to reflect on them.

According to the engineer and philosopher Ludwig Wittgenstein, putting a limit on thinking – or rather, not on thinking, but on the expression of thoughts – is difficult. Because, and I quote: “in order to draw a limit to thinking we must be able to think both sides of the limit, which is impossible, by definition”. It is a paradox. He therefore comes to the following well-known conclusion: “What can be said at all can be said clearly; and what we cannot talk about we must pass over in silence”.

In what follows, I will not hide behind language games but will pay attention to concrete practices as I do in my research. Yet, Wittgenstein's statement does have meaning for those practices: namely, not all knowledge about this can be made explicit. To paraphrase the physical chemist Michael Polanyi: knowing is not just a matter of know-what, but also of know-how, of practice-based knowledge and tacit knowing, which we can only partially formalize.

Hence, I will talk about boundaries without explicitly defining them. For they acquire meaning in practices in which they are discussed, contested and constantly changing. In the tradition of Science and Technology Studies, with representatives such as Bruno Latour, I speak of *boundary work*. Thomas Gieryn describes it as work that someone performs by moving between different domains, trying to connect them through action. This may involve the boundaries of different disciplines, cultural worlds, institutions, people or groups. But it

also includes boundaries between people and things or boundaries of time and place. Star and Griesemer have shown that boundary work takes place around a *boundary object*, which can be a thing, but it can also be an idea or a concept that is uniquely understood in one world but also has meaning in another world. This gives it the potential to bridge boundaries.

Risks and crises in the Anthropocene

In my research and teaching, I focus in particular on boundaries in situations of great uncertainty. In such situations, old routines become obsolete and require innovative ideas. One might say that life is full of uncertainty, and we make tough choices every day. That's true, but there's something more going on in my story.

To describe our modern way of living, Ulrich Beck introduced the concept of *risk society*. He published a book with that title in 1986. In hindsight, it was perfect timing because in that same year, the disaster at the Chernobyl nuclear power plant took place. It was a disaster with severe cross-border, cross-boundary consequences. This and other disasters do not so much show that our current society is full of risks, because all times are full of risks. But the current risks are ones that we ourselves have created through our technological innovations that are not easy to control. And Beck wasn't the first to see that. As early as the '70s, Hannah Arendt wrote about the constant presence of crises in her essay "Crises of the Republic". They confront us with the limits of our behavior and with the limitations of old truths. The biologist and activist Rachel Carson published her book *Silent Spring* in 1962: silent springs because of bird mortality due to pesticide use.

And the analysis of risk society has only gained in importance. In a short but influential article in *Nature* from 2002 entitled "Geology of Mankind", the chemist and Nobel Prize winner Paul Crutzen refers to our era as the *Anthropocene*. That is the era in which the earth experiences the consequences of human action. These result in "grand challenges" or "wicked problems": issues that are difficult or impossible to solve because of their complex and interconnected nature.

In my work, I zoom in on *the local*, the grassroots in particular, because it is at that level that the consequences of crises are felt the hardest. But also because that's where the knowledge and the power is to deal with them.

And whereas I focus on the local, in the Anthropocene the local is connected to the supra-local and often the global. Here are just a few examples. Climate change, caused by our actions, has major consequences for vulnerable communities and causes climate refugees within and outside national borders, especially in the Global South. The global energy crisis requires far-reaching transitions in local urban neighborhoods. The Corona pandemic, by definition a global crisis, has exposed the weakness of local healthcare systems and has also revealed that some people are much more vulnerable than others. The earthquakes in Groningen, in the Netherlands, which were the result of natural gas extraction practices that caused unsafe situations for citizens, have now become intertwined with geopolitical tensions because of Russia's war against Ukraine.

Today's crises transcend time and place and have long-term impacts. These are *cross-boundary, creeping crises*, as my colleague Michel Dücker recently pointed out in his inaugural lecture in Groningen and as another colleague Arjen Boin stated earlier during his inaugural lecture in Leiden.

And I understand the fascination with crises, but labeling everything as a crisis can also lead to passivity. However, we do not have to be passive and go from crisis to crisis. Ulrich Beck, together with the sociologists Antony Giddens and Scott Lash, pointed to the *reflexive ability* of our societies. This relates to the potential of a reorganization and reform process that continuously questions existing truths. Research into this is challenging and constructive.

And action matters! Thanks to Crutzen's research and activism, the use of chlorofluorocarbon – CFCs – has been restricted and the ozone layer that was threatened by them has been able to recover. Carson's work sparked social movements against pesticides. Thanks to this, biodiversity has increased again in areas where pesticides are prohibited. Yes, I admit that today's challenges are grand challenges indeed, but let me state this clearly: *there are no natural disasters*. Disasters do not happen to us. We have a duty to prevent them from happening by protecting what is vulnerable.

Yet, the crisis management literature is still relevant because it has shifted its focus from response and recovery to prevention and risk reduction, to anticipation and social resilience. In what follows, I build on that notion. First, I will show how, in my teaching and research, I connect societal resilience to emergent practices. Then, I will discuss three examples of this connection from my research. And finally, I will describe my research and education agenda for the future.

Crises and societal resilience

In the 1970s, the sociologists Enrico Quarantelli and Russell Dynes were commissioned by the US government to investigate how US society would respond to a nuclear attack – this was in the midst of the Cold War. Of course, waiting for a nuclear strike would be virtually useless because people want to know what to expect in advance, not to mention how to prevent a strike altogether! Quarantelli and Dynes therefore decided to focus on a disaster that affected large parts of a community so severely that they could somewhat mirror the effects of a nuclear attack. They found such a situation during tornado season in the US – a proxy disaster, with the Mississippi Valley as a living lab *avant la lettre*. They visited the area, aware of the US government's assumption that the affected communities would descend into chaos and panic after a tornado struck and that top-down government action would be needed to deal with the chaos and restore order.

As good researchers, they questioned the government's assumption, and they were surprised by what they saw. For while tornadoes did indeed have devastating effects on local populations and their property, they found resilience rather than chaos, altruism rather than self-centeredness. They found a willingness to help each other rather than a focus on self-interest. But they also found the governmental tendency to frustrate those resilient practices because they didn't fit pre-defined blueprints.

And it turns out this is not unusual, as these insights have been confirmed in numerous empirical studies in different contexts. In my own research projects in various provinces of the world, I found similar patterns and I found that, despite all our differences, it is an almost universal story: people tend to help each other during crisis situations. But also: formal institutions and authorities find it difficult to fit such initiatives into their working methods.

Now, I am not denying the misery and devastation a crisis can cause, but I am criticizing the idea that there are no resilient patterns of action that formal authorities can build upon in

complex situations . As far as I am concerned, the word *chaos* is used far too often to indicate crisis situations. Because it legitimizes the reflex to restrain local initiatives through a top-down governance approach. And that approach has run up against the limits of its legitimacy.

If only a top-down approach was simply an attempt by a strong leader to make decisions from a central point! This rarely results in an unequivocal outcome, but if it is done with some goodwill, it can still be understood. In uncertain times, people look for stability and call for strong leadership. There is nothing wrong with that in itself. The top-down approach that I criticize is about the inability – and often the unwillingness – to make connections between different initiatives that emerge during crises. And then, to neutralize the results of those initiatives, to impose so-called solutions from above. This top-down policy is based on a *one size fits all* governance approach that does not take into account local differences, knowledges and needs. This approach increases the consequences of crises and undermines trust.

Different perspectives on societal resilience

However, in line with the László quote I began this lecture with, we can also see crisis as an opportunity, a policy window in which social and political entrepreneurs seize the opportunity to develop and apply their innovative ideas. In such processes, decisions to act, to change and to adjust are characterized by not yet fully proven organizational solutions. The public administration scholars Michael Cohen, James March and Johan Olsen labelled this as *organized anarchy*: wherein decisions are characterized by unclear preferences and not fully proven organizational solutions. In my view, societal resilience plays a major role in this. It is an important boundary object in the discussion on crisis governance.

Resilience has long been seen as systems *bouncing back* to the old normal once the pressure on them is released. That “social-engineering” approach, however, is not very sustainable, because, if a system has not been able to adapt, it will run into problems again the next time it is confronted with a similar shock. Societies have bounced back after COVID-19, but have they learned its lessons? Unfortunately, it still seems like a rhetorical question in too many ways.

An alternative perspective is therefore needed, one that focuses on the *adaptation* and *transformation* of systems. Such a perspective builds on the work of ecologist C. S. Holling who introduced the concept of resilience as a feature that allows systems to overcome thresholds and achieve renewed stability over and over again after a disruption. In the social sciences, this approach to resilience has been used to interpret the actions and responses of individuals, organizations, communities and ecosystems when faced with crises. In this regard, resilience is the ability of a social system to proactively adapt to and recover from disturbances that lie outside the range of normal and expected disturbances.

At the same time, resilience is a very controversial concept, and not unexpectedly so: boundary objects are often controversial. The main criticism is that resilience has become part of a neoliberal policy agenda. In this agenda, the government “obligates”, as it were, local stakeholders to participate without offering them the right support. This results in aggravating vulnerability and not in solving it.

However, the fact that the concept of resilience has been dragged through the neoliberal mud has not stopped me from building on it. Neoliberalism abuses the power of society for its own

agenda and denies creative bottom-up solutions. But in spite of this misuse of “participatory society” initiatives, there is more participation than ever before, and it occurs in forms that were unknown and unexpected before. For initiatives to be sustainable, it is essential that governments create the right conditions for them. In his book *Better Together*, Robert Putnam has shown the social, innovative power of the different forms of social capital that such initiatives have. And thus also of the resilience of societies. But he also argues that the potential will die if the government does not provide the resources to support it. In other words: while we need to criticize the neoliberal approach, we also have to insist on a government that actively participates, facilitates and, above all, coordinates.

In my own research, I have used the concept of resilience to show the creativity of the grassroots. In a participatory study in one of Amsterdam's neighborhoods – the Indische Buurt – I used the living lab method in working together with local parties. The living lab brought different stakeholders together in so-called *co-creation* sessions in which both problems and solutions were jointly developed. Participants included social entrepreneurs, such as Firoez Azarhoosh and Farnoosh Forozesh, and theater producer Petra Ardai. And people from the formal authorities also participated: Jan Bos from the Amsterdam Amstelland Safety Region and representatives of the local government. The co-creation sessions focused on actions taking place in the neighborhood to support the vulnerable during the COVID-19 lockdown by providing them free meals. The outcome of the living lab was a jointly supported coordination approach via a temporary coalition.

In the following, I would like to draw specific attention to that coordination issue. And I will do so using the notion of *networked emergence* which I have used and developed in my research.

Networked emergence and fragmentation

Emergence in the ecosystem approach refers to something that, literally, “becomes visible”. It reflects on the creative and adaptive capacity of social entities. Emergence is a *bottom-up process* in which individuals create patterns through mutual interactions that are more sophisticated than what an individual can create alone. And that is necessary because, after all, no individual could come up with the whole solution to a complex problem a priori on the basis of their own acquired knowledge and information – holism is the mindset.

And though I just critically questioned the call for a central leader, leadership in emergent processes is indeed important. But, following Marie Uhl-Bien, it does not, or does not exclusively, lie with individuals centrally positioned in bureaucratic contexts. Emergent leadership is adaptive and can be temporary. It focuses on recognizing and appreciating the unexpected, and it earns legitimacy by making connections between emerging initiatives.

It is important to realize that emergence is not a characteristic of informal networks only. Thinking that would create a false contrast with established organizations, where we also see emergent practices. An example is the National Operational Team Corona that was set up in the Netherlands at the start of the Corona pandemic. I participated in its social resilience section, which was led by Laurens van der Varst. Many of our discussions revolved around the question of how we could pass on knowledge about societal resilience to the Safety Regions. This was a challenge because the regions still had insufficient expertise on how to implement that knowledge.

Emergence is, however, always a bottom-up process: when we speak of emergent system behavior (as far as behavior can be attributed to a system), it is the result of the behavior of individuals in the lower orders. Sharing information and communicating are crucial in emergent processes. An important condition of these interactions is that the individuals involved must share a common understanding of the goal while being free to explore good and alternative paths to get there. So there is a reason that information management is given such a major role in crisis management!

With the concept of *networked* emergence, I account for the fact that although solutions are situational, they are often interconnected. This can be through direct interactions, but also virtually, because they are part of the same social movement.

As an example of the latter: in one of my projects, I collaborated with the Red Cross in Rome. This was in response to an initiative by the LGBTQ+ community to provide free meals to vulnerable people during the Corona lockdown, just as was done in the Indische Buurt in Amsterdam. Though these were comparable initiatives, they were not centrally controlled but instead were run by local coalitions. Connected in the world of ideas, but without direct contact.

Sometimes, however, direct coordination is necessary because there is interdependence. In cases of interdependency, parties have to coordinate their efforts, because they need each other to perform a certain task. Sharing information and giving it meaning are crucial in such networked emergent processes. And that is no sinecure. Jeroen Wolbers looked at this in his PhD thesis “Drawing the line”. He zoomed in on the idea of fragmentation: that is, the ambiguity of interpretations about solutions that cut through, undermine and confuse desirable claims of consensus.

Fragmentation as a characteristic of a dynamic system describes how discontinuity and ambiguity arise in turbulent environments. Recognizing that fragmentation arises means that we recognize that contradictions are not deviations but expected and indispensable parts of regular coordination practices. After all, there are many actors involved, each with their own expectations, actions and routines. Fragmentation should therefore not necessarily be viewed negatively, because it can serve as a steering mechanism that supports the diversity of approaches, as organizational sociologist JoAnne Martin has shown.

Fragmentation as a coordination mechanism goes against the frequently heard call that “everyone should be on the same page” when there is a threat of uncertainty about whether a decision should be implemented. However, although actors charged with coordination in dynamic environments will certainly have to deal with ambiguity and discontinuity, they can also actively use them, accepting that the situation is constantly changing and that this means that ambiguity of action and multiple perspectives are a given.

Three examples from my research

In what follows, I will give three concrete examples from my research to further illustrate networked emergence. These include examples from crisis management, humanitarian actions and innovation management – always with the question of how the local can connect with the supra-local. Three different contexts, but with similar patterns.

1. Information sharing in crisis management

The first example comes from my research into cooperation in crisis management and disaster relief in the Netherlands. During a number of serious accidents, it turned out that the emergency services, including the fire brigade, police and ambulance services, often had difficulty creating a shared picture of the situation due to their different professional routines and working methods.

Together with Peter Groenewegen, Jeroen Wolbers, Julie Ferguson, Femke Mulder and Arjen Schmidt, I studied their collaboration practices in the project I led called Smart Disaster Governance, funded by the Dutch Research Council. We found, among other things, that creating a common understanding of the purpose of action is important, but at the same time, it is crucial to have the freedom to explore alternative paths to get there. While that is not exactly an easy task in any human interaction, it is definitely certainly not easy in situations of uncertainty.

In order to facilitate coordination between emergency services, the Dutch Safety Regions have invested in so-called *net-centric work* principles. Willem Treurniet of the Netherlands Institute for Public Safety, with whom I often work, recently showed their potential in his PhD dissertation. In short, net-centric work means that emergency services share locally collected information with each other on a central platform. Then, after some enrichment and verification, it is sent back to the networks. And that happens in several cycles, which means that decisions can improve in quality. At least as long as the time is taken to give meaning to the information. And that turns out to be quite a challenge.

Because even if the same piece of information is shared, misunderstandings can still arise. During one of the exercises I attended, the emergency services worked on the scenario: fire in a Casino. The police had announced in advance, via the central platform, that they would be “demarcating” the area. “Demarcating” turned out to be a boundary object in this exercise. Because, at the fire service, that means putting up a screen so that the crowd that gathers remains at a distance. For the police, however, it is a standard operational procedure to demarcate a crime scene, which the casino may be, once the fire is extinguished. This means that anyone entering or leaving the area will be vetted. Including the fire department. And given the firefighters’ reactions to being vetted, the police should have explained that in advance!

This is an example of a concept that was shared but misunderstood during a relatively simple scenario. Imagine a crisis the size of the COVID-19 pandemic, and you can understand the coordination challenge... The trick is to transcend professional and organizational boundaries and to create a joint understanding and collective sensemaking of the situation. And that is only possible by spending time on the ways in which different parties give meaning to a boundary object.

The next challenge is to include parties that unexpectedly present themselves, as in my earlier examples from the Indische Buurt and Rome. Our research showed that there is little to no room for emergent parties in the net-centric protocols. This is because the *accountability question* almost always arises: what if things go wrong, who is responsible – the formal authorities or the informal networks? As Arjen Schmidt has shown in his dissertation, if we get stuck in that question, we will miss the potential of the emergent initiatives.

In the European Horizon 2020 research project LINKS, which I am privileged to lead, we are therefore asking how the efforts of the emergent groups can be aligned with those of the formal authorities. Together with 16 academic and non-academic partners in 6 different countries, we are looking at how we can use social media and crowdsourcing to aid this alignment. At Vrije Universiteit, Nathan Clark, Romy van der Lee, Chiara Fonio, Katerina Tzavella, Robert Larruina, Lieke Rijks, Emmeline Roelofs and Risha Jagarnathsingh form a great project team.

Using the wisdom of the crowd through social media is inspired by the pioneering work of social entrepreneur Juliana Rotich. In 2008, she developed a tool called Ushahidi, “testimony” in Swahili, to map the post-election violence in Kenya. Local eyewitnesses to the crisis were able to share information via smartphones, after which it was plotted on an online map. The map was open source, available for anyone who wanted to be informed about the violence. Ushahidi's crowdsourcing tools have since been used in many contexts by millions of people to share information about crises caused by political, as well as natural or industrial, risks.

In the LINKS project, we found that the use of crowdsourcing could not be captured in standard procedures. I started my speech with references to Wittgenstein and Polanyi for a reason: to show that know-how is important. That is why the central focus of the LINKS project is not the accountability question but the question of organizations’ routines for using social media and crowdsourcing that have not been or cannot be formally recorded.

We also looked into this in the European research project HERoS, which focused on interconnected health care systems. Together with Lianne Cremers, Cato Janssen and Yiannis Kyratsis, I examined how organizations at a local level dealt with the COVID-19 lockdown measures. It is precisely at that level where we can learn about the most vulnerable, including about their coping mechanisms. Lianne and Cato showed this beautifully in their documentary about high school students entitled *We Thought It Would Be Fun*. We will follow up on this in a new project funded by the Dutch Research Council called Institutional Resilience, Organizational Healing and Adaptive Capacity, which will focus on the residents and staff of nursing homes.

2. Early warning, early actions in humanitarian actions

The second example comes from my research on information sharing and coordination in humanitarian actions based on big data analytics.

For this part of my research, I work with the Dutch Red Cross, which is conducting research in an initiative called 510, led by Marc van den Homberg. Many master students of Societal Resilience are also participating in this research. The “510” in the name represents the total surface of the earth in millions of square kilometers. In other words: it expresses the ambition to link all available global, local and historical data about extreme weather, such as typhoons. On the basis of that data, machine learning and predictive modeling can be used to predict where a typhoon will strike within certain margins of error. Through this early warning and through an action protocol, local communities in vulnerable areas are offered micro-financing that they can use to strengthen their houses before the typhoon makes landfall, thus preventing a disaster.

For example, early warning messages can be sent through WhatsApp groups. Affected people can text or call specific hotlines to express their needs and to send valuable locally collected data, such as water levels. The 510 protocol works on the basis of a “trigger”: the warning of a typhoon. This trigger means that a predicted impact reaches a pre-agreed upon threshold. For example, a trigger could be when the predicted impact on housing is the total destruction of more than 15% of the houses in at least five municipalities.

It is a promising approach that ties in with the early warning, early action ambitions of the Sendai Framework for Disaster Risk Reduction and the UN development goals. I am working with the Red Cross on a *user-driven design* approach, inspired in part by the work of the innovation economist Eric von Hippel, in order to include the knowledge and interests of local parties in the models. With this part of my research, I am contributing to the growing attention on *localization* – the use of local knowledge and data and the building of local ownership in humanitarian actions.

3. From closed to open innovation

The third and final example relates to coordination issues in science innovation environments. It builds on the PhD research I did at Eindhoven University of Technology, where I focused on the history of industrial research and development. The central question was how strategic management in industry can find organizational solutions for the coordination between research and production. In particular, I focused on the Philips Physics Laboratory, popularly known as the NatLab.

The NatLab turned out to be a resilient organization because it transformed itself into a new organization during and shortly after the “Operation Centurion” reorganization directed by then CEO Jan Timmer. The idea was that innovative practices thrive best when they are open, not turned inward. For those among us who like business history: during my archival research, I found out that the reorganization actually meant a return to the vision and strategy of the first director, Gilles Holst, who started the NatLab in 1914.

This renewed strategy had immense consequences for research and development at Philips. When I visited the NatLab in the mid-1990s, I had to report to the guard, who checked my credentials before opening the barrier and allowing me in. That changed when the NatLab embraced the “Open Innovation paradigm” that they adopted from Silicon Valley, where it was developed by Henry Chesbrough. In this paradigm, companies combine internal and external resources for both the development and commercialization of new technologies and products. As a result of this change, the barrier literally disappeared and dozens of companies can now be found at the old NatLab site, which has been renamed the *High Tech Campus Eindhoven*. Fortunately, big business also has a sense of history from time to time, so the knowledge center on the High Tech Campus is named after Gilles Holst. The research there is not directed from a central point, top-down, but is part of an innovative ecosystem of public and private organizations called *Brainport Eindhoven*.

Crossing borders

Now, there is a great temptation to think that emergent, innovative practices make borders and boundaries irrelevant. Don't get me wrong, though: boundary work is certainly not without obligation. To paraphrase the Thomas theorem: If people define boundaries as real, they become real in their consequences. Even if borders seem to disappear, you can still

experience a lot of inconvenience – just ask the millions of displaced people who have to fight borders every day, even after they have physically crossed borders. In a similar vein, this also applies to the companies at Brainport Eindhoven: one cannot really just walk into any lab over there, and intellectual property is well protected with patents. The same applies in crisis management: the online platforms I study in crisis situations often work on the basis of opaque algorithms and have great surveillance power. Finally, power games can also arise within grassroots movements and local communities. Who may or may not participate is often the big question there.

This is because power plays an important role in every social relationship and therefore also in emergent processes. In my research and teaching, I therefore follow the lead of political scientist Steven Lukes by drawing attention, not only to the visible dimensions of power, but also to the invisible and systemic dimensions. The first dimension deals with the question of how scarce resources (such as expertise, rewards, money and status) are used to influence decisions. The central question in this case is how actors can influence decisions to their advantage. Systemic power, on the other hand, is about the procedures and political routines used by the dominant coalition to ensure that certain persons or groups cannot participate or can only partially participate in the decision-making process. This power shows no boundaries; it is invisible and latent, and it is difficult to recognize, let alone influence.

But a question remains: what if we give too much credit to the role of the dominant coalition in the systemic analysis of power? What if it is also caught in the web of power relations? Analyzing the power of and in the everyday is therefore important. How do new power balances and imbalances arise in emergent practices? It is an important question to ask because those involved do not know in advance exactly with whom to share information and with whom to collaborate.

No single innovation is able to solve this issue of power. The elimination of one power structure will by definition lead to another. However, this does not mean that we have to give up. We can exercise power by uncovering and adjusting underlying patterns of behavior. Attention to the different dimensions of power is crucial for understanding social processes. In line with Michel Foucault: knowledge about power has a liberating and emancipating effect. We should therefore not reduce social scientists to mere problem solvers. They are also able to show and investigate the positive power of society.

An agenda for education and research

In my position as endowed chair, which is based within both the Faculty of Social Sciences and the Faculty of Science, I would like to contribute to the debate on innovation and societal resilience. Guided by the principle of networked emergence, I want to focus on organizational and technological innovations to promote societal resilience, the title of my endowed chair. To this end, I will briefly outline three interrelated topics for teaching and research before I wrap up:

1. First, to better understand emergent patterns of organizing in relation to cross-border crises.

Understanding emergence in crisis situations is aimed at creating more flexible designs for crisis organizations. However, I want to look beyond the mere crisis management literature and build on the ambitions of prevention, social resilience and disaster risk reduction.

Consider, for example, the energy transition aimed at reducing the use of fossil fuels in order to find an answer to the climate crisis.

Multidisciplinary, holistic research and open innovation has the potential to provide answers. For such a transition requires knowledge from physics and chemistry to develop the new generation of batteries that are needed as buffers to enable, for example, the use of hydrogen as a fuel. I can give a similar example when it comes to developing new medicines and vaccines for pandemics. But: there is no technological, scientific fix for social problems and certainly not for the grand challenges and the wicked problems I spoke about earlier. Social science knowledge is also needed. Using the *co-creation* approach, I want to contribute to research into the interactions between the various actors required for these future transitions. Including actors that are not yet on our radar. Because coordination in such transitions is certainly necessary, but we are moving away from the one-size-fits-all approach.

Much research is still needed into the new governance mechanisms that are necessary to guarantee inclusiveness and local ownership in the transitions. Shared understanding of the issues and collective sensemaking are crucial in this respect. As far as I am concerned, these can only be developed through the co-production of knowledge. From this point of view, I applaud the Vrije Universiteit board's initiative to invest in knowledge valorization and open innovation. I especially recognize the efforts of Davide Iannuzzi, Valorization Officer for our university, Iwan de Esch, Director of Valorization for the Science Faculty, and Linda van de Burgwal, Director of the "Demonstrator Lab" that facilitates start-ups. And also the work done by Bart Bossink and Sandra Hasanefendic on sustainable innovation, as well as Joris Rijbroek of the Institute for Societal Resilience from the Faculty of Social Sciences, and colleagues from the KIN group led by Hans Berends from the School of Business and Economics. I look forward to further discussions on knowledge valorization in relation to the grand challenges.

2. Second, I want to zoom in on the role of boundary spanners.

Boundary spanners use their knowledge of the different domains to connect members of networks that otherwise operate independently of each other. In examining their role, I will be taking into account the importance of agency and the creation and extraction of value in the transitions. *Resilient entrepreneurship* is a good example of this. Resilient entrepreneurship is about improvisation and daring to think outside the box. Levi Strauss's bricolage, or being able to deal with imperfect sources in a smart way, plays a major role in this. It results in constantly adjusting search directions and being able to respond flexibly to new opportunities: that is, it results in adaptive capacity. My colleagues from the various faculties, such as Marie Louise Blankesteijn from Science Business and Innovation, Michiel Verver from Organization Sciences and Enno Masurel from the VU Center for Entrepreneurship, as well as Jorick Houtkamp from the Netherlands Enterprise Agency, are each involved in their own way with various forms of what I call resilient entrepreneurship. I very much look forward to further discussions with them on this topic.

3. Finally, I want to zoom out on the innovation ecosystems in which the emergent creative practices are embedded.

The focus on the ecosystem offers the scope for research into new forms of mission-driven innovations in response to cross-border crises. These are badly needed for the challenges

defined in the UN's sustainable development goals, including issues such as energy transition, climate change, poverty and digitalization. The exact solutions to these problems are not yet clear, but the urgency to find them is increasing.

Government organizations have to play an important role in this. In *The Entrepreneurial State*, Mariana Mazzucato has convincingly shown, against the dominant discourse, that in complex transitions it is in fact the government – the state – that makes risky investments in building social and technological infrastructures, thus showing more innovative power than the private sector. Dutch municipalities' initiative to invest in the infrastructure for a district heating system, which the private sector considers too risky, is a good example of this.

Mission-driven innovations are not neutral. First of all, there are various partial interests that are not always easy to reconcile. But moreover, the pursuit of the goals often comes at the expense of the most vulnerable. Accountability in this respect is in my view, not about following blueprints, but about how we can ensure that no one is left behind. I want to draw attention to this, but not from a naive idea of progress: my curiosity is focused on the unexpected, and on creative solutions that come from below.

The need for groundbreaking research

To wrap up: the results of research into emergent practices, resilient entrepreneurship and ecosystems are unclear. I will promise *not* to come up with blueprints, because I will instead develop an open research agenda. I quote from a great essay by the physicist and Nobel Prize winner Richard Feynman entitled "The Value of Science": "When a scientist doesn't know the answer to a problem, [the scientist] is ignorant. When [the scientist] has a hunch as to what the result is, [the scientist] is uncertain. And when [the scientist] is pretty darn sure of what the result is going to be, [the scientist] is in some doubt. ... If we want to solve a problem that we have never solved before, we must leave the door to the unknown ajar".

Being ignorant is an important value of science, according to Feynman, and I agree with that. Science is about not knowing based on fundamental doubt. Not knowing what happens when we explore the new, when we embrace emergent practices. The knowledge about emergent practices, resilient entrepreneurship and ecosystems will remain imperfect because new forms will continue to emerge that challenge further research.

Promoting societal resilience as a response to cross-border, transboundary and creeping crises therefore requires letting go of old truths and investing in groundbreaking research that transcends disciplinary boundaries.

Acknowledgements.

The Executive Board of the Vrije Universiteit; the Deans of the Faculty of Social Sciences and the Faculty of Science. The heads of departments Organization Sciences; Chemistry and Pharmaceutical Sciences; Physics and Astronomy.

My promotors profs. Harry Lintsen, Arie Rip and Marc de Vries.

Personal words to colleagues, family and friends.

References

- Anholt, R.M. (2022). *Governing (in) security and the politics of resilience: The politics, policy, and practice of building resilience in fragile and conflict-affected contexts*. VU Amsterdam: PhD thesis.
- Arendt, H. (1972). *Crises of the Republic*. New York: Harvest.
- Beck, U. (2014). *Risk society. Essential concepts of global environmental governance*. London: Routledge.
- Beck, U., A. Giddens and S. Lash (1994). *Reflexive modernization: Politics, tradition and aesthetics in the modern social order*. Stanford: Stanford University Press.
- Boin, R.A. (2017). *De grenzeloze crisis: Uitdagingen voor politiek en bestuur*. Oratie Universiteit Leiden.
- Carson, R. (1962). *Silent spring*. Boston: Houghton Mifflin.
- Chesbrough, H.W. and M.M. Appleyard (2007). Open innovation and strategy. *California Management Review*, 50(1), 57-76.
- Cohen, M.D., J.G. March and J.P. Olsen (1972). A garbage can model of organizational choice. *Administrative Science Quarterly*, 17(1), 1-25.
- Crutzen, P.J. (2002). Geology of Mankind. *Nature*, 415, 23.
- Dückers, M. (2022). *De beelden die ons bewegen, de voorspelbaarheid van de rampen die we samen creëren*. Oratie Universiteit Groningen.
- Feynman, R. P. (1955). The value of science. *Engineering and Science*, 19(3), 13-15.
- Foucault, M. (1982). The subject and power. *Critical Inquiry*, 8(4), 777-795.
- Gieryn, T.F. (1983). Boundary-work and the demarcation of science from non-science: Strains and interests in professional ideologies of scientists. *American Sociological Review*, 48(6), 781-795.
- Holling, C.S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4, 1-23.
- Laszlo, E. (1995). *Interconnected Universe. Conceptual foundations of transdisciplinary unified theory*. Singapore: World Scientific.
- Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Cambridge: Harvard University Press.
- Lukes, S. (2021). *Power: A radical view*. Bloomsbury Publishing.
- Martin, J. (1992). *Cultures in organizations: Three perspectives*. Oxford: Oxford University Press.
- Mazzucato, M. (2011). The entrepreneurial state. *Soundings*, 49(49), 131-142.
- Meadows, D.H., D.L. Meadows, J. Randers and W.W. Behrens (2018). *The limits to growth*. New York: Universe Books.
- Oltmans, W. (1973). *Grenzen aan de groei. Deel 1. 75 gesprekken over het rapport van de Club van Rome*. Utrecht / Antwerpen: Bruna & Zoon.
- Polanyi, M. (1997). *The tacit dimension*. London: Routledge.
- Putnam, R.D., L. Feldstein and D.J. Cohen (2004). *Better together: Restoring the American community*. New York: Simon and Schuster.
- Quarantelli, E.L. and R.R. Dynes (1977). Response to social crisis and disaster. *Annual Review of Sociology*, 3, 23-49.
- Rotich, J. (2017). Ushahidi: Empowering Citizens through Crowdsourcing and Digital Data Collection. Interview of Juliana Rotich. *The Journal of Field Actions*, (Special Issue 16), 36-38.
- Schmidt, A. (2019). *Turbulent Societies. How Governments Can Respond to the Mobilization of Societal Actors during Crises*. VU Amsterdam: PhD thesis.
- Solnit, R. (2010). *A paradise built in hell: The extraordinary communities that arise in disaster*. London: Penguin.

- Star, S.L. and J.R. Griesemer (1989). Institutional ecology, translations' and boundary objects. *Social Studies of Science*, 19(3), 387-420.
- Treurniet, W. (2022). *Between chaos and continuity: A common operational picture in support of emergency response networks*. VU: PhD thesis.
- Uhl-Bien, M. and R. Marion (2009). Complexity leadership in bureaucratic forms of organizing: A meso model. *The Leadership Quarterly*, 20(4), 631-650.
- Von Hippel, E. (1986). Lead users: a source of novel product concepts. *Management Science*, 32(7), 791-805.
- Weber, E.P. and A.M. Khademian (2008). Wicked problems, knowledge challenges, and collaborative capacity builders in network settings. *Public Administration Review*, 68(2), 334–349.
- Wittgenstein, L. (1922). *Tractatus logico-philosophicus*. New York: Brace & Company.
- Wolbers, J.J. (2016). *Drawing the Line: Cross-boundary Coordination Processes in Emergency Management*. VU Amsterdam: PhD thesis.
- Wolbers, J., F.K. Boersma and P. Groenewegen (2018). Introducing a fragmentation perspective on coordination in crisis management. *Organization Studies*, 39(11), 1521-1546.

A selection of my contributions to the debates mentioned, clustered by topic.

Crisis management

- Boersma, F.K., R. Berg, J. Rijbroek, P. Ardai, F. Azarhoosh, F. Forozesh, S. de Kort, A.J. van Scheepstal and J. Bos (2022). Exploring the potential of local stakeholders' involvement in crisis management. The living lab approach in a case study from Amsterdam. *International Journal of Disaster Risk Reduction*. 79, 103179.
- Boersma, F.K., J. Ferguson, P. Groenewegen, F. Mulder, A. Schmidt and J.J. Wolbers (2018). Platformsturing van zelforganisatie tijdens rampen. *Bestuurskunde*, 27(2), 14-21.
- Schmidt A., J.J. Wolbers, J. Ferguson and F.K. Boersma (2018). Are you Ready2Help? Conceptualizing the management of online and onsite volunteer convergence. *Journal of Contingencies and Crisis Management*, 26(3), 338-349.
- Wolbers, J., F.K. Boersma and P. Groenewegen (2018). Introducing a Fragmentation Perspective on Coordination in Crisis Management, *Organization Studies*, 39(11), 1521-1546.
- Boersma, F.K., L. Comfort, J. Groenendaal and J. Wolbers (2014). Incident Command Systems: A Dynamic Tension among Goals, Rules and Practice. Introduction to a special issue of the *Journal of Contingencies and Crisis Management*, 22(1), 1-4.
- Wolbers, J.J. and F.K. Boersma (2013). The Common Operational Picture As Collective Sensemaking, *Journal of Contingencies and Crisis Management*, 21(4), 186-199.
- Boersma, F.K., P. Wagenaar and J. Wolbers (2012). Negotiating the 'Trading Zone'. Creating a Shared Information Infrastructure in the Dutch Public Safety Sector. *Journal of Homeland Security and Emergency Management*: 9(2), Article 6.

Humanitarian actions and disaster response

- Bierens, S., F.K. Boersma and M. van den Homberg (2020). The Legitimacy, Accountability, and Ownership of an Impact-Based Forecasting Model in Disaster Governance. *Politics and Governance*, 8(4), 445-455.
- Hilhorst, D., F.K. Boersma and E. Raju (2020). Research on Politics of Disaster Risk Governance: Where Are We Headed? *Politics and Governance*, 8(4), 214-219.

- Boersma, F.K., A. Kraiukhina, R. Larruina, Z. Lehota and O. Nury (2019). A port in a storm: Spontaneous volunteering and grassroots movements in Amsterdam. A resilient approach to the (European) refugee crisis. *Social Policy and Administration*, 53(5), 728-742.
- Mulder, F., J.E. Ferguson, P. Groenewegen, F.K. Boersma and J.J. Wolbers (2016). Questioning Big Data: Crowdsourcing crisis data toward an inclusive humanitarian response. *Big Data and Society*, July-December, 1-13.
- Wolbers, J., J. Ferguson, P. Groenewegen, F. Mulder and F.K. Boersma (2016). Two faces of disaster response: Transcending the dichotomy of control and collaboration during the Nepal earthquake relief operation. *International Journal of Mass Emergencies and Disasters*, 34(3), 419-438.
- Ghorashi, H. and F.K. Boersma (2009). Iranian Diaspora and the New Media: From Political Action to Humanitarian Help, *Development and Change*, 40(4), 667-691.

History of industrial research and development

- Boersma, F.K. and M. de Vries (2008). Transitions in Industrial Research. The case of the Philips Natuurkundig Laboratorium (1914-1994). *Business History*, 50(4), 509-529.
- Boersma, F.K. (2007). Managing between Science and Industry, *Journal of Management History*, 13(2): 122-134.
- Boersma, F.K. (2003). Structural Ways to embed a research laboratory into the company. A comparison between the Research Departments of Philips and General Electric. *History and Technology*, 19(2), 1-18.
- Boersma, F.K. (2002). *Inventing Structures for Industrial Research. A History of the Philips Nat.Lab., 1914-1946*. Amsterdam, Aksant Publishers. PhD thesis. EBHA-award 2002.

Organizational learning and creativity

- Bakker, H., F.K. Boersma and S. Oreel (2006). Creativity Management in Industrial R&D Organizations. A Crea-Political Process Model and an Empirical Illustration of Corus RD&T, *Creativity and Innovation Management*, 15(3), 296-309.
- Broekhans, B., M. Popkema and F.K. Boersma (2005). 'Kennis-vragen in de polder. Een inleiding', in: Alberts, G. et al. (red.): *Kennis-vragen in de polder. Jaarboek Kennissamenleving. Deel 1*. Amsterdam: Aksant Academic Publishers.
- Berends, H.H., F.K. Boersma and M. Weggeman (2003). The Structuration of Organizational Learning, *Human Relations*, 56(9), 1035-1056.

Surveillance studies

- Boersma, F.K., M. Büscher and C. Fonio (2022). Crisis Management, Surveillance, and Digital Ethics in the COVID-19 Era. *Journal of Contingencies and Crisis Management*, 30(1), 2-9.
- Boersma, F.K. and C. Fonio (eds.) (2018). *Big Data, Surveillance and Crisis Management*. London: Routledge.
- Boersma, F.K., R. van Brakel, C. Fonio and F.P. Wagenaar (eds.) (2014). *Histories of State Surveillance in Europe and Beyond*. London: Routledge.
- Fuchs, C., F.K. Boersma, A. Albrechtslund and M. Sandoval (eds.) (2011). *Internet and Surveillance*. London: Routledge.
- Wagenaar, P. and F.K. Boersma (2008). Soft sister and the rationalization of the world. The driving forces behind increased surveillance, *Administration Theory & Practice*, 30(2), 184-206.

Corona pandemic

- Boersma, F.K., Y. Kyratsis and J.J. Wolbers (2022). “A Contested Intelligent Approach. Crisis management and societal response to the COVID-19 pandemic in The Netherlands”. In: Cheung, A. and S. Van Thiel (Eds.). *Crisis Leadership and Public Governance during the Covid-19 Pandemic: International Comparisons*. World Scientific Publishing Co. Pte. Ltd.
- Boersma, F.K., M. Büscher and C. Fonio (2022). Crisis Management, Surveillance, and Digital Ethics in the COVID-19 Era. *Journal of Contingencies and Crisis Management*, 30(1), 2-9.
- Brakel, R. van, O. Kundina, C. Fonio and F.K. Boersma (2022). Bridging values: finding a balance between privacy and control. The case of Corona apps in Belgium and the Netherlands. *Journal of Contingencies and Crisis Management*, 30(1), 50-58.
- De Vries, M., Claassen, L., Lambooi, M., Leung, K.Y., Boersma, F.K. and Timen, A. (2022). Understanding COVID-19 vaccination intentions: a major role for the belief that vaccination will put an end to the crisis. *Emerging Infectious Diseases*, 28(8), 1642-1649.



Kees Boersma,
PhD.
f.k.boersma@vu.nl

I am Professor of Socio-Technical Innovation and Societal Resilience in the Faculty of Social Sciences (at the Department of Organization Sciences) and in the Faculty of Science (at Science, Business & Innovation) at the Vrije Universiteit Amsterdam.

I am passionate about doing research on technological and organizational innovation in complex, demanding environments. I like to work in projects with experts from various disciplines, including computer science, earth and life sciences, law and development studies, and in collaboration with professionals, practitioners and policy makers. I teach in the areas of organization sciences, innovation studies, crisis and disaster management, and societal resilience. I publish on these topics in journals including *Organization Studies*, *Contingencies and Crisis Management*, *Organizational Change Management*, *Public Administration*, and in edited books and volumes.