Ministry of Digital Development, Communications and Mass Media of the Russian Federation

FEDERAL STATE STATISTICS SERVICE

HSE UNIVERSITY

DIGITAL ECONOMY

POCKET DATA BOOK

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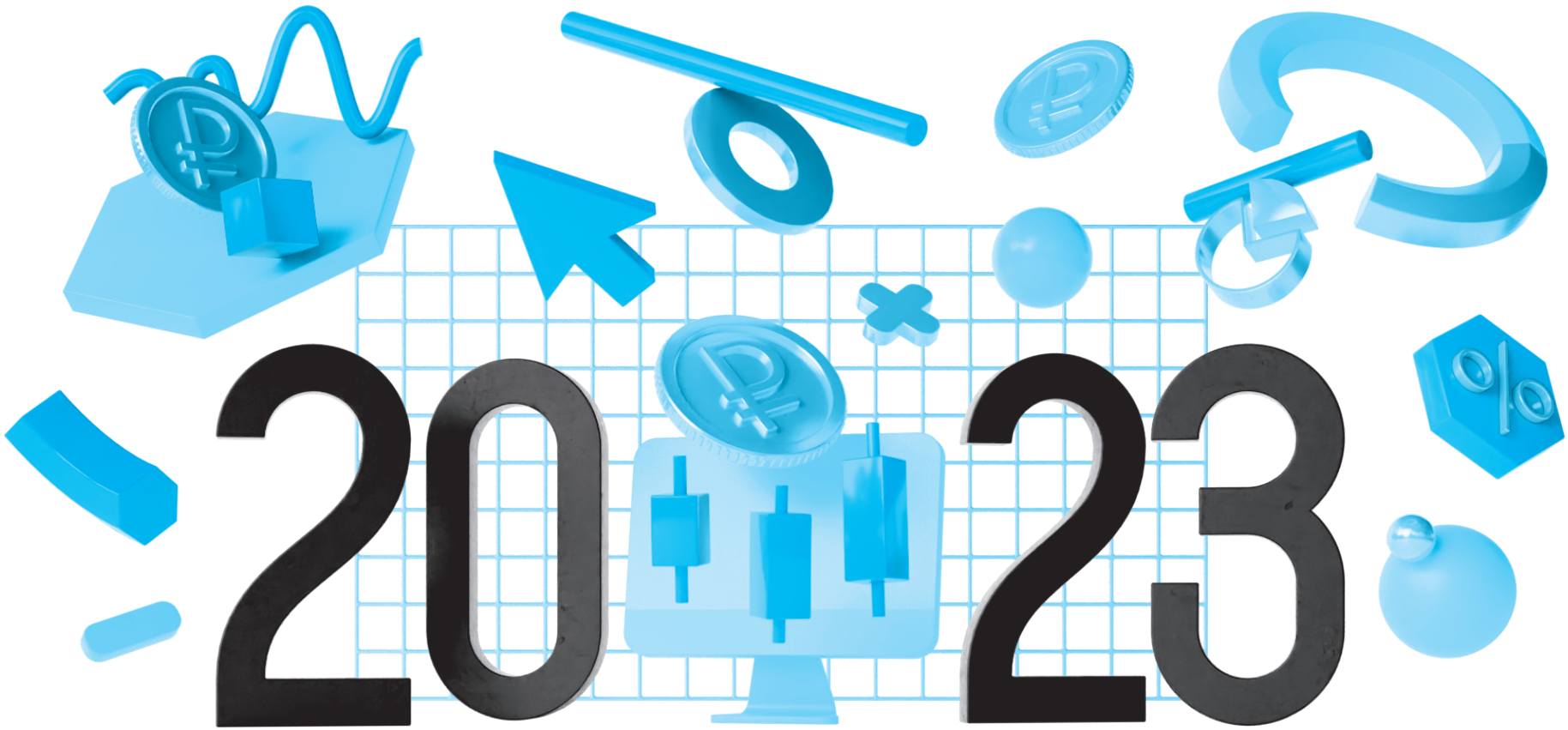

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POCKET DATA BOOK

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This pocket data book contains the main indicators of the digital economy development in the Russian Federation: gross domestic expenditure, use of digital technologies by households, individuals, and enterprises, personnel, infrastructure, ICT sector enterprises activity, etc.

The data book includes information of the Russian Federal State Statistics Service (Rosstat), Ministry of Digital Development, Communications and Mass Media of the Russian Federation, Ministry of Science and Higher Education of the Russian Federation, Federal Customs Service of Russia, Russian Central Bank (Bank of Russia), European Statistical Office (Eurostat), Organisation for Economic Co-operation and Development (OECD), International Telecommunication Union (ITU), United Nations Conference on Trade and Development (UNCTAD), UN Department of Economic and Social Affairs, World Intellectual Property Organization (WIPO), Scopus database, and results of methodological and analytical studies of the HSE Institute for Statistical Studies and Economics of Knowledge.

In some cases, the presented data specify those published earlier.

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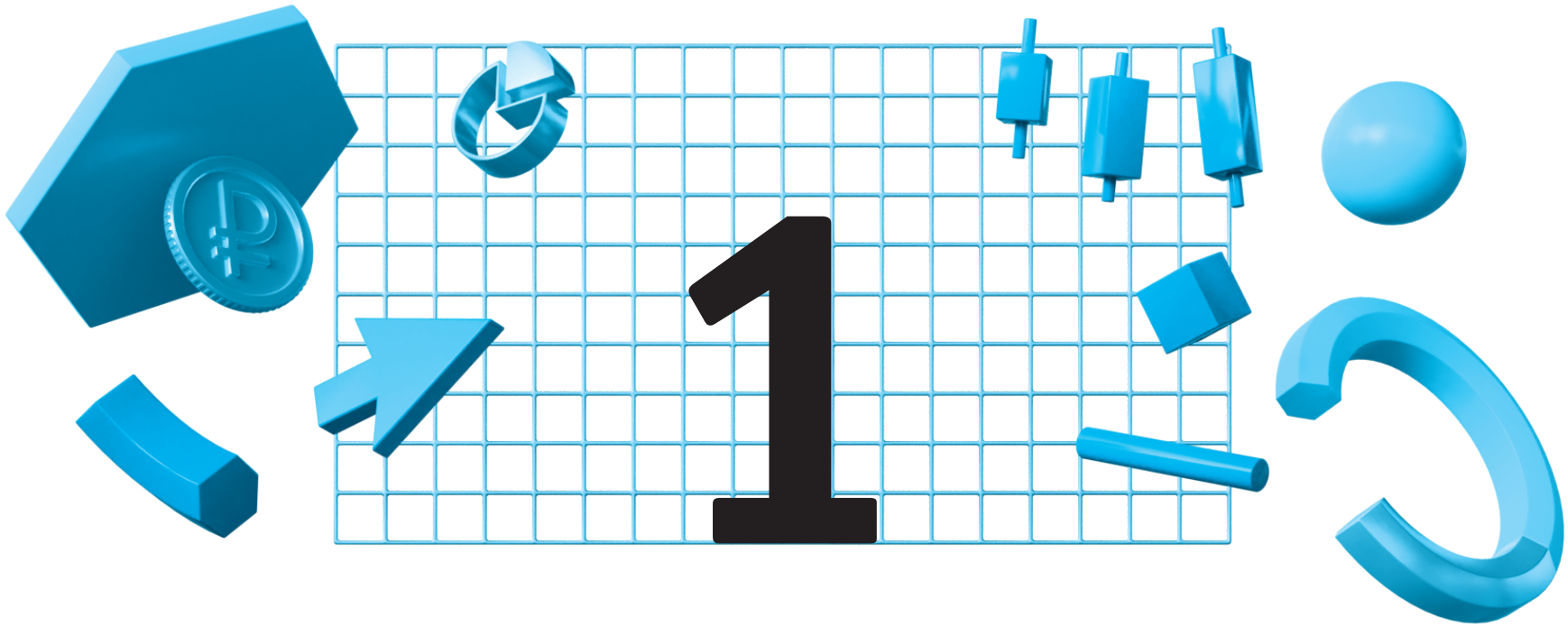
Symbols used in tables are:

… data not available and not included in the totals,

– data not applicable,

0.0 insignificant value.

In some tables, the sum of the breakdown may not add to the total because of rounding.

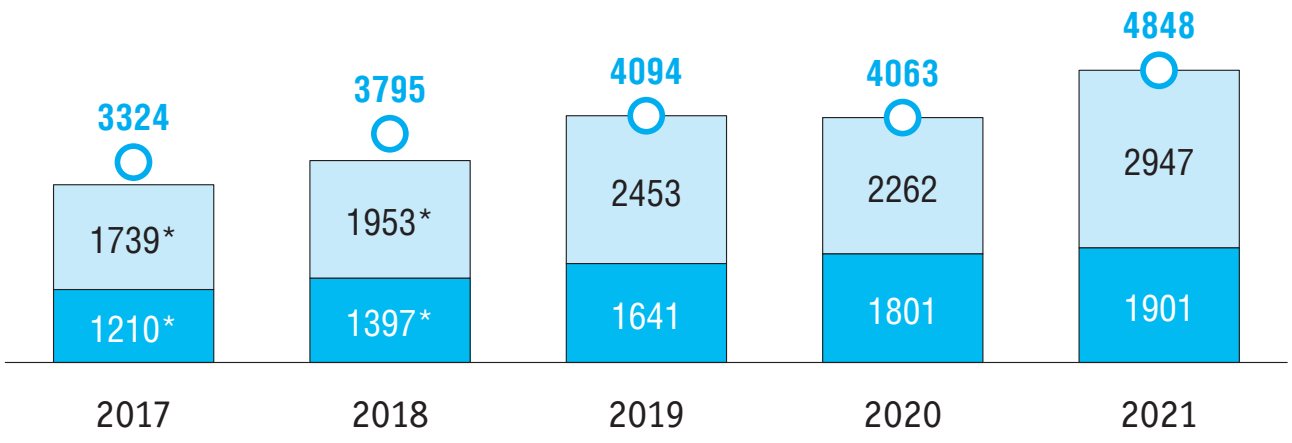


1

GROSS DOMESTIC EXPENDITURE ON DIGITAL ECONOMY DEVELOPMENT

1.1. Expenditure on digital economy deveopment

(billion roubles)

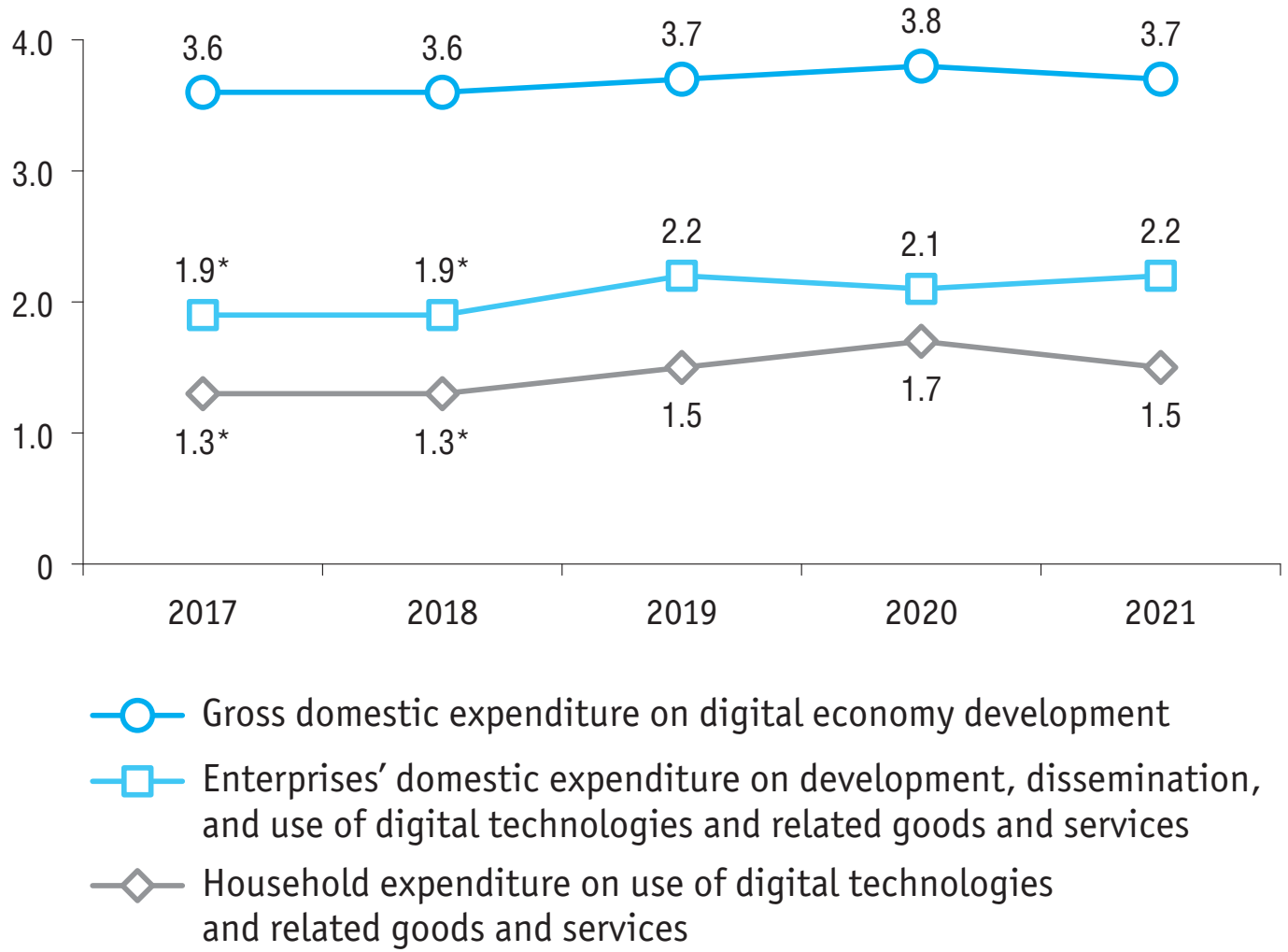


* Excluding the expenditure on digital content.

** Enterprises' domestic expenditure on development, dissemination, and use of digital technologies and related goods and services is domestic expenditure on the digital economy development from all sources of funds (session protocol no. 557pr of September 27, 2019 of the Digital Economy Subcom-mittee under the Government Commission on the Digital Development, Use of Information Technologies for Improving Quality of Life and Business Environment).

Source: here and below in this section, HSE ISSEK estimates based on the Rosstat data.

1.2. Gross domestic expenditure on digital economy development as a percentage of GDP



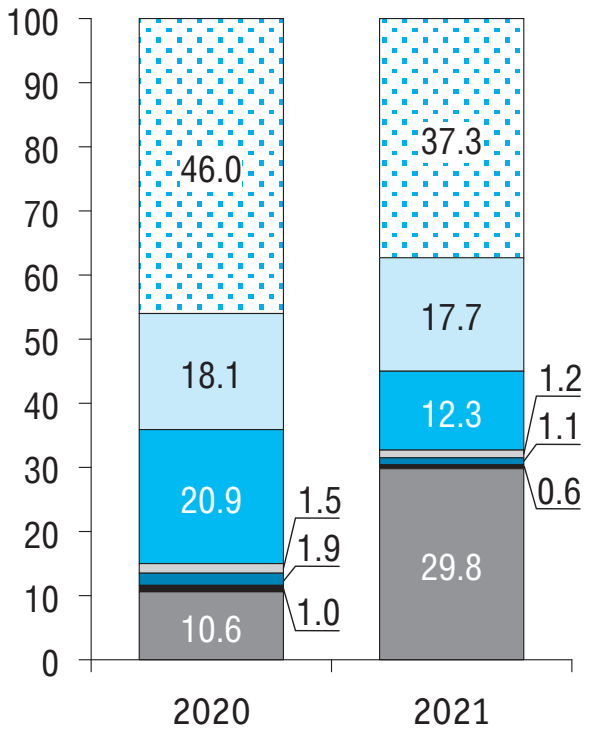
* Excluding the expenditure on digital content.

1.3. Percentage distribution of enterprises' domestic expenditure on development, dissemination, and use of digital technologies and related goods and services by type of economic activity

	2020	2021
Agriculture, forestry and fishing	0.4	0.4
Mining and quarrying	1.4	1.9
Manufacturing	8.2	8.7
Electricity, gas, steam and air-conditioning supply	2.2	1.8
Water supply, sewerage, waste management and remediation activities	0.6	0.3
Construction	1.6	2.8
Wholesale and retail trade; repair of motor vehicles and motorcycles	6.0	9.2
Transportation and storage	7.9	5.1
Accommodation and food service activities	0.4	0.5

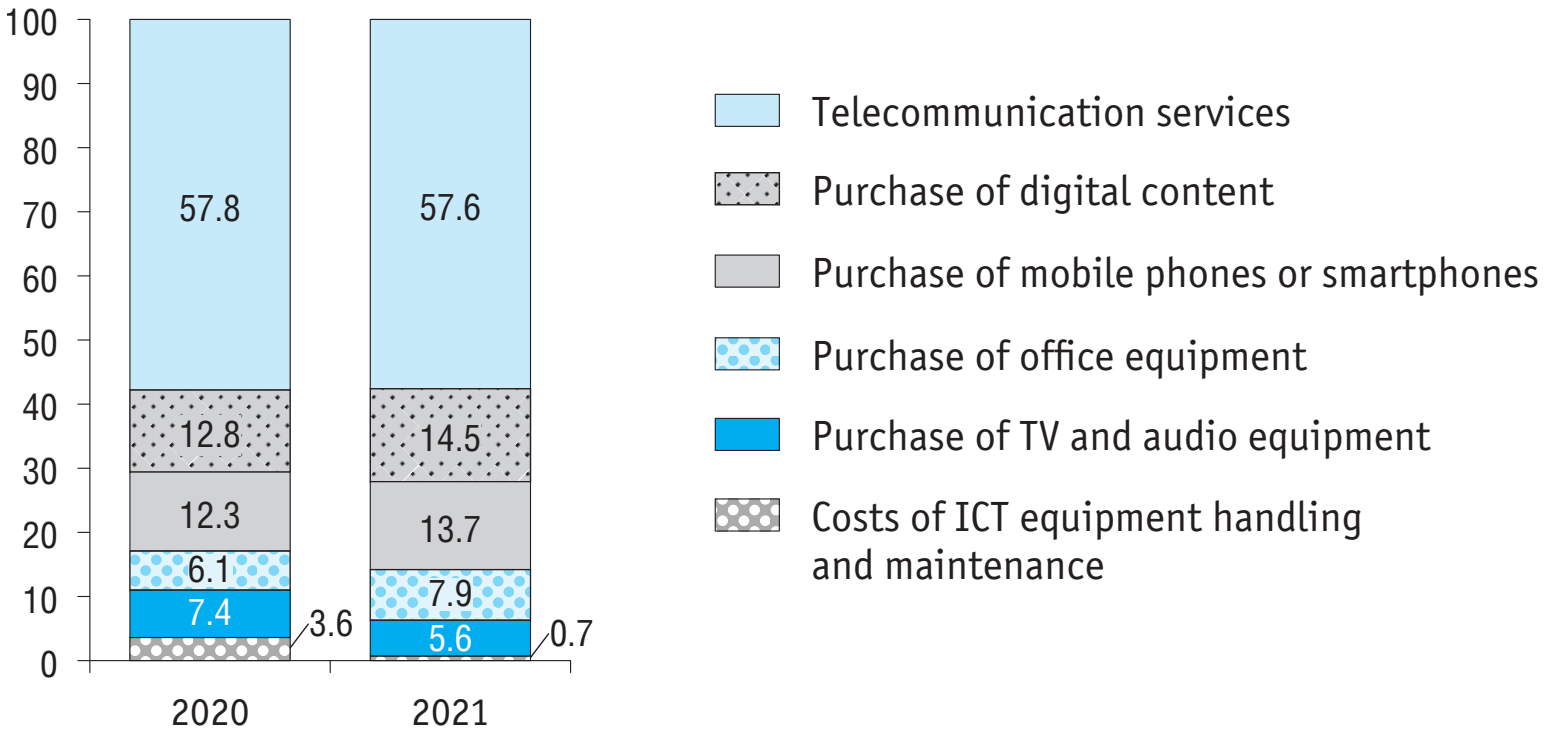
	2020	2021
Information and communication	26.8	29.4
IT industry	7.4	12.7
Financial and insurance activities	13.2	12.9
Real estate activities	2.4	2.7
Professional, scientific and technical activities	9.1	10.3
Education	9.7	4.1
Human health and social work activities	2.2	2.6
Arts, entertainment and recreation	0.7	2.0
Public administration and defence; compulsory social security	6.4	4.2

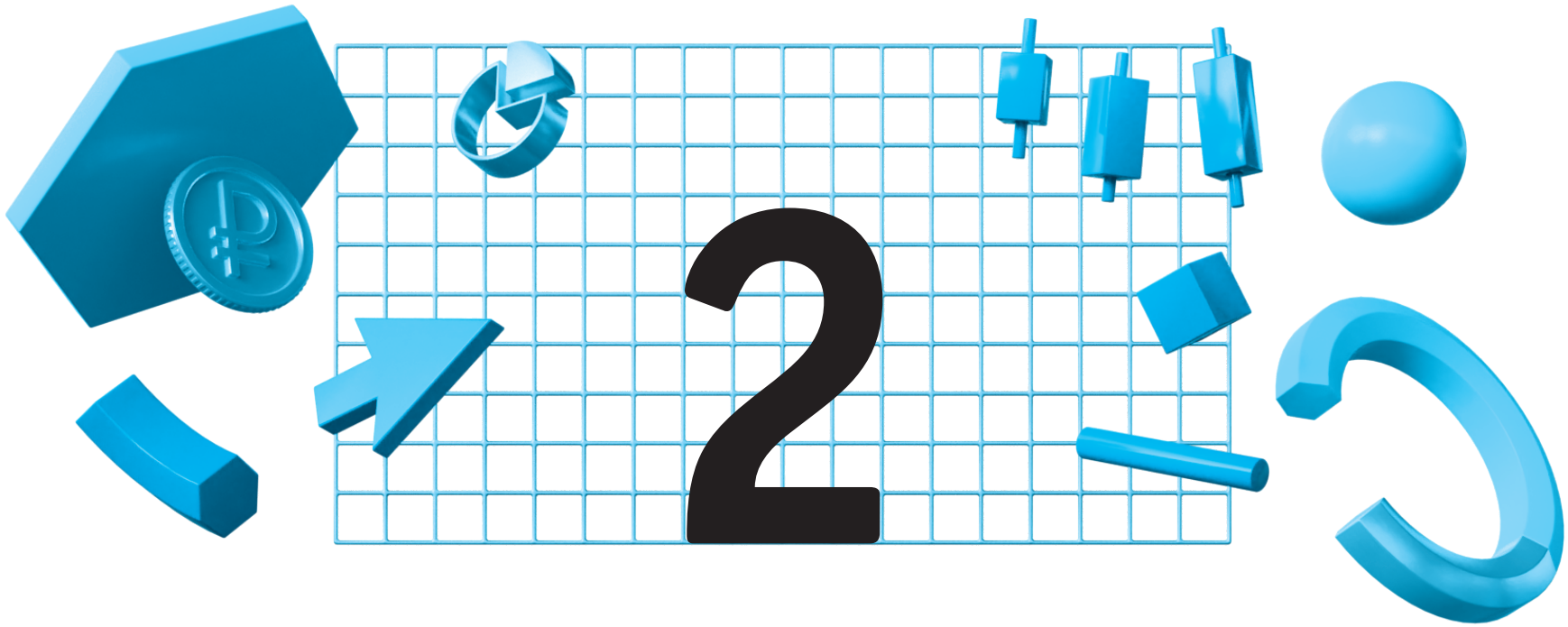
1.4. Percentage distribution of enterprises' domestic expenditure on development, dissemination, and use of digital technologies and related goods and services by type



- Purchase of ICT-related machinery and equipment
- Purchase of software, its adaptation and enhancement
- Telecommunication services
- Research and development
- Purchase of digital content
- ICT-related training of staff
- Other domestic expenditure related to implementation and use of digital technologies

1.5. Percentage distribution of household expenditure on use of digital technologies and related goods and services



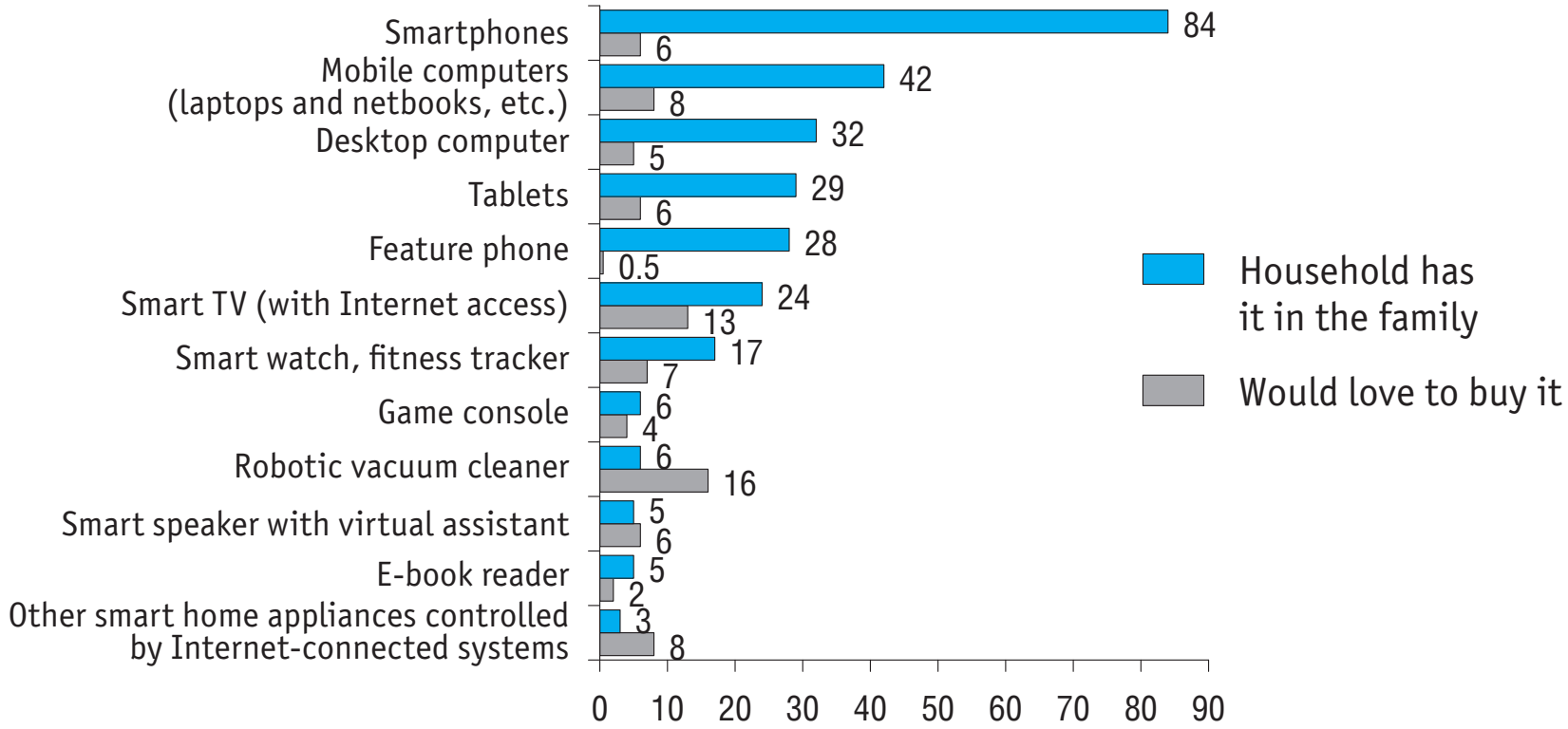


2

POPULATION IN THE DIGITAL WORLD

2.1. Households with digital devices: 2022*

(as a percentage of respondents aged 14 and over)

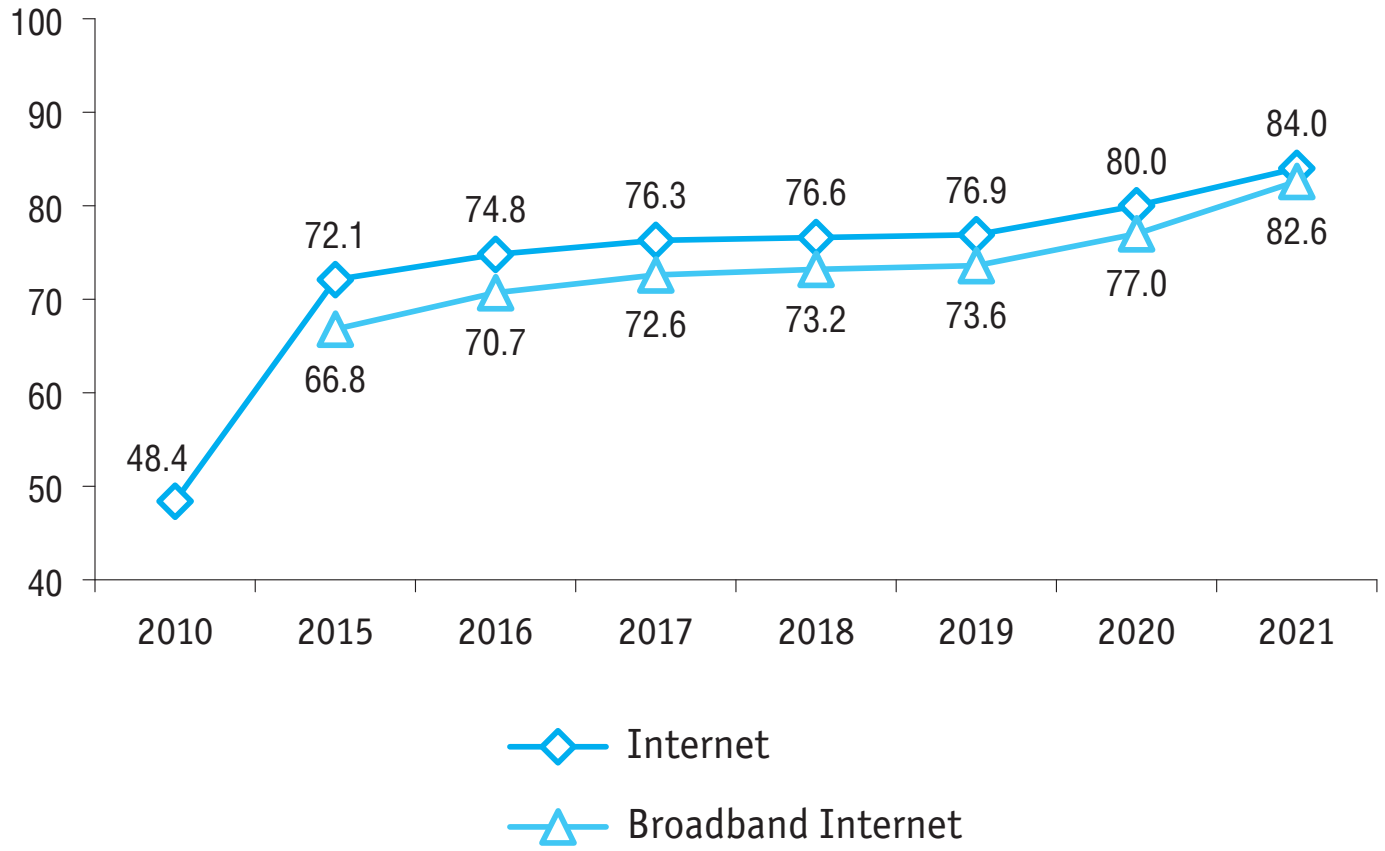


* The percentage of respondents who reported that there is a least one such device in good working order in their family (household).

Sources: here and below in this section, for Russia, results of a representative survey of the adult Russian population aged 14 years and over conducted by HSE ISSEK within Digital Transformation Monitoring of the Economy and Society (carried out in August 4 – September 7, 2022 with of 10,021 participants) (2.1, 2.19); Rosstat (2.2–2.5, 2.16, 2.17); HSE ISSEK estimates based on Rosstat data (2.6–2.15, 2.18); for countries other than Russia, Eurostat, OECD, and ITU.

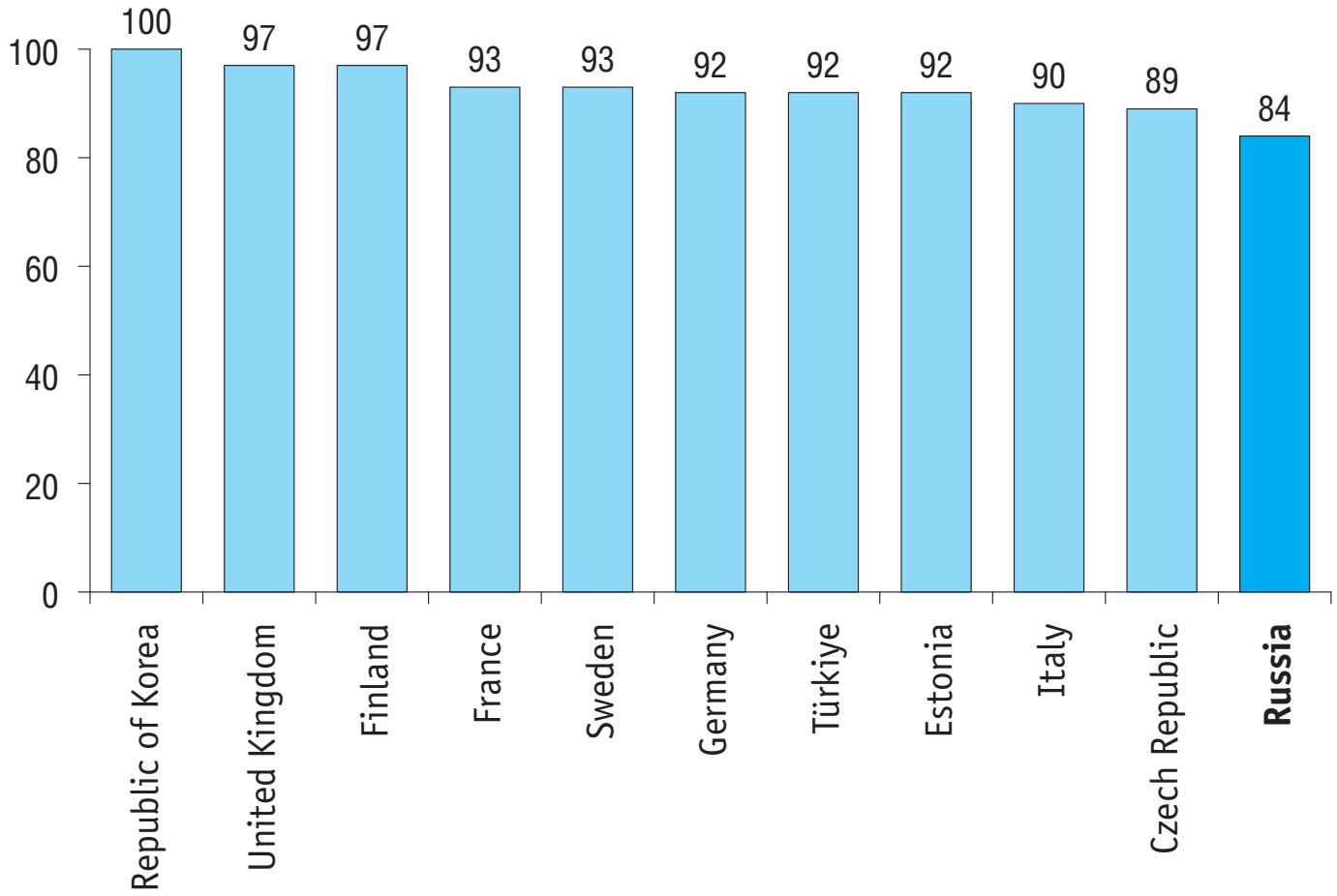
2.2. Households with Internet access

(as a percentage of all households)



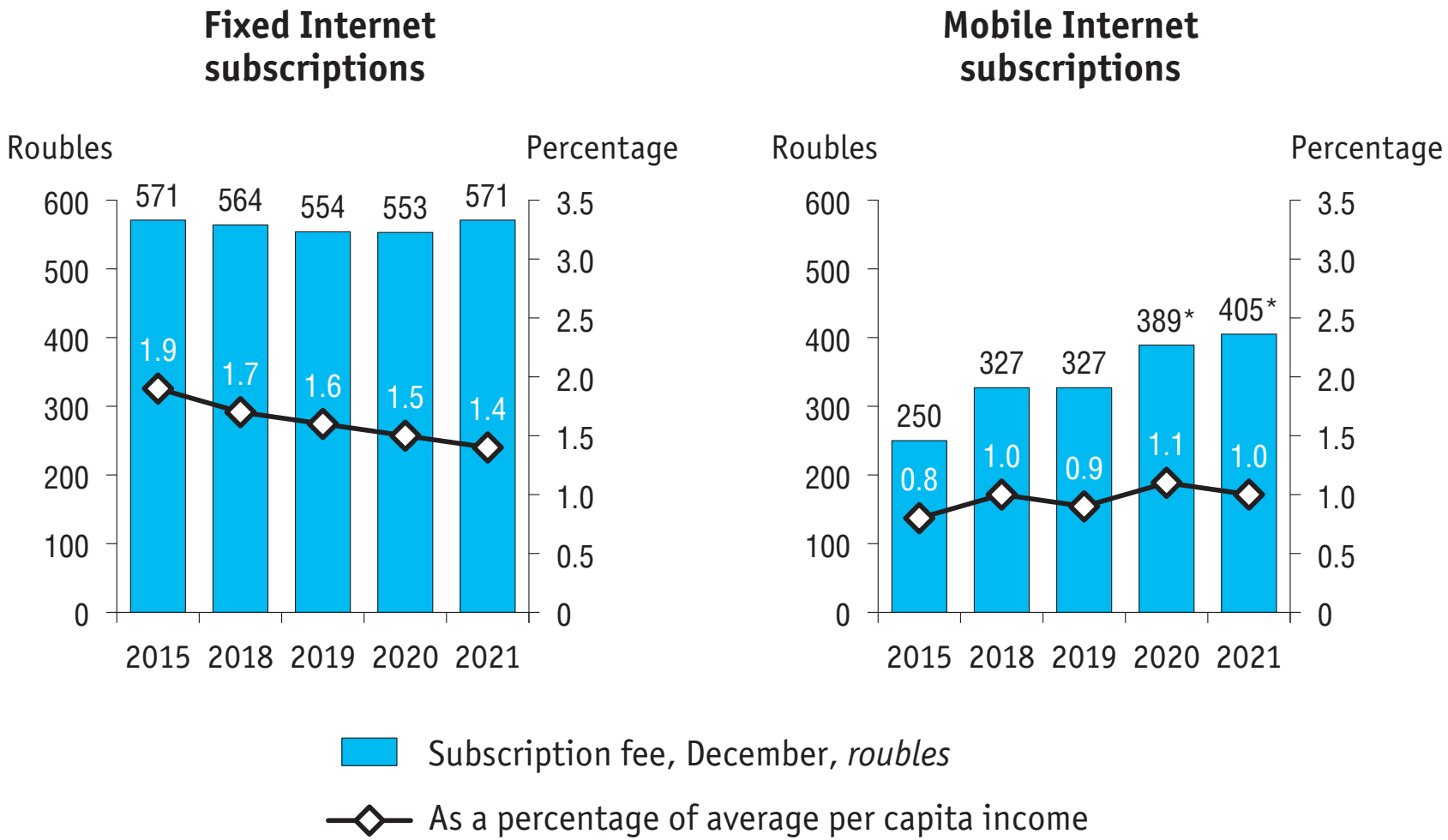
2.3. Households with Internet access by country: 2021*

(as a percentage of all households)



* Or nearest years for which data are available.

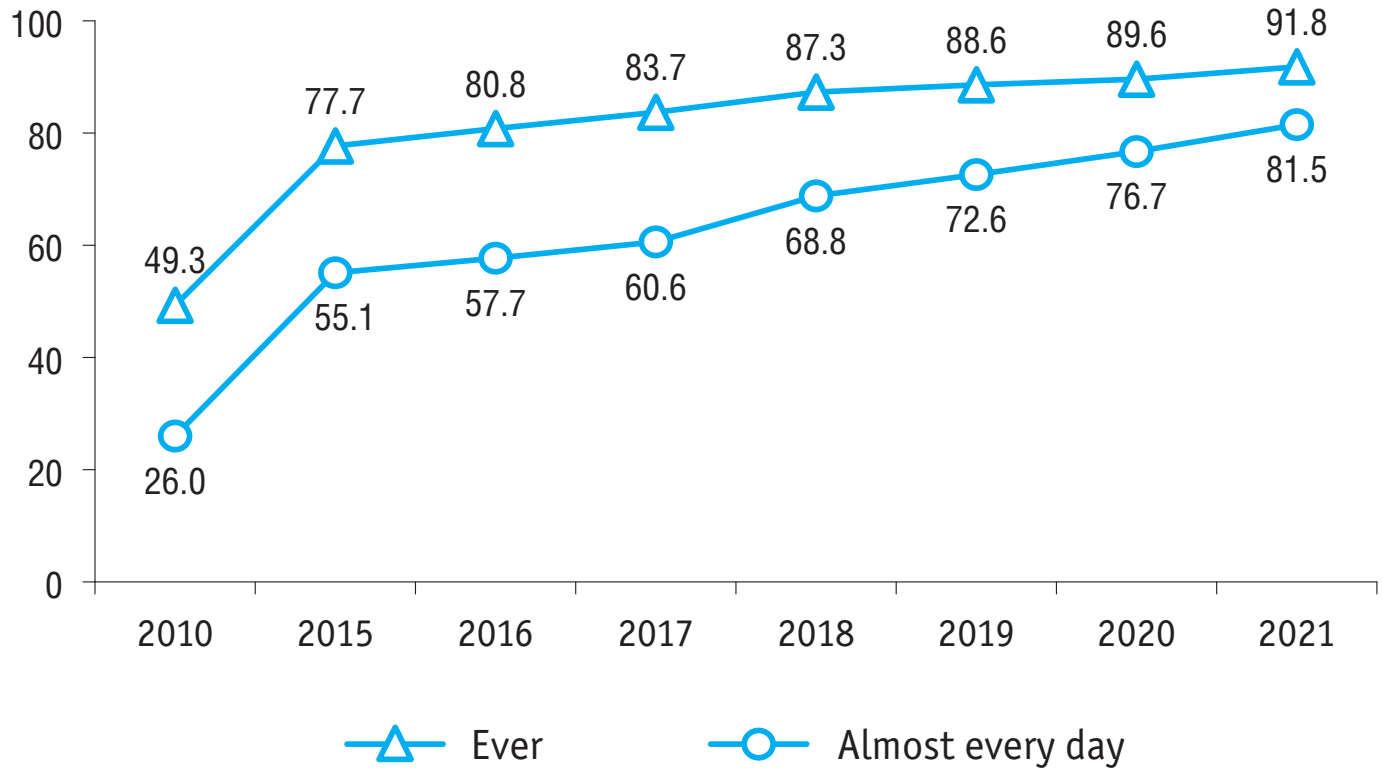
2.4. Ratio of Internet access tariffs for individuals to average per capita income



* The data are provided for the service 'Subscription fee for a mobile cellular network services package', which includes mobile Internet, minutes of phone calls, SMS messages.

2.5. Internet users

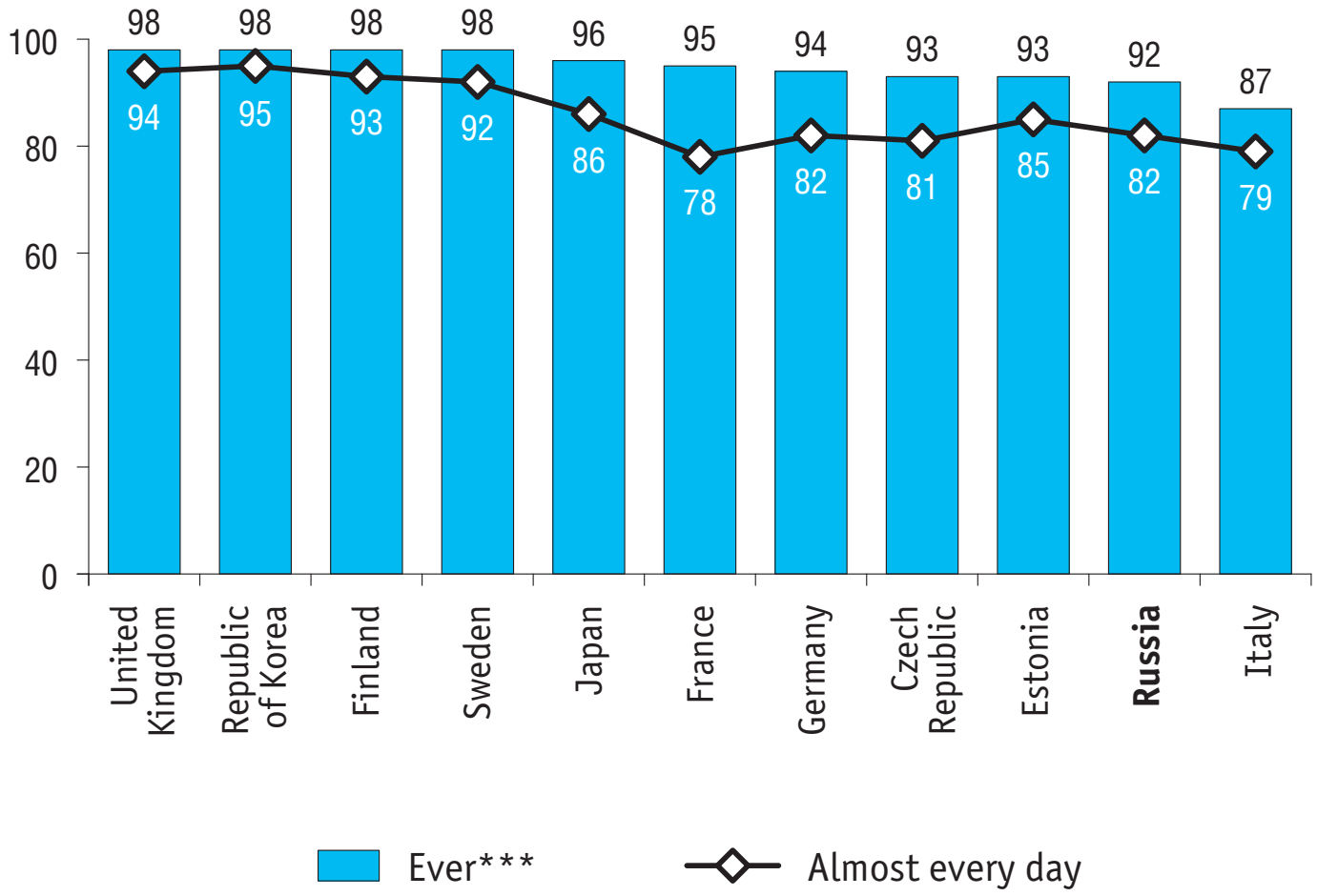
(as a percentage of individuals aged 15–74)*



* Here and below in this section, the data for individuals' use of the Internet refer to 2010, for 2011, for those aged 16–74, for 2012, aged 18–74, for 2013–2016, aged 15–72.

2.6. Internet users by country: 2021*

*(as a percentage of individuals aged 15–74**)*



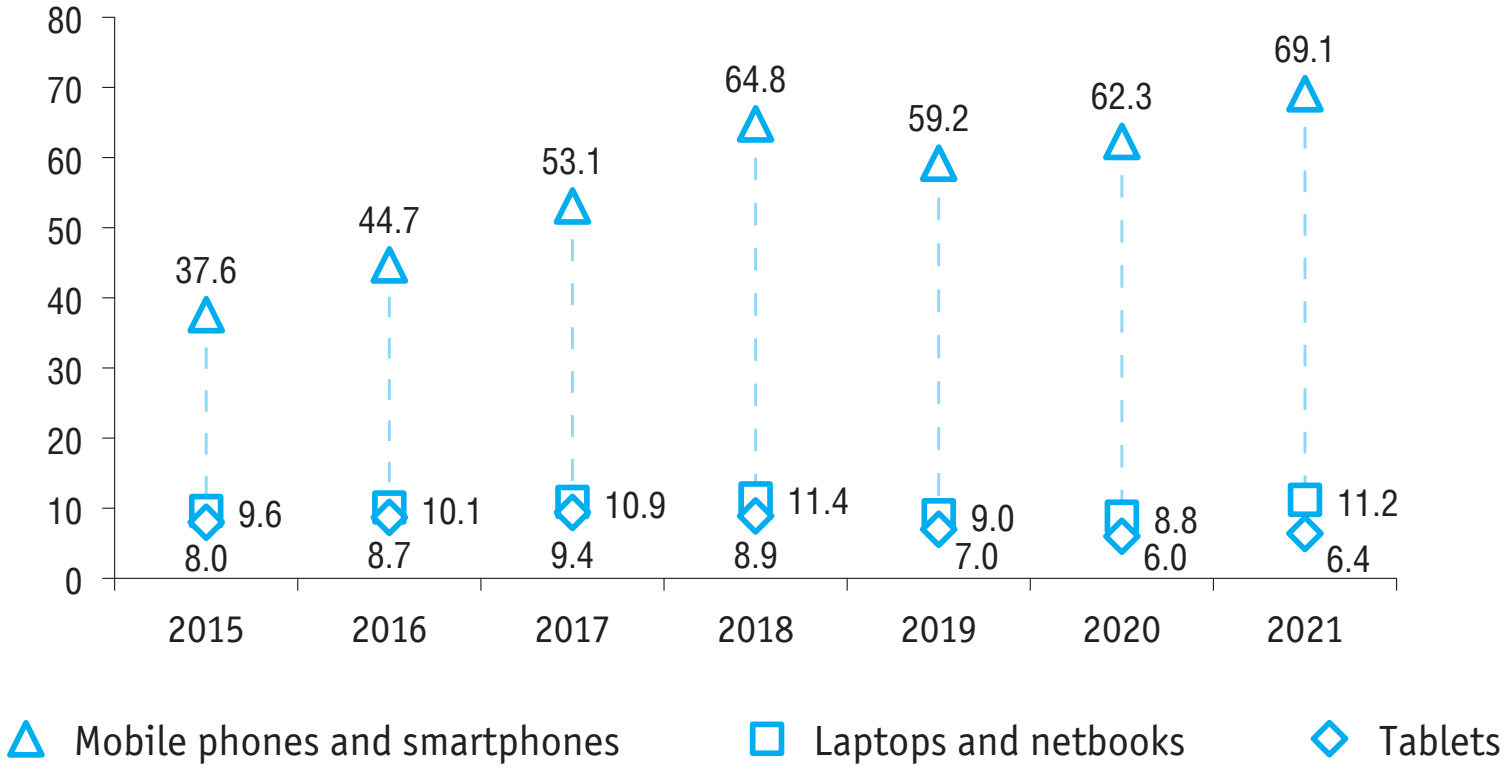
* Or nearest years for which data are available.

** For countries other than Russia, aged 16–74.

*** For the Republic of Korea and Japan, during the last 12 months.

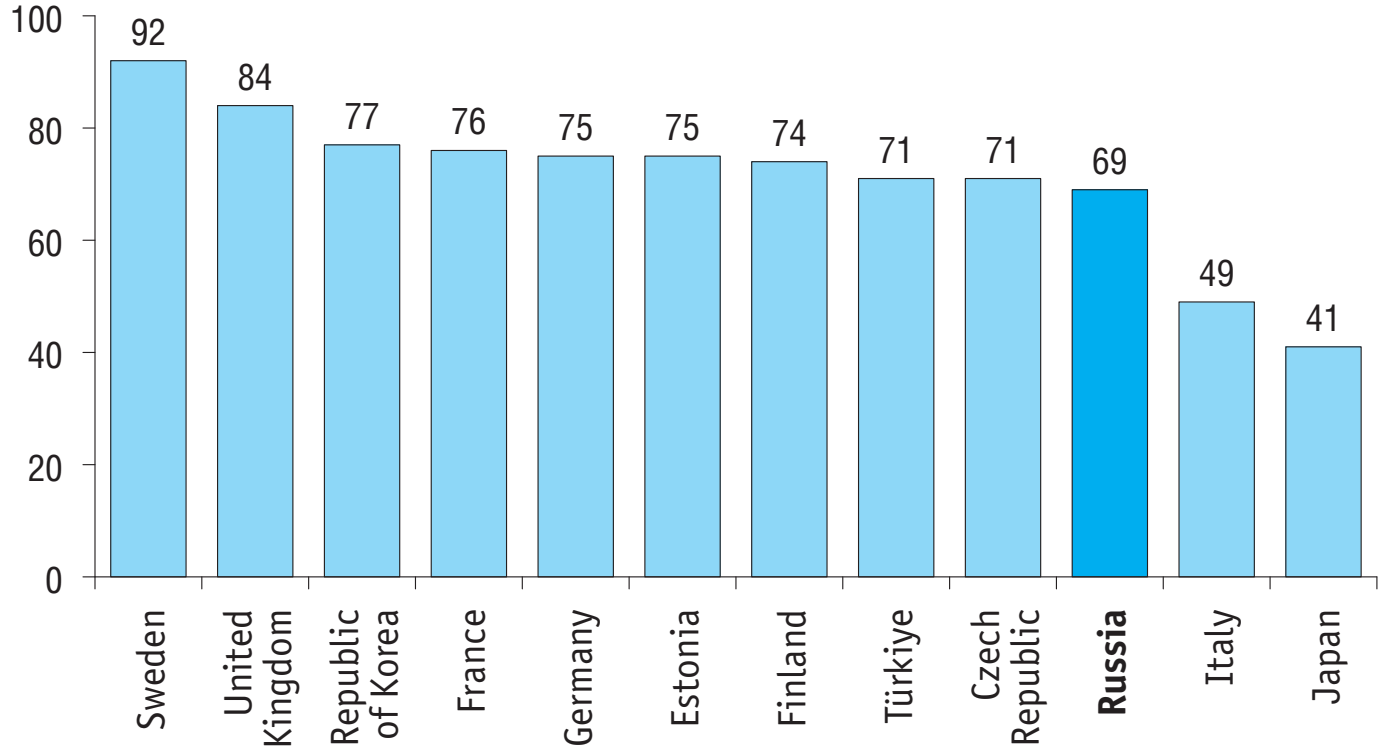
2.7. Individuals' use of mobile devices to access the Internet on the move or at work

(as a percentage of individuals aged 15–74)



2.8. Individuals' use of mobile phones or smartphones to access the Internet on the move or at work by country: 2021*

*(as a percentage of individuals aged 15–74**)*



* Or nearest years for which data are available. For the Republic of Korea and Japan, the use of any mobile devices.

** For countries other than Russia, aged 16–74.

2.9. Individuals' Internet activities related to communications by country: 2021*

*(as a percentage of individuals aged 15–74**)*

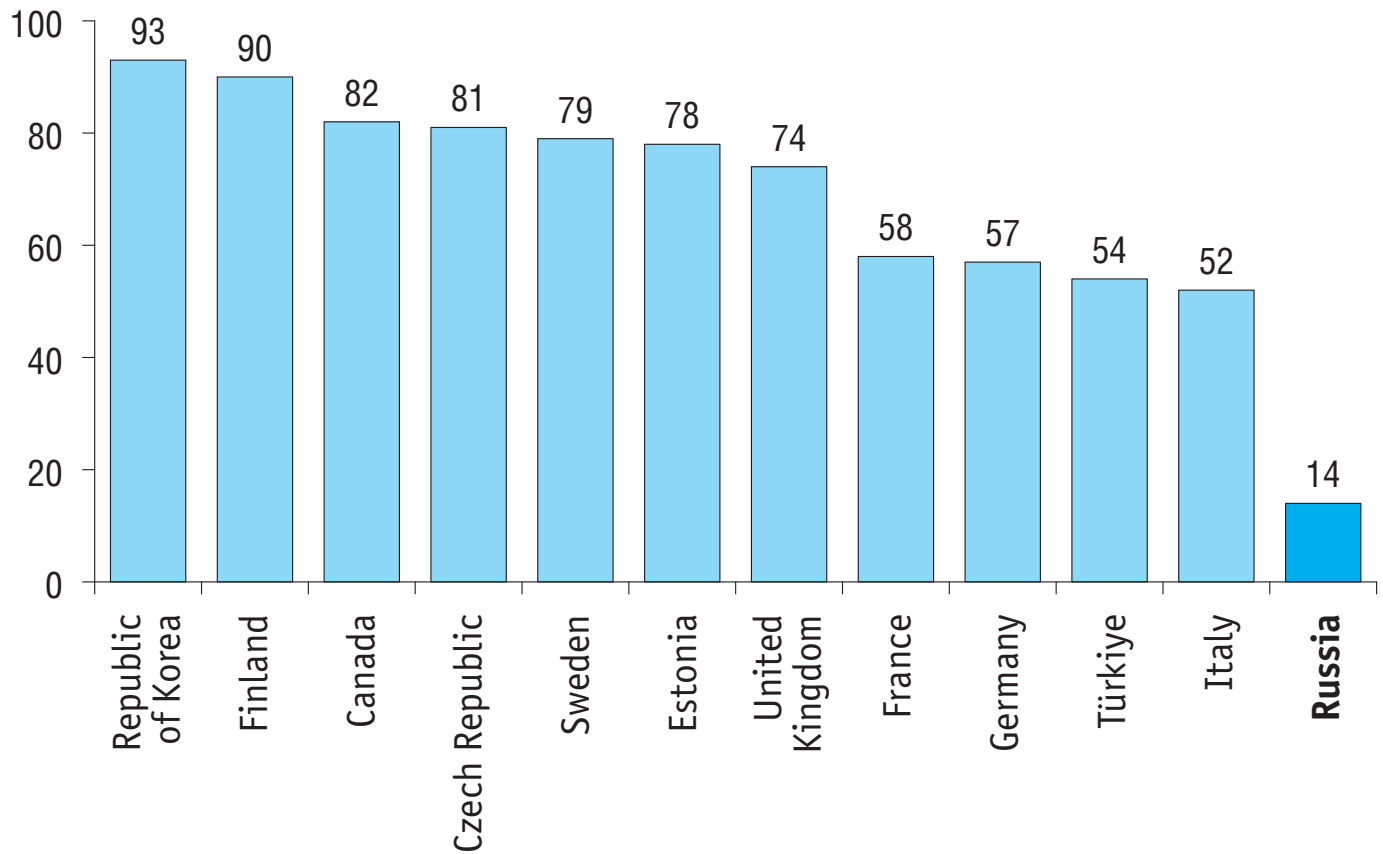
	Making online telephone/video calls	Participating in social media
Russia	**74**	**66**
Canada	68	75
Czech Republic	58	61
Estonia	63	67
Finland	71	75
France	64	45
Germany	56	47
Italy	67	50
Japan	58	75
Republic of Korea	68	69
Sweden	76	72
United Kingdom	52	76
United States	56	64

* Or nearest years for which data are available.

** For countries other than Russia, aged 16–74.

2.10. Individuals' Internet activities related to reading or downloading online newspapers / magazines / e-books by country: 2021*

*(as a percentage of individuals aged 15–74**)*

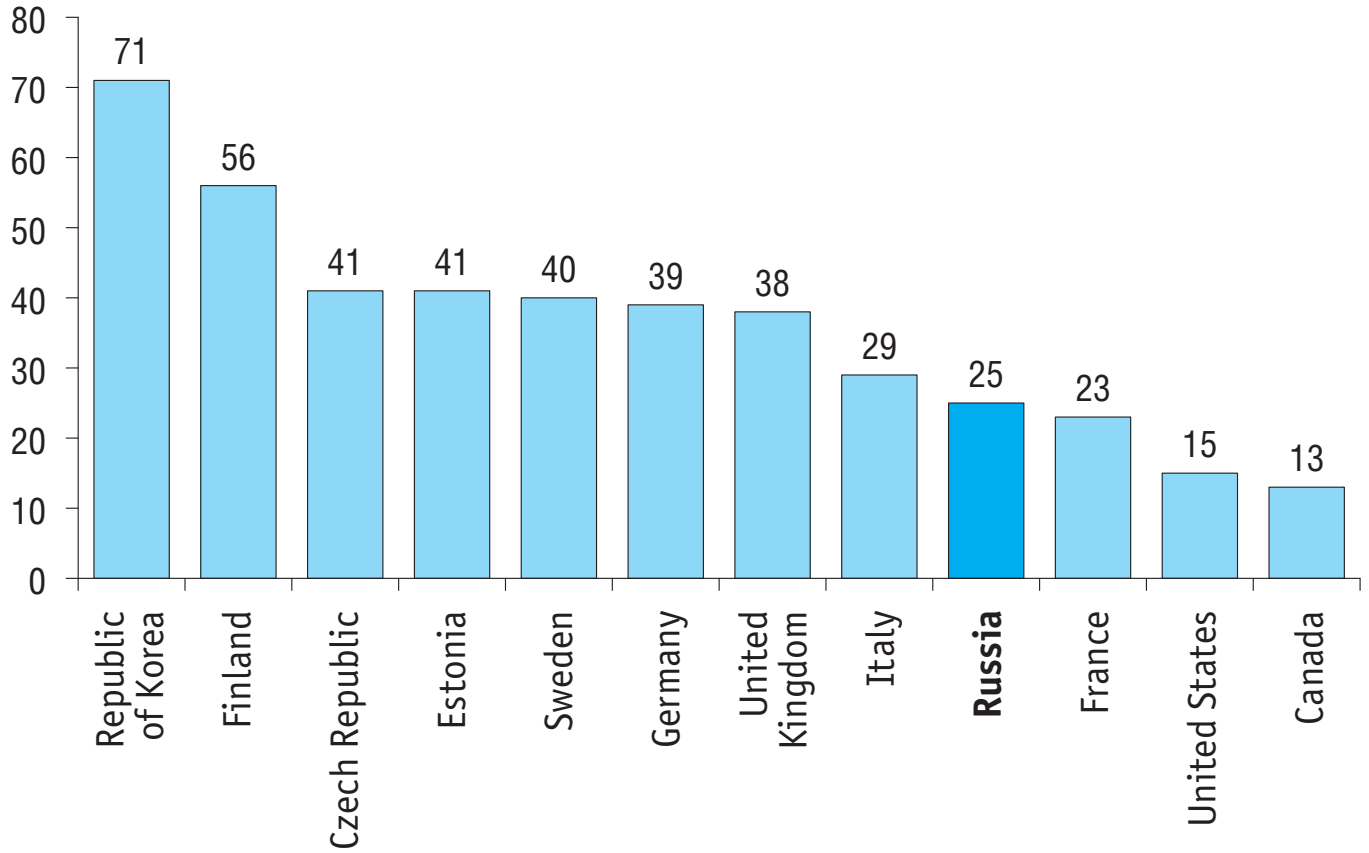


* Or nearest years for which data are available.

** For countries other than Russia, aged 16–74.

2.11. Individuals' Internet activities related to uploading personal files to publicly accessible sources by country: 2021*

*(as a percentage of individuals aged 15–74**)*

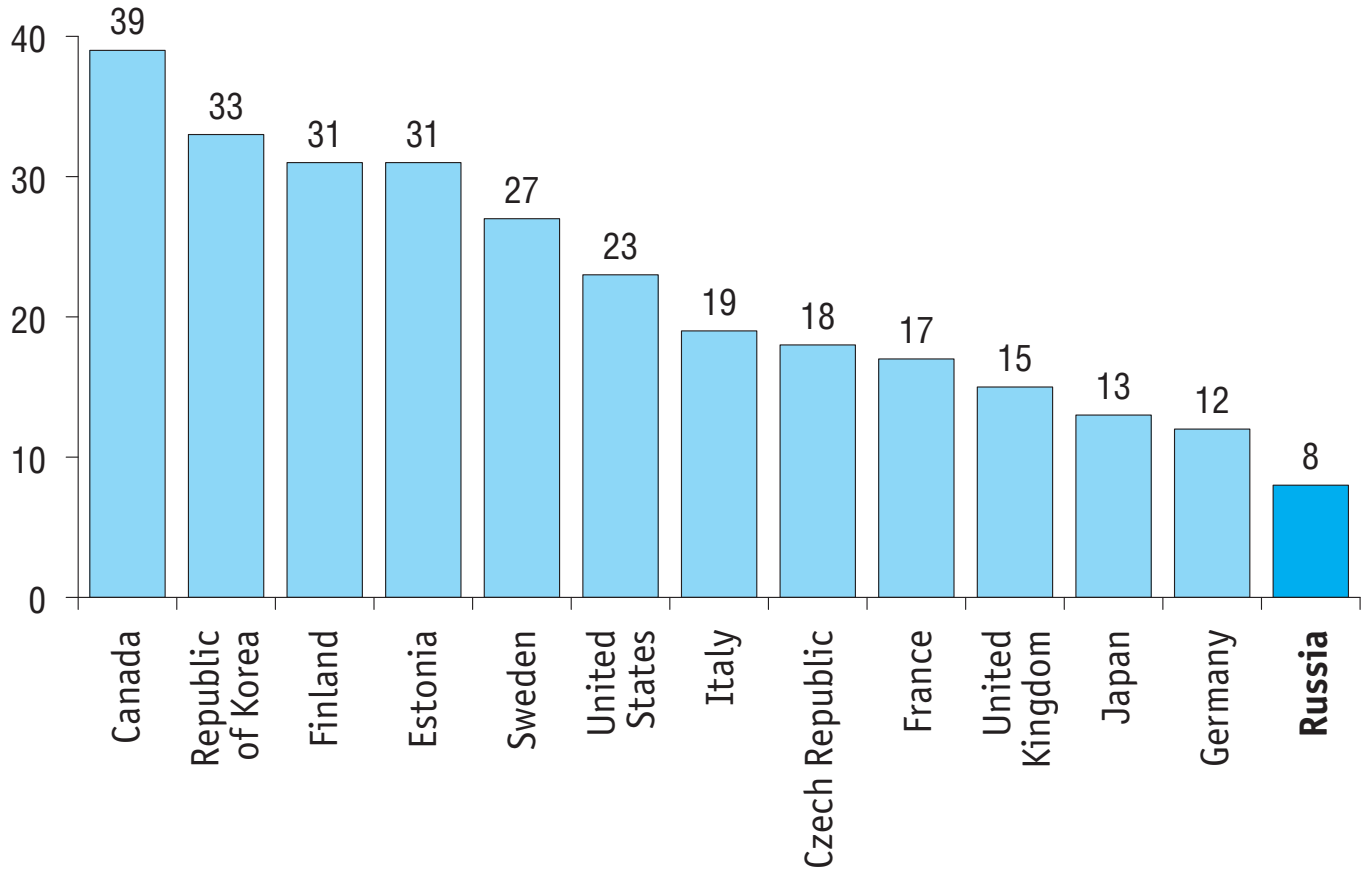


* Or nearest years for which data are available.

** For countries other than Russia, aged 16–74.

2.12. Individuals' Internet activities related to e-learning by country: 2021*

*(as a percentage of individuals aged 15–74**)*

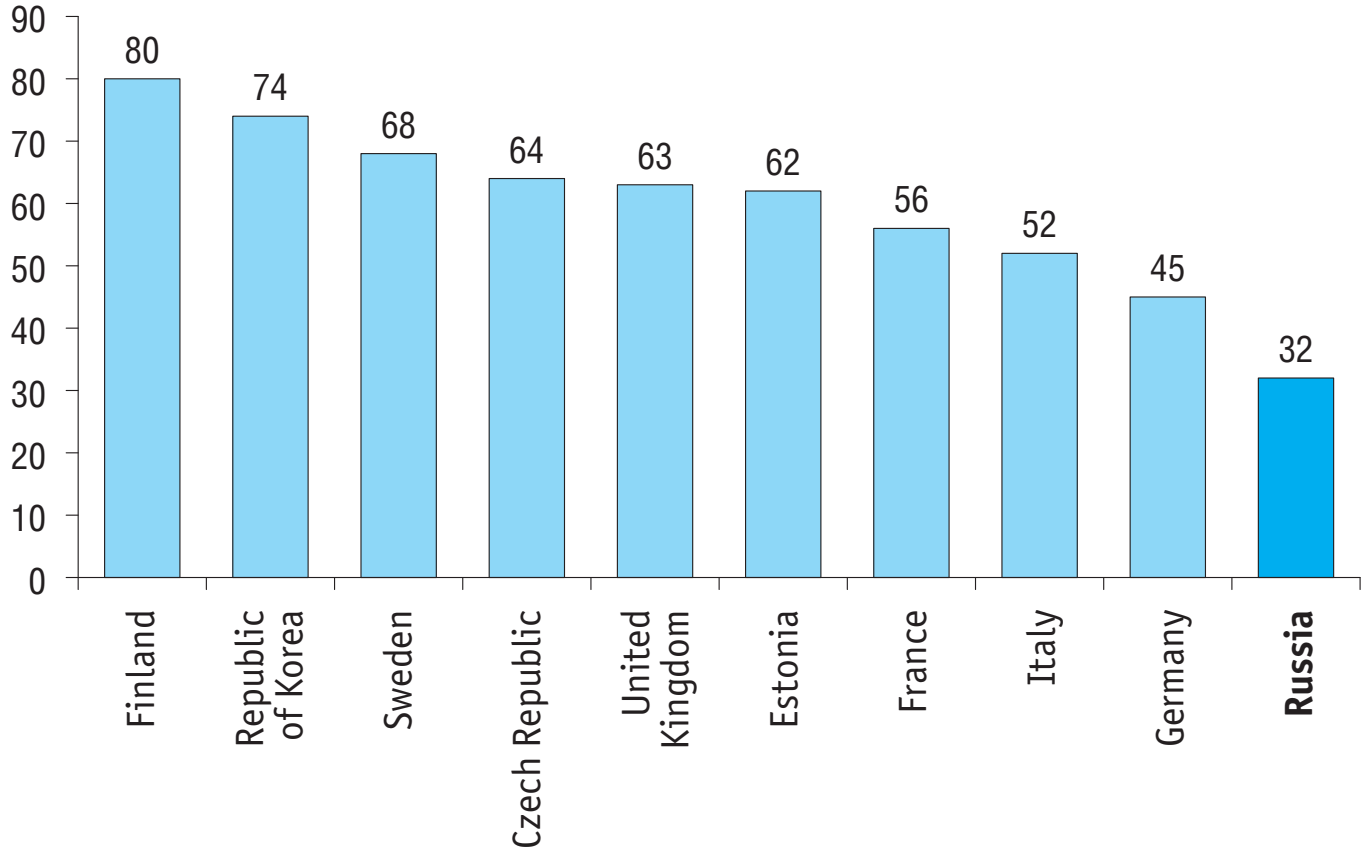


* Or nearest years for which data are available.

** For countries other than Russia, aged 16–74.

2.13. Individuals' Internet activities related to searching for information related to health and healthcare services: 2021*

*(as a percentage of individuals aged 15–74**)*

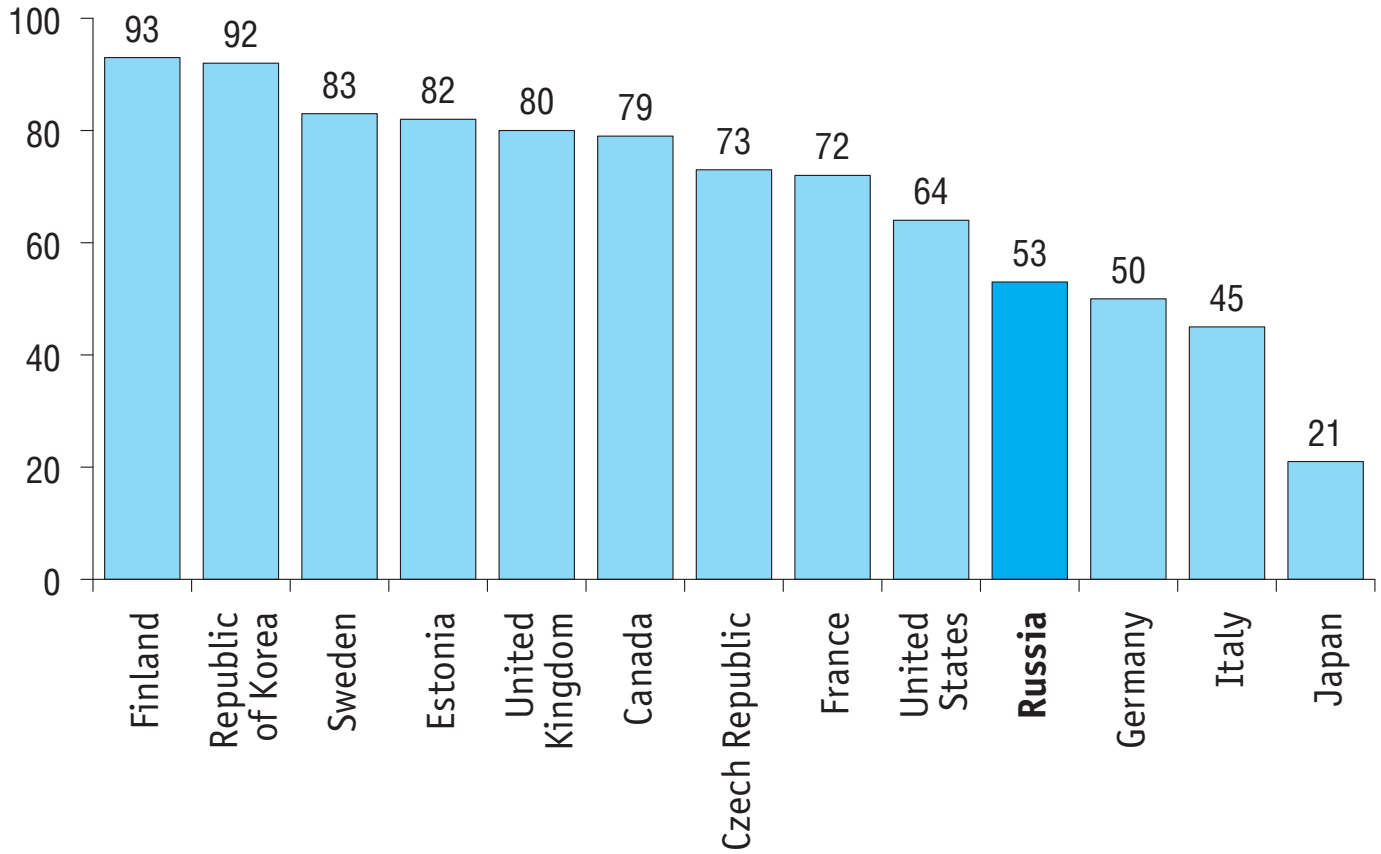


* Or nearest years for which data are available.

** For countries other than Russia, aged 16–74.

2.14. Individuals' Internet activities related to financial transactions by country: 2021*

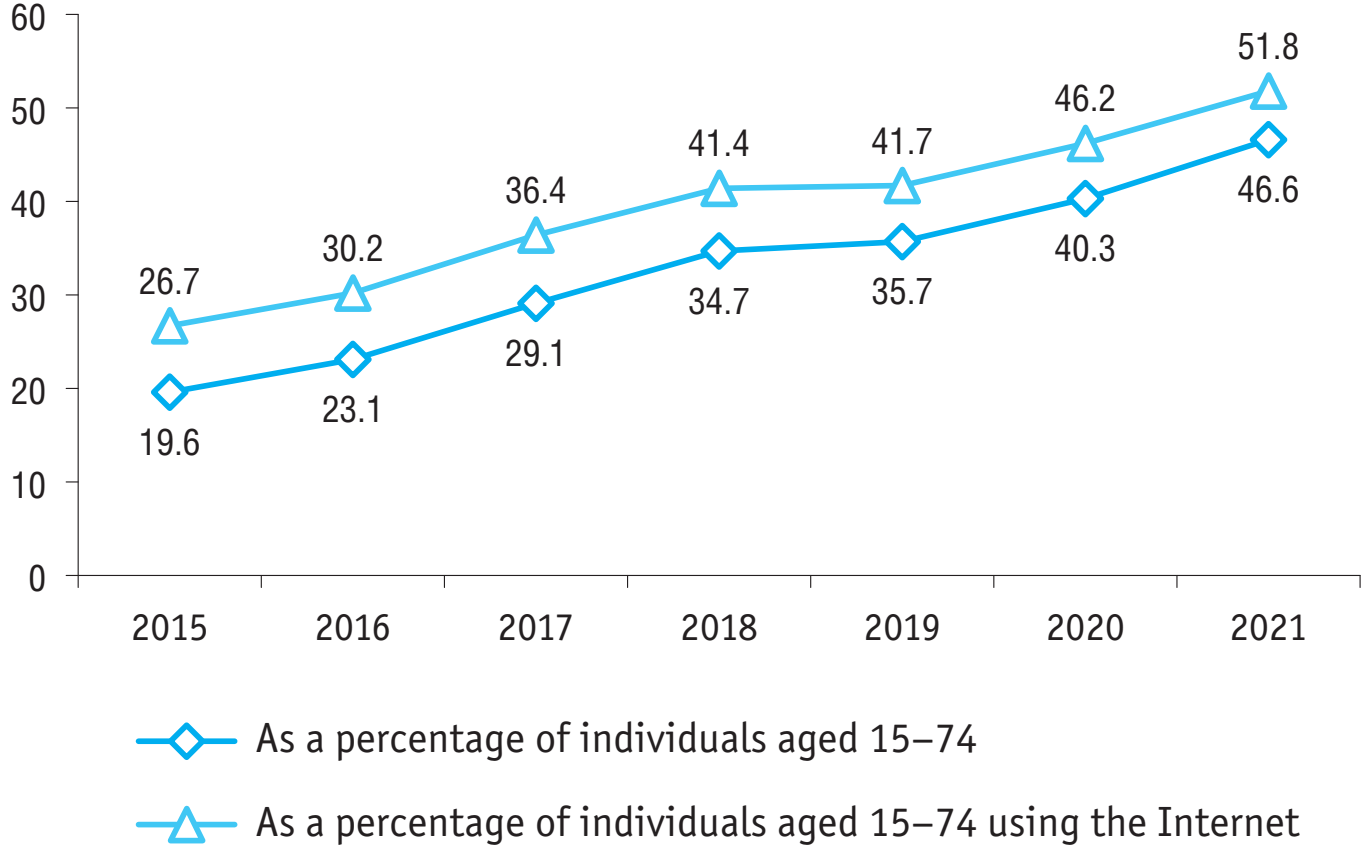
*(as a percentage of individuals aged 15–74**)*



* Or nearest years for which data are available.

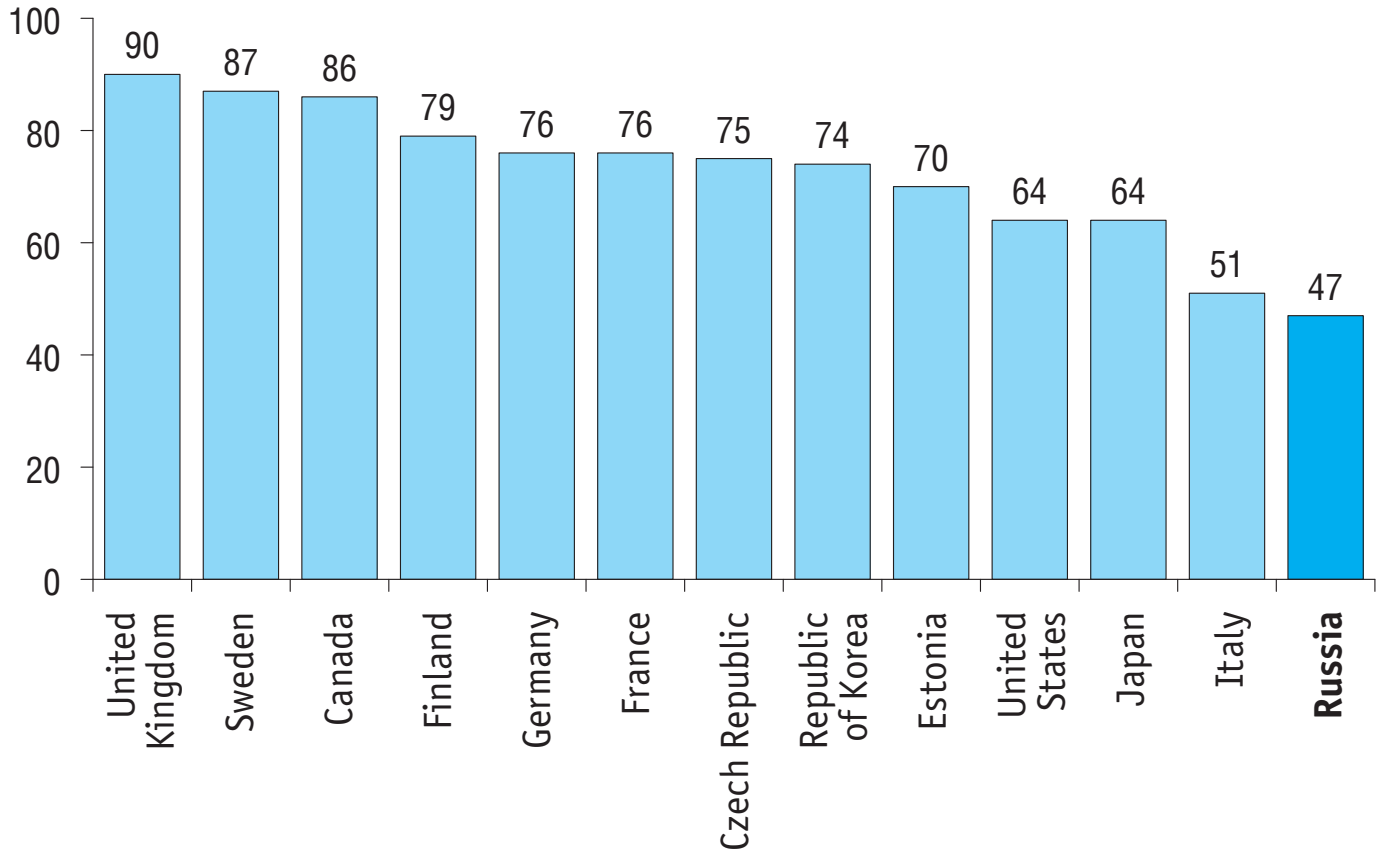
** For countries other than Russia, aged 16–74.

2.15. Individuals' Internet activities related to ordering goods or services



2.16. Individuals' Internet activities related to ordering goods or services by country: 2021*

*(as a percentage of individuals aged 15–74**)*



* Or nearest years for which data are available.

** For countries other than Russia, aged 16–74.

2.17. Digital skills

(as a percentage of all individuals aged 15 and over)

	2018	2019	2020	2021
Transferring files via e-mail*	36.8	39.7	42.2	62.6
Using word processing software	41.1	40.4	40.4	38.4
Copying or moving files or folders	34.5	36.3	37.5	36.3
Using copy/paste tools in documents	22.4	24.9	27.7	27.7
Transferring files between a computer and other devices	31.1	31.0	27.3	26.1
Using spreadsheet software	20.8	22.0	22.9	21.4
Using software to edit photos, video, or audio files	21.2	21.9	20.9	21.4
Connecting and installing new devices	9.8	15.3	14.2	14.2
Creating e-presentations using special software	8.2	9.0	9.3	10.1
Search, download, installing, and configuration of software	–	5.8	5.5	5.7
Installing or reinstalling an operating system	2.8	2.9	2.5	2.6
Writing software by oneself using a programming language	1.1	1.2	0.7	0.9

* For 2021, due to changes in Rosstat methodology, the data refer to sending messages via e-mails, messengers, SMS with attached files.

2.18. Digital skills by country: 2021*

*(as a percentage of all individuals aged 15 and over**)*

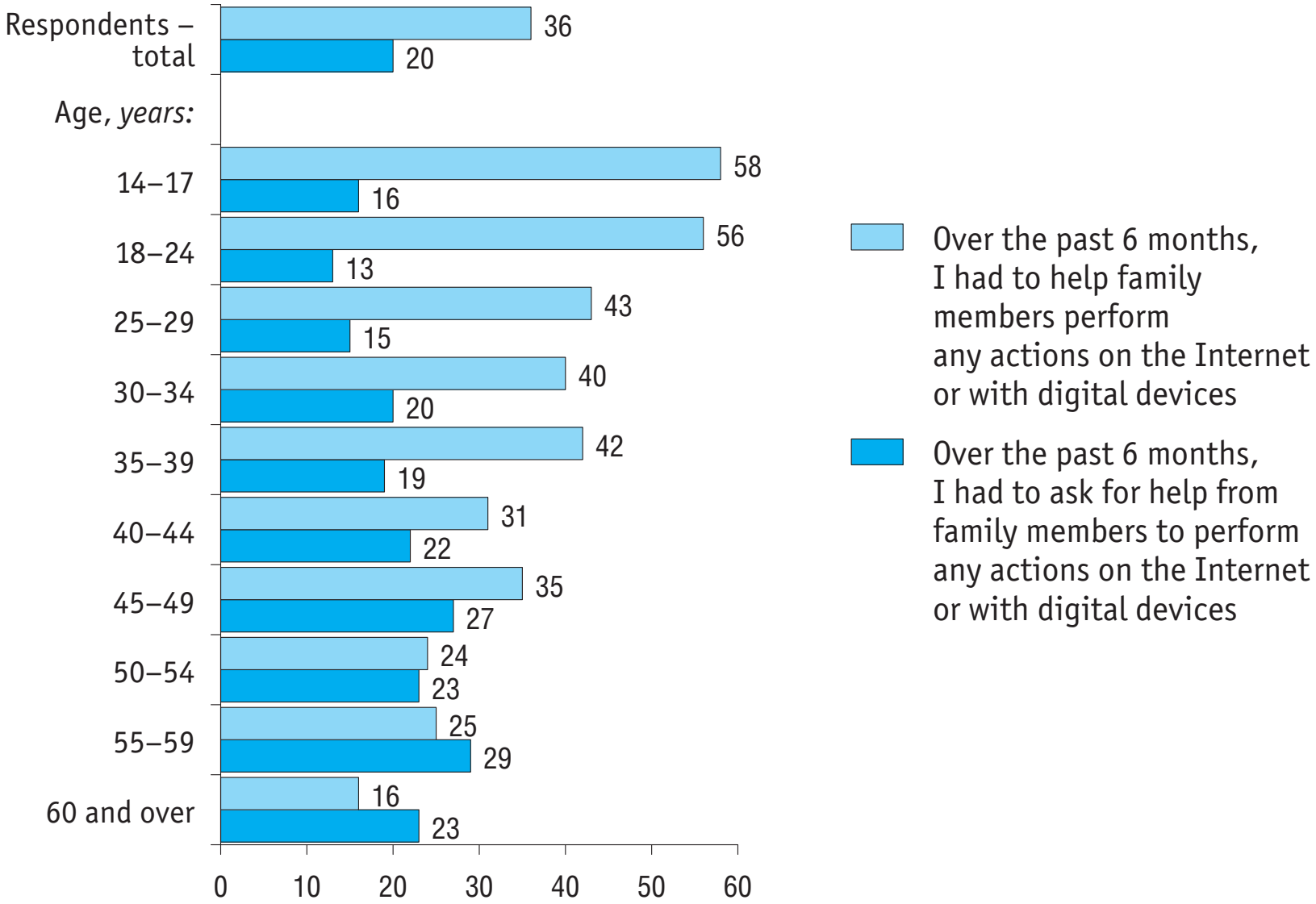
	Transferring files between a computer and other devices	Using spreadsheet software	Using software to edit photos, video, or audio files
Russia	**26**	**21**	**21**
Czech Republic	57	40	28
Estonia	55	42	34
Finland	71	51	54
France	69	44	41
Germany	53	34	31
Sweden	62	45	34
United Kingdom	56	39	49

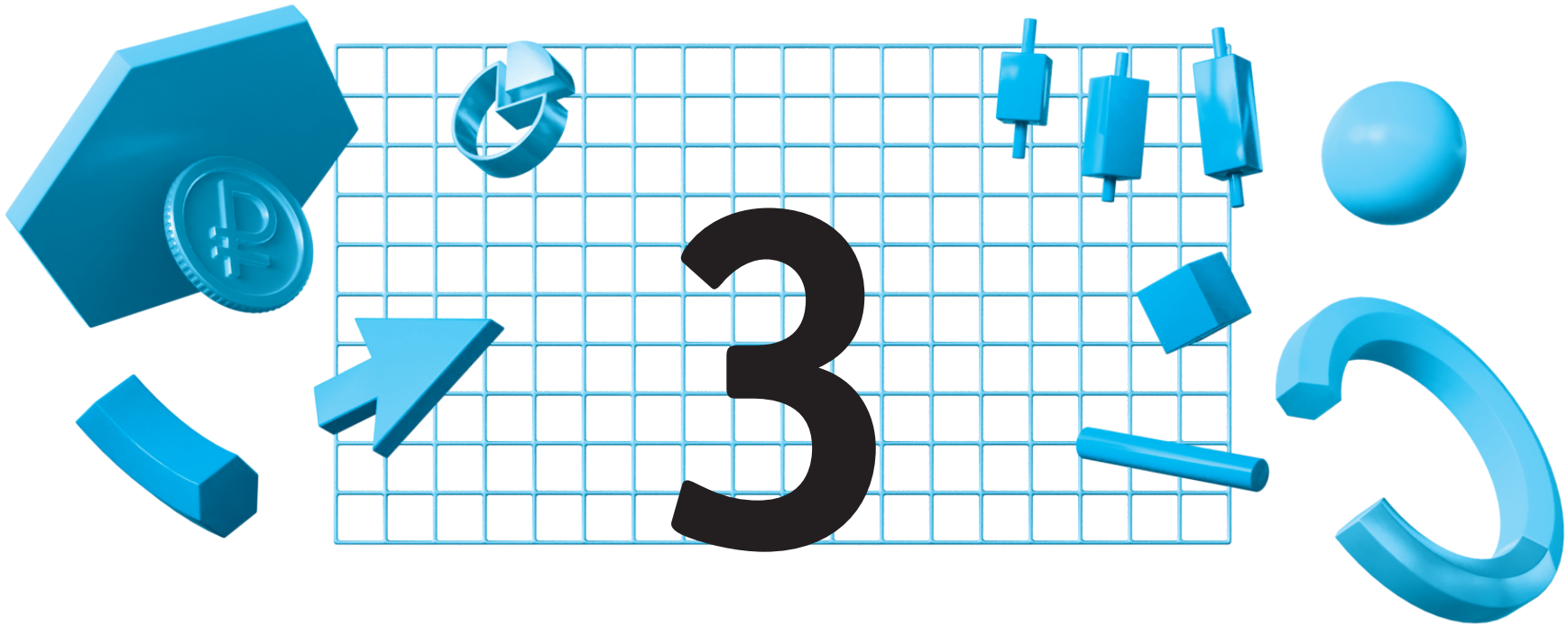
* Or nearest years for which data are available.

** For countries other than Russia, aged 16–74.

2.19. Digital assistance in households: 2022

(as a percentage of respondents aged 14 years and over who live in households of two or more people)



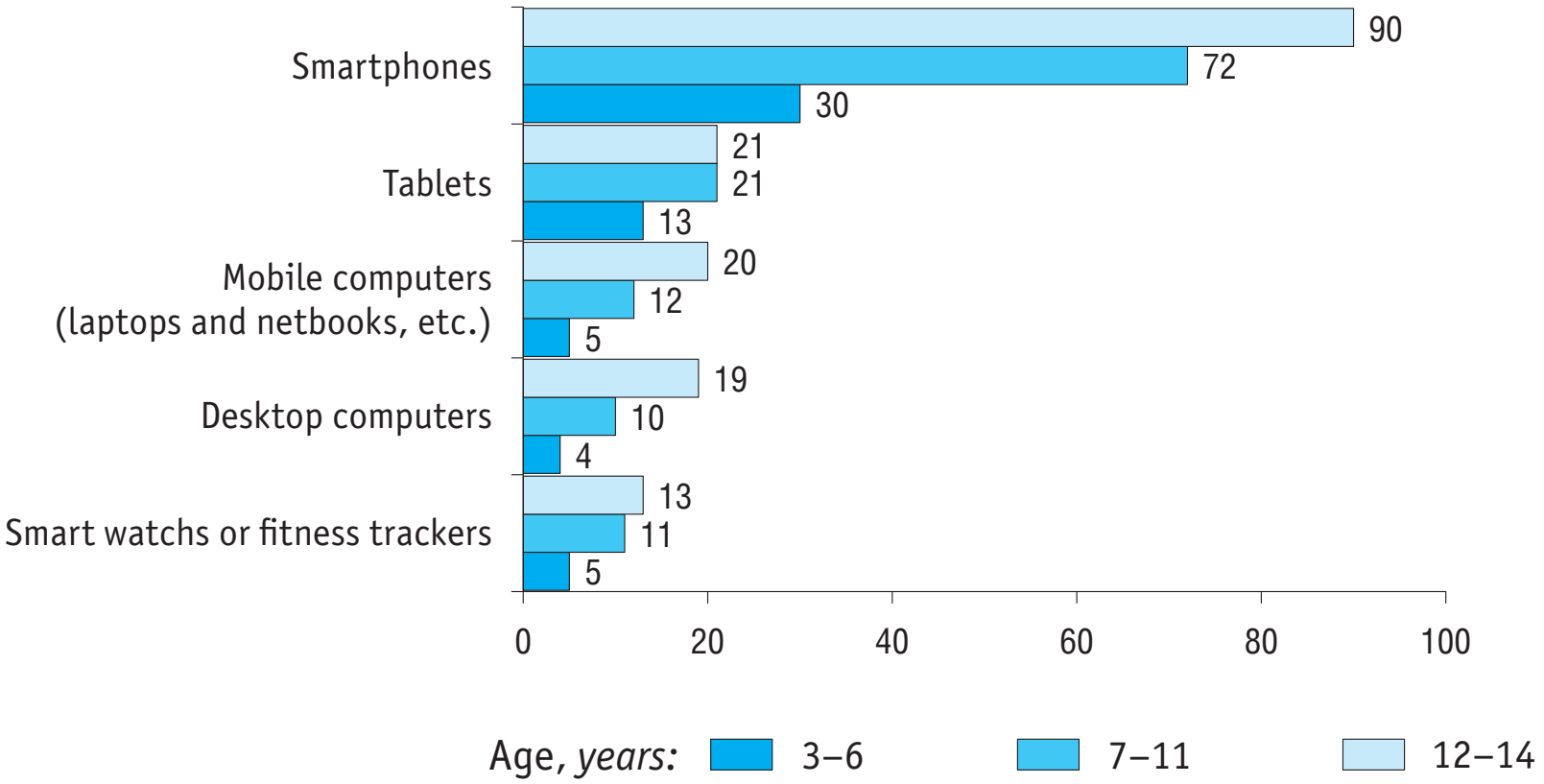


3

CHILDREN AND THE INTERNET

3.1. Children's use of digital devices: 2022

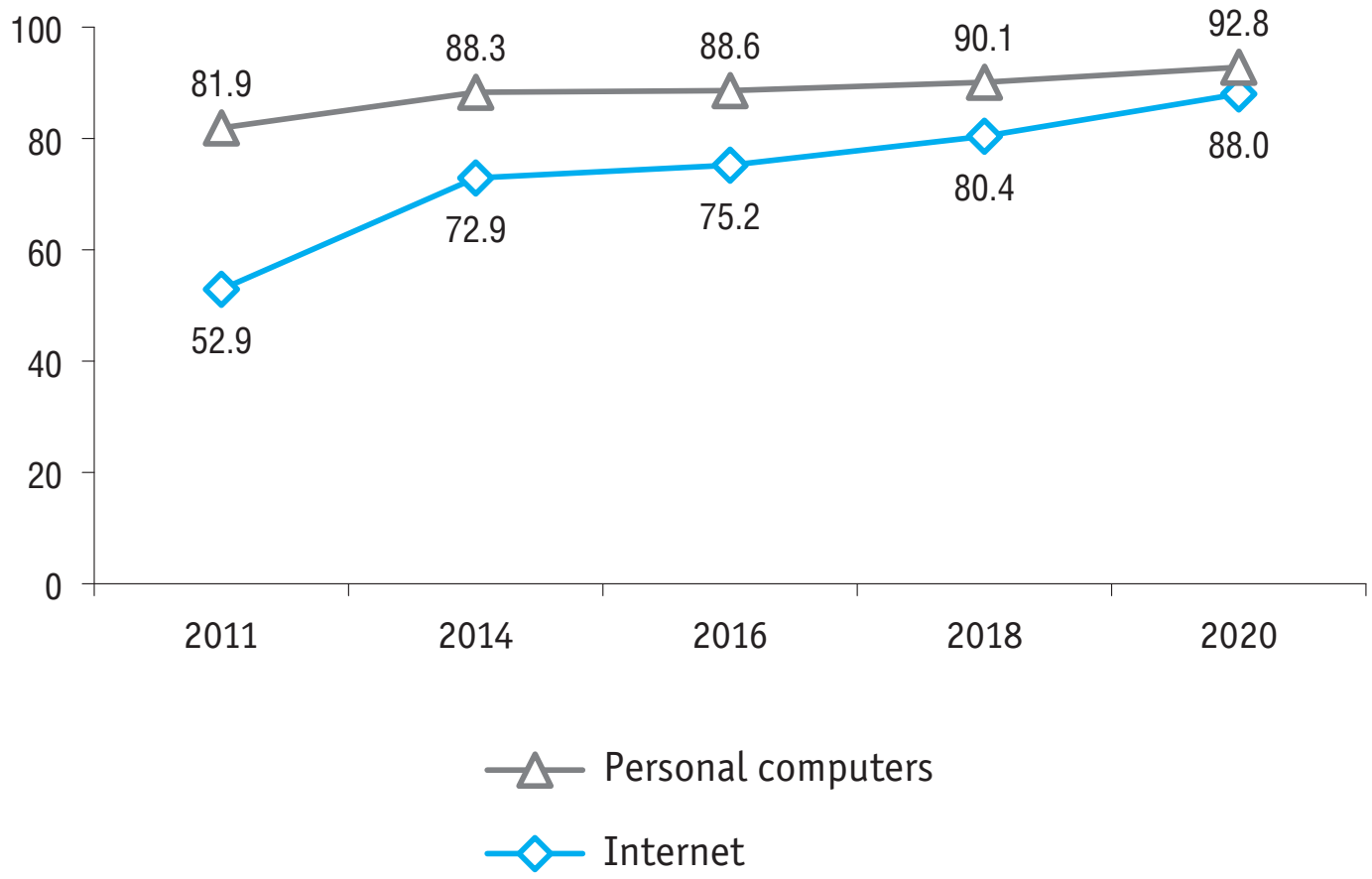
(as a percentage of households with children under 15)



Sources: here and below in this section, the results of a representative survey of the adult Russian population aged 14 years and over conducted by HSE ISSEK within Digital Transformation Monitoring of the Economy and Society (carried out in August 4 – September 7, 2022 with of 10,021 participants) (3.1, 3.6); Rosstat (3.2–3.5).

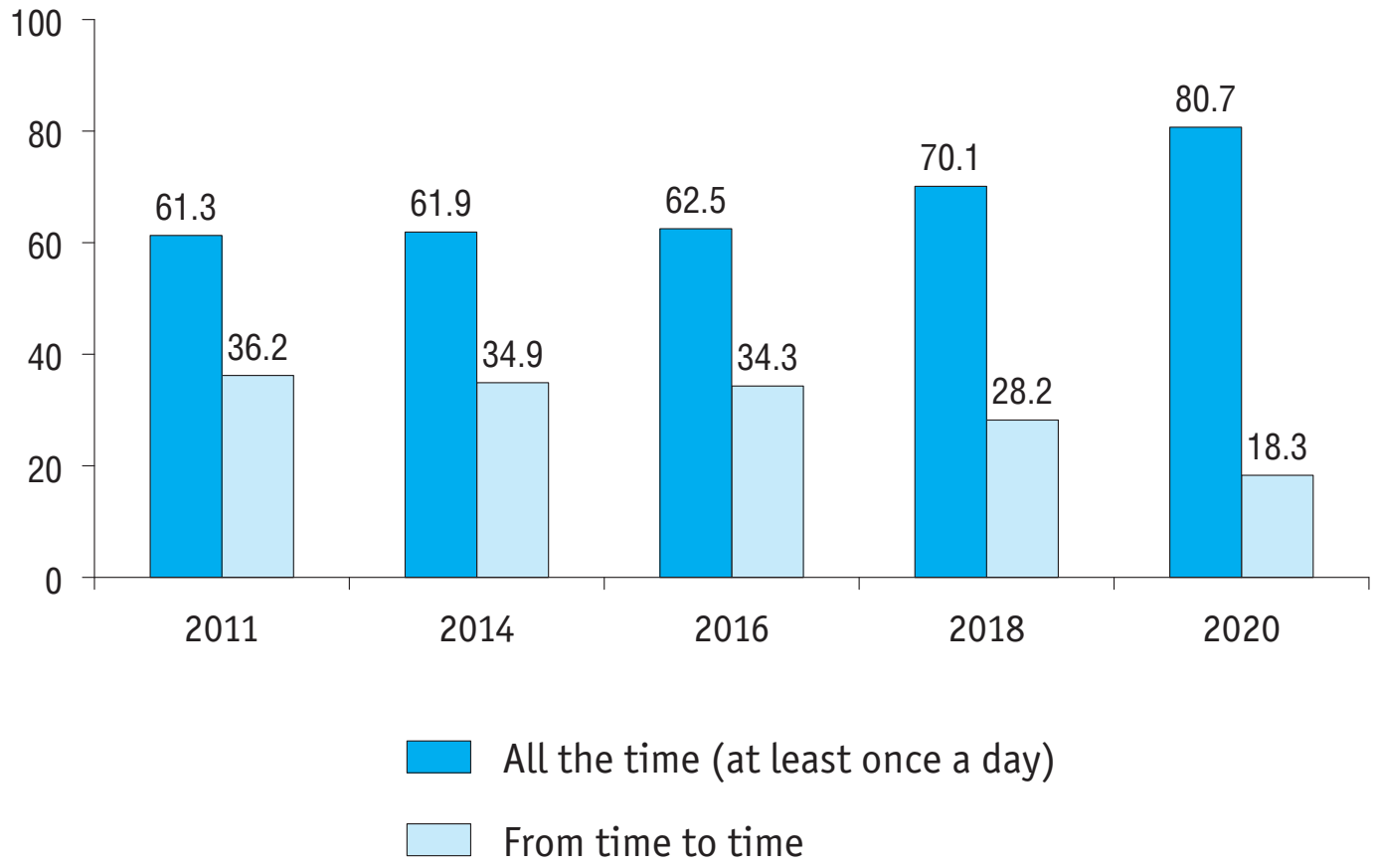
3.2. Children's use of personal computers and the Internet

(as a percentage of children under 15 who study at general education institutions)



3.3. Children's use of the Internet

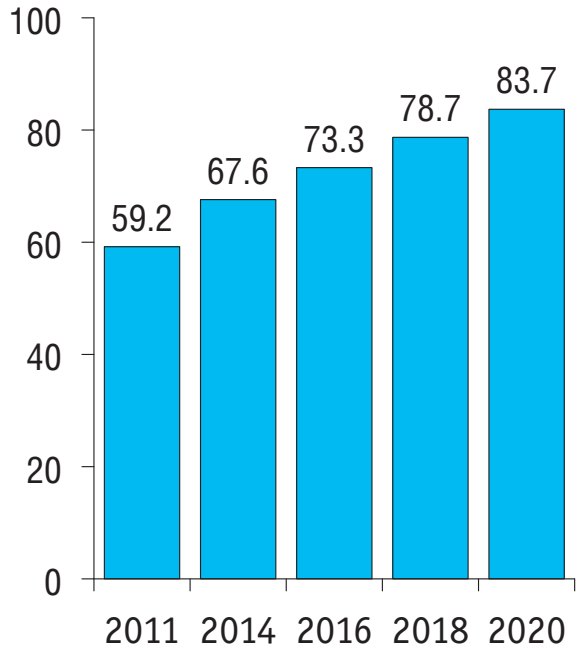
(as a percentage of children under 15 who study at general education institutions and use the Internet)



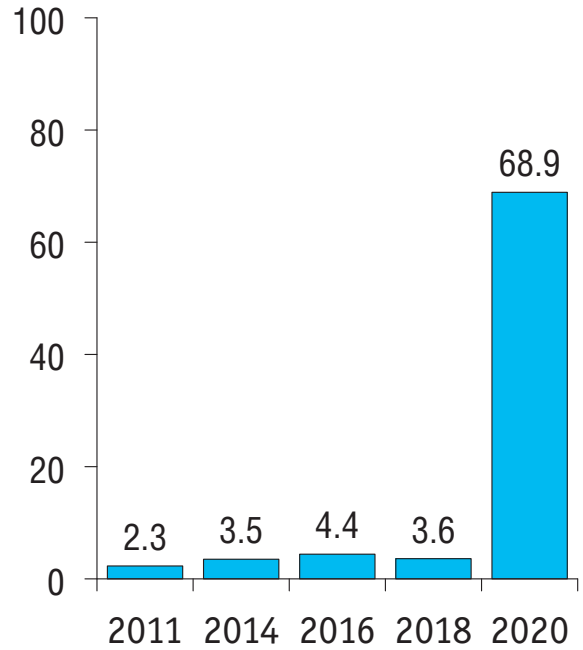
3.4. Children's Internet activities

(as a percentage of children under 15 who study at general education institutions and use the Internet)

Homework, school projects preparation

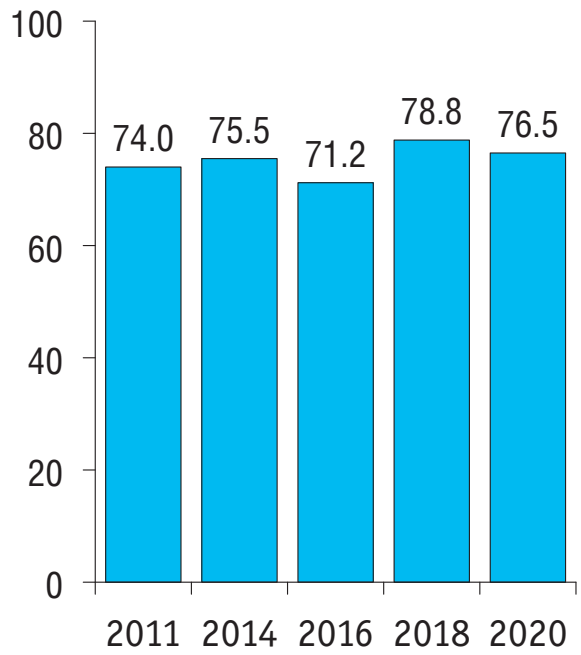


Distance learning

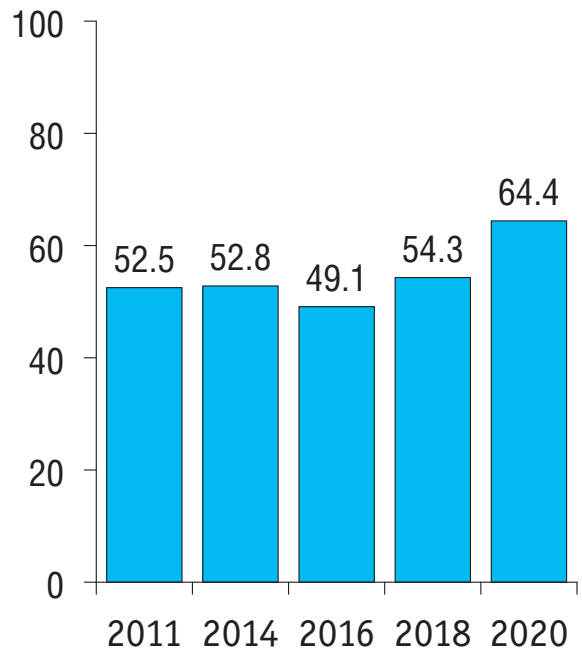


(continued)

Entertainment (watching films, playing games, etc.)

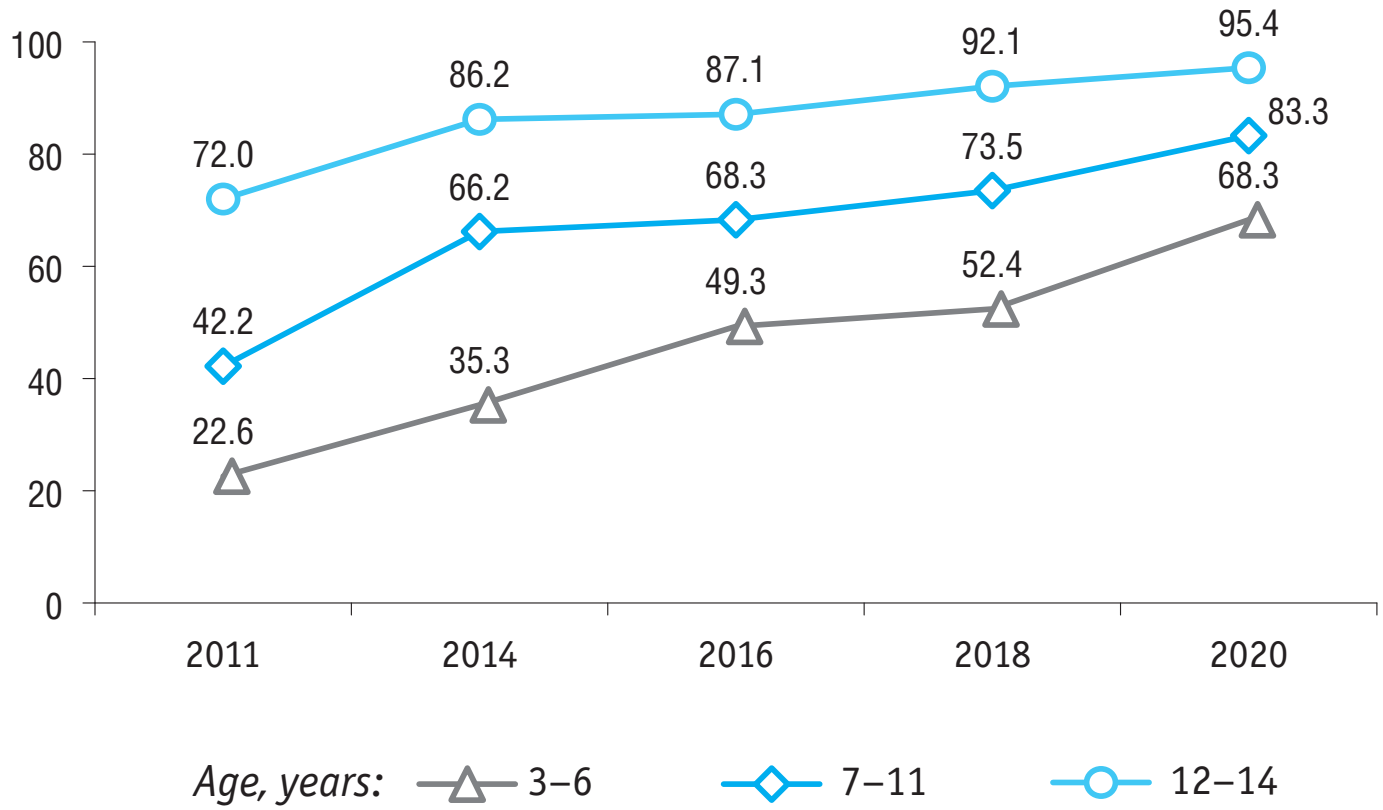


Participation in social media



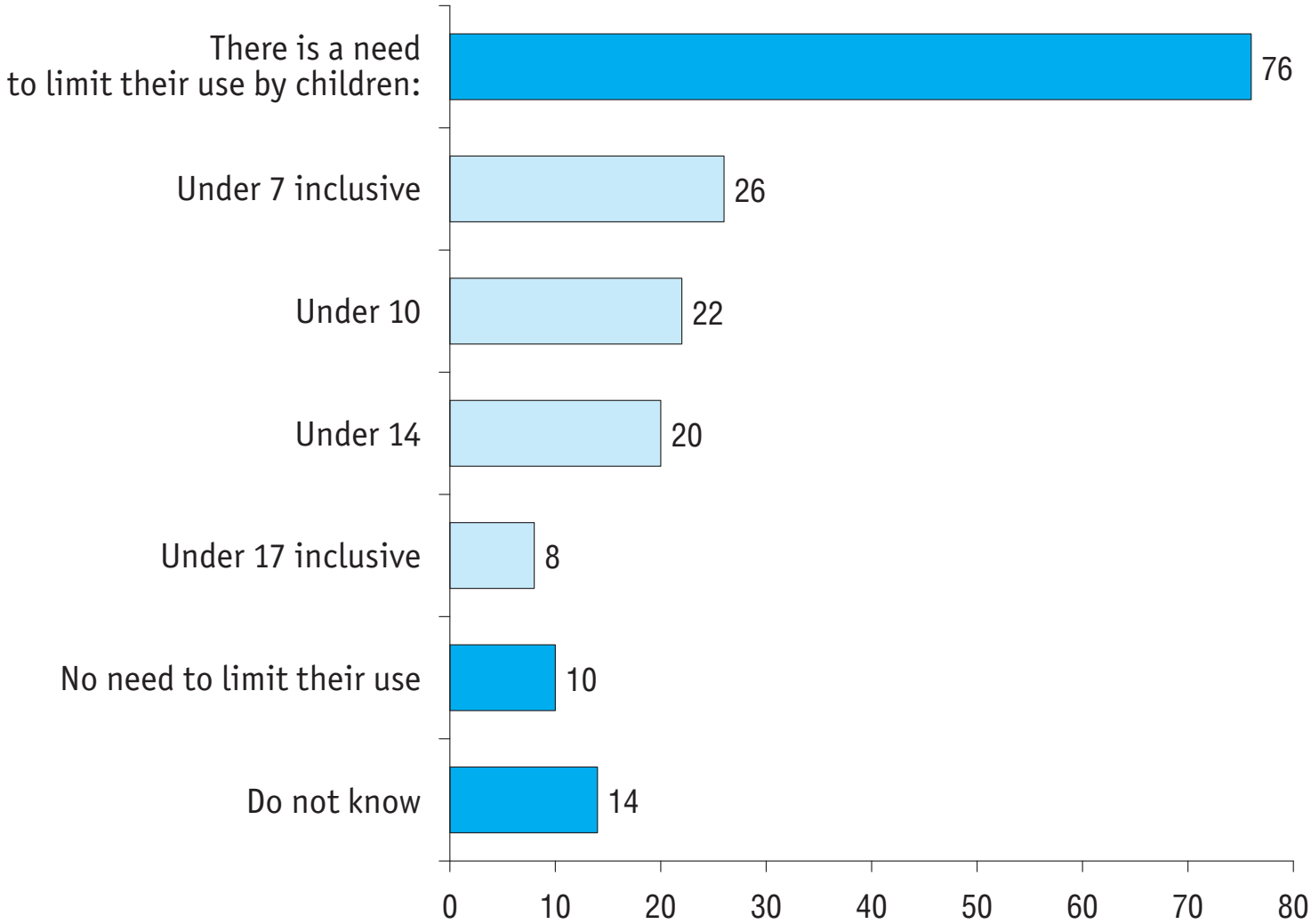
3.5. Children's Internet activities by age

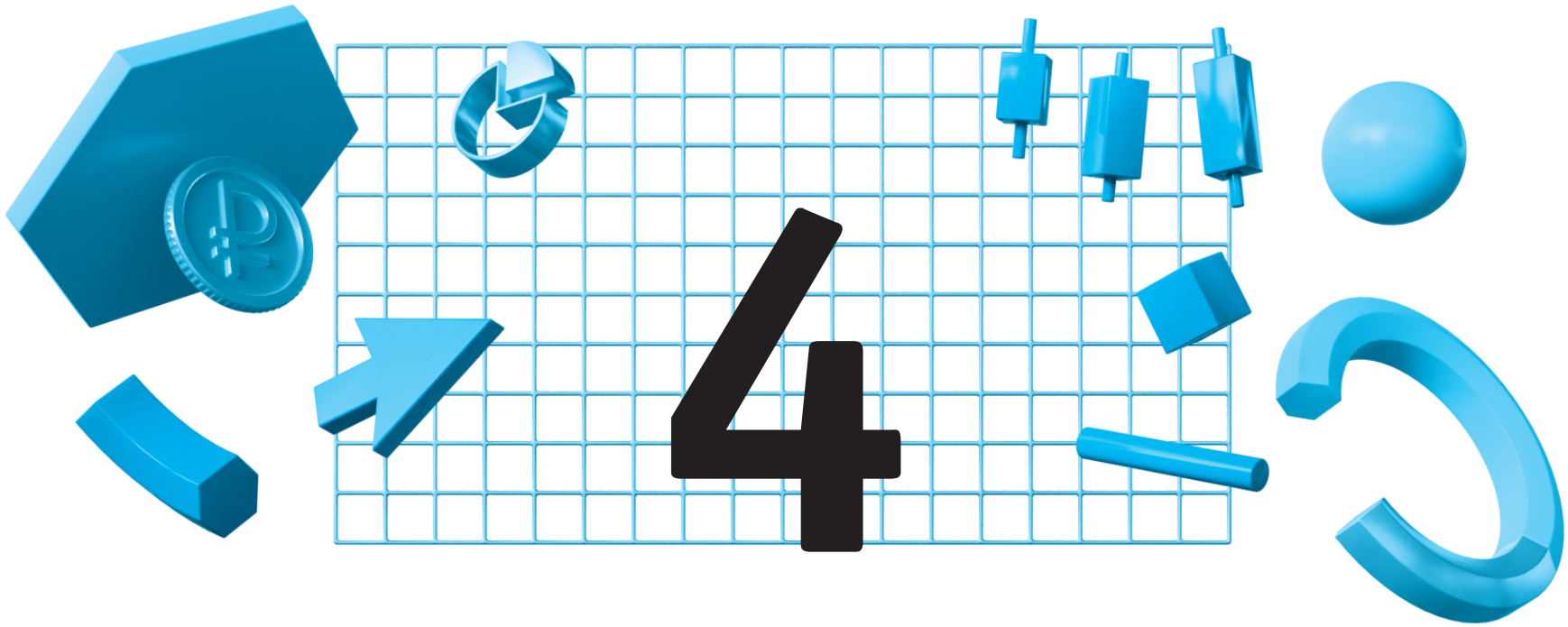
(as a percentage of children in the corresponding age group who study in general education institutions)



3.6. Internet users' attitude on the need to limit the time of children's use of digital devices and the Internet: 2022

(as a percentage of respondents aged 18 and over who have used the Internet within the last 3 months)



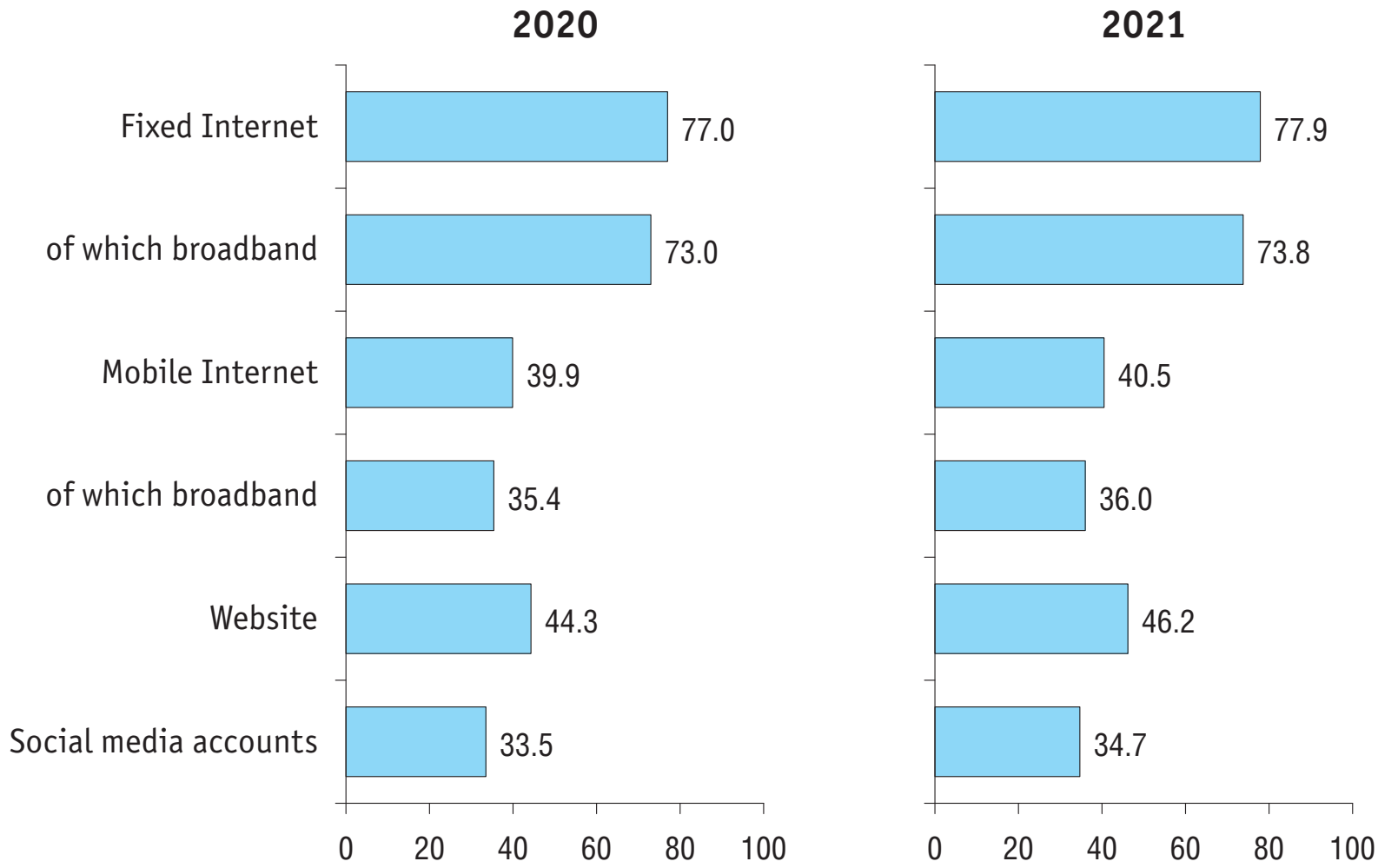


4

DIGITALISATION OF SECTORS

4.1. Enterprises' use of the Internet

(as a percentage of all enterprises)



Sources: here and below in this section, for Russia, HSE ISSEK estimates based on Rosstat data; for countries other than Russia, Eurostat.

4.2. Enterprises with fixed broadband Internet access by type of economic activity

(as a percentage of all enterprises)

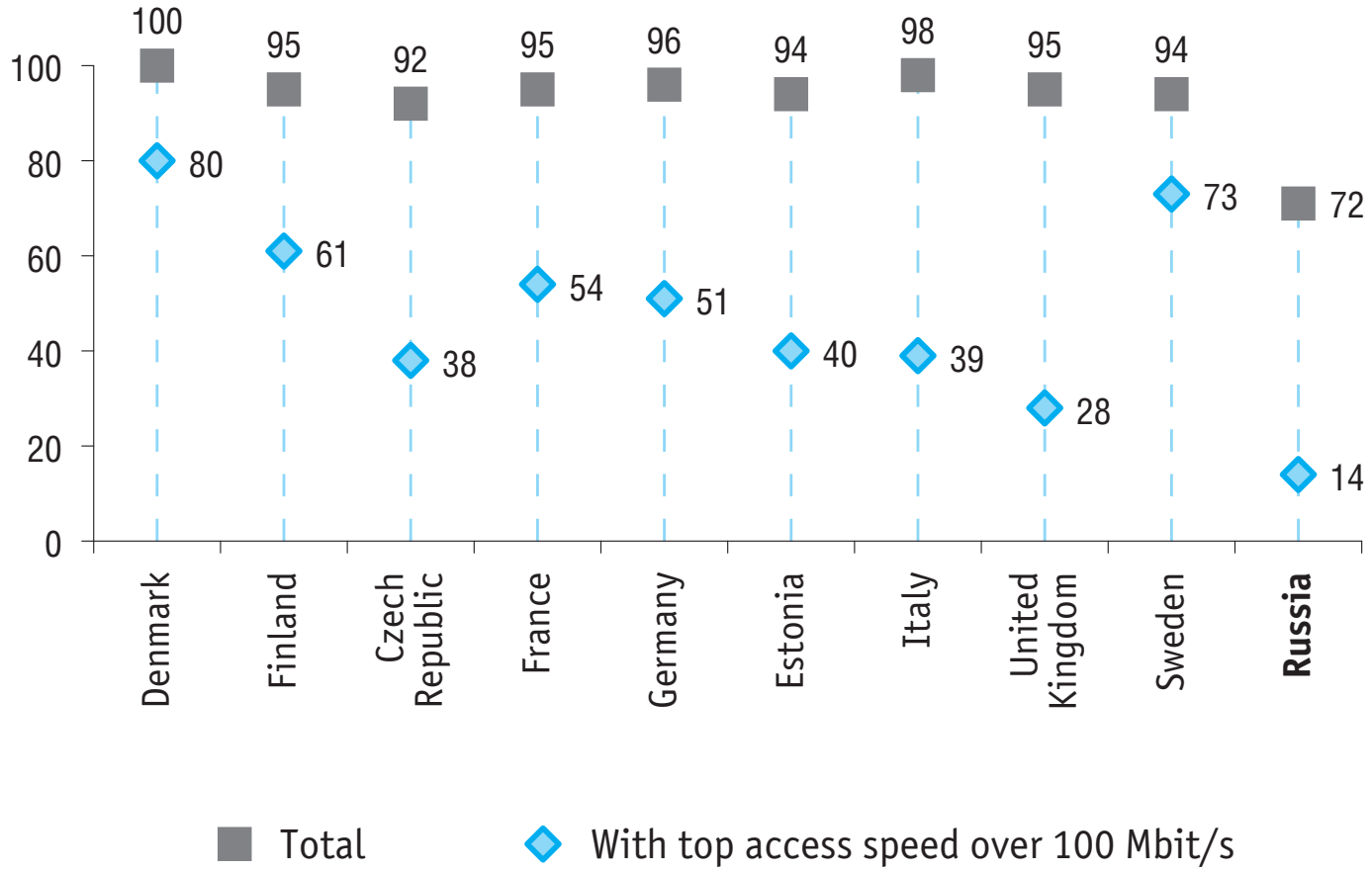
	Total		With top access speed					
			256 kbit/s – 1.9 Mbit/s		2.0–100.0 Mbit/s		Over 100 Mbit/s	
	2020	2021	2020	2021	2020	2021	2020	2021
Total	**73.0**	**73.8**	**10.4**	**8.3**	**51.3**	**53.2**	**11.3**	**12.3**
Agriculture, forestry and fishing	57.8	65.8	9.3	9.4	43.2	49.7	5.3	6.8
Mining and quarrying	59.9	65.7	6.4	5.1	43.1	48.9	10.4	11.7
Manufacturing	71.9	79.3	5.9	5.4	54.9	59.7	11.3	14.2
Electricity, gas, steam and air-conditioning supply	76.1	77.2	10.5	9.7	56.5	58.7	9.1	8.8
Water supply, sewerage, waste management and remediation activities	64.9	69.4	12.6	12.3	45.8	49.9	6.5	7.2
Construction	52.6	58.4	5.1	5.7	39.0	42.1	8.4	10.6
Wholesale and retail trade; repair of motor vehicles and motorcycles	79.5	80.4	16.1	7.1	47.2	56.7	16.3	16.6
Transportation and storage	69.5	69.3	8.8	7.4	49.3	48.4	11.4	13.5

(continued)

	Total		With top access speed					
			256 kbit/s – 1.9 Mbit/s		2.0–100.0 Mbit/s		Over 100 Mbit/s	
	2020	2021	2020	2021	2020	2021	2020	2021
Accommodation and food service activities	66.1	67.8	10.8	10.7	38.7	39.6	16.6	17.5
Information and communication	79.0	79.3	6.6	5.6	49.9	48.8	22.5	24.9
IT industry	81.2	80.5	4.4	3.8	53.3	49.8	23.5	26.9
Financial and insurance activities	79.6	78.7	3.2	3.2	57.3	54.4	19.3	21.1
Real estate activities	57.2	57.4	8.3	7.8	40.9	40.9	8.2	8.7
Professional, scientific and technical activities	63.6	65.4	7.9	7.5	44.9	45.4	10.8	12.5
Higher education	88.4	87.0	2.8	2.8	54.9	51.7	30.7	32.5
Human health and social work activities	82.5	81.5	7.9	6.9	67.5	66.8	7.1	7.8
Arts, entertainment and recreation	67.0	68.1	12.8	12.3	47.6	49.0	6.6	6.8
Public administration and defence; compulsory social security	74.6	78.8	12.3	11.8	54.8	59.0	7.3	8.0

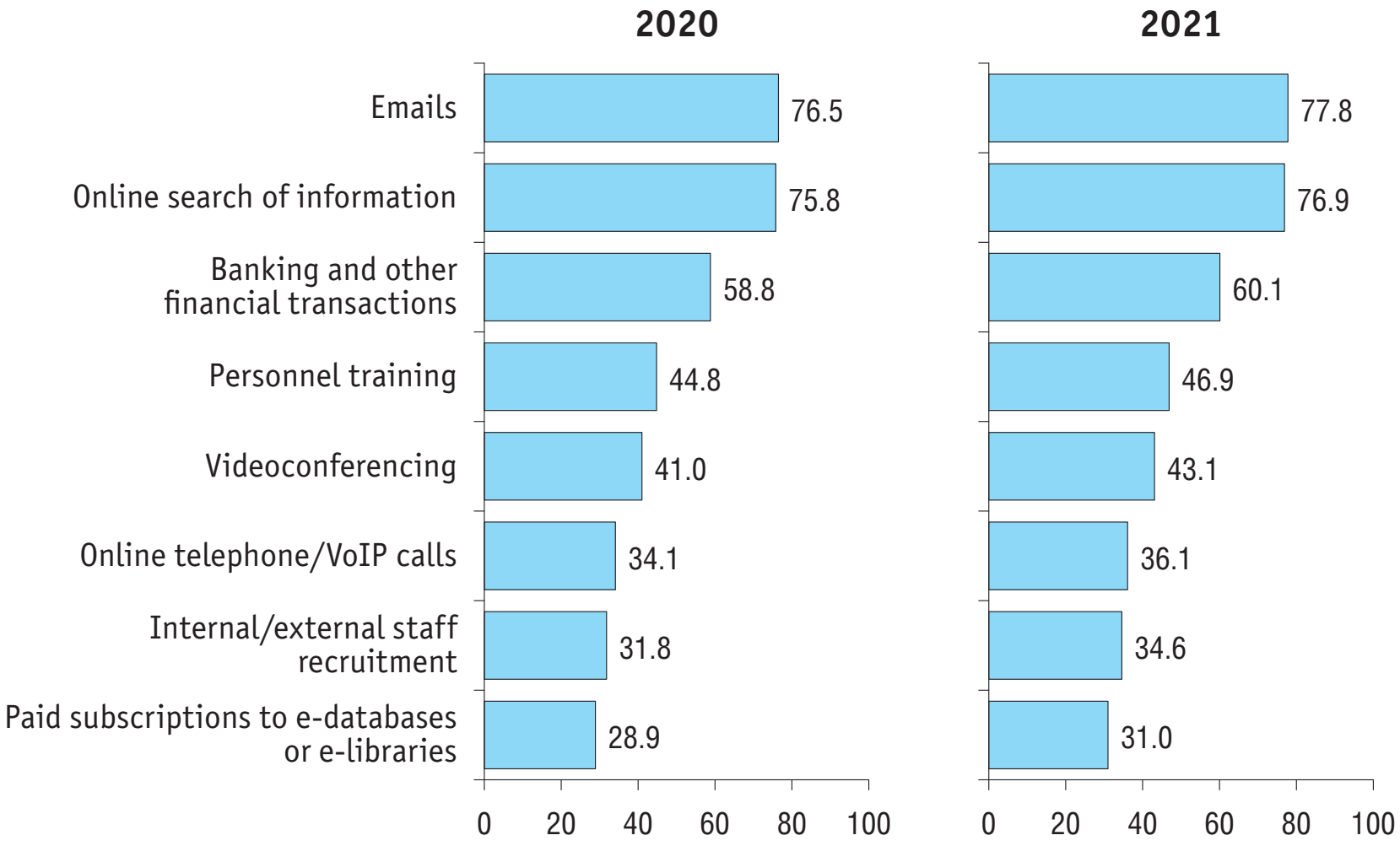
4.3. Fixed broadband Internet in business enterprise sector by country: 2021

(as a percentage of all enterprises)



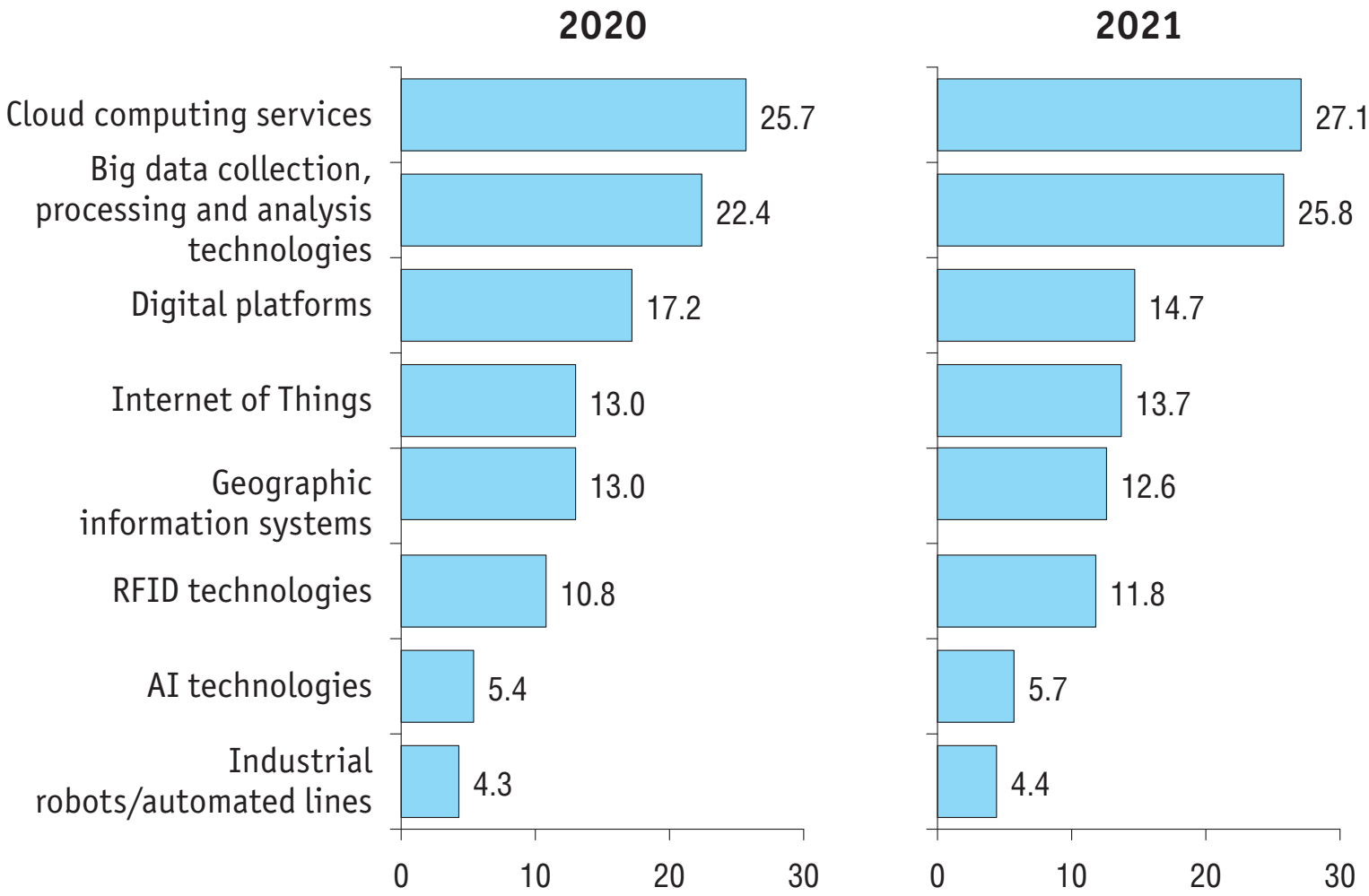
4.4. Enterprises' Internet activities

(as a percentage of all enterprises)



4.5. Enterprises' use of digital technologies

(as a percentage of all enterprises)



4.6. Enterprises' use of digital technologies by type of economic activity

(as a percentage of all enterprises)

	Cloud computing services		Big data collection, processing and analysis technologies		Digital platforms		Internet of Things	
	2020	2021	2020	2021	2020	2021	2020	2021
Total	**25.7**	**27.1**	**22.4**	**25.8**	**17.2**	**14.7**	**13.0**	**13.7**
Agriculture, forestry and fishing	17.8	21.5	17.2	23.3	10.2	9.8	11.6	14.4
Mining and quarrying	19.0	19.8	21.8	25.0	13.2	10.8	14.6	15.4
Manufacturing	27.1	28.9	26.5	29.9	16.0	14.5	15.8	17.6
Electricity, gas, steam and air-conditioning supply	19.4	20.6	23.7	25.1	16.6	13.4	15.9	16.8
Water supply, sewerage, waste management and remediation activities	19.4	22.2	20.8	26.0	11.9	10.6	12.3	14.8
Construction	16.0	19.3	16.3	20.9	8.9	8.5	8.6	10.6
Wholesale and retail trade; repair of motor vehicles and motorcycles	38.3	39.8	25.9	32.3	30.3	24.6	24.4	23.0
Transportation and storage	20.1	21.2	21.0	23.5	14.8	12.7	13.6	15.0

(continued)

	Cloud computing services		Big data collection, processing and analysis technologies		Digital platforms		Internet of Things	
	2020	2021	2020	2021	2020	2021	2020	2021
Accommodation and food service activities	27.5	29.9	28.8	31.9	15.7	15.5	21.4	21.5
Information and communication	31.9	33.9	29.1	32.9	22.6	21.3	14.6	15.1
IT industry	34.6	37.3	29.5	33.3	24.2	23.2	12.8	13.7
Financial and insurance activities	41.0	38.9	44.4	45.5	36.3	33.2	10.8	11.2
Real estate activities	16.7	17.0	15.9	18.3	9.1	7.5	8.5	9.4
Professional, scientific and technical activities	21.1	21.6	18.6	20.3	11.4	9.3	8.2	8.2
Higher education	45.9	47.1	27.7	31.5	35.6	31.9	17.1	19.7
Human health and social work activities	32.6	34.0	27.2	30.6	18.3	16.5	13.8	15.1
Arts, entertainment and recreation	19.5	20.3	17.0	19.4	9.7	7.6	8.1	9.2
Public administration and defence; compulsory social security	19.9	21.2	17.4	19.5	11.8	9.1	7.7	8.6

(continued)

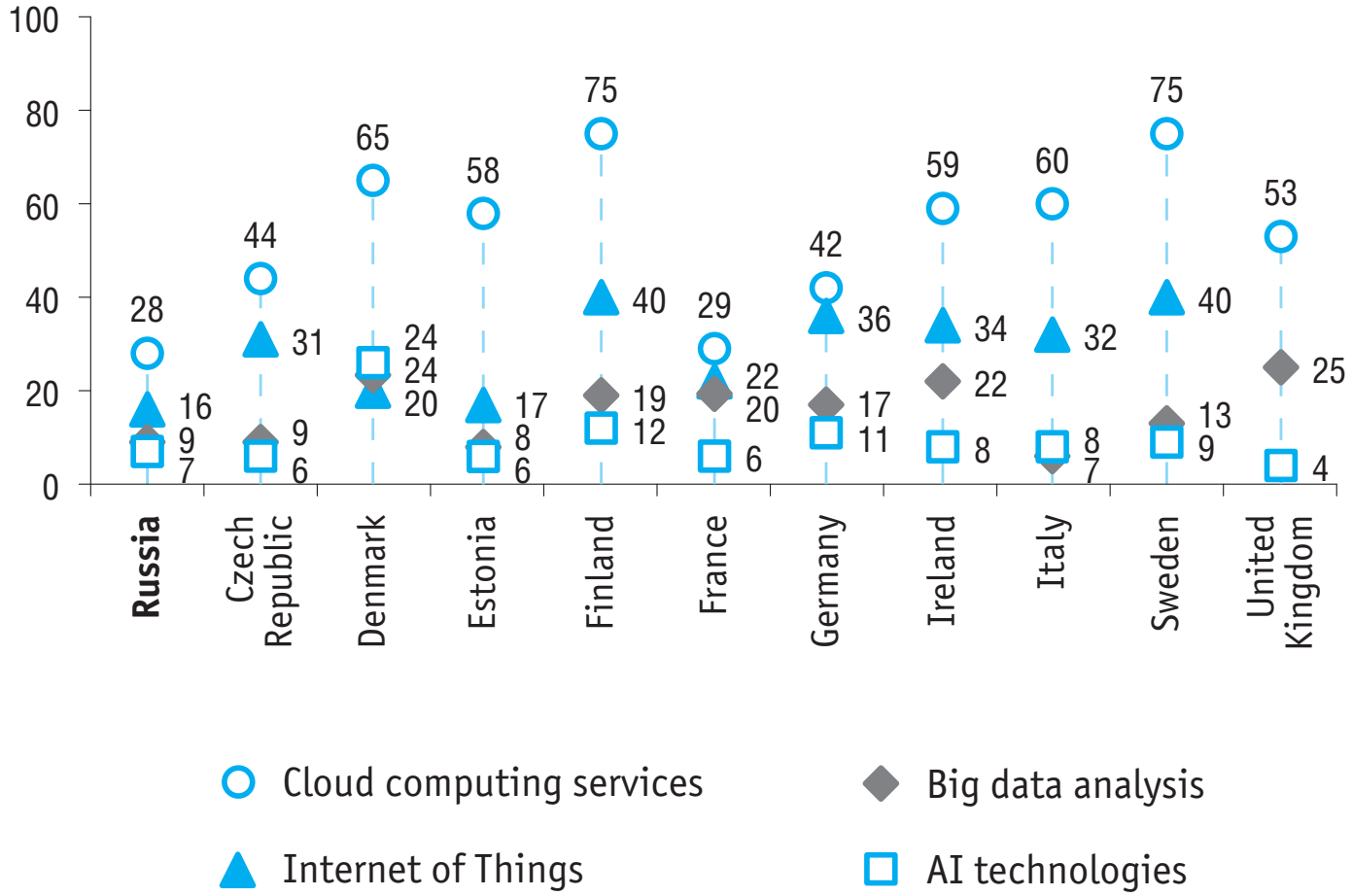
	Geographic information systems		RFID technologies		AI technologies		Industrial robots/ automated lines	
	2020	2021	2020	2021	2020	2021	2020	2021
Total	**13.0**	**12.6**	**10.8**	**11.8**	**5.4**	**5.7**	**4.3**	**4.4**
Agriculture, forestry and fishing	14.1	16.1	8.1	10.1	2.2	2.9	4.1	5.3
Mining and quarrying	18.8	18.5	14.0	16.0	2.5	2.9	4.2	2.9
Manufacturing	12.9	12.3	16.5	19.3	3.6	3.9	17.2	19.0
Electricity, gas, steam and air-conditioning supply	19.9	18.2	13.8	14.6	3.3	3.7	2.0	2.1
Water supply, sewerage, waste management and remediation activities	15.6	15.7	7.9	9.1	2.5	3.2	2.3	2.8
Construction	8.6	9.6	6.3	8.9	1.3	1.7	1.5	1.6
Wholesale and retail trade; repair of motor vehicles and motorcycles	13.8	14.6	22.3	21.4	13.0	14.4	12.0	11.2
Transportation and storage	15.8	15.7	12.1	13.4	3.7	4.4	3.4	3.7
Accommodation and food service activities	8.1	6.6	13.1	14.4	9.7	8.6	4.4	3.3

(continued)

	Geographic information systems		RFID technologies		AI technologies		Industrial robots/ automated lines	
	2020	2021	2020	2021	2020	2021	2020	2021
Information and communication	15.2	15.2	13.6	14.8	7.8	9.8	1.4	1.5
IT industry	12.5	12.4	12.0	13.4	8.1	9.6	1.5	1.4
Financial and insurance activities	26.0	26.0	11.8	12.9	22.8	13.0	0.8	0.9
Real estate activities	8.7	7.8	6.2	7.7	1.8	2.3	1.4	1.7
Professional, scientific and technical activities	10.1	8.8	6.4	6.7	2.1	2.6	1.4	1.3
Higher education	19.5	18.5	26.2	29.3	8.4	9.1	4.6	4.9
Human health and social work activities	15.8	14.3	8.5	9.8	2.6	2.9	1.3	1.6
Arts, entertainment and recreation	7.6	6.7	5.7	6.7	1.8	2.0	0.8	0.8
Public administration and defence; compulsory social security	12.0	11.2	5.1	5.7	1.7	2.0	0.9	0.8

4.7. Use of digital technologies in business enterprise sector by country: 2021*

(as a percentage of all enterprises)



* Or nearest years for which data are available.

4.8. Enterprises' use of specialised software by type of economic activity

(as a percentage of all enterprises)

	Electronic document management systems		Electronic payment transactions		Access to databases through global information networks		Education and training programmes	
	2020	2021	2020	2021	2020	2021	2020	2021
Total	**53.8**	**55.7**	**41.8**	**42.3**	**22.1**	**21.8**	**15.3**	**16.1**
Agriculture, forestry and fishing	40.1	49.7	31.6	39.1	12.8	17.0	6.3	8.9
Mining and quarrying	44.1	50.3	34.2	40.0	9.5	15.3	16.7	19.0
Manufacturing	50.7	59.7	42.4	49.2	12.0	19.3	11.7	15.7
Electricity, gas, steam and air-conditioning supply	55.2	62.4	41.8	46.3	15.7	19.7	21.6	23.8
Water supply, sewerage, waste management and remediation activities	44.3	53.2	35.9	41.0	13.4	17.3	8.0	9.9
Construction	35.2	43.0	29.0	33.9	8.6	13.8	6.8	8.8
Wholesale and retail trade; repair of motor vehicles and motorcycles	43.3	61.1	36.5	50.3	15.7	35.4	12.8	26.3
Transportation and storage	45.7	55.0	33.0	38.1	11.7	17.5	18.5	20.9

(continued)

	Electronic document management systems		Electronic payment transactions		Access to databases through global information networks		Education and training programmes	
	2020	2021	2020	2021	2020	2021	2020	2021
Accommodation and food service activities	43.5	49.0	37.4	43.9	13.0	19.9	6.7	13.2
Information and communication	54.4	62.6	37.3	43.8	14.1	23.4	13.9	19.5
IT industry	58.7	64.7	33.8	40.5	13.7	24.5	17.0	22.4
Financial and insurance activities	41.9	63.0	36.4	51.4	16.5	36.5	21.6	38.4
Real estate activities	40.2	43.3	31.9	33.8	10.1	11.9	5.4	6.1
Professional, scientific and technical activities	45.3	48.5	35.5	38.4	11.7	14.7	9.1	10.6
Higher education	60.4	65.0	59.2	59.5	28.4	35.6	53.7	58.8
Human health and social work activities	61.0	64.2	52.1	54.3	19.6	21.7	11.6	13.5
Arts, entertainment and recreation	41.0	43.8	26.7	27.8	14.8	16.9	6.7	8.3
Public administration and defence; compulsory social security	55.5	59.8	38.1	39.9	17.4	18.7	8.5	9.3

4.9. Enterprises' use of cybersecurity tools by type of economic activity

(as a percentage of all enterprises)

	Electronic signature tools		Automatically updated antivirus software		Firewalls (software and hardware)	
	2020	2021	2020	2021	2020	2021
Total	**68.6**	**70.1**	**63.6**	**64.5**	**44.7**	**45.9**
Agriculture, forestry and fishing	58.0	67.5	48.7	56.7	27.2	32.8
Mining and quarrying	58.4	60.0	60.7	60.7	49.1	49.4
Manufacturing	71.0	73.8	69.0	72.2	54.2	57.2
Electricity, gas, steam and air-conditioning supply	74.1	77.2	69.4	72.4	50.3	52.5
Water supply, sewerage, waste management and remediation activities	68.3	73.6	51.1	55.3	27.9	31.3
Construction	48.2	53.6	45.0	50.5	30.1	34.5
Wholesale and retail trade; repair of motor vehicles and motorcycles	64.7	65.3	72.2	72.5	60.1	60.2
Transportation and storage	64.7	66.8	65.0	66.1	48.4	50.6
Accommodation and food service activities	61.7	63.2	58.0	59.2	37.0	39.8

(continued)

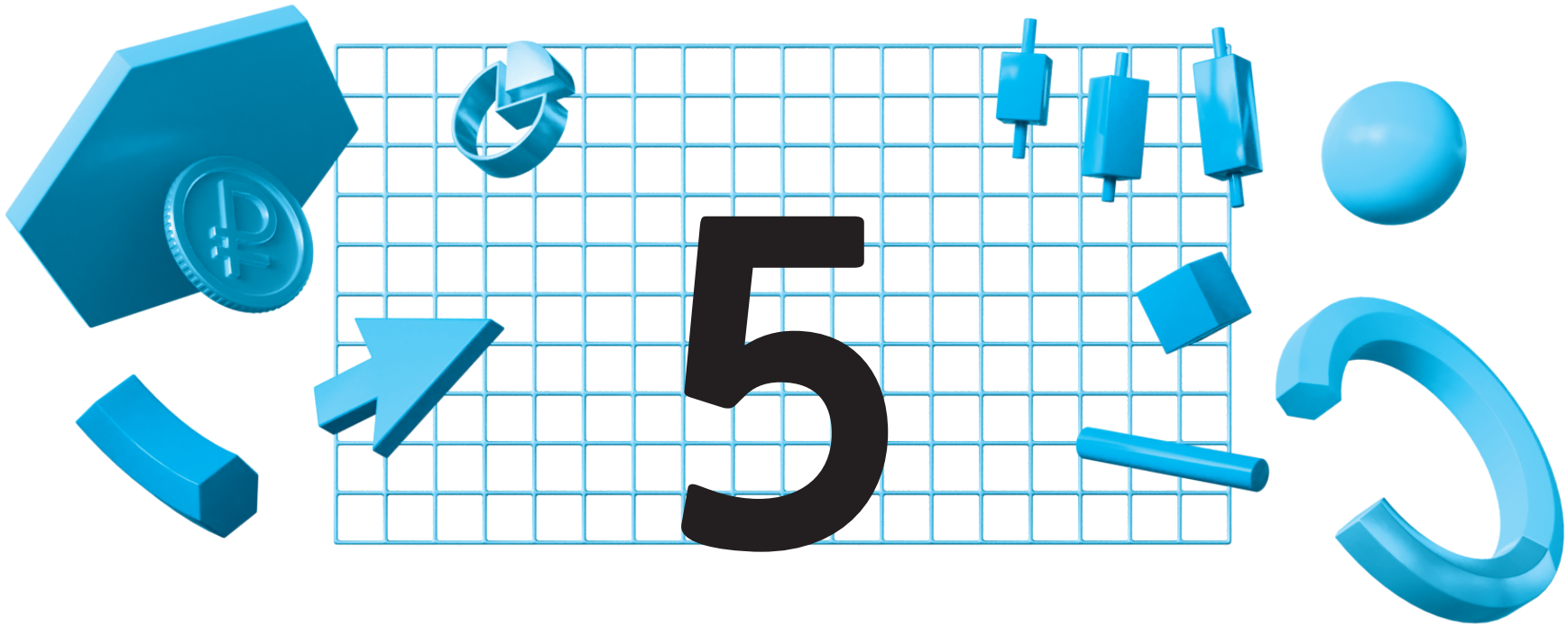
	Electronic signature tools		Automatically updated antivirus software		Firewalls (software and hardware)	
	2020	2021	2020	2021	2020	2021
Information and communication	72.5	74.9	71.0	70.8	53.3	54.1
IT industry	74.3	75.0	75.1	73.6	65.2	64.9
Financial and insurance activities	73.3	75.5	76.5	76.5	68.8	69.5
Real estate activities	58.4	59.4	45.9	46.2	27.8	29.1
Professional, scientific and technical activities	63.7	63.6	56.6	55.6	37.5	37.1
Higher education	79.0	79.2	80.9	79.3	71.3	69.5
Human health and social work activities	82.8	82.8	74.8	74.7	54.8	55.8
Arts, entertainment and recreation	66.7	67.6	49.8	50.5	23.9	25.2
Public administration and defence; compulsory social security	78.3	79.5	65.9	66.4	39.0	39.5

(continued)

	Spam filters		Data encryption for confidentiality facilities		Intrusion detection systems		Automated IT security control and analysis software	
	2020	2021	2020	2021	2020	2021	2020	2021
Total	**40.4**	**41.6**	**38.5**	**39.5**	**32.0**	**33.0**	**27.2**	**28.0**
Agriculture, forestry and fishing	23.7	29.0	22.0	26.9	18.5	22.6	16.5	19.7
Mining and quarrying	44.5	44.4	36.0	37.2	32.6	33.4	25.4	26.5
Manufacturing	49.4	51.9	41.1	43.6	38.1	39.8	28.8	30.1
Electricity, gas, steam and air-conditioning supply	45.2	46.7	41.7	43.1	35.5	36.7	28.9	30.3
Water supply, sewerage, waste management and remediation activities	24.3	27.1	25.3	28.7	18.9	22.1	16.6	18.7
Construction	29.2	33.1	23.1	25.9	22.9	25.6	18.2	20.1
Wholesale and retail trade; repair of motor vehicles and motorcycles	60.5	59.9	47.5	48.0	49.1	49.1	40.8	41.4
Transportation and storage	42.2	43.5	37.8	39.7	34.2	34.4	26.8	26.5
Accommodation and food service activities	39.0	40.9	30.8	30.8	29.2	30.1	27.5	27.8

(continued)

	Spam filters		Data encryption for confidentiality facilities		Intrusion detection systems		Automated IT security control and analysis software	
	2020	2021	2020	2021	2020	2021	2020	2021
Information and communication	50.3	59.4	47.3	48.1	43.0	44.8	38.1	39.4
IT industry	59.6	64.9	59.2	58.5	52.7	54.1	46.9	47.8
Financial and insurance activities	63.6	27.0	65.9	67.1	55.5	56.9	53.2	54.2
Real estate activities	26.0	35.2	24.5	25.7	19.9	21.1	16.5	17.1
Professional, scientific and technical activities	35.4	62.5	31.4	31.7	26.2	26.0	22.3	22.2
Higher education	63.3	41.1	59.3	60.0	47.8	47.4	36.3	36.6
Human health and social work activities	40.3	23.7	53.1	53.3	33.5	34.6	26.6	26.7
Arts, entertainment and recreation	22.5	31.3	22.3	22.9	14.4	15.4	13.2	14.0
Public administration and defence; compulsory social security	30.8	59.4	37.6	37.7	24.0	24.4	21.9	21.9



E-GOVERNMENT

5.1. E-Government Development Index by country: 2022*

	E-Government Development Index		Of which subindices values:		
	Rank	Value	Online Services Index**	Telecommunications Infrastructure Index**	Human Capital Index**
Denmark	1	0.9717	0.9797 (4)	0.9795 (2)	0.9559 (8)
Finland	2	0.9533	0.9833 (2)	0.9127 (14)	0.9640 (5)
Republic of Korea	3	0.9529	0.9826 (3)	0.9674 (4)	0.9087 (23)
New Zealand	4	0.9432	0.9579 (6)	0.8896 (20)	0.9823 (2)
Iceland	5	0.9410	0.8867 (16)	0.9705 (3)	0.9657 (3)
Sweden	5	0.9410	0.9002 (13)	0.9580 (6)	0.9649 (4)
…	…	…	…	…	…
Serbia	40	0.8237	0.8514 (26)	0.7865 (55)	0.8332 (58)
Argentina	41	0.8198	0.8089 (38)	0.7332 (69)	0.9173 (20)
Russia	**42**	**0.8162**	**0.7368 (61)**	**0.8053 (46)**	**0.9065 (26)**
China	43	0.8119	0.8876 (15)	0.8050 (47)	0.7429 (98)
Croatia	44	0.8106	0.8108 (36)	0.7711 (59)	0.8500 (52)

* 193 Member States were ranked.

** The country's subindex rank is provided in parenthesis.

Source: the United Nations Department of Economic and Social Affairs (UN DESA).

5.2. Individuals' online interaction with public authorities by country: 2021

(as a percentage of individuals aged 15–72)*

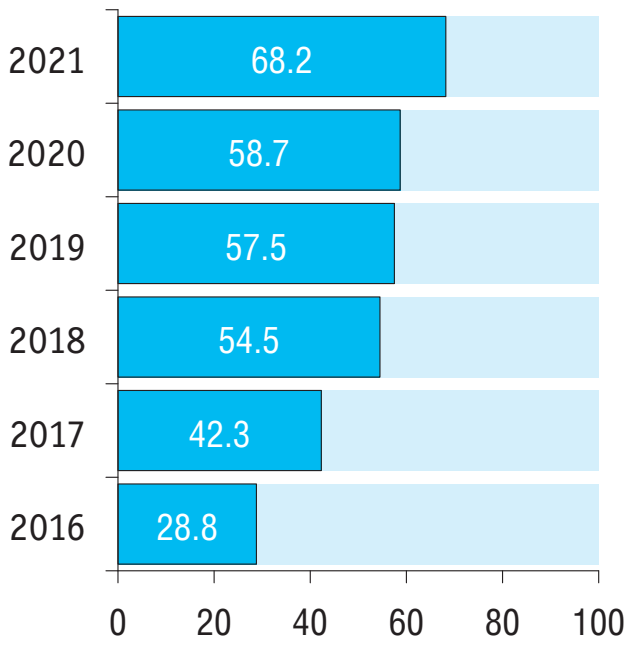
	Obtaining information from the websites of government agencies	Submitting completed forms online	Downloading official forms
Russia	**52**	**30**	**21**
Czech Republic	58	52	31
Estonia	69	76	47
Finland	86	74	73
France	51	71	48
Germany	46	27	35
Italy	26	23	27
Sweden	85	80	55
United Kingdom	46	39	27

* For countries other than Russia, aged 16–74.

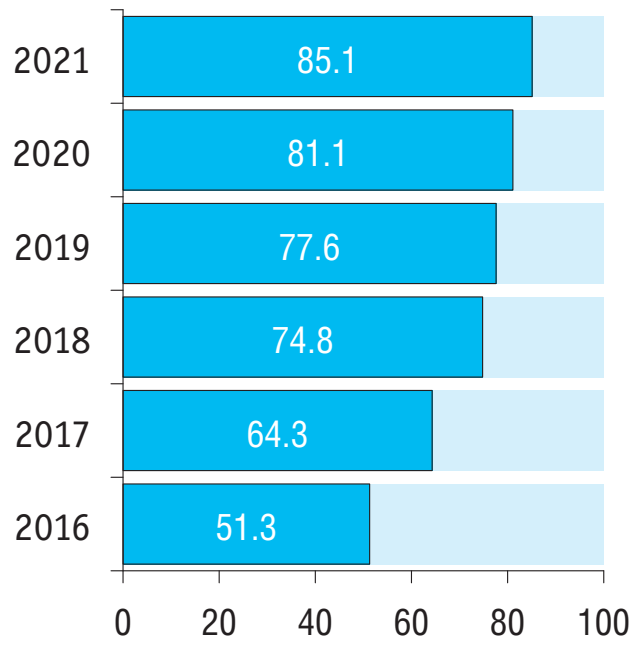
Sources: here and below in this section, for Russia, Rosstat; for countries other than Russia, Eurostat.

5.3. Public and municipal services received by individuals in digital form

As a percentage of all individuals aged 15–72

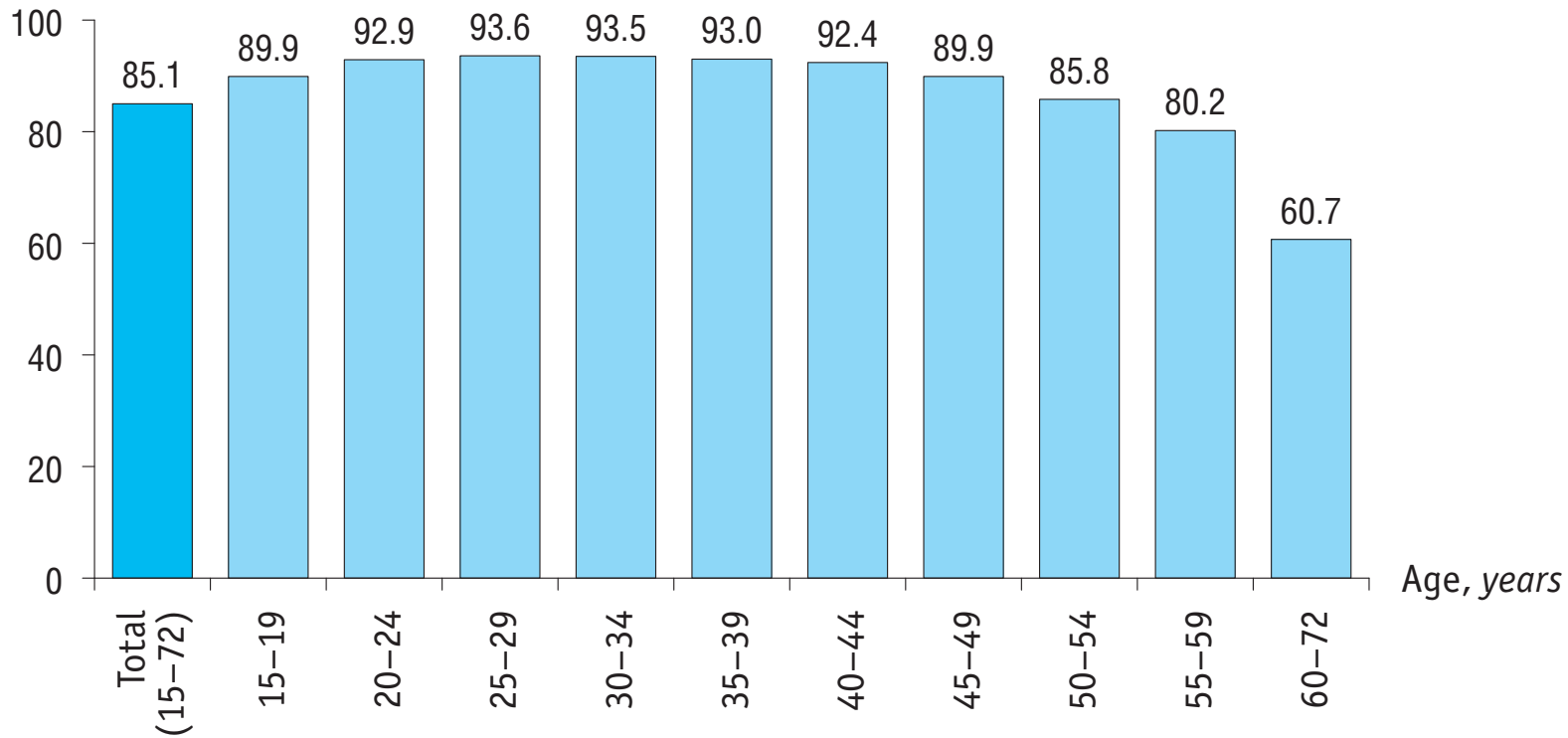


As a percentage of individuals aged 15–72 years who have received public and municipal services within the last 12 months



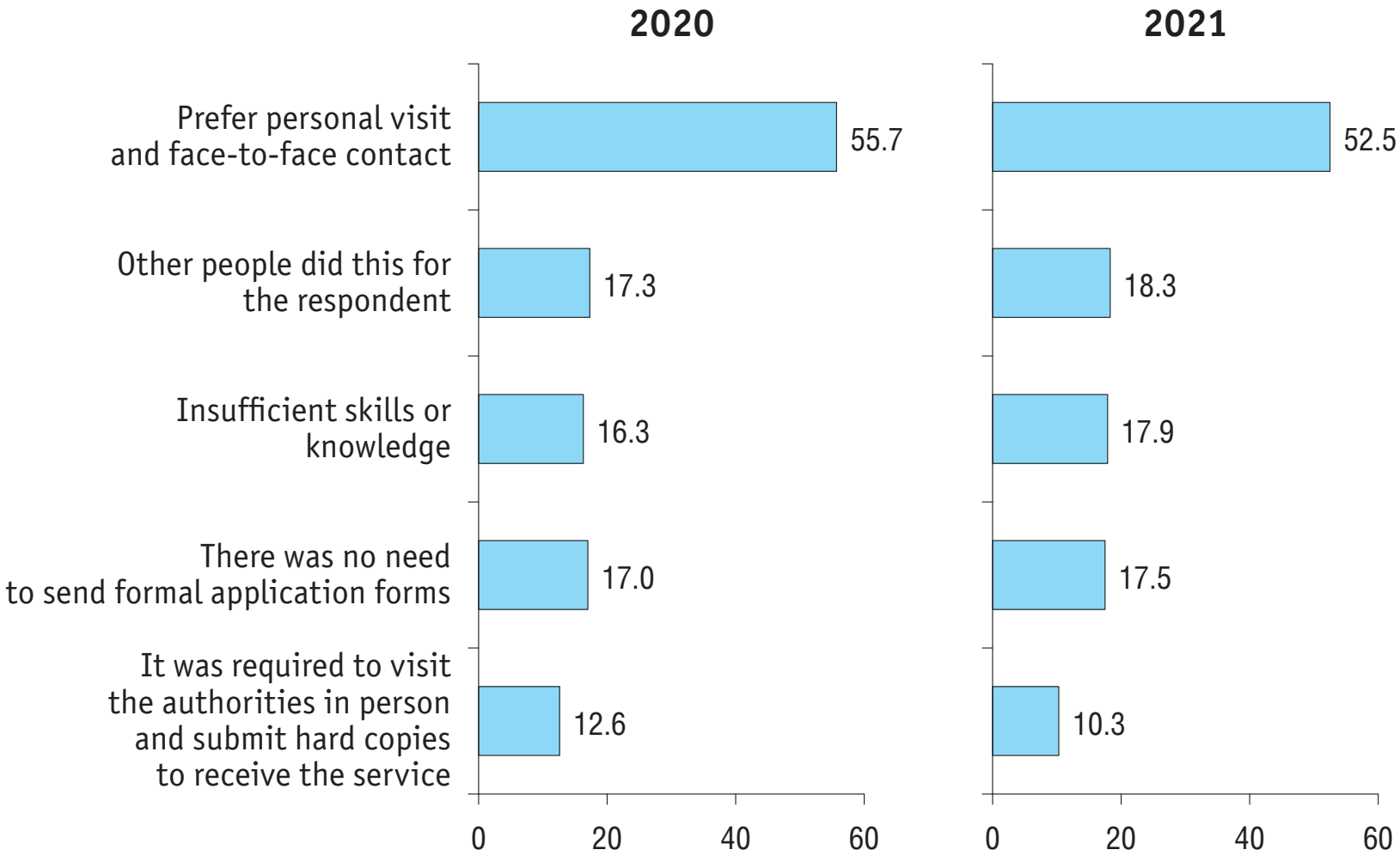
5.4. Public and municipal services received by individuals in digital form by age: 2021

(as a percentage of all individuals in each age group who have received public and municipal services within the last 12 months)



5.5. Individuals' reasons to refrain from receiving public and municipal services in digital form

(as a percentage of all individuals aged 15–72 who have not used the Internet to receive public and municipal services within the last 12 months)



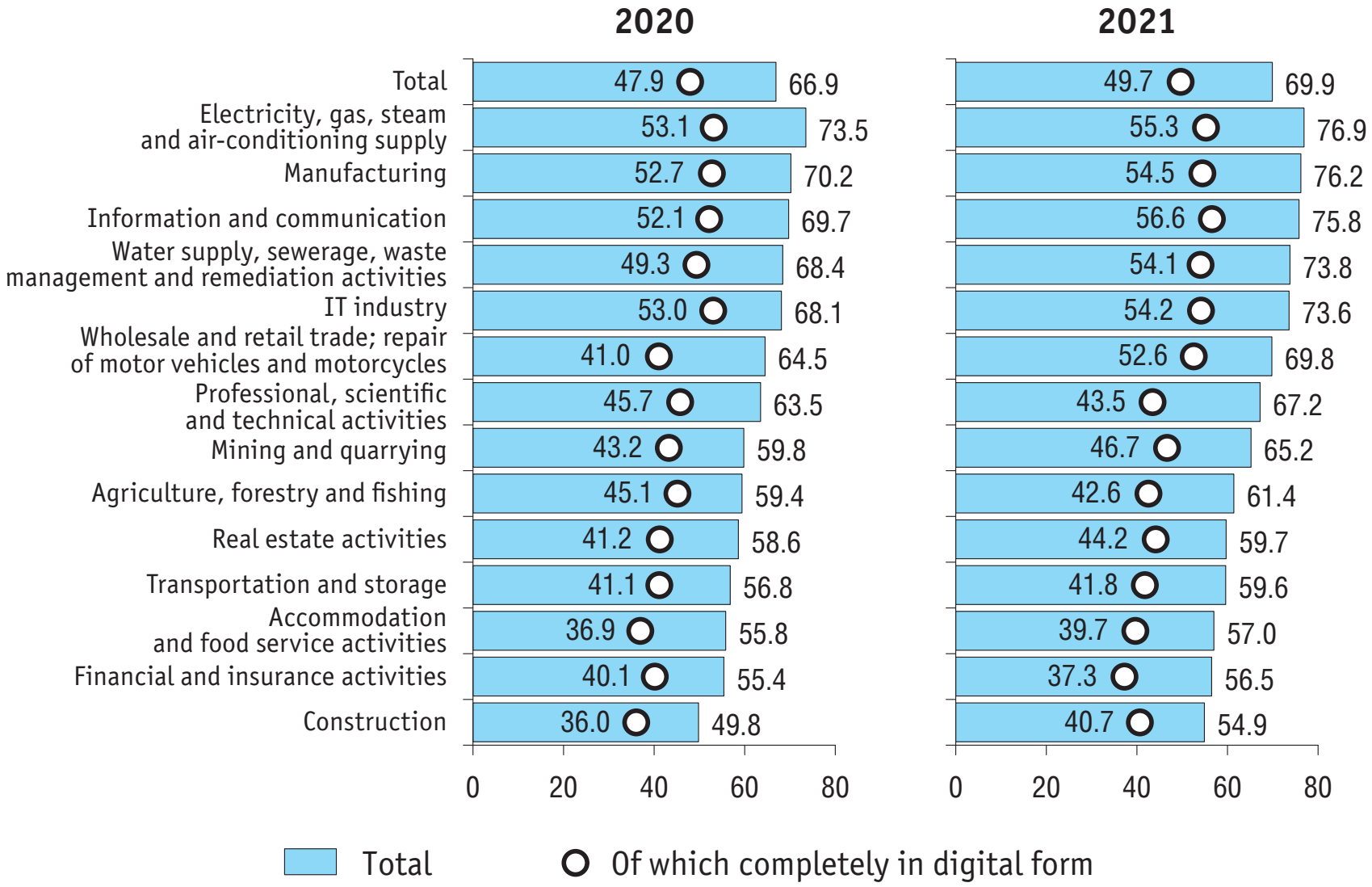
5.6. Enterprises' online interaction with public authorities

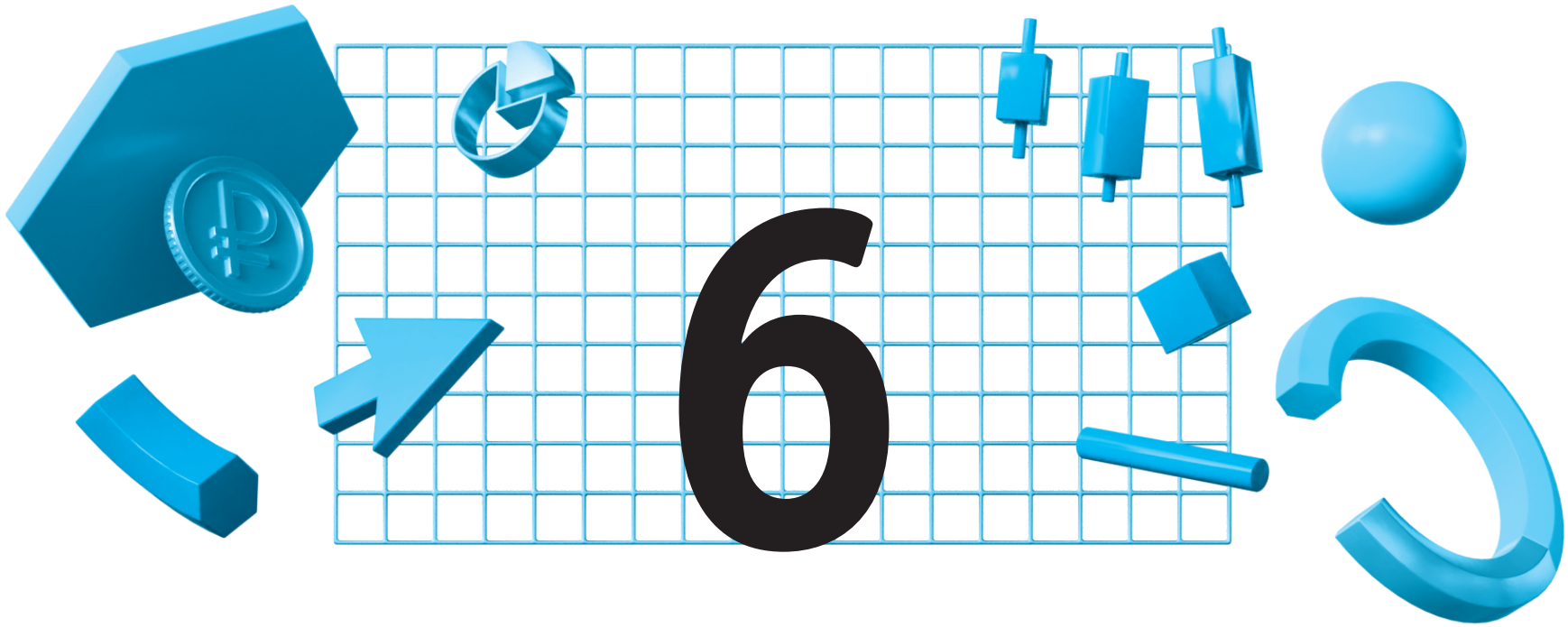
(as a percentage of all enterprises)

	Submitting completed forms online		Downloading official forms		Obtaining information from the websites of government agencies		E-procurement	
	2020	2021	2020	2021	2020	2021	2020	2021
Total	**65.7**	**66.2**	**64.6**	**65.5**	**60.0**	**61.1**	**36.0**	**36.2**
Agriculture, forestry and fishing	58.6	67.4	58.0	66.9	48.3	56.6	23.5	28.5
Mining and quarrying	58.1	57.2	57.8	57.2	51.8	52.6	13.4	15.2
Manufacturing	71.2	73.6	70.3	72.8	62.7	65.7	24.6	26.4
Electricity, gas, steam and air-conditioning supply	72.8	73.9	72.4	73.2	66.8	68.8	42.5	44.1
Water supply, sewerage, waste management and remediation activities	68.5	74.1	68.0	72.6	59.0	63.7	40.7	43.9
Construction	48.0	52.5	46.8	50.9	40.7	45.4	21.2	24.8
Wholesale and retail trade; repair of motor vehicles and motorcycles	62.2	63.8	62.2	63.6	57.4	58.6	15.0	16.0
Transportation and storage	58.1	58.5	57.1	57.2	50.4	51.2	24.8	24.4
Accommodation and food service activities	54.1	54.3	52.8	53.1	42.9	43.6	25.8	22.9
Information and communication	68.1	69.0	69.0	69.2	63.6	64.3	38.2	38.4
IT industry	67.0	67.3	69.3	68.8	63.4	63.8	33.4	32.4
Financial and insurance activities	62.6	50.9	53.0	53.0	51.1	50.8	17.6	14.1
Real estate activities	57.5	57.0	55.9	55.1	49.5	49.5	22.2	21.6
Professional, scientific and technical activities	62.8	61.9	61.7	60.6	55.8	55.2	31.9	31.2

5.7. Public services received by enterprises in digital form

(as a percentage of all enterprises)





6

PERSONNEL

6.1. Employed in ICT task-intensive occupations

	Thousand persons			As a percentage of total		
	2019	2020	2021	2019	2020	2021
Employed in ICT task-intensive occupations – total	**8626.7**	**9148.9**	**9013.3**	**100**	**100**	**100**
Of which:						
ICT professionals – total	**1665.5**	**1764.6**	**1756.4**	**19.3**	**19.3**	**19.5**
Managers						
ICT service managers	64.1	63.5	58.2	0.7	0.7	0.6
Professionals						
Software and multimedia developers and analysts	674.5	761.5	800.7	7.8	8.3	8.9
Database and network professionals	311.8	332.4	330.2	3.6	3.6	3.7
Electronics engineers	161.4	159.4	145.8	1.9	1.7	1.6
Telecommunications engineers	88.5	92.2	84.0	1.0	1.0	0.9
ICT sales professionals	11.5	15.9	13.8	0.1	0.2	0.2

(continued)

	Thousand persons			As a percentage of total		
	2019	2020	2021	2019	2020	2021
Graphic and multimedia designers	27.1	36.0	36.2	0.3	0.4	0.4
Information technology trainers	7.0	10.8	10.8	0.1	0.1	0.1
Technicians and associate professionals						
ICT operations and user support technicians	94.4	78.9	72.9	1.1	0.9	0.8
Telecommunications and broadcasting technicians	65.0	66.2	63.5	0.8	0.7	0.7
Electronics engineering technicians	50.2	43.1	33.6	0.6	0.5	0.4
Installers and services						
Electronics and telecommunications technology installers and servicers	110.0	104.7	106.7	1.3	1.1	1.2

(continued)

	Thousand persons			As a percentage of total		
	2019	2020	2021	2019	2020	2021
Other ICT task-intensive occupations – total	**6961.2**	**7384.3**	**7256.9**	**80.7**	**80.7**	**80.5**
Managers						
Business services and administration managers	839.7	826.6	786.5	9.7	9.0	8.7
Sales, marketing and development managers	193.5	199.5	187.3	2.2	2.2	2.1
Professional services managers	387.3	377.7	382.2	4.5	4.1	4.2
Professionals						
Physical and earth science professionals	118.4	109.9	115.2	1.4	1.2	1.3
Architects, planners, surveyors and designers	448.2	471.0	515.7	5.2	5.1	5.7
University and higher education teachers	244.9	206.6	206.4	2.8	2.3	2.2

(continued)

	Thousand persons			As a percentage of total		
	2019	2020	2021	2019	2020	2021
Finance professionals	2217.0	2293.2	2151.8	25.7	25.1	23.9
Administration experts	1112.0	1236.2	1198.1	12.9	13.5	13.3
Sales, goods and services marketing, and PR experts	1185.7	1456.3	1510.9	13.7	15.9	16.8
Electrical engineers	214.5	207.2	202.7	2.5	2.3	2.2

Sources: here and below in this section, for Russia, HSE ISSEK estimated based on the Rosstat data (6.1–6.5), the Ministry of Education of the Russian Federation, the Ministry of Science and Higher Education of he Russian Federation (6.6–6.9); for countries other than Russia, Eurostat and OECD (6.3, 6.9).

6.2. Employed in ICT task-intensive occupations by type of economic activity: 2021

(as a percentage of total employment)

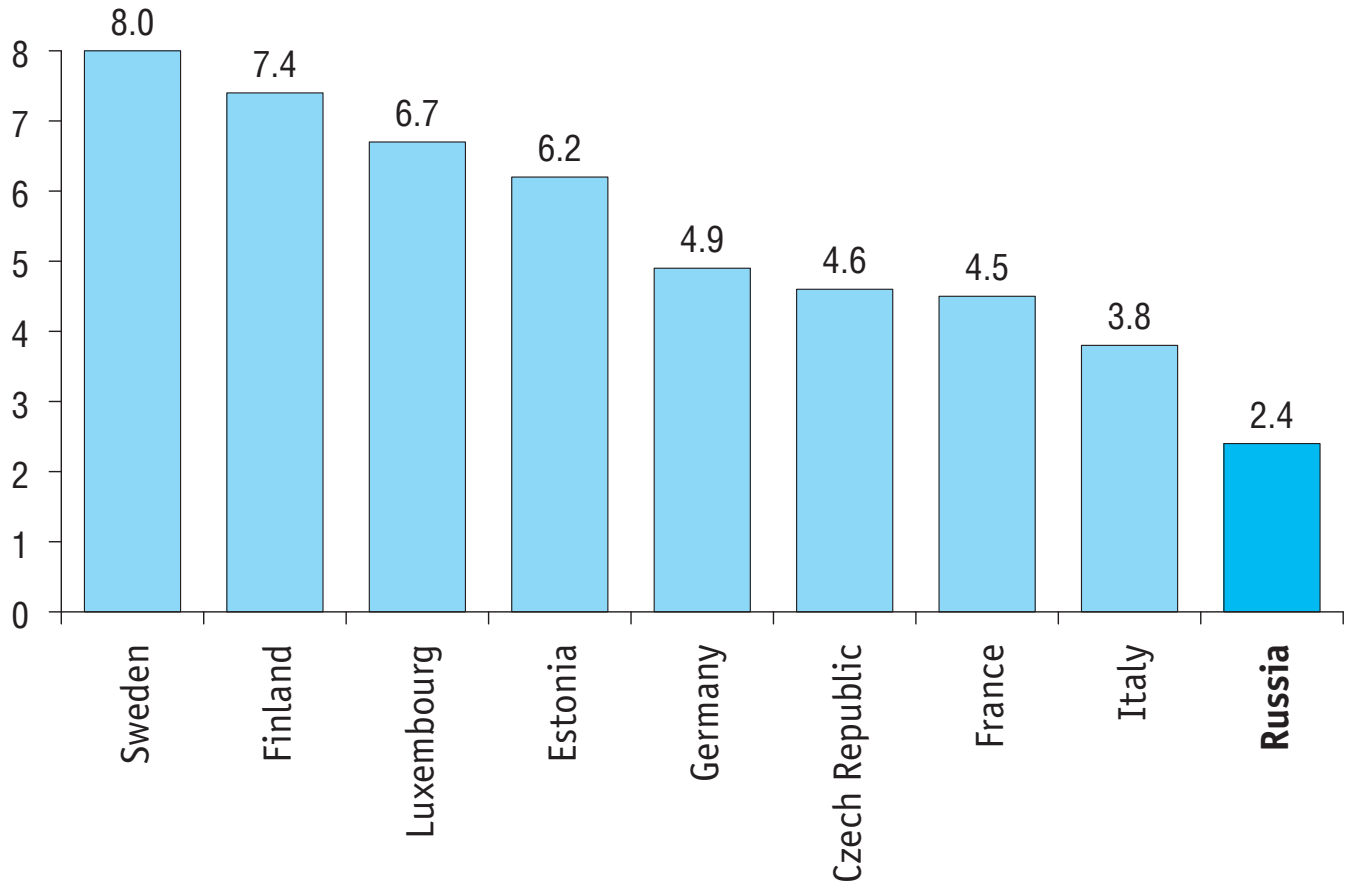
	ICT specialists	Other ICT task-intensive occupations
Total	**2.4**	**10.2**
Agriculture, forestry and fishing	0.4	2.4
Mining and quarrying	1.8	4.7
Manufacturing	2.7	5.9
Electricity, gas, steam and air-conditioning supply	2.6	9.3
Water supply, sewerage, waste management and remediation activities	1.4	5.8
Construction	0.8	6.4
Wholesale and retail trade; repair of motor vehicles and motorcycles	1.0	12.6
Transportation and storage	1.3	4.9
Accommodation and food service activities	0.2	4.7
Information and communication	43.5	11.5
Of which:		
Telecommunications	32.4	13.7
IT industry	75.9	8.0

(continued)

	ICT specialists	Other ICT task-intensive occupations
Financial and insurance activities	6.0	44.8
Real estate activities	1.2	10.2
Professional, scientific and technical activities	6.1	32.0
Public administration and defence; compulsory social security	2.0	22.0
Education	0.7	8.6
Human health and social work activities	0.8	5.4
Arts, entertainment and recreation	1.3	5.6

6.3. ICT specialists by country: 2021*

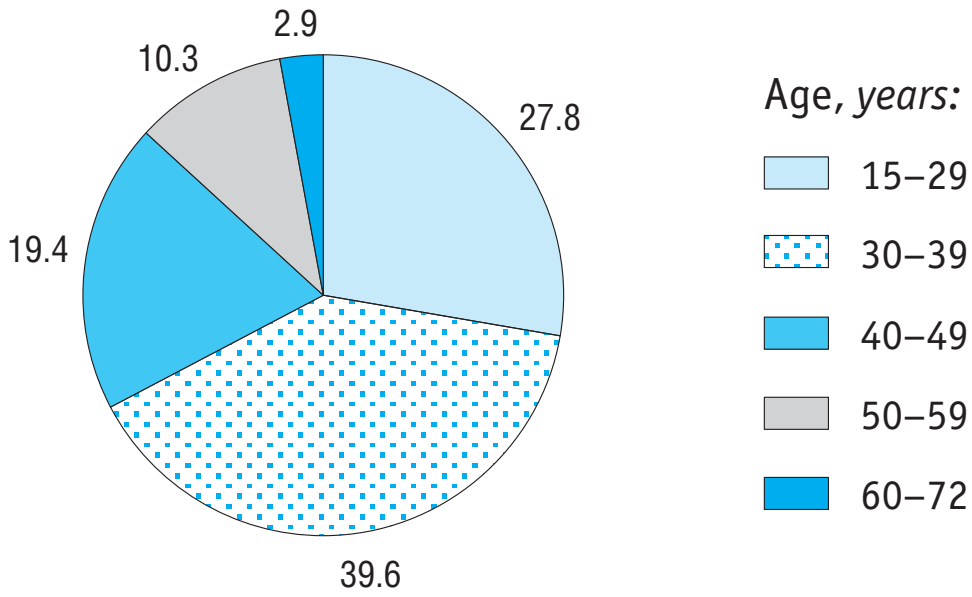
(as a percentage of the total employment)



* Or nearest years for which data are available.

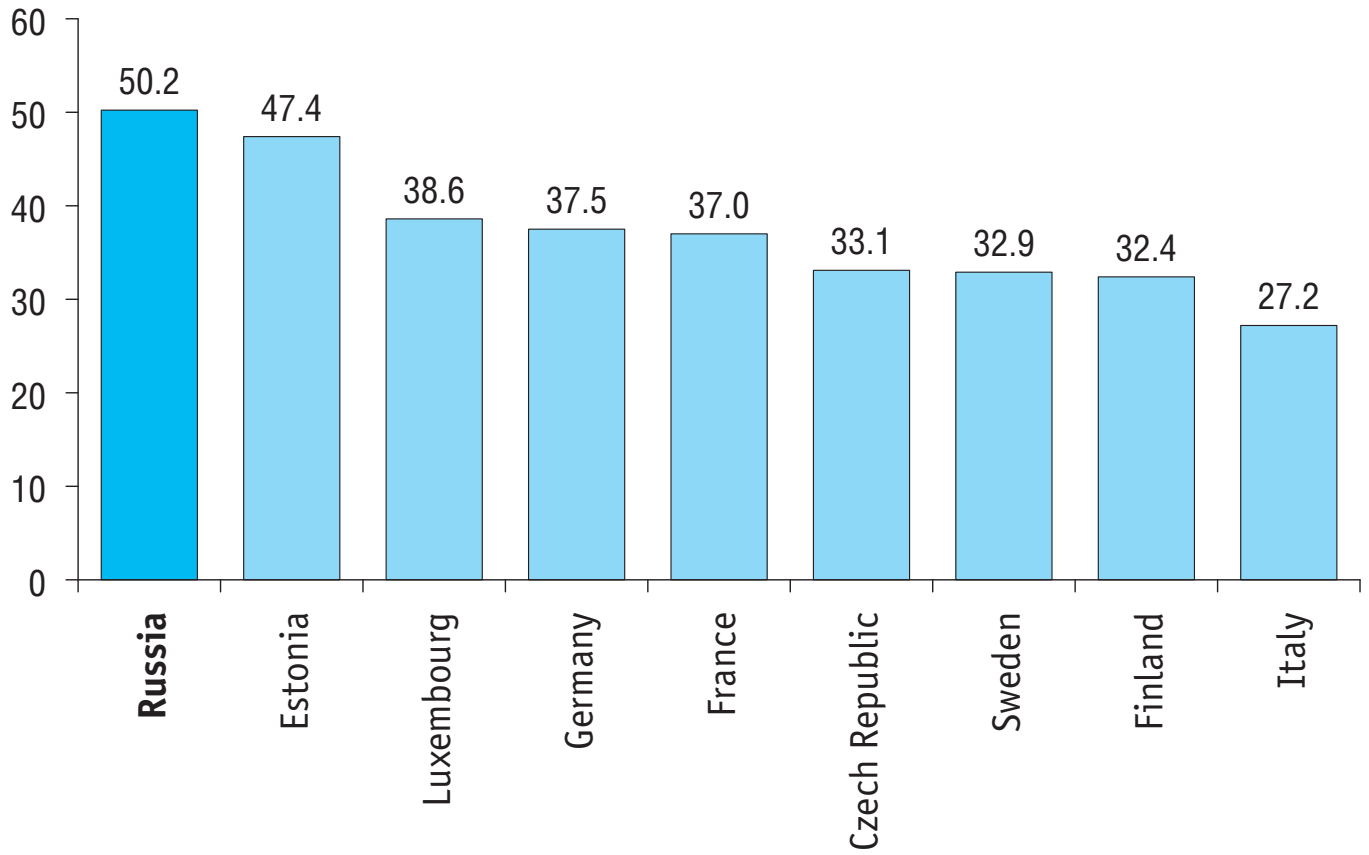
6.4. ICT specialists by age: 2021

(as a percentage of all ICT specialists)



6.5. ICT specialists under 35 by country: 2021*

(as a percentage of all ICT specialists)



* Or nearest years for which data are available.

6.6. Education and training in IT and related ICT task-intensive fields: secondary vocational education

(thousand persons)

Key general groups of professions and qualifications	Programmes for skilled workers and employees		Programmes for mid-level specialists	
	Enrolment, at the beginning of the 2021/2022 academic year	Graduates, 2021	Enrolment, at the beginning of the 2021/2022 academic year	Graduates, 2021
Total	**40.2**	**11.5**	**347.0**	**56.7**
Computer science and engineering	21.1	6.4	232.3	36.1
Information security	–	–	21.6	3.1
Electronics and communications engineering	5.4	1.8	31.6	7.3
Photonics, instrumentation engineering, optical and biomedical engineering	–	–	3.2	0.6

(continued)

Key general groups of professions and qualifications	Programmes for skilled workers and employees		Programmes for mid-level specialists	
	Enrolment, at the beginning of the 2021/2022 academic year	Graduates, 2021	Enrolment, at the beginning of the 2021/2022 academic year	Graduates, 2021
Mechanical engineering	13.7	3.3	32.9	5.0
Applied geology, mining and quarrying, oil and gas engineering, geodesy	–	–	4.2	0.7
Systems engineering management	–	–	18.3	3.4
Screen arts	–	–	2.9	0.5

6.7. Education and training in IT and related ICT task-intensive fields: bachelor's, specialist's, and master's programmes

(thousand persons)

Key general groups of professions and qualifications	Enrolment, at the beginning of the 2021/2022 academic year	Graduates, 2021
Total	**1037.3**	**208.2**
Engineering mathematics	46.5	7.9
Computer and information science	20.2	3.2
Physics and astronomy	22.3	5.4
Earth sciences	1.8	0.3
Biological sciences	1.2	0.1
Computer science and engineering	215.5	31.1
Information security	40.7	4.9
Electronics and communications engineering	64.6	12.2
Photonics, instrumentation engineering, optical and biomedical engineering	18.4	4.0
Electrical and thermal power engineering	84.1	17.8
Nuclear power engineering and technology	6.9	1.2
Mechanical engineering	108.0	21.1

(continued)

Key general groups of professions and qualifications	Enrolment, at the beginning of the 2021/2022 academic year	Graduates, 2021
Weapons and armaments systems	2.2	0.3
Aircraft and aerospace engineering	24.8	3.9
Flight navigation and aircraft and aerospace equipment operation	0.2	0.0
Shipbuilding and water-borne transportation engineering and technology	6.1	1.1
Systems engineering management	43.7	9.7
Nanotechnologies and nanomaterials	2.0	0.4
Basic medicine	1.0	0.1
Economics and management	317.9	81.9
Linguistics and literary studies	3.7	0.6
Screen arts	5.5	0.9

6.8. Education and training in IT and related ICT task-intensive fields: postgraduate and apprenticeship programmes

(persons)

Key general groups of professions and qualifications	Enrolment, at the end of 2021	Graduates, 2021
Total	**30364**	**4456**
Engineering mathematics	2438	386
Computer and information science	368	45
Physics and astronomy	4364	739
Computer science and engineering	7510	928
Information security	553	38
Electronics and communications engineering	1778	281
Photonics, instrumentation engineering, optical and biomedical engineering	954	159
Nuclear power engineering and technology	296	52
Mechanical engineering	2132	315
Engineering physics and technology	32	6
Weapons and armaments systems	64	7

(continued)

Key general groups of professions and qualifications	Enrolment, at the end of 2021	Graduates, 2021
Aircraft and aerospace engineering	956	138
Systems engineering management	992	159
Nanotechnologies and nanomaterials	35	2
Economics and management	7495	1149
Mass media, library and information science	376	46
Screen arts	21	6

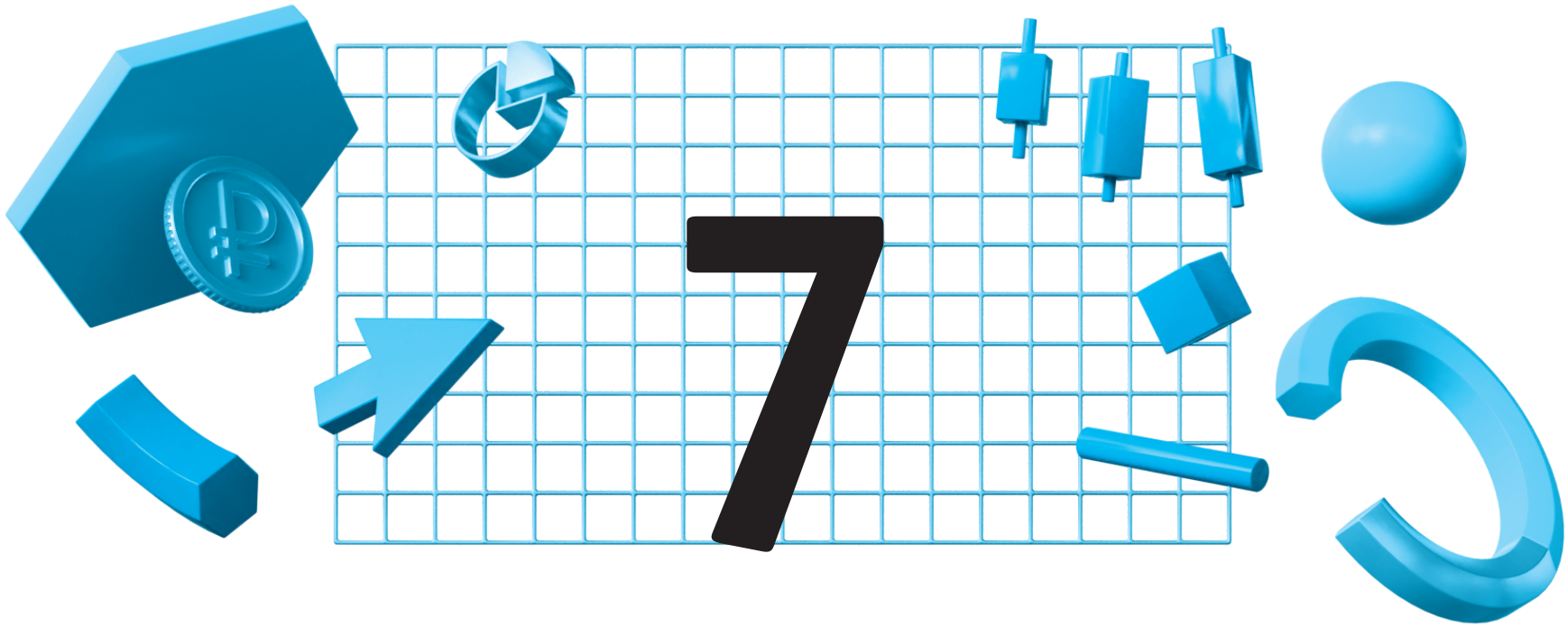
6.9. Secondary vocational education graduates – programmes for mid-level specialists and higher education graduates in 'Information and Communications Technologies' scientific areas by country: 2021*

	Secondary vocational education – programmes for mid-level specialists (ISCED level 5)		Higher education – bachelor's, specialist's, master's programmes (ISCED level 6 and 7)		Higher education – postgraduate programmes (ISCED level 8)	
	Thousand persons	As a percentage of the total	Thousand persons	As a percentage of the total	Thousand persons	As a percentage of the total
Russia	**40.2**	**7.0**	**42.7**	**5.3**	**1.0**	**7.1**
Canada	14.3	6.6	12.6	4.4	0.3	3.8
Czech Republic	–	–	3.6	5.3	0.0	2.6
Estonia	–	–	0.7	8.4	0.0	7.7
Finland	–	–	4.6	7.5	0.1	6.4
France	5.7	2.5	24.3	4.0	0.6	5.3
Germany	–	–	28.4	5.0	0.9	3.3

(continued)

	Secondary vocational education – programmes for mid-level specialists (ISCED level 5)		Higher education – bachelor's, specialist's, master's programmes (ISCED level 6 and 7)		Higher education – postgraduate programmes (ISCED level 8)	
	Thousand persons	As a percentage of the total	Thousand persons	As a percentage of the total	Thousand persons	As a percentage of the total
Italy	0.7	13.5	5.5	1.3	0.1	1.8
Republic of Korea	8.1	5.0	20.0	4.6	0.5	3.3
Sweden	1.3	11.2	2.6	3.7	0.1	3.8
United Kingdom	6.4	5.6	29.4	4.2	1.1	4.0
United States	36.2	3.6	156.6	5.2	2.4	3.3

* For countries other than Russia, the data refer to 2020.

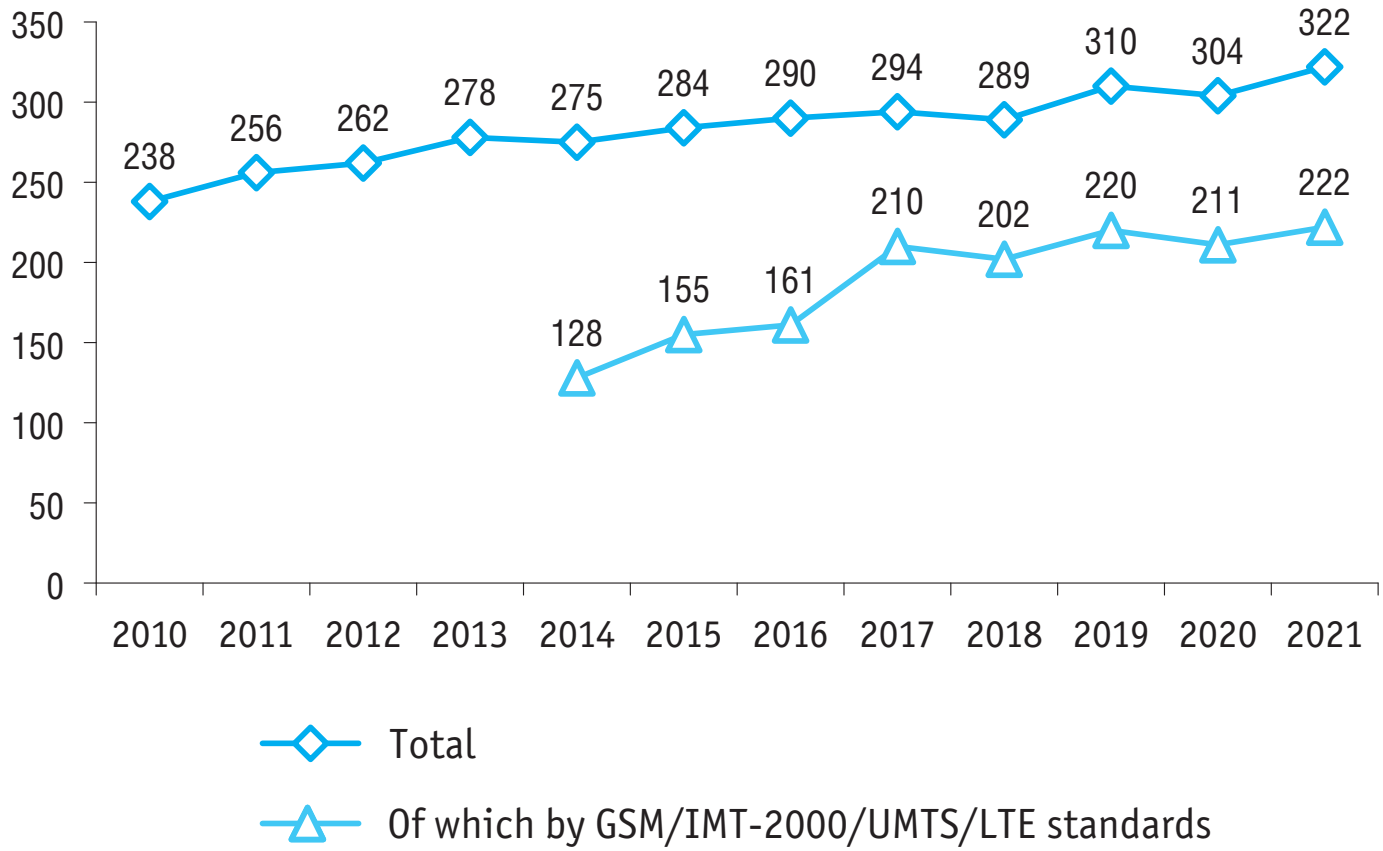


7

INFRASTRUCTURE

7.1. Mobile cellular telephone subscriptions

(million units; at the end of the year)



Sources: here and below in this section, for Russia, the Ministry of Digital Development, Communications and Mass Media of the Russian Federation (7.1–7.5, 7.7), Rosstat (7.6); for countries other than Russia, ITU.

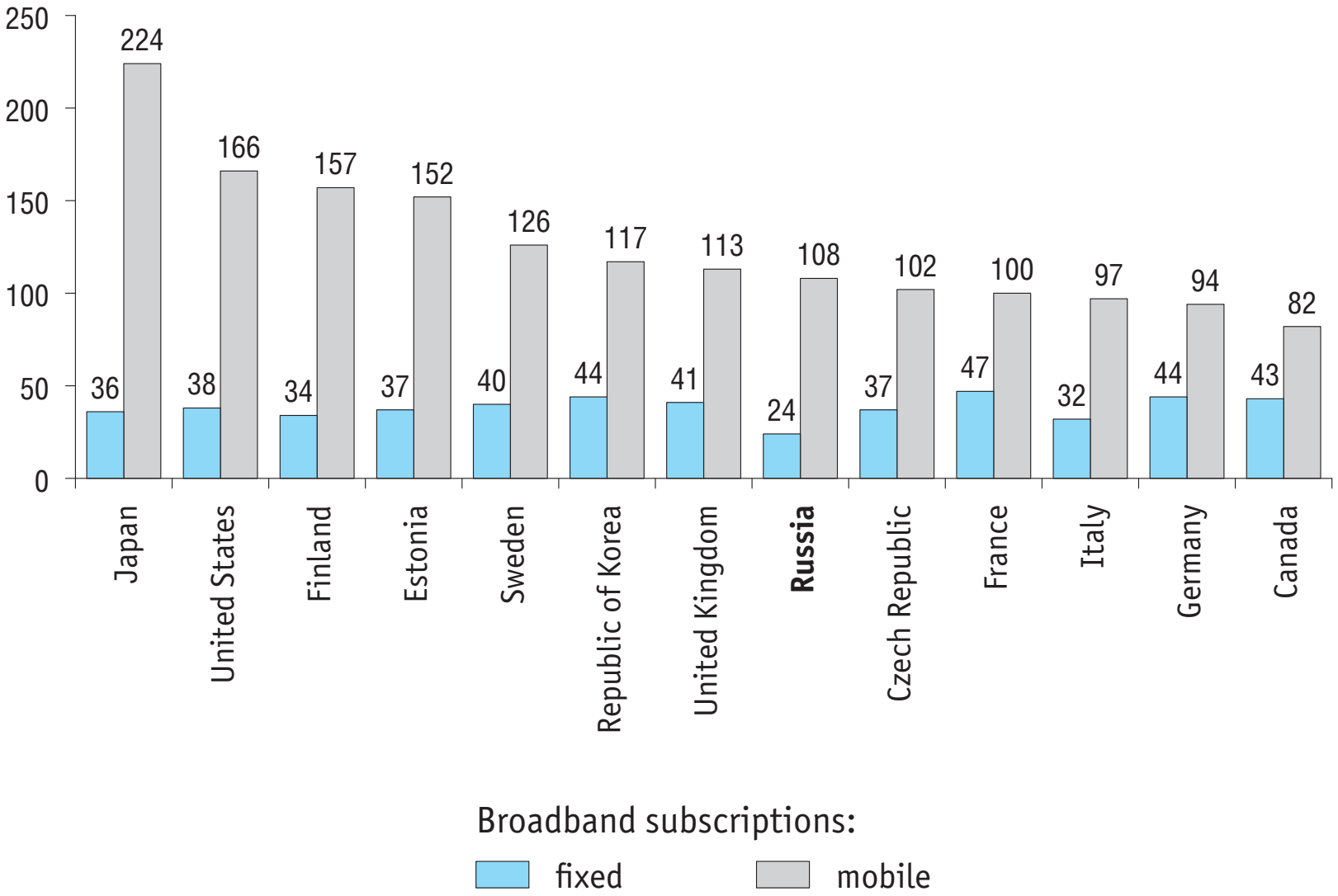
7.2. Internet subscriptions

(thousand units; at the end of the year)

	Total				Of which broadband			
	2018	2019	2020	2021	2018	2019	2020	2021
Internet subscriptions:								
fixed	31968	32739	33792	34504	31789	32524	33582	34411
mobile	131359	145633	149622	160745	126557	141463	145626	156487
satellite	66	88	65	99	44	68	45	64
terrestrial fixed wireless	233	269	271	272	230	266	267	270
terrestrial mobile wireless	697	669	678	627	643	600	623	581

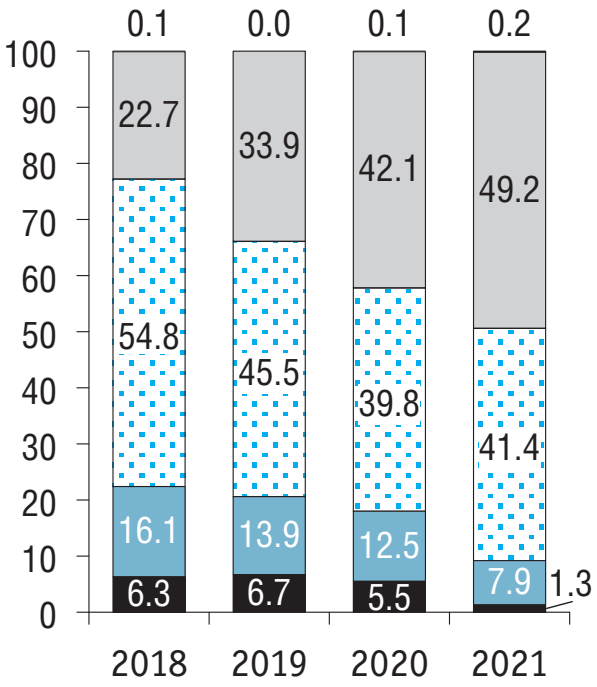
7.3. Broadband subscriptions by country: 2021

(units per 100 inhabitants; at the end of the year)



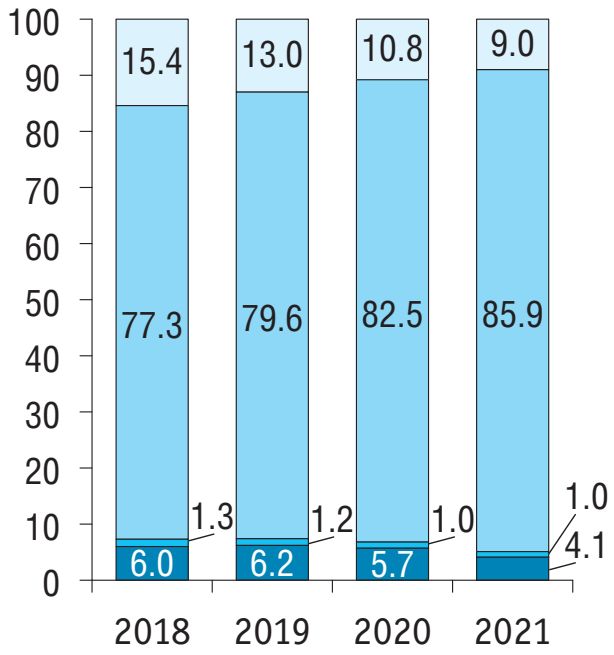
7.4. Fixed broadband subscriptions

(as a percentage of respondents aged 14 years and over who live in households of two or more people)



By access speed:

- over 1 Gbit/s
- 100 Mbit/s – less than 1 Gbit/s
- 10 Mbit/s – less than 100 Mbit/s
- 2 Mbit/s – less than 10 Mbit/s
- 256 kbit/s – less than 2 Mbit/s

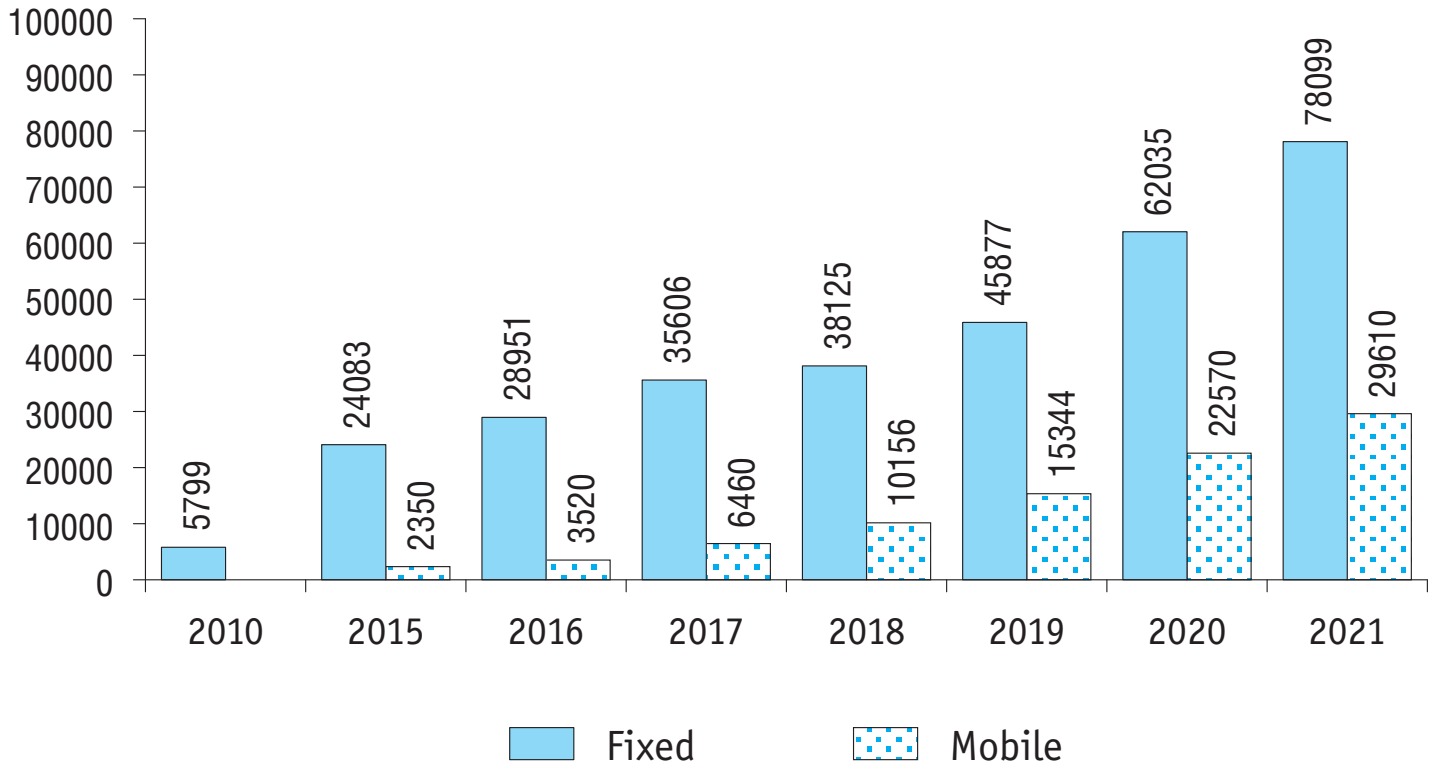


By technology:

- xDSL
- FTTH/FTTB (FTTx)
- cable modem
- other

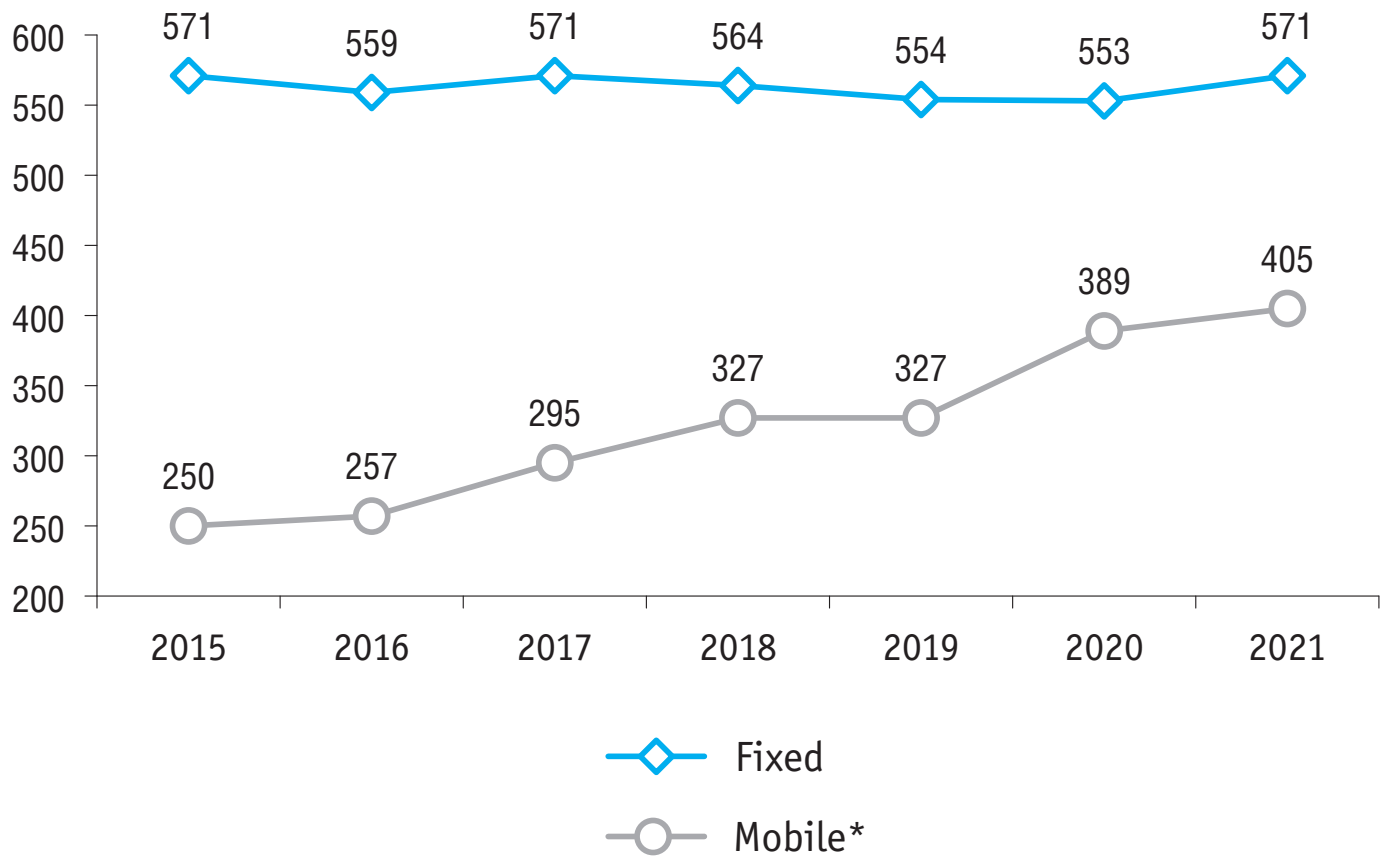
7.5. Internet traffic

(Petabytes)



7.6. Internet access subscription fee

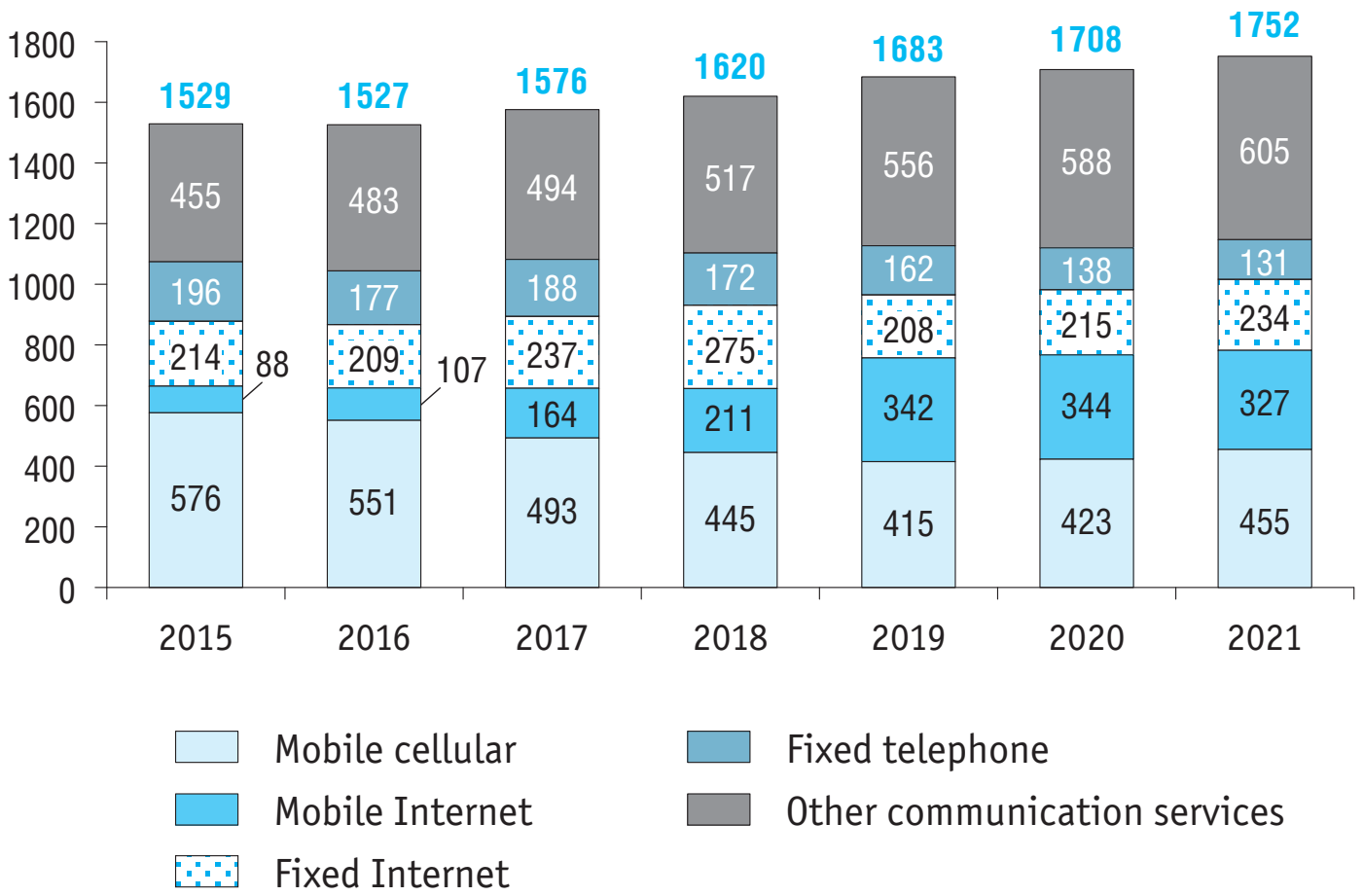
(roubles per month; December)

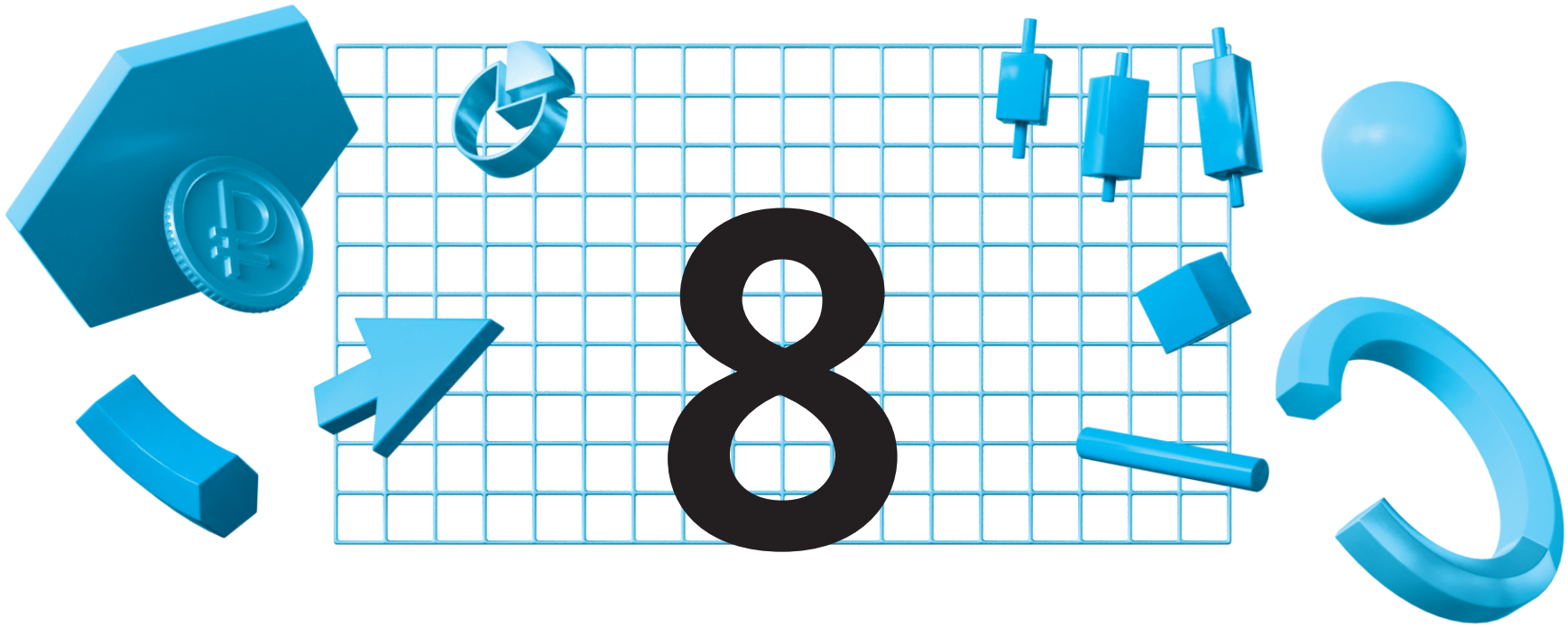


* The data refer to 2020 and 2021 for the service 'Subscription fee for a mobile cellular network services package', which includes mobile Internet, minutes of phone calls, SMS messages.

7.7. Revenue from telecommunication services

(billion roubles)





8

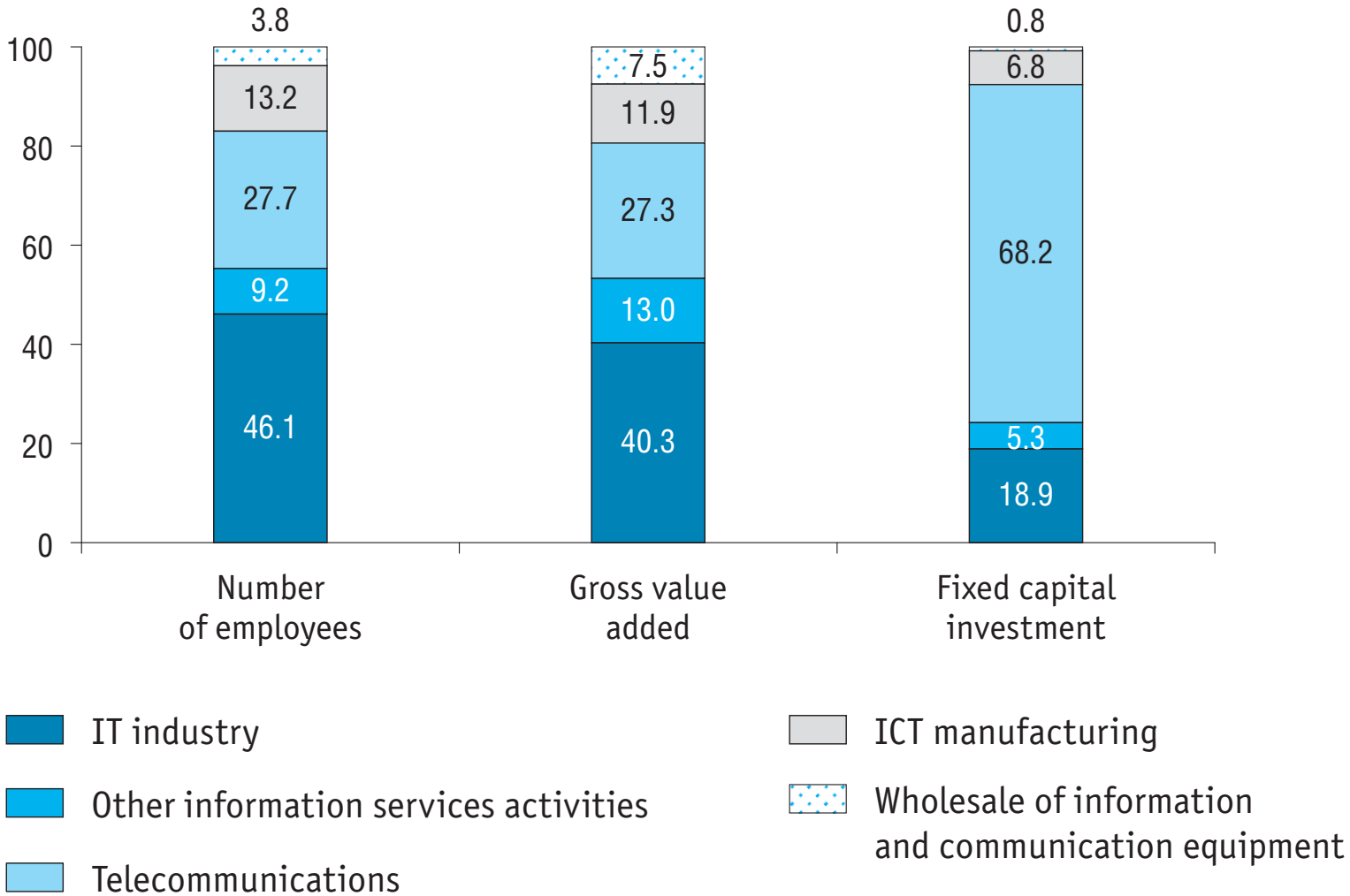
ICT SECTOR

8.1. Main ICT sector indicators

	2017	2018	2019	2020	2021
Number of employees:					
thousand persons	1106	1159	1203	1240	1286
as a percentage of total employment	2.5	2.6	2.7	2.9	3.0
Gross value added:					
billion roubles	2413	2596	2860	3180	3754
as a percentage of GDP	2.9	2.8	2.9	3.3	3.2
Fixed capital investment:					
billion roubles	474	604	741	825	948
as a percentage of total investment	3.0	3.4	3.8	4.1	4.1

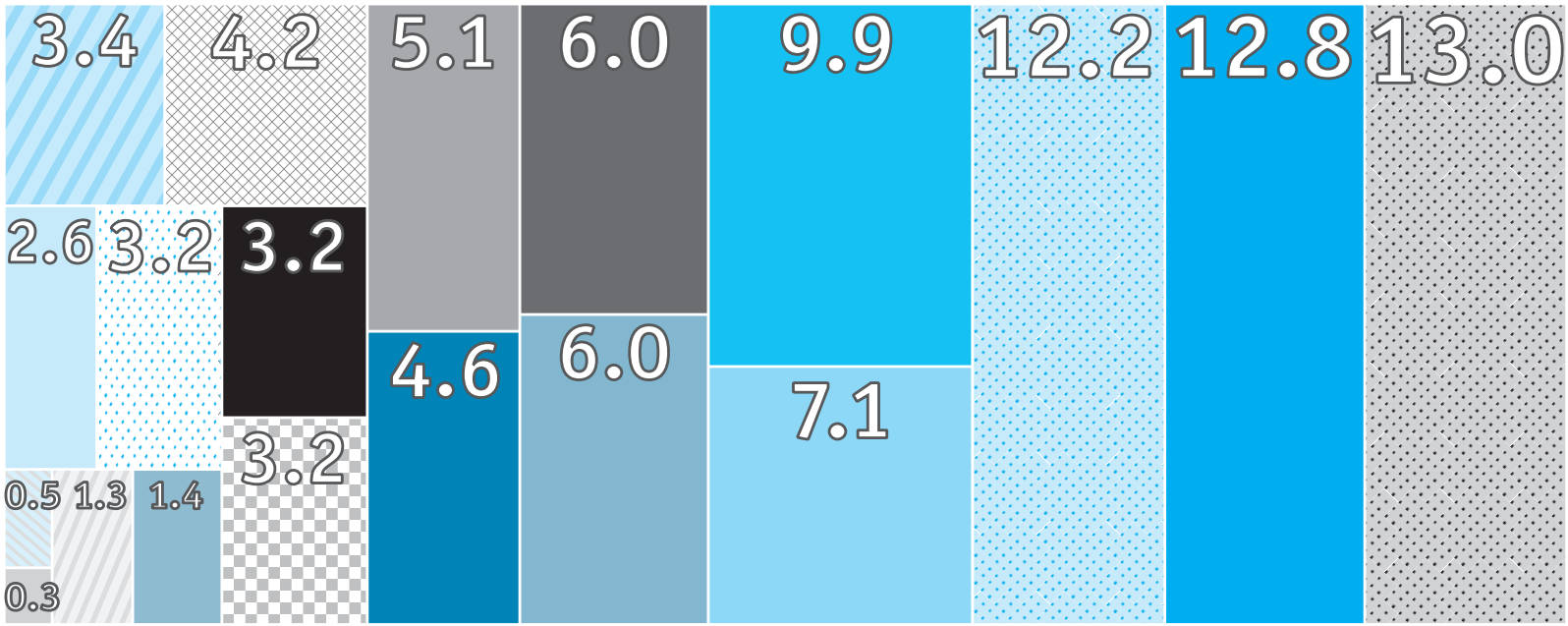
Sources: here and below in this section, for Russia, HSE ISSEK estimates by based on Rosstat data (8.1–8.7); Scopus databases as of September 21, 2022 and the World Intellectual Property Organization (WIPO) as of November 29, 2021 (8.8); HSE ISSEK estimates by based on Rosstat, Russian Federal Customs Service, Bank of Russia (8.9, 8.10); for countries other than Russia, Eurostat and UNCTAD.

8.2. Percentage distribution of ICT sector by type of economic sector: 2021



8.3. ICT sector's input into the national economy development: 2021

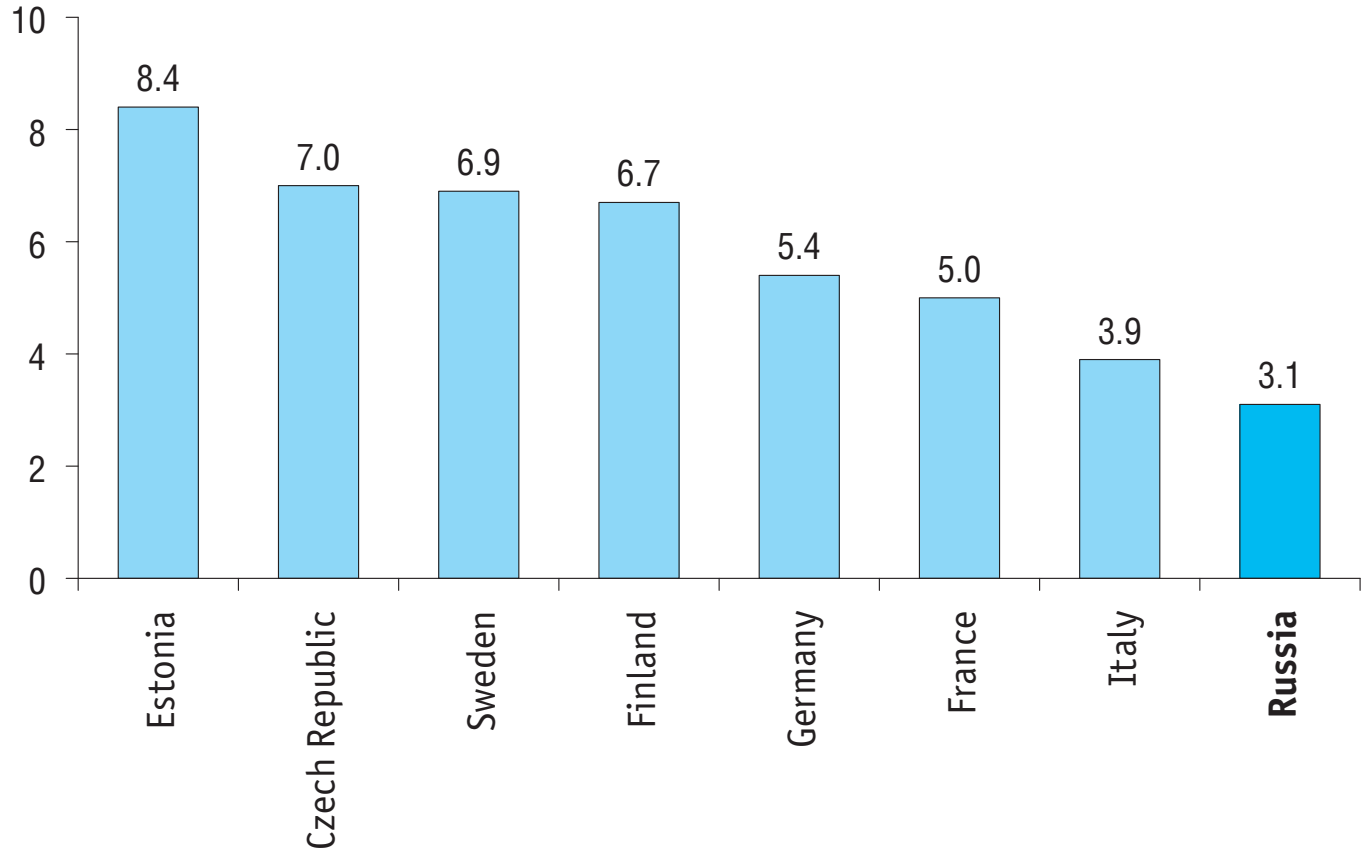
(as a percentage of GDP)



- **ICT sector (3,754 billion roubles)**
- Content and media sector
- Manufacture of motor vehicles, trailers, and semi-trailers
- Production of coke and refined petroleum products
- Human health and social work activities
- Scientific research and development
- Manufacture of chemicals and chemical products
- Education
- Manufacture of basic metals
- Agriculture, forestry and fishing
- Financial and insurance activities
- Construction
- Transportation and storage
- Electricity, gas, steam and air-conditioning supply
- Public administration and defence; compulsory social security
- Real estate activities
- Mining and quarrying
- Wholesale and retail trade
- Other sectors

8.4. ICT sector's share in the gross value added by country: 2021*

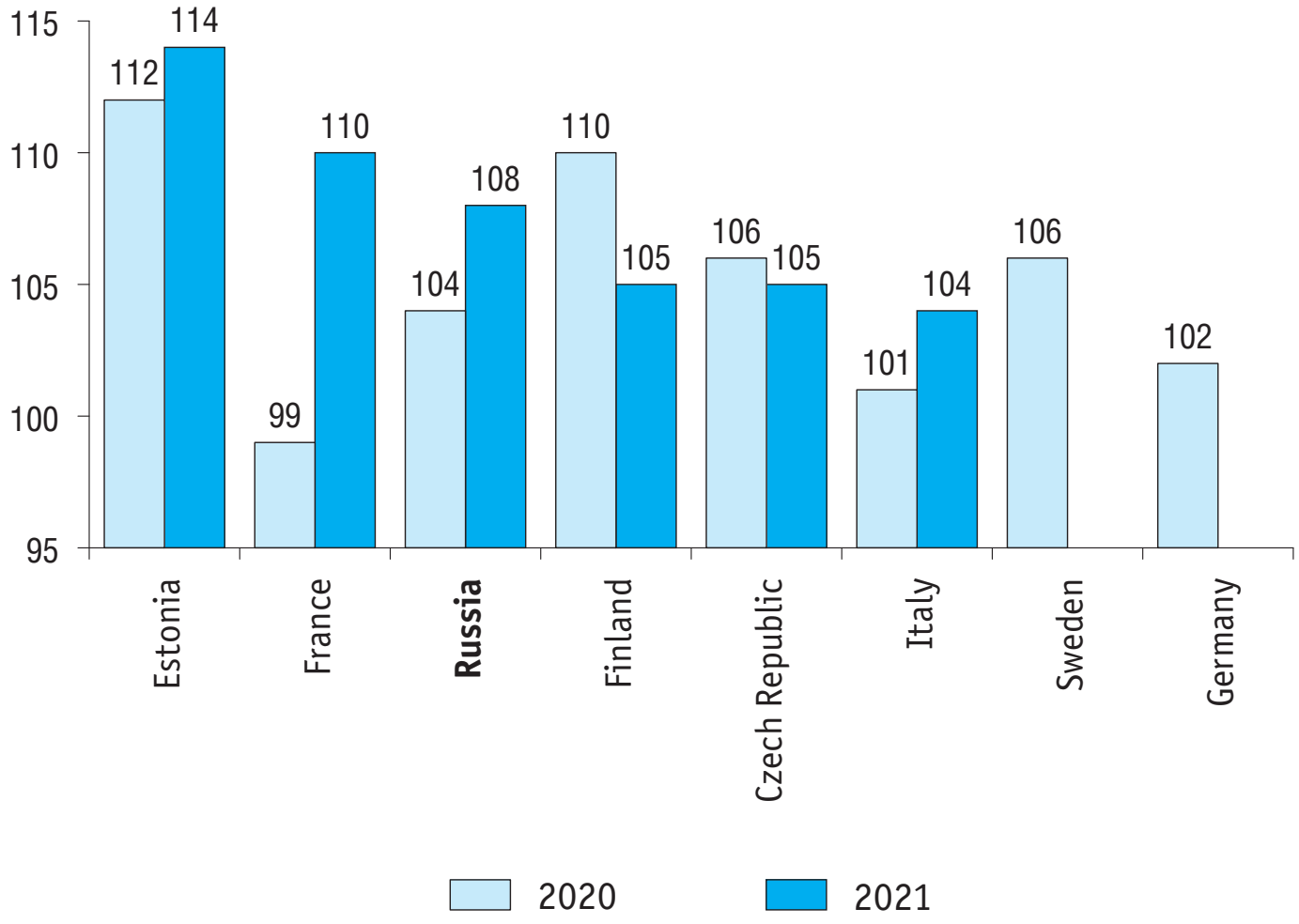
(percentage)



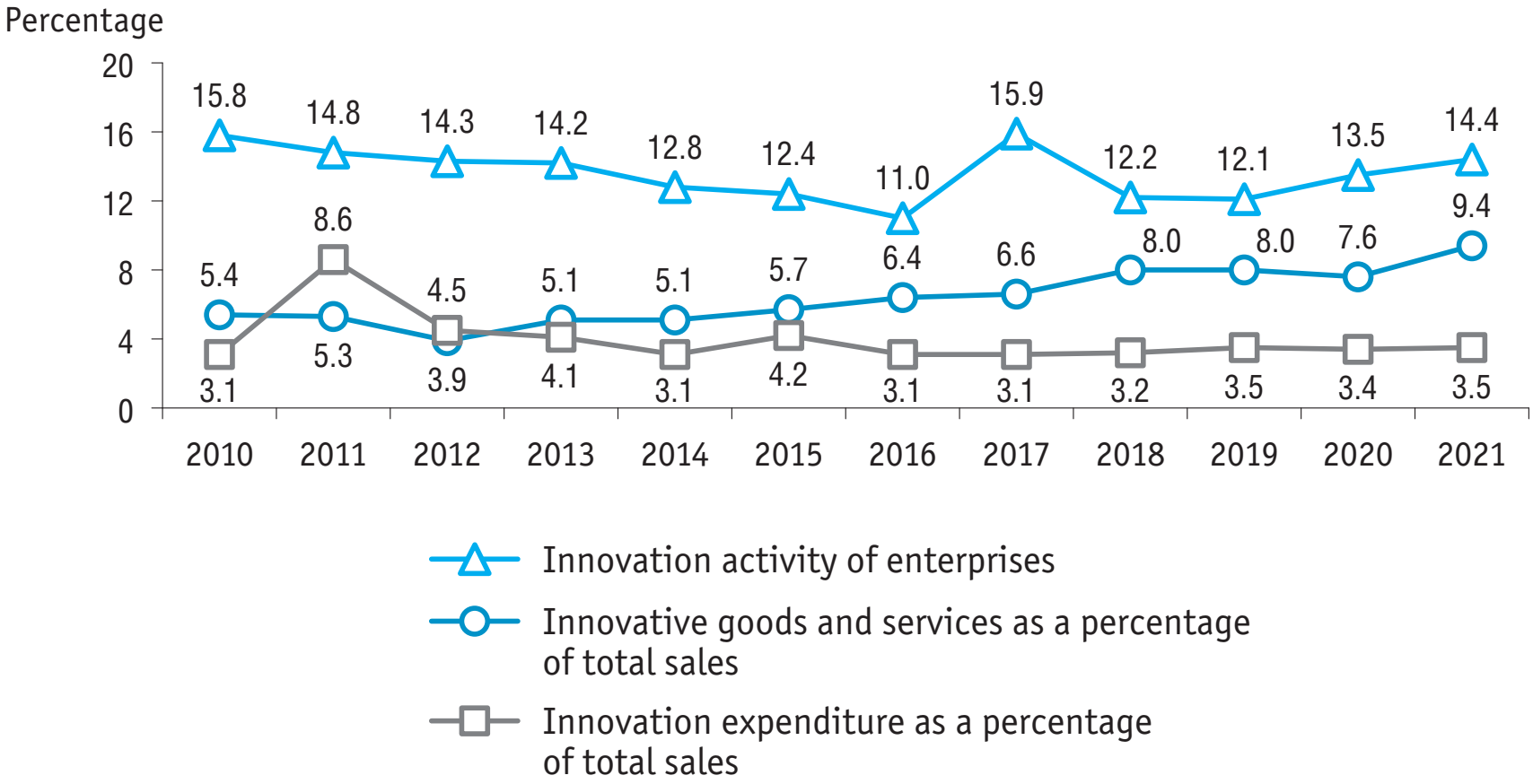
* Or nearest years for which data are available. Here and in 8.5, ICT sector data are given by types of eco-nomic activity with the Russian Classification of Economic Activity (OKVED2) codes: 26, 61, 62, and 63.

8.5. Trends in the ICT sector's share in the gross value added by country

(as a percentage of the previous year; at constant prices)

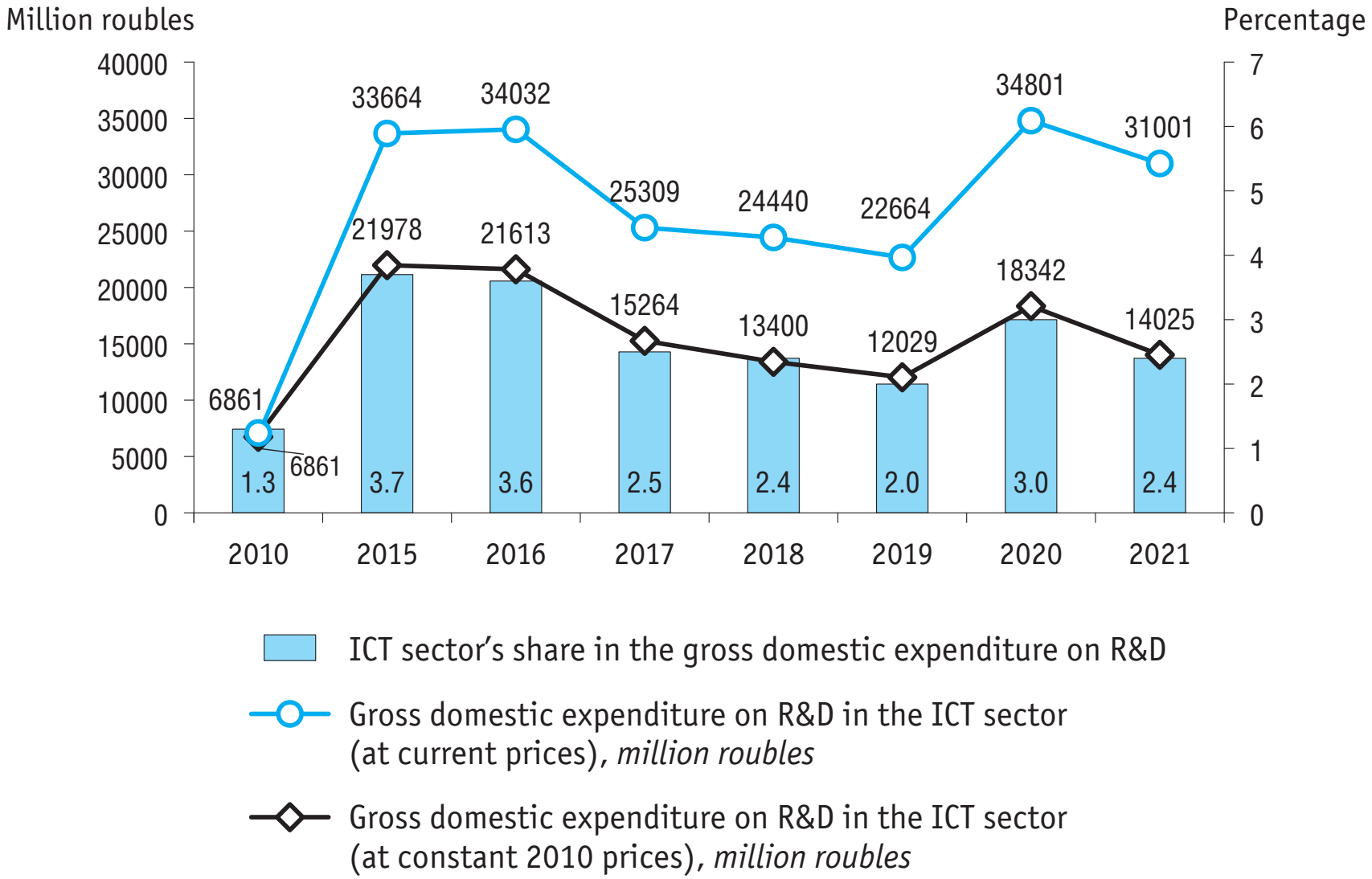


8.6. Main ICT sector indicators of innovation activity*



* ICT sector data are given by types of economic activity with the Russian Classification of Economic Activity codes: until 2017, OKVED Rev. 1.1: 30, 32, 64, and 72; for 2017–2020, OKVED2: 26.1–26.4, 26.8, 58.2, 61, 62, 63.11, and 63.12.

8.7. R&D in the ICT sector



8.8. R&D output in ICT-related fields of S&T

	2011	2016	2017	2018	2019	2020	2021
ICT-related publications by Russian authors indexed in Scopus:							
number	3239	8743	11455	13270	17128	18417	17778
as a percentage of the world total of ICT-related publications	0.91	2.11	2.60	2.69	2.97	3.38	2.98
ICT-related patent applications* filed by Russian residents:							
number	1722	1977	2270	2063	2710	2475	...
as a percentage of the world total of ICT-related patent applications	0.38	0.33	0.34	0.30	0.35	0.30	...

* Data for the following technological areas: audio-visual technology, telecommunications, digital communication, basic communication processes, computer technology, IT methods for manage-ment, semiconductors.

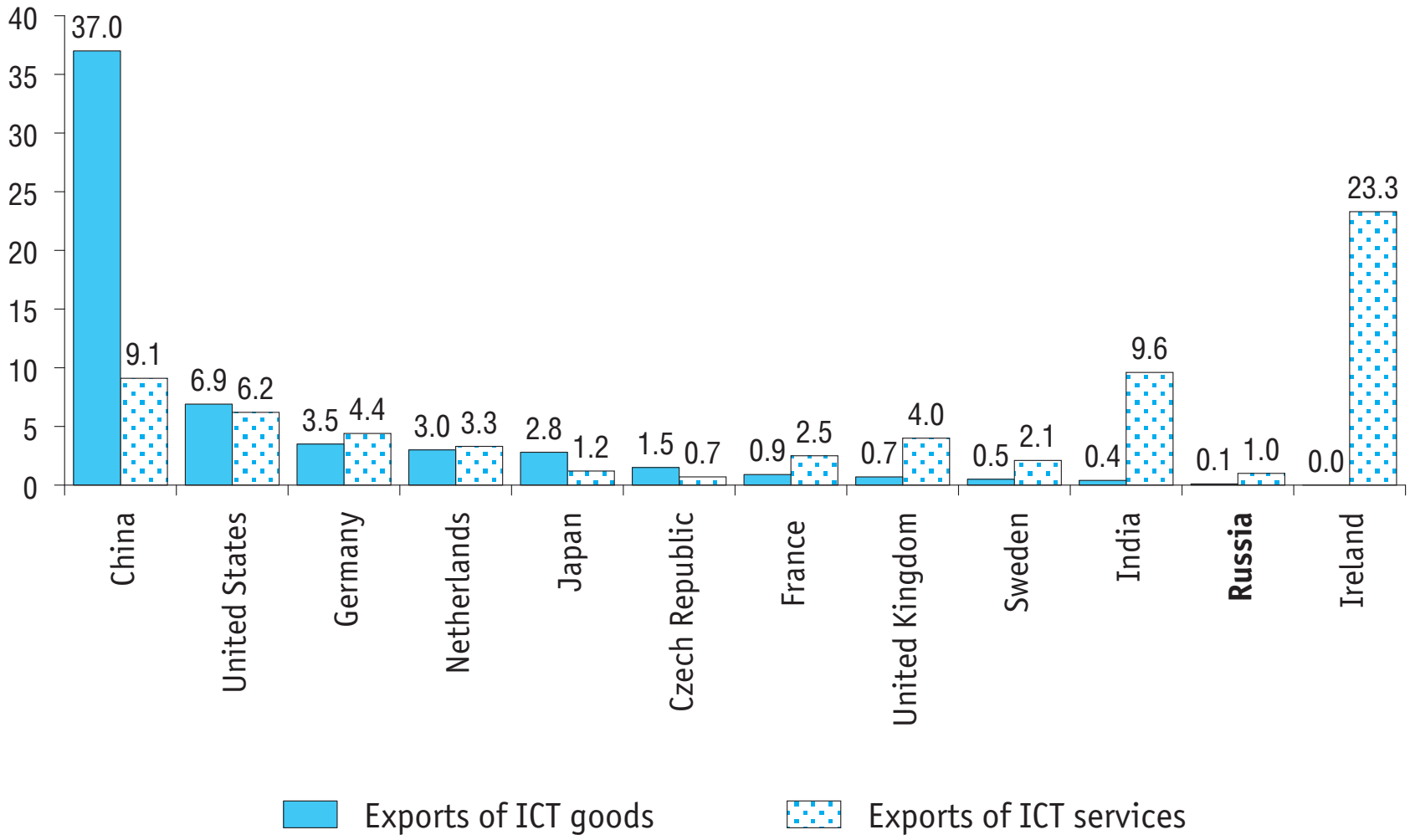
8.9. Exports and imports of ICT goods and services

(million USD)

	Exports		Imports	
	2020	2021	2020	2021
ICT goods – total	**1825**	**2686**	**24089**	**29381**
Computers and related equipment	281	565	8762	10732
Communication equipment	417	541	9401	11499
Consumer electronic equipment	452	596	2571	3037
Other ICT and related goods	675	984	3356	4113
ICT services – total	**5936**	**7232**	**5982**	**6653**
Computer services	5093	6 354	4503	5 162
Telecommunications services	723	735	968	984
Information services	120	143	511	507

8.10. Exports of ICT goods and services by country: 2021

(as a percentage of global exports of ICT goods and services)



Technical Notes

Internet (broadband) subscriptions are individuals and legal entities having entered into a services provision contract/contracts on the use of data transmission network according to tariffs under a **mobile/fixed (including broadband)** Internet access plan at the end of the reporting period.

Gross domestic expenditure on digital economy development means total enterprises' domestic expenditure on performance of works and provision of services concerning development, dissemination, and use of digital technologies and related goods and services, and total household expenditure on use of digital technologies and related goods and services. Enterprises' domestic expenditure on development, dissemination, and use of digital technologies and related goods and services, including domestic expenditure on R&D in the field of digital technologies, is **domestic expenditure on the development of digital economy from all sources of funds. Household expenditure on the use of digital technologies and related goods and services** are the actual expenditure of household members on the purchase, operation, and repair of equipment related to digital technologies or payment for telecommunications services. The methodology for calculating gross domestic expenditure on digital economy development was approved by the Digital Economy Subcommittee under the Government Commission on the Digital Development, Use of Information Technologies for Improving Quality of Life and Business Environment (session protocol no. 557pr of September 27, 2019).

Website is an Internet site which has a specific address and an owner, and comprises web pages. For statistical purposes, an enterprise is considered to have a website if it has at least one web page displaying regularly updated information (at least once every six months).

Geographic information system is an information system operating spacial data.

Public and municipal services in digital form mean public and municipal services rendered through data exchange and technological interaction, including via unified and (or) regional public and municipal services portals. Public and municipal services are considered to be rendered in digital form if the applicant uses the ESIA, the Unified Identification and Authentication System, when receiving the service used on the Unified Public and Municipal Services Portal and (or) regional portals of public and municipal services.

Employed in ICT task-intensive occupations are the employed who are highly likely to be professionally engaged in performance of ICT-assisted tasks (from simple surfing of the Internet, use of spreadsheets to programming). This category includes ICT specialists, managers and professionals in finance, economics, management, sales, marketing, development, social services; physicist and chemists, architects, design engineers, surveyors, and designers; and faculty staff of higher education institutions. The list of occupations is provided by the OECD experts: https://doi.org/10.1787/9789264311992-en.https://doi.org/10.1787/9789264311992-en. **ICT specialists** are employees who are able to develop, operate and maintain ICT, for whom ICT-related activities are the main part of their professional activity. In accordance with the Russian Classification of Occupations (RCO), they include:

- managers – Information and Communications Technology Services Managers (RCO code: 133);
- professionals – Software and Applications Developers and Analysts (code 251); Database and Network Professionals (252); other ICT professionals (Electronics Engineers (2152); Telecommunications engineers (2153); Graphics and Multimedia Designers (2166); Information Technology Trainers (2356), and ICT Sales Professionals (2434);
- technicians – ICT Operations and User Support Technicians (code: 351); Telecommunications and Broadcasting technicians (352), and Electronics Engineering Technicians (3114);
- mechanics and servicers – Electronics and Telecommunications Installers and Repairers (742).

Innovation expenditure is the actual expenditure in monetary form, connected with the implementation of different or all types of innovative activities (research and development, acquisition of machinery and equipment, engineering, etc.) performed within an organisation. Innovation expenditure includes current expenditure and capital expenditure. The stage of the innovation process does not matter, whether at the final stage, when the equipment is already commissioned and mastered in operation, i.e. production is organised and goods (works or services) are produced, or at the initial or intermediate stage, for example, when new equipment is still being installed or is only ready for operation, but has not been put into work, tested and used in the production of goods (works or services).

E-Government Development Index (EGDI) measures the readiness and capacity of national institutions to use ICTs to deliver public services. It is calculated by the United Nations Department of Economic and Social Development (UN DESA) for 193 UN Member States by three subindex indicators: Online Service Index, Telecommunication Infrastructure Index and Human Capital Index. The 2022 data were published in the 'United Nations E-Government Survey 2022. The Future of Digital Government': https://desapublications.un.org/sites/default/files/publications/2022-09/Web%20version%20E-Government%202022.pdf.

Innovative activity includes all developmental (R&D), financial or commercial activity related to creation of technologically new or significantly improved goods or services that have been introduced on the market and differ significantly from the previously produced goods and services; or technologically new or significantly improved business processes that differ significantly from the previously used business processes.

Innovative goods and services are new or significantly improved goods or services that have undergone various degrees of technological changes within the last three years (including the reporting period). According to the degree of novelty, there are two types of innovative goods and services – those newly introduced (or those that have undergone substantial technological changes) and those significantly improved.

Internet is a worldwide (global) network of independent computer networks connected with each other to exchange data via standard open protocols.

Internet of Things are devices and systems connected within a single network that collect and exchange data and have remote Internet control with the help of software on any types of computers, smartphones, or via interfaces.

Internet traffic is information (transmitted and/or received) when providing an information access service via the Internet.

Information and communication technologies (ICT) are microelectronics technologies used to assemble, store, process, search, transmit, and represent data, texts, images, and sounds.

Artificial Intelligence (AI) is a hardware and software system that mimics human intelligence processes (including self-education and solution search without pre-programmed algorithms) and obtains results from performing specific tasks at least comparable to results of human intelligence.

Top access speed of data transmission via Internet is bandwidth; the maximum rate of data transfer across a given path is measured in bits per second (bit/s).

Cloud computing services is distributed data processing technologies, where computer resources and capacities are provided to users as Internet services.

Patent is a title of protection granted for an invention that certifies inventor's priority, inventorship, and the right of exclusive use of this invention during patent's term of validity.
Invention is a technical and/or engineering solution in any sphere pertaining to a product (namely, a device, material, strain of microorganism, plant and animal cell culture) or to a method (a process of manipulating material objects with the help of material means), including

to the application of a product or a method for a specified purpose. An invention must be new, innovative, and applicable for industrial use.

Education and training in IT and related ICT task-intensive fields mean systematic and organised education and graduation of skilled personnel with special knowledge and expertise in IT and related ICT task-intensive fields. **The list of professions, qualifications, and fields of education in IT and ISC task-intensive fields** is formed on the basis of the lists of professions and qualifications of secondary vocational education approved by Order of the Ministry of Science and Higher Education of the Russian Federation no. 1199 of October 29, 2013, and the lists of qualifications and fields of education in higher education approved by Order of the Ministry of Science and Higher Education of the Russian Federation o. 1061 of September 12, 2013, taking into account:

- the list of ICT related fields of education and vocational training developed by the UNESCO Institute of Statistics ("The Guide to Measuring Information and Communication Technologies (ICT) in Education", published by the UNESCO Institute of Statistics in 2011). In terms of the International Standard Classification of Education and Vocational Training 2013 (ISCED-F 2013), published by the UNESCO Institute of Statistics in 2014, these include the following fields of education and vocational training:

06 Information and communication technologies (ICT)

061 Information and communication technologies (ICT)

0611 Computer use

0612 Database and network design and administration

0613 Software and applications development and analysis

07 Engineering, manufacturing and construction industries

071 Engineering and engineering trades

0714 Electronics and automation

02 Arts and humanities

021 Arts

0211 Audio-visual techniques and media production

Compliance of the Russian classification of professions, qualifications, and areas of education in ICT with ISCED-F 2013 is determined using the Russian Classifier of Occupations (RCO, RC 009-2016), approved by Order of the Federal Agency for Technical Regulation and Metrology no. 2007-st of December 8, 2016, where professions, qualifications, and areas of education are attributed to certain areas of education and vocational training in ISCED-F 2013;

- requirements of Federal State Educational Standards (FSES) for professional competencies and areas of professional activity related to information and communication technologies.

International comparisons of graduates in secondary vocational education – mid-career professional programmes and higher education programmes in 'Information and Communications Technologies' area are provided in accordance with the levels of education comprised by the International Standard Classification of Education (ISCED 2011) and fields

of education and training (ISCED-F 2013). Equivalence of scientific areas in the field of ICT in ISCED-F 2013 and the Russian classification of professions and qualifications in the field of ICT are as follows:

ISCED-F 2013 scientific area	Russian equivalent – key general groups / groups from the list of professions and qualifications of secondary vocational education and list of professions and qualifications of higher education
06 Information and communication technologies (ICT) 061 Information and communication technologies (ICT) 0611 Computer use 0612 Database and network design and administration 0613 Software and applications development and analysis	Computer and information sciences (code 02.00.00) Computer engineering (code 09.00.00) Information security (code 10.00.00) Business informatics (codes 38.03.05 and 38.04.05) Additive technologies (code 15.02.09) Information systems designed for city planning (code 21.02.06)

ICT-related patent activity are calculated on the data of the World Intellectual Property Organisation (WIPO). ICT includes the following areas: audio-visual technology, telecommunications, digital communication, basic communication processes, computer technology, IT

methods for management, semiconductors. List of ICT-related areas is compiled 119on the basis of OECD taxonomy (Inaba T., Squicciarini M. (2017) ICT: A New Taxonomy Based on the International Patent Classification / OECD Science, Technology and Industry Working Papers, 2017/01. Paris: OECD Publishing) and WIPO Classification of Technological Areas (Schmoch U. (2008) Concept of a Technology Classification for Country Comparisons: Final Report to the World Intellectual Property Organization. Karlsruhe: Fraunhofer Institute for Systems and Innovation Research).

Publication activity indicators is calculated based on Scopus database. Unless stated otherwise, 'publications' include the following types of documents: article, conference papers, review, book, or book chapter. Scopus ICT topics include: Human–Computer Interaction, Computational Mechanics, Information Systems, Artificial Intelligence, Computer Graphics and Computer-Aided Design, Computer Vision and Pattern Recognition, Hardware and Architecture, Computer Networks and Communications, Control and Systems Engineering, Health Informatics, Library and Information Sciences, Signal Processing, Applied Computer Research, Computers in Earth Sciences, Software, Computer Science, Theory and Methods, General Computer Science, and Computer Science (miscellaneous).

Industrial robots / automated lines are automated production systems equipped with manipulators with three or more degrees of mobility, capable of perceiving the environment, controlling their actions and adapting to changes; can be used both for industrial processing (welding, cutting, painting, etc.) and for performing auxiliary operations (assembly, sorting, transportation, packaging, etc.).

ICT sector involves economic activities related to production of goods and provision of services intended for processing of information (or enabling such processing) and communication via electronic devices, including transmission and display of information. Pursuant Order of the Russian Ministry of Digital Development Communications and Mass Media no. 515 of December 7, 2015, the following types of economic activities are assigned to the ICT sector (according to OKVED2): 26.1, 26.2, 26.3, 26.4, 26.8, 46.5, 58.2, 61, 62, 63.11, 63.12, 95.1.

Innovation activity of enterprises is determined as the ratio of the number of innovation-active enterprises to the total number of enterprises surveyed in the reporting year. The indicator's methodology is approved by the Order of Rosstat no. 818 of December 27, 2019. Changes in 2017 data are due to the recalculation of the indicator according to this methodology.

Digital platform is an information system within which a significant number of independent participants form a new business model that enables cutting down transaction costs and accelerating the communication between participants.

Digital economy means activities directed at creation, dissemination, and use of digital technologies and related goods and services.

Individuals' digital skills are the competencies of people in the field of using personal computers, the Internet, and other types of ICT.

Broadband access includes fixed broadband access: xDSL technologies, cable TV connection, leased line connection, fiber optic connection, satellite connection, extended fixed wired and wireless access (WiMax connection, etc.), high-speed cellular network, and other types of access with the promised top access speed of 256 kbit/s and higher;

mobile broadband access: mobile telephone network that advertise top access speed of 256 kbit/s and higher.

Exports (imports) of ICT goods are listed based on Foreign Economic Activity Commodity Nomenclature (FEACN) for in accordance with OECD ICT goods classification developed on the base of 2007 Harmonized Commodity Description and Coding System, HS and includes the following groups of goods:

- computers and related equipment (FEACN codes: 844331, 844332, 847050, 8471, 847290, 847330, 847350, 852351, 852842, 852852, 852862);
- communication equipment (8517, 852550, 852560, 853110);
- consumer electronic equipment (8518, 8519, 8521, 8522, 852580, 8527, 852849, 852859, 852869, 852871, 852872, 852873, 990450);
- other ICT and related goods (852321, 852329, 852341, 852352, 852359, 852380, 8529, 8534, 8540, 8541, 8542, 9013).

Exports (imports) of telecommunications services, computer services, and information services lists are compiled by the Bank of Russia. According to the Manual on Statistics of International Trade in Services 2010 (MSITS 2010), telecommunications services include the broadcast or transmission of sound, images, data, or other information by telephone, telex, telegram, radio and television cable transmission, radio and television satellite, electronic mail, facsimile, etc., including business network services, teleconferencing and support services; computer services include services related to hardware, software and data processing; information services are broken down into news agency services and database services, such as database conception, data storage, and the dissemination of data and databases (both

online and on magnetic, optical or printed media) and web search portals, also include direct non-bulk subscriptions to newspapers and periodicals, whether by mail, electronic transmission or otherwise, as well other information services.

RFID technologies are automatic identification and data capture technologies which enable reading or recording data stored in RFID tags by means of radio signals.

Electronic Resource

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