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CHAPTER 16

Run Runet Runaway: The Transformation of the Russian Internet as a Cultural-Historical Object

Gregory Asmolov and Polina Kolozaridi

16.1 Introduction

Unlike some other national segments of the World Wide Web, the Russian Internet has a name of its own: it is often called Runet. One may ask why there is a need for a special term focused on one country and the Internet in that country. The question, however, is even more complicated, since we face two simultaneously important designations when working with the Internet and Russia: the first is *Runet* and the second is the *Internet in Russia*. If we explore the Russian Internet, are we exploring Runet or the Internet in Russia? Is this merely a matter of language, since the Russian language is typically considered one of the features designating Runet? How can we distinguish between these two concepts and what are the methodological consequences of this distinction? The Internet in Russia seems to be a wider concept, but a clear one. For instance, if we speak about the "Internet of things" in Russia, this is an element

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of the Internet in Russia, but it is doubtful if it can be called part of Runet. The latter is usually seen as a socio-cultural space or a segment of the Internet. Both terms designate the Internet as a place, something that has borders intended both to include and to exclude (Markham 1998).

In our previous study, we argued that Runet is the object of continuous construction by a variety of actors, including technological, political, cultural, business and media elites, and that changes in the process of construction are associated with the dynamics of power relations between these actors (Asmolov and Kolozaridi 2017). However, following these dynamics is not sufficient to identify the boundaries of Runet as an object or to distinguish it from the Internet in Russia or from the World Wide Web. This chapter is based on historical analysis and aims to offer a conceptual framework for this distinction and to illustrate how this framework can be applied in order to deepen our understanding of Runet as an object. The purpose of the chapter is to explore the history of Russian Internet development in the context of the tension between different approaches to understanding the Internet at the country level.

We focus here on two key properties of Runet: it is historically sensitive and it is multidimensional. The historicity of Runet highlights the fact that what has been developing is not only the content of the object (e.g. what happened with Runet) but the object itself (what Runet is). In this sense, our history has an ambivalent position, since it is both a history of the construction of an object and a historical description of various events related to this object. Therefore, when telling the story of Runet we should constantly question whether our story is still taking place within the boundaries of Runet or whether perhaps it is already the story of something else, for instance, of the Internet in Russia.

Following the dynamics of the historical process, not just as an ongoing chain of events but as the evolution of an object, requires a framework for following changes in the object. Previously, we identified five stages of Internet change in Russia (Asmolov and Kolozaridi 2017). Here we seek to advance this approach by replacing the linear structure of periodization with a framework that approaches Runet as a multidimensional socio-technical object with a number of vectors that are ongoing through continuous change.

16.2 RUNET AS AN OBJECT: THEORETICAL AND HISTORICAL APPROACHES

The Internet in Russia is older than Runet. The history of the Russian Internet, at least as a concept, starts many years before the collapse of the Union of Soviet Socialist Republics (USSR). The conceptual origins of the Internet in Russia have been linked to information networks and cybernetics development as part of the Soviet planned economy (Gerovitch 2002). Peters (2016, 4) explores the failure of the early development of a nationwide Soviet computer

network (the All-State Automated System), which was inspired by "a utopian vision of [a] distinctly state socialist information society."

There are a number of other events that could be considered as the starting point of the Internet in Russia, including the first instance of modem-based communication between the Kurchatov Institute and the University of Helsinki in August 1990, the foundation of the first Soviet Internet service provider or the registration of the domain zone. The Soviet domain zone .su was established on September 19, 1990, while the .ru zone traditionally associated with Runet was registered on April 7, 1994. The word Runet, however, only appeared later. A number of sources argue that it was first used in 1996 by Raf Aslanbeyli, a journalist living at that time in Israel (Lihachev 2015).

Researchers argue that the "Internet in Russia" and the "Russian Internet" form a "complex matrix of overlapping areas and distinct segments, producing constant fractions" (Schmidt et al. 2006, 130). Schmidt and Teubener (2006, 14) highlight how the notion of Runet as a dedicated term for a specific segment of cyber space "has almost no analogue in Western languages." They point out that the boundaries of Runet rely on a variety of factors, including "language, technology, territory, cultural norms, traditions or values and political power" (Schmidt and Teubener 2006, 14). Deibert and Rohozinski (2010, 19) highlight how Runet relies mostly on digital platforms that "are modelled on services available in the United States and the English-speaking world, but are completely separate, independent, and only available in Russian." ¹

That said, the significance of the distinction between Runet and the World Wide Web is also questioned. For instance, according to Bowles (2006, 30), the "differences between the RuNet and the rest of the Internet have gradually been dropping away" while "RuNet is simply another backwater of the Internet, fenced in by a language barrier and sometimes subject to mystification by loyal denizens, but not essentially different." Recent literature presents an understanding of Runet based on its perception by the Russian state. According to Nocetti (2015), the Russian authorities conceive of "cyberspace as a territory with virtual borders corresponding to physical state borders, and wishes to see the remit of international laws extended to the internet space, thereby reaffirming the principles of sovereignty and non-intervention." Building on this argument, Ristolainen (2017, 8) proposes that "RuNet—the Russian segment of the Internet—is considered an extension of the existing territory in the Russian 'information space."

Runet is not the only national segment of cyberspace in the former USSR, and not the final chain in the hierarchy of segmentation of cyberspace. The idea of a national segment of the Internet, as discursively manifested through a dedicated name, can also be seen in Kazakhstan (Kaznet), Ukraine (Uanet), Belarus (Bynet) and other states (Shklovski and Struthers 2010). There are also socio-cultural online spaces in some of the Russian regions. For instance, Tonet was the name for a city-based network in Tomsk, Chuvashtet is the title given to the Internet associated with users from Chuvashia, while Tatnet is described as the "Internet for Tatars and in the Tatar language" (Sibgatullin 2009). So

Runet is not the only "net" in Russia, or in the Russian language, and it is not the same as the Internet in Russia in general.

The following section offers a conceptual framework that allows us to resolve some of the challenges for the conceptualization of Runet as an object of investigation.

16.3 Runet as a Runaway Object

As argued above, Runet cannot be reduced to the experience of a shared language (Bowles 2006). Some early approaches addressed it in terms of sociopolitical phenomena seen in the USSR. For instance, comparing the role of Runet to a "Soviet Kitchen" (Popkova 2014, 98) would suggest that Runet should be explored as a new type of public sphere "where people can get together and freely discuss and identify societal problems" (Habermas 1991, 398). Another notion taken from the Soviet Union, that of samizdat, presents Runet as a space for the independent generation and distribution of content (for more, see Chap. 15). In both cases, the conceptualization of Runet builds on the antagonism between an authoritarian state and users seeking new, uncontrolled spaces of freedom. Drawing on Bakhtin, Gorny (2007) seeks to go beyond the political conceptualization of Runet and to address it as an alternative socio-cultural space that deconstructs traditional cultural hierarchies, offering space for the flourishing of new identities and alternative ways of living. Runet can also be addressed as a space that allows the emergence of a Russian network society (Castells and Kiselyova 2003).

Previously we have argued that Runet can be explored by following the changes in Internet elites and in the dominant/alternative Internet imaginaries (Mansell 2012) promoted by different actors (Asmolov and Kolozaridi 2017). This approach highlights how Runet cannot be defined as a static entity or as a set of technological properties. It requires a conceptualization drawing on a historical perspective that allows us to capture the dynamics of continuous change. In this sense, historical description is not the purpose of our investigation but a method that allows us to deal with the complexity of its object.

Traditional concepts of the social construction of technology have a limited capacity to address large-scale and constantly developing socio-technical objects. Following Giddens (2000) and Engeström (2008), we would argue that these types of objects can be considered as "runaway objects"—objects that are constantly shaped by the forces of both technological development and social construction. According to Engeström (2008, 227), a "runaway object" is a large-scale, complex object which is "pervasive and [whose] boundaries are hard to draw" and "poorly under anyone's control and have far-reaching, unexpected side effects". Runaway objects are not artifacts in a traditional sense but are constantly addressed, shaped and changed by the activities of numerous actors, while every event may create a contradiction between different actors and potentially lead to a new chain of events. Runet as an object has constantly created new challenges, new opportunities and "alternative ways of

living" (Mansell 2002, 408) for various types of actors. It has thus also triggered some actors to address these changes.

Our analysis presents Runet as a "net," opposing it to the Internet as a single network spreading all over the world. As Kevin Driscoll and Camille Paloque-Berges emphasize, taking this "net" into account helps us to avoid a simplification of the Internet as solely a technology and to conceptualize its socio-technical role. "Nets" are various and highly dependent on the historical and cultural context, while "the Internet" remains a global phenomenon (Driscoll and Paloque-Berges 2017).

16.4 THE VECTORS OF RUNET DEVELOPMENT: DEFINING RUNET AS AN OBJECT IN A CULTURAL-HISTORICAL CONTEXT

The description of Runet as a runaway object requires us to approach Runet as a multi-vector object and to follow its historical development in terms of each different vector. A runaway object is developed through the activity of a variety of actors, including not only political, cultural, media and business actors but also developers and everyday users. Accordingly, these sets of relationships between different actors can be seen in terms of each vector. The vectors are interrelated, however, and distinguishing between the actors allows us to conceptualize the complexity of Runet as a multidimensional and complex runaway object. Our analysis of the vectors relied on a thematic analysis of media sources and on the research literature on Runet.

We have chosen to distinguish the following five vectors of Runet development: the technological vector, the cultural vector, the media vector, the user and everyday life vector, and the political vector. This selection does not necessarily mean that these are the only vectors that could be followed or that there is no place for alternative descriptions. For instance, one may argue that there is a need to follow an "economic vector"; however, we have not addressed this as a distinct vector since the manifestation of economic power can be seen in all the vectors, as can the manifestation of political power.

The *technological vector* is concerned with the development of the hardware and software that Runet relies on, including fiber cables, domains and their registers, various online platforms and the infrastructure of surveillance. The technological question is concerned with the identification of the most popular online Runet platforms, including search engines, social networks and blogospheres. It examines the extent to which Runet relies on local or foreign platforms and follows the changes in dominant platforms. This vector is particularly concerned with forces of technological development and with who controls the technological segments of Runet.

The *cultural vector* allows an exploration of the role of Runet as a space of cultural development. On the one hand, it examines whether Runet offers a space for alternative and underground cultures that were not able to find a proper place in traditional offline space or participatory cultures (Jenkins

2006). On the other hand, it examines different manifestations of traditional and mainstream culture, how these fight to establish their presence in Runet and the relationships between underground and mainstream.

The *media vector* addresses the role of Runet as a space for media development. It explores how new types of media platforms shape the news consumption and production of the Runet audience and examines the extent to which online media have been able to set the agenda and frame different types of events. It is particularly concerned with the relationship between the new online and traditional offline media. It also explores how power relations are manifested in changes in the structure of ownership, different modes of censorship and various forms of state-sponsored regulation.

The role of technologies substantially changes during the transition from usage by a minority of early adopters to when new technologies become domesticated (Silverstone 2002). The *user vector* follows how Runet became a part of everyday life in almost every sphere for a wide spectrum of the population. It explores how Runet has configured its users and the functions of Runet in everyday life. This includes an analysis of the changing popularity of platforms, sociological data on Runet usage in different time periods and the mapping of new forms of social interaction and community building. It also addresses various forms of facilitation of user activity in order to address different types of everyday life issues and crisis situations. A distinct sub-topic of this vector is the role of Runet in the lives of children and teens.

The *political vector* follows the role of Runet in the political life of Russia. It encompasses approaching Runet as a public sphere, the role of Runet in political mobilization and the role of Runet in the empowerment of the state, including new technologies of surveillance and crowd control. In this sense, this vector follows the tension between the different imaginaries of Runet as an alternative political space, a space of political discussion and mobilization as well as the securitization and sovereignization trends on Runet that seem to make it one more sphere of the state's political influence and an additional set of technologies of political power.

16.5 THE HISTORY OF RUNET THROUGH FIVE VECTORS

16.5.1 The Technological Vector: From Enthusiasts to Corporations

Some of the technological origins of Runet relate to the development of informational systems for communication, scientific purposes and the advancement of the planned economy in the Soviet Union (Gerovitch 2002; Peters 2016). The experience of early Internet usage could be connected to that of earlier computer-based network systems like Usenet and, later, Bulletin Board Systems (BBS) and FidoNet² (Driscoll 2016). However, the development of FidoNet and BBS differed from that of the Internet in terms of both technology and social organization: "Unlike the Internet, which in the United States was the preserve of academic and military institutions up to the early 1990s, FidoNet

has been more the preserve of talented computerphiles, run on a purely non-commercial, anyone-can-join basis" (Rohozinski 1999).

The early development of Runet can be linked to the continuous development of the Internet in Russia, but, as mentioned, there are different approaches to what can be considered its starting point. For instance, Kuznetsov (2004) identifies two events as the starting points of the Russian Internet: the registration of the .su domain and the creation of the Relcom/Demos computer network. In this sense, the development of the technology that offered an infrastructure for Runet was driven by scientists and programmers together with businessmen who identified the commercial potential of the Internet.

From a relatively early stage, the Russian security services interfered in the development of the new informational system. A number of scholars highlight, however, how KGB (Komitet gosudarstvennoj bezopasnosti, Committee for State Security) apparently had no capacity to control the electronic flow of information in the first phase of Runet development, and specifically around the political events that triggered the final collapse of the USSR (Konradova 2016). The systematic surveillance of Internet-based communication started with the implementation of SORM-2 (Sistema tehničeskih sredstv dlå obespečeniå funkcij operativno-razysknyh meropriâtij-2, System for Operative Investigative Activities-2) in 1998, when all telecommunications operators were required to integrate this into their communication hardware.

In addition to cables and hardware, the technical aspects of Runet relied on the development of various types of online services. The Russian search engines Aport (1996), Rambler (1996) and Yandex (1997) were founded before Google. A social network, Odnoklassniki, was launched in March 2006 and followed by VKontakte in January 2007. The most popular e-mail services were offered by Mail.ru and Yandex. Russian blogging relied mostly on an American platform, LiveJournal, which was subsequently sold to a Russian company, Sup Media, in 2007. Since then, Yandex and Mail.ru have become the two major Russian Internet giants, while VKontakte dominates the social networks market. However, the dominance of Russian online platforms has not excluded Western platforms. Google, YouTube, Facebook, Twitter and Instagram have continued to be popular destinations for the users of Runet (for more on social networks, see Chap. 19).

One of the ongoing developments of Runet within the technological vector is the change in the structure of ownership of the major online platforms. Gold stock in Yandex was purchased by Sberbank in 2009. Most of the platforms, including Mail.ru (Mail.ru Group has been controlled by Alisher Usmanov since 2015), Odnoklassniki (owned by Mail.ru Group), LiveJournal (since 2013 a part of Rambler, owned by Aleksandr Mamut) and VKontakte (owned by the Mail.ru Group since 2014), came under the control of oligarchs alleged to have close ties with the Kremlin. The founder of VKontakte, Pavel Durov, was forced to sell his share of the company in 2014. At the same time, the Russian authorities increased the scale of regulation of the activity of foreign Internet companies including Facebook, Google and Twitter. Russian law

required these companies to keep the private data of Russian citizens on servers located in Russia. LinkedIn did not comply and was banned. Other major Western platforms such as Twitter and Facebook have also not complied, but in 2020 they remain accessible in Russia.

Efforts to increase state control can also be seen at the infrastructural level. The introduction of the Cyrillic .pφ domain in 2010, actively supported by the Russian authorities, afforded new technical opportunities for the russification of the Internet in Russia. In 2017, the Kremlin required Russian Information Technologies (IT) entrepreneurs to focus locally at the expense of the global market in order to be independent of foreign influences (Budnitsky and Jia 2018, 607). A number of initiatives promoted a vision of Runet as a "sovereign Internet" (Asmolov 2010; Kukkola and Ristolainen 2018). In 2019, this vision led to a law requiring the development of an independent infrastructure for the Russian Internet that would enable it to continue functioning while relying solely on Russian servers. Increasing control over technological infrastructure and software can also be seen at the policy level. Strategic documents from the late 1990s promote the idea that "our" technologies, produced and used in Russia, were treated by the state as a "social good" while global technologies were considered a threat (Shubenkova and Kolozaridi 2016).

16.5.2 The Cultural Vector: From Alternative to Mainstream

The first popular websites on Runet included an online library (lib.ru) and online competitions for writers and poets. Since the early 1990s, Runet has been rapidly occupied by artists, journalists and members of the academic community, who have not only shared their work but also actively participated in the construction of the new space. Roman Leibov, a semiotics scholar from Tartu, Estonia, is considered to have been the first Russian-language blogger on LiveJournal. These writers and scholars considered Runet a laboratory for cultural experiments such as collaborative production and hypertext. A range of online projects crossed national boundaries and offered a common space of cultural production for people in former USSR countries and for emigrants all over the world, including in the United States (US), Europe and Israel.

One of the first web design studios that actively contributed to designing the early Runet space was launched by Artemy Lebedev in October 1995. A special space was also offered for the production and sharing of humor, which had played an oppositional role in Russian culture. The list of the most popular websites included at that time anekdot.ru, created by Dmitry Verner. Later, the web project Lurkmore.to, launched by David Homak in 2007, sought to offer an encyclopedia of memes illustrating the underground culture of Runet.

At the beginning of the 2000s, LiveJournal became the most popular platform among Russian cultural elites and, as highlighted by Alexanyan (2013), could be considered a unique mix of blogging and social networking. Initially, the option to create a blog on LiveJournal was by invitation only. This type of model ensured the elitist nature of the LiveJournal community. In 2002, however, the invitation-only requirement was cancelled, and LiveJournal opened its gates to the growing community of Runet. In 2010 Harvard-based researchers identified this cultural cluster as still one of the biggest clusters in the Russian blogosphere, although it was less dominant by comparison with the public affairs cluster (Alexanyan et al. 2010). Later, the first Russian social networks, VKontakte and Odnoklassniki, contributed to a shift from content-generation toward social networking among friends as a dominant form of activity of Russian Internet users.

The shift from Runet as a space of alternative culture to a mainstream domain could be seen in a number of aspects. Firstly, the Russian social network VKontakte offered not only an option for communication but also a limitless and unregulated environment for sharing any type of music and video content. Accordingly, despite copyright laws, any type of cultural content could be found online. Later, VKontakte started to comply with some of the copyright laws; however, it remained one of the major music and video hosts on Runet. The increasing role of mainstream culture is associated with the increasing dominance of content created for the traditional media. For instance, the most popular YouTube accounts among Russian audiences are KVN (Klub veselyh i nahodčivyh, a Russian humor show,), with 4 million subscribers, and a talk show, The Evening Urgant, with 2.7 million viewers. The most popular Russian account on Instagram belongs to a pop-singer, Olga Buzova, who has 14 million followers (Lebedev 2018).

At the same time both YouTube and Instagram are key sites for new celebrities competing with traditional media content, such as videobloggers, beauty bloggers and musicians. However, these phenomena are rarely treated as specifically characteristic of Runet, since they partly belong to a global culture of micro-celebrities, various youth scenes (Omelchenko 2019) or particular genres. They use the Russian language, but it is arguable whether they share that sense of commonality which was so important for the Runet culture of the 1990s and 2000s.

16.5.3 The Media Vector: From Alternative Media to State Control

The first time Runet was able to play a substantial role as an alternative form of media was during the coup attempt against Gorbachev in 1991. While Soviet TV was broadcasting the ballet Swan Lake, Relcom allowed geeks and scientists to break the information blockade through UseNet groups and inform the Western audience about what was happening (Konradova 2016). The first Russian media websites appeared a few years later, when early adopters started to occupy the Runet space. The first news website, *Večernij Internet* (Evening Internet), launched by Anton Nosik in 1996, covered mostly news concerning Runet.³ As pointed out by Kuznetsov, "The Russian Internet was so small at that time, that the appearance of any new page was an event" (Kuznetsov 2004).

The first website of an offline newspaper was launched in spring 1995 by *Učitelskaâ gazeta* (Teachers' Newspaper). However, very soon Runet was

offering a space for the development of new media organizations. These included Vesti.ru, Gazeta.ru and Lenta.ru. While the democratization of the Russian media sphere was led by traditional media in the 1990s, the Internet took a lead as a major liberal media domain in the 2000s. Under the new president, Vladimir Putin, who took office in 2000, the Russian state succeeded within a short time in taking control of the major TV channels from the oligarchs Berezovsky and Gusinsky, while online media remained relatively independent. Although Vesti.ru was taken under the control of the Russian national TV channel, Lenta.ru and Gazeta.ru were considered among the most popular independent online sources for about another ten years.

Social media also started to play an increasing role in shaping the Russian media environment. The rise of blogs, citizen journalism and groups on VKontakte can be seen as important factors that challenged the control of the traditional Russian media. Many traditional journalists also started using blogs to develop their personal professional brands, to share unedited content and to have direct communication with their audience. Other types of actors also contributed to the transformation of the Russian online media system. An increasing number of newsmakers, including politicians (such as President Dmitry Medvedev), experts and celebrities, started using blogs and social networks, which now could often be considered a source of first-hand information.

Social media activists and opposition politicians also contributed to the development of Runet as a media sphere. These activists launched online investigations that were able to set the news agenda and make an impact on traditional media. This included securing investigations of police corruption as well as helping to hold high-ranking businessmen and officials accountable for their misdeeds, as in the case of a car accident involving the vice president of the Lukoil oil company in February 2010. That said, Toepfl (2011) points out that the traditional Russian political elites learned how to manage public outrage and restructure it to serve their own political goals.

During parliamentary and presidential elections in 2011–2012 the Russian online media played a central role in exposing the scale of fraud and in covering the protests. Following the protests, the Russian authorities started to increase their control over and pressure on online media. Some, like Grani.ru, were blocked. The editorial teams of two leading news websites, Gazeta.ru and Lenta.ru, were changed and some former members of the Lenta.ru team moved to Latvia to found a new website, Meduza.io, in 2014. At that time LiveJournal also lost its political function while most of the influential media bloggers moved to standalone platforms or to social networks. Opposition sources also became less visible in the Yandex News aggregator following political pressure from the Kremlin (Soldatov and Borogan 2015).

Alexanyan has argued that in the 2000s Runet gave rise to a different type of imagined community of Russian citizens, distinguishing between "Internet Russia and TV Russia" (Alexanyan 2013, 161). However, as a result of state media regulation, the Russian authorities increased their control over the Runet media sphere. Only a few liberal online media outlets, including

NovayaGazeta.ru, Meduza.io, Ekho Moskvy (https://echo.msk.ru/) and the TV Rain (Dožď) channel (tvrain.ru), remained active. Facebook also continued to play some role, whereas a new digital platform, the messaging app Telegram, assumed increasing importance for the circulation of political rumors through anonymous channels. While on the one hand the Russian authorities made a failed attempt to ban Telegram in 2018 for non-compliance with antiterrorist legislation, on the other hand it was also being actively used by the Kremlin for various types of political media manipulation through popular anonymous political channels (Rubin and Badanin 2018). While the Runet media sphere lost its oppositional power as an alternative media environment, it still offered a diversity of media voices and genres, although since 2014 it has started to be dominated by state-affiliated platforms (e.g. Lenta.ru, which changed its ownership, Yandex News, RIA Novosti, KP.ru and Izvestia.ru) and the Russian authorities gained more control over agenda-setting and the framing of political events. At the same time, some opposition content moved to non-Russian platforms, such as in the case of the popular YouTube video channels of opposition leader Alexei Navalny and TV presenter Yury Dud, as well as of the independent political channels on Telegram (for more on digital journalism, see Chap. 9).

16.5.4 The User Vector: From Elites to Everyday Usage

In the 1990s and the first part of the 2000s, the Internet was used actively by a minority of Russian citizens. The major trend, however, that changed the profile of the Russian user was the gradual increase in the number of Internet users in Russia. This could be seen in terms of both the regions covered by the Internet and the frequency of usage. The socio-economic groups that had had limited access to the Internet during the first years of Runet became active users. This happened as a result of the reduction in costs of Internet access and the broader availability of computers and mobile phones.

In 2017 Russia had more than 107 million Internet users (more than 76% of the Russian population) and the number of users aged between 10 and 55 was more than the TV audience. The growth in the number of users was linked to the increase in instrumental usage of Runet. According to Nisbet et al. (2015), the most popular usage of the Russian Internet included: "search for information for personal usage"; "communicating in social networks"; "reading national news"; "e-mail correspondence," and "downloading and listening to/viewing of music and video." These types of usage are related to the increasing popularity of a number of websites, including Avito.ru (online sales), weather forecasts (Gismeteo.ru) and Head Hunter [hh.ru] (recruitment). The ratings of most popular Russian websites are constantly changing, while the top placings are not only dominated by media, social networks, e-mail services and search engines but also determined by trends in digital consumption and online education. The rankings of statistically most-visited websites among Russia users can be seen at radar.yandex.ru and top1000-ru.hotlog.ru.

In 2020 VKontakte remains one of the most popular websites, offering not only social networking but also various forms of entertainment including movies, music and pornography (Ostrovsky 2019). VKontakte also offers a platform for the development of communities of different kinds, from vibrant youth culture to intellectual clubs, wives of prisoners and street-food testers in small towns. An additional sector that fulfills instrumental functions and addresses the needs of Russian citizens includes state-related services offered through the e-governance portal Gosuslugi. The increasing scope of instrumental functions is also manifested through rapid growth in online banking services and online payment systems.

We may also find evidence of how digital platforms afford Russian users an opportunity to address everyday life challenges. This is related to various forms of crowdsourcing, as a digitally mediated form of mobilization of resources to address different goals. One of the groups of digital platforms that allow users to be mobilized around everyday life issues consists of civic applications (Ermoshina 2014). Runet has offered a rich diversity of platforms of this type, from the mapping of potholes (the Rosyama.ru project, initiated by Navalny in 2010) to RosZKH.ru and Zalivaet.SPB.ru, which map the failure of local authorities to fix buildings and local infrastructure. Charity platforms like pomogi.org and TakieDela.ru raise awareness of individuals needing various kinds of help and allow users' financial resources to be mobilized to address these problems.

The Internet has also played a substantial role in the case of various emergencies, where it has not only offered independent sources of information but also allowed people to take part in response. One of the most significant cases of digitally mediated civic mobilization was the response to wildfires in 2010 (Asmolov 2013b). Some of these projects support continuous engagement to save people's lives. For instance, the Liza Alert platform allows people to be mobilized for search and rescue operations when elderly people and children become lost in Russian forests.

The Russian authorities also seek to develop platforms to engage users and harness crowd resources. State-affiliated initiatives for the engagement of citizens in decision-making, such as the Active Citizen project (ag.mos.ru) launched by the mayor of Moscow, have been criticized for offering "a semblance of openness and participation, while in practice neutralizing citizens' activity and exerting control over them" (Asmolov 2018).

The user vector, perhaps, is the sphere where the contrast between Runet and the Internet in Russia is most visible. This is where the Russian Internet continuously becomes an instrument of the "uses and gratifications" (Katz et al. 1973) of a majority of Russian citizens. Here, we also see how the change in the demography of Russian Internet users, specifically the increase in the number of users among older generations and in more remote areas of Russia, is associated with the change in the role of Runet. The instrumental usage of the Russian Internet also makes it more similar to the Internet in other countries.

16.5.5 The Political Vector: From Democratic Promise to Digital Sovereignty

During the 1990s politicians started slowly to explore the new political technologies. In March 1996, Yabloko was the first Russian political party to open a website. However, Runet is sometimes considered to be a space for opposition political actors, various types of movements and individuals that have had no affiliation with traditional political organizations. In 1999, Putin—then prime minister—held his first meeting with leaders of Runet. Despite some pressure from a minister of communication, Mikhail Lesin, to introduce some form of Internet regulation, Putin opposed Lesin's proposal. He stated: "We are not going to look for a balance between freedom and regulation. We will always choose freedom" (Soldatov and Borogan 2015).

The elections of 2000 were the first where the Internet started to play a significant role. A new type of political consultant with the Internet as an area of expertise appeared. This group included such people as Gleb Pavlovsky, a founder of the Fund for Effective Politics (FEP). FEP was the first organization to release public opinion polls online. During the first two terms of President Putin the authorities did not actively interfere in the online space, although a number of legislative initiatives for the regulation of communication were introduced. Meanwhile some liberal governors like Oleg Chirkunov and Nikita Belykh started to experiment with the online space by managing LiveJournal blogs. In 2008 Dmitry Medvedev became president and started a campaign of popularization of open data and e-government. Medvedev visited the head office of Twitter in California, where he opened an account and wrote his first Tweet.

At the same time, in the late 2000s, Runet displayed a "growing use of digital platforms in social mobilization and civic action" (Alexanyan et al. 2012). This political mobilization was not necessarily associated with any political organization but rather with "issue-based campaign[s]" initiated by Internet users (Alexanyan et al. 2012). At the same time, some leaders started to develop their political capital online, without affiliation with any political party. One example of the new generation of Internet-enabled leaders was Alexei Navalny, who gained popularity via his blog on LiveJournal, where he published his investigations into corruption. Later, when LiveJournal came under the control of pro-Kremlin owners, Navalny launched a standalone website, Navalny. ru, as well as actively using YouTube, Twitter, Facebook and Telegram.

That said, according to Fossato (2009), "The state remained the main mobilizing agent." She argues that Runet operates "as a device to spread and share information, but largely among closed clusters of like-minded users who are seldom able or willing to cooperate." In 2010, contradicting his previous positive assessments of the Internet, Putin stated that it was well known that 50 percent of online content was pornography. Since then, one can see the domination of the state's discourse on the role of the Internet as a dangerous technology and a threat to socio-political stability that has to be regulated. The

major examination of the political role of Runet, however, took place around the parliamentary and presidential elections in winter 2011–2012.

During the parliamentary elections of 2012, social networks, crowdsourcing platforms and dedicated websites were employed to monitor electoral fraud (Oates 2013). At the same time, the Russian authorities launched the WebVybory2012 (webvybory2012.ru) operation to cover 95,000 polling stations with two web cameras for each station and offer online live broadcasting of the vote and the counting process. The project sought to prove that the Russian elections were transparent and legitimate. Despite the efforts of the Russian authorities to protect the legitimacy of the elections, independent monitoring efforts and online media challenged the results. The parliamentary elections were followed by a wave of protests facilitated via social networks.

The electoral cycle of 2011–2012 provided a momentum for accelerated political innovation (Asmolov 2013a) and specifically for new forms of digitally enabled horizontal mobilization of protests. This included the development of crowdsourcing platforms for election monitoring (Kartanarusheniv.ru), using social networks including Facebook for large-scale mobilization, and the development of dedicated digital tools for the organization of distributed protests (e.g. in the case of the White Circle protest, where a website, Feb26.ru, supported self-organization, enabling people to create a live chain around the center of Moscow). Digital political innovation also offered new ways of collecting data on the scale of arrests and of offering assistance to people who were detained. The wave of political innovation continued after the elections. During the Moscow mayoral election in 2013 Navalny's team was able to develop online tools to mobilize support despite the lack of coverage in the traditional media. Eventually Navalny received 27 percent of the vote, which was considered an unexpected success. Later Dmitry Gudkov developed so-called "political Uber" to simplify voting for the most liberal politician at a neighborhood level. However, this success never went beyond local level.

Following the electoral cycle of 2011–2012, the authorities identified the political threat associated with Runet, through the challenge to the legitimacy of elections or the capacity to facilitate large-scale political action. Klyueva (2016) argues that "[T]he successes of the protest movement initiated a government crackdown on the Russian Internet and social media." She concludes that "the pro-government actors were able to monopolize and control the public sphere with their issues and messages" (Klyueva 2016, 4674). Gunitsky (2015, 50) suggests that the case of Runet illustrates a "shift from contestation to co-optation" of social media (for more on social networks and politics, see Chap. 30).

The third Putin presidency (2012–2018) started with a series of restrictive laws. The Yarovaya package obliged Internet Service Providers (ISP) to store their information about user activity for a long time. The state also supported groups of cyber guards who search for prohibited content online and report it to the authorities. At the same time a new generation of pro-Kremlin digital-savvy politicians started to play an increasingly significant role online (for

instance, spokesperson of the Russian Ministry of Foreign Affairs, Maria Zaharova). Some experts started talking about building a "great Russian firewall" (Kulikova 2014). The process of actually doing this, however, would be substantially different from that of its Chinese predecessor.

Taking control of Runet required a multidimensional operation that addressed content, technological infrastructure, the structure of ownership of major Internet platforms, shaping the perception of the Internet among Russian citizens and creating a legal environment to support various forms of repressive measures. This took the form of *sovereignization*—that is, the type and scale of control over online space became more and more like the control exercised over offline space (Nocetti 2015). Another notion that applied to the state's approach to Runet was fragmentation (Kolozaridi 2019) or what is sometimes called balkanization (Kulikova 2014). Another trend seen in the most recent history of Runet development is the increasing securitization of the Russian online space. The online sphere became a major domain in the context of international conflict, which included not only cyberattacks and the use of trolls and bots as a part of state-sponsored propaganda but also the mobilization of users' resources to support various aspects of warfare. These tendencies were visible in the conflict between Russian and Ukraine (2014–2016) (Asmolov 2019).

The increasing role of regulation and approval of new sovereignization also led to the emergence of a new wave of "digital resistance." The first wave of protests in April 2018, with about 12,000 participants, addressed the efforts of the Russian authorities to ban Telegram, which led to the blocking of hundreds of other websites as "collateral damage." The second wave of protests "against the isolation of Runet," with about 15,000 participants, was triggered by the approval of the "Internet sovereignization" law and took place in March 2019. The new restrictions of sovereignization have been addressed by proliferation of Virtual Private Network (VPN) services and other circumvention tools. In August 2019 Telegram chats and chatbots became a major tool for the coordination of protests after a ban on the participation of opposition candidates in local Moscow elections (for more on digital politics, see Chap. 2).

16.6 Conclusion

This vector-based historical overview of Runet allows us to identify some important properties of Runet as an object that has been developed as an alternative socio-political and cultural space. First, all the vectors seem to be interrelated. The major trend that can be seen in all the vectors is the increasing conflict between understanding Runet as an alternative phenomenon with its own rules influencing the outer social world and treating it like other entities that follow the offline cultural and political order. This conflict is manifested in the increasing efforts of state institutions to impose various forms of regulation on the online networked environment. This regulation seems to be aimed at

restricting Runet as a construct with a distinct cultural and socio-political role (as seen from the first stages of Runet development), while also offering more space for the Internet in Russia as an instrumental construct that serves a broad spectrum of needs of Russian citizens, from digital consumption to e-government services. Most recent digital innovations offer a broad range of new services and contribute to the development of the Internet in Russia, but it is debatable whether these can be considered part of the continuous development of Runet as a socio-political and cultural object.

The notion of a runaway object highlights the fact that objects are shaped by the continuous activity of a variety of actors who do not necessarily agree about what the object should look like. That said, their activity is still driven by a shared vision of the object to be constituted as a distinct entity with its own boundaries. All the vectors described here demonstrate that the early development of the Russian Internet was driven by various imaginaries of Runet as a socio-cultural project and an alternative political space. It seems, however, that the increase in the number of users, the change of policy on Information and Communication Technologies (ICT) development and the increase in various forms of regulations and other trends not only drastically changed Runet but gradually decreased its salience as an object of participatory socio-political construction.

What continued was the development of the Internet as an advanced form of communication infrastructure in modern society that supports various aspects of people's lives as well as being used by governments as a tool of political influence. However, the decline of Runet is not necessarily an outcome of political Internet regulation but also of a range of socio-technical processes related to the development of the Internet, its accessibility and functions. Moreover, one may argue that the political regulation of the Internet in Russia in fact contributes to the continuation of Runet, since the act of regulation reinforces the boundaries of the object regulated.

We are not necessarily arguing, in imitation of Fukuyama, that Runet is at the end of its history. However, a historical consideration of the Russian Internet seems to suggest a major shift. The main outcome of the trends identified through this historical analysis of five vectors is not increasing state control of Runet but a gradual replacement of Runet by the whole Internet in Russia. That said, Runet and the Internet in Russia continue to co-exist. One may argue that the latent resources of Runet could still be mobilized and take center stage in Russian cyberspace.

Notes

- 1. For example, in the cases of Yandex, which can be considered as the "Russian Google," or of VKontakte, which can be considered as the "Russian Facebook."
- 2. FidoNet is a worldwide computer network used for communication between bulletin board systems (BBSes).
- 3. The online archive of the project is available at: http://www.gagin.ru/vi/

REFERENCES

- Alexanyan, K. 2013. The Map and the Territory: Russian Social Media Networks and Society. Doctoral Thesis, Columbia University, NY. https://academiccommons.columbia.edu/doi/10.7916/D8XP7C49.
- Alexanyan, K., Barash, V., Etling, B., Faris, R., Gasser, U., Kelly, J., Palfrey Jr., J.G., and Roberts, H. 2012. Exploring Russian cyberspace: Digitally-mediated Collective Action and the Networked Public Sphere. Berkman Center Research Publication No. 2012-2.
- Alexanyan, K., Etling, B., Kelly, J., Faris, R., Palfrey, J.G. and U. Gasser. 2010. *Public Discourse in the Russian Blogosphere: Mapping RuNet Politics and Mobilization*. Cambridge, MA: Berkman Center.
- Asmolov, G. 2010. Russia: From 'Sovereign Democracy' to 'Sovereign Internet'? *Global Voices Online*, June 13, 2010. https://globalvoices.org/2010/06/13/russia-from-sovereign-democracy-to-sovereign-internet/.
- ——. 2013a. Dynamics of Innovation and the Balance of Power in Russia. In *State Power 2.0 Authoritarian Entrenchment and Political Engagement Worldwide*, ed. M.M. Hussain and P.N. Howard. Farnham: Ashgate.
- ——. 2013b. Natural Disasters and Alternative Modes of Governance: The Role of Social Networks and Crowdsourcing Platforms in Russia. In *Bits and Atoms Information and Communication Technology in Areas of Limited Statehood*, ed. S. Livingston and G. Walter-Drop. Oxford: Oxford University Press.
- ——. 2018. Vertical Crowdsourcing (Russia). In *The Global Encyclopedia of Informality: Towards an Understanding of Social & Cultural Complexity 2*, eds. A. Ledeneva, A. Bailey, S. Barron, and E. Teague. 463–467. London: UCL Press. http://in-formality.com/wiki/index.php?title=Vertical_Crowdsourcing_(Russia).
- ——. 2019. The Effects of Participatory Propaganda: From Socialization to Internalization of Conflicts. *Journal of Design and Science* 6: 20. https://doi.org/10.21428/7808da6b.833c9940.
- Asmolov, G., and P. Kolozaridi. 2017. The Imaginaries of RuNet: The Change of the Elites and the Construction of Online Space. *Russian Politics* 2: 54–79.
- Bowles, A. 2006. The Changing Face of the RuNet. In *Control + Shift. Public and Private Usages of the Russian Internet*, ed. H. Schmidt, K. Teubener, and N. Konradova. Norderstedt: Books on Demand.
- Budnitsky, S., and L. Jia. 2018. Branding Internet Sovereignty: Digital Media and the Chinese-Russian Cyberalliance. *European Journal of Cultural Studies* 21 (5): 594–613.
- Castells, M., and E. Kiselyova. 2003. The Collapse of the Soviet Union. The View from the Information Society. Los Angeles: Figueroa Press/USC Bookstore.
- Deibert, R., and R. Rohozinski. 2010. Control and Subversion in Russian Cyberspace. In *Access Controlled: The Shaping of Power, Rights, and Rule in Cyberspace*, ed. Ronald Deibert et al. Cambridge: The MIT Press.
- Driscoll, K. 2016. Social Media's Dial-up Roots. IEEE Spectrum 53 (11): 54-60.
- Driscoll, K., and C. Paloque-Berges. 2017. Searching for Missing 'Net Histories'. *Internet Histories* 1 (1–2): 47–59.
- Engeström, Y. 2008. From Teams to Knots: Studies of Collaboration and Learning at Work. New York, NY: Cambridge University Press.

- Ermoshina, K. 2014. Democracy as Pothole Repair: Civic Applications and Cyberempowerment in Russia. Cyberpsychology: Journal of Psychosocial Research on Cyberspace 8 (3): Article 4.
- Etling, B., K. Alexanyan, J. Kelly, R. Faris, J.G. Palfrey, and U. Gasser. 2010. *Public Discourse in the Russian Blogosphere: Mapping RuNet Politics and Mobilization*. Cambridge, MA: Berkman Center.
- Fossato, F. 2009. Discussion: Is Runet the Last Adaptation Tool? Russian Cyberspace 1 (1): 8.
- Gerovitch, S. 2002. From Newspeak to Cyberspeak: A History of Soviet Cybernetics. Cambridge, MA: MIT Press.
- Giddens, A. 2000. Runaway World: How Globalization Is Reshaping Our Lives. New York: Routledge.
- Gorny E. 2007, October 18. The Russian Internet: Between Kitchen-Table Talks and the Public Sphere. *Art Margins*. http://www.artmargins.com/index.php/2-articles/145-the-russian-internet-between-kitchen-tabletalks-and-the-public-sphere.
- Gunitsky, S. 2015. Corrupting the Cyber-Commons: Social Media as a Tool of Autocratic Stability. *Perspectives on Politics* 13 (01): 42–54.
- Habermas, Jurgen. 1991. The Public Sphere. In *Rethinking Popular Culture:* Contemporary Perspectives in Cultural Studies, ed. C. Mukerji and M. Schudson. Berkeley: University of California Press.
- Jenkins, H. 2006. Convergence Culture: Where Old and New Media Collide. New York: New York University Press.
- Katz, E., J.G. Blumler, and M. Gurevitch. 1973. Uses and Gratifications Research. *The Public Opinion Quarterly* 37 (4): 509–523.
- Klyueva, A. 2016. Taming Online Political Engagement in Russia: Disempowered Publics, Empowered State and Challenges of the Fully Functioning Society. *International Journal of Communication* 10: 20.
- Kolozaridi, P. 2019, forthcoming. Internet in Fragments: How Can We Think Over It. Konradova, N. 2016. A Putch in Usenet. A hall of unfulfilled fame, OpenDemocracy. net. https://www.opendemocracy.net/od-russia/natalia-konradova/putch-usenet. Accessed Aug 16.
- Kukkola, J., and M. Ristolainen. 2018. Projected Territoriality: A Case Study of the Infrastructure of Russian 'Digital Borders'. *Journal of Information Warfare* 17 (2).
- Kulikova, A. 2014, May 19. The 'Balkanisation' of Russia's Internet. *OpenDemocracy*. https://www.opendemocracy.net/od-russia/alexandra-kulikova/%E2%80%98bal kanisation%E2%80%99-of-russia%E2%80%99s-internet.
- Kuznetsov, S. 2004. Osupyvaâ slona: Zametki po istorii russkogo Interneta [Feeling an Elephant: Notes on the History of the Russian Internet]. Moscow: Novoe literaturnoe obozrenie.
- Lebedev, Pavel. 2018. Cifrovaâ èpoha. Zaterânnye v socsetâh [The Digital Age. Lost in Social Networks]. IPSOS Views. https://www.ipsos.com/ru-ru/cifrovaya-epokha-zateryannye-v-socsetyakh.
- Lihachev, N. 2015. 21-letie Runeta [21 Years of Runet]. TJournal. http://tjournal.ru/paper/runet-21.
- Mansell, R. 2002. From Digital Divides to Digital Entitlements in Knowledge Societies. *Current Sociology* 50 (3): 407–426.
- 2012. Imagining the Internet: Communication, Innovation, and Governance. Oxford: Oxford University Press.

- Markham, A.N. 1998. Life Online: Researching Real Experience in Virtual Space. Lanham, MD: Rowman Altamira.
- Nisbet, E. 2015. Benchmarking Public Demand: Russia's Appetite for Internet Control. Philadelphia: Center for Global Communications Studies. http://www.global.asc.upenn.edu/publications/benchmarking-public-demand-russias-appetite-for-internet-control/.
- Nocetti, J. 2015. Contest and Conquest: Russia and Global Internet Governance. *International Affairs* 91 (1): 111–130.
- Oates, S. 2013. Revolution Stalled: The Political Limits of the Internet in the Post-Soviet Sphere. Oxford: Oxford University Press.
- Omelchenko, E.L. 2019. Is the Russian Case of the Transformation of Youth Cultural Practices Unique? *Monitoring of Public Opinion: Economic and Social Changes* 1: 3–25.
- Ostrovsky, A. 2019, March 7. Russians Are Shunning State-controlled TV for YouTube. *The Economist.* https://www.economist.com/europe/2019/03/09/russians-are-shunning-statecontrolled-tv-for-youtube.
- Peters, B.J. 2016. How Not to Network a Nation. The Uneasy History of the Soviet Internet. Boston, MA: MIT Press.
- Popkova, A. 2014. Political Criticism from the Soviet Kitchen to the Russian Internet: A Comparative Analysis of Russian Media Coverage of the December 2011 Election Protests. *Journal of Communication Inquiry* 38 (2): 95–112.
- Ristolainen, M. 2017. Should 'RuNet 2020' Be Taken Seriously? Contradictory Views About Cybersecurity Between Russia and the West. *Journal of Information Warfare* 16 (4): 21.
- Rohozinski, R. 1999. Mapping Russian Cyberspace: Perspectives on Democracy and the Net. *United Nations Research Institute for Social Development (UNRISD)*, Discussion Paper 115. New York: United Nations.
- Rubin, M., and Badanin, R. 2018. Telega Iz Kremlâ [The cart from the Kremlin]. Proekt.Media. https://www.proekt.media/narrative/telegram-kanaly/.
- Schmidt, H. 2014. Russian Literature on the Internet. Digital Russia: The Language, Culture and Politics of New Media Communication. In *Digital Russia: The Language, Culture, and Politics of New Media Communication*, ed. M. Gorham, I. Lunde, and M. Paulsen, 177–194. London and New York: Routledge.
- Schmidt, H., and K. Teubener. 2006. Our RuNet. Cultural Identity and Media Usage. In *Control+ Shift. Public and Private Usages of the Russian Internet*, ed. H. Schmidt, K. Teubener, and N. Konradova, 14–20. Norderstedt: Books on Demand.
- Schmidt, H., K. Teubener, and N. Zurawski. 2006. Virtual (Re) unification? Diasporic Cultures on the Russian Internet. In *Control + Shift. Public and Private Usages of the Russian Internet*, ed. H. Schmidt, K. Teubener, and N. Konradova. Norderstedt: Books on Demand.
- Shklovski, I., and D.M. Struthers. 2010. Of States and Borders on the Internet: The Role of Domain Name Extensions in Expressions of Nationalism Online in Kazakhstan. *Policy and Internet* 2 (4): 107–129.
- Shubenkova, A.Y., and P.V. Kolozaridi. 2016. The Internet as a Subject of Social Policy in the Official Discourse of Russia: A Benefit or a Threat? *Journal of Researches of Social Policy* 14 (1): 39–54.
- Sibgatullin, A.A. 2009. Tatarskij Internet [Tatarian Internet]. Medina. http://www.idmedina.ru/books/history_culture/?1802.

Silverstone, R. 2002. Complicity and Collusion in the Mediation of Everyday Life. *New Literary History* 33: 745–764.

Soldatov, A., and I. Borogan. 2015. The Red Web: The Struggle Between Russia's Digital Dictators and the New Online Revolutionaries. New York: Public Affairs.

Toepfl, F. 2011. Managing Public Outrage: Power, Scandal, and New Media in Contemporary Russia. *New Media & Society* 13 (8): 1301–1319.

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