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Estonian e-Residency: Redefining the Nation-State in the Digital Era

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INTRODUCTION

This paper explores Estonia's innovative e-Residency initiative, an ambitious project launched in 2014 that, for the first time, enables people from anywhere in the world to become digital residents of another nation. Like other pioneering developments in the Estonian "e-state," the e-Residency project challenges traditional notions of residency, citizenship, territoriality, and globalisation—with potentially profound implications for social theories of the state and citizen networks in the modern era.

The study has both theoretical and policy-oriented objectives. Theoretically, it applies the principle of "flat" ontology, drawing from the Actor Network Theory perspective, to elucidate the workings and potential impact of e-Residency. At a policy level, the analysis provides the reader with the necessary information to understand the functions and aims of e-Residency, as well as the business possibilities that it offers. Moreover, the paper will discuss lessons and insights that will help practitioners identify and unlock the transforming potential of this new policy instrument of the e-state for other nations.

The paper has four sections. First, it briefly reviews concepts and methods in Actor Network Theory, a social-science perspective that is useful in framing the theoretical underpinnings and implications of e-Residency. Second, it examines the foundations of the project within the broader context of the Estonian e-state and discusses the prime agents involved in the creation and functioning of e-Residency. Third, it assesses the initiative's benefits and risks to society. Finally, the paper concludes by exploring the broad implications of e-Residency for conventional understandings of the nation-state.

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ACTOR NETWORK THEORY: THEORETICAL AND METHODOLOGICAL RESOURCES IN THE STUDY OF E-RESIDENCY

This section introduces concepts and methods in "Actor Network Theory" (ANT) to identify and clarify the various components of the e-Residency agent network in Estonia.[1] The ANT social-scientific perspective enables us to examine the vital role of non-human technical entities, and human agents' interactions with them, in the project's origins and implementation. In particular, the notion of "flat ontology"[2] proposed by Manuel Delanda provides a useful conceptual tool to theorise about the actors involved in the creation of e-Residency; it presses us to consider these actors as concrete social agents, without taking into consideration their absolute institutional size, which can lead to an underestimation of the roles of small or individual players. Within this conception, for instance, a Ministry and an individual person could potentially have an equally significant degree of participation and influence in the development of e-Residency. Furthermore, the analysis will use ANT to expand the ontological definition of agents so that it includes non-living entities such as technical elements of e-Residency—for example, the "X-Road" or "eIDs."

In short, ANT furnishes valuable theoretical tools to integrate human and technological agency into the study of e-government practices. On this basis, we argue that e-Residency is the result of a process of sustained collaboration among human and technical agents. Each dimension—and the interactions among them—is essential to understanding the development, functioning, and success of the project. Consonant with the research methods of ANT, the study will describe, trace, and analyse the different actors and their stories.[3] As John Law and John Hassard explain, "ANT writers typically develop their arguments in an empirical context. By telling stories and tracing histories rather than taking snapshots, ANT proves itself as a pragmatic, recursive sociology of process with an interest in the uncertain processes that generate power and size."[4] The analysis of stories from the perspective of ANT yields a superior "appreciation of the establishment and the evolution of power relationships, because all the fluctuations that occur are preserved in these histories."[5]

Building on these concepts, the empirical sections of this paper describe and analyse the e-Residency project's emergence as well as benefits and risks. The discussion opens up the e-Residency "black box,"[6] reviewing its origins within the broader Estonian e-government context and tracing the specific actors and actions behind the initiative.

BACKGROUND AND ORIGINS OF E-RESIDENCY: AN AGENT-CENTRIC STORY

This section examines the broader e-government context in which e-Residency emerged and identifies the key actors and their policy decisions during the project's creation.

"E-ESTONIA" AND THE FOUNDATIONS OF E-RESIDENCY

It is not possible to understand the workings and implications of e-Residency without first comprehending the broader policy and the institutional, legal, and technical circumstances in which it was created. E-Residency is not an isolated phenomenon; rather, it is the natural extension of years of experimentation with and development of Estonian e-government practices. Today, Estonia has a technological ecosystem in which almost every regular daily activity of public life provides the impetus for its transformation into an e-service—hence, the country's common label, "e-Estonia."

What are the origins of e-Estonia? Since 1991, when Estonia regained its independence from the Soviet Union, the government launched the development of an ambitious digital infrastructure as the focal point of a national strategy to ensure the success of the country's democratic transition as well as its economic and social development. Estonia had the opportunity to start from scratch and invest in the newest information technologies then available. Thus, the 1990s were the foundational years for

1   See, for example, Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2005).
2   Manuel De Landa, *Intensive Science and Virtual Philosophy* (London: Continuum, 2002).
3   Wiebe E. Bijker and John Law, *Shaping Technology/Building Society: Studies in Sociotechnical Change* (Cambridge, Mass.: MIT Press, 1994), pp. 21–52; and Michel Callon, "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay," in John Law, ed., *Power, Action, and Belief: A New Sociology of Knowledge?* (London: Routledge and Kegan Paul, 1986).
4   John Law and John Hassard, *Actor Network Theory and After* (New York: John Wiley and Sons, 1999).
5   Callon, "Some Elements of a Sociology of Translation."
6   John Law and Michel Callon, "The Life and Death of an Aircraft: A Network Analysis of Technical Change," in Bijker and Law, eds., *Shaping Technology/Building Society.*

the succeeding two decades of technological innovation in the country's transformation. During this period, the legal and political elite sought a technologically driven solution to post-Soviet economic, social, and political crises. Two elements of this transitional strategy were crucial to the consolidation of e-Estonia (and the emergence, later, of e-Residency): Estonia's ID code system and its e-government infrastructure (in which the new initiative is firmly embedded).

The first key basis of e-Residency—and, more broadly, e-Estonia—is the Estonian Personal Identification Code, or *isikukood*.[7] The isikukood was created in 1990, even before the liberation of Estonia from the Soviet Union. It was conceived as an instrument against occupation because it enabled dissident movements to register and organise the native Estonian population—an act that was explicitly forbidden by the Soviets.[8] Later, the isikukood was integrated into the new "eID" system described below and extended to physically resident non-citizens. The new e-Residency project takes this logic to a new level: it expands Estonia's unique identification code system to foreigners who are not physically present in the country. Since its creation, the isikukood has been the key instrument with which citizens and now e-residents access all government e-services, banking operations, and business transactions. On the Internet, the isikukood is just as valid as a person's signature is in the physical world. Furthermore, it provides e-residents with a unique identity, which prevents the confusion that often arises from the existence of multiple digital identities among the same users. Without it, the security foundations of the Estonian e-government and the e-Residency ecosystem would not be as strong as they are today.

A second important factor in the development of e-Residency was the emergence of a robust legal and policy environment in e-government, along with a technical infrastructure. Moves to establish Estonia's current e-government infrastructure began with the adoption of the Database Act in 1997,[9] which regulated digital databases from creation to maintenance. One year later, "The Principles of the Estonian Information Policy"

became the country's first overall digital strategy.[10] Some researchers, however, dispute the significance of this plan. Meelis Kitsing, for example, argued that in the Estonian case, success was based instead on particular efforts from different e-services that belonged both to the government and to the private sector.[11] In addition, access to the Internet became a basic human right in Estonia in 2000,[12] prompting an intensification of efforts to expand connectivity to rural areas, which would enable the government to develop and offer its online services more widely and equitably among the citizenry. By the end of 2001, one of the pillars of Estonian e-government was launched, the so-called "X-Road" exchange layer, which enables secure interconnections between state information systems.[13] Various government databases use this digital platform to communicate with each other: all Estonian e-services are connected to it. But the platform's proper and secure functioning necessitated a mechanism for secure access—hence, the creation of eID cards.[14]

The X-Road and the eID are the fundamental technical and policy bases of e-Estonia. The X-Road is the infrastructure that allows the creation and coordination of new e-services; the eIDs, which incorporate the isikukood, are equipped with a chip and two authentication codes for accessing the X-Road. By integrating and leveraging these two elements of the system, the government has greatly facilitated the development of a new generation of e-services. Further services can easily be built onto this existing infrastructure; new entities can simply adopt its pre-existing components.

In 2003, the Estonian government launched an access route to the X-Road, an e-government portal (eesti.ee) that united all new e-services and provided a single entry point for eID cardholders. This was followed by a bilateral agreement with Finland that set the stage for the mutual

7   "The Estonian Personal Identification Code (isikukood)," Work in Estonia, http://www.workinestonia.com/coming-to-estonia/the-estonian-personal-identification-code-isikukood, accessed 16 July 2015.

8   Andres Kütt, "On Estonian Id-Code: Architecting a Country," 11 December 2014, https://www.ria.ee/riigiarhitektuur/blog/2014/12/11/on-estonian-id-code.

9   Database Act (Andmekogude Seadus) of 19 April 1997," http://www.legaltext.ee/text/en/X1060K6.htm, accessed 14 July 2015.

10   Rein Harjo, "Principles of Estonian Information Policy," http://intosaiitaudit.org/pas/010402estoniacpapp.pdf.

11   Meelis Kitsing, "Success Without Strategy: E-Government Development in Estonia," *Policy and Internet*, Vol. 3, No. 1 (February 2011), pp. 1–21.

12   Mellakauls Andris, "Access to the Internet—A Human Right?" (Strasbourg: Council of Europe, 2012), http://www.coe.int/t/dghl/standardsetting/media/Belgrade2013/CDMSI(2012)Misc3Rev_Internet%20Access%20as%20a%20Human%20Right_en.pdf.

13   Enterprise Estonia, "X-Road," *E-Estonia Showroom*, http://e-estonia.com/component/x-road, accessed 11 May 2014; Ahto Kalja, "The First Ten Years of X-Road," in K. Kastehein, ed., *Estonian Information Society Yearbook 2011/2012* (Tallinn: Ministry of Economic Affairs and Communications of Estonia, 2012), pp. 78–80.

14   Sertifitseerimiskeskus A.S., "The Estonian ID Card and Digital Signature Concept: Principles and Solutions," Version 20030307, http://www.id.ee/public/The_Estonian_ID_Card_and_Digital_Signature_Concept.pdf, accessed 13 May 2014.

acceptance of digital signatures (one of the many e-services available to cardholders). Today, the digital signature is one of the most popular features of e-Estonia; approximately 234 million digital signatures have been issued so far.[15]

In 2005, the Estonian Broadband Strategy designated the development of fast Internet capabilities as a strategic priority in the e-state's development because it would facilitate access to e-services among the citizenry. Indeed, that same year, the country became the first in the world to offer "i-voting" in local elections.[16] The Mobile-ID service, which provides mobile access to features available with an eID, was launched in 2007.[17] Estonian citizens were able to use it to cast their "i-votes" in general elections that year.

As Estonian e-services evolved in complexity and scope, Estonian society needed to adapt. Programmes like "AssaPauk" (*What a Hell!*) were initiated in an attempt to educate people and increase technological awareness. A digital signature campaign, *Ole Kaasas*, taught over 100,000 people how to use this feature.[18] Thereafter, the Estonian e-government enterprise focused on improving services that appeared most directly useful to society and citizens. In 2009, the Estonian Informatics Centre created a new defence framework in an effort to strengthen the government's cybersecurity capabilities. The Ministry of Economic Affairs and Communications founded the Broadband Development Foundation, which brought Estonia's main ICT companies together to establish a new-generation communications infrastructure in rural areas. The Estonian Information Society Strategy 2007–2013 was amended to reflect improvements in e-services arising from the expansion of Internet broadband.

Other developments soon followed. In 2010, the state portal (eesti.ee) was translated into English in an effort to make Estonian e-government more accessible to non-Estonian speakers. Also in 2010, the Estonian Informatics Centre changed its name to the Estonian Information System Authority and expanded the security systems for the public and private sectors. Another new platform, the

"Draft Information System Authority," enabled people to scrutinise legislative acts and policy documents, promoting clarity and transparency in governmental affairs.

E-Residency represents the latest in this explosive succession of e-government innovations. How does it work? E-residents receive an eID that is similar to an Estonian eID, though the former incorporates biometrics rather than a photograph. It allows a cardholder to sign documents (including legally binding contracts) digitally; to verify the authenticity of signed documents; and to encrypt sensitive documents, with the ability to direct them to a specific person or group. Moreover, the eID can be used to establish an Estonian company and manage it from anywhere in the world. By providing access to the extensive privileges of Estonian e-banking, the eID also enables digital payments to service providers and online tax filing (in cases where the company in question is subject to Estonian taxation). Despite the enormous digital accessibility that e-Residency provides, it is important to note that it does not confer Estonian citizenship, tax residency, or free access to either Estonia or the European Union. Furthermore, it does not substitute for a passport or visa; hence, it is not a valid travel document.

In sum, since 1991, Estonia has rapidly developed and improved its e-government infrastructure, expanding old platforms and adding new ones such as e-Residency. The significance of this project to preceding e-services and infrastructures is this: the initiative provides a new method of access to them. E-Residency seeks to improve the efficiency of Estonia's public and private networks by using the already existing infrastructure while, crucially, providing a "transnational digital identity available to anyone in the world interested in administering a location-independent business online."[19] Thus, e-Residency is not a self-standing policy innovation; fundamentally, it is an instrument of global access to *pre-existing* (and rapidly growing) e-state innovations in Estonia. Its novelty and transforming potential lie in the possibility it affords foreigners to enter Estonia's vast X-Road infrastructure and use its services — just as any Estonian citizen or territorial resident would do. E-Residency is the latest leap forward in the Estonian e-state's remarkable technological evolution.[20] It embodies the spirit of Estonian innovation

15 Sertifitseerimiskeskus A.S., "Home > ID.ee," http://id.ee/?lang=en&id=, accessed 31 March 2015.

16 "I-voting" is different from "e-voting," which requires an electronic polling booth; i-voting allows people to vote from anywhere in the world as long as they have Internet access.

17 GSMA, "Estonian Mobile ID: Driving Today's E-Services Economy," *Personal Data* (blog), 30 July 2013, http://www.gsma.com/personaldata/estonian-mobile-id-driving-todays-e-services-economy.

18 *Vaata Maailma/Look@World Foundation*, "Ole Kaasas!," http://www.vaatamaailma.ee/projektid/ole-kaasas, accessed 16 August 2015.

19 Enterprise Estonia, "What Is E-Residency," *E-Estonia Showroom*, https://e-estonia.com/e-residents/about/, accessed 15 July 2015.

20 On recent developments in the Estonian e-state, see Taavi Kotka and Innar Liiv, "Concept of Estonian Government Cloud and Data Embassies," in Andrea Kő and Enrico Francesconi, eds., *Electronic Government and the Information Systems Perspective: Proceedings of the 4th International Conference EGOVIS 2015 in Valencia, Spain, September 1–3, 2015* (Cham: Springer, 2015), pp. 149–162.

in public administration, which the project strives to expand to citizens around the globe.

THE ORIGINS OF E-RESIDENCY

Why did Estonia create e-Residency? The initiative's point of origin was the ambitious ideal of recruiting "10 million e-Estonians," which was conceived by three people: Taavi Kotka (a co-author of this publication), Siim Sikkut, and Ruth Annus.[21] This principle emerged from the priorities established by the Digital Agenda

for Estonia 2020, in which the Estonian Cabinet prioritised the aim of increasing Estonia's international recognition in digital affairs as follows:

> "Estonia will start offering its secure and convenient services to the citizens of other countries. Virtual residence or e-Residence will be launched, meaning that Estonia will issue non-residents with electronic identity in the form of digital ID cards. The aspiration for Estonia is to become as re-known [*sic*] for its e-services as Switzerland is in the field of banking."[22]

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21 Sikkut is the Digital Policy Adviser at the Government Office of Estonia and a board member of the e-Residency project. Annus is the Head of the Migration and Border Policy Department at the Estonian Ministry of the Interior.

22 Ministry of Economic Affairs and Communications, "Digital Agenda 2020 for Estonia" (Tallinn: Estonia, November 2013), p. 3, https://www.mkm.ee/sites/default/files/digital_agenda_2020_estonia_engf.pdf.

Figure 1. Roles of the Key Actors in the E-Residency Network.

- Creators of Digital Agenda for Estonia 2020: Government document from November 2013 which first discussed the e-Residency initiative.

- Creators of the Idea: Visionary leaders who developed the idea of e-Residency into an award-winning concept and now provide strategic support to the project.

- Estonian Development Fund: Organised the competition that initially promoted and funded the "10-Million E-Estonian" concept.

- Seven-member team at Enterprise Estonia: Facilitates the administration of the e-Residency project and coordinates with cooperating public, private, and non-profit sector partners.

- The Board of E-Residency: Supervises the strategy, goals, and budget of the project proposed by the seven-member team.

- Cabinet: Supervises the strategy, goals, and budget of the project proposed by the Board.

- eID: Access key for e-residents to the digital world.

- X-Road: Estonian data-exchange layer enabling secure internet-based data exchange between public and private sector information systems.

- Estonian Police and Border Guard: Monitors the application process for e-Residency cards, conducts background checks on applicants, and issues cards to Estonian embassies and consulates, which will issue the eIDs to e-residents.

- Information System Authority (RIA): Coordinates and safeguards the development and administration of the national information system.

- Ministry of the Interior: Develops legislation regarding e-Residency applications and processes.

- Ministry of Economic Affairs and Communications: Manages the public-sector IT budget and formulates decisions on how to invest in applications.

- Ministry of Justice: Develops legislation regarding the business environment.

- Ministry of Finance: Develops legislation regarding the financial aspects of e-Residency and reviews its compliance with the law.

- Ministry of Foreign Affairs: Holds face-to-face meetings with applicants, takes their fingerprints, and issues e-Residency start-up kits.

The concept of e-Residency was then submitted for approval to the Estonian Parliament, where it received unanimous support. In spring 2014, the "10 million e-Estonians" idea was sent to the Estonian Development Fund, which was organising a competition for the "Best Development Idea 2015." E-Residency received immediate attention and won a twelve-month development grant (which was directed to Kaspar Korjus, the current e-Residency Programme Director and co-author of this publication).[23] The ensuing e-Residency website and subscription list went viral through social media channels. In this way, the project attracted substantial international attention even before the Estonian government began promoting it. Indeed, positive coverage by the international media was a crucial factor in the project's acceptance within Estonian society.[24] By 1 December 2014, Estonia had recruited its first e-resident (Edward Lucas of *The Economist*). Animated by these early successes, the Estonian Cabinet soon after this held a second meeting to decide the future of the project. A seven-member team was assigned to run the project beginning in April 2015.[25]

By May 2015, Estonia had launched e-Residency as an internationally accessible "beta" initiative. Henceforth, physical visits to Estonia were no longer required in order to apply for e-Residency. Rather, following a thorough background check, the applicant could visit any of thirty-eight foreign embassies from New York to Tokyo, identify herself with her passport, provide biometric data, and pick up the e-Residency eID card. Although the application process thereby became easier, obstacles to the conduct

of business and other activities remain. For example, in order to open a bank account or to sell shares in a company, e-residents must travel to Estonia to meet with bank officials or notaries.

In July 2015, the Cabinet held a third meeting on e-Residency, which resulted in a resolution to adapt major legislation, processes, and e-services in order to facilitate the conduct of business activities in Estonia. As of August 2015, e-Residency remains in a public beta phase, meaning that everyone is invited to apply for residency and to help the Estonian government by providing feedback that will help the organisers tailor it to users' specific needs. In short, Estonia is developing e-Residency in the spirit and manner of a start-up enterprise: the launch and methods of improvement have been swift and institutionally nimble.

So far, the initiative has met with great success in growing the number of users. On December 2014, the Cabinet agreed to aim for 2,000 e-residents by the end of 2015, meaning that, on average, 8 e-residents per working day would have to apply successfully. As of August 2015, there have been 4,569 applications, of which 4,043 (80 percent) resulted in e-Residency; 434 (10 percent) are still in process; 60 (1 percent) were denied; and 24 (0.5 percent) were closed. Thus, the initial goal of 2,000 applicants was exceeded by 128 percent within just three quarters. Through May 2015, there were 15 applications per day. Since the launch of the online application form on 13 May, 43 applications have been submitted daily. If this trend continues, by the end of 2015 there will be approximately 8,826 e-residents—far exceeding initial recruitment goals.
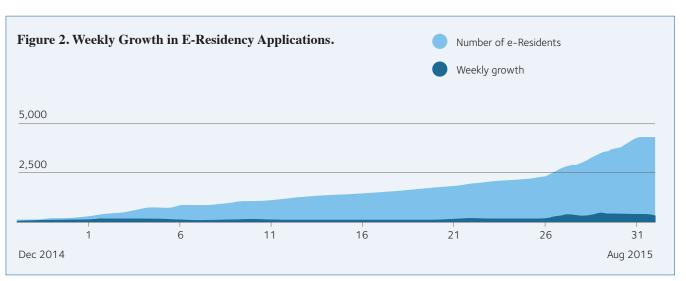
Before the application became available online, most e-residents came from Estonia's neighbouring countries, because applicants had been required to visit Estonia twice in order to complete the process. As of August 2015, however, the top 10 countries for applicants are Finland, with 1,025 applications (22 percent of the total); Russia, 519 (11 percent); the United States, 263 (6 percent); Ukraine, 259 (6 percent); Italy, 254 (6 percent); Germany, 193 (4 percent); Great Britain, 177 (4 percent); Latvia, 161 (4 percent); the Netherlands, 138 (3 percent); and India, 125 (3 percent). Recently, the online application platform has witnessed a surge in applications from the developing world. Since its inception, 284 Estonian companies have at least one e-resident shareholder. Out of these companies, 93 were newly established in 2015. Additionally, the e-Residency network contains 20,069 active e-mail subscribers.

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23 Taavi Kotka, "10 Million 'e-Estonians' by 2025!," *Taavikotka*, https://taavikotka.wordpress.com/2014/05/04/10-million-e-estonians-by-2025/, accessed 31 August 2015.

24 BBC World News, "E-Residency" (21 May 2015), https://www.youtube.com/watch?v=9gnXZBHqONs; Nabeelah Shabbir, "Estonia Offers E-Residency to Foreigners," *The Guardian*, 26 December 2014, http://www.theguardian.com/world/2014/dec/26/estonia-offers-e-residency-to-world-what-does-it-mean; "Estonia Takes the Plunge," *The Economist*, 28 June 2014, http://www.economist.com/news/international/21605923-national-identity-scheme-goes-global-estonia-takes-plunge; Kirsten Drysdale, "Is This the Beginning of the End of the Nation State?" ABC News (Australia), 25 November 2014, http://www.abc.net.au/news/2014-11-25/is-this-the-beginning-of-the-end-of-the-nation/5917922; "Last Look: E-Residency in Estonia" CNN, 12 August 2014, http://edition.cnn.com/videos/bestoftv/2014/12/08/exp-gps-1207-last-look.cnn; Ben Hammersley, "Why You Should Be an E-Resident of Estonia," *Wired UK*, 12 August 2015, http://www.wired.co.uk/magazine/archive/2015/07/features/estonia-e-resident.

25 The team consisted of: Kaspar Korjus (Programme Director), Katre Kasmel (Head of Communications and Marketing), Ott Vatter (Head of Quality Assurance), Katrin Sepp (Head of Legal Matters), Victoria Saue (Head of Risks and Compliance), Jannus Jaska (Head of User Experience), and Remo Tiigirand (Head of Business Development).

Figure 2. Weekly Growth in E-Residency Applications.

● Number of e-Residents
● Weekly growth

5,000

2,500

1   6   11   16   21   26   31

Dec 2014   Aug 2015

Source: Estonian Government

This section opened up the e-Residency "black box" by describing the broader policy context in which it emerged and by identifying the initiative's main actors, tracing their key decisions and identifying key "moments of translation."[26] The discussion demonstrated that the project evolved not as an isolated phenomenon, but as a result of a succession of concrete policy decisions that Estonian policymakers took over the last twenty-five years. Moreover, these actors and their decisions were embedded in, shaped, and constrained by a pre-existing technical infrastructure and e-government ecosystem without which the e-Residency project would not have been possible. The conceptual lens of ANT, and in particular its notion of "flat ontology," provides a unique and insightful understanding of the initiative's emergence; it presses us to consider the crucial role of individual actors at critical junctures of the decisionmaking process. The following section takes this discussion to another level: it analyses the process of e-Residency's "translation" into practice, with a special emphasis on identifying the benefits and risks associated with this process.

BENEFITS AND RISKS OF E-RESIDENCY

The practical consequences of e-Residency for citizens and for the Estonian state are not yet entirely known; they will, however, create possibilities for the project's continued expansion or failure. Following is an assessment of the project's benefits and risks. We argue that the positive

practical consequences of e-Residency for Estonia and its citizens significantly outweigh the risks associated with the initiative; nevertheless, these risks are real and merit serious attention—particularly among policymakers in nations who may consider adopting similar measures in the future.

BENEFITS

Although, as we argue, e-Residency is best perceived as a sort of governmental start-up, some benefits have already emerged for three types of non-governmental stakeholders: e-residents, the private sector, and the Republic of Estonia as a whole.

E-Residents

Why do people become e-residents? The answer is simple and compelling. E-residents can access and use the following services online:

• Establish and administer a company
• Conduct all their banking
• Declare taxes
• Digitally sign contracts and other documents
• Access international payment service providers

We can divide e-residents into three groups: visitors to Estonia; virtual businesses; and "fans," or the community of e-residents who are motivated by personal considerations. Visitors to Estonia include diplomats, academics, even some tourists—all of whom now and again physically live in Estonia for a short period of time.

26 Callon, "Some Elements of a Sociology of Translation."

Because present-day Estonia is a fully digitised nation, life without a digital identity can be challenging—indeed, it is almost inconceivable. As e-residents, diplomats no longer have to carry and sign invoices to obtain VAT returns; with the digital signature feature, this process can be conducted in seconds via email. Guest lecturers or researchers can now sign contracts from other universities even before arriving in the country. And visitors, during their stay in Estonia, can use the e-Residency card in local pharmacies to collect prescriptions; at libraries to take out books; or as a discount card in local supermarkets. Because every e-resident possesses a unique identity number, many digital services available to legal residents and citizens are also available to e-residents.

Individuals working in virtual businesses constitute the second group of e-residents. Mainly, these are people from neighbouring countries who already have investments in Estonia. Before the era of e-Residency, changing a company's email address, for example, required visiting a notary, paying for postal and other fees, and waiting at least one week before the new information was entered into the Estonian business registry. Now, e-residents can go online and perform all of these functions—in a matter of seconds—via the e-business registry. The same ease of conducting business applies to tax filings, annual report submissions, shareholder meetings, and many other obligatory business tasks. E-Residency, in brief, makes the life of foreign shareholders and managers much more efficient.

It is important to note that the virtual business environment also includes entrepreneurs and freelancers from outside the EU, especially in the developing world. These people face huge challenges in today's changing global business environment, challenges for which Estonian e-Residency could be a solution. It is likely that in the coming years there will be many more self-employed freelancers whose lifestyle is more mobile, whose customers hail from various different countries, and whose services are sold via e-commerce channels. These trends put traditional nation-states in a position that, instead of creating a business-friendly environment for residents and citizens, holds them back from growing their businesses. Today's global citizens prefer to avoid the confines of national borders, face-to-face meeting requirements, and double taxation by governments. E-Residency provides the opportunity to run location-independent international businesses while keeping administrative costs to a minimum. Ownership and control of a company remains fully with its founders, without any need to hire and correspond with local directors as businesses must do in typical financial

offshore centres such as Panama and the Cayman Islands. E-Residency offers individuals in the developing world a particularly useful set of business opportunities and advantages. First, for reasons of political or economic instability in their countries of origin, such individuals may struggle to gain trust in Western business circles, complicating the search for partners and customers abroad. Estonia, in contrast, is firmly embedded within the EU legal framework, which offers e-residents from developing countries a basis on which to build the same level of trust as residents elsewhere in the Western world. Second, many developing countries are plagued by significant levels of bureaucracy, travel restrictions, and sometimes unstable political climates, which make it very difficult to seize long-term competitive advantages. Third, the general level of Internet access in much of the developing world is low; furthermore, even countries with a comparatively broad level of Internet access may not offer standard digital services, such as online payment providers. Therefore, businesses in these countries cannot accept international payments—hence they cannot sell their services or products via online channels. Selling digital services exclusively in local markets greatly hampers the potential for business development.

The solution to these problems is simple: as Estonian e-residents, these business owners can establish and manage a trusted EU company online; open an Estonian bank account and transfer money online; gain access to trustworthy Estonian payment provider services; and sign contracts, tax declarations, and administrative filings online. While these functions provide particular advantages to e-residents in the developing world, they also allow all e-residents the chance to run location-independent international businesses—the ultimate freedom of mobility—while at the same time keeping the administrative costs to a minimum. This, then, is the ultimate goal of Estonia's e-Residency project with respect to businesspersons: to unlock the entrepreneurial potential of every world citizen.

But why choose Estonia as a basis for residency—of any kind—in the first place? First, Estonia offers a strong social and infrastructural basis for aspiring entrepreneurs. According to a 2014 study by Freedom House, Estonia ranks second in the world in terms of Internet freedom.[27] In addition, in 2015, a study by the Heritage Foundation

27 Sanja Kelly, Madeline Earp, Laura Reed, Adrian Shahbaz, and Mai Truong, "Tightening the Net: Governments Expand Online Controls," Freedom on the Net 2014 (Washington, D.C.: Freedom House, 2014), https://freedomhouse.org/sites/default/files/FOTN_2014_Full_Report_compressedv2_0.pdf.

and the *Wall Street Journal* ranked Estonia first among EU member states in economic freedom.[28] Second, the country has a transparent flat-rate tax system with 0 percent income tax on businesses for profits that are reinvested domestically. Third, because the government has the lowest—by far—level of national debt in the EU,[29] has a very high adult literacy rate (99.8 percent),[30] and benefits from universal 4G coverage, Estonia's business environment provides ideal conditions for the growth of global techno-business infrastructures.

A third group of e-residents consists simply of the project's community of fans—that is, individuals who join for personal reasons, not to conduct business. According to a study conducted by the e-Residency operators, 35 percent of subscribers fall into this group. These individuals may be politically or ideologically minded and perceive e-Residency as a mechanism to protest against or subvert the controls of governments that are repressive of Internet freedom, press freedom, and other civil and political rights. Herein, then, lies an essential underlying premise of the e-Residency project: people everywhere resent ever-increasing restrictions in both their personal and professional lives. They do not want to choose between privacy and security—they want both. And this is exactly what e-Residency offers.

One reason why Estonians have one of the highest levels of government-citizen trust in the world is that the advanced state of Estonia's ICT infrastructure strikes a reasonable balance between user security and privacy, on the one hand, and convenience of lifestyle, on the other. E-residents find that their eIDs offer an extra layer of identity, one that is superior to those conferred by their parent states of origin, which are confined by geographic frontiers and severely limited by legal restrictions and cumbersome bureaucracies. There is a natural pool of prospective e-residents—from both the industrialised and the developing worlds—among people who are oppressed by their territorial home nations. E-residents from these nations may now enjoy a new level of belonging to an emergent, transparent, and privacy-first globalised world. For this group, the decision to become e-residents is a fundamental choice to break free from conventional

restrictions of citizenship and territoriality. One cannot choose one's country of birth; one may not even be able, realistically, to choose one's country of physical habitation; but now, regardless of these two constraints, one can always choose a country of *digital* residence.

Private sector entities

Another important group of e-Residency stakeholders comprises partner companies that offer services to existing e-residents. These partners generally fall into the following groups: authentication plug-in service providers, new eID service start-ups, corporations in need of optimising internal business processes, and customer support organisations. E-Residency is not just a service; it is also a *platform*. The Republic of Estonia is just one party that offers services to e-residents, such as establishing a company or accepting digital signatures. But any third party can offer these (and many other) services as well, because all the necessary tools for organisations to implement e-Residency services are publicly available on the web.

Authentication plug-in service providers integrate Facebook-like login buttons that allow e-residents to enter their web sites. This feature is extremely useful for service providers who need to ensure that the other party is who she claims to be. Also, e-Residency is the first government-issued transnational digital identity whose authentication procedures are treated as equivalent to face-to-face encounters. Hence, enabling e-Residency login makes sense for those who want to replace the requirement for face-to-face meetings with a digital form of authentication. This can be especially useful for financial service providers who need to follow very strict regulatory frameworks.

In addition to financial service providers, there are entirely new emerging business areas, such as virtual currencies, e-health, and the sharing economy that require this level of trust on the Internet. For e-residents, this trust is backed up by the Estonian government rather than by comments, likes, or shares on a website.

The second group of private sector partners consists of entrepreneurs who are inventing new services using eID platform functions, such as verification of signed document authenticity. (A more detailed description of these functions is found in the Appendix.) The services of new start-ups may range from encrypted videoconferencing to safe file storage to data verification services.

A third type of partner consists of corporations that can optimise their internal processes using the e-Residency

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28 "Country Rankings: World and Global Economy Rankings on Economic Freedom," *2015 Index of Economic Freedom* (Washington, D.C.: Heritage Foundation, 2015), http://www.heritage.org/index/ranking.

29 "DebtClocks.eu—Debt Clocks of the EU Member States: Comparison," *DebtClocks.eu.*

30 United Nations Children's Fund, "At a Glance: Estonia," 24 December 2013, http://www.unicef.org/infobycountry/estonia_statistics.html.

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the Digital Era**

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platform. Every employee, associate, or client of these corporations can use e-Residency cards to access internal information systems where activities can be encrypted, logged, signed, and traced. This opens new possibilities for outsourcing some internal infrastructure and maintenance costs to the Estonian government. This feature is particularly useful to businesses in the fields of logistics, construction, trade, shipping, and other industries.

A fourth partner consists of customer support service providers. There are thousands of new e-residents that need support of various kinds, such as legal, business, or accounting advice, which may not be obtainable with the eID. E-residents are highly valuable customers because of their innovative approach to international markets and their readiness to submit to strong, continuing background checks by Estonian authorities. Such partners are key stakeholders in the e-Residency project, because the Estonian government could not possibly offer all of these business services itself.

The Republic of Estonia
Estonia is the third main beneficiary of e-Residency. From its very beginning, questions have arisen about why Estonia is running this project. What, then, are the benefits for Estonia and Estonians?

In spring 2014, when the discussion on e-Residency began, the main rationale for undertaking the necessary legislative changes was that these changes would facilitate business activity for foreigners who had some connection with Estonia. Previously, for example, if an Estonian company had at least one foreign shareholder, then everybody in the group not only had to sign contracts and attend board meetings in person, but occasionally also had to meet physically with governmental agencies. This resulted in higher administrative costs for both the companies and the government. In addition, the Estonian diaspora was the second target market; e-Residency was recognised as a tool to maintain closer relations with them.

So, while the initial benefits of e-Residency for Estonia were mainly related to increased efficiency in both the public and private sectors, the "10 million e-Estonians" idea refocused this aim in a way that sought to enable location-independent businesses for businesspeople outside the EU. This pivot has also made the government redefine the business value of e-Residency for the state. The most obvious revenue model would be tax collection from companies. Yet for many reasons the government has not taken this route. To begin with, in many cases taxes are payable to the country where the business

value is created or where most of the board is situated; if Estonia, too, were to tax these businesses, then the companies would likely reject e-Residency because of the prospect of double taxation. A second reason why the Estonian government did not consider direct taxation as a revenue model for e-Residency is more straightforward: the government never planned to become a tax haven for businesses to optimise earnings.

For Estonia, the ultimate business purpose of e-Residency is to build stronger relations with different nations worldwide. If entrepreneurs from Ukraine, for example, can utilise e-Residency to build international businesses, sell services abroad, receive credit card payments, and pay their taxes in Kiev, then the project would increase Ukraine's GDP. And it would do so in a short period, compared to the amount of time needed for traditional economic boosters, such as education reform, and without necessitating any investment by the Ukrainian government. Instead, Ukraine can simply leverage Estonia's existing platform to boost its own economy. Therefore, instead of directly collecting taxes from e-residents' companies, Estonian companies can offer them services and bring new foreign money and investment to the country (e-residents pay for bank accounts, credit cards, tax and legal advice, physical address providers, and many other services).

With a current pool of just 4,000 e-residents, the resulting income may not yet be substantial, but it will grow if the long-term goal of recruiting tens of thousands—or even millions—of e-residents is attained. As long as Estonia continues its policy of tax exemption and so long as it enables people all over the world to grow their businesses within their own countries, it is simply a matter of time before a large number of people becomes interested in this new initiative. Furthermore, in the coming years there will be 1 billion new Internet users.[31] Forty percent of the U.S. workforce alone will consist of freelancers.[32] As people become more digitally connected—and thus, in principle, more mobile—the necessity for location-independent business platforms will only grow.

In sum, the main reason why Estonia seeks to expand e-Residency's reach is to increase the country's economic size—not through direct taxation levied upon e-residents, but through the extra income generated by Estonian
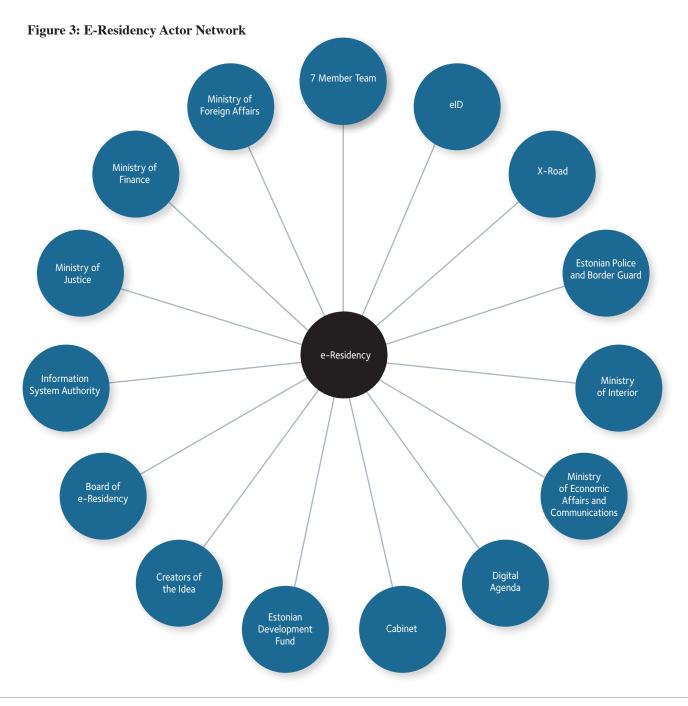
31 Internet Live Stats, "Number of Internet Users (2015)," http://www.internetlivestats.com/internet-users/, accessed 26 August 2015.
32 Elena Kvovhko, "The Online, Freelance, Globalizing World of Work," Techonomy, 31 March 2014, http://*techonomy*.com/2014/03/online-freelance-globalizing-world-work/.

companies that offer products and services (e.g., bank accounts, postal services, legal and tax advice) to them. There are, moreover, secondary reasons why Estonia is building the e-Residency project. As a result of the initiative, the country has garnered sustained positive media attention with no marketing costs. This attention by itself can, in the long run, increase foreign trade investment, tourism, and export business. If and when Estonia has signed up millions of e-residents worldwide, then arguably the resulting new economic relationships may increase Estonia's national security by, for example, fostering "soft" ties to people abroad, which may help to deter future conflicts or generate increased international support should Estonia find itself in a conflict. One other intangible benefit of e-Residency for Estonians is the simple matter of national pride: the feeling that through the initiative the country is positively influencing international relationships and businesses. Much of the emphasis in the country's transition following the collapse of the Soviet Union was on internal rebuilding; now e-Residency can help Estonia project its transitional successes to the external world.

Figure 3: E-Residency Actor Network

RISKS

Having reviewed the benefits that may ensure e-Residency's continued growth and durability, we now proceed to discuss the factors that might imperil the project. ANT instructs us to consider these risks, especially if they endanger the networks of collaboration among key actors involved in the project's creation. The analysis would not be complete without considering the potential for these risks.

What are the risks? How does the government tackle them? What returns on investment are required to overcome the inherent limitations of existing political, financial, and business boundaries? These questions, which have inspired much of the international interest in the project, are difficult to answer: how can one identify or manage risks when the final outcomes and implications of e-Residency are not yet clearly understood? Moreover, for national security reasons, the Estonian government does not publish its official risk analyses. Despite these obstacles, the discussion below will illustrate some of the risks by drawing from current experience and publicly available data.

One risk is political: the governmental consistency required to sustain funding and legislative priorities across different coalitions of power may erode. A new governing coalition would not necessarily end the project, but for this kind of multi-actor initiative to work, many different government agencies must be committed to its success. The main political challenge, then, is to sustain the project's relevance to the governing coalition (whatever it be), thus ensuring that the necessary mandate to expand the project endures, while at the same time preserving the project's independence from any particular political or governmental grouping so that the project attracts support across the domestic political spectrum.

Another important risk relates to public relations and communications, both in Estonia and internationally. E-Residency was launched without a clear business model or end-goal in sight. In today's start-up world, the concept of using a technological platform to build a global "user base" is more common in business than in an entity such as a nation-state. The key to success is striking the right balance of involvement among Estonian citizens and global e-residents and remembering that the investor in the e-Residency project is the Estonian taxpayer. Moreover, the project needs to face the external challenges of managing unrealistic expectations.

Technological risks are also a concern. Possible abuse of the eID is the greatest threat, because the security of users' identity is the chief prerequisite of e-Residency. In addition to thorough background checks, capturing and analysis of biometrics, and face-to-face meetings with trained authorities, Estonia should also consider establishing a single infrastructure for all users that is optimised for the prevention and detection of misuse. In principle, this is possible: like residents and citizens, every foreigner leaves a digital fingerprint on every activity she conducts with the eID.

There are further technological risks in the threat of cyberattacks, which might threaten the stability of the eID platform that is necessary to scale up the project to over ten million users. Despite numerous security precautions, in April 2007 Estonia suffered a massive cyberattack that was reportedly perpetrated by politically-motivated Russian hacktivists angered by the Estonian government's relocation of a Soviet war monument from the centre of Tallinn. The attacks prompted one of the most important strategic adjustments in Estonian and European security doctrine. Today, the protection of digital services and databases is of paramount importance to national security. Within this new security culture, Estonia has become a pioneer in the area of cyber defence, as illustrated by the establishment, in 2008, of the NATO Cooperative Cyber Defence Centre of Excellence in Tallinn. The e-Residency project reinforces this perception by sending a clear message to the world: Estonia is so confident about its technical e-government platform that it is not afraid to make it publicly available to everybody everywhere.

In sum, e-Residency opens up a whole new realm of debate about the opportunities for and challenges to national security in the digital era. Existing risk analyses suggest that e-Residency will not generate new critical risks to government functions; however, the risks could scale up if they are not adequately addressed by policymakers. Instead of trying to face these challenges in isolation or in secrecy, Estonia has opted to confront them in a spirit of public scrutiny and open discourse. Anyone from anywhere in the world is invited to identify, solve, and learn from the risks associated with e-Residency.

CONCLUSION: LESSONS, INSIGHTS, AND QUESTIONS FOR FURTHER RESEARCH

ANT concepts and methods enable a fuller analysis of e-Residency's origins, benefits, and risks than other theoretical approaches in the social sciences. The theory furnishes conceptual guideposts that are useful in opening up the "black box" of e-Residency to scholarly investigation. It helps us to identify the key actors and their policy decisions in the creation, functioning, and expansion of e-Residency. Furthermore, the theory orients us in the search for definitive circumstances and moments during the process of "translation" by which this actor network can expand or disintegrate.

Estonia is the first country to offer a transnational digital identity. The implications of this move are difficult to foresee, because the world has never before experienced this level of trust in the implementation of the e-state. When users obtain digital identities, they cease to be random users and become real beings. Without a physical passport, one is not trusted to travel across countries; similarly, on the Internet one cannot be trusted without a secure digital identity. The chief implication of a secure transnational digital identity is that it makes possible a world in which every Internet user possesses a trustworthy digital persona. Several trends in this regard can already be noted. For example, e-Residency reduces the need for middle-level controls or institutions that reduce the risk of fraud in business. In addition, the project increases the pool of people who can comfortably interact with each other across national borders, thus boosting the development of peer-to-peer services within the so-called sharing economy.

These trends mean that governments could in principle adopt the habits of client-oriented service providers—just like the private sector—in order to keep citizens, residents, and non-resident clients satisfied. No government can afford to lose its resident- and citizen-generated expenditures to other governments. Nor can any government afford to "sell" its services only to local residents. In the digital era, economies of scale in the management of information systems are enormous; achieving these economies requires that the system architectures are uniform—whether they serve one million national citizens or one billion e-residents.

These ongoing trends in the development of the e-state present both positive and negative implications for the security and welfare of nation-states. Governments that do not partake in digital initiatives or that experience losses because of them might perceive these trends as a plan to "steal" their residents and citizens, producing political and economic tensions. But as this study has suggested, the emergent digital single market might also enhance interstate cooperation in new ways. The joint Estonian and Finnish X-Road project represents a promising case in this respect.[33]

More fundamentally, the e-Residency project may lead to the redefinition of the nation-state itself. Perhaps individual identity should be based less on one's place of physical birth or residence and more on intangible values and senses of belonging. In time, the e-Residency project may radically alter the perception of belonging so that it is no longer anchored to the territorial nation-state. In this way, e-Residency challenges prevailing theories of the state.

These developments open up a new field of enquiry in the study of government and public administration. The options for academic research on e-Residency are vast. Future studies may analyse questions such as:

• What will life will look like in 2018, after regulation to expand the use of electronic identification and trust services in the EU (eIDAS) has been enforced?[34]

• What would be the political and legal implications if the EU changed its policy so that every Estonian e-resident could also become an EU e-resident?

• If secure transnational digital identities became widely adopted in the coming decades, what would the implications for nation-states be?

• If e-Residency is adopted and applied by more countries, would one be able to choose multiple countries of digital residence?

33 "Finland and Estonia on Joint X-Road Starting November," *Postimees*, 17 July 2015, http://news.postimees.ee/3264073/finland-and-estonia-on-joint-x-road-starting-november.

34 The European Parliament and the Council of the European Union, "Regulation (EU) No 910/2014 of the European Parliament and of the Council on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market and Repealing Directive 1999/93/EC," *Official Journal of the European Union*, 23 July 2014, http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014R0910&from=EL .

Each of these questions begets opportunities for interdisciplinary collaboration. Research on the sociology, political science, public administration, computer science, and international relations of the e-state is necessary to understand the broader implications of the e-Residency project and how it will affect citizens, governments, politics, and indeed the very future and meaning of the nation-state in the digital era.

Within political science, new scholarly endeavours may require the reevaluation of core notions in political theory, such as "cosmopolitanism." This core notion offers a useful conceptual starting point for an exploration of the broader implications of e-Residency in academic research. Cosmopolitanism is a multi-dimensional concept encompassing globalising trends that affect the social and perceptual worlds. It represents an erosion of the traditional dichotomous divides between the national and the international, the local and the global, drawing attention instead to inclusive forms of social and political existence. By definition, the conventional perception and distinction of the world as "us" and "them" becomes weaker the more cosmopolitan a country's people are. Recent developments such as e-Residency provide a digital forum for cosmopolitanism to flourish. Therefore, we propose a term to capture this new phenomenon—*e-cosmopolitanism*, which conveys the new reality of an emergent secure digital world in which e-Residency can serve as a transforming venue of global social interaction and commercial transaction.

As of August 2015, this ambitious project has run without any significant setbacks. The active participation of foreigners has led to a massive number of applications for e-Residency in less than one year of active functionality. The Estonian government has seen this as an opportunity to reinforce their economy and has provided even more resources for the project. The impact that e-Residency has caused around the world demonstrates Estonia's high level of development in the field of e-government. Consequently, interest in the country has grown in the last year because of the popularity of the X-Road and the eID as models of e-government infrastructure. Certainly Estonia is well prepared to export these models to other countries; after all, the infrastructure is ready for immediate use by others. Moreover, Estonia's remarkable capacity to draw on information technology to overcome transitional problems since the collapse of the Soviet Union—e.g., a bloated bureaucratic apparatus, institutional disorganisation, the absence of sufficient national finances, and social crisis—offers lessons and inspiration for developing nations.

Yet because Estonia is the first country in the world to offer such a policy project, it has no point of reference or possibility for benchmarking success; rather, the only option is to forge a path of future implementation without clear metrics. The custodians of e-Residency bear the enormous responsibility of proving to the world that such an innovative project is capable of working correctly and safely. Until now, there have been only positive consequences. Experience so far strongly suggests that Estonia is well prepared to welcome thousands, if not millions, of new e-residents.

APPENDIX

Functions of the eID Platform.

1 *Government-issued unique ID code*. Each e-resident receives a unique ID code for identification. This ID code can be used as a public identifier, and is used in this manner in Estonian systems.

2 *Physical ID card with verified name and code*. E-residents are issued a physical card by the Republic of Estonia containing their verified name and unique ID code.

3 *Government-verified digital identity*. E-residents are issued digital identity certificates by SK Corporation in partnership with the Estonian government. These certificates contain the verified name and unique ID code of the e-resident. They are contained inside the physical ID card, and therefore cannot be compromised by remote access.

4 *Verification of name with national identity document*. Estonia confirms that the name of the e-resident, as stated on an authorised national identity document, matches the name on the e-resident's physical card and contained in the digital identity certificates.

5 *Verification of date of birth with national identity document*. Estonia confirms that the birthdate of the e-resident, as stated on an authorised national identity document, matches the information in their ID code. (Note that the ID code schema may be changed in future.)

6 *Three-factor authentication*. Digital certificates issued by e-residents cannot be used without an additional PIN code, meeting the three-factor authentication requirements of "something you have" (physical card), "something a user is" (biometrics and face-to-face meeting), and "something you know" (PIN code).

7 *Background check of identity*. The Estonian government confirms that the applicant is not listed in international felony databases.

8 *Ongoing verification of identity*. Estonia reconfirms annually, with limited exceptions, that the e-resident is not listed in international felony databases.

9 *Limited term of identity verification*. E-resident cards are valid for three years from the date of issue and, at this time, may not be extended. E-residents must reapply for a new card after expiration.

10 *Digital signature of documents*. Documents signed with the eID card are legally binding in Estonia and can be used worldwide. The signature on the eID card cannot be copied or placed on other documents without the physical ID card and PIN code.

11 *Verification of signed document authenticity*. Because of the method of digital signing, documents signed with the eID card can be verified as authentic and unmodified using free software provided by the government of Estonia.

12 *Encryption and decryption of documents*. E-residents may encrypt documents to other e-residents using free software provided by Estonia. This software employs strong encryption that relies on the certificates stored on the physical ID card. Without access to the physical ID card and PIN code, the documents may not be decrypted. (Note that if the e-resident loses his eID, the documents cannot be decrypted.)

13 *Ongoing investment in encryption*. Estonia continues to improve its encryption technology to conform to the highest practical standards. Cards are valid for three years and contain the latest encryption standards available at the time of issue.

14 *Ongoing investment in digital signature*. Estonia continues to invest in the latest digital signature technologies and formats, improving interoperability and verifiability.

15 *Remote deactivation in case of loss or theft*. If the eID card is lost or stolen, the e-resident's digital certificates and PIN codes may be remotely invalidated.

16 *Remote deactivation for fraudulent use*. Estonia reserves the right to invalidate the digital certificates of e-residents for any reason, but will definitely revoke e-Residency for fraudulent use or application.

17 *Libraries and API access to facilitate authentication and authorisation*. Estonia makes a set of software libraries available for external users to employ as a login and verification mechanism.

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The Cyber Studies Programme seeks to create a new body of knowledge that clarifies the consequences of information technology for the structures and processes of political systems.

Our research mission is (a) to produce scholarly works that contribute to major academic debates and opinions; and (b) to apply these new understandings in the analysis of major policy problems affecting the security and welfare of states and citizens.

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