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Between Infrastructural Experimentation and Collective Imagination: The Digital Transformation of the EU Border Regime

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Abstract

A central and formative ingredient in the governance of migration in the European Union (EU) is the continuous construction of a large-scale digital infrastructure to ensure border security. Although border and critical security studies have increasingly focused on the multiple aspects of techno-materiality and infrastructural devices of border control, less has been said about how such an infrastructure encodes and transmits collective future visions of border (in)security. Therefore, this paper analyzes the making of a sociotechnical imaginary of digital transformation of the EU border regime, specifically focusing on the role of eu-LISA, the European

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agency for the development and management of large-scale IT systems. Drawing on ethnographic observations and interview material, we analyze the ways in which this agency emerges as a site for assembling and rehearsing this sociotechnical imaginary, gradually transforming borders into sites of experimentation in the EU Schengen laboratory. As our case illustrates, studying the visionary dimensions of digital infrastructuring helps us to understand how imagination becomes collectivized and materialized, opens up or closes down sociotechnical realizations, and thus tacitly governs the project of digitally infrastructuring the EU border regime.

Keywords
infrastructuring borders, sociotechnical imaginary, governing migration, experimental politics, digitalization

Introduction: Infrastructuring EU Borders

The registering, processing, and storing of migrant data have proliferated and have transformed the landscape of border control in Europe. In particular, large-scale IT systems have become an integral part of the discursive and material infrastructures of the border regime in the European Union (EU) that currently hold the complex logics and the imaginaries of control in place. As these infrastructures are built, they "become spaces of bordering practices in their own right" (Walters 2009, 495). In Europe, this is aptly demonstrated by the legal and technological expansion of biometric IT systems such as the EURODAC system, the centralized fingerprint database for asylum seekers, or the Visa Information System, which stores and cross-checks the biometric identities of visa applicants. In official terms, the EU now seeks to govern and control migration by continuously improving "the Union's data management architecture for border management and security" (EU 2019, 2), which is based on the promise of constructing new databases, such as a centralized Entry-Exit System (EES), and promoting interoperability between databases, for example, through an underlying common identity repository of biometric templates.[1] This continuous buildup and expansion of transnational databases and the practices they involve not only testify to a digital solutionism (Morozov 2013) behind contemporary processes of rebordering but can also be seen as part of the "reaction formations" to cross-border mobility (De Genova 2017, 5)—a process best described as the digital infrastructuring of EU borders.

In this article, we want to move away from focusing on the heavy investment in databases and related IT infrastructures to reconfigure borders and instead investigate collective visions of border (in)security as key actors within these developments. In doing so, we specifically look into the role of the European agency eu-LISA, which is the responsible body for developing and building IT systems and the underlying infrastructure for the purpose of managing EU borders.[2] It is the agency that "provide[s] continuous monitoring of infrastructure, services and systems" (eu-LISA 2015a, 8). Being interested in the imaginative dimension of this technological project, we devote specific attention to how databases and related infrastructures encode and translate future visions of (in)security and social order. We aim to study how collective imagination and processes of digital infrastructuring mutually shape each other. We thus direct our attention to eu-LISA's construction and rehearsal of a sociotechnical imaginary (Jasanoff and Kim 2015; Felt 2015) of *digital transformation* that aims at stabilizing both the shared vision of border (in)security and the related infrastructure. We start by describing the efforts of eu-LISA in trying to implement its vanguard vision (Hilgartner 2015) of the sociotechnological problem at stake and then show the work done to transform it into a widely shared and institutionally stabilized sociotechnical imaginary, which is actualized through the emerging digital infrastructure. Unpacking the making of this imaginary allows us to understand why and how the visions of certain futures seem to prevail over others and, most importantly, become politically normalized and powerful—even though officials and experts oftentimes refer to the actual construction and operation of databases/digital infrastructures as yet fragile and uncertain.

In offering our analysis, we want to contribute to a growing body of scholarship at the intersection of migration and border studies, on the one hand, and science and technology studies (STS), on the other. These studies have explored the various processes of infrastructuring to bring out the often invisible, laborious, and taken-for-granted work needed for the creation and maintenance of contemporary borders. We might also call this turn a heuristic shift to studying how "human *and* nonhuman actors that move migrants within specific infrastructural frames" (Lin et al. 2017, 169) are part of an increasingly logistified management of migration (Mezzadra 2017; Altenried et al. 2018). A common denominator among scholars is to focus on the emergence and proliferation of techno-material devices and practices that enact migrations in and to Europe (Scheel, Ruppert, and Ustek-Spilda 2019; Leese, Noori, and Scheel 2021). The digitization of border and migration management has moreover been examined as the

formation of an "administrative ecology" (Dijstelbloem and Broeders 2015) that calls for exploring the hidden scripts of a violent border regime. Migrations are brought into being and rendered governable through practices of inscription and visualization (Dijstelbloem, van Reekum, and Schinkel 2017; van Reekum 2019; Pezzani and Heller 2019; Follis 2017). At the same time, infrastructures also "reveal and [. . .] perform broader legislative, political and administrative transformations in the European bureaucratic order" (Pelizza 2020, 263). In other words, border and migration control infrastructures are coproduced with the sociopolitical orderings of Europe (Pollozek and Passoth 2019; Pelizza 2020). However, what these studies have given less attention to is the powerful role of sociotechnical visions, which will be the core contribution of our following analysis.

After outlining our conceptual framework, we conduct our empirical analysis in three steps. First, we revisit the making of eu-LISA as a relatively young institution in the EU border regime and how it enables its member states to centralize a growing digital infrastructure of borders. We believe that the agency, in orchestrating relations between various actors in the EU border regime, positions itself as a vanguard in forging and rehearsing a particular vision of reconfiguring borders by digital means. Second, we elaborate on the practices of narration and visualization that construct a particular future imaginary to be realized through the "digital transformation." Third, we examine when and how this imaginary is rehearsed in order to align new actors. In doing so, the agency embraces an experimental approach, gradually developing and testing potential options and thus working toward stabilization. Finally, we reflect on this process of reimagining EU borders by discussing some of its implications and point to related areas of further research.

Conceptualizing EU Borders as Sites of Experimentation

Infrastructural Experimentation

To capture the heterogeneous bordering processes in Europe, the notion of the "regime" has been used to describe the "multitude of actors whose practices relate to each other, without, however, being ordered in the form of a central logic or rationality" (Tsianos and Karakayali 2010, 375). More recently, scholars have argued that digital infrastructures have become key sites and arenas for the interplay and contestation between state and nonstate actors, (im)mobilities, and various regulatory practices in the border

regime (Pelizza 2020; Pollozek 2020; Amelung et al. 2020; Lin et al. 2017). The distributed character of infrastructures has moreover directed scholarly attention to the multiple and dispersed operations of control through which borders enact and maintain their "double function of politics at a distance and virtual data collection" (Tsianos and Karakayali 2010, 374).

However, to capture the distinct *experimental* character through which these digital borders are currently developed, deployed, and policed, it seems productive to use the notion of the laboratory as a sensitizing concept. As a metaphor, this notion has long been used to describe Schengen as a testbed for European integration and transnational cooperation between security actors to govern mobile populations (Zaiotti 2011, 74-75; Hess and Kasparek 2017, 60). Here, we suggest considering the introduction and expansion of a large-scale digital infrastructure as the *laboratorization* of the Schengen Area (allowing free movement of people), turning the borders into sites of experimentation. According to Knorr Cetina (1999), the laboratory is a space in which objects can be manipulated and reconfigured so that the "they match with an appropriately altered social order" (p. 44). However, experimentation has also been increasingly carried out beyond the classical laboratory, and we have witnessed the emergence of concepts such as "living labs," "real-world laboratories," and "society as a laboratory" (Van De Poel, Mehos, and Asveld 2017; Guggenheim 2012). This is in line with Engels, Wentland, and Pfotenhauer's (2019) argument that, currently, "it is society *as well as* technology that are subject to experimentation and testing" (p. 3, emphasis in original).

In our understanding of the border laboratory, we follow Guggenheim (2012) who defines a laboratory not as a physical, fully controlled territory but as *space of experimentality* that aims to bring under control the data and objects it seeks to manage. The laboratory is a "procedure that often results in a space with the properties to separate controlled inside from uncontrolled outside" (p. 101). Not only do borders move into the laboratory (Bourne, Johnson, and Lisle 2015), but the Schengen space *as* a laboratory "must be permanently brought into being, and it must be imagined and practiced" (Felt 2017, 153). The introduction of large-scale infrastructures in the border regime must therefore be imagined and gradually implemented to establish this space of experimentality. Take, for example, this statement of a senior official in the EU: "Now, the real test is with the development of new systems. And we have to see how that works out" (Interview 13 with EU official, 2019). This official does not understand and anticipate the buildup of IT systems in the border regime to be an infrangible project with stable and transparent outcomes. Instead, he implies that uncertainty and instability

might be gradually reduced through a process of experimentation. In that sense, experimentation turns infrastructures into emerging sites for engaging with and producing "new worlds" (Jensen and Morita 2015, 85) and the limits thereof. It is a procedure that performs what Callon, Lascoumes, and Barthe (2009) call *laboratorization*, a constant "interminable undertaking, always starting up again" (p. 67).

Collective Imagination

What is central to the (experimental) process of infrastructuring, as we argue throughout this paper, is how it is imagined and performed and by whom. How, in other words, can infrastructures become those "emblematic reflections and representations of particular social or political agendas" (Aarden 2017, 754)? Following Jasanoff and Kim's (2009, 2015) framework of sociotechnical imaginaries, we therefore trace the collectivized visions of social order and (in)security that are promoted as "attainable through, and supportive of, advances in science and technology" (Jasanoff 2015a, 15). As Jasanoff argues, designs of the future, articulated as collective acts of imagination, operate as "a crucial reservoir of power and action [that] lodges in the hearts and minds of human agents and institutions" (p. 17). Promised by science and technology, futures of border (in)security are propagated to become "integrated into the discourses and practices of governance, and thereby structure the life worlds of larger groups" (Jasanoff 2015b, 329). The unabated strength of this framework lies in its explanatory power in demonstrating how a particular technological trajectory of the border regime is related to the construction and gradual domination of certain visions of order and "progress" through advances in digital technology. Imaginaries have been associated predominantly with the modern nation state that orchestrated the coproduction of visions of science and technology with national policies, regulations, and institutions. However, forging and advancing imaginaries are frequently carried out by smaller collectives, such as institutions or corporate actors that may operate on the transnational level (Sadowski and Bendor 2019; Schiølin 2020). Pickersgill (2011) uses the case of neuroscience and law to show how imaginaries of transnational collectives (other than states) can be constitutive of, and simultaneously produced by, anticipatory and normative discourses that either develop and promote, or limit and restrict, certain engagements and ways of thinking. Institutional actors can secure their ascent and positions of power if they possess the means and resources to assemble and stabilize imaginaries, that is, to homogenize the visions of collectives and gradually

silence alternatives. In this context, Hilgartner (2015) speaks about *vanguards* who often portray themselves as the chosen harbingers of change by promoting "bold" or "progressivist" visions yet to be stabilized or embraced by larger political or social collectives.

Our empirical study of eu-LISA is a case in point, as we explore the agency as a European vanguard that attempts to assemble, rehearse, and stabilize the sociotechnical imaginary of digital transformation. Although its representatives tend to emphasize the technocratic character of this agency, their shared imaginations routinely focus on the digital infrastructure of borders, turning it into a vehicle "whereby those fantasies are transmitted and made emotionally real" (Larkin 2013, 333). By the example of the emergence, the projects and activities of this European institution, the eu-LISA agency, we can explore how a particular future of borders, its materialization, and its underlying norms and values are gradually assembled and rehearsed promising order and stability.

Connecting these two lines of thinking—infrastructural experimentation and collective imagination—we will investigate the Schengen borders as sites of infrastructural experimentation and trace how an imaginary can obtain *agency* in shaping technological and infrastructural change as it gets scripted "into the hard edifices of matter and practices" (Jasanoff 2015b, 323).

Notes on Method

For our analysis, we drew on materials including ethnographic observations, documents, and field notes collected over three years of empirical research (2018-2020). We selected additional material from more than thirty semi-structured interviews and informal conversations with officials from European and national institutions related to the development and management of IT systems. We focused in particular on the interviews with eu-LISA and European Commission representatives as well as on the observations we made at events organized by eu-LISA, where we could gather visual materials that addressed a broader audience beyond the agency's inner circle. To preserve anonymity, we refrain from specifying the interview partners' positions and affiliations but cite interviewees as "EU officials" or "member state representatives."

We understand both ethnographic observations and interview situations to be crucial sites of narrative production. In these scenarios, actors generate, share, and collectivize narratives, which are viewed as modes of knowing and communicating (Czarniawska 2004). We mobilized the tools of situational

analysis (Clarke, Friese, and Washburn 2018) and coded the material thematically to map out the central narrative and discursive elements and strands. This allowed us to identify and relate these elements to each other as well as locate them in the broader research situation, for example, by establishing the links between the key narrative elements, the different experimental practices, and the infrastructural sites of the agency. Of particular importance to our iterative and interpretative approach was to incrementally relate the sites of narration and visualization to the experimental practices of the agency. We then attempted to outline this future imaginary by elaborating on its key assembling practices and rehearsal sites as well as its integration into the eu-LISA's overall governance of large-scale IT systems.

"Not Just an IT System": Eu-LISA as Vanguard

The eu-LISA agency was legally established in 2011 to become a centralized node in the digital infrastructure of the EU border regime. Although the agency administers and develops all relevant large-scale databases related to the governance of borders and migration, only a few academic contributions account for the distinctive role of this institutional actor and its practices. Bigo (2014), for example, mentions that the agency represents a regrouping of software engineers and technicians and institutionalizes a perception of borders as "something to be analysed as points of entry and exit, connected through computerized networks that gather and analyse the traces of travelers" (p. 217). A notable exception is also Tsianos and Kuster's (2016) article on "the power of big data within the emerging European IT agency," which conceptualizes eu-LISA as a "technological zone" that ultimately intensifies surveillance through its expansionist and technocratic character, striving for the "optimization of technical process solutions, advanced data convertibility, and the excess of data" (p. 240). In a similar fashion, Glouftsios analyzes eu-LISA's mundane technological work to make visible how maintenance and repair "sustains the power to govern international mobility by digital means" (Glouftsios 2021, 457). While it is certainly worth pointing out this technocratic character, we propose to explore eu-LISA as a central agent in imagining and anticipating a vision of border (in)security that should be materialized through its sociotechnical experimental practices. We furthermore consider the agency as a hybrid institutional space in which various epistemic communities interact and various futures of borders are anticipated and negotiated. As one official describes it, eu-LISA is "not just an IT system; it's an agency that ensures many things" (Interview 3 with EU official, 2018).

In the EU's emblematic regulatory jargon, Regulation No 1077/2011 sets forth the rationale for establishing the agency: "With a view to achieving synergies, it is necessary to provide for the operational management of large-scale IT systems in a single entity, benefitting from economies of scale, creating critical mass and ensuring the highest possible utilization rate of capital and human resources" (EU 2011, 2). The creation of the agency is explained as a rational and cost-sensitive step to efficiently govern the expected expansion of large-scale IT systems in the so-called area of justice, security, and freedom. At the same time, this story successfully conceals the complex and diverging interests and contestations involved in the making of this institution, which involved the rearranging of knowledge patterns and governmental practices vis-à-vis techno-scientific developments.

The European Commission's continuous aspirations of Europeanizing the agenda of border security through building centralized IT systems, such as the Visa Information System and EURODAC, have been met with growing skepticism by EU member states. The states did not embrace the prospect of a large-scale border infrastructure project being part of the Commission's domain, as it would mean boosting the Commission's resources and thus its institutional power over the sensitive agenda of migration and borders. The increasing extension of borders into the virtual realm of databases (Côté-Boucher 2008, 160) thus turned European IT systems into sites of institutional struggles for sovereignty and power. Consequently, one interviewee stressed, "this is the member states' data. So, we are owning the data, which is important, so it is still, [. . .] let's call it communication towards the member states [. . .] that this is our agency" (Interview 24 with member state representative, 2019). EU agencies are not simply the Commission's little helpers but are often compromise solutions that epitomize the experimentalist framework of EU governance (Sabel and Zeitlin 2010). Established as an agency, eu-LISA allowed the necessary technical, human, and financial resources to be shifted to a "European" body that member states could better control. A management board with representatives of the member states and the commission was installed to oversee "the effective and coherent delivery of the eu-LISA vision" (eu-LISA 2020a). Accordingly, the agency must ensure it is "continuously aligning the capabilities of technology with the evolving needs of Member States" (eu-LISA 2017, 4).[3]

This brief account of the negotiated establishment of the agency also explains the relative institutional autonomy that allows the setting and driving forward of its own agenda within broader goals of border and migration

policy. At the same time, it gives member states a sense of centralized control over the transnational IT systems. We go one step further by arguing that the agency establishes itself as a vanguard, formulating and acting "to realize particular sociotechnical visions of the future that have yet to be accepted by wider collectives" (Hilgartner 2015, 34). eu-LISA should thus be considered an institution-in-the-making that solidifies and legitimizes a growing transnational dataveillance infrastructure in the EU border laboratory. It is therefore important to dissect its narrations through which ideological and normative elements are enmeshed with future visions of border (in)security and its material infrastructure.

Narrating the "Transformation": Inevitability, Unidirectionality, and Crisis

Three core narrative elements repeatedly emerged in our conversations with senior officials and higher representatives of eu-LISA and in their public appearances at official events. At times, they clash with individual statements made by national experts and practitioners at the agency, which tend to highlight their strictly executive mandate. However, as we argue, the agency actually operates as a vanguard by imagining and anticipating a particular future, creating a moral economy around it, and discursively setting "the conditions of possibility for action in the present, in which the future is inhabited in the present" (Adams, Murphy, and Clarke 2009, 249). These narrations are frequently combined in the concept of "digital transformation," which articulates an abstract future horizon and echoes broader contemporary imaginaries such as the "digital revolution." At the same time, it signals the agency's desire for change and the promise to actualize change through its infrastructural practices.

The first narrative element relates to the *inevitable and totalizing character* of digital transformation to bring into being our secure future. Techno-optimist sentiment prevails in this narrative, but the meaning of inevitability also disempowers social actors, framing them as exposed to and not agents of technological change. They are passengers without the capacity to steer: "One of the things I constantly repeat in different fora, [. . .] indeed, today we see [a] very major transformation of border management and internal security" (Interview 1 with EU official, 2018). Another high-ranked official claims likewise: "We are witnessing a deep transformation as a fast process of convergence" (field note, eu-LISA conference, October 16, 2019). As such statements are omnipresent, they

together discursively affirm and reproduce inevitability and situate the future in the here and now. It is a quasi-compulsory vision calling for immediate action in the present. During an eu-LISA event, one of the presenters argued, "You are starting this journey whether you want it or not" (field note, eu-LISA Industry Roundtable, April 24, 2019). The policy fields of border control, migration management, and internal security are framed as converging pieces fully determined by the "whole"—they become, inevitably, elements of the same "bigger and unique journey" (field note, eu-LISA Industry Roundtable, October 17, 2019). This "digital journey," in which everyone is perceived to be a voluntary or an involuntary passenger, conditions the scope and rationale of the agency's interventions: "We step into the future and invest into the future, that is what we do today" (field note, eu-LISA Industry Roundtable, April 24, 2019), whereas "all these expenses, if you like, are in fact investments for the future of all" (Interview 3 with EU official, 2018). Rendering the transformation inevitable in the name of a secure future frames the agency's building and expansion of a digital border infrastructure as a mandatory intervention.

The second core element constructed through narration and visualization is *unidirectionality*. It provides another powerful resource for officials to endow digital transformation with authoritative determination. For instance, during an official presentation, the agency would symbolize unidirectionality by a linear, blue arrow (see Figure 1). The arrow signals the integration of both time and technology into one clearly directed progression, leading to a fully virtualized space. The caption "a shift from physical to virtual" plainly invokes the notion that we find ourselves on a trajectory of change, on "a cumulative journey [. . .] from now to then" (Appadurai 2013, 223). In a conversation, a senior official explained that the transformation's "most obvious aspect, of course, is movement from the physical to the virtual world, which means that today, border management and internal security, migration management, all those areas are totally dependent [. . .] from the data and information available" (Interview 1 with EU official, 2018). While these representations remind us of neoliberal dreams of data-driven, seamless global networks and flows in contemporary capitalism (Broeders and Hampshire 2013; Boltanksi and Chiapello 2018), they also appear to render invisible the physicality of border environments, migrant bodies, barriers, queues, and checks by shifting them to a virtualized space. This image promises to detach human mobility from its very physical and local situatedness and render it into data streams and data points that are visible and actionable in a laboratory-like environment

Figure 1. eu-LISA slide presented at the conference "ID@Borders," organized by the Organization for Security and Co-operation in Europe, Vienna, April 11, 2019.

operating on a seemingly global scale. Conceptualizing the transformation as a unidirectional shift from "physical to virtual" neglects not only the human dimension of such transformation, but also the many "collateral realities" (Law 2015) that are created and that migrants have to confront. The virtualized laboratory articulates a desire to obtain one particular mode of authorized seeing (Jasanoff 2017), that is, a *view from beyond*, that conceals any frictions between human mobility and border control. The lab then seeks to dissolve the boundaries between the site and object of experimentation, translating both border settings and migratory human subjects into data that ought to be channeled and calibrated.

The third recurrent narrative element we identified is the double sense of *urgency and insecurity*, repeatedly conjured by a future that is couched not only in progressivist notions but also in visions of crisis and undesirable threats. For instance, eu-LISA's (2017) public strategy implies that its activities seek to avoid the "dramatic consequences on the future of Europe" if Europe reveals itself of being "too open and therefore exposed to the effects of globalization" (p. 7). More generally, the concept of crisis is

routinely invoked to render necessary the continuous buildup and implementation of large-scale IT systems. As one official argued, "we experience in Europe a lot of immigration and financial crises, two crises at the same time, especially with immigration and war around the Mediterranean. [. . .] [Y]ou will see that indeed, the situation [. . .] we experienced the last three, four years augmented, if you like, the need for the systems" (Interview 3 with EU official, 2018). The "digital transformation" presents a project that secures European order against a future that is pictured as potentially undesirable and dangerous. The invocation of "crisis" both naturalizes and affirms challenges to social order while calling to solve them via a technological fix. As a permanent diagnosis, as Schinkel (2015) defines Walter Benjamin's conceptualization of crisis, it appears "in the form of a crisis-recovery, of a crisis-as-opportunity and therefore at best of an affirmative critique" (p. 44). The transformation imaginary therefore engenders a crisis/order combination that, at the same time, perpetuates the illusion of techno-scientific progress.

eu-LISA's sociotechnical imaginary is thus assembled by means of a specific set of narrations and visualizations that portray the digital transformation as inevitable, unidirectional, and urgently needed. These elements may not be exceptional and resemble similar tropes in large-scale technological projects or innovation; however, they gain credibility and compose this imaginary only through specific, situated narrative performances. They allow the agency to portray itself as a vanguard with almost eschatological potential. One official argued, "we are the people who materialize the needs of the European citizens [. . .] We are the people who make their concerns [. . .] or their wishes reality, through technology" (Interview 3 with EU official, 2018). The invocation of the "European citizens" and their desires that must be directly realized by the agency's techno-material intervention implies that its vanguard role does not require conventional democratic legitimacy. It seems to be substituted by the agency's role as a harbinger and frontrunner in driving the transformation—"this very fast process of convergence between border management, internal security and migration management" (Interview 1 with EU official, 2018). The sense of urgency is important to the evocation of an exceptional space in which the agency wants to offer a disciplining guidance and epistemic orientation, demanding compliance with techno-centric transformations promising security for the future. At the same time, it limits the discursive space in which this future could be called into question, marginalizing alternative visions or framing them as destabilizing.

Embedding and Rehearsing the Transformation Imaginary

Aligning Actors—Turning a Vision into a Shared Imaginary

In the institutional machinery in this Schengen border-laboratory, eu-LISA's function as a "knowledge hub" should provide an arena in which different actors and communities can engage in collective acts of imagination. At the agency's official events, this sometimes can happen in over-emphatic ways, for instance, when the audience is called upon to acknowledge the "power of thought and imagination to create something," and Abraham Lincoln is quoted as saying "the best way to predict the future is to actually create it" (eu-LISA 2019a). Conferences, industry roundtables, and other forums are spaces in which to circulate discourses or problematizations of "smart" or "new" technologies among a variety of policy delegates, technical experts, industry representatives, and national bureaucrats in the police and migration sectors. These professionals use these meetings to communicate as "peers" in the border regime, speak about potential future challenges, and foresee and anticipate change (Interview 17 with member state representative, 2019). As Feldman (2014) crucially observed, the protocols of such ritualized meetings "ossify" social patterns that create the "epistemological condition for policy knowledge, and a discourse through which migration can be described as a particular kind of problem" (p. 49). These gatherings then also engage professionals and delegates in particular future-making practices and give them the feeling of speaking a common language. The ostentatious, anticipatory orientation toward the future testifies here to the important role of building aspirational regimes and transnational communities for digitally infrastructuring borders (Wienroth 2018). Participants must embark on the almost impossible task of creating a shared epistemological space in which they can discuss a "European" understanding of digital borders. This sense is expressed, for instance, by one of our interviewees:

> [T]here is a very big difference [in] understanding what this all means. [. . .] [W]e have different actors: ministerial actors, there are agencies, there are different agencies, there are ICT people, there are people working with the national legislation. And it's very hard, [. . .] to form a common understanding of what's happening and what is needed on the national level. So, these seminars, [. . .] it's actually distributing information to everybody. (Interview 26 with a member state representative, 2019)

Despite these apparent challenges, meetings allow the agency to align other actors and rehearse the transformation imaginary in a setting inhabited by a wide range of European security professionals and commercial stakeholders. A high ranked official, for example, appeals to "the industry to join in this broader project, in this bigger and unique journey" (field notes, eu-LISA Industry Roundtable, October 17, 2019). eu-LISA therefore constitutes the "territory" in which technological promises and futures are collectively framed and promoted. Beyond policy meetings and conferences, the agency seeks to enroll actors by publishing in quarterly publications such as "Border Management Today," which likewise address the broader epistemic communities of security and IT professionals.[4] Here, the buzzwords and slogans are pitched, in repetitive style, to illustrate the contours of the imaginary: "the digital transformation of border management in the EU and globally will continue at high pace in the coming years" (Garkov 2020, 29). "Stakeholders," such as "carriers, passengers, airport and seaport operators and other relevant actors," need to be integrated into the process of "redesign[ing] of business models at the borders" (Garkov 2020, 29) and aligned with this vision. Therefore, the alignment of a growing number of diverse actors must be achieved to stabilize eu-LISA's sociotechnical imaginary and to fully unfold the power of its material realization—the IT infrastructure of border control.

A Process of Experimentation

In the EU border regime, the transformation imaginary is furthermore embedded in concrete practices and activities, assembling the material infrastructure, the meaning it should acquire, and the normative values that promise to preserve order. We describe these as *practices of experimentation with and through the gradual infrastructuring of borders* to illustrate how futures are not simply imagined collectively in a vacuum but rehearsed in specific contexts and integrated into, and thus stabilized through, concrete artifacts and projects. Experimentation is here understood not as a sudden, large-scale social experiment, but as a continuous, staged process driven forward by agencies such as eu-LISA that subject EU borders to a regime of testing. The agency promotes and performs these experimental practices as preferred modes of assembling technologies, databases, institutional and human actors, and futures, through either large-scale IT projects or its hybrid agenda of research and development.

A good example is the so-called *Smart Borders Package*, proposed as "the next steps in border management" (EC 2008). Initially, it contained a

set of legislative proposals that planned to biometrically register and store all non-EU citizens' entries into and exits from the Schengen territory in an Entry-Exit-System. Sontowski (2018) demonstrates how "smart borders" have evolved as a contentiously debated project repeatedly brought to the brink of failure (p. 2731). A key turn in these controversies has been the involvement of eu-LISA, which was tasked with establishing "a unique and large-scale EU pilot" (eu-LISA 2015b, 3). The pilot branded the project as "testing the borders of the future" to anticipate the "significant transformation" that the border management of the EU would undergo. The agency conducted the pilot in collaboration with the consultancy PricewaterhouseCoopers to explore how "we make the external border a reality [. . .] in this European question of borders," according to one consultant (Interview 5 with private consultant, 2019). In twelve EU member states, the pilot tested the enrollment procedures of biometric registering and identification, that is, various amounts and combinations of fingerprints, facial images, and iris scans, of third-country nationals at eighteen border crossing points. Casting biometric (re)bordering into the language of testing became an instrument to confront vocal opposition against new "smart borders," especially in the European Parliament, where the roll-out of biometrics on this scale was criticized as disproportionate, ineffective, and expensive. Through its involvement and subsequently released technical reports, eu-LISA aimed to produce "(counter)evidence" (Sontowski 2018, 2739), which also envisioned "smart borders" to be a realizable goal on a unilinear trajectory that is propelled by experimental activities such as research and testing.[5] The reports of the pilot visualized experimental activities such as research and testing as cornerstones in the construction of "smart borders" (see Figure 2). They seem to enroll various actors, such as consultancies, vendors, member state experts, representatives of the commission, and technicians, into this gradual process of realizing a large-scale IT system—a move that is hoped to support the imaginary of transformation to materialize.

Our second example is the large-scale project of interoperability that is being developed by the agency. Its widely debated legal framework was adopted in 2019 to render possible the rearrangement of the infrastructural architecture of EU borders by interconnecting all databases used in the management of migration and borders (EU 2019). The interoperability project attempts to technically converge databases that have been operating separately on principles of data protection, thus pooling and repurposing sensitive personal data of third-country nationals. Although much more could be said about this new architecture, we are interested in reflecting

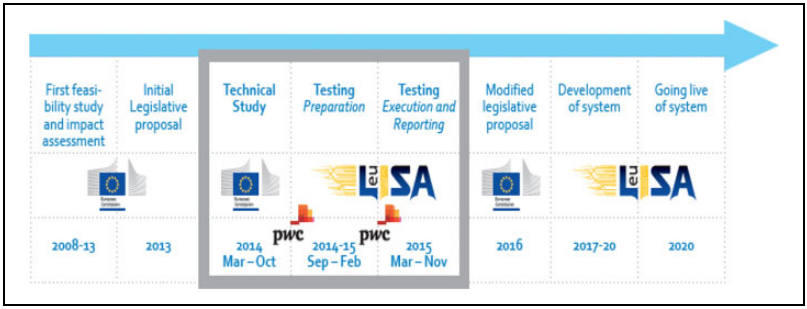

Figure 2. "Indicative timeline for the establishment of smart borders," taken from eu-LISA (2015b).

on it as an additional moment in the gradual process of infrastructural experimentation. Its mechanisms and actual effectiveness are often described as complex, precarious, and uncertain, that is, as a *test*. One interviewee explained, "that's going to be a big test; [. . .] there is no other way to do it. [. . .] [Y]ou need an agency to do it, and now we have to see what comes out" (Interview 13 with EU official, 2019). The infrastructural project is here conceptualized as an experimental process that can only gradually reduce uncertainty and complexity in the border regime (Van De Poel, Mehos, and Asveld 2017). In a feasibility study on interoperability as "the Future Architecture" (eu-LISA 2019b), the agency furthermore argues: "Given the significant changes to come, it is critical that new developments and evolutions currently being planned and even under way proceed with full knowledge of the intended future state" (p. 5). Testing activities are seen as means not only to acquire "full knowledge" about any IT system but also to broadly rehearse and thus gradually stabilize the imaginary of digital transformation as the solution to future problems. Documentation and reporting, more generally, play an important role in rehearsing the sociotechnical imaginary in different contexts, which in turn allows the agency both to distribute the relevant knowledge and to navigate moments of friction or contestation.

A third example of this experimentality relates to the agency's goal and its declared intention in its new mandate (EU 2018) to evolve into a "center of excellence" and node of research and development within the border regime. As one official argued, the agency assumes "a completely new role in terms of research. [. . .] We have also reinforcement in terms of pilot projects, proofs of concept, testing. So, basically more and more the role of

eu-LISA is there, it's clear, kind of" (Interview 28 with EU official, 2019). The mandate endows the agency with the ability to increasingly carry out activities that bring to life, according to another interviewee, "a knowledge hub by default" (Interview 25 with EU official, 2019), that is, research, individual pilots, and prototypes of bordering devices (EU 2018, Art. 14-16). Again, enhancing experimental activities is perceived and promoted by the agency as a "contribution growing over time as the pace of change quickens" (eu-LISA 2020b). The agency is promoted as a site where ideas, values, norms, and future visions are again and again assembled in moments of infrastructural experimentation.

Conclusions

We aimed to carefully unpack the making of the sociotechnical imaginary of digital transformation to illustrate how visions become collectivized and transformed into powerful agents in infrastructuring both borders and the transnational regime of migration control. We argued that the materiality of technologies and the devices of rebordering are not the only issues that need closer attention when studying border regimes. As in the case of eu-LISA, dissecting and analyzing the visionary dimensions of infrastructuring helps to understand how collective imagination opens up or closes down sociotechnical realizations, tacitly governing the realm of the possible and contributing to the mounting normalization and public acceptance of border dataveillance. The agency mobilizes the performative power of the imaginary— that is the inevitable, unidirectional, and urgently needed digital transformation for ensuring border security, and aligns a diverse set of actors and practices in the project of infrastructuring. This permits the agency to present itself as a harbinger of compulsory change and its activities as legitimate means to realize the imaginary. The notion of *transformation* contains a promise of gradual and unidirectional change, through which digital solutions can arrive in almost arbitrary forms—whether they relate to the coordination, interconnection, implementation, or the automatization of border control. The transformation imaginary contributes to naturalizing a deeply held solutionism that proposes (future) techno-fixes to fundamentally social and political problems (Morozov 2013).

Moreover, this imaginary allows the emergence of a space of experimentality that exposes human subjects to numerous technological and social interventions with unclear outcomes. The EU's Schengen Area hereby becomes a laboratory, in which the governance of human mobility is detached from physical bodies and border environments. It portrays the

complex governance of mobility as securely manageable in a flattened world of calibrated and aligned data streams. While the collection of data related to mobile subjects is a complex issue, the imaginary and the related laboratorization enact the powerful idea of simplification, supporting the illusion of making humans and their mobility "behave as in the research laboratory" (Callon, Lascoumes, and Barthe 2009, 65). Simplification suggests the idea of "infrastructuring people," which, in reality, would happen through an immensely complex process. In the first step, IT-assisted bordering practices would transform humans into sets of data, turning them into IT-readable and, in theory, clearly categorizable identities. In addition, simplification promises to enable digital-ordering practices such as sorting and selecting. The consequence of such laboratorization is the black-boxing of complex local and temporal conditions of bordering, which bodies encounter and try to resist. The search for this technoscientific manipulation and conditioning of mobility resembles Shiv Visvanathan's (1997) characterization of the "laboratory state." It produces the hyperobjectification of migrants (Feldman 2011, 389), through which people, rather than being encountered as qualitative subjects, are transformed into and managed as abstract, quantitative, and calculable objects based on the digitized fragments of their identity. Moreover, European institutional actors promote and present Schengen border interventions as techno-scientifically certain and accurate, whereas the potential mistakes and inaccuracies that frequently occur in data entry and processing are difficult to expose to public scrutiny. Thus, making mobility conform to the lab not only allows to generate an increasing indifference toward migratory human beings but also to ignore the social implications deriving from mistakes in digital bordering processes. Infrastructural experimentation at border sites seems to nonetheless emerge as a mode of operation in the increasingly logistified environments of border and migration regimes (see Altenried et al. 2018; Pollozek and Passoth 2019). We thus suggest that further research should explore not only the social implications of mistakes and inaccuracies in datafication processes but also the consequences of simplification, abstraction, and experimentation.

Finally, infrastructural innovations such as those implemented by eu-LISA are materializations of a specific imaginary and pose questions of responsibility in new ways. Akrich's (1992) "geography of responsibilities" as a sensitizing concept invites us to acknowledge the role of eu-LISA as an agent that not only imagines and supports the implementation of the digital border regime but also decides what kinds of actions with regard to migrants are delegated and to whom. First, geography refers to the infrastructural

innovation of digital borders creating a space in the world—the Schengen space—that is to be protected; thus, generating an inside to be secured and an outside to be kept in its place, that is, to remain excluded. However, upon closer examination, we see that what is imagined and performed as abstract and unidirectional in the laboratory comes into being in the real world as distinctly distributed, messy, and contested infrastructures. Second, geography alludes to the places where these seemingly abstract actions become located in space and time and points to the need to better understand how responsibilities are distributed and where/by whom power can be exercised based on digital border infrastructures. We want to end with the question of how to better identify and make visible the distribution of responsibility and accountability that currently seems to be ambiguously allocated across this transnational border regime. We believe this question is necessary in order to keep this increasingly dominant imaginary of the digital transformation, and the geography of exclusions it produces, open to scrutiny and contestation.

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Notes

1. The Entry-Exit System will register all entries and exits of short-stay travelers to the Schengen space. Additional databases under development for border control are the European Travel Information and Authorization System (ETIAS) and the European Criminal Record System for Third Country Nationals (ECRIS-TCN). The oldest transnational database is the so-called second generation of the Schengen Information System (SIS II), which is an information exchange tool between police, customs, and border authorities to perform border checks and fight cross-border crime and counterterrorism. In recent years, the use of these databases has significantly expanded by increasingly granting access to law enforcement. A recent push in this regard was the adoption of interoperability regulations that aimed for a "new approach to the management of data of borders, security and migration whereby all EU information systems for security, border and migration management were to be interoperable" (EU 2019, 3).
2. eu-LISA is the official abbreviation for European Union Agency for the Operational Management of Large-Scale IT Systems in the Area of Freedom, Security and Justice.
3. The agency is located in different geographical regions. While Tallinn (Estonia) became the city of its headquarters, French authorities insisted that Strasbourg remained its operational center. The backup center was established in an Austrian mountain of the Salzburg region; these sites previously hosted both the central systems of SIS II and the Visa Information System. The commission in turn ensured that many of its staff were transferred while the member states took the opportunity to recommend their own national bureaucrats to the agency.
4. This quarterly was published by the International Border Management and Technologies Association, which describes itself as a "not for profit international nongovernmental organization" bringing together experts, practitioners, policy makers, and technology providers (see http://www.ibmata.org/about/).
5. The eu-LISA pilot report ultimately claimed that a large-scale biometric system and its comprehensive enrollment at the Schengen external borders were, in principle, "feasible (in terms of accuracy, effectiveness and impact)" (eu-LISA 2015b, 12).

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