
InCiSE: applying RAP principles



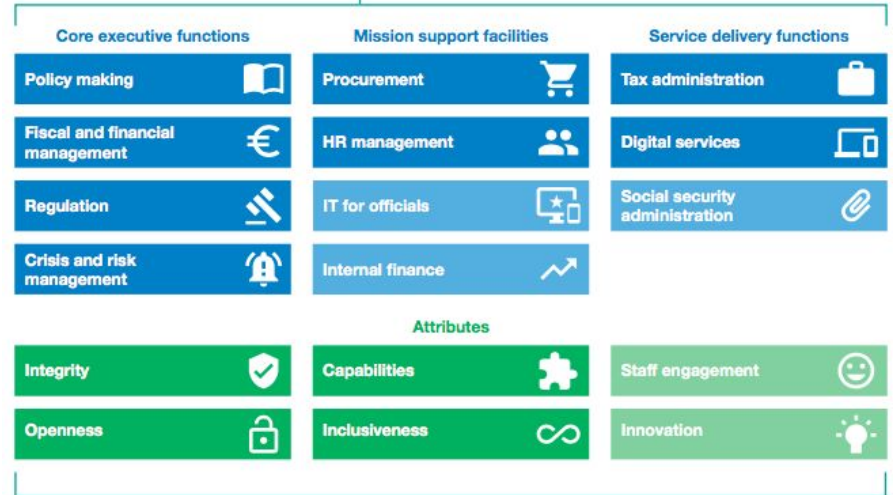
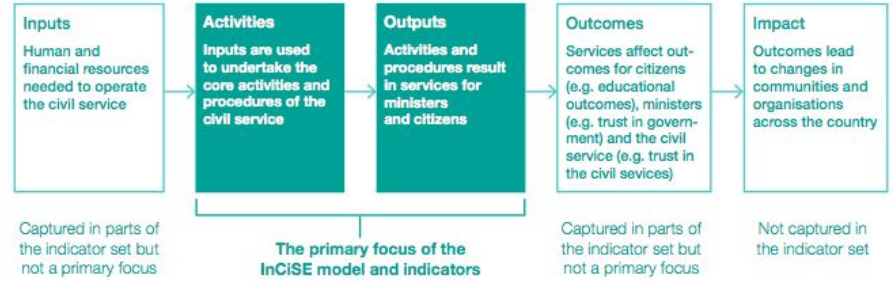
The International Civil
Service Effectiveness
(InCiSE) project

Matt Kerlogue
Analysis & Insight Team, Cabinet Office

INSTITUTE
FOR
GOVERNMENT



Civil Service



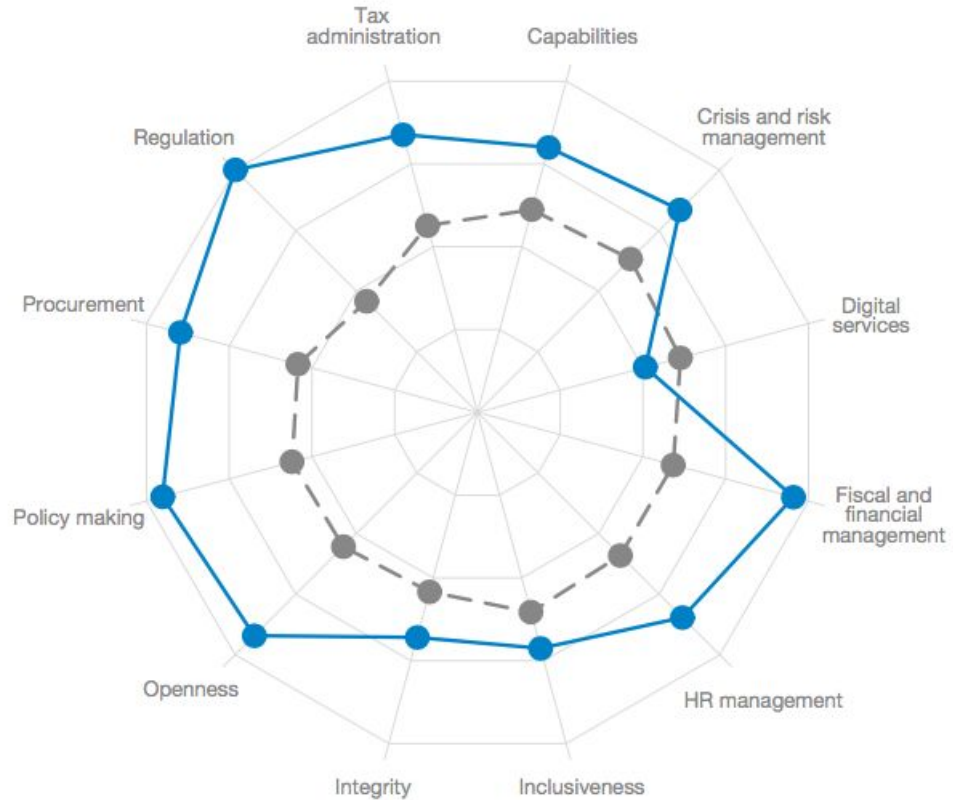
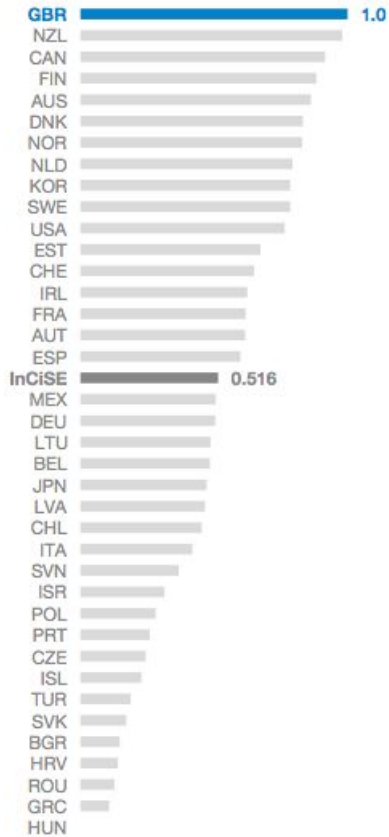
IT for officials, internal finance, social security administration, staff engagement, and innovation are not currently measured in the InCiSE Index.

InCiSE takes data from a wide range of sources to assess the effectiveness of different civil services around the world



| Bertelsmann Stiftung





The 2017 pilot edition

- A mixed workflow using **Excel** and **Stata**
 - The source data for InCiSE is very messy - manual transformations, transpositions and formulas, cumbersome to QA
 - **Excel** → **Stata** → **Excel** workflow creates additional risks relating to how data is imported/exported
 - Stata code is lengthy, difficult to understand, and re-run individual segments (all-or-nothing)
 - Not easy to distribute or for others to reproduce
 - Version control was/is a nightmare
-

2016-12-09 - Straw man indicator - updates

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Calibri (Body) 11

Number

Conditional Formatting Format as Table Cell Styles

Insert Delete Format

AutoSum Fill Clear Sort & Filter

K33 fx 68

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y		
1	Q6	Perceptions of corruption, by institution																									
2		1	2	3	4	5	6	7	8	9	10	11	12	13	14												
3		AGGREGATED, BY COUNTRY - % that think corrupt or extremely corrupt																									
4	Country	ISO	Political Parties	Parliament/Legislature	Military	NGOs	Media	Religious Bodies	Business/Private Sector	Education system	Judiciary	Medical and health	Police	Public officials/Civil servants	Public officials/Civil servants												
5	Afghanistan	AFG	36	40	21	34	21	20	35	33	60	31	33	43	-43												
6	Albania	ALB	72	66	33	16	34	9	29	70	81	80	58	52	-52												
7	Algeria	DZA	67	62	52	47	45	15	74	62	72	58	66	62	-62												
8	Argentina	ARG	78	72	32	22	44	34	49	23	65	26	70	77	-77												
9	Armenia	ARM	57	57	47	32	37	39	51	58	69	66	66	68	-68												
10	Australia	AUS	58	36	25	23	58	44	47	19	28	20	33	35	-35												
11	Azerbaijan	AZE	28	29	29	26	27	26	35	37	42	44	41	37	-37												
12	Bangladesh	BGD	45	41	5	6	9	4	18	12	53	33	64	29	-29												
13	Belgium	BEL	67	51	32	25	37	56	41	17	43	22	41	51	-51												
14	Bolivia	BOL	68	68	52	31	27	19	33	36	76	36	86	69	-69												
15	Bosnia and Herzegovina	BIH	77	67	26	22	47	33	52	64	65	76	62	67	-67												
16	Brazil	BRA	81	72	30	35	38	31	35	33	50	55	70	46	-46												
17	Bulgaria	BGR	76	71	28	37	49	49	63	47	86	78	65	64	-64												
18	Burundi	BDI	14	15	5	1	3	1	40	46	69	11	82	49	-49												
19	Cambodia	KHM	28	16	23	4	12	6	20	26	60	21	37	30	-30												
20	Cameroon	CMR	69	62	64	22	49	32	54	72	81	61	86	72	-72												
21	Canada	CAN	62	47	21	24	39	33	48	20	25	24	27	38	-38												
22	Chile	CHL	76	68	36	32	48	45	65	60	67	51	53	58	-58												
23	Colombia	COL	81	79	49	37	39	37	38	37	64	63	61	70	-70												
24	Croatia	HRV	72	63	24	28	48	31	50	50	70	61	51	64	-64												
25	Cyprus	CYP	91	76	54	20	68	44	37	27	38	54	76	59	-59												
26	Czech Republic	CZE	73	59	47	20	28	17	45	30	52	43	54	71	-71												
27	Democratic Republic of Congo	COD	76	84	65	29	65	25	68	75	87	29	86	85	-85												
28	Denmark	DNK	30	18	17	15	30	39	31	6	5	13	9	11	-11												
29	Egypt	EGY	72	71	45	32	80	31	48	67	65	73	78	76	-76												
30	El Salvador	SLV	85	70	55	36	45	31	46	40	81	37	87	76	-76												
31	Estonia	EST	55	33	8	15	18	12	41	13	26	24	17	38	-38												
32	Ethiopia	ETH	24	23	29	18	23	27	29	36	35	21	42	35	-35												
33	FYR Macedonia	MKD	68	53	21	38	52	33	39	46	68	53	53	55	-55												
34	Fiji	FJI	50	35	16	23	20	22	55	24	30	29	45	49	-49												
35	Finland	FIN	45	31	7	13	35	15	42	7	9	17	5	25	-25												
36	France	FRA	73	52	19	26	54	31	61	16	34	28	41	48	-48												
37	Georgia	GEO	28	34	13	13	42	8	28	22	51	32	26	26	-26												
38	Germany	DEU	65	48	25	31	54	34	61	19	20	48	20	49	-49												
39	Ghana	GHA	76	57	29	19	47	21	38	66	71	37	92	59	-59												
40	Greece	GRC	90	83	31	39	86	49	65	45	66	73	56	66	-66												

Ready

Radar charts (detail) Sens analysis>>> No subj. assessment No out of date data No public sector proxy DATA >>> Integrity >> GCB 2013 WEF GCI 2016 favouritism QoG 2016 +

90%

2016-12-09 - Straw man indicator - updates

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Wrap Text

General

Conditional Formatting Format as Table Cell Styles

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G35 fx 2015-2016 weighted avg

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Source: http://reports.weforum.org/global-competitiveness-index/appendix-a-methodology-and-computation-of-the-global-competitiveness-index-2016-2017/																							
2	Full survey question: To what extent do government officials in your country show favoritism to well-connected firms and individuals when deciding upon policies and contracts? (1) always show favoritism; (7) never show favoritism.																							
3	Placement	Placement	g	g	g	g	g	g																
4	Dataset	Dataset	Global Comp	Global Comp	Global Comp	Global Comp	Global Comp	Global Comp	Global Competitiveness Index															
5	Edition	Edition	2016-2017	2016-2017	2016-2017	2016-2017	2016-2017	2016-2017	2016-2017															
6	GLOBAL ID	GLOBAL ID	EOSQ042	EOSQ042	EOSQ042	EOSQ042	EOSQ042	EOSQ042	EOSQ042															
7	Series code	Code GCR	1.07	1.07	1.07	1.07	1.07	1.07	1.07															
8	Series	Series	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07 Favoritism in decisions of government officials, 1-7 (best)														
9	Series unide	Series unide	Favoritism in	Favoritism in	Favoritism in	Favoritism in	Favoritism in	Favoritism in	Favoritism in	Favoritism in decisions of government officials, 1-7 (best)														
10	Attribute	Value	Source d	Source	Rank	Period	Note																	
11	ALB	Albania	3.02357945	23/08/2016	World Econo	72	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
12	DZA	Algeria	3.03553238	23/08/2016	World Econo	70	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
13	AGO	Angola	N/A	N/A	N/A	N/A	N/A	N/A																
14	ARG	Argentina	1.97977526	23/08/2016	World Econo	131	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
15	ARM	Armenia	3.24789193	23/08/2016	World Econo	61	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
16	AUS	Australia	4.24359127	23/08/2016	World Econo	22	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
17	AUT	Austria	3.87342327	23/08/2016	World Econo	36	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
18	AZE	Azerbaijan	3.64848598	23/08/2016	World Econo	43	2014-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
19	BHR	Bahrain	4.29024634	23/08/2016	World Econo	21	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
20	BGD	Bangladesh	2.23744285	23/08/2016	World Econo	117	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
21	BRB	Barbados	2.76508614	23/08/2016	World Econo	90	2014-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
22	BEL	Belgium	4.47033762	23/08/2016	World Econo	19	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
23	BLZ	Belize	N/A	N/A	N/A	N/A	N/A	N/A																
24	BEN	Benin	3.08435903	23/08/2016	World Econo	66	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
25	BTN	Bhutan	3.82891215	23/08/2016	World Econo	38	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
26	BOL	Bolivia	1.81047088	23/08/2016	World Econo	137	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
27	BIH	Bosnia and H	2.47384659	23/08/2016	World Econo	108	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
28	BWA	Botswana	3.57324378	23/08/2016	World Econo	44	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
29	BRA	Brazil	2.16032308	23/08/2016	World Econo	121	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
30	BRN	Brunei Darus	3.43055558	23/08/2016	World Econo	51	2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
31	BGR	Bulgaria	2.69754336	23/08/2016	World Econo	97	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
32	BFA	Burkina Faso	N/A	N/A	N/A	N/A	N/A	N/A																
33	BDI	Burundi	2.47968763	23/08/2016	World Econo	107	2014-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
34	KHM	Cambodia	2.98994616	23/08/2016	World Econo	76	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
35	CMR	Cameroon	2.68222866	23/08/2016	World Econo	98	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															
36	CAN	Canada	3.99062617	23/08/2016	World Econo	31	2015-2016	We Refer to Chapter 1.3 of The	Global Competitiveness Report 2016-2017 for details about the computation methodology															

Ready

Radar charts (detail) Sens analysis>>> No subj. assessment No out of date data No public sector proxy DATA >>> Integrity >> GCB 2013 WEF GCI 2016 favoritism GoQ 201 +

110%

2016-12-09 - Straw man indicator - updates

Source: OECD PIAAC data - <http://vs-web-fs-1.oecd.org/piaac/puf/data>. Country files downloaded into Stata, appended, then results generated, as described in [piaac_capabilities_v2 do file](#). Results are in html format.

Public sector: literacy level		ISIC code 0: literacy level NOTE: small samples sizes in ISIC code 0 - most countries less than 100													
Variable	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5	Variable	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5		
Country	%	S.E.	%	S.E.	%	S.E.	Country	%	S.E.	%	S.E.	%	S.E.		
26	America														
27	Average	41.27821	0.15907	58.72179	0.15907	0	Average	59.29095	1.73967	40.70905	1.73967	0	0		
30	Variable	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5	Variable	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5	
31	Country	%	S.E.	%	S.E.	%	S.E.	Country	%	S.E.	%	S.E.	%	S.E.	
32	Canada	CAN	1.41525	0.31659	7.53331	0.75941	26.01907	1.36502	43.59416	1.56896	19.6131	1.26697	1.25122	0.42667	21.4382
33	Czech Republic	CZE	1.93422	1.53074	9.659	2.17148	30.80391	3.56352	34.97766	3.53604	11.84849	2.25143	0.77778	0.85178	12.6263
34	Denmark	DNK	1.95386	0.33661	8.89012	0.93809	33.42237	1.49498	43.73777	1.66250	11.82797	1.18346	0.33691	0.24044	12.1599
35	Estonia	EST	0.87861	0.33152	8.64983	0.93133	30.99459	1.49263	42.79187	1.67021	15.12478	1.20389	1.59402	0.50776	16.6842
36	Finland	FIN	1.22003	0.4883	4.54255	0.68409	21.17497	1.49788	44.82714	1.88037	24.65643	1.64516	3.03888	0.12562	27.6953
37	France	FRA	1.03124	0.71693	11.68767	1.29355	32.32229	1.95134	41.80507	1.66093	10.67214	1.0755	0.48159	0.27942	11.1537
38	Germany	DEU	0.83513	0.43941	8.12381	1.46681	29.1006	2.73163	44.83977	2.66743	16.18074	1.9687	0.91995	0.53641	17.1007
39	Ireland	IRL	1.40012	0.56583	8.51369	1.33168	33.66575	2.06467	44.31167	2.2786	11.62808	1.36391	0.46607	0.2785	12.0888
40	Italy	ITA	2.38762	1.07237	15.7858	2.55619	41.46575	3.09911	35.86764	2.72374	4.41646	1.25134	0.06891	0.16507	45.0339
41	Japan	JPN	0.04148	0.33067	1.88082	0.79052	14.54142	2.04549	49.94385	3.14057	31.88835	2.72477	1.70687	0.88562	33.5652
42	Austria	AUT	1.08082	0.53474	9.66434	1.20906	34.29268	2.26538	45.0752	2.11046	9.59459	1.23114	0.32327	0.25112	9.88696
43	Korea	KOR	0.95166	0.51394	4.99032	1.1692	30.36265	2.44358	52.16183	3.07176	11.09624	2.19247	0.4373	0.68816	11.5335
44	Netherlands	NLD	1.59378	0.44474	6.07936	1.03216	21.32363	1.73697	46.61634	1.93756	21.99458	1.95437	1.39231	0.57856	24.3869
45	Flanders (Belgium)	BEL	1.63104	0.88848	8.11949	1.13014	25.97728	2.15464	47.09987	2.13693	16.85127	1.97876	0.72105	0.46098	17.5723
46	Norway	NOR	1.56684	0.41386	7.98762	1.05561	27.23238	1.5744	45.79695	1.52565	16.45258	1.38219	0.87094	0.29343	17.4162
47	Poland	POL	1.72994	0.6141	9.4653	1.79888	32.5139	2.36288	41.18538	2.58396	13.71111	1.79816	1.29688	0.592	15.068
48	Russian Federation	RUS	0.9874	0.66979	9.27587	1.6677	37.57332	2.98979	41.39332	2.67319	10.33638	2.26924	0.4337	0.41278	10.7701
49	Slovak Republic	SVK	0.93363	0.47222	6.62877	1.23076	36.6887	2.30038	48.11363	2.25681	8.04553	1.59237	0.20975	0.29255	8.25528
50	Spain	ESP	1.93101	0.76239	12.31592	1.75605	33.73115	2.23471	42.05348	2.55306	5.97804	1.34129	0.3884	0.34261	9.96644
51	Sweden	SWE	1.68754	0.51507	8.09757	0.97614	28.38057	1.57435	45.28293	1.56489	15.22885	1.22608	1.32254	0.1942	16.5514
52	England, Ireland (UK)	GBR	1.6382	0.60916	8.61495	1.31613	27.79684	2.2847	43.37208	2.47993	17.48915	1.61378	1.08879	0.45152	18.5779
53	United States	USA	1.95333	0.78454	8.32094	1.8687	25.24825	2.39523	46.14507	2.65577	16.87555	2.05890	1.27666	0.53814	18.1522
54	Average	4.9022	0.13747	8.40156	0.29911	29.75366	0.47696	44.57488	0.50081	14.7901	0.36483	1.00607	0.10543	15.7797	
55															
56	Variable	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5	Variable	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5	
57	Country	%	S.E.	%	S.E.	%	S.E.	Country	%	S.E.	%	S.E.	%	S.E.	
58	Canada	CAN	2.4915	0.46514	11.70066	0.9152	29.54022	1.34377	38.77113	1.4963	15.55839	1.14143	1.94211	0.50353	17.5005
59	Czech Republic	CZE	1.84293	1.33687	9.97005	2.39281	31.44435	3.24429	3.9214	12.84554	2.36467	1.48306	1.09784	14.3286	
60	Denmark	DNK	2.03642	0.45953	8.96831	0.90762	29.81591	1.46145	41.13586	1.44367	16.38131	1.97339	1.7054	0.42156	18.0435
61	Estonia	EST	0.94515	0.37725	9.65406	0.98876	34.66538	1.51145	40.79425	1.70444	13.7477	1.16769	0.53733	0.27927	14.5422
62	Finland	FIN	1.61389	0.53484	6.72359	0.88262	28.7296	1.55313	41.33649	1.69211	19.17732	1.37623	2.87564	0.63717	22.053
63	France	FRA	0.56708	0.73325	14.3102	1.43334	30.79868	1.67315	36.29813	1.64596	12.23494	1.14409	0.19126	0.42235	13.1479
64	Germany	DEU	1.37636	0.61669	9.33708	1.33972	27.4502	2.22972	41.4772	2.33794	18.44833	1.94581	1.71533	0.51107	20.1592
65	Ireland	IRL	2.6287	0.68989	14.19635	1.71367	32.70274	2.39337	36.34544	9.93866	8.72827	1.33955	0.87671	0.51144	9.60168
66															
GAAG whistleblowers Openness >> OGI 2015 E-P 2017 Bertelsmann SGIs- G4.1 ODB 2015 ODI 2015 OURData 2014 Capabilities >> OECD PIAAC educ and skills															

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General

Conditional Formatting Format as Table Cell Styles

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		7.8. Scope of whistleblower protection in the public and private sector, 2014											
		Public and private sector											
		Employees	Consultants	Suppliers	Temporary employees	Former employees	Volunteers	Employees	Consultants	Suppliers	Temporary employees	Former employees	Volunteers
10	Australia	●	●	○	○	○	○						
11	Austria	●	○	○	○	○	○		m	m			
12	Belgium	●	○	○	○	○	○		m	m		m	m
13	Canada	●	○	○	○	○	○						m
14	Chile	●	○	○	○	○	○		m	m	m	m	m
15	Czech Republic	●	○	○	○	○	○		m	m	m	m	m
16	Estonia	●	●	●	●	●	●						
17	France	●	●	●	●	●	●						
18	Germany	●	●	●	●	●	○						m
19	Hungary	●	●	●	●	●	●						
20	Iceland	●	○	○	○	○	○		m	m		m	m
21	Ireland	●	●	●	●	●	○						m
22	Israel	●	●	○	○	○	○			m			m
23	Italy	●	○	○	○	○	○			m			m
24	Japan	●	●	○	○	○	○		m	m		m	m
25	Korea	●	●	●	●	●	●						
26	Mexico	●	○	○	○	○	○						
27	Netherlands	●	○	○	○	○	○		m	m			m
28	New Zealand	●	●	●	●	●	●						
29	Norway	●	○	○	○	○	○		m	m	m	m	m
30	Slovak Republic	●	○	○	○	○	○		m	m	m	m	m
31	Slovenia	●	●	●	●	●	●						
32	Switzerland	●	○	○	○	○	○		m	m		m	m
33	Turkey	●	○	○	○	○	○			m		m	m
34	United Kingdom	●	●	●	●	●	○					m	m
35	United States	●	●	○	○	○	○			m			m
36	Brazil	●	○	○	○	○	○		m	m		m	m
37	Colombia	●	●	●	●	●	○						m
38	Latvia	●	○	○	○	○	○			m	m	m	m
39	Russia	●	○	○	○	○	○		m	m	m	m	m

Excel ribbon with tabs: Home, Insert, Page Layout, Formulas, Data, Review, View. Includes font settings (Calibri, 11), alignment options, and various tool icons.

Main data table with columns for country codes (A1-AZ), indicator levels (1-2), and various quality of life metrics (G1-G20, S1-S20, U1-U20, X1-X20, Y1-Y20, AA1-AA20, AC1-AC20, AD1-AD20, AE1-AE20, AF1-AF20, AG1-AG20, AI1-AI20, AJ1-AJ20). Rows list countries like Albania, Algeria, Armenia, etc.

Navigation bar with buttons: Versions, Overview, Theme aggregation, Into Stata, Into Stata (count impute), Stata output, Radar charts (detail), Sens analysis>>>, No sub. assessment, No out of date data.

Footer area with 'Ready' status, a progress bar, and a zoom level indicator set to 50%.

Why RAP?

Reproducible Want others to be able to verify/repeat the work

Analytical ...

Pipeline Clear flow of inputs into outputs

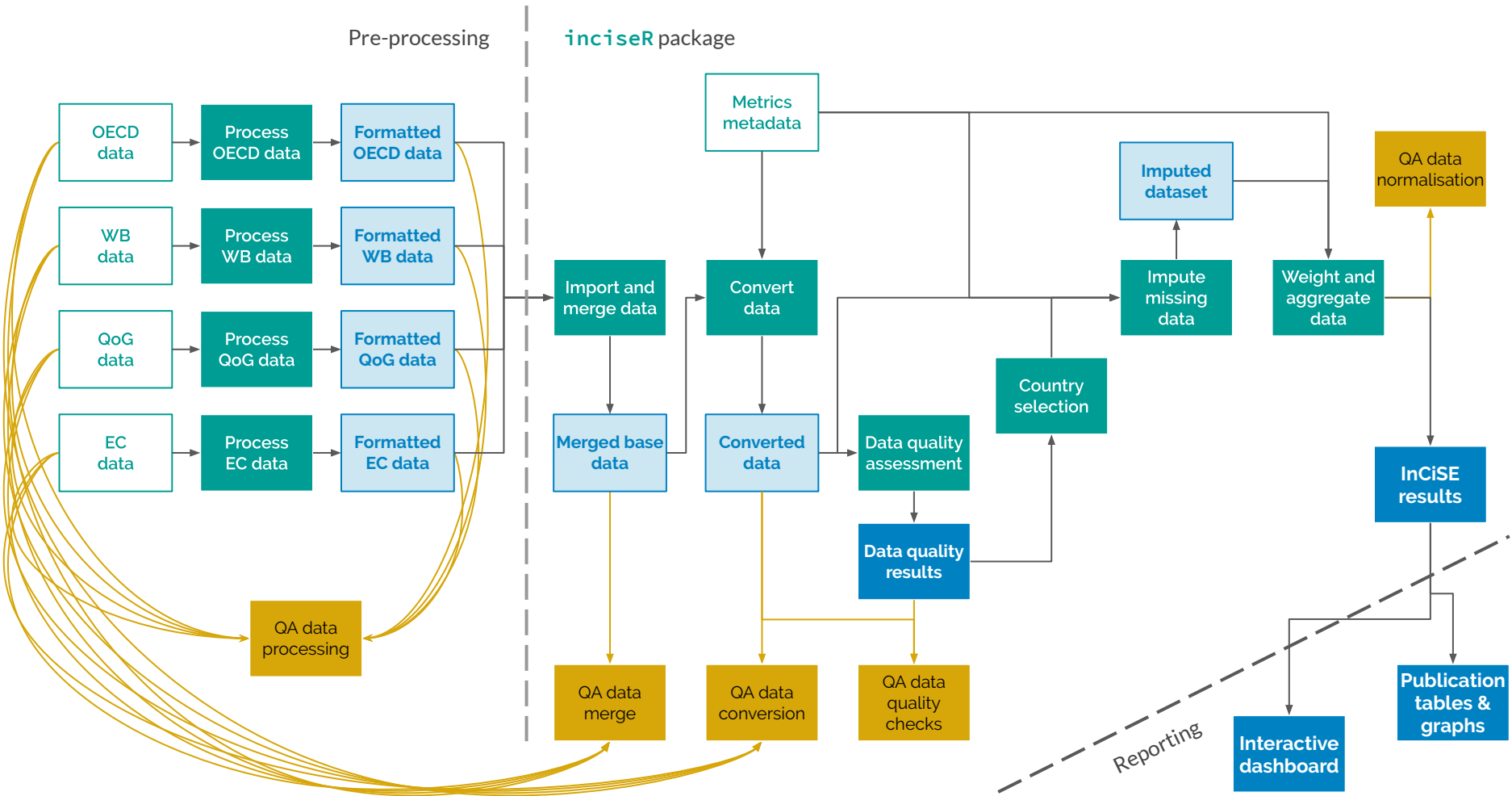
Using RAP principles

- Data should be cleaned and processed by code - no manual edits of source data
 - Using only one app (**R**) - reducing potential for error when switching from Excel to Stata and back again
 - Using git for version control
 - Wide array of really useful R packages to make
 - Data cleaning - **tidyverse**, **countrycode**, **janitor**, **readxl**
 - Data processing - **tidyverse**, **mice** (for imputation)
 - Non-spreadsheet data - **Rilostat**, **intsurvey**, **rvest**, **haven**
 - Output - **ggplot**, **plotly**, **flexdashboard**, **jsonlite**
-

RAP in practice

1. Collate input data
 2. Clean and tidy data
- Pre-processing
-
3. "Import" tidy data
 4. Process tidy data
 5. Run analysis/models
 6. Produce outputs
- `inciseR` package
-
7. Reports & graphs
 8. Interactive dashboard
- Post-processing

Obviously it didn't really happen like this!!



(Good) lessons learnt

- Using git “offline”
 - Creating complex ‘generic’ functions
 - Packages aren’t actually that scary
 - **janitor** and **countrycode** are amazing
 - **Plotly** won’t replace **ggplot**, but is very versatile
-

Figure 5.1
InCiSE Index scores
using different country
groupings

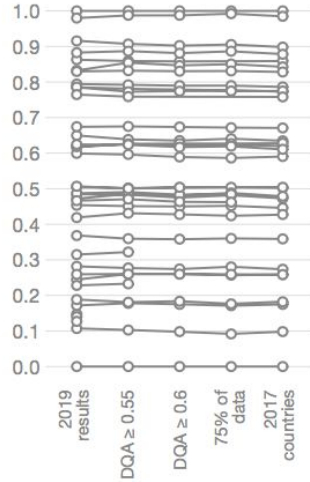


Figure 5.2
InCiSE Index scores
excluding 'out of date'
data

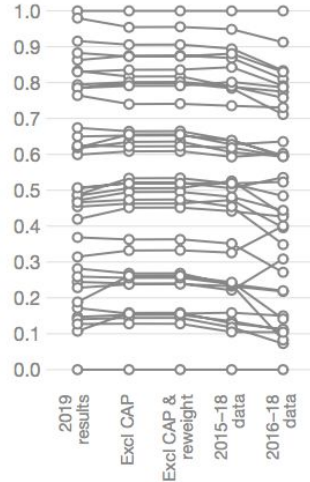


Figure 5.3
InCiSE Index scores
using alternative
weighting

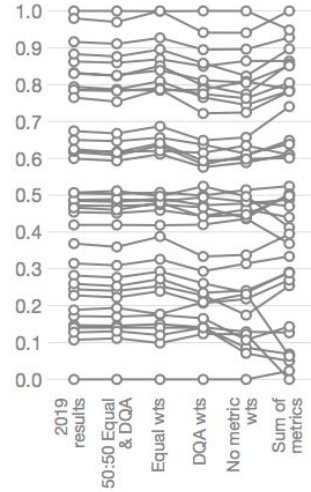


Figure 5.4
InCiSE Index scores
adjusting the base
data

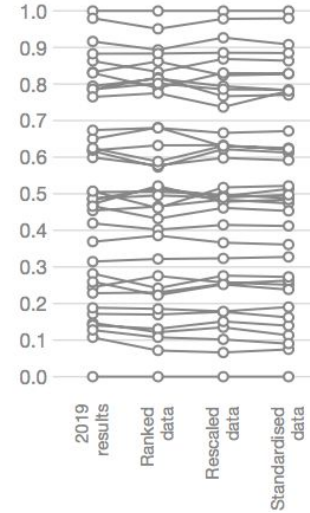
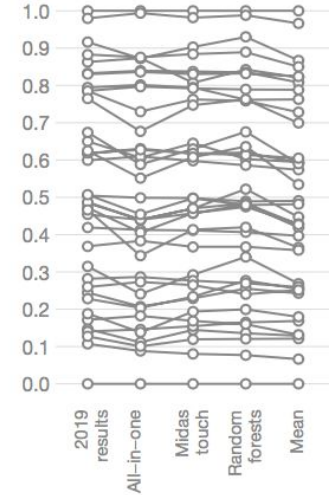


Figure 5.5
InCiSE Index scores
using alternative
imputation methods



Using RAP enabled 4x as many sensitivity tests to be undertaken

Package hell *or how I learnt to love Microsoft*

- InCiSE uses **mice** for multiple imputation - a complex statistical package for estimating missing data
 - Originally downloaded **mice** v2.4.6 in November 2017
 - Laptop rebuild in late-January 2019 - had to reinstall everything
 - Meanwhile, **mice** updated to v3.0.0 in May 2018 (v3.5.0 in March 2019)
 - Re-ran analysis - figures didn't match !!!
 - Eventually worked out it was **mice** - we use in a v non-standard way (that the author doesn't recommend)
 - CRAN only hosts source versions of old packages - **mice** needs compiling, which I couldn't do.
 - Microsoft CRAN "time machine" - daily snapshot of CRAN with binaries!
<https://mran.microsoft.com/timemachine>
-

Next steps

- Publishing the R package
 - Developing countries work
 - Transferring to one of our partner organisations - R package makes that a lot easier
 - Using as case study for transformation of Analysis & Insight's more regular work - FOI statistics, Civil Service workforce data, Civil Service People Survey...
 - Using R/Python - and creating & automating flows
 - Using version control
 - In-built error checking/QA
 - DOCUMENT AS YOU GO !!!
 - Producing packages of regular functions
-

Useful links

- InCiSE reports:
<https://www.bsg.ox.ac.uk/incise>
 - InCiSE 'app':
<https://incise-project.github.io/incise-app/incise-app.html>
 - Civil Service People Survey analyst/data scientist (B2: HEO/SEO equivalent)
<http://bit.ly/csps-analyst>
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