Annex A. Materials from background study for the innovation model

A.1. Additional examples for societal objectives

Societal Objective	Examples and sources
So1: Innovation for peace	• Projects of the Peace Innovation Lab: https://www.peaceinnovation.stanford.edu/peace-projects. • Digital Innovations for Peace: https://akademie.dw.com/en/digital-innovations-for-peace-combines-new-technologies-and-trainings-to-fight-information-disorder-in-the-mena-region/a-64163064. • Miklian, J., & Hoelscher, K. (2017). A new research approach for Peace Innovation. *Innovation and Development* 7(3), 1–19. Available from https://www.prio.org/publications/10633.
So2: Innovation for justice	• OGP Policy Area and Relevant Commitments: https://www.opengovpartnership.org/policy-area/justice/. • Work of the Innovation and Justice Lab: https://www.innovation4justice.org/work. • Work of the Justice Innovation Lab: https://www.justiceinnovationlab.org/approach. • Work of the Centre for Justice Innovation: https://www.innovatingjustice.org/programs. • Work of The Hague Institute for Innovation of Law: https://www.hiil.org/programmes/.
So3: Innovation for safety	• Work of the Urban Innovative Actions Lab: https://www.uia-initiative.eu/en/theme/urban-security. • Work of the National Network for Safe Communities: https://nnscommunities.org/innovations/. • John Hopkins University Innovation Fund for Community Safety: https://www.jhu.edu/jhu-innovation-fund-for-community-safety/. • Sebastian, T. and others (2022). *A new community safety blueprint: How the federal government can address violence and harm through a public health approach*. Brookings Institution. Available from https://www.brookings.edu/articles/a-new-community-safety-blueprint-how-the-federal-government-can-address-violence-and-harm-through-a-public-health-approach/.
So4 and So5: Innovation for disaster and climate resilience	• UNDRR Prevention Web Knowledge Base: https://www.preventionweb.net/knowledge-base/type-content/latest-additions. • DRR Voices blog: https://www.preventionweb.net/knowledge-base/type-content/drr-voices. • UNDESA Sustainable Development Voluntary Local Reviews: https://sdgs.un.org/topics/voluntary-local-reviews.
So6: Innovation for green technology	• Green Cities Europe Award: https://award.thegreencities.eu/. • EBRD Green Cities project: https://www.ebrdgreencities.com/. • FAO Green Cities Initiative: https://www.fao.org/green-cities-initiative/en. • Cittaslow International Network of Cities where Living is Good: https://www.cittaslow.org/. • Danish Design Centre's Green Transition projects: https://ddc.dk/themes/green-transition/. • Circular Innovation City Challenge: https://www.circularinnovation.city/winners.
So7: Innovation for cities deciding openly	• NESTA Participatory City Foundation project: https://www.nesta.org.uk/feature/new-radicals-2018/participatory-city-foundation/. • Cities Alliance Cities for Women project: https://www.citiesalliance.org/how-we-work/global-programmes/cities-women/participatory-methods. • CityChangers Stories of Change: https://citychangers.org/inspiration/.

Source: Compiled by the author.

A.2. Detailed data for trends and practices related to innovation in public institutions

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
EU1	EC CONNECT (2020)	User centricity: New technologies such as AI and chatbots enable government to deliver support, information and services increasingly pro-active and in simplified ways; hence better facilitating the use of mobile devices for these purposes.			
EU2	EC CONNECT (2020)	Transparency: Machine learning algorithms provide users with accurate estimations for the duration of the service delivery.			
EU3	EC CONNECT (2020)	Cross-border mobility: Seamless and interoperable services allow citizens and businesses access to user-friendly online services in other countries, delivering on the potential of a Digital Single Market.			
EU4	EC CONNECT (2020)	Key enablers: Big data and cloud solutions enable governments to federate data sources to pre-fill, simplify and automate the filling in of forms to increase efficiency of eGovernment services.			
EU5	EC CONNECT (2021)	Central government services outperform local and regional services throughout.			
EU6	EC CONNECT (2021)	Business services are more digital than citizen services.			
EU7	EC CONNECT (2021)	National users have an edge over cross-border users.			
EU8	EC CONNECT (2021)	Findable portals: gateways to the digital government	suomi.fi	Finland	https://www.suomi.fi/frontpage
EU8	EC CONNECT (2021)	Findable portals: gateways to the digital government	gov.mt	Malta	https://www.gov.mt/mt/Pages/home.aspx
EU8	EC CONNECT (2021)	Findable portals: gateways to the digital government	administracion.gob.es	Spain	https://administracion.gob.es/
EU8	EC CONNECT (2021)	Findable portals: gateways to the digital government	rijksoverheid.nl	The Netherlands	https://www.rijksoverheid.nl/
EU8	EC CONNECT (2021)	Findable portals: gateways to the digital government	island.is	Iceland	https://island.is/
EU8	EC CONNECT (2021)	Findable portals: gateways to the digital government	epaslaugos.lt	Lithuania	https://www.epaslaugos.lt/portal/
EU8	EC CONNECT (2021)	Findable portals: gateways to the digital government	eportugal.gov.pt	Portugal	https://eportugal.gov.pt/
EU8	EC CONNECT (2021)	Findable portals: gateways to the digital government	gov.ie	Ireland	https://www.gov.ie/en/

1 For methodological reasons, certain trends and practices repeated in different years of the ITU WSIS Stocktaking and EU eGovernment Benchmark reports are assigned different ids but then grouped together. In this respect, the 213 non-unique across different years trends and practices that have been selected are grouped down to a final set of 171 trends and practices unique across different years.

2 Initiatives by NGOs, INGOs, IGOs and private sector entities are indicated as international, given their non-confinement to national borders. Initiatives from cross-border or regional collaborations are also indicated as international, except for those undertaken by supranational governance entities such as the European Union. For national initiatives, the country names used are those employed in the original reports in which these initiatives are presented.

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
EU9, EU34	EC CONNECT (2021)	Online Availability: Accessing Services 24/7			
EU10	EC CONNECT (2021)	Delivering government services proactively			
EU11	EC CONNECT (2021)	User support: lending a helping hand			
EU12	EC CONNECT (2021)	Mobile: the government at your fingertips			
EU13, EU37	EC CONNECT (2021)	Transparency of service delivery: managing user expectations			
EU14	EC CONNECT (2021)	Transparency of personal data: staying in control			
EU15, EU39	EC CONNECT (2021)	Transparency of service design: co-creating digital services			
EU16	EC CONNECT (2021)	eID: the key to accessing eGovernment	Identity Malta	Malta	https://www.identitymalta.com/unit/e-id-cards-unit/
EU16	EC CONNECT (2021)	eID: the key to accessing eGovernment	Auðkenni	Iceland	https://www.audkenni.is/en/
EU16	EC CONNECT (2021)	eID: the key to accessing eGovernment	e-identity scheme	Estonia	https://e-estonia.com/solutions/e-identity/smart-id/
EU16	EC CONNECT (2021)	eID: the key to accessing eGovernment	Suomi.fi e-Identification	Finland	https://www.suomi.fi/instructions-and-support/identification
EU16	EC CONNECT (2021)	eID: the key to accessing eGovernment	NemID	Denmark	https://www.nemid.nu/dk-en/
EU16	EC CONNECT (2021)	eID: the key to accessing eGovernment	ID-porten	Norway	https://eid.difi.no/en/id-porten
EU17	EC CONNECT (2021)	eDocuments: uploading and obtaining files online			
EU18	EC CONNECT (2021)	Authentic sources: pre-filling information from base registries			
EU19	EC CONNECT (2021)	Digital post: staying informed and connected	My Space/eDelivery	Bulgaria	https://edelivery.egov.bg/
EU19	EC CONNECT (2021)	Digital post: staying informed and connected	eAdrese	Latvia	https://mana.latvija.lv/e-adrese/
EU19	EC CONNECT (2021)	Digital post: staying informed and connected	Slovensko Electronic Mailbox	Slovakia	https://www.slovensko.sk/en/title
EU19	EC CONNECT (2021)	Digital post: staying informed and connected	e-Government Gateway	Türkiye	https://www.turkiye.gov.tr/non-citizens
EU20, EU44	EC CONNECT (2021)	Cross-border online availability: accessing services across Europe			
EU21, EU45	EC CONNECT (2021)	Cross-border user support: assisting international users			
EU22	EC CONNECT (2021)	Cross-border eID: online identification across borders			
EU23, EU47	EC CONNECT (2021)	Cross-border eDocuments: online files across borders			
EU24	EC CONNECT (2022)	Rethink the user: consider the needs of both citizens and businesses			

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
EU25	EC CONNECT (2022)	Rethink the user: tailor services for nationals as well as cross-border users			
EU26	EC CONNECT (2022)	Rethink the user: ensure perceivable, operable, understandable and robust websites for persons with disabilities			
EU27	EC CONNECT (2022)	Rethink the user: serve users with different devices			
EU28	EC CONNECT (2022)	Rethink the user: co-create services with users			
EU29	EC CONNECT (2022)	Realign the user journey: overcome service gaps across multiple layers of government			
EU30	EC CONNECT (2022)	Realign the user journey: leverage the role of government portals			
EU31	EC CONNECT (2022)	Reinforce the interoperability ambition: promote interoperable data exchange to deliver more services proactively			
EU32	EC CONNECT (2022)	Reinforce the interoperability ambition: pave the way for future eIDs			
EU33	EC CONNECT (2022)	Government Portals: A Single Gateway	e-albania.al	Albania	https://e-albania.al/
EU33	EC CONNECT (2022)	Government Portals: A Single Gateway	oesterreich.gv.at	Austria	https://www.oesterreich.gv.at/en/public.html
EU33	EC CONNECT (2022)	Government Portals: A Single Gateway	egov.bg	Bulgaria	https://egov.bg/wps/portal/egov/en/your%20europe/home
EU33	EC CONNECT (2022)	Government Portals: A Single Gateway	gov.gr	Greece	https://www.gov.gr/en/
EU33	EC CONNECT (2022)	Government Portals: A Single Gateway	guichet.lu	Luxemburg	https://guichet.public.lu/en.html
EU33	EC CONNECT (2022)	Government Portals: A Single Gateway	euprava.me	Montenegro	https://www.euprava.me/en?alphabet=lat
EU33	EC CONNECT (2022)	Government Portals: A Single Gateway	gov.pl	Poland	https://www.gov.pl/
EU33	EC CONNECT (2022)	Government Portals: A Single Gateway	euprava.gov.rs	Serbia	https://euprava.gov.rs/
EU33	EC CONNECT (2022)	Government Portals: A Single Gateway	turkiye.gov.tr	Türkiye	https://www.turkiye.gov.tr/
EU9, EU34	EC CONNECT (2022)	Online Availability: Accessing Services 24/7			
EU35	EC CONNECT (2022)	User Support: Providing Online Help			
EU36	EC CONNECT (2022)	Mobile Friendliness: Offering Portable eGovernment			
EU13, EU37	EC CONNECT (2022)	Transparency of Service Delivery: Managing User Expectations			
EU38	EC CONNECT (2022)	Transparency of Personal Data: Keep the User in Control			
EU15, EU39	EC CONNECT (2022)	Transparency of Service Design: Co-creating Digital Services			
EU40	EC CONNECT (2022)	eID: The Key to Accessing Digital Government Services	France Connect	France	https://franceconnect.gouv.fr/

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
EU40	EC CONNECT (2022)	eID: The Key to Accessing Digital Government Services	Public Digital Identity System	Italy	https://www.spid.gov.it/en/
EU40	EC CONNECT (2022)	eID: The Key to Accessing Digital Government Services	Mobile Identity smsPASS	Slovenia	https://www.si-trust.gov.si/en/si-pass/mobile-identity-smspass/
EU40	EC CONNECT (2022)	eID: The Key to Accessing Digital Government Services	Swiss ID	Switzerland	https://www.swissid.ch/en/
EU41	EC CONNECT (2022)	eDocuments: Uploading and Obtaining Digital Files			
EU42	EC CONNECT (2022)	Authentic Sources: Pre-filling Data to Ease Online Form Applications			
EU43	EC CONNECT (2022)	Digital Post: Communicate Faster in One Place	My eBox	Belgium	https://myebox.be/fr
EU43	EC CONNECT (2022)	Digital Post: Communicate Faster in One Place	Digital Postbox	Ireland	https://account.digitalpostbox.ie/
EU43	EC CONNECT (2022)	Digital Post: Communicate Faster in One Place	e-Boks and Digipost	Norway	https://www.norge.no/en/digital-citizen/choose-digital-mailbox
EU43	EC CONNECT (2022)	Digital Post: Communicate Faster in One Place	Slovensko Electronic Mailbox	Slovakia	https://www.slovensko.sk/en/agendas/agenda/_electronic-mailboxes1
EU43	EC CONNECT (2022)	Digital Post: Communicate Faster in One Place	Digimail and e-Boks	Sweden	https://www.digg.se/for-privatpersoner/digital-post-for-dig-som-privatperson
EU43	EC CONNECT (2022)	Digital Post: Communicate Faster in One Place	Kivra	Sweden	https://kivra.se/en/private
EU43	EC CONNECT (2022)	Digital Post: Communicate Faster in One Place	Min mydighetspost	Sweden	https://www.minmyndighetspost.se/
EU43	EC CONNECT (2022)	Digital Post: Communicate Faster in One Place	Berichtenbox	The Netherlands	https://mijn.overheid.nl/about-mijnoverheid/
EU20, EU44	EC CONNECT (2022)	Cross-Border Online Availability: Accessing Services across Europe			
EU21, EU45	EC CONNECT (2022)	Cross-Border User Support: Assisting International Users			
EU46	EC CONNECT (2022)	Cross-Border eID: Borderless Online Identification			
EU23, EU47	EC CONNECT (2022)	Cross-Border eDocuments: Online Files across Borders			
WB1	Dener and others (2021)	Few governments record or report transparently GovTech investments, results achieved, and challenges faced.	Digital Transformation Agency	Australia	https://www.dta.gov.au/
WB1	Dener and others (2021)	Few governments record or report transparently GovTech investments, results achieved, and challenges faced.	Federal Computing Center Securing Innovation	Austria	https://www.brz.gv.at/en/
WB1	Dener and others (2021)	Few governments record or report transparently GovTech investments, results achieved, and challenges faced.	UMANG	India	https://web.umang.gov.in/landing/

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
WB1	Dener and others (2021)	Few governments record or report transparently GovTech investments, results achieved, and challenges faced.	Digital Switzerland	Switzerland	https://digitalswitzerland.com/
WB2	Dener and others (2021)	Core government systems remain disconnected, with point-to-point and not secured data exchange.	Espacio colaborativo Data Sandbox	Colombia	https://gobiernodigital.mintic.gov.co/portal/Iniciativas/Espacio-colaborativo-Data-Sandbox/
WB2	Dener and others (2021)	Core government systems remain disconnected, with point-to-point and not secured data exchange.	State Information Technology Agency	South Africa	https://www.sita.co.za/
WB2	Dener and others (2021)	Core government systems remain disconnected, with point-to-point and not secured data exchange.	Digital Public Services Switzerland	Switzerland	https://www.digital-public-services-switzerland.ch/en
WB3	Dener and others (2021)	There is substantial interest in developing government gateways, service bus, interoperability frameworks and cloud platforms for government enterprise architecture.	Digital Austria	Austria	https://www.digitalaustria.gv.at/
WB3	Dener and others (2021)	There is substantial interest in developing government gateways, service bus, interoperability frameworks and cloud platforms for government enterprise architecture.	ePING	Brazil	https://eping.governoeletronico.gov.br/
WB3	Dener and others (2021)	There is substantial interest in developing government gateways, service bus, interoperability frameworks and cloud platforms for government enterprise architecture.	SPB	Brazil	https://softwarepublico.gov.br/social/search/software_infos
WB3	Dener and others (2021)	There is substantial interest in developing government gateways, service bus, interoperability frameworks and cloud platforms for government enterprise architecture.	eGovFrame Portal	Korea	https://www.egovframe.go.kr/eng/main.do
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	Servicios y País Digital	Argentina	https://www.argentina.gob.ar/jefatura/innovacion-publica/servicios-y-pais-digital
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	miArgentina	Argentina	https://www.argentina.gob.ar/miargentina
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	myGov	Australia	https://my.gov.au/

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	Services Australia	Australia	https://www.servicesaustralia.gov.au/
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	Österreichs digitales Amt	Austria	https://www.oesterreich.gv.at/public.html
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	gov.br Governo Digital	Brazil	https://www.gov.br/governodigital/pt-br/transformacao-digital/lista-servicos-digitais
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	GOV.CO	Colombia	https://www.gov.co/
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	National Government Services Portal	India	https://services.india.gov.in/
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	CitizenConnect	Singapore	https://www.citizenconnectcentre.gov.sg/
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	SITA e-Services	South Africa	https://www.eservices.gov.za/tonkana/citizen/eservices.jsf
WB4	Dener and others (2021)	Only few national e-government portals provide two-way information flows, universally accessible user-centric transactional services via mobile apps, and quality of service metrics.	ch.ch	Switzerland	https://www.ch.ch/en/
WB5	Dener and others (2021)	Technology solutions to improve digital citizen engagement provide little information about impact, service quality and responsiveness.	Punto Digital	Argentina	https://www.argentina.gob.ar/jefatura/innovacion-publica/servicios-y-pais-digital/punto-digital
WB5	Dener and others (2021)	Technology solutions to improve digital citizen engagement provide little information about impact, service quality and responsiveness.	Plataforma de Aprentizaje Virtual	Argentina	https://cursos.innovacion.gob.ar/

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
WB5	Dener and others (2021)	Technology solutions to improve digital citizen engagement provide little information about impact, service quality and responsiveness.	mSurvey	United Arab Emirates	https://u.ae/en/information-and-services/g2g-services/msurvey
WB6	Dener and others (2021)	Only few multifunctional citizen participation portals allow to submit petitions, publish citizen inputs, provide anonymous feedback, or post government's response.	Consulta Pública	Argentina	https://consultapublica.argentina.gob.ar/
WB6	Dener and others (2021)	Only few multifunctional citizen participation portals allow to submit petitions, publish citizen inputs, provide anonymous feedback, or post government's response.	Fala.BR	Brazil	https://falabr.cgu.gov.br/publico/Manifestacao/SelecionarTipoManifestacao.aspx
WB6	Dener and others (2021)	Only few multifunctional citizen participation portals allow to submit petitions, publish citizen inputs, provide anonymous feedback, or post government's response.	Urna de Cristal	Colombia	https://www.urnadecristal.gov.co/
WB6	Dener and others (2021)	Only few multifunctional citizen participation portals allow to submit petitions, publish citizen inputs, provide anonymous feedback, or post government's response.	GOV.CO/Territorial	Colombia	https://home.micolombiadigital.gov.co/territorial/
WB6	Dener and others (2021)	Only few multifunctional citizen participation portals allow to submit petitions, publish citizen inputs, provide anonymous feedback, or post government's response.	MyGov.in	India	https://www.mygov.in/
WB6	Dener and others (2021)	Only few multifunctional citizen participation portals allow to submit petitions, publish citizen inputs, provide anonymous feedback, or post government's response.	MyBudget	Korea	https://www.mybudget.go.kr/
WB6	Dener and others (2021)	Only few multifunctional citizen participation portals allow to submit petitions, publish citizen inputs, provide anonymous feedback, or post government's response.	Reaching Everyone For Active Citizenry @ Home)	Singapore	https://www.reach.gov.sg/
WB7	Dener and others (2021)	Digital government strategies and action plans establish institutions to support GovTech with focus on a whole-of-government approach, data-driven public sector, digital skills development, and innovation labs.	LABgobar	Argentina	https://www.argentina.gob.ar/jefatura/innovacion-publica/laboratoriodegobierno
WB7	Dener and others (2021)	Digital government strategies and action plans establish institutions to support GovTech with focus on a whole-of-government approach, data-driven	GovLabAustria	Austria	https://www.govlabaustria.gv.at/

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
		public sector, digital skills development, and innovation labs.			
WB7	Dener and others (2021)	Digital government strategies and action plans establish institutions to support GovTech with focus on a whole-of-government approach, data-driven public sector, digital skills development, and innovation labs.	BrazilLAB	Brazil	https://brazillab.org.br/institucional
WB7	Dener and others (2021)	Digital government strategies and action plans establish institutions to support GovTech with focus on a whole-of-government approach, data-driven public sector, digital skills development, and innovation labs.	Centro de Innovación Pública Digital	Colombia	https://gobiernodigital.mintic.gov.co/portal/Iniciativas/Centro-de-Innovacion-Publica-Digital
WB7	Dener and others (2021)	Digital government strategies and action plans establish institutions to support GovTech with focus on a whole-of-government approach, data-driven public sector, digital skills development, and innovation labs.	Digital India	India	https://digitalindia.gov.in/
WB7	Dener and others (2021)	Digital government strategies and action plans establish institutions to support GovTech with focus on a whole-of-government approach, data-driven public sector, digital skills development, and innovation labs.	GovTech	Singapore	https://www.tech.gov.sg/
WB7	Dener and others (2021)	Digital government strategies and action plans establish institutions to support GovTech with focus on a whole-of-government approach, data-driven public sector, digital skills development, and innovation labs.	Center for Public Service Innovation	South Africa	https://www.cpsi.co.za/
WB8	Dener and others (2021)	Few countries engage in public-private partnerships to draw on private sector skills, innovations and investments for addressing public sector challenges.	Service Portal – BuyICT	Australia	https://www.buyict.gov.au/sp
WB8	Dener and others (2021)	Few countries engage in public-private partnerships to draw on private sector skills, innovations and investments for addressing public sector challenges.	Centre of Excellence for IoT & AI	India	https://www.coe-iot.com/
WB8	Dener and others (2021)	Few countries engage in public-private partnerships to draw on private sector skills, innovations and investments for addressing public sector challenges.	GeBIZ	Singapore	https://www.gebiz.gov.sg/
WB9	Dener and others (2021)	Efforts are needed to expand issuance of unique national ID at birth and civil registration.	Digital ID	Australia	https://www.digitalidentity.gov.au/
WB9	Dener and others (2021)	Efforts are needed to expand issuance of unique national ID at birth and civil registration.	Aadhaar	India	https://uidai.gov.in/en/

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
WB9	Dener and others (2021)	Efforts are needed to expand issuance of unique national ID at birth and civil registration.	United Arab Emirates pass	United Arab Emirates	https://selfcare.uaepass.ae/
WB10	Dener and others (2021)	AI, chatbots, blockchain, IoT and drones, inter alia, are used to reduce administrative burden, strengthen oversight and better service quality.	Soluciones Tecnológicas para la Administración Pública	Argentina	https://www.argentina.gob.ar/jefatura/innovacion-publica/servicios-y-pais-digital/soluciones
WB10	Dener and others (2021)	AI, chatbots, blockchain, IoT and drones, inter alia, are used to reduce administrative burden, strengthen oversight and better service quality.	Digital Dubai	United Arab Emirates	https://www.digitaldubai.ae/
WB11	World Bank. (2022a)	Core Government Systems: Government cloud.	National Data Center	Bangladesh	https://ndc.bcc.gov.bd/
WB11	World Bank. (2022a)	Core Government Systems: Government cloud.	Mauritius Digital Promotion Agency	Mauritius	https://ncb.govmu.org/ncb/governmentonline.html
WB11	World Bank. (2022a)	Core Government Systems: Government cloud.	Data Center Services	Uganda	https://www.nita.go.ug/DataCentreservices
WB12	World Bank. (2022a)	Core Government Systems: Interoperability framework and government service bus.	National Digital Architecture	Bangladesh	https://bnda.gov.bd/Index
WB12	World Bank. (2022a)	Core Government Systems: Interoperability framework and government service bus.	GovNet	Tanzania	https://www.ega.go.tz/products/govnet
WB12	World Bank. (2022a)	Core Government Systems: Interoperability framework and government service bus.	GEA & e-GIF	Uganda	https://www.nita.go.ug/projects-service-portfolio/uganda-enterprise-architecture-and-interoperability-framework
WB13	World Bank. (2022a)	Core Government Systems: Core systems for central government operations.	Government e-Office System	Tanzania	https://www.ega.go.tz/products/e-office
WB14	World Bank. (2022a)	Core Government Systems: Shared platforms.			
WB15	World Bank. (2022a)	Core Government Systems: Open-source software.	Software Ecuatoriano	Ecuador	https://www.softwarepublico.gob.ec/
WB16	World Bank. (2022a)	Core Government Systems: National strategy on disruptive/innovative technologies.			
WB17	World Bank. (2022a)	Public Service Delivery: Online service portals.	MyGov	Bangladesh	https://www.mygov.bd/
WB17	World Bank. (2022a)	Public Service Delivery: Online service portals.	island.is	Iceland	https://island.is/
WB17	World Bank. (2022a)	Public Service Delivery: Online service portals.	MYGOV	Mauritius	https://govmu.org/EN/Pages/default.aspx
WB17	World Bank. (2022a)	Public Service Delivery: Online service portals.	e-Mongolia	Mongolia	https://e-mongolia.mn/start
WB17	World Bank. (2022a)	Public Service Delivery: Online service portals.	Omanuna	Oman	https://www.oman.om/
WB17	World Bank. (2022a)	Public Service Delivery: Online service portals.	G2C Services	Tanzania	https://www.ega.go.tz/e-services/government-to-citizens-g2c
WB17	World Bank. (2022a)	Public Service Delivery: Online service portals.	eCitizen	Uganda	https://ecitizen.go.ug
WB17	World Bank. (2022a)	Public Service Delivery: Online service portals.	my.gov.uz	Uzbekistan	https://my.gov.uz/en/tourism/index

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
WB18	World Bank. (2022a)	Public Service Delivery: Tax online services and e-filing.	MRA e-Services	Mauritius	https://eservices.mra.mu/
WB19	World Bank. (2022a)	Public Service Delivery: Customs single window online services.			
WB20	World Bank. (2022a)	Public Service Delivery: E-payment services.	e-Payment Gateway	Mauritius	https://govmu.org/EN/Pages/epayment.aspx
WB21	World Bank. (2022a)	Public Service Delivery: Social insurance/pension online services.	Ecuadorian Social Security Institute	Ecuador	https://www.iess.gob.ec/
WB22	World Bank. (2022a)	Public Service Delivery: Job portal.	Mauritius Jobs	Mauritius	https://mauritiusjobs.govmu.org/
WB22	World Bank. (2022a)	Public Service Delivery: Job portal.	Search Job Vacancies	Oman	https://www.mol.gov.om/job
WB23	World Bank. (2022a)	Public Service Delivery: Citizen-centric and universally accessible services.	Reports and Reviews	Iceland	https://island.is/s/stafraent-island/skyrslur
WB23	World Bank. (2022a)	Public Service Delivery: Citizen-centric and universally accessible services.	Mobile Government Services System	Tanzania	https://www.ega.go.tz/products/mgov
WB24	World Bank. (2022a)	Digital Citizen Engagement: Open government portals.			
WB25	World Bank. (2022a)	Digital Citizen Engagement: Open data portals.	Opin gögn	Iceland	https://opingogn.is/
WB25	World Bank. (2022a)	Digital Citizen Engagement: Open data portals.	Open Data Oman	Oman	https://opendata.om/
WB26	World Bank. (2022a)	Digital Citizen Engagement: E-participation.	Diálogo 2.0	Ecuador	https://aportecivico.gobiernoelectronico.gob.ec/
WB26	World Bank. (2022a)	Digital Citizen Engagement: E-participation.	DParliament	Mongolia	https://d.parliament.mn
WB26	World Bank. (2022a)	Digital Citizen Engagement: E-participation.	eParticipation	Oman	https://omanportal.gov.om
WB27	World Bank. (2022a)	Digital Citizen Engagement: E-feedback.	11-11	Mongolia	https://www.11-11.mn/
WB28	World Bank. (2022a)	Digital Citizen Engagement: Government response.			
WB29	World Bank. (2022a)	GovTech Enablers: GovTech institutions.	Department of Information and Communication Technology	Bangladesh	https://ictd.gov.bd/
WB29	World Bank. (2022a)	GovTech Enablers: GovTech institutions.	Ministry of Telecommunications and Information Society	Ecuador	https://www.telecomunicaciones.gob.ec/
WB29	World Bank. (2022a)	GovTech Enablers: GovTech institutions.	Ministry of Communications and Information Technology	Egypt	https://mcit.gov.eg/en
WB29	World Bank. (2022a)	GovTech Enablers: GovTech institutions.	Internet Government Authority	Tanzania	https://www.ega.go.tz/

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WB29	World Bank. (2022a)	GovTech Enablers: GovTech institutions.	National Information Technology Authority	Uganda	https://www.nita.go.ug/
WB29	World Bank. (2022a)	GovTech Enablers: GovTech institutions.	Ministry of Digital Technologies	Uzbekistan	https://mitc.uz/en
WB30	World Bank. (2022a)	GovTech Enablers: Data governance institutions.	Bangladesh Computer Council	Bangladesh	https://bcc.gov.bd/
WB31	World Bank. (2022a)	GovTech Enablers: Digital strategy.	ICT 2030 Strategy	Egypt	https://mcit.gov.eg/en/ICT_Strategy
WB31	World Bank. (2022a)	GovTech Enablers: Digital strategy.	Digital Iceland Strategy	Iceland	https://island.is/en/o/digital-iceland/digital-strategy
WB31	World Bank. (2022a)	GovTech Enablers: Digital strategy.	Digital Uzbekistan 2030	Uzbekistan	https://lex.uz/docs/5031048
WB32	World Bank. (2022a)	GovTech Enablers: Whole-of-government approach.	Agenda de Transformación Digital Ecuador	Ecuador	https://www.telecomunicaciones.gob.ec/agenda-de-transformacion-digital-ecuador/
WB32	World Bank. (2022a)	GovTech Enablers: Whole-of-government approach.	Development Strategy of New Uzbekistan for 2022-2026	Uzbekistan	https://lex.uz/ru/docs/5841077
WB33	World Bank. (2022a)	GovTech Enablers: Laws and regulations.			
WB34	World Bank. (2022a)	GovTech Enablers: Digital signature.	Office of the Controller of Certifying Authorities	Bangladesh	https://www.cca.gov.bd/
WB35	World Bank. (2022a)	GovTech Enablers: Digital skills strategy or program.	Digital Egypt	Egypt	https://mcit.gov.eg/en/Digital_Egypt
WB35	World Bank. (2022a)	GovTech Enablers: Digital skills strategy or program.	Introduction to Innovation and Technology	Egypt	https://tiec.gov.eg/English/Programs/Innovation-Tech-Intro/Pages/default.aspx
WB36	World Bank. (2022a)	GovTech Enablers: Public sector innovation strategy or program.			
WB37	World Bank. (2022a)	GovTech Enablers: Public sector innovation entity.			
WB38	World Bank. (2022a)	GovTech Enablers: GovTech startups.			
OOM1	OECD OPSI & MBRCGI (2020a)	Innovative COVID-19 Responses Theme 1: Rapid acceleration of digital innovation and transformation.	United States Digital Response	USA	https://www.usdigitalresponse.org/
OOM2	OECD OPSI & MBRCGI (2020a)	Innovative COVID-19 Responses Theme 2: Seeking bottom-up solutions and insights.	Hack the Crisis	Estonia	https://garage48.org/hack-the-crisis
OOM3	OECD OPSI & MBRCGI (2020a)	Innovative COVID-19 Responses Theme 3: Social solidarity and caring.			

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OOM4	OECD OPSI & MBRCGI (2020a)	Innovative COVID-19 Responses Theme 4: Reducing the spread through virus tracking and adaptive action.	SPOTON – AI-Powered Thermal Scanning	Singapore	https://www.developer.tech.gov.sg/products/categories/digital-solutions-to-address-covid-19/spoton/overview.html
OOM5	OECD OPSI & MBRCGI (2020a)	Innovative COVID-19 Responses Theme 5: Forging a path to recovery.			
OOM6	OECD OPSI & MBRCGI (2020b)	Seamless Government Theme 1: Invisible government	Ministry of Possibilities, United Arab Emirates	United Arab Emirates	https://u.ae/en/about-the-uae/the-uae-government/ministry-of-possibilities
OOM7	OECD OPSI & MBRCGI (2020b)	Seamless Government Theme 2: Matrixed government			
OOM8	OECD OPSI & MBRCGI (2020b)	Seamless Government Theme 3: Anticipatory government	JRC Scenario Exploration System	EU	https://knowledge4policy.ec.europa.eu/foresight/tool/scenario-exploration-system-ses_en
OOM9	OECD OPSI & MBRCGI (2020c)	Focusing on the Overlooked Theme 1: New opportunities for the often neglected			
OOM10	OECD OPSI & MBRCGI (2020c)	Focusing on the Overlooked Theme 2: Bridging the urban-rural divide	Barefoot College International	India	https://www.barefootcollege.org/
OOM11	OECD OPSI & MBRCGI (2020c)	Focusing on the Overlooked Theme 3: Accessible and equitable service design	Video Chat and Sign Language for Inclusive Services	Georgia	https://govinsider.asia/intl-en/article/exclusive-georgia-using-video-chat-sign-language-inclusive-services-emergency-service-112
OOM12	OECD OPSI & MBRCGI (2020d)	Public Provider versus Big Brother Theme 1: Data harvesting and monitoring	Collecting mobile data about women to build safer public transportation	Chile	https://apolitical.co/solution-articles/en/women-move-around-cities-santiago-finding
OOM13	OECD OPSI & MBRCGI (2020d)	Public Provider versus Big Brother Theme 2: Biometric technologies and facial recognition	Facial verification for national digital identity	Singapore	https://www.developer.tech.gov.sg/products/categories/digital-identity/identiface/overview.html
OOM13	OECD OPSI & MBRCGI (2020d)	Public Provider versus Big Brother Theme 2: Biometric technologies and facial recognition	ICRC Designing a biometric policy for humanitarian aid	International	https://blogs.icrc.org/law-and-policy/2019/10/18/innovation-protection-icrc-biometrics-policy/
OOM14	OECD OPSI & MBRCGI (2020e)	Upskilling and Investing in People Theme 1: Investing in the public as a critical resource	CanCode	Canada	https://ised-isde.canada.ca/site/cancode/en
OOM14	OECD OPSI & MBRCGI (2020e)	Upskilling and Investing in People Theme 1: Investing in the public as a critical resource	Equalising the Potential for AI	Finland	https://www.elementsofai.com/
OOM15	OECD OPSI & MBRCGI (2020e)	Upskilling and Investing in People Theme 2: Upskilling the public service to unlock the potential of government	An Official Shadows an Entrepreneur	Latvia	https://www.em.gov.lv/en/article/more-100-public-administration-employees-familiarised-themselves-everyday-work-and-challenges-entrepreneurs-within-functionary-shadows-entrepreneur-initiative
OOM16	OECD OPSI & MBRCGI (2021-2022a)	Governing Cross- Border Challenges Theme 1: Building cross-border governance bodies	Kvarken Council	International	https://www.kvarken.org/en/the-kvarken-council/

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OOM17	OECD OPSI & MBRCGI (2021-2022a)	Governing Cross- Border Challenges Theme 2: Innovative networks tackling cross-border collaboration	Open European Dialogue	International	https://www.openeuropeandialogue.org/
OOM18	OECD OPSI & MBRCGI (2021-2022a)	Governing Cross- Border Challenges Theme 3: Exploring emerging governance system dynamics	Borderlands Inclusive Growth Deal	International	https://www.borderlandsgrowth.com/
OOM19	OECD OPSI & MBRCGI (2021-2022b)	Surfacing Insights and Experimenting Across Borders Theme 1: Surfacing ground-up insights and collective intelligence	Deep Space Food Challenge	International	https://www.deepspacefoodchallenge.org/
OOM20	OECD OPSI & MBRCGI (2021-2022b)	Surfacing Insights and Experimenting Across Borders Theme 2: Experimenting and testing across borders	5G-MOBIX	International	https://www.5g-mobix.com/
OOM21	OECD OPSI & MBRCGI (2021-2022c)	Delivering and Enabling Impactful Cross-Border Solutions Theme 1: Delivering joint cross-border policy and solution-oriented services	Korea Program on International Agriculture	Korea	http://itcc.rda.go.kr/kopia/main/mainpage/goMainPage.do?languageGb=02
OOM22	OECD OPSI & MBRCGI (2021-2022c)	Delivering and Enabling Impactful Cross-Border Solutions Theme 2: Digital architecture enabling cross-border innovation	X-Road Trust Federation	International	https://x-road.global/trust-federation
OOM23	OECD OPSI & MBRCGI (2021-2022c)	Delivering and Enabling Impactful Cross-Border Solutions Theme 3: Adding a cross-border dimension to upskilling and capacity building	Government Experience Exchange Programme	United Arab Emirates	https://www.governmentexchange.gov.ae/
OOM24	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/Algorithmic accountability	European Union Artificial Intelligence Act and AI Liability Directive	EU	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0206, https://ec.europa.eu/commission/presscorner/detail/en/ip_22_5807
OOM24	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/Algorithmic accountability	Spanish Artificial Intelligence Supervision Agency	Spain	https://www.boe.es/buscar/act.php?id=BOE-A-2021-21653
OOM24	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/Algorithmic accountability	OECD Good Practices Principles for Data Ethics in the Public Sector	International	https://www.oecd.org/gov/digital-government/good-practice-principles-for-data-ethics-in-the-public-sector.htm
OOM24	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/Algorithmic accountability	Ada Lovelace Institute determinants for the effective deployment of algorithmic accountability	UK	https://www.adalovelaceinstitute.org/report/algorithmic-accountability-public-sector/

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OOM24	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/Algorithmic accountability	GovTech Ecosystems in Latin America, Spain and Portugal	International	https://scioteca.caf.com/handle/123456789/1580
OOM24	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/Algorithmic accountability	Stanford University HAI considerations for algorithm auditing	USA	https://hai.stanford.edu/policy-brief-using-algorithm-audits-understand-ai
OOM24	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/Algorithmic accountability	Algorithmic Transparency Recording Standard	UK	https://www.gov.uk/government/collections/algorithmic-transparency-recording-standard-hub
OOM25	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/New aspects of transparency	OECD Rules as Code	International	https://oecd-opsi.org/publications/cracking-the-code/
OOM25	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/New aspects of transparency	Digital Trust for Places & Routines Standard	International	https://dtpr.io/
OOM25	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/New aspects of transparency	City of Amsterdam Sensor Register	The Netherlands	https://amsterdamintelligence.com/posts/an-interview-with-beryl-dreijer-about-the-sensor-register
OOM25	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/New aspects of transparency	Management Accountability Framework – Innovation Area of Management	Canada	https://www.canada.ca/en/treasury-board-secretariat/services/management-accountability-framework/maf-methodologies/2022-2023-aom.html
OOM25	OECD OPSI & MBRCGI (2023)	Trend 1: New forms of accountability for a new era of government/New aspects of transparency	Accountability Incubator	International	https://accountabilitylab.org/accountability-incubator/
OOM26	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/Re-orienting care (eco)systems	OECD Systems Approaches	International	https://oecd-opsi.org/publications/systems-approaches/
OOM26	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/Re-orienting care (eco)systems	European Health Data Space and Open Science Cloud	EU	https://health.ec.europa.eu/ehealth-digital-health-and-care/european-health-data-space_en, https://eosc-portal.eu/
OOM26	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/Re-orienting care (eco)systems	OECD Recommendation on Health Data Governance	International	https://www.oecd.org/health/health-data-governance-for-the-digital-age-68b60796-en.htm
OOM26	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/Re-orienting care (eco)systems	Queensland Bridge Labs Programme: An ecosystem approach to care	Australia	https://clinicalexcellence.qld.gov.au/priority-areas/service-improvement/bridge-labs-program

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OOM26	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/Re-orienting care (eco)systems	Bogotá Care Blocks	Colombia	https://oecd-opsi.org/innovations/bogota-care-blocks/
OOM27	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/Empathy and care to support mental health	Urgent Mental Health Care Centre	Australia	https://www.umhcc.org.au/
OOM27	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/Empathy and care to support mental health	OECD Mission Action Lab	International	https://oecd-missions.org/
OOM27	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/Empathy and care to support mental health	Mental Health Café	Australia	https://www.healthassembly.org.au/all-projects/mental-health-cafe/
OOM28	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/New technologies revolutionising healthcare	Mixed reality technology for healthcare	Serbia	https://oecd-opsi.org/innovations/mixed-reality-healthcare/
OOM28	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/New technologies revolutionising healthcare	NHS AI Lab	UK	https://transform.england.nhs.uk/ai-lab/
OOM28	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/New technologies revolutionising healthcare	Good Machine Learning Practice for Medical Device Development: Guiding Principles	USA	https://www.fda.gov/medical-devices/software-medical-device-samd/good-machine-learning-practice-medical-device-development-guiding-principles
OOM28	OECD OPSI & MBRCGI (2023)	Trend 2: New approaches to care/New technologies revolutionising healthcare	Tucuvi AI Nurse	International	https://www.tucuvi.com/
OOM29	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Honouring Indigenous communities and local cultures	IVOW Indigenous Knowledge Graph	International	https://www.ivow.ai/ikgstories.html
OOM29	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Honouring Indigenous communities and local cultures	CARE Principles for Indigenous Data Governance	International	https://www.gida-global.org/care
OOM29	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Honouring Indigenous communities and local cultures	Declaration of cooperation on advancing digitisation of cultural heritage	EU	https://digital-strategy.ec.europa.eu/en/news/eu-member-states-sign-cooperate-digitising-cultural-heritage
OOM29	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Honouring Indigenous communities and local cultures	Citizenship, democracy and justice for the Maxakali people	Brazil	https://oecd-opsi.org/innovations/citizenship-democracy-and-justice-for-the-maxakali-people/
OOM30	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Enabling families and communities	Presidential Employment Stimulus	South Africa	https://www.stateofthenation.gov.za/employment-stimulus-dashboard

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OOM30	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Enabling families and communities	Virtual Power Plant	Australia	https://www.energymining.sa.gov.au/consumers/solar-and-batteries/south-australias-virtual-power-plant
OOM30	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Enabling families and communities	Project Connect Anti-Displacement Initiatives	USA	https://www.austintexas.gov/department/project-connect-anti-displacement-initiatives
OOM30	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Enabling families and communities	Digital Girls Emilia-Romagna	Italy	https://digitale.regione.emilia-romagna.it/ragazze-digitali/ragazze-digitali
OOM30	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Enabling families and communities	National AI Supercomputing Platform	Serbia	https://www.ai.gov.rs/
OOM30	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Enabling families and communities	Empowered Families Initiative	Singapore	https://oecd-opsi.org/innovations/empowered-families-initiative/
OOM31	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Counteracting the creation of a gig economy underclass	OII Fairwork	International	https://fair.work/en/fw/homepage/
OOM31	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Counteracting the creation of a gig economy underclass	Neighbourhood Joint Delivery	Korea	https://oecd-opsi.org/innovations/neighborhood-joint-delivery/
OOM31	OECD OPSI & MBRCGI (2023)	Trend 3: New methods for preserving identities and strengthening equity/Counteracting the creation of a gig economy underclass	Ethical Deliveries	Italy	https://consegnetiche.it/
OOM32	OECD OPSI & MBRCGI (2023)	Trend 4: New ways of engaging citizens and residents/Empowering voices	Aarhus University Crea.Visions	Denmark	https://mgmt.au.dk/center-for-hybrid-intelligence/projects/creavisions
OOM32	OECD OPSI & MBRCGI (2023)	Trend 4: New ways of engaging citizens and residents/Empowering voices	Stanford Online Deliberation Platform	USA	https://deliberation.stanford.edu/tools-and-resources/online-deliberation-platform
OOM32	OECD OPSI & MBRCGI (2023)	Trend 4: New ways of engaging citizens and residents/Empowering voices	Brussels Parliament Deliberative Committees	Belgium	https://democratie.brussels/
OOM33	OECD OPSI & MBRCGI (2023)	Trend 4: New ways of engaging citizens and residents/Re-imagining communities, physically and virtually	PropTech Engagement Fund	UK	https://www.localdigital.gov.uk/digital-planning/proptech/funding/proptech-engagement-fund-round-2/
OOM33	OECD OPSI & MBRCGI (2023)	Trend 4: New ways of engaging citizens and residents/Re-imagining communities, physically and virtually	Citizen Initiative Accelerator	France	https://citoyens.transformation.gouv.fr/

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OOM33	OECD OPSI & MBRCGI (2023)	Trend 4: New ways of engaging citizens and residents/Re-imagining communities, physically and virtually	#FreetownTheTree Town	Sierra Leone	https://fcc.gov.sl/freetown-the-treetown/
UND1	United Nations, Department of Economic and Social Affairs (2020)	Regional challenges, opportunities and initiatives: UN regional commissions play an important leading or coordinating role	Asia-Pacific Information Superhighway	International)	https://www.unescap.org/our-work/ict-and-disaster-risk-reduction/asia-pacific-information-superhighway-platform
UND1	United Nations, Department of Economic and Social Affairs (2020)	Regional challenges, opportunities and initiatives: UN regional commissions play an important leading or coordinating role	Digital Silk Road	International	https://www.unescap.org/sites/default/files/BRI.pdf
UND2	United Nations, Department of Economic and Social Affairs (2020)	Regional challenges, opportunities and initiatives: focus on digital trade, digital economy, open government, open data, user-centric evaluation, disaster risk mitigation, large-scale digitalization of core public sector functions, adoption of national/regional strategic digital policies and implementation plans	United Nations Centre for Trade Facilitation and Electronic Business	International	https://unece.org/trade/uncefact/introduction
UND2	United Nations, Department of Economic and Social Affairs (2020)	Regional challenges, opportunities and initiatives: focus on digital trade, digital economy, open government, open data, user-centric evaluation, disaster risk mitigation, large-scale digitalization of core public sector functions, adoption of national/regional strategic digital policies and implementation plans	Government Electronic and Mobile Services Maturity Index	International	https://www.unescwa.org/publications/government-electronic-mobile-services-maturity-index-2021
UND3	United Nations, Department of Economic and Social Affairs (2020)	Regional challenges, opportunities and initiatives: importance of regional cooperation and relevance of digital transformation for specific regional challenges and the SDGs	Smart Africa	International	https://smartafrica.org/
UND3	United Nations, Department of Economic and Social Affairs (2020)	Regional challenges, opportunities and initiatives: importance of regional cooperation and relevance of digital transformation for specific regional challenges and the SDGs	Policy and Regulation Initiative for Digital Africa	International	https://www.itu.int/net4/ITU-D/CDS/projects/display.asp?ProjectNo=9RAF18089
UND3	United Nations, Department of Economic and Social Affairs (2020)	Regional challenges, opportunities and initiatives: importance of regional cooperation and relevance of digital transformation for specific regional challenges and the SDGs	The SAMOA Pathway	International	https://www.un.org/ohrlls/content/samoa-pathway
UND3	United Nations, Department of Economic and Social Affairs (2020)	Regional challenges, opportunities and initiatives: importance of regional cooperation and relevance of digital transformation for specific regional challenges and the SDGs	Network of e-Government Leaders of Latin America and the Caribbean	International	https://www.redgealc.org/

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UND4	United Nations, Department of Economic and Social Affairs (2020)	Local e-government development: most city portals are still offering few or no services, but nearly all city portals are accessible from mobile devices, confirming awareness of the importance of multichannel service delivery	City of Sydney Data Hub	Australia	https://data.cityofsydney.nsw.gov.au/
UND4	United Nations, Department of Economic and Social Affairs (2020)	Local e-government development: most city portals are still offering few or no services, but nearly all city portals are accessible from mobile devices, confirming awareness of the importance of multichannel service delivery	DEWA Rammas chatbot	United Arab Emirates	https://www.dewa.gov.ae/en/rammas
UND4	United Nations, Department of Economic and Social Affairs (2020)	Local e-government development: most city portals are still offering few or no services, but nearly all city portals are accessible from mobile devices, confirming awareness of the importance of multichannel service delivery	Amman e-tenders platform	Jordan	http://www.gamtenders.gov.jo/
UND4	United Nations, Department of Economic and Social Affairs (2020)	Local e-government development: most city portals are still offering few or no services, but nearly all city portals are accessible from mobile devices, confirming awareness of the importance of multichannel service delivery	Casablanca Casa Store	Morocco	http://www.casastore.ma/
UND4	United Nations, Department of Economic and Social Affairs (2020)	Local e-government development: most city portals are still offering few or no services, but nearly all city portals are accessible from mobile devices, confirming awareness of the importance of multichannel service delivery	New York City ASL Direct	USA	https://www.nyc.gov/site/mopd/initiatives/asl-direct.page
UND5	United Nations, Department of Economic and Social Affairs (2020)	Local e-government development: need for involvement of local residents, public and private sector entities, NGOs and INGOs/IGO, incentives for SMEs to partner in innovative smart city projects and sharing of successful smart city initiatives	Boston school bus routing optimization	USA	https://www.route-fifty.com/digital-government/2019/08/boston-school-bus-routes/159113/
UND5	United Nations, Department of Economic and Social Affairs (2020)	Local e-government development: need for involvement of local residents, public and private sector entities, NGOs and INGOs/IGO, incentives for SMEs to partner in innovative smart city projects and sharing of successful smart city initiatives	São Paulo Electronic Waste Transport Control	Brazil	https://publicadministration.un.org/en/Themes/Digital-Government/Good-Practices-for-Digital-Government/Compendium/CompendiumID/538
UND5	United Nations, Department of Economic and Social Affairs (2020)	Local e-government development: need for involvement of local residents, public and private sector entities, NGOs and INGOs/IGO, incentives for SMEs to partner in innovative smart city projects and sharing of successful smart city initiatives	Hangzhou City Brain	China	https://chinareportasean.com/2022/02/24/hangzhou-brainy-urban-transit/

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
UND5	United Nations, Department of Economic and Social Affairs (2020)	Local e-government development: need for involvement of local residents, public and private sector entities, NGOs and INGOs/IGO, incentives for SMEs to partner in innovative smart city projects and sharing of successful smart city initiatives	Buenos Aires Interact City lighting management	Argentina	https://www.interact-lighting.com/global/customer-stories/buenos-aires
UND6	United Nations, Department of Economic and Social Affairs (2020)	E-Participation: rising of multi-function platforms, ideation forums, new policy consultations/e-petitions, opinion surveys, complaint filing, corruption reporting, idea/innovation generation	Decide Madrid	Spain	https://decide.madrid.es/
UND6	United Nations, Department of Economic and Social Affairs (2020)	E-Participation: rising of multi-function platforms, ideation forums, new policy consultations/e-petitions, opinion surveys, complaint filing, corruption reporting, idea/innovation generation	Bogotá te escucha	Colombia	https://bogota.gov.co/sdqs/
UND6	United Nations, Department of Economic and Social Affairs (2020)	E-Participation: rising of multi-function platforms, ideation forums, new policy consultations/e-petitions, opinion surveys, complaint filing, corruption reporting, idea/innovation generation	Tawasul Complaint and Suggestions System	Bahrain	https://services.bahrain.bh/wps/portal/tawasul
UND7	United Nations, Department of Economic and Social Affairs (2020)	E-Participation: boundaries between public and private initiatives blur by private and NPO platforms for citizen action or user feedback			
UND8	United Nations, Department of Economic and Social Affairs (2020)	E-Participation: take-up remains largely low due, inter alia, to lack of technology access, digital skills, citizen motivations, reluctance of public institutions to share agenda setting and decision-making power	My Budget	Korea	https://www.mybudget.go.kr/
UND9	United Nations, Department of Economic and Social Affairs (2020)	Towards data-centric e-government: optimize government data use for productivity, accountability, inclusivity, trustworthiness of public institutions, in line to SDG16 principles	Shanghai Municipal Big Data Center	China	https://archive.shine.cn/business/it/Big-Data-center-launched-to-drive-smart-Shanghai/shdaily.shtml
UND9	United Nations, Department of Economic and Social Affairs (2020)	Towards data-centric e-government: optimize government data use for productivity, accountability, inclusivity, trustworthiness of public institutions, in line to SDG16 principles	Registro Nacional de Identificación y Estado Civil	Peru	https://www.reniec.gob.pe/portal/masServiciosLinea.htm
UND9	United Nations, Department of Economic and Social Affairs (2020)	Towards data-centric e-government: optimize government data use for productivity, accountability, inclusivity, trustworthiness of public institutions, in line to SDG16 principles	National Information Resources Service	Korea	https://www.nirs.go.kr/index.jsp
UND10	United Nations, Department of Economic and Social Affairs (2020)	Towards data-centric e-government: overcome low understanding of data/data science, low political priority, low data leadership, resource constraints, quality, security and privacy concerns	Digital Bangladesh	Bangladesh	https://digitalbangladesh.gov.bd/

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
UND11	United Nations, Department of Economic and Social Affairs (2020)	Towards data-centric e-government: harvesting public value from data requires long-term vision and mastering data governance economics, politics, security, privacy via whole-of-government approaches, frameworks, strategies, leadership and a data ecosystem	Smart Nation	Singapore	https://www.smartnation.gov.sg/
UND12	United Nations, Department of Economic and Social Affairs (2020)	Capacities for digital transformation: fundamental role of governance transformation and cultural change in support of national development vision/strategy and the SDGs	Digital Kazakhstan State Program	Kazakhstan	https://egov.kz/cms/en/digital-kazakhstan
UND13	United Nations, Department of Economic and Social Affairs (2020)	Capacities for digital transformation: need for a holistic value-driven approach, institutionalized across the whole of government and society, via context and situation analysis, shared vision of government transformation and leveraging technologies for societal goals, a strategy/roadmap and monitoring/evaluation	Digital Strategy Toolkit	Australia	https://www.dpc.sa.gov.au/responsibilities/ict-digital-cyber-security/toolkits/digital-transformation-toolkit
UND13	United Nations, Department of Economic and Social Affairs (2020)	Capacities for digital transformation: need for a holistic value-driven approach, institutionalized across the whole of government and society, via context and situation analysis, shared vision of government transformation and leveraging technologies for societal goals, a strategy/roadmap and monitoring/evaluation	OECD Going Digital Toolkit	International	https://goingdigital.oecd.org/
UND14	United Nations, Department of Economic and Social Affairs (2020)	Capacities for digital transformation: put people needs first, promote digital inclusion, ensure that vulnerable groups and all can access new technologies to improve their wellbeing	Silver Infocomm Junctions	Singapore	https://www.imda.gov.sg/how-we-can-help/silver-infocomm-junctions
UND15	United Nations, Department of Economic and Social Affairs (2020)	The role of digital government in the COVID-19 pandemic: establish essential communication, leadership and collaboration between policymakers and society			
UND16	United Nations, Department of Economic and Social Affairs (2020)	The role of digital government in the COVID-19 pandemic: consider unintended consequences of technology use and actively protect sensitive data and people's privacy and security			
UND17	United Nations, Department of Economic and Social Affairs (2020)	The role of digital government in the COVID-19 pandemic: leveraging ICT is critical for good governance in difficult times and needs to continue beyond the crisis			

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
UND18	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Digital technologies improve vaccine delivery.	CDC Vaccine Tracking System	USA	https://www.cdc.gov/vaccines/programs/vtrcks/about.html
UND19	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Procurement processes are improved to allow responding expeditiously to urgent demands.			
UND20	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Digital technologies constitute a key component of COVID-19 response.	UNICEF HealthBuddy+	International	https://healthbuddy.plus/index
UND21	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Virtual communication has become the norm.			
UND22	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Employees no longer have to live where they work, and students no longer have to live where they study.	New South Wales Dept of Education Schools Digital Strategy	Australia	https://education.nsw.gov.au/about-us/strategies-and-reports/schools-digital-strategy
UND23	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: The idea that personalization of government service delivery requires human contact is challenged by emerging digital options.	Hispabot-Covid19 WhatsApp Channel	Spain	https://www.lamoncloa.gob.es/lang/en/gobierno/news/Paginas/2020/20200408covid-assistance.aspx
UND24	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Digital identity is more widely accepted by governments.	ClaveÚnica	Chile	https://claveunica.gob.cl/
UND25	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Internal coordination, open access to government data, and interoperability are key priorities in government digitalization.	Digital Nations	International	https://www.leadingdigitalgovs.org/
UND25	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Internal coordination, open access to government data, and interoperability are key priorities in government digitalization.	Open Data Charter	International	https://opendatacharter.net/who-we-are/
UND26	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Efforts are made to expand Internet accessibility and acquisition of digital skills for the general population.			
UND27	United Nations, Department of Economic and Social Affairs (2022)	Impact of the COVID-19 pandemic: Governments upgrade information-sharing systems between health-care providers, government agencies and the public.	e-Rakt Kosh Centralised Blood Bank Management System	India	https://www.eraktkosh.in/BLDAHIMS/bloodbank/transactions/bbpublicindex.html

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
UND28	United Nations, Department of Economic and Social Affairs (2022)	Importance of engaging the private sector: Governments invest more in R&D for high-growth and high-risk areas.			
UND29	United Nations, Department of Economic and Social Affairs (2022)	Digital transformation in the public sector: Governments empower and engage the general public in development discussions and decisions on an ongoing basis.	Borgerforslag Platform	Denmark	https://www.borgerforslag.dk/
UND30	United Nations, Department of Economic and Social Affairs (2022)	Digital transformation in the public sector: Making government data, information and digital resources readily available to the public is crucial.			
UND31	United Nations, Department of Economic and Social Affairs (2022)	Digital transformation in the public sector: Cloud technology allows to optimize and facilitate IT management and adoption.			
UND32	United Nations, Department of Economic and Social Affairs (2022)	Digital transformation in the public sector: Cloud computing facilitates disaster response and humanitarian efforts.			
UND33	United Nations, Department of Economic and Social Affairs (2022)	Digital transformation in the public sector: Cybercrime and skills gaps challenge law enforcement, especially in cross-border contexts.			
UND34	United Nations, Department of Economic and Social Affairs (2022)	Digital transformation in the public sector: Non-uniform data protection regulations create conflicts for data sharing across jurisdictions.			
UND35	United Nations, Department of Economic and Social Affairs (2022)	Digital transformation in the public sector: Cognitive government leverages hindsight, real-time data, and foresight to drive policy- and decision-making.			
UND36	United Nations, Department of Economic and Social Affairs (2022)	Digital transformation in the public sector: Agile and adaptive government is flexible in, inter alia, policymaking, regulation, procurement and workforce.			
UND37	United Nations, Department of Economic and Social Affairs (2022)	Digital transformation in the public sector: Seamless government provides personalized, proactive services in a “frictionless” experience.			
UND38	United Nations, Department of Economic and Social Affairs (2022)	Digital government at the local level: key areas include smart cities, intelligent transportation, precision agriculture and health care.	Virtual Singapore	Singapore	https://www.sla.gov.sg/geospatial/gw/virtual-singapore
UND39	United Nations, Department of Economic and Social Affairs (2022)	Leaving no one behind in the digital society: The new face of inequality is digital, and e-government can be the social equalizer.			

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
UND40	United Nations, Department of Economic and Social Affairs (2022)	Leaving no one behind in the digital society: equity innovation that promotes equity, often with multistakeholder input.			
UND41	United Nations, Department of Economic and Social Affairs (2022)	Leaving no one behind in the digital society: inclusive innovation, via service development for and by those excluded from the development mainstream.			
ITU1, ITU19, ITU37	ITU (2020a), ITU (2020b)	The role of governments and all stakeholders in the promotion of ICTs for development.	Digital Clinic	Singapore	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15738009633980341, https://www.imda.gov.sg/resources/press-releases-factsheets-and-speeches/press-releases/2020/virtual-support-and-activities-to-help-more-seniors-during-circuit-breaker
ITU2, ITU20, ITU38	ITU (2020a), ITU (2020b)	Information and communication infrastructure: An essential foundation for the information society	Wifi Gratuito	Mexico	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15744714664105182, https://gobierno.cdmx.gob.mx/acciones/wifi-gratuito/
ITU3, ITU21, ITU39	ITU (2020a), ITU (2020b)	Access to information and knowledge	Geospatial Infrastructure Platform	United Arab Emirates	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15750595503016933, https://geoportal.moid.gov.ae/msdi/HomeEn.aspx
ITU4, ITU22, ITU40	ITU (2020a), ITU (2020b)	Capacity building	Siberkreasi National Movement for Digital Literacy	Indonesia	https://www.itu.int/net4/wsis/archive/stocktaking/Project/Details?projectId=1514925904, https://gnld.siberkreasi.id/
ITU5, ITU23, ITU41	ITU (2020a), ITU (2020b)	Building confidence and security in the use of ICTs	Global Accredited Cybersecurity Education Scheme	Malaysia	https://www.itu.int/net4/wsis/archive/stocktaking/Project/Details?projectId=1514450542, https://www.cybersecurity.my/en/index.html
ITU6, ITU24, ITU42	ITU (2020a), ITU (2020b)	Enabling environment	Startup Tunisia	Tunisia	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15748702221348752, https://startup.gov.tn/en/home
ITU7, ITU25, ITU43	ITU (2020a), ITU (2020b)	Applications of e-government	Sabooj Sathi Bi-cycle Distribution Scheme	India	https://www.itu.int/net4/wsis/archive/stocktaking/Project/Details?projectId=1515590597, https://wbsaboojsathi.gov.in/v2/
ITU8, ITU26, ITU44	ITU (2020a), ITU (2020b)	Applications of e-business	Centros de Transformación Digital Empresarial	Colombia	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15729855407467321, https://www.mintic.gov.co/portal/inicio/Atencion-y-Servicio-a-la-Ciudadania/Preguntas-frecuentes/198857:Centros-de-Transformacion-Digital

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
ITU9, ITU27, ITU45	ITU (2020a), ITU (2020b)	Applications of e-learning	KIBERone International Cyberschool of the Future	Russian Federation	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15743175374799936, https://kiber-one.com/
ITU10, ITU28, ITU46	ITU (2020a), ITU (2020b)	Applications of e-health	Early Diagnosis of Breast Cancer using Artificial Intelligence	Oman	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15722606566133837, https://omanportal.gov.om/wps/wcm/connect/2a19ffae-ade0-428b-9f7c-b30bdd874882/Al%2BShifa_MoH.pdf?MOD=AJPERES
ITU11, ITU29, ITU47	ITU (2020a), ITU (2020b)	Applications of e-employment	Shared Recruitment Management System	Bangladesh	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15743601692379936, https://erecruitment.bcc.gov.bd
ITU12, ITU30, ITU48	ITU (2020a), ITU (2020b)	Applications of e-environment	"Smart Blue" Public Service Big Data Platform	China	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15742314744986231
ITU13, ITU31, ITU49	ITU (2020a), ITU (2020b)	Applications of e-agriculture	Eyes in the Sky, Smart Techs on the Ground	The Netherlands	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15741977569904997, https://cta.int/en/legacy/eyes-in-the-sky-smart-techs-on-the-ground.html
ITU14, ITU32, ITU50	ITU (2020a), ITU (2020b)	Applications of e-science	Open Data Policy and Portal	Qatar	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15742450543860234, https://www.data.gov.qa/pages/home/
ITU15, ITU33, ITU51	ITU (2020a), ITU (2020b)	Cultural diversity and identity, linguistic diversity and local content	Attaa Initiative	Saudi Arabia	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15742785217616085, https://attaa.sa/
ITU16, ITU34, ITU52	ITU (2020a), ITU (2020b)	Media	Voices of women media	Nepal	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15746764066965210, https://www.voicesofwomenmedia.org/
ITU17, ITU35, ITU53	ITU (2020a), ITU (2020b)	Ethical Dimension of the Information Society	ICT and Media: Efficient tools for youth to Counter Violent Extremism	Ghana	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15729673755295321, https://gifec.gov.gh/
ITU18, ITU36, ITU54	ITU (2020a), ITU (2020b)	International and Regional Cooperation	Innovactoras	Spain	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/15749588157622304, https://innovactoras.eu/
ITU1, ITU19, ITU37	ITU (2021)	The role of governments and all stakeholders in the promotion of ICTs for development.	KSA Free Wi-Fi	Saudi Arabia	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16121776243755024, https://www.cst.gov.sa/en/mediacenter/pressreleases/Pages/2020111502.aspx

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
ITU2, ITU20, ITU38	ITU (2021)	Information and communication infrastructure: An essential foundation for the information society	National Implementation of the Financial Inclusion Initiative	China	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16112210980171296, https://www.worldbank.org/en/topic/financialinclusion/brief/figi
ITU3, ITU21, ITU39	ITU (2021)	Access to information and knowledge	Comparatel	Peru	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16115857610237947, https://www.checatuplan.pe/
ITU4, ITU22, ITU40	ITU (2021)	Capacity building	Talk to me	Georgia	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16115655701130029
ITU5, ITU23, ITU41	ITU (2021)	Building confidence and security in the use of ICTs	Central Biometric Verification Monitoring Platform	Bangladesh	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16115777478941397, http://www.btrc.gov.bd/site/page/006f2b07-753d-4e2d-bfd2-2325fd096b18/%E0%A6%A1%E0%A6%AC%E0%A7%8D%E0%A6%B2%E0%A6%BF%E0%A6%89%E0%A6%8F%E0%A6%B8%E0%A6%86%E0%A6%87%E0%A6%8F%E0%A6%B8--%E0%A7%A8%E0%A7%A6%E0%A7%A8%E0%A7%A7
ITU6, ITU24, ITU42	ITU (2021)	Enabling environment	Practice-focused training in cybersecurity	Russian Federation	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16113288803165454
ITU7, ITU25, ITU43	ITU (2021)	Applications of e-government	Citizens' Electronic Appeals	Azerbaijan	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16114420930371335
ITU8, ITU26, ITU44	ITU (2021)	Applications of e-business	ServicePlus Metadata based eService Delivery Framework	India	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16100066222829673, https://serviceonline.gov.in/
ITU9, ITU27, ITU45	ITU (2021)	Applications of e-learning	Our Girls Our Future	Ghana	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16121704413030647, https://www.blacksis.org/our-girls-our-future
ITU10, ITU28, ITU46	ITU (2021)	Applications of e-health	SHEFAA Platform	United Arab Emirates	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16121141751615103, https://patient.ehs.gov.ae/FE/Home.aspx
ITU11, ITU29, ITU47	ITU (2021)	Applications of e-employment	Kahramaa Mobile Application - Employee Section	Qatar	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16117371534091032

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
ITU12, ITU30, ITU48	ITU (2021)	Applications of e-environment	Al Nawras Flight Permission and Scheduling System	Bahrain	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16112045204869966
ITU13, ITU31, ITU49	ITU (2021)	Applications of e-agriculture	Leveraging ICT for Irrigated Agricultural Information	Indonesia	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16110566483215160
ITU14, ITU32, ITU50	ITU (2021)	Applications of e-science	Epidemiological Surveillance 4.0 Ramón Carrillo	Argentina	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16115247461934287
ITU15, ITU33, ITU51	ITU (2021)	Cultural diversity and identity, linguistic diversity and local content	Digital Transformation Center	Rwanda	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16122163593945285, https://digicenter.rw/
ITU16, ITU34, ITU52	ITU (2021)	Media	CMHS Radio Caibarién | La Voz de la Villa Blanca	Cuba	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16077823660883007, https://www.radiocaibarien.icrt.cu/
ITU17, ITU35, ITU53	ITU (2021)	Ethical Dimension of the Information Society	Digital Community Center	Thailand	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16045588332512297
ITU18, ITU36, ITU54	ITU (2021)	International and Regional Cooperation	Digital Communities	USA	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16115517515788723, https://www.americantower.com/sustainability/digital-communities.html
ITU1, ITU19, ITU37	ITU (2022a), ITU (2022b)	The role of governments and all stakeholders in the promotion of ICTs for development	Meghalaya Enterprise Architecture	India	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16427469524214476, https://megplanning.gov.in/megh_ea.html
ITU2, ITU20, ITU38	ITU (2022a), ITU (2022b)	Information and communication infrastructure: An essential foundation for the information society	Free Wifi for All	Philippines	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16427481645414476, https://dict.gov.ph/freewifi/
ITU3, ITU21, ITU39	ITU (2022a), ITU (2022b)	Access to information and knowledge	Targeted poverty alleviation management based on GIS and location big data analysis	China	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16421761923203369
ITU4, ITU22, ITU40	ITU (2022a), ITU (2022b)	Capacity building	Tumaris Tech	Uzbekistan	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16426796404467185, https://tumaris.tech/
ITU5, ITU23, ITU41	ITU (2022a), ITU (2022b)	Building confidence and security in the use of ICTs	SafeSpace Platform	Qatar	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16423271834224692, https://www.safespace.qa/en

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
ITU6, ITU24, ITU42	ITU (2022a), ITU (2022b)	Enabling environment	2030 Digital Agenda	Dominican Republic	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16348432581164710, https://agendadigital.gob.do/
ITU7, ITU25, ITU43	ITU (2022a), ITU (2022b)	Applications of e-government	Digital Land Tax	Bangladesh	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16428023359194512, https://ldtax.gov.bd/
ITU8, ITU26, ITU44	ITU (2022a), ITU (2022b)	Applications of e-business	Mobile Payment Solution D17	Tunisia	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16420145975511582
ITU9, ITU27, ITU45	ITU (2022a), ITU (2022b)	Applications of e-learning	Emirati School Smart Learning Ecosystem	United Arab Emirates	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16427761553910649
ITU10, ITU28, ITU46	ITU (2022a), ITU (2022b)	Applications of e-health	COVID-19MX App	Mexico	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16436284049575874, https://play.google.com/store/apps/details?id=mx.gob.www&hl=en&gl=US
ITU11, ITU29, ITU47	ITU (2022a), ITU (2022b)	Applications of e-employment	E-recruitment platform	Palestine	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16425341001674958, https://www.gpc.pna.ps/diwan/index.gpc
ITU12, ITU30, ITU48	ITU (2022a), ITU (2022b)	Applications of e-environment	#YREstayshome challenge	International	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16437228458263928, https://www.yre.global/stories-news/2020/3/24/yrestayshome-challenge-stay-home-and-stay-active
ITU13, ITU31, ITU49	ITU (2022a), ITU (2022b)	Applications of e-agriculture	Agriculture Holdings Platform	Saudi Arabia	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16401538153620195, https://www.mewa.gov.sa/ar/Pages/default.aspx
ITU14, ITU32, ITU50	ITU (2022a), ITU (2022b)	Applications of e-science	Flood Analytics	Indonesia	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16427838646678616
ITU15, ITU33, ITU51	ITU (2022a), ITU (2022b)	Cultural diversity and identity, linguistic diversity and local content	Art and Technology for Climate Change and Green Social Entrepreneurship	Lesotho	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16436629258323588, https://geminstitutels.org/
ITU16, ITU34, ITU52	ITU (2022a), ITU (2022b)	Media	COVID-19 Radio Response	International	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16426957519822434, https://farmradio.org/our-work-on-covid-19-so-far/

Id[1]	Source report(s)	Featured trends and practices	Featured initiative	Country[2]	Additional information available from
ITU17, ITU35, ITU53	ITU (2022a), ITU (2022b)	Ethical Dimension of the Information Society	Apprise Audit	International	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16432759788952173
ITU18, ITU36, ITU54	ITU (2022a), ITU (2022b)	International and Regional Cooperation	ASEAN Data Management Framework and Model Contractual Clauses for Cross Border Data Flows	International	https://www.itu.int/net4/wsis/stocktaking/Prizes/2023/DetailsPopup/16425121886457861, https://asean.org/our-communities/economic-community/asean-digital-sector/

Source: Compiled by the Author from the referenced reports.

A.3. List of European Innovation Scoreboard indicators and their interpretations

Indicator category	Indicator	Interpretation
1. FRAMEWORK CONDITIONS 1.1 Human resources	1.1.1 New doctorate graduates in science, technology, engineering, and mathematics (STEM) per 1000 population aged 25-34.	The indicator is a measure of the supply of new second stage tertiary graduates in all fields of training (ISCED 8). For most countries, ISCED 8 captures PhD graduates There is a complex relation between STEM-graduates and innovation in the private sector. STEM-graduates do well as employees within firms with many of them taking up managerial positions.
1. FRAMEWORK CONDITIONS 1.1 Human resources	1.1.2 Percentage population aged 25-34 having completed tertiary education.	This is a general indicator of the supply of advanced skills. It is not limited to science and technical fields, because the adoption of innovations in many areas depends on a wide range of skills. The indicator focuses on a younger age cohort of the population, aged 25 to 34, and will therefore easily and quickly reflect changes in educational policies leading to more tertiary graduates.
1. FRAMEWORK CONDITIONS 1.1 Human resources	1.1.3. Lifelong learning.	Lifelong learning encompasses all purposeful learning activity, whether formal, non-formal or informal, undertaken on an ongoing basis with the aim of improving knowledge, skills and competence. The intention or aim to learn is the critical point that distinguishes these activities from non-learning activities, such as cultural or sporting activities.
1. FRAMEWORK CONDITIONS 1.2 Attractive research systems	1.2.1 International scientific co-publications per million population.	International scientific co-publications are a proxy for the quality of scientific research as collaboration increases scientific productivity for individual countries all publications with at least one co-author outside the country are included, For the EU only publications with at least one co-author in a non- EU Member State are included.
1. FRAMEWORK CONDITIONS 1.2 Attractive research systems	1.2.2 Scientific publications among the top- 10% most cited publications worldwide as percentage of total scientific publications of the country.	The indicator is a measure for the quality of the research system, as highly cited publications are assumed to be of higher quality. There could be a bias towards small or English-speaking countries given the coverage of Scopus' publication data.
1. FRAMEWORK CONDITIONS 1.2 Attractive research systems	1.2.3 Foreign doctorate students as a percentage of all doctorate students.	The share of foreign doctorate students reflects the mobility of students as an effective way of diffusing knowledge. Attracting high-skilled foreign doctorate students will secure a continuous supply of researchers.
1. FRAMEWORK CONDITIONS 1.3 Digitalisation	1.3.1 Broadband penetration.	Realising Europe's full e-potential depends on creating the conditions for electronic commerce and the Internet to flourish. This indicator captures the relative use of this e-potential by the share of enterprises that have access to fast broadband Data on the speed of mobile connections is not available, the indicator on the speed of fixed internet access is the most suitable proxy.
1. FRAMEWORK CONDITIONS 1.3 Digitalisation	1.3.2 Individuals who have above basic overall digital skills (% share).	Above basic overall digital skills represent the highest level of the overall digital skills indicator, which is a composite indicator based on selected activities performed by individuals aged 16-74 on the internet in four specific areas (information, communication, problem solving, content creation) during the previous 3 months.
2. INVESTMENTS 2.1 Finance and support	2.1.1 R&D expenditure in the public sector (percentage of GDP).	Research and development (R&D) expenditure represents one of the major drivers of economic growth in a knowledge-based economy. As such, trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth of the EU. R&D spending is essential for making the transition to a knowledge-based economy as well as for improving production technologies and stimulating growth.

Indicator category	Indicator	Interpretation
2. INVESTMENTS 2.1 Finance and support	2.1.2 Venture capital (percentage of GDP).	The amount of venture capital is a proxy for the relative dynamism of new business creation. For enterprises using or developing new (risky) technologies, venture capital is often the only available means of financing their (expanding) business.
2. INVESTMENTS 2.1 Finance and support	2.1.3 Direct government funding and government tax support for business R&D (percentage of GDP).	Public financing of R&D can take two forms: Direct funding for R&D through instruments such as grants and public procurement, and Indirect support through the tax system Direct funding is well captured in the official data on R&D expenditure by source of fund, differentiating between the following sources: Business enterprise sector, Government sector, Higher education sector, Private non-profit sector, and Abroad. Data on R&D funded by the Government sector are available from Eurostat (EU Member States and other European countries), OECD (OECD member states) and UIS (global coverage). Over time, more and more countries have introduced R&D tax incentives. The OECD has started to systematically collect data on R&D tax incentives since 2018 and with the support of the EC data are currently being collected on an annual basis and made available in the 'OECD R&D Tax Incentives database'. In the EU, 21 countries were offering R&D tax relief in 2019, a significant increase compared to only 12 countries offering R&D tax relief in 2000.
2. INVESTMENTS 2.2 Firm investments	2.2.1 R&D expenditure in the business sector (percentage of GDP).	The indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sectors (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories.
2. INVESTMENTS 2.2 Firm investments	2.2.2 Non-R&D innovation expenditures (percentage of turnover).	This indicator measures non-R&D innovation expenditure as a percentage of total turnover. Several of the components of innovation expenditure, such as investment in equipment and machinery and the acquisition of patents and licenses, measure the diffusion of new production technology and ideas.
2. INVESTMENTS 2.2 Firm investments	2.2.3 Innovation expenditures per person employed.	The indicator measures the monetary input directly related to innovation activities.
2. INVESTMENTS 2.3 Use of information technologies	2.3.1 Enterprises providing training to develop or upgrade ICT skills of their personnel.	ICT skills are particularly important for innovation in an increasingly digital economy. The share of enterprises providing training in that respect is a proxy for the overall skills development of employees.
2. INVESTMENTS 2.3 Use of information technologies	2.3.2 ICT specialists (as a percentage of total employment).	Eurostat defines ICT specialists as "workers who have the ability to develop, operate and maintain ICT systems, and for whom ICT constitute the main part of their job". Operationalised in terms of ISCO codes, this definition converts into a statistical definition of ICT specialists as follow: from 2011 onwards - corresponding to the application of the ISCO-08, Eurostat and OECD adopted a joint approach to define the occupations to be treated as ICT specialists (OECD, 2015).
3. INNOVATION ACTIVITIES 3.1 Innovators	3.1.1 SMEs introducing product innovations (percentage of SMEs).	Product innovation is a key ingredient to innovation as they can create new markets and improve competitiveness. Higher shares of product innovators reflect a higher level of innovation activities.
3. INNOVATION ACTIVITIES 3.1 Innovators	3.1.2 SMEs introducing business process innovations (percentage of SMEs).	Many firms innovate not by improving new products but by improving their business processes. Business process innovations include process, marketing and organisational innovations.

Indicator category	Indicator	Interpretation
3. INNOVATION ACTIVITIES 3.2 Linkages	3.2.1 Innovative SMEs collaborating with others (percentage of SMEs).	This indicator measures the degree to which SMEs are involved in innovation co-operation. Complex innovations often depend on the ability to draw on diverse sources of information and knowledge, or to collaborate in the development of an innovation. This indicator measures the flow of knowledge between public research institutions and firms, and between firms and other firms. The indicator is limited to SMEs, because almost all large firms are involved in innovation co-operation.
3. INNOVATION ACTIVITIES 3.2 Linkages	3.2.2 Public-private co-publications per million population.	This indicator captures public-private research linkages and active collaboration activities between business sector researchers and public sector researchers resulting in academic publications.
3. INNOVATION ACTIVITIES 3.2 Linkages	3.2.3 Job-to-job mobility of Human Resources in Science & Technology.	Human Resources in Science & Technology (HRST) are people who fulfil one or other of the following conditions: (1) have successfully completed a tertiary level education; (2) not formally qualified as above but employed in a S&T occupation where the above qualifications are normally required. Job-to-job mobility in this context is defined as the movement of individuals between one job and another from one year to the next. It does not include inflows into the labour market from a situation of unemployment or inactivity.
3. INNOVATION ACTIVITIES 3.3 Intellectual assets	3.3.1 PCT patent applications per billion GDP (in PPS) Number of patent applications filed under the PCT, at international phase, designating the European Patent Office (EPO).	The capacity of firms to develop new products will determine their competitive advantage. One measure of the rate of new product innovation is the number of patents. This indicator measures the number of PCT patent applications.
3. INNOVATION ACTIVITIES 3.3 Intellectual assets	3.3.2 Trademark applications per billion GDP (in PPS).	Trademarks are an important innovation indicator, especially for the service sector. The Community trademark gives its proprietor a uniform right applicable in all Member States of the European Union through a single procedure which simplifies trademark policies at European level. It fulfils the three essential functions of a trademark: it identifies the origin of goods and services, guarantees consistent quality through evidence of the company's commitment vis-à-vis the consumer, and it is a form of communication, a basis for publicity and advertising.
3. INNOVATION ACTIVITIES 3.3 Intellectual assets	3.3.3 Design applications per billion GDP (in PPS).	A design is the outward appearance of a product or part of it resulting from the lines, contours, colours, shape, texture, materials and/or its ornamentation. A product can be any industrial or handicraft item including packaging, graphic symbols and typographic typefaces but excluding computer programmes. It also includes products that are composed of multiple components, which may be disassembled and reassembled. Community design protection is directly enforceable in each Member State, and it provides both the option of an unregistered and a registered Community design right for one area encompassing all Member States.
4. IMPACTS 4.1 Employment impacts	4.1.1 Employment in knowledge-intensive activities (percentage of total employment).	Knowledge-intensive activities provide services directly to consumers, such as telecommunications, and provide inputs to the innovative activities of other firms in all sectors of the economy.
4. IMPACTS 4.1 Employment impacts	4.1.2 Employment in innovative enterprises.	Innovation in enterprises has a profound impact on the employability of workers, but its effect in product- and process-innovation oriented firms varies across countries. Firm innovation proves to be specifically important during a time of economic recession. Although high-skilled employees are less affected by a

Indicator category	Indicator	Interpretation
		recession than low-skilled employees, a notable positive effect is observed for low-skilled employees in innovative firms as well.
4. IMPACTS 4.2 Sales impacts	4.2.1 Exports of medium and high technology products as a share of total product exports.	The indicator measures the technological competitiveness of the EU, i.e. the ability to commercialise the results of research and development (R&D) and innovation in international markets. It also reflects product specialisation by country. Creating, exploiting and commercialising new technologies are vital for the competitiveness of a country in the modern economy. Medium and high technology products are key drivers for economic growth, productivity and welfare, and are generally a source of high value added and well-paid employment.
4. IMPACTS 4.2 Sales impacts	4.2.2 Knowledge-intensive services exports as percentage of total services exports.	The indicator measures the competitiveness of the knowledge-intensive services sector. Competitiveness enhancing measures and innovation strategies can be mutually reinforcing for the growth of employment, export shares and turnover at the firm level. It reflects the ability of an economy, notably resulting from innovation, to export services with high levels of value added, and successfully take part in knowledge-intensive global value chains.
4. IMPACTS 4.2 Sales impacts	4.2.3 Sales of new-to-market and new-to-firm innovations as percentage of turnover.	This indicator measures the turnover of new or significantly improved products and includes both products which are only new to the firm and products which are also new to the market. The indicator thus captures both the creation of state-of-the-art technologies (new-to-market products) and the diffusion of these technologies (new-to-firm products).
4. IMPACTS 4.3 Environmental sustainability	4.3.1 Resource productivity.	Resource productivity is a measure of the total amount of materials directly used by an economy (measured as domestic material consumption (DMC)) in relation to GDP. It provides insights into whether decoupling between the use of natural resources and economic growth is taking place. Resource productivity (GDP/DMC) is the EU sustainable development indicator for policy evaluation Domestic material consumption (DMC) measures the total amount of materials directly used by an economy and is defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports.
4. IMPACTS 4.3 Environmental sustainability	4.3.2 Air emissions by fine particulate matter (PM2.5) in Industry.	Air pollution may be anthropogenic (human-induced) or of natural origin. Air pollution has the potential to harm both human health and the environment: particulate matter (PM), nitrogen dioxide and ground-level ozone are known to pose particular health risks. Long-term and peak exposures to these pollutants may be associated, among other impacts, with cardiovascular and respiratory diseases or an increased incidence of cancer. This indicator captures average concentration levels of fine particulate matter (PM2.5 — particles with a diameter of 2.5 micrometres or less) to which the population is exposed. The EU set an annual limit of 25 μg/m³ for fine particulate matter in Directive 2008/50/EC on ambient air quality and cleaner air, while the World Health Organisation (WHO) set a more stringent, but non-binding guideline value, whereby annual mean concentrations should not exceed 10 μg/m³ in order to protect human health. PM2.5 is considered by the WHO as the pollutant with the highest impact on human health.
4. IMPACTS 4.3 Environmental sustainability	4.3.3 Development of environment-related technologies, percentage of all technologies.	The number of environment-related inventions is expressed as a percentage of all domestic inventions (in all technologies). Indicators of technology development are constructed by measuring inventive activity using patent data across a wide range of environment-related technological domains (ENVTECH), including environmental management, waterrelated adaptation, and climate change mitigation technologies. The counts used include only higher-value inventions (with patent family size ≥ 2). Data are obtained from the Patents: Technology development dataset of the OECD Environment Database.

Source: Consultant's compilation of information drawn from EC RTD & Hollanders, 2023.

A.4. List of Global Innovation Index indicators and their interpretations

Indicator category	Indicator	Interpretation
1. Institutions 1.1. Institutional environment	1.1.1. Operational stability for businesses	Index that measures the likelihood and severity of political, legal, operational or security risks affecting business operations. Scores are annualized, standardized and aggregated for end Q1, Q2, Q3 and Q4.
1. Institutions 1.1. Institutional environment	1.1.2. Government effectiveness	Index that reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Scores are standardized.
1. Institutions 1.2. Regulatory environment	1.2.1. Regulatory quality	Index that reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development. Scores are standardized.
1. Institutions 1.2. Regulatory environment	1.2.2. Rule of law	Index that reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence. Scores are standardized.
1. Institutions 1.2. Regulatory environment	1.2.3. Cost of redundancy dismissal	Redundancy costs measure the cost of advance notice requirements and severance payments due when terminating a redundant worker's employment, expressed in weeks of salary. The average value of notice requirements and severance payments applicable to a worker with one year of tenure, a worker with five years and a worker with 10 years are considered. One month is recorded as 4.3 weeks. If the redundancy cost adds up to eight or fewer weeks of salary, a value of eight is assigned but the actual number of weeks is published. If the cost adds up to more than eight weeks of salary, the score is the number of weeks.
1. Institutions 1.3. Business environment	1.3.1. Policies for doing business	Average answer to the survey question: In your country, to what extent does the government ensure a stable policy environment for doing business? [1 = not at all; 7 = to a great extent].
1. Institutions 1.3. Business environment	1.3.2. Entrepreneurship policies and culture	Average perception scores (five-year average) of experts on entrepreneurial policies and entrepreneurial culture (Items B, C and I3 and I4 of the Global Entrepreneurship Monitor (GEM) National Expert Survey (NES)). Experts in different fields (purposive sampling, minimum 36 experts per year) assess conditions for entrepreneurship in their country via statements (0 = completely false; 10 = completely true). Country participation in GEM varies and therefore the number of experts and years on which this item is based differs according to country.
2. Human capital and research 2.1. Education	2.1.1. Expenditure on education, % GDP	Total general (local, regional and central) government expenditure on education (current, capital and transfers), expressed as a percentage of GDP. It includes expenditure funded by transfers from international sources to government.
2. Human capital and research 2.1. Education	2.1.2. Government funding/pupil, secondary, % GDP/cap	Average total (current, capital and transfers) general government expenditure per student at secondary level, expressed as a percentage of GDP per capita.
2. Human capital and research 2.1. Education	2.1.3. School life expectancy, years	Total number of years that a person of school entrance age can expect to spend within the primary to tertiary levels of education. For a child of a given age, the school life expectancy is calculated as the sum of the age-specific enrolment rates for primary to tertiary levels of education. The part of the enrolment that is not distributed by age is divided by the school-age population for the primary to tertiary level of education in which they are enrolled and multiplied by the duration of that level of education. The result is then added to the sum of the age-specific enrolment rates. A relatively high value indicates a greater probability of children spending

Indicator category	Indicator	Interpretation
		more years in education and a higher overall retention rate within the education system. It must be noted that the expected number of years does not necessarily coincide with the expected number of grades of education completed due to grade repetition.
2. Human capital and research 2.1. Education	2.1.4. PISA scales in reading, maths and science	PISA is the OECD's (Organisation for Economic Co-operation and Development) Programme for International Student Assessment. PISA measures 15-year-olds' ability to use their reading, mathematics and science knowledge skills. Results from PISA indicate the quality and equity of learning outcomes attained around the world. The 2018 PISA survey is the seventh round of the triennial assessment. The indicator is built using the average of the reading, mathematics and science scores for each country. PISA scores are set in relation to the variation in results observed across all test participants in a country. There is, theoretically, no minimum or maximum score in 227 PISA; rather, the results are scaled to fit approximately normal distributions, with means around 500 score points and standard deviations around 100 score points. The 2018 scores for China correspond to the provinces/municipalities of Beijing, Shanghai, Jiangsu and Zhejiang only. The 2018 scores for Azerbaijan correspond only to the capital Baku. The 2018 average scores for Spain are based only on the scores for mathematics and science, as the reading scores were not published by the OECD owing to implausible student response behaviour.
2. Human capital and research 2.1. Education	2.1.5. Pupil–teacher ratio, secondary	The number of pupils enrolled in secondary school divided by the number of secondary school teachers (regardless of their teaching assignment). Where the data are missing for the secondary education level as a whole, the ratios for upper-secondary are reported; if these are also missing, the ratios for lower-secondary education are reported instead. A high pupil–teacher ratio suggests that each teacher has to be responsible for a large number of pupils. In other words, the higher the pupil–teacher ratio, the lower the relative access of pupils to teachers.
2. Human capital and research 2.2. Tertiary education	2.2.1. Tertiary enrolment, % gross	The ratio of total tertiary enrolment, regardless of age, to the population of the age group that officially corresponds to the tertiary level of education. Tertiary education, whether or not at an advanced research qualification level, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level. The school enrolment ratio can exceed 100 percent due to grade repetition and the inclusion of under-aged and over-aged students, who are early or late entrants.
2. Human capital and research 2.2. Tertiary education	2.2.2. Graduates in science and engineering, %	The share of all tertiary-level graduates in natural sciences, mathematics, statistics, information and technology, manufacturing, engineering and construction as a percentage of all tertiary-level graduates.
2. Human capital and research 2.2. Tertiary education	2.2.3. Tertiary inbound mobility, %	The number of students from abroad studying in a given country as a percentage of the total tertiary-level enrolment in that country.
2. Human capital and research 2.3. Research and development (R&D)	2.3.1. Researchers, FTE/mn pop	Researchers in R&D are professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques, instrumentation, software or operational methods.
2. Human capital and research 2.3. Research and development (R&D)	2.3.2. Gross expenditure on R&D, % GDP	Gross expenditure on R&D (GERD) is the total domestic intramural expenditure on R&D during a given period as a percentage of GDP. "Intramural R&D expenditure" is all expenditure for R&D performed within a statistical unit or sector of the economy during a specific period, regardless of the source of funding.

Indicator category	Indicator	Interpretation
2. Human capital and research 2.3. Research and development (R&D)	2.3.3. Global corporate R&D investors, top 3, in USD	Average expenditure on R&D of the top three global companies. If a country has fewer than three global companies listed, the figure is either the average of the sum of the two companies listed or the total for a single listed company. A score of 0 is given to countries with no listed companies. The data include economies outside the European Union (EU).
2. Human capital and research 2.3. Research and development (R&D)	2.3.4. QS university ranking, top 3	Average score of the top three universities per country. If fewer than three universities are listed in the QS ranking of the global top 1,000 universities, the sum of the scores of the listed universities is divided by three, thus implying a score of zero for the non-listed universities. The 2023 ranking corresponds to data published in March 2022.
3. Infrastructure 3.1. Information and communication technologies (ICTs)	3.1.1. ICT access	The ICT access index is a composite index that assigns weights to four ICT indicators (25 percent each): (1) Percentage of the population covered by mobile networks (at least 3G, at least LTE/WiMax); (2) Mobile cellular telephone subscriptions per 100 inhabitants; (3) International internet bandwidth (bit/s) per internet user; and (4) Percentage of households with internet access.
3. Infrastructure 3.1. Information and communication technologies (ICTs)	3.1.2. ICT use	The ICT use index is a composite index that assigns weights to four ICT indicators (25 percent each): (1) Percentage of individuals using the internet; (2) Fixed (wired) broadband internet subscriptions per 100 inhabitants; (3) Active mobile broadband subscriptions per 100 inhabitants; and (4) Mobile broadband internet traffic (gigabytes/ subscriptions).
3. Infrastructure 3.1. Information and communication technologies (ICTs)	3.1.3. Government's online service	The Online Service Index (OSI) is a component of the E-Government Development Index. The OSI is a composite indicator that assesses how well governments use technology to deliver public services at the national level. It is based on a survey of national websites and e-government policies, with scores normalized to a range of 0 to 1. In the 2022 edition, the OSI is now calculated based on five weighted sub-indices: services provision (45 percent), technology (5 percent), institutional framework (10 percent), content provision (5 percent) and e-participation (35 percent), with the overall score calculated from the normalized values of each sub-index.
3. Infrastructure 3.1. Information and communication technologies (ICTs)	3.1.4. E-participation	The E-Participation Index (EPI) is a measure of citizen engagement in public policymaking through e-government programs. It is a supplement to the United Nations E-Government Survey, which assesses how well governments use online services to provide information, interact with stakeholders and engage in decision-making. Scores range from 0 to 1, with higher values indicating greater e-participation. The index questions are periodically updated to reflect changes in e-government trends and technologies. In the 2022 Survey, the e-participation questions were further expanded to reflect current trends and modalities relating to the ways in which governments promote the engagement of their people in public policymaking, implementation and evaluation.
3. Infrastructure 3.2. General infrastructure	3.2.1. Electricity output, GWh/mn pop.	Electricity production measured at the terminals of all alternator sets in a station. In addition to hydropower, coal, oil, gas and nuclear power generation, this indicator covers the generation of electricity by means of geothermal, solar, wind, tide and wave energy, as well as that from combustible renewables and waste. Production includes the output of plants that are designed to produce solely electricity, as well as the output of combined heat and power plants. Electricity output in GWh is scaled by population.
3. Infrastructure 3.2. General infrastructure	3.2.2. Logistics performance	A multidimensional assessment of logistics performance, the 2023 Logistics Performance Index (LPI) ranks 139 countries, combining data on six core performance components into a single aggregate measure that includes customs performance, infrastructure quality and timeliness of shipments. The data used in the ranking come from

Indicator category	Indicator	Interpretation
		a survey of logistics professionals who are asked questions about the foreign countries in which they operate. The LPI's six components are: (1) Customs: the efficiency of customs and border management clearance; (2) Infrastructure: the quality of trade and transport infrastructure; (3) International shipments: the ease of arranging competitively priced shipments; (4) Services quality: the competence and quality of logistics services; (5) Tracking and tracing: the ability to track and trace consignments; and (6) Timeliness: the frequency with which shipments reach consignees within scheduled or expected delivery times.
3. Infrastructure 3.2. General infrastructure	3.2.3. Gross capital formation, % GDP	Gross capital formation is expressed as the ratio of total investment in current local currency to GDP in current local currency. Investment or gross capital formation is measured by the total value of the gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables for a unit or sector, on the basis of the System of National Accounts (SNA) 1993.
3. Infrastructure 3.3. Ecological sustainability	3.3.1. GDP/unit of energy use	Purchasing power parity gross domestic product (2015 PPP$ GDP) per total energy supply (TES). TES is made up of production + imports – exports – international marine bunkers – international aviation bunkers +/− stock changes. GDP/TES is an indicator of energy productivity.
3. Infrastructure 3.3. Ecological sustainability	3.3.2. Environmental performance	The 2022 Environmental Performance Index (EPI) ranks 180 countries on different categories covering environmental health and ecosystem vitality. These indicators provide a gauge of how close countries are to achieving established environmental policy targets. The EPI offers a scorecard that highlights leaders and laggards in environmental performance and provides practical guidance for countries that aspire to move toward a sustainable future. The index ranges from 0 to 100, with 100 indicating best performance.
3. Infrastructure 3.3. Ecological sustainability	3.3.3. ISO 14001 environment/bn PPP$ GDP	ISO 14001 specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance. ISO 14001 is intended for use by an organization that is seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability. ISO 14001 helps an organization to achieve the intended outcomes of its environmental management system, providing value for the environment, the organization itself and interested parties. Consistent with the organization's environmental policy, the intended outcomes of an environmental management system include enhancement of environmental performance, fulfilment of compliance obligations and achievement of environmental objectives. ISO 14001 is applicable to any organization, regardless of size, type or nature, and applies to the environmental aspects of its activities, products and services that the organization determines it can either control or influence from a life-cycle perspective. ISO 14001 does not state specific environmental performance criteria. It can be used in whole or in part to systematically improve environmental management. Claims of conformity to ISO 14001, however, are not acceptable unless all its requirements are incorporated into an organization's environmental management system and fulfilled without exclusion. The data are reported per billion PPP$ GDP.
4. Market sophistication 4.1. Credit	4.1.1. Finance for start-ups and scaleups	Average perception scores (five-year average) of experts on finance for starting and growing firms (Item A1 of the GEM National Expert Survey). Experts in different fields (purposive sampling, minimum 36 experts per year) assess conditions for entrepreneurship in their country via statements (0 = completely false; 10 = completely true). Country participation in GEM varies and therefore the number of experts and years on which this item is based differs according to country.

Indicator category	Indicator	Interpretation
4. Market sophistication 4.1. Credit	4.1.2. Domestic credit to private sector, % GDP	Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities and trade credits and other accounts receivable, that establish a claim for repayment. For some countries, these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not allow transferable deposits but do accept such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds and foreign exchange companies.
4. Market sophistication 4.1. Credit	4.1.3. Loans from microfinance institutions, % GDP	Outstanding loans from all microfinance institutions in a country as a percentage of its GDP.
4. Market sophistication 4.2. Investment	4.2.1. Market capitalization, % GDP	Market capitalization (also known as "market value") is the share price times the number of shares outstanding (including their several classes) for listed domestic companies. Investment funds, unit trusts and companies whose only business goal is to hold shares of other listed companies are excluded. Data are the average of the end-of-year values for the last three years.
4. Market sophistication 4.2. Investment	4.2.2. Venture capital (VC) investors, deals/bn PPP$ GDP	Refinitiv data on private equity deals, per deal, with information on the location of the firm investing in a venture capital (VC) deal, among other details. The data extraction corresponds to a query on VC deals between January 1, 2020 and December 31, 2022, with the data aggregated by the location of the investing firm. The data represent the three-year average of 2020–2022 deals invested in and are reported per billion PPP$ GDP.
4. Market sophistication 4.2. Investment	4.2.3. VC recipients, deals/bn PPP$ GDP	Refinitiv data on private equity deals, per deal, with information on the location of the firm receiving the VC investment, among other details. The data extraction corresponds to a query on VC deals between January 1, 2020 and December 31, 2022, with the data aggregated by the location invested in. The data represent the three-year average of 2020–2022 deals received and are reported per billion PPP$ GDP.
4. Market sophistication 4.2. Investment	4.2.4. VC received, value, % GDP	Refinitiv data on the monetary value of private equity deals, per deal, with information on the location of the firm receiving the VC investment, among other details. The data extraction corresponds to a query on VC deals between January 1, 2020 and December 31, 2022, with the data aggregated by the location invested in. The data represent the three-year average of reported deal value received, in current USD (billions).
4. Market sophistication 4.3. Trade, diversification and market scale	4.3.1. Applied tariff rate, weighted avg., %	Weighted average applied tariff is the average of effectively applied rates weighted by the product import shares corresponding to each partner country. Data are classified using the Harmonized System of trade at the six- or eight-digit level. Tariff line data were matched to Standard International Trade Classification (SITC) Revision 3 codes to define commodity groups and import weights. As far as possible, specific rates have been converted to their ad valorem equivalent rates and have been included in the calculation of weighted average tariffs. Effectively applied tariff rates at the six- and eight-digit product level are averaged for products in each commodity group. When the effectively applied rate is unavailable, the most favored nation rate is used instead. Data extracted from the World Bank's World Development Indicators database.
4. Market sophistication 4.3. Trade, diversification and market scale	4.3.2. Domestic industry diversification	The Herfindahl-Hirschman Index (HHI) for a country's industry is defined as the sum of the squared shares of subsectors in total manufacturing output. The HHI is a measure of concentration and can help to determine the extent to which a country's industrial system is diversified across different industrial subsectors (or, conversely, concentrated in a few industrial subsectors). A country with a perfectly diversified industrial system will have an

Indicator category	Indicator	Interpretation
		index close to zero, whereas a country that is active in only one industrial subsector will have a value of one (least diversified).
4. Market sophistication 4.3. Trade, diversification and market scale	4.3.3. Domestic market scale, bn PPP$	The domestic market size is measured by GDP based on the PPP valuation of country GDP, in current international dollars (billions).
5. Business sophistication 5.1. Knowledge workers	5.1.1. Knowledge-intensive employment, %	Sum of people in categories 1 to 3 as a percentage of total people employed, according to the International Standard Classification of Occupations (ISCO). Categories included in ISCO-08 are: 1 Managers; 2 Professionals; 3 Technicians and associate professionals. Where ISCO-08 data were not available, ISCO-88 data were used. Categories included in ISCO-88 are: 1 Legislators, senior officials and managers; 2 Professionals; 3 Technicians and associate professionals.
5. Business sophistication 5.1. Knowledge workers	5.1.2. Firms offering formal training, %	The percentage of firms offering formal training programs for their permanent, full-time employees in the sample of firms in the World Bank's Enterprise Survey in each country. Data for Bangladesh, India, Iraq and Madagascar, published in 2022, and data covering the COVID-19 period are not being used after discussions with the Enterprise Survey World Bank staff.
5. Business sophistication 5.1. Knowledge workers	5.1.3. GERD performed by business, % GDP	Gross expenditure on R&D performed by business enterprises as a percentage of GDP. For the definition of GERD, see indicator 2.3.2.
5. Business sophistication 5.1. Knowledge workers	5.1.4. GERD financed by business, %	Gross expenditure on R&D financed by business enterprises as a percentage of total gross expenditure on R&D. For the definition of GERD, see indicator 2.3.2.
5. Business sophistication 5.1. Knowledge workers	5.1.5. Females employed w/advanced degrees, %	The percentage of females employed with advanced degrees out of total employed. The employed comprise all persons of working age who, during a specified brief period, were in one of the following categories: (1) paid employment; or (2) self-employment. Data are disaggregated by level of education, which refers to the highest level of education completed, classified according to the International Standard Classification of Education (ISCE). Data for Canada are based on Table 14-10-0020-01 of the country's Labour Force Survey estimates.
5. Business sophistication 5.2. Innovation linkages	5.2.1. University–industry R&D collaboration	Average answer to the survey question: In your country, to what extent do businesses and universities collaborate on research and development (R&D)? [1 = not at all; 7 = to a great extent].
5. Business sophistication 5.2. Innovation linkages	5.2.2. State of cluster development	Average answer to the survey question: In your country, how widespread are well-developed and deep clusters (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field)? [1 = non-existent; 7 = widespread in many fields].
5. Business sophistication 5.2. Innovation linkages	5.2.3. GERD financed by abroad, % GDP	Percentage of gross expenditure on R&D financed by abroad (billions, national currency) – that is, with foreign financing as a percentage of GDP (billions, national currency). For the definition of GERD, see indicator 2.3.2.
5. Business sophistication 5.2. Innovation linkages	5.2.4. Joint venture/strategic alliance deals/bn PPP$ GDP	Refinitiv's data on joint ventures/strategic alliances, per deal, with details on the country of origin of partner firms, among others. The data extraction corresponds to a query on joint venture/strategic alliance deals between January 1, 2020 and December 31, 2022. The nation of each company participating in a deal (*n* companies per deal) is allocated, per deal, a score equivalent to 1/*n* (with the effect that all country scores add up to the total number of deals). The data are reported per billion PPP$ GDP.
5. Business sophistication 5.2. Innovation linkages	5.2.5. Patent families/bn PPP$ GDP	A patent family is a set of interrelated patent applications filed in one or more countries or jurisdictions to protect the same invention. Patent families containing applications filed in at least two different offices is a subset of patent families where protection of the same invention is sought in at least two different countries. In

Indicator category	Indicator	Interpretation
		this report, "patent families data" refers to patent families containing applications filed in at least two intellectual property (IP) offices; the data are scaled by PPP$ GDP (billions). A patent is a set of exclusive rights granted by law to applicants for inventions that are new, non-obvious and industrially applicable. A patent is valid for a limited period of time (generally 20 years) and within a defined territory. The patent system is designed to encourage innovation by providing innovators with time-limited exclusive legal rights, thus enabling them to reap the rewards of their innovative activity.
5. Business sophistication 5.3. Knowledge absorption	5.3.1. Intellectual property payments, % total trade	Charges for the use of intellectual property not included elsewhere, i.e. payments (% of total trade), average of three most recent years or most recent year. Value is calculated according to the Extended Balance of Payments Services Classification EBOPS 2010 – that is, code SH: Charges for the use of intellectual property not included elsewhere, as a percentage of total trade. Total trade is defined as the sum of total imports of code G goods and code SOX commercial services (excluding government goods and services not included elsewhere) plus total exports of code G goods and code SOX commercial services (excluding government goods and services not included elsewhere), divided by 2. According to the sixth edition (2009) of the International Monetary Fund's *Balance of Payments and International Investment Position Manual*, the item "Goods" covers general merchandise, net exports of goods under merchanting and non-monetary gold. The "commercial services" category is defined as being equal to "services" minus "government goods and services not included elsewhere." Receipts are between residents and non-residents for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes and designs, including trade secrets and franchises), and for licenses 237 to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works and sound recordings) and related rights (such as for live performances and television, cable or satellite broadcast).
5. Business sophistication 5.3. Knowledge absorption	5.3.2. High-tech imports, % total trade	High-technology imports as a percentage of total trade. High-technology exports and imports contain technical products with a high intensity of R&D, defined by the Eurostat classification, which is based on Standard International Trade Classification (SITC) Revision 4 and the OECD definition (see http://ec.europa.eu/eurostat/cache/metadata/Annexes/ htec_esms_an5.pdf). Commodities belong to the following sectors: aerospace; computers and office machines; electronics – telecommunications; pharmacy; scientific instruments; electrical machinery; chemistry; non-electrical machinery; and armament.
5. Business sophistication 5.3. Knowledge absorption	5.3.3. ICT services imports, % total trade	Telecommunications, computer and information services imports as a percentage of total trade according to the OECD's Extended Balance of Payments Services Classification EBOPS 2010, coded SI: Telecommunications, computer, and information services. Values are based on the classification of the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database. For the definition of total trade, see indicator 5.3.1.
5. Business sophistication 5.3. Knowledge absorption	5.3.4. FDI net inflows, % GDP	FDI net inflow is the average of the most recent three years of net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital and short-term capital as shown in the balance of payments. This data series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP. Data extracted from the World Bank's World Development Indicators database.

Indicator category	Indicator	Interpretation
5. Business sophistication 5.3. Knowledge absorption	5.3.5. Research talent, % in businesses	Researchers in the business enterprise sector, measured in full-time equivalence (FTE), refers to researchers as professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, as well as in the management of these projects, broken down by the sectors in which they are employed (business enterprise, government, higher education and private non-profit organizations). In the context of R&D statistics, the business enterprise sector includes all firms, organizations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price, and the mainly private non-profit institutions serving them; the core of this sector is made up of private enterprises.
6. Knowledge and technology outputs 6.1. Knowledge creation	6.1.1. Patents by origin/bn PPP$ GDP	The definition of a patent can be found in the description of indicator 5.2.5. A resident patent application refers to an application filed with an IP office for or on behalf of the first-named applicant's country of residence. For example, an application filed with the Japan Patent Office by a resident of Japan is to be considered a resident application for Japan. Similarly, an application filed with the European Patent Office (EPO) by an applicant who resides in any of the EPO member states (for example, Germany) is considered to be a resident application for that member state (Germany). Data are scaled by PPP$ GDP (billions).
6. Knowledge and technology outputs 6.1. Knowledge creation	6.1.2. PCT patents by origin/bn PPP$ GDP	A PCT application refers to an international patent application filed through the WIPO-administered Patent Cooperation Treaty. The PCT system makes it possible to seek patent protection for an invention simultaneously in a number of countries by filing a single international patent application. The origin of PCT applications is defined by the residence of the first-named applicant. Data are available only for those economies that are PCT Contracting States (157 to date). Data are scaled by PPP$ GDP (billions).
6. Knowledge and technology outputs 6.1. Knowledge creation	6.1.3. Utility models by origin/bn PPP$ GDP	A utility model (UM) is a special form of patent right. The terms and conditions for granting a UM are slightly different from those for patents and include a shorter term of protection and less stringent patentability requirements. A resident UM application refers to an application filed with an IP office for or on behalf of the first-named applicant's country of residence. For example, an application filed with the IP office of Germany by a resident of 239 Germany is considered a resident application for Germany. Data are scaled by PPP$ GDP (billions).
6. Knowledge and technology outputs 6.1. Knowledge creation	6.1.4. Scientific and technical articles/bn PPP$ GDP	The number of articles published in the fields of science and technology. This encompasses 182 different research categories belonging to research areas including engineering, chemistry, physics, environmental sciences, computer science, mathematics, biochemistry, molecular biology, oncology, agriculture, cell biology and many more. Article counts are taken from a set of journals covered by the Science Citation Index Expanded (SCIE) and the Social Sciences Citation Index (SSCI). Articles are classified by year of publication and assigned to each economy on the basis of the institutional address(es) listed in the article. Articles are counted on a count basis (rather than a fractional basis) – that is, for articles with collaborating institutions from multiple economies, each economy receives credit on the basis of its participating institutions. The data are reported per billion PPP$ GDP.
6. Knowledge and technology outputs 6.1. Knowledge creation	6.1.5. Citable documents H-index	The H-index expresses the journal's number of articles (H) that have received at least H citations. It quantifies both journal scientific productivity and scientific impact, and is also applicable to scientists, journals, and so on. The H-index is tabulated from the number of citations received in subsequent years by articles published in a given year, divided by the number of articles published that year.

Indicator category	Indicator	Interpretation
6. Knowledge and technology outputs 6.2. Knowledge impact	6.2.1. Labour productivity growth, %	Growth rate of real GDP per person employed average of five most recent available years (2017–2021). Growth of GDP per person engaged provides a measure of labour productivity (defined as output per unit of labor input). GDP per person employed is GDP divided by total employment in the economy.
6. Knowledge and technology outputs 6.2. Knowledge impact	6.2.2. Unicorn valuation, % GDP	Total valuation of all unicorns in a country as a percentage of GDP. A unicorn company is a private company with a valuation over USD 1 billion. Unicorn companies worldwide number 1,207 as of April 7, 2023.
6. Knowledge and technology outputs 6.2. Knowledge impact	6.2.3. Software spending, % GDP	Computer software spending includes the total value of purchased or leased packaged software, such as operating systems, database systems, programming tools, utilities and applications. It excludes expenditures for internal software development and outsourced custom software development. The data are a combination of actual figures and estimates. Data are reported as a percentage of GDP.
6. Knowledge and technology outputs 6.2. Knowledge impact	6.2.4. High-tech manufacturing, %	High-technology and medium-high-technology output as a percentage of total manufacturing output, on the basis of the OECD classification of Technology Intensity Definition (www.oecd.org/sti/ind/48350231.pdf), itself based on International Standard Industrial Classification (ISIC) Revision 4 and Revision 3 and using data from the INDSTAT 2 and INDSTAT 4 databases of the United Nations Industrial Development Organization (UNIDO).
6. Knowledge and technology outputs 6.3. Knowledge diffusion	6.3.1. Intellectual property receipts, % total trade	Charges for the use of intellectual property not included elsewhere, i.e. receipts (% of total trade), average of three most recent years or most recent year. Value is calculated according to the Extended Balance of Payments Services Classification EBOPS 2010 – that is, code SH: Charges for the use of intellectual property not included elsewhere, as a percentage of total trade. Receipts are between residents and non-residents for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes and designs, including trade secrets and franchises), and for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works and sound recordings) and related rights (such as for live performances and television, cable, or satellite broadcast). Values are based on the classification of the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database. For the definition of total trade, see indicator 5.3.1.
6. Knowledge and technology outputs 6.3. Knowledge diffusion	6.3.2. Production and export complexity	The Economic Complexity Index is a ranking of countries based on the diversity and complexity of their export basket. High-complexity countries are home to a range of 241 sophisticated, specialized capabilities and are therefore able to produce a highly diversified set of complex products. Determining the economic complexity of a country is not solely dependent on a country's productive knowledge. Information about how many capabilities the country has is contained not only in the absolute number of products that it makes, but also in the ubiquity of those products (the number of countries that import those products) and in the sophistication and diversity of the products that those other countries make. Economic complexity expresses the diversity and sophistication of the productive capabilities embedded in the exports of each country.
6. Knowledge and technology outputs 6.3. Knowledge diffusion	6.3.3. High-tech exports, % total trade	High-technology exports as a percentage of total trade. See indicator 5.3.2 for details. Data for Hong Kong, China is corrected for re-exports using data from the Trade Data Monitor.

Indicator category	Indicator	Interpretation
6. Knowledge and technology outputs 6.3. Knowledge diffusion	6.3.4. ICT services exports, % total trade	Telecommunications, computer and information services exports as a percentage of total trade according to the Extended Balance of Payments Services Classification EBOPS 2010, coded SI: Telecommunications, computer, and information services. Values are based on the classification of the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database. For the definition of total trade, see indicator 5.3.1.
6. Knowledge and technology outputs 6.3. Knowledge diffusion	6.3.5. ISO 9001 quality/bn PPP$ GDP	ISO 9001 specifies requirements for a quality management system when an organization needs to demonstrate its ability to provide products and services that meet both customer and applicable statutory and regulatory requirements. It aims to enhance customer satisfaction through the effective application of the system, including processes for improving the system and ensuring conformity to customer and applicable statutory and regulatory requirements. All the requirements of ISO 9001 are generic and intended to be applicable to any organization, regardless of type or size, or the products and services it provides. The data are reported per billion PPP$ GDP.
7. Creative outputs 7.1. Intangible assets	7.1.1. Intangible asset intensity, top 15, %	The data cover a global list of firms for which intangible asset value and total firm value are observed. Only the top 15 firms of each economy are considered, ranked by intangible assets in absolute terms (in USD). Countries with fewer than 15 firms are not considered. For each firm, the intangible asset value is divided by the firm's total value before computing the arithmetic mean across the top 15 firms for each economy.
7. Creative outputs 7.1. Intangible assets	7.1.2. Trademarks by origin/bn PPP$ GDP	A trademark is a sign used by the owner of certain products or provider of certain services to distinguish them from the products or services of other companies. A trademark can consist of words or a combination of words and other elements, such as slogans, names, logos, figures and images, letters, numbers, sounds and moving images. The procedures for registering trademarks are governed by the legislation and procedures of national and regional IP offices. Trademark rights are limited to the jurisdiction of the IP office that registers the trademark. Trademarks can be registered by filing an application at the relevant national or regional office(s) or by filing an international application through the Madrid System. A resident trademark application refers to an application filed with an IP office for or on behalf of the first-named applicant's country of residence. For example, an application filed with the Japan Patent Office by a resident of Japan is considered to be a resident application for Japan. Similarly, an application filed with the Office for Harmonization in the Internal Market (OHIM) by an applicant who resides in any of the EU member states, such as France, is considered to be a resident application for that member state (France). This indicator is based on class count – the total number of goods and services classes specified in resident trademark applications. Data are scaled by PPP$ GDP (billions).
7. Creative outputs 7.1. Intangible assets	7.1.3. Global brand value, top 5,000, % GDP	Sum of global brand values, top 5,000 as a percentage of GDP. Brand Finance calculates brand value using the royalty relief methodology, which determines the value that a company would be willing to pay to license its brand if it did not own it. The methodology is compliant with industry standards set in ISO 10668. This approach involves estimating the future revenue attributable to a brand and calculating a royalty rate that would be charged for the use of the brand. Brand Finance's study is based on publicly available information on the largest brands in the world. This indicator assesses the economy's brands in the top 5,000 global brand database and produces the sum of the brand values corresponding to that economy. This sum is then scaled by GDP. A score of 0 is assigned where there are no brands in the country that make the top 5,000 ranking. A score of "n/a" is assigned where Brand Finance has been unable to determine if there are brands from the country that would rank within the top 5,000, because of data availability limitations.

Indicator category	Indicator	Interpretation
7. Creative outputs 7.1. Intangible assets	7.1.4. Industrial designs by origin/bn PPP$ GDP	An industrial design is a set of exclusive rights granted by law to applicants to protect the ornamental or aesthetic aspect of their products. An industrial design is valid for a limited period of time and within a defined territory. A resident industrial design application refers to an application filed with the IP office for or on behalf of the applicant's country of residence. For example, an application filed with the Japan Patent Office by a resident of Japan is considered to be a resident application for Japan. Similarly, an application filed with the Office for Harmonization in the Internal Market (OHIM) by an applicant who resides in any of the OHIM member states, such as Italy, is considered to be a resident application for that member state (Italy). This indicator is based on design count – the total number of designs contained in the resident industrial design applications. Data are scaled by PPP$ GDP (billions).
7. Creative outputs 7.2. Creative goods and services	7.2.1. Cultural and creative services exports, % total trade	Creative services exports as a percentage of total exports according to the Extended Balance of Payments Services Classification EBOPS 2010 – that is, EBOPS code SI3: Information services; code SJ22: Advertising, market research, and public opinion polling services; code SK1: Audio-visual and related services; and code SK23: Heritage and recreational services as a percentage of total trade. Values are based on the classification of the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database. See indicator 5.3.1 for the full definition of total trade.
7. Creative outputs 7.2. Creative goods and services	7.2.2. National feature films/mn pop. 15–69	A feature film is defined as a film with a running time of 60 minutes or longer. It includes works of fiction, animation and documentaries. It is intended for commercial exhibition in cinemas. Feature films produced exclusively for television broadcasting, as well as newsreels and advertising films, are excluded. Country of origin for co-productions is attributed to the majority producer. Data are reported per million population aged 15–69 years old.
7. Creative outputs 7.2. Creative goods and services	7.2.3. Entertainment and media market/th pop. 15–69	The Global Entertainment & Media Outlook is a comprehensive source of global analyses and five-year forecasts of consumer and advertising spending across different territories and entertainment and media segments. The figures for Algeria, Bahrain, the Islamic Republic of Iran, Jordan, Kuwait, Lebanon, Malta, Morocco, Oman, Qatar, Tunisia and Yemen were estimated from a total corresponding to Middle East and North Africa (MENA) countries using a breakdown of total GDP (current USD) for the above-mentioned countries to define referential percentages.
7. Creative outputs 7.2. Creative goods and services	7.2.4. Creative goods exports, % total trade	Total value of creative goods exports (current USD) as a percentage of total trade. Creative goods exports based on the 2009 UNESCO Framework for Cultural Statistics, Table 3, International trade of cultural goods and services defined with the Harmonized System (HS) 2007 codes; World Trade Organization and United Nations Conference on Trade and Development, Trade in Commercial Services database, itself based on the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database. For the definition of total trade, see indicator 5.3.1.
7. Creative outputs 7.3. Online creativity	7.3.1. Generic top-level domains (TLDs)/th pop. 15–69	A generic top-level domain (TLD) is one of the categories of TLDs maintained by the Internet Assigned Numbers Authority (IANA) for use on the internet. Generic TLDs can be unrestricted (.com, .info, .net and .org) or restricted – that is, used on the basis of fulfilling eligibility criteria (.biz, .name and .pro). Of these, the statistic covers the five generic domains .biz, .info, .org, .net and .com. Generic domains .name and .pro, and sponsored domains (.arpa, .aero, .asia, .cat, .coop, .edu, .gov, .int, .jobs, .mil, .museum, .tel and .travel) are not included. Neither are country-code top-level domains (refer to indicator 7.3.2). The statistic represents the total number of

Indicator category	Indicator	Interpretation
		registered domains (i.e., net totals as of December 2021, existing domains + new registrations – expired domains). Data are collected on the basis of a 4 percent random sample of the total population of domains drawn from the root zone files (a complete listing of active domains) for each TLD. The geographic location of a domain is determined by the registration address for the domain name registrant that is returned from a whois query. These registration data are parsed by country and postal code and then aggregated to the required geographic levels, such as county, city or economy. The original hard data were scaled by thousand population, 15–69 years old. For confidentiality reasons, only normalized values are reported; while relative positions are preserved, magnitudes are not.
7. Creative outputs 7.3. Online creativity	7.3.2. Country-code TLDs/th pop. 15–69	A country-code top-level domain (TLD) is one of the categories of TLDs maintained by the Internet Assigned Numbers Authority (IANA) for use on the internet. Country-code TLDs are two-letter domains especially designated for a particular economy, country or autonomous territory. The statistic represents the total number of registered domains (i.e., net totals as of December 2021, existing domains + new registrations – expired domains). Data are collected from the registry responsible for each country-code TLD and represent the total number of domain registrations in the country-code TLD. Each country-code TLD is assigned to the country with which it is associated rather than based on the registration address of the registrant. ZookNIC reports that, for the country-code TLDs it covers, 85–100 percent of domains are registered in the same country; the only exceptions are the country-code TLDs that have been licensed for worldwide commercial use. Data are reported per thousand population, 15–69 years old. For confidentiality reasons, only normalized values are reported; while relative positions are preserved, magnitudes are not.
7. Creative outputs 7.3. Online creativity	7.3.3. GitHub commits/mn pop. 15–69	GitHub is the world's largest host of source code and a commit is the term used for a change on this platform. One or more commits can be saved (or pushed) to projects (or repositories). Thus, "GitHub commit pushes received and sent" refers to the sum of the number of batched changes received and sent by projects on GitHub that are publicly available within a specific economy. Automated activity resulting in non-productive commits is excluded.
7. Creative outputs 7.3. Online creativity	7.3.4. Mobile app creation/bn PPP$ GDP	Global downloads of mobile apps, by origin of the headquarters of the developer/firm, scaled by PPP$ GDP (billions). Global downloads are compiled by data.ia, public data sources and the company's proprietary forecast model based on data from Google Play Store and iOS App Store in each country. Since data for China are not available for Google Play Store and only for iOS App Store, data from China are treated as missing and classified as "n/a."

Source: Consultant's compilation of information drawn from WIPO, 2023.

A.5. Main findings of the UN Statistics Division Sustainable Development Goals Report series, 2020-2023

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
Goal 1. No poverty: End poverty in all its forms everywhere			
• COVID-19 shifts forecast on the global goal to end extreme poverty. • Working poverty is expected to increase sharply as a result of the pandemic. • Social protection coverage varies widely across regions, with many left exposed in the current crisis. • Disasters affect least developed countries disproportionately.	• COVID-19 has led to the first rise in extreme poverty in a generation. • Working poverty disproportionately affects women and youth, and the pandemic is likely to magnify those disparities. • Governments have put new social protection measures in place, but most are only temporary. • Good results from a global initiative to reduce disaster risk could be undermined by the pandemic.	• First COVID-19 and now the Ukraine crisis are derailing progress on ending extreme poverty. • In 2020, the share of workers living in extreme poverty rose for the first time in two decades. • Over half of the unemployed in high-income countries receive cash benefits, compared with 1 per cent in low-income countries. • Disaster-related deaths rose sixfold in 2020, largely as a result of the pandemic.	• Slow and uneven progress on poverty reduction may leave hundreds of millions in extreme poverty by 2030. • If current trends continue, only one third of countries will halve national poverty by 2030. • Amid overlapping crises, coverage and expenditures on social protection programmes remain low. • Advanced, emerging and developing economies alike have all increased their share of government spending on essential services. • Globally, disasters are affecting more people but causing fewer deaths.
Goal 2. Zero hunger: End hunger, achieve food security and improved nutrition and promote sustainable agriculture			
• Recent increases in food insecurity are likely to worsen as a result of COVID-19. • Small-scale food producers, already disadvantaged, are being hit hard by the effects of the pandemic. • Urgent actions are especially needed to protect the nutritional status of the most vulnerable children during the pandemic. • The incidence of overweight in young children is increasing, a warning sign for future health problems. • Investment in agriculture, relative to its contribution to the economy, continues to decline. • Rising food prices were mostly concentrated in sub-Saharan Africa in 2019.	• COVID-19 is pushing rising rates of hunger and food insecurity even higher. • Small-scale farmers are disadvantaged on many fronts, especially if they are women. • Pandemic-related shocks are likely to trigger a rise in stunting, which already affects more than one in five children. • Childhood wasting and overweight are now at alarming levels, and are likely to get worse due to COVID-19. • With little progress to show over the last 20 years, almost a third of women of reproductive age are still anaemic.	• Conflict, COVID-19, climate change and growing inequalities are converging to undermine food security worldwide. • The low labour productivity of small-scale food producers remains troubling. • Already slow progress on child malnutrition has likely been set back further by the pandemic and growing food insecurity. • The proportion of countries affected by high food prices increased sharply in 2020.	• In the face of a poly-crisis, joint global efforts are urgently needed to address hunger and ensure food security. • Aid and public spending on agriculture are falling despite the growing global food crisis. • Malnutrition continues to threaten children and women worldwide, despite some progress. • Despite dropping in 2021, the share of countries experiencing high food prices remained above the 2015–2019 average.

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
Goal 3. Good health and well-being: Ensure healthy lives and promote well-being for all at all ages			
• COVID-19 could reverse years of progress in reducing maternal and child deaths unless urgent action is taken. • The rate of unintended pregnancies could soar if continuity in family planning supplies and services is not ensured. • The COVID-19 crisis has interrupted childhood immunization efforts globally, with potentially deadly consequences. • Critical care for people with non-communicable diseases is even more precious in the age of COVID-19. • COVID-related disruptions could cause a spike in illness and deaths from other communicable diseases. • The world is falling short on its promise of universal health coverage by 2030. • Rising out-of-pocket health expenses are reaching unsustainable levels, pushing millions into extreme poverty. • The pandemic has spotlighted the shortage of medical personnel worldwide as well as the heavy burden on women as nursing personnel. • The need for greater public health preparedness has never been clearer	• Beyond millions of deaths worldwide, the full toll of the COVID-19 pandemic on health is not yet known. • A decade of progress in reproductive, maternal and child health could be stalled or reversed by the pandemic. • The COVID-19 pandemic is aggravating the burden of non-communicable diseases. • Disruptions in detecting and treating communicable diseases could undo years of focused effort. • Support for mental health is being recognized by the vast majority of countries in their COVID-19 response plans. • COVID-19 is amplifying health inequalities. • Countries are working hard to maintain essential health services despite the current crisis. • Health and care workers – in short supply in many regions – have been stretched to their limits. • A lack of data is the main stumbling block to understanding the true impact of COVID-19.	• COVID-19 directly and indirectly led to the deaths of nearly 15 million people in the first two years of the pandemic. • The pandemic has triggered a significant rise in anxiety and depression, particularly among young people. • Progress has been made in maternal and child health, but glaring regional disparities must be addressed. • The health and economic impacts of COVID-19 have likely worsened uneven progress towards universal health coverage. • Widespread disruptions have derailed progress against HIV, tuberculosis and malaria. • More children are missing out on essential vaccines due to the pandemic. • The COVID-19 pandemic has taken a heavy toll on health and care workers, who are already stretched thin in most regions.	• Stagnating progress in reducing maternal mortality means a woman dies of preventable causes every two minutes. • Progress on reproductive health continues, with falling adolescent birth rates and rising access to contraception. • Global child mortality rates show significant decline, but challenges remain. • The alarming decline in childhood vaccination is leaving millions of children at risk from devastating but preventable diseases. • Intersecting crises have left the world off-kilter to achieve SDG targets on HIV, malaria and tuberculosis. • In the wake of the pandemic, progress towards universal health coverage has slowed while financial hardship has risen. • Despite increases in the global health workforce, numbers remain low in regions with the highest burden of disease. • Driven by COVID-19, official development assistance for basic health has doubled since 2015.
Goal 4. Quality education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all			
• School closures worldwide may reverse years of progress in access to education	• Exceptional measures are needed to get students back on track after a catastrophic year for education	• Prolonged school closures have heightened the risk that children will not return to school	• Primary and secondary school completion is rising, but the pace is far too slow and uneven

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
• Without remedial action, the effects of COVID-19 will only add to the obstacles faced by poor children in completing their education. • Remote learning remains out of reach for most students in the poorest countries. • School closures create added risks for the health and safety of vulnerable children. • Lack of basic infrastructure in schools, such as handwashing facilities, will make recovery from COVID-19 more difficult.	• Large disparities in school completion are likely to get worse, especially among poor or vulnerable children. • Good progress in early childhood education has been brought to a halt by the pandemic. • Broader participation in continuing education and training is needed to create resilient and adaptable workers. • Building back better from the crisis can start with basic school infrastructure, which is sorely lacking in many countries.	• COVID-19 has cast a shadow on an already dire picture of learning outcomes. • Entrenched inequities in education have only worsened during the pandemic. • Countries are improving schools as they reopen, but psychosocial support for students is often overlooked.	• Patchy data show disappointing progress on improving primary school reading levels. • Access to early childhood education has expanded, but progress has slowed since 2015. • Low digital skills hamper progress towards universal and meaningful connectivity. • Basic school infrastructure varies widely across regions and is far from universal. • Many teachers still lack the required qualifications to teach.
Goal 5. Gender equality: Achieve gender equality and empower all women and girls			
• COVID-19 is intensifying the risk of violence against women and girls. • The global pandemic could set back progress to end child marriage and female genital mutilation. • Women spend more time than men in unpaid work, a burden that is likely to get heavier during the pandemic. • Women are increasingly assuming positions of power, but the world is still far from parity. • Women's lack of decision-making power extends even to their own reproductive health.	• Violence against women persists at unacceptably high levels and has been intensified by the pandemic. • COVID-19 threatens global progress against child marriage. • The pandemic is adding to the burden of women's unpaid work while squeezing them out of the labour force. • Women's equal participation in decision-making, crucial for COVID-19 response and recovery, remains a distant target. • Discriminatory laws and legal gaps continue to deprive women of their human rights. • Giving women equal access to land would go a long way towards alleviating poverty and food insecurity.	• Awareness of violence against older women is growing, but data remain limited. • Child marriage and female genital mutilation are persistent human rights violations holding back progress for girls and women. • Progress in women's access to leadership positions, in both political and economic spheres, remains sluggish. • In many countries, women still lack the legal right to autonomy over their own bodies. • Protection of women's land and property rights still has a long way to go. • Accelerated progress is needed to align public financing with gender equality objectives.	• Progress has been sluggish on upping women's share in management and political representation. • Nearly half of married women lack decision-making power over their sexual and reproductive health and rights. • Insufficient progress has been made in reducing intimate partner violence over the past two decades. • Discriminatory laws and gaps in legal protection persist in critical aspects, denying women their human rights worldwide. • Recent gains are under threat in efforts to end child marriage. • Agricultural land ownership and legal protection of women's land rights remain low. • Mobile phone ownership can be a powerful tool for empowering women, but gender parity remains elusive in many regions.

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
Goal 6. Clean water and sanitation: Ensure availability and sustainable management of water and sanitation for all			
• Closing the gaps in water, sanitation and hygiene are critical to containing the spread of COVID-19 and other diseases. • Cooperation over transboundary waters needs to accelerate. • Alarming levels of water stress in many regions threaten progress towards sustainable development. • Lack of fresh water in the poorest countries is increasing their vulnerability to climate change and water scarcity. • Funding available for Goal 6 targets is insufficient to meet countries' needs. • A global framework for water resources management shows a poor record of implementation.	• Universal access to drinking water, sanitation and hygiene is fundamental to the COVID-19 response. • Water stress is getting worse in subregions with already high or critical levels. • Freshwater ecosystems are changing dramatically, signalling the need for an urgent response. • Ensuring that operational arrangements cover all transboundary water basins by 2030 will require a major acceleration in effort. • Countries are lagging in the implementation of integrated management of water resources, central to a sustainable future.	• Meeting drinking water, sanitation and hygiene targets by 2030 will require a fourfold increase in the pace of progress. • The world's wetlands are being lost at an alarming rate; it's time to protect and restore them on a massive scale. • Early remediation of water pollution will require active monitoring, which is sorely lacking in the poorest countries. • Stress on water resources in Northern Africa and Western Asia is already at dangerous levels. • Most countries still lack cooperation agreements on shared water resources, a potential source of conflict.	• Access to drinking water, sanitation and hygiene improved significantly in rural areas, but stagnated or decreased in urban areas. • Water quality is improving in countries with robust monitoring, but there are still many unknowns. • Water-use efficiency has improved, particularly in agriculture, but rising water stress in several areas is cause for concern. • Enhancing water management and transboundary cooperation is critical for bolstering resilience to crises. • Decline in official development assistance to water sector raises concerns. • As wetland ecosystems and species disappear, large-scale protection and restoration are imperative.
Goal 7. Affordable and clean energy: Ensure access to affordable, reliable, sustainable and modern energy for all			
• Deficits in electricity are increasingly concentrated in sub-Saharan Africa. • Slow progress on clean cooking solutions puts the health of nearly 3 billion people at risk. • Stepped-up efforts in renewable energy are needed to achieve long-term climate goals. • Improvements in energy efficiency – key to reducing greenhouse gas emissions – are falling short of the SDG target. • The rise in international financing for renewable energy is encouraging, but only a fraction of it is reaching the poorest countries.	• The lights are going out in parts of Africa and Asia due to the effects of growing poverty. • At the current rate of progress, one third of the world's population will still be using dangerous and inefficient cooking systems in 2030. • Effective climate action will require accelerated action on modern renewable energy, especially for heating and transport. • The world will reach the global target for energy efficiency only through substantial investment on a systematic scale.	• Progress in electrification has slowed with the challenge of reaching those hardest to reach. • Intensified efforts are needed in least developed countries to jump-start access to clean cooking fuels and technologies. • Meeting global energy and climate objectives will require a major push in the deployment of renewables, with massive finance mobilization. • The target for global energy efficiency remains within reach, but only with significant investment on a systematic scale.	• More people than ever have access to electricity, but the pace is lagging for least developed countries. • At the current pace, a quarter of the population will still be using unsafe and inefficient cooking systems by 2030. • Renewable energy use is growing in the electricity sector, but limited in heating and transport. • A strong rebound is needed to reach energy efficiency targets. • International public financing for clean energy in developing countries continues to decline.

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
	• Least developed countries receive only a fraction of international financing for renewable energy.	• International public financing for renewable energy had already slowed before the pandemic, despite the growing urgency of climate change.	• Renewable energy is booming in developing countries, but the least developed are falling behind.
Goal 8. Decent work and economic growth: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all			
• Even before the pandemic, economic growth in LDCs, while rapid, failed to approach the 7 per cent target. • The steady rise in global labour productivity observed since 2000 may falter in the face of the coronavirus crisis. • The pandemic will have a particularly adverse impact on workers in the informal economy. • Global unemployment may reach an historic high in 2020, depending on the policies adopted. • Occupational safety and health becomes an even heavier challenge as workplaces reopen. • Tourism is facing unprecedented challenges, with many small island developing States confronting new and harsh economic realities.	• For many countries, the road to economic recovery may be a long, bumpy ride. • COVID-19 has led to massive job losses, particularly among youth and women. • The lack of a social safety net has left informal workers on their own to cope with the COVID-19 fallout. • The worst year on record for international tourism disproportionally affected Small Island Developing States. • The pandemic has led to an increase in youth who are not employed, in school or in training.	• Various shocks, including the war in Ukraine, continue to hinder robust economic recovery. • The pandemic has resulted in volatile shifts in labour productivity, affecting small firms and the poorest countries the most. • Labour market recovery remains shaky. • Informal employment was not an option for many workers displaced at the start of the pandemic. • Rising poverty and pandemic-related disruptions are forcing millions of children into child labour. • Youth training, education and employment have suffered massive disruptions, with women facing the biggest challenges.	• Global economic recovery continues on a slow trajectory. • Challenging economic conditions are pushing more workers into informal employment. • Global unemployment is expected to decline below pre-pandemic levels, but challenges persist in low-income countries. • Young women are more than twice as likely as young men to be out of education, employment or training. • Tourism is on a path to recovery, but still well below pre-pandemic levels. • COVID-19 has accelerated the adoption of digital solutions, transforming access to finance.
Goal 9. Industry, innovation and infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation			
• The aviation industry, a driver of economic development, has likely suffered the steepest decline in its history. • Already slow manufacturing growth has plummeted as a result of the pandemic. • Better access to financial services for small-scale industries is urgently needed to resuscitate the global economy.	• Global manufacturing production plummeted as a result of the COVID-19 crisis. • Aviation had its gravest moment in history with a collapse in demand for air travel. • Economic recovery in the latter half of 2020 was fuelled by the manufacture of medium-and high-tech products.	• Manufacturing in more developed countries has rebounded, leaving least developed countries behind. • Jobs in manufacturing have not regained ground lost during the pandemic. • The passenger airline industry is still struggling to recoup catastrophic losses.	• Least developed countries face challenges in achieving the manufacturing target by 2030. • Economic growth outpaced increases in CO2 emissions, aided by the use of clean technologies and reduced industrial output. • Global research and development spending is up, particularly since the pandemic, but is still too low in least developed countries.

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
• Despite progress in recent years, investments in research and development need to accelerate, in part to cope with COVID-19. • Mobile connections are practically universal, but about half the global population is offline, mostly in LDCs.	• Increased investment in research and development is essential to finding solutions for crises such as COVID-19. • Small-scale industries in the poorest countries still struggle with access to credit. • Vast swathes of the global population are still unable to connect, either through rural roads or cyberspace.	• The lack of credit or other support has dealt a death blow to many small-scale industries. • Higher-technology industries are proving far more resilient in crises than their lower-tech counterparts. • Most of the world's population are covered by a mobile-broadband signal, but blind spots remain.	• Strong growth in medium-high- and high-technology industries amid global manufacturing slowdown. • More than 95 per cent of the world has mobile broadband access of at least 3G, but connecting the final frontier is proving difficult.
Goal 10. Reduced inequalities: Reduce inequality within and among countries			
• While real incomes of the poorest within countries are rising, the rich still prosper disproportionately. • Women with disabilities face multiple – and intersecting – forms of discrimination. • Workers are receiving a smaller share of the output they helped produce. • Income inequality is falling in some countries, but levels generally remain high. • The global recession could constrict aid flows to developing countries. • Most regions still have a long way to go in establishing adequate migration policies.	• The proportion of the global population who are refugees has more than doubled since 2010. • Despite thousands of migrant deaths each year, not all countries have comprehensive policies on migration. • Income inequality has been going down since the global financial crisis; the pandemic could reverse that trend. • Fiscal policies that help shape more equitable societies play a small role in low-income countries. • Relative low incomes mean that many are being left behind. • Remittance costs are at an all-time low, but more effort is still needed to meet the agreed target.	• The war in Ukraine is adding to already record numbers of refugees worldwide. • Large numbers of migrants lost their lives last year on sometimes treacherous migratory routes. • COVID-19 increased relative poverty in many countries, but others bucked the trend. • The pandemic has caused a rise in income inequality, jeopardizing two decades of steady progress. • Discrimination remains widespread, with women and persons with disabilities at heightened risk. • Workers' share of national income is eroding, exacerbating income inequality.	• Most countries experienced increased shared prosperity, but the pandemic may have reversed some of this progress. • The pandemic has caused the largest rise in income inequality between countries in three decades. • Racial discrimination is one of the most common grounds for discrimination worldwide. • With deaths along migratory routes rising globally, urgent action is needed to ensure safe migration. • Record numbers of people are fleeing their countries in the face of mounting crises.
Goal 11. Sustainable cities and communities: Make cities and human settlements inclusive, safe, resilient and sustainable			
• Global progress has been reversed in reducing the share of slum dwellers, whose vulnerability has been intensified by the pandemic • More public transport is needed in the world's cities	• COVID-19 has only worsened the plight of slum dwellers, further marginalizing those already vulnerable • The pandemic has drawn attention to the need for safe, accessible and reliable public transport	• Leaving no one behind will require an intensified focus on urban slums – home to 1 billion people • Air quality is now being monitored in a record number of cities, but it remains substandard worldwide	• Smaller cities and towns in many regions are recording faster growth in slum populations than major cities • The demand for urban transportation continues to grow exponentially, particularly in developing countries

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
• Beyond the devastation, the pandemic has prompted a positive rethinking of our cities. • Open public spaces in the world's cities promote health and productivity, but access is often limited. • Clearer skies over some of the world's most polluted cities provide a glimpse of what could be.	• The world's urban areas fall well short of the target for streets and open public spaces. • Countries are increasingly adopting national urban policies, which are key to managing pandemic-related and other risks.	• Only about half the world's city dwellers have convenient access to public transportation. • As cities continue to grow, the longstanding problem of municipal solid waste continues to mount. • Open public spaces in congested urban areas play a vital role in social and economic life, but are not widely accessible. • More local governments are adopting disaster risk reduction strategies, but a broader disaster and climate risk management approach is now needed.	• Air pollution is not only an urban problem, but is also affecting towns and rural areas. • Provision and access to open public spaces remains low across regions, impacting negatively on the quality of urban life. • Urban sprawl is outpacing population growth in most cities, with detrimental effects on sustainability. • Since 2015, many more national and local governments have reported having disaster risk reduction strategies.
Goal 12. Responsible consumption and production: Ensure sustainable consumption and production patterns			
• The world continues on a path of using natural resources unsustainably. • Growth in the generation of electronic waste far outpaces its rate of recycling. • A significant proportion of food is lost along the supply chain before it reaches the consumer. • Despite the growing urgency of the climate crisis, Governments are still subsidizing the fossil fuel industry. • Countries now need to operationalize the principles of sustainable economic growth. • Businesses must address gaps in the quality of sustainability reporting.	• The rapidly growing rate of natural resource consumption is unsustainable. • Progress to promote sustainable production and consumption is uneven. • Electronic waste continues to proliferate and is not being disposed of in a responsible way. • Progress to eliminate fossil fuel subsidies remains uneven, threatening the achievement of the Paris Agreement and 2030 Agenda. • Despite progress, developing countries still have vast untapped potential for renewable energy.	• Growing reliance on natural resources has set the Earth on an unsustainable course. • Too much food is being lost or wasted – in every country every day. • The vast majority of the world's electronic waste is not being safely managed. • Renewable energy is taking off in developing countries overall, but the poorest, most disadvantaged countries are lagging behind. • Fossil fuel subsidies remain alarmingly high, despite a temporary drop in 2020. • More effort is needed to fully mainstream sustainable development and global citizenship in national education systems.	• Regional inequalities in material footprints highlight consumption disparities. • Fossil fuel subsidies rise back to 2014 levels despite calls for a phase-out. • Despite rising global hunger, food waste and losses are staggering and uneven. • More companies, large and small, are reporting on their efforts to improve sustainability. • Global cooperation on sustainable consumption and production rises, while reporting dwindles. • Despite increased public procurement reporting, sustainable tourism monitoring is down.
Goal 13. Climate action: Take urgent action to combat climate change and its impacts			

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
• The world is way off track to meet the Paris Agreement target, signalling cataclysmic changes ahead. • Financing for climate action has increased substantially, but it continues to be surpassed by investments in fossil fuels. • Most developing countries have begun to formulate plans to strengthen resilience and adapt to climate change. • Despite its glaring relevance, progress in meeting the 2020 disaster risk reduction target has been slow.	• Greenhouse gas emissions will continue to increase without critical steps to shift economies towards carbon neutrality. • Notwithstanding a global pandemic, countries are advancing climate action, with a focus on adaptation. • The global transition to a low-emission, climate-resilient future is backed up by increasing financial support.	• Rising global greenhouse gas emissions are resulting in record-breaking temperatures and more extreme weather. • Fossil fuel emissions rebounded to a record high in 2021, erasing pandemic-related declines. • Climate financing is just a fraction of what the United Nations says is needed to avert the worst scenarios.	• Urgent global greenhouse gas emission reductions are needed to avert 1.5°C tipping point. • Global climate change education has so far not kept up with youth demand. • Record-setting rising sea levels are a severe threat to hundreds of millions of people. • The $100-billion-a-year climate finance goal by developed countries has yet to be met.
Goal 14. Life below water: Conserve and sustainably use the oceans, seas and marine resources for sustainable development			
• Continuing ocean acidification threatens the marine environment and ecosystem services. • While protection of marine environments is expanding, it is critical that coverage extend to key biodiversity areas. • Countries are curtailing illegal fishing through a binding international agreement, but even more concerted action is required. • Sustainable fisheries are vital to the livelihoods of communities in the most disadvantaged countries. • Small-scale fishers, large contributors to developing country economies, continue to be marginalized. • A pause in the assault on global fish stocks may not be enough to avert the collapse of certain fisheries.	• The sustainability of our oceans demands renewed efforts to safeguard key biodiversity areas. • The number of dead zones in the world's coastal waters is growing at an alarming rate. • Implementation of international instruments to conserve and responsibly use ocean resources remains uneven, highlighting the need for increased support. • Funding for marine research pales in comparison to the enormous economic contribution of the world's oceans.	• Increasing acidification is limiting the ocean's capacity to moderate climate change. • The proliferation of plastic, nutrient run-off and other forms of waste is killing marine life. • Vast areas of the ocean are under protection, but more intensive efforts are still needed. • Global fish stocks are still under threat, although the route to sustainability is clear and navigable. • Pressure on fish stocks is lowering the contribution of sustainable fisheries to economic growth in some regions. • Accelerated action is needed to support small-scale fishers, many of whose livelihoods collapsed under the pandemic.	• Citizen science sheds light on the magnitude of ocean plastic pollution. • Coastal eutrophication: a growing threat to marine ecosystems and communities. • Expanding global ocean acidification monitoring is crucial to confront an unabating crisis. • Despite improvements, stronger global cooperation is needed to reel in illegal fishing. • Turning the tide: Recent marine agreements show promise for ocean protection.

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
Goal 15. Life on land: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss			
• Wildlife crime endangers both animal species and human health, including through new deadly diseases. • Land degradation affects billions of people, drives species to extinction and intensifies climate change. • The world is falling short on 2020 targets to halt biodiversity loss, despite some progress. • Only one third of countries are on track to achieve their national biodiversity targets.	• More than one quarter of the species assessed for the IUCN Red List are threatened with extinction. • Progress to safeguard key biodiversity areas, essential for environmental sustainability, has stalled. • Sustainable forest management is gaining ground, but forest loss continues at an alarming rate. • Funding is needed to implement legislation adopted in almost all countries in response to invasive alien species.	• The world's forest area continues to shrink, mainly due to agricultural expansion. • Global efforts to promote access and benefit-sharing of genetic resources gains momentum. • The risk of species extinction continues to rise and is highest in Asia and small island developing States. • Nearly half of areas identified as key for global biodiversity are under protection, though progress lags in four regions. • National planning processes are increasingly reflecting the value of biodiversity; still, progress is too slow.	• Deforestation and forest degradation remain major global threats. • Despite efforts to mobilize financing for biodiversity conservation, a persistent funding gap remains. • Species extinction risk has accelerated each decade since 1993. • Growth in protected area coverage of key biodiversity areas has largely stalled. • Alarming trends in land degradation call for urgent action to restore the Earth.
Goal 16. Peace, justice and strong institutions: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels			
• Every day, 100 civilians – including women and children – are killed in armed conflicts despite protections under international law. • Stronger efforts are needed to reduce the global homicide rate, which is dropping too slowly. • Children are regularly exposed to multiple forms of violence, many of which are unrecognized and unreported. • Exposure to COVID-19 is among the many inhumane conditions faced by those who are incarcerated, often unsentenced.	• The pandemic is intensifying children's risk of exploitation, including trafficking and child labour. • Bribery is at least five times more likely in low-income than in high-income countries. • Widespread civilian deaths in armed conflicts persist, although progress has been made in most regions. • The slaying of human rights defenders, journalists and trade unionists remains unacceptably high. • Efforts to establish national human rights institutions, which have proven invaluable during the pandemic, need to be reinvigorated.	• Civilians continue to bear the brunt of violent conflicts, with record numbers forcibly displaced. • Tracing is key to curbing illict trade in small arms, but it needs to be strengthened through better global cooperation. • About a third of the world's population – mostly women – say they feel unsafe walking alone in their local neighbourhoods at night. • Declining homicide rates continue to reflect strong gender differences. • Streamlined and transparent business processes can help curb corruption, which is found in every region.	• Global homicides hit a 20-year high amid escalating gang and sociopolitical violence. • There has been an unprecedented increase in civilian deaths in conflicts – the first since the adoption of the 2030 Agenda. • Falling detection of victims of human trafficking during crises prompts new methods to track and combat this hidden crime. • The global prison population keeps rising, creating overcrowding and concerns over the proportion of unsentenced detainees.

SDG Report 2020 findings	SDG Report 2021 findings	SDG Report 2022 findings	SDG Report 2023 findings
• Human rights defenders, journalists and trade unionists are too often targets of violent attacks. • More countries now have freedom-of-information laws, but their implementation could be stepped up.			• Drug trafficking is generating illicit financial flows worth billions, fuelling corruption and diverting resources. • The number of young parliamentarians remains low, with few holding leadership positions.
Goal 17. Partnership for the Goals: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development			
• Major donors say they will strive to protect ODA budgets, even as the coronavirus upends the global economy. • After reaching a new high, remittances are expected to drop dramatically in 2020. • Foreign direct investment and global value chains are likely to take a hit from the coronavirus crisis. • Global trade is expected to plummet while LDCs struggle to build their share of exports. • The Internet is now essential for many daily activities, but half the world's population is still not connected. • While the need for sound data continues to escalate, poorer countries lack the resources to produce them.	• Foreign aid reached an all-time high during the crisis, but donors are still not living up to their commitments. • Foreign direct investment flows fell sharply in 2020, especially to poorer regions. • Remittance flows remained strong in 2020, despite the pandemic. • The target of doubling the global share of LDC exports by 2020 has been missed. • Despite the immense need for connectivity during the pandemic, nearly half of the global population are still not online. • Notwithstanding a surge in data demand, international support for data and statistics remains inadequate.	• Official development assistance has reached a new high, largely due to COVID-related aid, but still falls short of the target. • The importance of data and statistics for sound decision-making has never been clearer, but funding for this sector has stagnated. • The pandemic has added extra weight to the debt burdens of low- and middle-income countries. • Internet use has surged, prompted by the pandemic, although poorer regions still lag behind. • Global foreign direct investment rebounded strongly in 2021, but flows to the poorest countries showed only modest growth. • Remittance flows to poorer countries remain robust, buttressed by strong economic activity and employment levels in many host countries.	• In the wake of the pandemic, many developing countries are facing a debt crisis. • Despite record-breaking global trade increases, the share of exports from least developed countries has stagnated and is far off target. • Official development assistance surged in 2022 owing to spending on refugees in donor countries and aid to Ukraine. • Internet usage reaches two-thirds of the world's population, but gender and connectivity gaps persist. • The world needs more timely, detailed and accurate data to tackle a multitude of crises, but funding for data and statistics is ever more scarce.

Source: Compiled by the Author from United Nations Statistics Division,2020; 2021; 2022; 2023.

A.6. Global Risk Definitions Used in the world Economic Forum Global Risks Perception Survey 2022-2023

Global risk	Definition
Global economic risks	
Asset bubble bursts	Prices for housing, investment funds, shares and other assets become increasingly disconnected from the real economy, leading to a severe drop in demand and prices. Includes, but is not limited to cryptocurrencies, energy prices, housing prices, and stock markets.
Collapse of a systemically important industry or supply chain	Collapse of a systemically important global industry or supply chain with an impact on the global economy, financial markets or society leading to an abrupt shock to the supply and demand of systemically important goods and services at a global scale. Includes, but is not limited to energy, food and fast-moving consumer goods.
Debt crises	Corporate or public finances struggle to service debt accumulation, resulting in mass bankruptcies or insolvencies, liquidity crises or defaults and sovereign debt crises.
Failure to stabilize price trajectories	Inability to control the general price level of goods and services, including commodities. Inclusive of an unmanageable increase (inflation) or decrease (deflation) of prices.
Proliferation of illicit economic activity	Global proliferation of illicit economic activities and potential violence that undermine economic advancement and growth due to organized crime or the illicit activities of businesses. Includes, but is not limited to illicit financial flows (e.g., tax evasion); and illicit trade and trafficking (e.g., counterfeiting, human trafficking, wildlife trade).
Prolonged economic downturn	Near-zero or slow global growth lasting for many years leading to periods of stagnation; or a global contraction (recession or depression).
Global environmental risks	
Biodiversity loss and ecosystem collapse	Severe consequences for the environment, humankind and economic activity due to destruction of natural capital stemming from a result of species extinction or reduction spanning both terrestrial and marine ecosystems.
Failure of climate-change adaption	Failure of governments, businesses and individuals to enforce, enact or invest in effective climate-change measures to adapt to climate change, such as a lack of climate-resilient infrastructure.
Failure to mitigate climate change	Failure of governments, businesses and individuals to enforce, enact or invest in effective climate-change mitigation measures, such as the decarbonization of economic activity.
Large-scale environmental damage incidents	Loss of human life, financial loss and/or damage to ecosystems as a result of human activity and/or failure to co-exist with animal ecosystems. Inclusive of deregulation of industrial accidents, oil spills and radioactive contamination.
Natural disasters and extreme weather events	Loss of human life, damage to ecosystems, destruction of property and/or financial loss at a global scale due to extreme weather events. Inclusive of land-based (e.g., earthquakes, volcanos wildfires), water-based (e.g., floods), atmospheric (e.g., heatwaves), and extra-terrestrial based (e.g., comet strikes and geomagnetic storms).
Natural resource crises	Severe commodity and natural resource supply shortages at a global scale as a result of human overexploitation and/or mismanagement of critical natural resources. Includes, but is not limited to: chemicals, food, minerals and water.
Global geopolitical risks	
Geo-economic confrontation	Deployment of economic levers by global or regional powers to decouple economic interactions between nations, restricting goods, knowledge, services or technology with the intent of gaining geopolitical advantage and consolidate spheres of influence. Includes, but is not limited to currency measures, investment controls, sanctions, state aid and subsidies, and trade controls on energy, minerals and technology.
Ineffectiveness of multilateral institutions and international cooperation	Ineffectiveness of international cooperation mechanisms due to a weakening of global multilateral institutions or marked geopolitical fragmentation. Includes, but is not limited to processes that underpin coordination on finance, the environment, humanitarian aid, health pandemics and trade.
Interstate conflict	Belligerent bilateral or multilateral conflict between states manifesting as cyber-attacks, proxy wars or hot war.
State collapse or severe instability	Collapse of a state with geopolitical significance due to the erosion of institutions and rule of law, internal civil unrest and military coups, or the effects of severe regional or global instability.

Terrorist attacks	Large-scale or persistent small-scale terrorist attacks carried out by non-state actors with ideological, political or religious goals, resulting in loss of life, severe injury or material damage caused by biological, chemical, nuclear or radiological weapons or other means.
Use of weapons of mass destruction	Deployment of biological, chemical, cyber, nuclear, radiological or autonomous AI weapons, resulting in loss of life, destruction and/or international crises.
Global societal risks	
Chronic diseases and health conditions	Widescale increase in chronic physical health conditions. Includes, but is not limited to, conditions linked to excessive consumption habits and economic activity that releases harmful pollutants in the air, water or food through agricultural, industrial and household practices.
Collapse or lack of public infrastructure and services	Non-existence, or widespread bankruptcy of social security systems and erosion of social security benefits, alongside inequitable or insufficient public infrastructure and services. Includes but is not limited to lack of disability and family benefits, as well as affordable and adequate housing, public education, child and elder care, healthcare, transportation systems and urban development.
Cost-of-living crisis	Significant inability among broad sections of populations to maintain their current lifestyle due to increases in the cost of essential goods which are not matched with a rise in real household income.
Employment crises	Structural deterioration of work prospects or standards of work. Includes, but is not limited to erosion of workers' rights; stagnating wages; rising unemployment and underemployment; displacement due to automation; stagnant social mobility; and geographical or industry mismatches between labour supply and demand.
Erosion of social cohesion and societal polarization	Loss of social capital and fracturing of communities leading to declining social stability, individual and collective well-being and economic productivity. Includes, but is not limited to persistent and potentially violent civil unrest; and actual or perceived inequalities in opportunities across age, income bracket, ethnicity and race, educational background, demographic characteristics, and political affiliation.
Infectious diseases	Massive and rapid spread of viruses, parasites, fungi or bacteria that cause an uncontrolled contagion of infectious diseases, resulting in an epidemic or pandemic with loss of life and economic disruption. Includes, but is not limited to: zootic diseases, accidental or intentional releases of natural or man-made pathogens, the resurgence of pre-existing diseases due to lower levels of immunity, and the rise of antimicrobial resistance.
Large-scale involuntary migration	Large-scale involuntary migration and displacement across or within borders, stemming from: persistent discrimination and persecution, lack of economic advancement opportunities, natural or human-made disasters, and internal or interstate conflict.
Misinformation and disinformation	Persistent false information (deliberate or otherwise) widely spread through media networks, shifting public opinion in a significant way towards distrust in facts and authority. Includes, but is not limited to, dissemination by states, public figures, media organizations and networks of individuals.
Severe mental health deterioration	Widescale spread of mental health disorders or rising inequality globally across multiple demographics, which negatively impacts well-being, social cohesion and productivity. Includes, but is not limited to anxiety, dementia, depression, loneliness and stress.
Global technological risks	
Adverse outcomes of frontier technologies	Intended or unintended negative consequences of technological advances on individuals, businesses, ecosystems and/or economies. Includes, but is not limited to: AI, brain-computer interfaces, biotechnology, geo-engineering, quantum computing and the metaverse.
Breakdown of critical information infrastructure	Deterioration, overload or shutdown of critical physical and digital infrastructure or services leading to the breakdown of internet, cellular devices, public utilities or satellites. Stemming from, but not limited to, cyberattacks, intentional or unintentional physical damage, or solar storms.
Digital inequality and lack of access to digital services	Fractured or unequal access to digital networks and technologies stemming from underinvestment, low digital skills, insufficient purchasing power, or government restrictions on technologies.
Digital power concentration	Concentration of critical digital assets, capabilities or knowledge among a small number of individuals, businesses or states that can control access to digital technologies and demand discretionary pricing. Stemming from, but not limited to, the failure of anti-trust regulation, inadequate investment in the innovation ecosystem, or state control over key technologies.
Widespread cybercrime and cyber insecurity	Increasingly sophisticated cyberespionage or cybercrimes. Includes, but is not limited to: loss of privacy, data fraud or theft, and cyber espionage.

Source: Consultant's compilation of information drawn from World Economic Forum, 2023.

A.7. Major topics and key messages/main findings/policy priorities of The World Bank World Development Report series 2020-2023

Major topic	Key messages/Main findings/Policy priorities
World Development Report 2020: Trading for Development in the Age of Global Value Chains	
Drivers of participation in GVCs	• Global value chain (GVC) participation is determined by fundamentals such as factor endowments, market size, geography, and institutional quality, but these fundamentals need not dictate destiny. Choosing the right policies can shape each one of these fundamentals and thus GVC participation. • Factor endowments matter. Low-skilled labour and foreign capital are central to backward participation in GVCs at early stages. An abundance of natural resources drives forward GVC integration. Foreign capital, whether efficiency-seeking or resource-seeking, can enhance host country integration in GVCs. • Market size matters. Small countries are more dependent on imported inputs and foreign markets. Trade liberalization can expand effective market size and promote participation in GVCs. • Geography matters. Overcoming remoteness by improving connectivity can promote GVC participation. Trade in parts and components within international production networks is highly sensitive to logistics performance and uncertainty in bilateral international transport times. • Institutional quality matters. Entering deep preferential trade agreements (PTAs) can enhance institutional quality and increase GVC participation. Deep PTAs cover legal and regulatory frameworks, harmonize customs procedures, and set rules on intellectual property rights.
Consequences of GVCs for development	• Hyperspecialization and durable firm-to-firm relationships promote efficient production and the diffusion of technology, as well as access to capital and inputs along value chains. The result is increased productivity and income growth—more so than what countries achieve through domestic production but also than what they achieve through trade in finished goods. • How countries participate in global value chains (GVCs) matters for the impact on development. Countries experience the biggest growth spurt during the transition out of commodities into basic manufacturing activities. • GVCs deliver more productive jobs, primarily through scale effects that result from increased productivity and expanded output. Because they boost income and productive employment, participation in GVCs is associated with reduced poverty. • The gains from GVC participation are not distributed equally across and within countries. Inequalities arise in the distribution of firm markups across countries; in the distribution of capital and labour, between skilled and unskilled workers as well as between male and female workers; and geographically within countries. • The expansion of GVCs has magnified the challenges facing the international tax system. The tax revenue losses from profit shifting and tax competition are substantial, particularly for lower-income countries.
Macroeconomic implications of GVCs	• Global value chains (GVCs) are associated with greater synchronization of economic activity across countries. When production in one country relies on inputs from another country, then economic activity in the two countries is linked. • GVCs create strong links in price formation, implying that inflation in one country is more likely to spill over to its direct and indirect trading partners. In this sense, GVC participation is associated with the rising synchrony in inflation across countries. • In GVC countries, episodes of export growth are linked to episodes of import growth. This finding implies that the consequences of currency movements for export volumes are likely to be dampened. • GVCs amplify the costs of protectionism for trade and growth. The back-and-forth movement in tasks and parts across borders means that trade barriers are incurred multiple times. Protectionism is therefore costlier for growth and welfare. • Trade agreements have the potential to reshape the geography of production. The prevalence of rules of origin as well as the productivity gains associated with a reduction in the price of imported inputs imply that trade agreements have systemic consequences for the allocation of production across countries in GVCs.

Impact of GVCs on the environment	• Global value chains (GVCs) are a mixed blessing for the environment. Scale effects— which refer to the rapid growth of GVC economic activity—are bad for the environment, whereas composition effects—which refer to how tasks are distributed across the globe— have ambiguous effects. Technique effects—which refer to the environmental cost per unit of production—are positive for the environment. • GVCs are associated with more shipping and more waste in the aggregate than standard trade. Both have environmental costs. • One important concern has been that industries might migrate to jurisdictions where environmental regulations are lax, but that concern is not borne out by the data. Rather, by locating production where it is most efficient, GVCs can lower the net resource intensity of global agricultural production. • The relational aspect of GVCs can attenuate environmental concerns. Knowledge flows between firms can enable the spread of more environmentally friendly production techniques throughout a GVC. The large scale of lead firms in GVCs can accelerate environmental innovation and push for higher standards. • GVCs also facilitate the production of new environmentally friendly goods. Products such as solar panels, electric cars, and wind turbines are produced at lower costs in GVCs and help reduce the environmental costs of consumption.
GVCs and technological change	• Trade costs are likely to continue to fall. New digital technologies enhance opportunities for global value chain (GVC) participation. Developing countries, which exhibit the highest costs and biggest impediments to trade, stand to gain the most. • Platform firms and e-commerce generate uneven benefits across firms and households. Platform firms facilitate participation but also foster concentration, which affects the distribution of gains from participation in GVCs. • Anxiety that automation will hinder export-led industrialization may not be warranted. Evidence of reshoring is limited. New production technologies have promoted North– South trade, although the effects are heterogeneous across countries and sectors. • Increased automation in manufacturing is likely to have distributional impacts. Adoption of robots is driving down the labour share of income and increasing the demand for skilled workers, thereby exacerbating inequality in the labour market and increasing the need for adjustment policies to support disrupted workers. • Restricting trade to promote manufacturing is counterproductive. It lowers efficiency, raises prices of both inputs and outputs, and undermines incentives to innovate.
Policies to enhance GVC participation	• Factor endowments matter: Eliminating restrictions in factor markets enables countries to exploit their comparative advantage. Avoiding overvalued exchange rates and restrictive regulations ensures labour is competitively priced. A favourable business climate and effective investment promotion facilitate foreign direct investment. • Market size matters: Liberalizing trade expands access to markets and inputs. By reducing tariffs and eliminating nontariff measures, a country expands its sources of supply. Liberalization in destination markets through trade agreements expands market access. • Geography matters: Remoteness can be overcome by improving connectivity and lowering trade costs. Costs related to delay and uncertainty can be reduced by customs reform, introducing competition in transport services, and improving port structure and governance. • Institutional quality matters: It can be improved by strengthening contract enforcement, protecting intellectual property rights, and improving standards regimes. Deep trade agreements can help lock in institutional reforms. • Proactive policies can enhance and upgrade global value chain (GVC) participation. Coordinating, informing, and training domestic small and medium enterprises helps link them to GVC lead firms. Investment in education and improvements in management encourage upgrading. Special economic zones can be a shortcut on the GVC development path when they successfully address specific market and policy failures.
Policies for GVC inclusion and sustainability	• Developing countries would benefit from policies that spread the jobs and earnings gains from global value chain (GVC) participation across society. Access to childcare and training programs support jobs for women and youth, respectively. Smallholders need assistance, such as extension services and access to finance, to integrate into agricultural value chains. GVC lead firms, labour, and governments can work together to protect workers' safety and rights.

	• Industrial countries would benefit from adjustment policies for workers displaced by technology, trade, and the expansion of GVCs. Placement services, training, and mobility support can help workers transition to more productive jobs. • Policy can mitigate negative environmental consequences and promote the adoption of environmentally friendly technologies. Pricing the environmental costs of production and distribution appropriately will encourage conservation and cleaner technologies. In addition, regulation is needed for specific pollutants and industries. • These national measures can be complemented by global cooperation on the environment and working conditions. Standardized international data will help expose poor production practices and induce firms to improve.
GVC and cooperation on trade	• Developing countries have benefited from the rules-based trade system, with its guarantees against trade discrimination, incentives to reform, assured market access, and dispute settlement. • The international trade system is especially valuable in a global value chain (GVC) world. Policy action or inaction in one country can affect producers and consumers in other countries. • Increasing pressure on the global trading system, manifested in protectionism and policy uncertainty, puts these benefits at risk. These pressures arise, first, from the growing symmetry in the economic size of countries and the persistent asymmetry in their levels of protection; second, from the failure to use domestic policies to address labor market dislocation and growing inequality in some advanced countries. • To sustain beneficial trade openness, countries need to deepen traditional trade cooperation to address remaining barriers to trade in goods and services, as well as other measures that distort trade, such as subsidies and the activities of state-owned enterprises. • Meaningful outcomes may be possible if the major developing country traders engage as equal partners and even leaders instead of seeking special and differential treatment; if the large, advanced countries continue to place their faith in rules-based negotiations instead of resorting to unilateral protection; and if countries together define a negotiating agenda that reflects both development and business priorities.
GVCs and cooperation beyond trade	• Sustaining openness to trade and global value chains (GVCs) requires cooperation beyond trade policy on taxes, regulation, competition policy, and infrastructure. • GVCs exacerbate the problems of tax avoidance and tax competition between potential host countries. International cooperation is necessary to enable countries to raise tax revenues and to ensure that conditions of competition are not distorted. Ultimately, a joint approach to greater use of destination-based corporate taxation could eliminate the incentive to shift profits and compete over taxes. Meanwhile, other measures against tax base erosion and income shifting could enhance domestic resource mobilization. • Domestic regulation is insufficient to address international market failures, such as privacy concerns related to cross-border data transfers. Cooperation by data-destination countries to protect foreign consumer data could reassure data-source countries that their commitments to openness will not put their citizens' data at risk. • Anticompetitive behaviour by GVC firms can affect the distribution of gains from GVC participation. Enhanced international cooperation around competition law enforcement would enable countries to overcome jurisdictional and capacity constraints to combat anticompetitive practices. • Coordination between countries on investment in transport and communication infrastructure can improve international connectivity. Gains are larger when governments collaborate to expedite trade simultaneously.
World Development Report 2021: Data for Better Lives	
Harnessing the value of data for the poor	• Data can improve people's lives in many ways. However, economic and political factors typically prevent benefits from being shared equitably. • The value of data for development is largely untapped. Realizing data's full value entails repeatedly reusing and repurposing data in creative ways to promote economic and social development. • The challenge is to develop a trust environment that safeguards against harmful misuse of data as they are exchanged between parties and enables data to be created, reused, and repurposed.

	• A strong data governance framework, composed of appropriate policies, laws, regulations, and institutions, is needed to ensure that the full value of data is realized and shared safely and equitably.
Data as a force for public good	• Public intent data, a foundation of public policies, can play a transformative role in the public sector. However, gaps in the availability, quality, and usability of these data are pervasive, particularly in low-income countries— the countries that stand to benefit most from improving public intent data. • Lack of resources, technical capacity, and data governance hamper the production of useful data for public policy. Lack of data literacy and demand for data limits their use for public policy. • These problems can be addressed through the high-level prioritization of data, including long-term financing, investments in human capital, and laws conducive to the safe production, exchange, and use of data. Some investments in better data have paid for themselves. • Ensuring a political commitment to and predictable government financing for the production of public intent data remains a central struggle in lower-income countries. The political will to prioritize funding for data systems can be stimulated by boosting the demand for data.
Data as a resource for the private sector	• Businesses are reaping tremendous value from both data created through businesses' economic activities and data shared by governments. Used as an input in data-driven decision-making, those data can spur innovation in products and services and reduce transaction costs, ultimately boosting productivity, export competitiveness, and growth. • Use of data in the production process of firms may help tilt the playing field toward poor people and underserved populations (who can trade across platforms and access free services) by reducing fragmentation in markets. However, it can also exacerbate domestic inequalities where foundational skills, infrastructure, and finance are not widely available in countries. • Use of data by businesses can also tilt the playing field away from poor countries, whose local enterprises may struggle to compete with large global players in part because of economies of scale and scope from data. • Although the use of data in the production process presents many opportunities to solve development challenges, policy makers should heed the risks this use presents for the concentration of economic power, patterns of inequality, and protection of the rights of individuals.
Creative reuses of data for greater value	• Innovations in repurposing and combining public intent and private intent data are opening doors to development impacts previously unimaginable. These innovations can inform and advance policy goals, help governments improve and target service delivery, and empower individuals and civil society. • When private intent data are repurposed for public purposes, they can help fill data gaps and provide real-time and finer-scale insights. When public intent and private intent data are combined, some or many of the limitations of each data type can be overcome. • Private intent data can be difficult to understand, monitor, and regulate. They may also miss the poorest or other marginalized populations and perpetuate discrimination and biases. Data protection is a key issue. • Responsive regulation and consumer protection measures are needed, along with recognition of which populations are omitted from an analysis. Using private intent data for effective policy making requires short- and long-term coordinated investments in training, data partnerships, and research. Best practices and guidelines need to be developed.
Data infrastructure policy: Ensuring equitable access for poor people and poor countries	• As new mobile technologies emerge, policy makers should proactively facilitate their rollout by promoting service competition, where possible, and infrastructure sharing, where necessary. • Universal service policies should incorporate measures designed to ease the demand-side barriers often faced by those who do not seek data services even when they are locally available. These measures include programs to improve the affordability of handsets and data services, while enhancing the digital literacy of excluded groups. • To ensure high-speed, cost-effective data services, policy makers should facilitate development of domestic data infrastructure that allows local storage, processing, and exchange of data so that data need not travel through distant overseas facilities.

	• A competitive market and open governance arrangements are two policies that support the creation of internet exchange points. Establishment of colocation data centres will depend on a stable investment climate for private sector investors, combined with the availability of low-cost reliable sources of clean energy.
Data policies, laws, and regulations: Creating a trust environment	• Trust in data transactions is sustained by a robust legal and regulatory framework encompassing both safeguards, which prevent the misuse of data, and enablers, which facilitate access to and reuse of data. • Safeguards must differentiate between personal data, requiring a rights-based approach with individual protection, and nonpersonal data, allowing a balancing of interests in data reuse. • Enablers for data sharing are typically more developed for public intent data, where public policy and law mandating data access and sharing are more readily established, than for private intent data, where governments have more limited influence. • Creation of a trust environment remains a work in progress worldwide, especially in low-income countries. There is no one-size-fits-all legal and regulatory framework. In countries with weak regulatory environments, the design of suitable safeguards and enablers may have to be carefully adapted to local priorities and capacities.
Creating value in the data economy: The role of competition, trade, and tax policy	• The expanding role of data in ubiquitous platform business models is reshaping competition, trade, and taxation in the real economy, posing important risks for low- and middle-income countries. • The way countries design safeguards and enablers for data will have knock-on effects for the real economy. For example, enabling data sharing among market players can play a valuable role in promoting competition. At the same time, the stringency of data safeguards will shape cross-border trading patterns for data-enabled services. Meanwhile, the intangible nature of digital value chains is posing major challenges for tax revenue mobilization. • Low- and middle-income countries too often lack the institutional capacity to manage the economic policy challenges posed by the data-driven economy. These challenges call for agile competition policies and modern trade and tax administrations. Complicating matters, policies on competition, trade, and taxation are significantly intertwined. • Internationally coordinated action — on antitrust enforcement, regulation of platform firms, data standards, trade agreements, and tax policy — is critical to ensuring efficient, equitable policies for the data economy that respond to countries' needs and interests.
Institutions for data governance: Building trust through collective action	• The institutions required to govern data fill four main functions: strategic planning; developing rules and standards; compliance and enforcement; and generating the learning and evidence needed to gain insights and address emerging challenges. • Nongovernmental institutions and mechanisms such as data intermediaries can help governments and other actors safely share and use data to capture greater value, while promoting equitable access to data and the value they create. • Public institutions must have sufficient resources, adequate autonomy, and technical capacity, including data literacy, to fulfil their mandates efficiently. Political champions in positions of power are critical to leading data management reforms that create incentives and a culture of data use, dissemination, and transparency. • A multistakeholder, purpose-driven approach to data management and governance can help institutions keep pace with an ever-evolving data ecosystem and enhance their legitimacy, transparency, and accountability.
Creating an integrated national data system	• By building an integrated national data system, countries can realize the full value of data for development. The system should provide a framework for the trustworthy, equitable production, flow, and use of data. • An integrated data system is built on an approach to data governance that is intentional, whole-of-government, and multistakeholder. The steps needed to implement such a system depend on a country's data maturity. What works in one context may not work in another. • To be sustainable, an integrated national data system must be continually improved. This will depend on having highly skilled human resources in government, civil society, academia, and the private sector.

	• Robust data protection is critical to building an integrated national data system. As the scope of such a system expands, the economic, social, and development returns increase, as do the data protection requirements.
World Development Report 2022: Finance for an Equitable Recovery	
Emerging risks to the recovery	• The pandemic has increased economic risks for households, firms, financial institutions, and governments. Counteracting these risks to ensure an equitable recovery will require policy action in the following areas: • Recognizing and resolving asset distress in the financial sector as support measures for households and firms are scaled back before economic activity has fully recovered. • Supporting insolvent households and businesses that are unable to resolve their debts in countries with limited or no formal insolvency mechanisms. • Ensuring continued access to finance in the face of tightening lending standards resulting from increased economic uncertainty and greater opacity about the true financial health of borrowers. • Managing and reducing high levels of government debt, especially in countries that entered the pandemic with a high risk of debt distress.
Resolving bank asset distress	• The pandemic and the related government policies have reduced the transparency of bank balance sheets. For banking sectors vulnerable to rapid increases in NPLs, the following timely corrective policies to preserve financial stability will help to support the continued provision of credit: • Ensuring clear, consistent practices for reporting on asset quality, enforced by effective supervision and with strong incentives to encourage speed and transparency. • Developing the capacity to manage nonperforming loans to avoid a rapid increase in bad loans impairing the capacity of banks to finance the real economy. • Dealing with problem banks swiftly to prevent broad distress in the financial system, misallocation of financial resources, and failure in the provision of credit.
Restructuring firm and household debt	• Countries can mitigate the risk of an onslaught of insolvent households and businesses by investing in four policy reforms: • Strengthening formal insolvency mechanisms so that the rules that define the rights and behaviours of debtors and creditors are in place, giving each an incentive to negotiate and come to an agreement, whether in court or out of court. • Facilitating alternative dispute resolution systems such as conciliation and mediation to enable faster and cheaper resolution of disputes than in the formal court system, but with some of the rigor that courts provide. • Establishing accessible and inexpensive in-court and out-of-court debt resolution procedures for micro-, small, and medium enterprises to facilitate the recapitalization of viable but illiquid firms and the swift, efficient market exit of nonviable firms. Rules designed for small entities can help resolve their debts more quickly and cheaply with less burden on the judicial system than requiring the same rules regardless of firm size. • Promoting debt forgiveness and discharge of natural person debtors so that solo entrepreneurs and individuals unable to pay their debts—through no fault of their own—can be discharged of those debts and more quickly move on from them, avoiding the stigma and loss of productivity that come from long-term debt distress.
Lending during the recovery and beyond	• Mitigating the environment of uncertainty and the lack of transparency that are making the traditional approaches to measuring risk fewer effective calls for the following measures: • Creating an enabling environment to leverage alternative data. Lenders should look to adapt underwriting approaches, with support from supervisory model validation and regulatory frameworks that open access to data while ensuring privacy and consumer protection. • Embracing innovations in product design and embedded finance that tailor loans to customer and market conditions or link credit to underlying business transactions to increase visibility and improve recourse. • Providing well-tuned guarantee programs where needed to bridge the gap between lenders' risk aversion and the role of credit as a driver of an equitable recovery.

	• Advancing the regulatory framework and financial infrastructure to support innovation; adjust the regulatory perimeter; provide clear, effective, and enforceable consumer and market protections; and facilitate digital payments, information exchange, and asset registration.
Managing sovereign debt	• Governments can take proactive policy approaches to mitigating the risks posed by high levels of sovereign debt to an equitable recovery: • Governments at high risk of debt distress can pursue proactive debt management approaches with creditors through, for example, debt reprofiling, which replaces existing debts with new debt with a different currency or maturity profile. • Governments in debt distress must coordinate with creditors to restructure debt. Effective restructuring requires the prompt and comprehensive recognition of debts, coordination with and among creditors, and a medium-term plan of reforms needed to achieve debt sustainability. • Governments and their creditors can benefit from improvements in sovereign debt transparency, which requires comprehensive disclosure of claims against the government and terms of the contracts that govern the debt. • Contractual innovations can help overcome coordination problems and speed up the resolution of unsustainable debts, but they are not a universal cure. • Well-developed tax policy and investments in tax administration can support debt sustainability in the longer run by increasing the government's ability to mobilize revenue.
Policy priorities for the recovery	• Pursuit of the following priorities can help set countries on the path to a more equitable and sustained economic recovery: • Mobilizing resources for the recovery. In many low-income economies, high levels of sovereign debt pose the most urgent threat to the recovery. Countries facing this scenario can free up resources for the recovery through improved debt management. • Safeguarding financial stability. In middle-income economies, financial sector risks tend to pose a larger threat to the recovery. These countries should focus on identifying and resolving financial sector risks to ensure the continued provision of credit. • Scaling back support in a transparent manner. Support policies should be withdrawn in a predictable manner and scaled back first for the most resilient households and firms to counteract the highly regressive impacts of the COVID-19 crisis. • Managing exposure to global economic risks that threaten an equitable recovery. These include interest rate and currency risks that are likely to arise as advanced economies scale back stimulus policies. • Supporting the transition to a green economy. Economic policies for the recovery should aim to support sustainable growth by facilitating the reallocation of resources to green sectors and business models.
World Development Report 2023: Migrants, Refugees and Societies	
The outlook: Changing patterns, needs, and risks	• Spurred by two unprecedented forces—rapid demographic transitions and climate change—cross border movements are becoming both inevitable and necessary for migrants and economies at all levels of income. They will influence where many migrants stand in the Match and Motive Matrix. • The populations of high-income and many middle-income countries are aging quickly, while the populations of low-income countries are expected to continue to grow. This trend is creating large mismatches between labour supply and demand across the world. Whether countries allow migration to help reduce some of these mismatches will largely determine economic and social trajectories at all income levels. • Climate change is compounding other drivers of mobility. So far, most movements induced by climate impacts have been within countries. But climate change has the potential to increase distressed cross-border movements, and the global community urgently needs to limit global warming and support country-level adaptation policies.
Migrants Prospering — and even more so with rights	• International migration has proved to be a powerful engine of poverty reduction for people in low and middle-income countries. • When migrants' skills and attributes strongly match the needs of their destination society, they reap significant benefits. Many migrants earn higher wages and enjoy access to better public services in the destination country than in their country of origin. • Formal access to the labour market — documented status, the right to work and to change employers, recognition of professional licenses and qualifications — leads to better outcomes for migrants. Undocumented migrants fare significantly worse, and they are more vulnerable to exploitation. • Migration is often not a one-way move; return migration is a significant phenomenon. Migrants who return voluntarily typically fare better than before they left—and better than non-migrants.

Origin countries: Managing migration for development	• When migrants' skills and attributes are a strong match with the needs of destination countries, origin countries benefit as well. Benefits include remittances, knowledge transfers, and positive impacts on the labour market. These benefits accrue to both regular and irregular migrants, although migrants' gains, and how much they can share with their families in their origin countries, are larger when they have regular status. • However, the absence of migrants also has a downside for their families and origin countries, including the impacts of the brain drain when high-skilled workers emigrate. Although the costs tend to be smaller in magnitude than the gains, they are significant in some countries. • Origin countries benefit most when they make labour emigration an integral part of their development strategy. In doing so, they can adopt policies and engage in bilateral cooperation with destination countries to increase the net impact of migration on poverty reduction.
Destination countries: Maximizing gains through economic and social policies	• Destination countries gain significantly from the contributions of migrants whose skills and attributes strongly match their needs, irrespective of migrants' legal status or motivation. • Benefits arise from migrants' contributions in the labour market and to higher productivity and greater availability and lower prices for some goods and services, as well as their fiscal contributions. These benefits are larger if migrants are allowed and able to work formally at the level of their qualifications. • Costs are associated with the use of public services and the negative wage or employment effects on some nationals (typically among the lower-skilled). Social integration can have a cost as well, but the debate must be placed in context: destination societies are not identical, culturally uniform, or static. • Destination countries can adopt policies that improve how well migrants' skills and attributes match countries' needs—and thus their gains—by creating adequate legal pathways for entry and by facilitating economic and social inclusion.
Refugees: Managing with a medium-term perspective	• Because refugees move for safety, they are not always able to reach destinations where their skills are in demand. Providing international protection often comes with costs for the host country, and yet it is an obligation under international law. • Responsibility-sharing is key to managing these costs, and it requires complementing global efforts with regional action. • Host countries' policies can also help reduce the costs, while maintaining high protection standards. Refugee situations tend to last for years and managing them exclusively through emergency and humanitarian programs is ineffective. Policies should be geared toward financial and social sustainability by means of internal mobility, self-reliance, and inclusion in national services. • Innovative approaches are also needed to facilitate the achievement of durable solutions by combining legal and development perspectives.
Distressed migrants: Preserving dignity	• The circumstances surrounding distressed migration are often irregular and painful. This type of migration also entails costs for destination countries, but these countries have no international legal obligation to host distressed migrants. Many countries seek to prevent the entry of distressed migrants, but restrictive policies often undermine migrants' dignity, which creates difficult policy trade-offs. • In this context, the challenge is to reduce the need for distressed migration, including by extending the scope of international protection, shifting incentives through the establishment of legal entry pathways, and strengthening the match of migrants' skills and attributes with the needs of destination economies through development. • Transit countries face particular issues, which can be addressed only through bilateral and multilateral cooperation. • Overall, migrants' inherent dignity should be the yardstick of migration policies.
Recommendations: Making migration work better	• There is significant scope for countries of origin, destination, and transit to manage cross-border movements in a strategic manner, thereby maximizing gains while mitigating costs. Countries in all situations can adopt policies that enhance the development effects of migration on their societies. • In most cases, the benefits of cross-border movements can be increased (and the costs mitigated) through international cooperation. Bilateral and multilateral approaches are needed. • Although making policy on migration is often politically sensitive, lessons can be drawn from other countries to develop evidence-based approaches. • The challenge is to determine not only what needs to be done, but also how to get it done. This will require better data and fit-for-purpose financing instruments, as well as ways to bring underrepresented voices to the debate.

Source: Compiled by the Author from World Bank, 2020; 2021; 2022b; 2023.

A.8. Selected articles for using emerging technologies to innovate for good

1. Innovating with artificial intelligence for good

Berendt, B. (2019). AI for the Common Good?! Pitfalls, challenges, and ethics pen-testing. *Paladyn, Journal of Behavioral Robotics*, *10*(1), 44-65.

Cowls, J., Tsamados, A., Taddeo, M., & Floridi, L. (2021). A definition, benchmark and database of AI for social good initiatives. *Nature Machine Intelligence*, *3*(2), 111-115.

Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., ... & Vayena, E. (2021). An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. *Ethics, governance, and policies in artificial intelligence*, 19-39.

Floridi, L., Cowls, J., King, T. C., & Taddeo, M. (2021). How to design AI for social good: seven essential factors. *Ethics, Governance, and Policies in Artificial Intelligence*, 125-151.

Taddeo, M., & Floridi, L. (2018). How AI can be a force for good. *Science*, *361*(6404), 751-752.

Tomašev, N., Cornebise, J., Hutter, F., Mohamed, S., Picciariello, A., Connelly, B., ... & Clopath, C. (2020). AI for social good: unlocking the opportunity for positive impact. *Nature Communications*, *11*(1), 2468.

Umbrello, S., & Van de Poel, I. (2021). Mapping value sensitive design onto AI for social good principles. *AI and Ethics*, *1*(3), 283-296.

Wamba, S. F., Bawack, R. E., Guthrie, C., Queiroz, M. M., & Carillo, K. D. A. (2021). Are we preparing for a good AI society? A bibliometric review and research agenda. *Technological Forecasting and Social Change*, *164*, 120482.

2. Innovating with big data for good

Alemanno, A. (2018). Big data for good: Unlocking privately-held data to the benefit of the many. *European Journal of Risk Regulation*, *9*(2), 183-191.

Chandy, R., Hassan, M., & Mukherji, P. (2017). Big data for good: Insights from emerging markets. *Journal of Product Innovation Management*, *34*(5), 703-713.

Coulton, C. J., Goerge, R., Putnam-Hornstein, E., & de Haan, B. (2015). Harnessing big data for social good: A grand challenge for social work. *Cleveland: American Academy of Social Work and Social Welfare*, 1-20.

Poom, A., Järv, O., Zook, M., & Toivonen, T. (2020). COVID-19 is spatial: Ensuring that mobile Big Data is used for social good. *Big Data & Society*, *7*(2), 2053951720952088.

Richards, N. M., & King, J. H. (2014). Big data ethics. *Wake Forest L. Rev.*, *49*, 393.

Sejnowski, T. J., Churchland, P. S., & Movshon, J. A. (2014). Putting big data to good use in neuroscience. *Nature neuroscience*, *17*(11), 1440-1441.

Taylor, L. (2016). The ethics of big data as a public good: which public? Whose good?. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *374*(2083), 20160126.

3. Innovating with blockchain for good

Bartoletti, M., Cimoli, T., Pompianu, L., & Serusi, S. (2018, November). Blockchain for social good: a quantitative analysis. In *Proceedings of the 4th EAI international conference on smart objects and technologies for social good* (pp. 37-42).

Cerf, M., Matz, S., & Berg, A. (2020). Using blockchain to improve decision making that benefits the public good. *Frontiers in blockchain*, *3*, 13.

Chow, C. (2018). Blockchain for Good? Improving supply chain transparency and human rights management. *Governance Directions*, *70*(1), 39-40.

Hughes, K. (2017). Blockchain, the greater good, and human and civil rights. *Metaphilosophy*, *48*(5), 654-665.

Kewell, B., Adams, R., & Parry, G. (2017). Blockchain for good?. *Strategic change*, *26*(5), 429-437.

Seyedsayamdost, E., & Vanderwal, P. (2020). From good governance to governance for good: blockchain for social impact. *Journal of International Development*, *32*(6), 943-960.

Tomlinson, B., Boberg, J., Cranefield, J., Johnstone, D., Luczak-Roesch, M., Patterson, D. J., & Kapoor, S. (2021). Analyzing the sustainability of 28 'Blockchain for Good'projects via affordances and constraints. *Information Technology for Development*, *27*(3), 439-469.

4. Innovating with data for good

Brook, E. L., Rosman, D. L., & Holman, C. D. A. J. (2008). Public good through data linkage: measuring research outputs from the Western Australian Data Linkage System. *Australian and New Zealand journal of public health*, *32*(1), 19-23.

Horvitz, E., & Mulligan, D. (2015). Data, privacy, and the greater good. *Science*, *349*(6245), 253-255.

Parasie, S., & Dagiral, E. (2013). Data-driven journalism and the public good:"Computer-assisted-reporters" and "programmer-journalists" in Chicago. *New media & society*, *15*(6), 853-871.

Zegura, E., DiSalvo, C., & Meng, A. (2018, June). Care and the practice of data science for social good. In *Proceedings of the 1st ACM SIGCAS Conference on Computing and Sustainable Societies* (pp. 1-9).

5. Innovating with drones for good

Ashour, R., Taha, T., Mohamed, F., Hableel, E., Kheil, Y. A., Elsalamouny, M., ... & Cai, G. (2016, October). Site inspection drone: A solution for inspecting and regulating construction sites. In *2016 IEEE 59th International midwest symposium on circuits and systems (MWSCAS)* (pp. 1-4). IEEE.

Choi-Fitzpatrick, A. (2014). Drones for good: Technological innovations, social movements, and the state. *Journal of International Affairs*, 19-36.

Dileep, M. R., Navaneeth, A. V., Ullagaddi, S., & Danti, A. (2020, November). A study and analysis on various types of agricultural drones and its applications. In *2020 Fifth International Conference on Research in Computational Intelligence and Communication Networks (ICRCICN)* (pp. 181-185). IEEE.

Hoople, G., Choi-Fitzpatrick, A., & Reddy, E. (2019). Drones for Good: Interdisciplinary Project Based Learning Between Engineering and Peace Studies. *International Journal of Engineering Education*, *35*(5), 1378-1391.

Khan, M. A., Alvi, B. A., Safi, A., & Khan, I. U. (2018, January). Drones for good in smart cities: A review. In *Proc. Int. Conf. Elect., Electron., Comput., Commun., Mech. Comput.(EECCMC)* (pp. 1-6).

Restás, Á. (2022). Drone applications fighting COVID-19 pandemic—Towards good practices. *Drones*, *6*(1), 15.

Sandbrook, C. (2015). The social implications of using drones for biodiversity conservation. *Ambio*, *44*(Suppl 4), 636-647.

van Wynsberghe, A., & Comes, T. (2020). Drones in humanitarian contexts, robot ethics, and the human–robot interaction. *Ethics and Information Technology*, *22*, 43-53.

6. Innovating with electronic identification for good

Dahan, M., & Gelb, A. (2015). The role of identification in the post-2015 development agenda.

Dahan, M., & Hanmer, L. (2015). The Identification for Development (ID4D) agenda: Its potential for empowering women and girls. *The World Bank*.

Dhaou, S. I. B., & Rohman, I. K. (2018). Global Challenge of Identity: Blockchain E-ID System for a Sustainable Development and Good Governance. *EGOV-CeDEM-ePart 2018*, 199.

Gelb, A., & Clark, J. (2013). Identification for development: The biometrics revolution. *Center for Global Development Working Paper*, (315).

World Bank. (2015). *Identification for Development: Liberia*. World Bank.

World Bank. (2016). *Identification for Development: Sierra Leone*. World Bank.

7. Innovating with the internet of things for good

Abdelgawad, A., Yelamarthi, K., & Khattab, A. (2017). IoT-based health monitoring system for active and assisted living. In *Smart Objects and Technologies for Social Good: Second International Conference, GOODTECHS 2016, Venice, Italy, November 30–December 1, 2016, Proceedings 2* (pp. 11-20). Springer International Publishing.

Berman, F., & Cerf, V. G. (2017). Social and ethical behavior in the internet of things. *Communications of the ACM*, *60*(2), 6-7.

Chohan, S. R., Hu, G., Khan, A. U., Pasha, A. T., Saleem, F., & Sheikh, M. A. (2023). IoT as societal transformer: improving citizens' continuous usage intention in digital society through perceived public value. *Library Hi Tech*, *41*(4), 1214-1237.

De Michele, R., & Furini, M. (2019, September). Iot healthcare: Benefits, issues and challenges. In *Proceedings of the 5th EAI international conference on smart objects and technologies for social good* (pp. 160-164).

Govoni, M., Michaelis, J., Morelli, A., Suri, N., & Tortonesi, M. (2017). Enabling social-and location-aware IoT applications in smart cities. In *Smart Objects and Technologies for Social Good: Second International Conference, GOODTECHS 2016, Venice, Italy, November 30–December 1, 2016, Proceedings 2* (pp. 305-314). Springer International Publishing.

Saha, H. N., Auddy, S., Pal, S., Kumar, S., Pandey, S., Singh, R., ... & Saha, S. (2017, August). Health monitoring using internet of things (IoT). In *2017 8th annual industrial automation and electromechanical engineering conference (IEMECON)* (pp. 69-73). IEEE.

Tzafestas, S. G. (2018). Ethics and law in the internet of things world. *Smart cities*, *1*(1), 98-120.

8. Innovating with virtual reality for good

Carruth, D. W. (2017, October). Virtual reality for education and workforce training. In *2017 15th International Conference on Emerging eLearning Technologies and Applications (ICETA)* (pp. 1-6). IEEE.

Good, J., Parsons, S., Yuill, N., & Brosnan, M. (2016). Virtual reality and robots for autism: moving beyond the screen. *Journal of Assistive Technologies*, *10*(4), 211-216.

Gruenewald, T., & Witteborn, S. (2022). Feeling good: Humanitarian virtual reality film, emotional style and global citizenship. *Cultural Studies*, *36*(1), 141-161.

Lin, C. S., Jeng, M. Y., & Yeh, T. M. (2018). The elderly perceived meanings and values of virtual reality leisure activities: A means-end chain approach. *International journal of environmental research and public health*, *15*(4), 663.

Nakamura, L. (2020). Feeling good about feeling bad: Virtuous virtual reality and the automation of racial empathy. *Journal of Visual Culture*, *19*(1), 47-64.

Zhang, L., Abreu, B. C., Seale, G. S., Masel, B., Christiansen, C. H., & Ottenbacher, K. J. (2003). A virtual reality environment for evaluation of a daily living skill in brain injury rehabilitation: reliability and validity. *Archives of physical medicine and rehabilitation*, *84*(8), 1118-1124.

Zhou, Y., Ji, S., Xu, T., & Wang, Z. (2018). Promoting knowledge construction: a model for using virtual reality interaction to enhance learning. *Procedia computer science*, *130*, 239-246.

9. Innovating with augmented reality for good

Dünser, A. (2008). Supporting low ability readers with interactive augmented reality. *Annual review of cybertherapy and telemedicine*, *6*(1), 39-46.

Freitas, R., & Campos, P. (2008). SMART: a System of augmented reality for teaching 2nd grade students. *People and Computers XXII Culture, Creativity, Interaction 22*, 27-30.

Huang, T. K., Yang, C. H., Hsieh, Y. H., Wang, J. C., & Hung, C. C. (2018). Augmented reality (AR) and virtual reality (VR) applied in dentistry. *The Kaohsiung journal of medical sciences*, *34*(4), 243-248.

Martín-Gutiérrez, J., Fabiani, P., Benesova, W., Meneses, M. D., & Mora, C. E. (2015). Augmented reality to promote collaborative and autonomous learning in higher education. *Computers in human behavior*, *51*, 752-761.

Merchán, M. J., Merchán, P., & Pérez, E. (2021). Good practices in the use of augmented reality for the dissemination of architectural heritage of rural areas. *Applied Sciences*, *11*(5), 2055.

Nischelwitzer, A., Lenz, F. J., Searle, G., & Holzinger, A. (2007). Some aspects of the development of low-cost augmented reality learning environments as examples for future interfaces in technology enhanced learning. In *Universal Access in Human-Computer Interaction. Applications and Services: 4th International Conference on Universal Access in Human-Computer Interaction, UAHCI 2007 Held as Part of HCI International 2007 Beijing, China, July 22-27, 2007 Proceedings, Part III 4* (pp. 728-737). Springer Berlin Heidelberg.

Suprapto, N., Nandyansah, W., & Mubarok, H. (2020). An evaluation of the "PicsAR" research project: An augmented reality in physics learning. *International Journal of Emerging Technologies in Learning (IJET)*, *15*(10), 113-125.

10. Innovating with ChatGPT for good

Cheng, S. W., Chang, C. W., Chang, W. J., Wang, H. W., Liang, C. S., Kishimoto, T., ... & Su, K. P. (2023). The now and future of ChatGPT and GPT in psychiatry. *Psychiatry and Clinical Neurosciences*.

Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., ... & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and individual differences*, *103*, 102274.

Qadir, J. (2023, May). Engineering education in the era of ChatGPT: Promise and pitfalls of generative AI for education. In *2023 IEEE Global Engineering Education Conference (EDUCON)* (pp. 1-9). IEEE.

Rahman, M. M., & Watanobe, Y. (2023). ChatGPT for education and research: Opportunities, threats, and strategies. *Applied Sciences*, *13*(9), 5783.

Sok, S., & Heng, K. (2023). ChatGPT for education and research: A review of benefits and risks. *Available at SSRN 4378735*.

Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments*, *10*(1), 15.