

# Insights to the digital economy and electronic communications in the Western Balkans

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The information and views in this presentation are solely those of the author and do not reflect the opinion of the Commission.



# Overview

- Marija Vuković
- EC study examining electronic communications in the Western Balkans economies and Turkey;
- Reviewing regulations and investigating implementation;
- Examining the digital economy and information society;
- DESI, 64 regulatory and digital indicators, and traffic lights in the Western Balkans economies;
- Developing insights from international indexes and benchmarking.

# Background

The aim of our three year research study is to monitor progress made by the Western Balkans economies and Turkey towards compliance with the European Union rules for electronic communications and information society services, and convergence with the internal market.

- Research consists of two components:–
  - A regulatory and implementation investigation;
  - An examination of the digital economy and information society;
- Both components examine the alignment of Western Balkans economies and Turkey with the European Union '*acquis*'. This is the body of common rights and obligations that are binding on all EU countries. It concerns regulations, legislation, measures, agreements, principles and political objectives.
- The *acquis* must be incorporated by applicant countries into their national legal order by the date of their accession to the EU.

# Regulations & implementation: Year 1

Our research is constantly evolving to provide richer insights to regulations and implementation.

- The first year of the regulatory study focused on the enactment of regulations and legislation. Analysis revealed that most economies are moving towards enacting the required legislation.
- The two most problematical areas in the 2018 study included:
  - **Number portability** - where few economies had legislated for transition within one working day;
  - **Emergency number availability** free of charge.

Regulations are being enacted, but the approach did not provide insights to how effectively regulations were being implemented.

# Regulations & implementation: Year 2

Year 2 of the study has included stakeholder consultation to seek views about the efficiency of implementation.

- All the mobile operators (26) in the seven economies were contacted. 18 responded (69 per cent);
- Operators were asked about their views on performance in eleven key areas using a five point scale (very good, good, average, poor, very poor, plus views on the main problems and opportunities);
- Regulators were asked exactly the same questions for the eleven key areas.

Dimension	Sub-dimension	Indicator
National Regulatory Authorities (A)	NRA independence (A1)	NRA staffing (A1a)
		NRA powers to impose fines (A1b)
		Electronic communications independence (A1c)
	NRA transparency and engagement (A2)	Public consultation (A2a) Stakeholders' inclusion in engagement (A2b)
Market entrance (B)	Market access (B1)	Electronic communications authorisation regime (B1a)
	Market analysis (B2)	Analysis of relevant market (B2a)
		SMP designation and regulatory remedies (B2b)
Competitive environment (C)	Wholesale services regulation (C1)	Interconnection (C1a)
		Wholesale broadband resale (C1b)
		Bitstream access (C1c)
		Virtual unbundled local access (VULA) (C1d)
		Local loop unbundling (C1e)
		Duct access (C1f)
	Operator switching (C2)	Number portability (C2a)
Price regulation and competition maintenance (C3)	Price control remedies (C3a) Margin squeeze and economic replicability testing (C3b)	
Broadband development (D)	Network construction (D1)	Rights of way (D1a)
	Technological neutrality (D2)	Spectrum licences technological neutrality (D2a)
	Digital dividends (D3)	Allocation of first digital dividend (790-862 Mhz) (D3a)
Allocation of second digital dividend (694-790 Mhz) (D3b)		
Universal Service and emergency numbers (E)	Universal service (E1)	USO providers by operator type (E1a)
		Minimum download speeds for USO Internet access (E1b)
		Universal service funding (E1c)
	Emergency number (E2)	European emergency number (112) availability (E2a)



# Digital economy & information society

The second component of the research is examining the digital economy and information society.

- The study has utilised the approach developed by the EU28 Digital Economy and Society Index (DESI);
- The approach is based on information from business and household surveys and data provided by regulators/govt.

**1 Connectivity:** The deployment of broadband infrastructure and its quality.

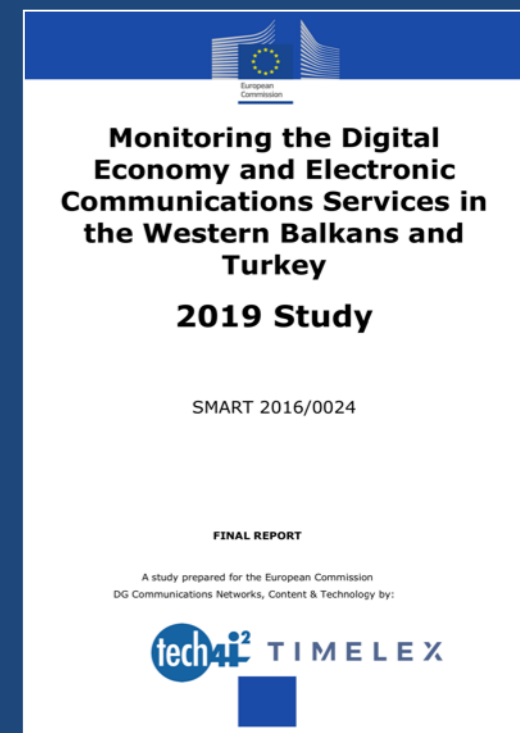
**2 Digital skills:** The skills needed to take advantage of the possibilities offered by a digital society.

**3 Citizen use of Internet:** The variety of activities performed by citizens already online.

**4 Business technology integration:** The digitisation of businesses and development of the online sales channel.

**5 Digital public services:** The digitisation of public services, focusing on eGovernment and eHealth.

**6 Telephony and market revenue:** Fixed and mobile coverage and subscriptions, market revenue and investment.



# Digital economy & information society

1 Connectivity	Fixed broadband (1A)	Fixed broadband coverage (1A.1)
		Fixed broadband subscriptions (1A.2)
		Incumbent ISP's market share (by revenue) (1A.3)
		*Fixed retail broadband by technology (1A.4)
	Mobile broadband (1B)	4G coverage (1B.1)
		Mobile broadband subscriptions (1B.2)
	Speed (1C)	Coverage of high-speed networks (>30 Mbps) (1C.1)
		Subscriptions to fixed high speed broadband (>30 Mbps) (1C.2)
		*Ultrafast coverage (1D.1)
	Affordability (1E)	*100Mbps take-up (1D.2)
Fixed broadband price (1E.1)		

2 Digital skills	Basic skills and usage (2A)	Internet users (2A.1)
		Individuals never having used the internet (2A.1B)
	Advanced skills and development (2B)	Individuals with at least basic skills (2B.1)
		Share of ICT specialists in the workforce (2B.2)
		Graduates in STEM (2B.3)

3 Citizen use of Internet	Content (3A)	News (3A.1)
		Music, video and games (3A.2)
		Video on-demand (3A.3)
	Communications (3B)	Video calls (3B.1)
		Social networks (3B.2)
	Transactions (3C)	Banking (3C.1)

4 Business technology integration	Business digitisation (4A)	Enterprises sharing internal information electronically (4A.1)
		Business connectivity (4A.1B)
		Enterprises using social media (4A.3)
		Enterprises sending and/or receiving invoices (4A.4)
		Enterprises using Cloud (4A.5)
	eCommerce (4B)	SMEs selling online (4B.1)
		Turnover from eCommerce (4B.2)
		SMEs selling online cross-border (4B.3)

5 Digital public services	eGovernment development index (5A)	People interacting with public authorities over the internet (5A.1)
		Data pre-filled in online public services forms (5A.2)
		Steps in a public services interaction completed online (5A.3)
		Open data (5A.4)
	eHealth (5B)	*People using eHealth services (5B.1)

6 Telephony and market revenue	Fixed Telephony (6A)	Fixed lines (6A.1)
		Fixed telephony market share (6A.2)
	Mobile Telephony (6B)	Mobile subscribers (6B.1)
		Mobile telephony market share (6B.2)
	Market Revenue & Investment (6C)	*Market revenue (6C.1)
		Investment (6C.2)

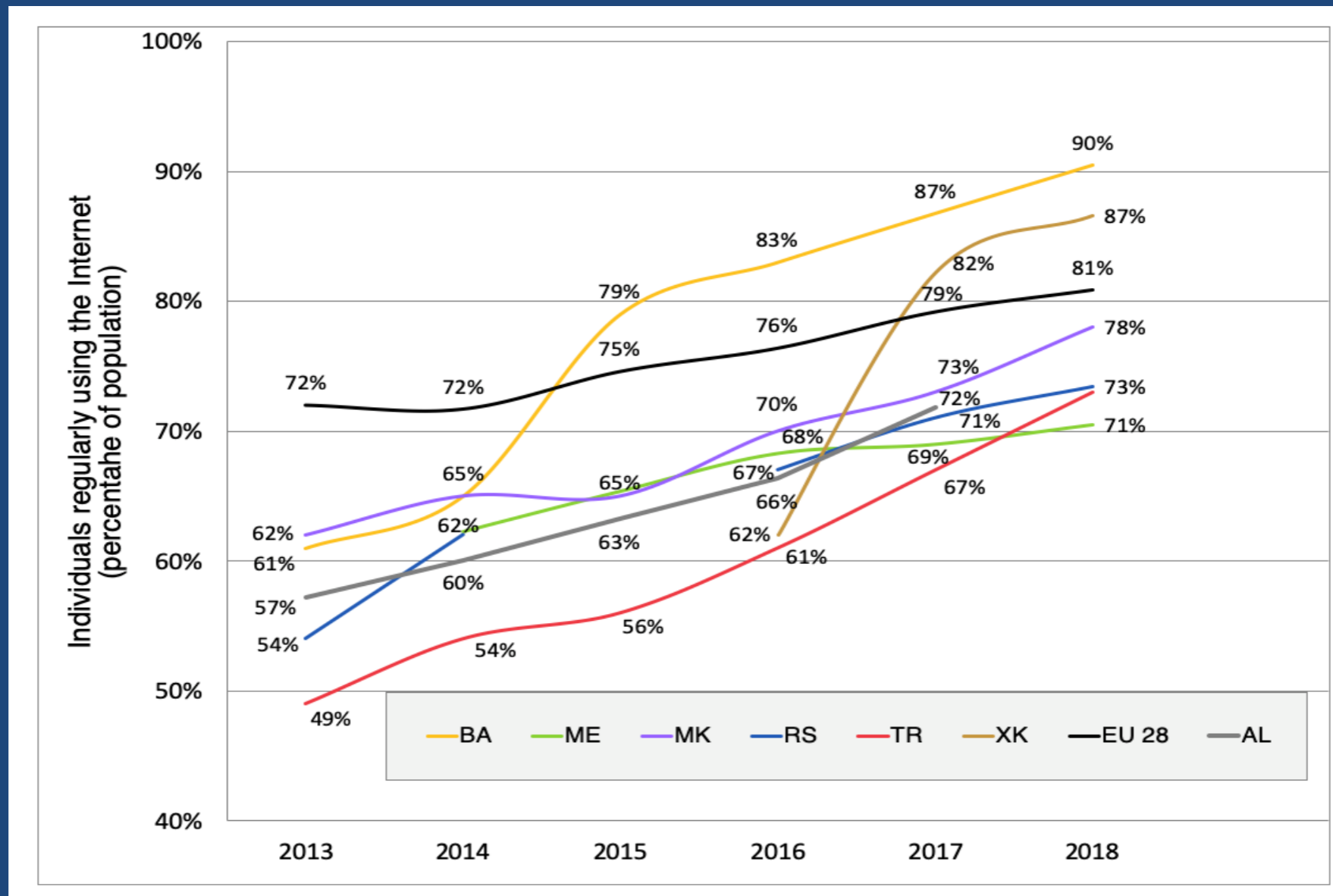
Indicator	EU avg	AL	BA	ME	MK	RS	TR	XK
<b>Indicators for which data available</b>								
		2	3	8	6	6	6	8
1A.1 Fixed broadband coverg (%) <sup>16</sup>	97%			80	41	69		81
1A.2 Fixed b'band subscriptions (%)	33%	9	17	19	18	21	13	13
1A.3 Incumbent ISP's mkt share (%)	40%		57	54	41	46	68	14
1B.1 4G coverage (%) <sup>17</sup>	96%			78		66	84	84
1B.2 Mobile Bband subsc. (/100 pop)	136	54	45	61	59	72	65	55
1C.1 Highspeed b'band coverage (%)	76%			28	50			63
1C.2 Highspeed subscriptions (%)	37%			7	13		5	20
1E.1 B'band price index (€) <sup>18</sup>	36.85			17.8		15.6	37	20.3

Performing above the average of EU28 Member States.	
Performing within 10 per cent of the EU28 Member States average.	
Performing between 20 and 10 per cent of the EU28 Member States average.	
Not performing within 20 per cent of the EU28 Member States average.	

# Digital economy & information society

Analysis provides insights to all 40 digital indicators that comprise the six dimensions between 2013 and 2018.

See, for example, the graphic of increasing internet use (indicator 2A1).

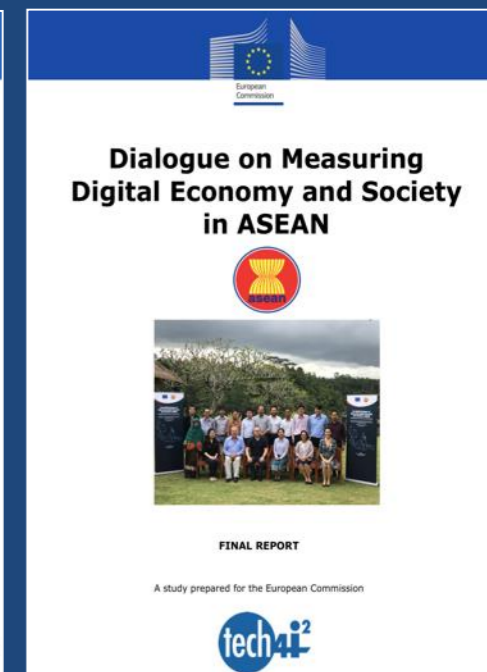
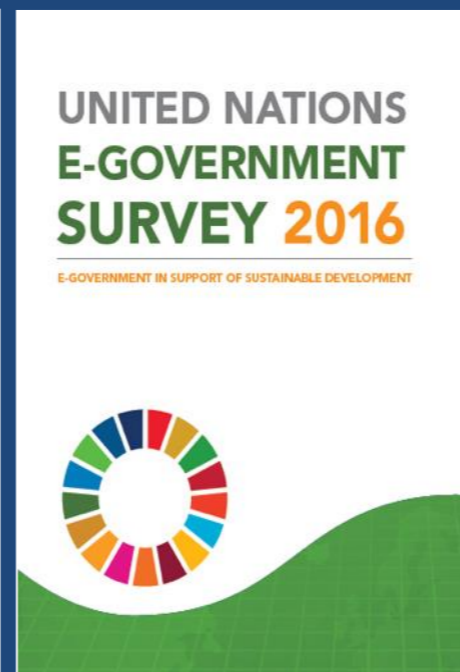




# DESI, international indexes and benchmarking

**STRESS** - The purpose of our research is to benchmark performance in relation to the acquis that must be undertaken by applicant countries prior to EU accession.

What do international indexes tell us? And what more could they reveal?



# DESI, international Indexes and benchmarking

Indexes and benchmarks reveal:-

- Winners and losers;
- Trends;
- Promote learning from others.

*Countries have economic and cultural reasons for performance and thus for high or low indicator scores.*

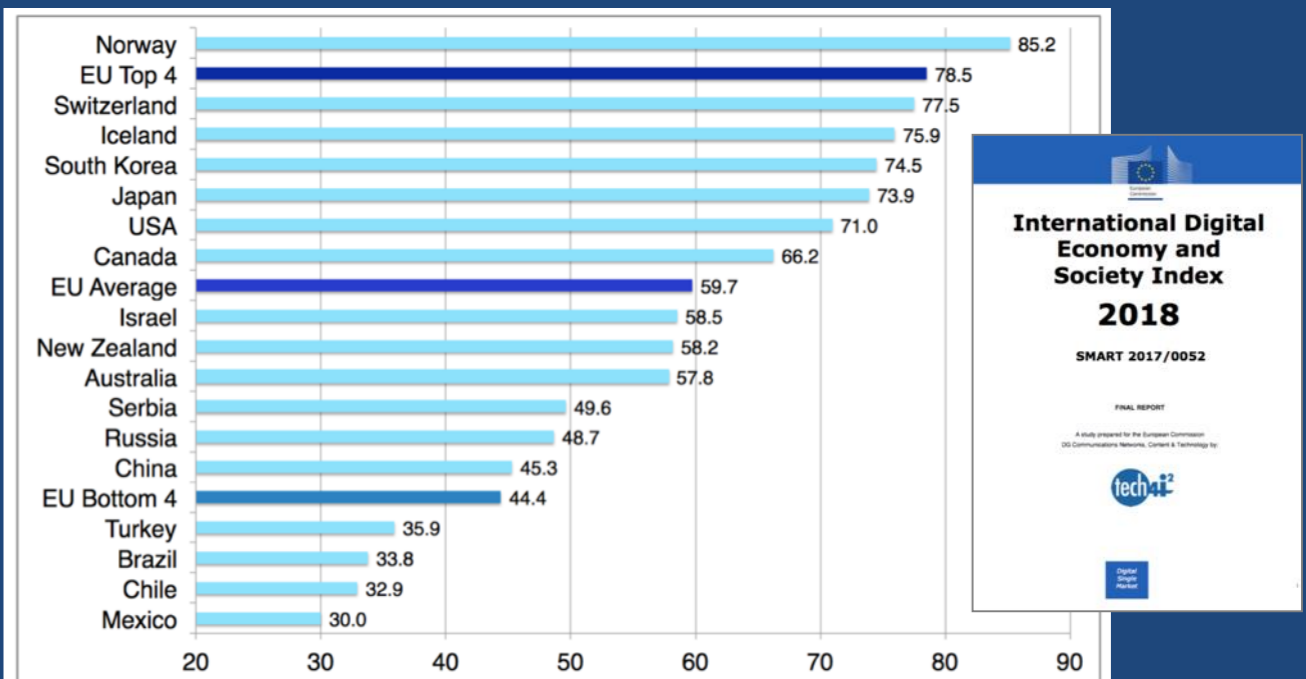


Figure 9 Normalised scores for the citizen Internet use dimension in 2016

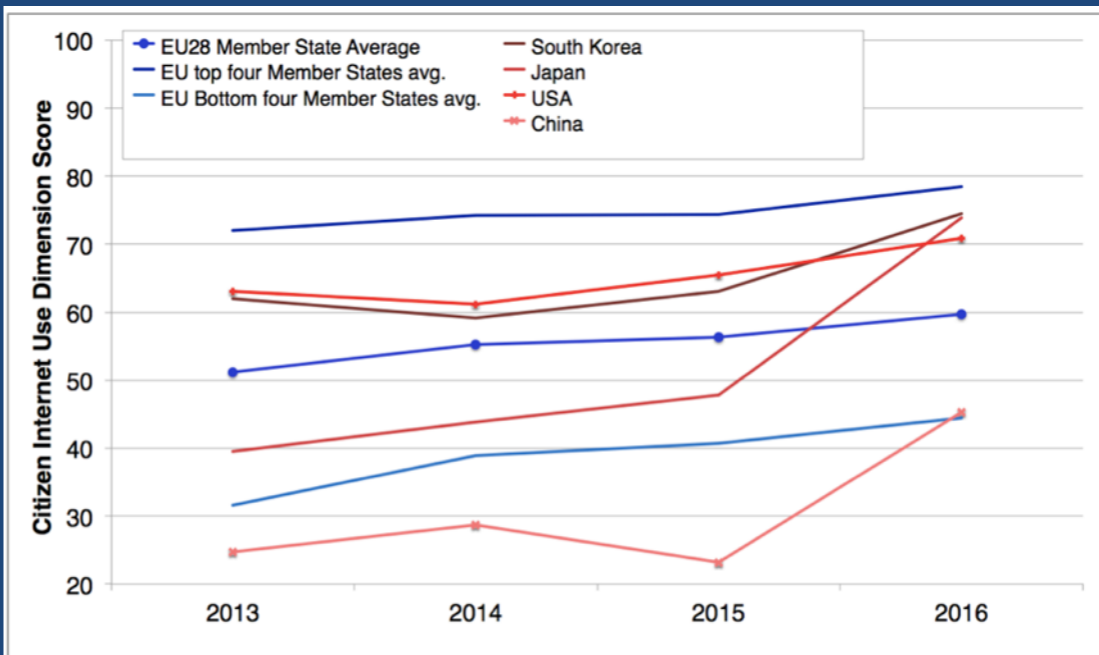


Figure 8 Average performance scores for the citizen Internet use dimension

<https://publications.europa.eu/en/publication-detail/-/publication/9016f6bc-db2f-11e8-afb3-01aa75ed71a1/language-en/format-PDF/source-search>

# DESI, international indexes and benchmarking

Indexes have very rarely been utilised to find the key factors, social and cultural, that explain differential performance between countries.

Understanding of these key factors would enable national policymakers to improve understanding of differential national performance and to better influence the factors having the greatest impact on particular indicators.

Analysis also enables countries to understand how they are performing relative to local social and cultural circumstance.

Tech4i2 are undertaking pilot experimental analysis to investigate these relationships. Key mathematical components include:

- Collection of independent variables;
- Cluster analysis to group independent variables;
- Correlation analysis to avoid multicollinearity;
- Multiple linear regression analysis;
- Residual analysis.

# Developing insights from indexes

Key factors explaining differences (variance) in the DESI Internet use dimension include:-

Independent variables reveal correlation not causality.

Pilot research utilised over 70 social, economic and geographic independent variables. When research is further developed we will include:

- More financial indicators;
- Dependent variables from other dimensions;
- Creativity and innovation variables.
- Others? . . . . .

Independent Variables (14)	Variance explained
Average temperature <sup>1</sup>	19.3%
Urban population	19.3%
Youth population <sup>7</sup>	17.1%
At risk of poverty rate <sup>5</sup>	7.8%
Mobile subscriptions <sup>6</sup>	7.7%
Persons employed <sup>2</sup>	5.2%
Population density <sup>4</sup>	4.4%
Emissions <sup>3</sup>	3.0%
Secondary enrolment	2.8%
Government military expenditure <sup>9</sup>	1.9%
Tourist establishments	1.7%
Alcohol consumption <sup>13</sup>	1.5%
Healthy life years <sup>14</sup>	0.7%
International trade <sup>12</sup>	0.2%
<b>Total</b>	<b>92.5 per cent</b>

11 of the variables were also significant in explaining variance for 'Connectivity'.

Ranking of independent variable for 'Connectivity' shown in superscript.



# Developing insights from indexes

Countries performing above expectations (in relation to the underlying independent variables – social and cultural conditions) are shaded green

DESI Rank	EU28 Member State	DESI Rank	EU28 Member State	Residual Values	Residual Rank	Ranking Difference
1	Denmark	18	Croatia	0.009	1	+17
2	Sweden	23	Portugal	0.008	2	+21
3	Netherlands	4	Finland	0.006	3	+1
4	Finland	5	Luxembourg	0.005	4	+1
5	Luxembourg	27	Bulgaria	0.005	5	+22
6	UK	2	Sweden	0.005	6	-4
7	Estonia	8	Malta	0.003	7	+1
8	Malta	7	Estonia	0.003	8	-1
9	Germany	20	Slovakia	0.002	9	+11
10	Belgium	12	France	0.002	10	+2
11	Spain	15	Ireland	0.001	11	+4
12	France	11	Spain	0.001	12	-1
13	Austria	25	Italy	0.001	13	+12
14	Lithuania	16	Latvia	0.001	14	+2
15	Ireland	14	Lithuania	0.001	15	-1
16	Latvia	1	Denmark	0.000	16	-15
17	Hungary	17	Hungary	-0.001	17	-
18	Croatia	3	Netherlands	-0.002	18	-15
19	Czech Republic	19	Czech Republic	-0.002	19	-
20	Slovakia	22	Cyprus	-0.002	20	+2
21	Slovenia	26	Greece	-0.003	21	+5
22	Cyprus	13	Austria	-0.003	22	-9
23	Portugal	9	Germany	-0.003	23	-14
24	Poland	6	UK	-0.006	24	-18
25	Italy	10	Belgium	-0.006	25	-15
26	Greece	21	Slovenia	-0.006	26	-5
27	Bulgaria	24	Poland	-0.007	27	-3
28	Romania	28	Romania	-0.011	28	-



**Marija Vuković** h 194cm; pb 195cm

**Marie Collonville** h 164cm; pb 195cm

# Developing insights from indexes

Differences between DESI ranks with the ranking taking into account performance relative to social and cultural conditions for Internet use .

DESI Rank	EU28 Member State	Residual Values	Residual Rank	Ranking Difference
27	Bulgaria	0.005	5	22
23	Portugal	0.008	2	21
18	Croatia	0.009	1	17
25	Italy	0.001	13	12
20	Slovakia	0.002	9	11
26	Greece	-0.003	21	5
15	Ireland	0.001	11	4
12	France	0.002	10	2
16	Latvia	0.001	14	2
22	Cyprus	-0.002	20	2
4	Finland	0.006	3	1
5	Luxembourg	0.005	4	1
8	Malta	0.003	7	1
17	Hungary	-0.001	17	0
19	Czech Republic	-0.002	19	0
28	Romania	-0.011	28	0
7	Estonia	0.003	8	-1
11	Spain	0.001	12	-1
14	Lithuania	0.001	15	-1
24	Poland	-0.007	27	-3
2	Sweden	0.005	6	-4
21	Slovenia	-0.006	26	-5
13	Austria	-0.003	22	-9
9	Germany	-0.003	23	-14
1	Denmark	0.000	16	-15
3	Netherlands	-0.002	18	-15
10	Belgium	-0.006	25	-15
6	UK	-0.006	24	-18

DESI Rank	EU28 Member State	Residual Values	Residual Rank	Ranking Difference
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16	Latvia			
17	Hungary			
18	Croatia			
19	Czech Republic			
20	Slovakia			
21	Slovenia			
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25	Italy			
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3	Netherlands	-0.002	18	-15
19	Czech Republic	-0.002	19	-
22	Cyprus	-0.002	20	+2
26	Greece	-0.003	21	+5
13	Austria	-0.003	22	-9
9	Germany	-0.003	23	-14
6	UK	-0.006	24	-18
10	Belgium	-0.006	25	-15
21	Slovenia	-0.006	26	-5
24	Poland	-0.007	27	-3
28	Romania	-0.011	28	-

# Conclusions

Our research is constantly evolving to provide richer insights to performance. This presentation has highlighted:

- The development of data visualisation methods to benchmark acquis performance;
- Innovative research to triangulate stakeholder views about implementation and performance;
- In-depth insights to more than 65 indicators between 2013 and 2018 for regulations and the digital economy in the Western Balkans economies and Turkey;
- Growth in the development of indexes and benchmarking;
- Development of innovative methods to better understand relative performance between countries.

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# S-Shaped adoption curves

