Industry 4.0 and Smart Specialisation: A way forward for the Western Balkans

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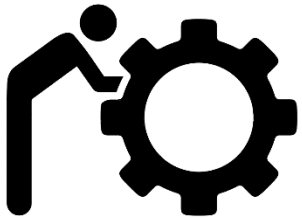
Industry 4.0 and the 4th Industrial Revolution

What is an Industrial Revolution?

When there are **major changes** in...

Industry **Economy**

The way we work, buy and sell things



Transportation

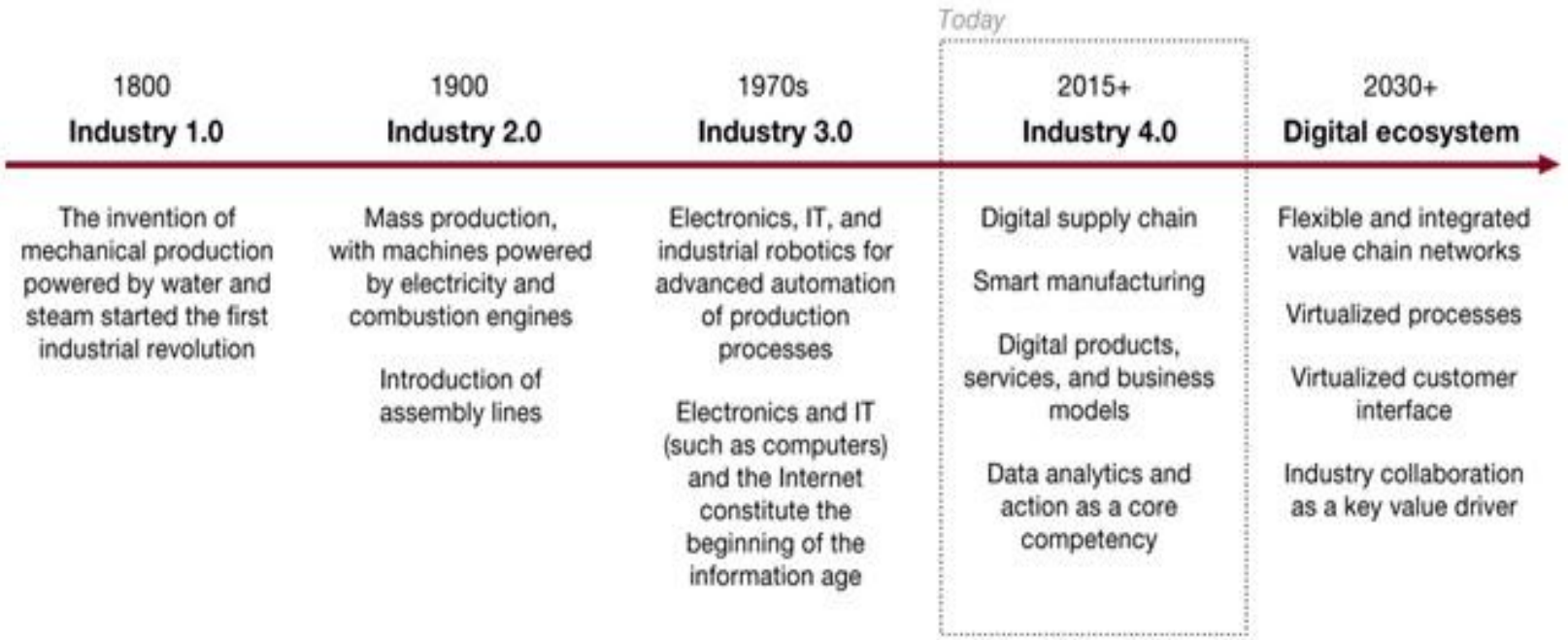
The way we travel

Society (social structure)

The way we live

It's usually new ways of thinking and doing and new technologies that cause the change to happen.

4 Stages of Industrial Revolution



Source: Strategy& analysis

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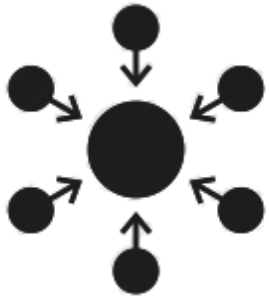
What is happening already?

Different technologies coming together and bringing different areas together



New products & services

with increased efficiency (working better and faster)

for a better life

Order a taxi (Uber)

Book accommodation

What is happening already?

Buying goods online

Paying bills online

- Learning online – education
- Listen to music
- Watch a film
- Play an online game

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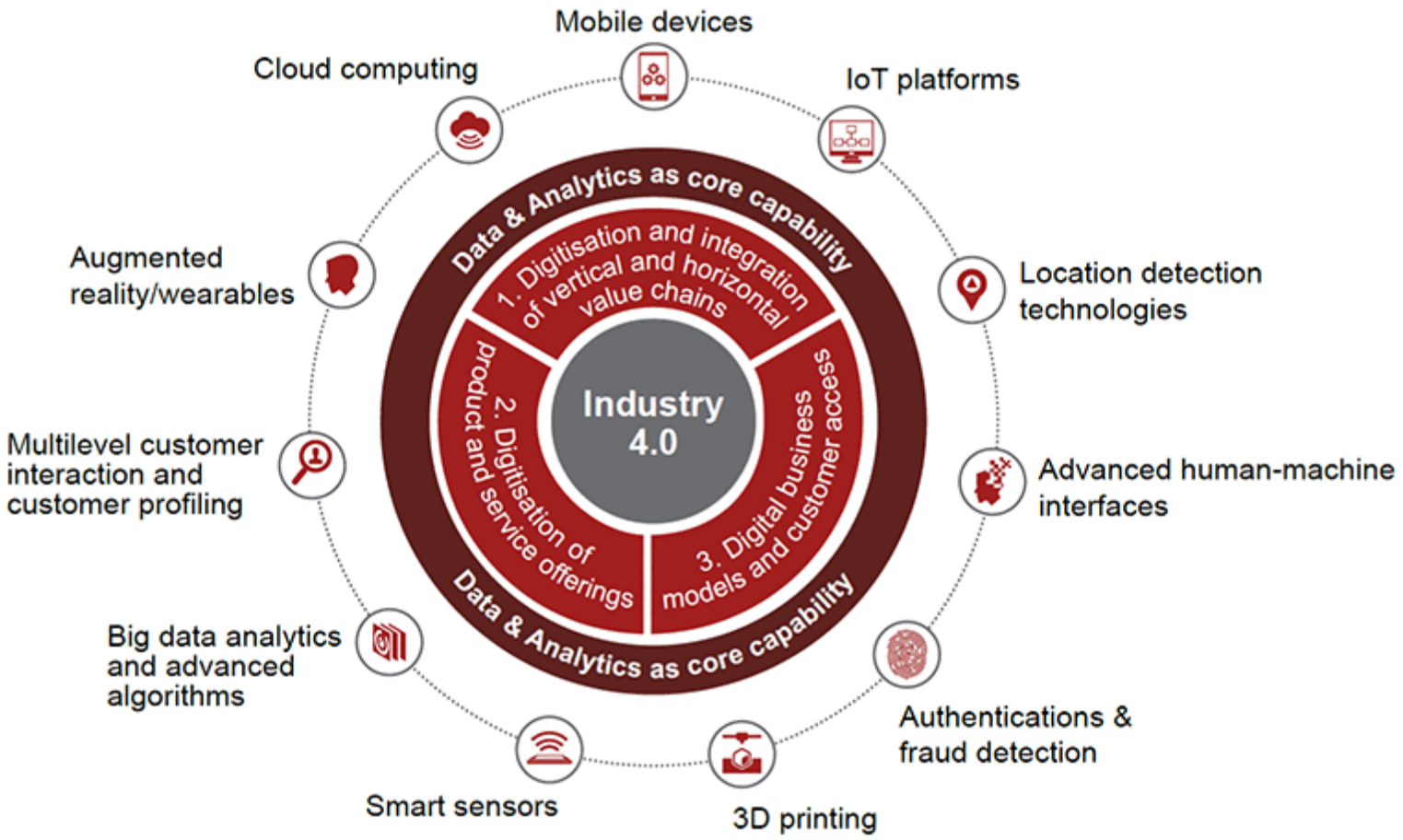
Enablers of Industry 4.0



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Enablers of Industry 4.0

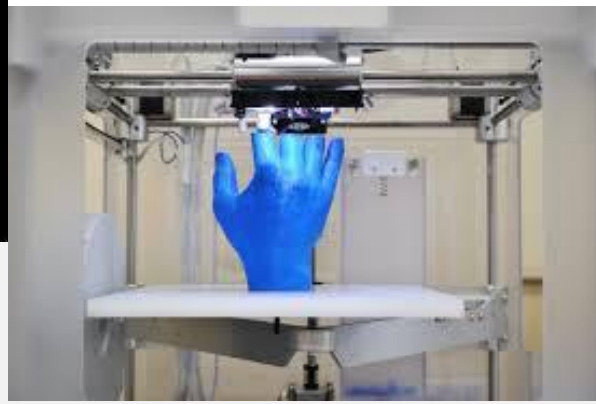
Robotics

Artificial intelligence

Virtual reality

Self driving cars

3D printing



Internet of Things (IoT)

Quantum computing

Metadata & analytics

Bioengineering

Digital currencies and blockchain

Key Industry 4.0 technologies full readiness timeframe

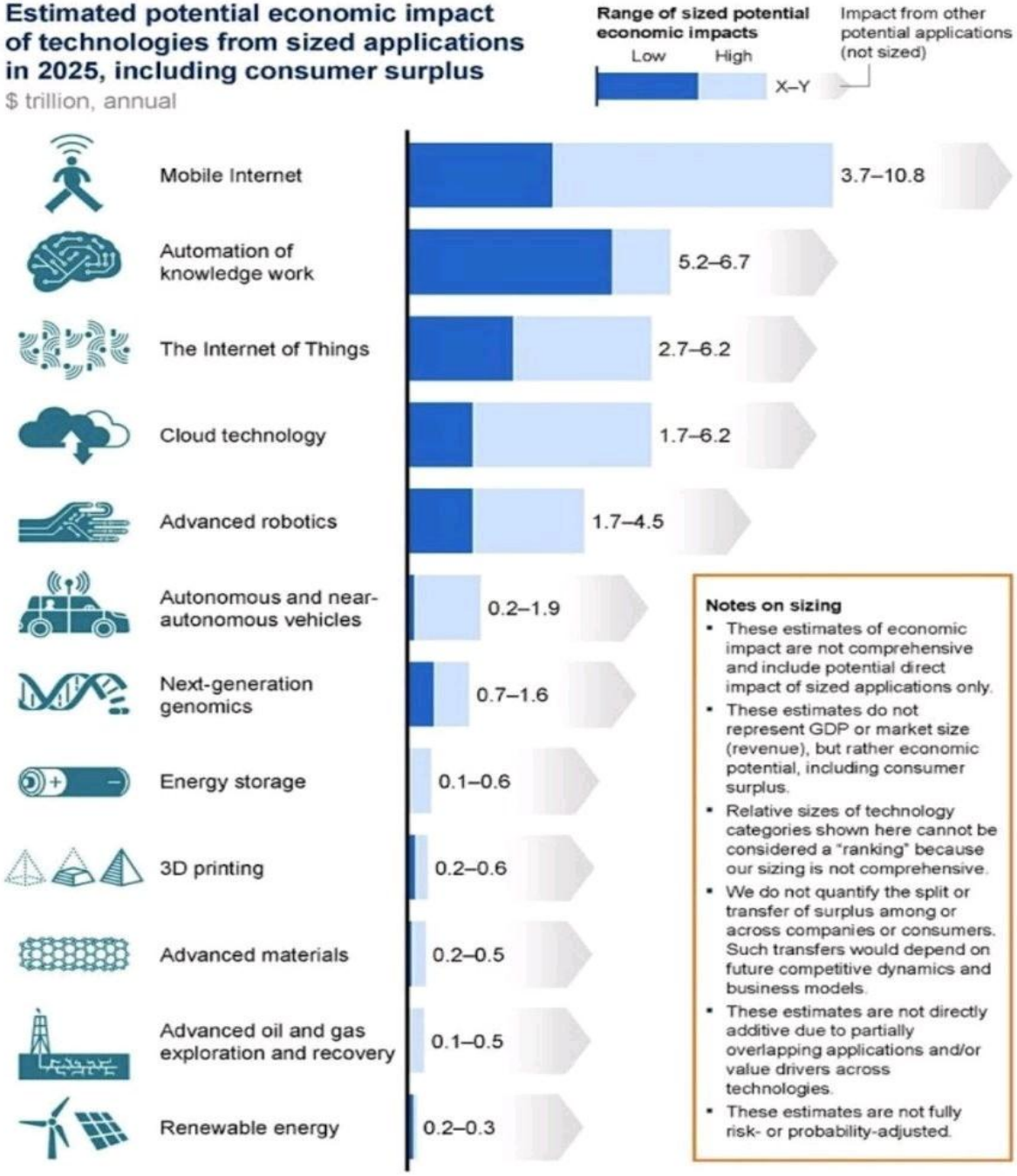
TECHNOLOGY	READINESS TODAY	TIME TO FULL READINESS	KEY ENABLERS FOR FULL READINESS
INTERNET OF THINGS		2-5 years	• Advanced capability to synthesize data, identify insights and act on them on an ongoing basis across the organization • Global standards for data collection • Advances in data security to ensure protection of consumer information
AUTONOMOUS VEHICLES / DRONES		Autonomous vehicles: 6-10 years Drones: 6-10 years	• Technology needs to mature (e.g. autonomous vehicles need advanced features to accommodate all road types in all weather conditions; drones need improved battery life, the ability to carry heavier items) • Regulatory frameworks for use
ARTIFICIAL INTELLIGENCE/ MACHINE LEARNING		2-5 years	• Advanced capability to synthesize data, identify insights and act on them on an ongoing basis across the organization • Advances in data security to ensure protection of consumer information
ROBOTICS		2-5 years	• Advanced features needed (e.g. dexterity and battery life) • Development of smarter bots
DIGITAL TRACEABILITY		2-5 years	• Advanced capability around predictive and preventive analytics • Common digital language for supply-chain traceability within industry
3D PRINTING		6-10 years	• Advanced features needed to improve speed, multi-material capabilities etc.
AUGMENTED REALITY / VIRTUAL REALITY		2-5 years	• Component parts (e.g. chips) must be affordable to sell AR/VR devices at scale • VR headsets need to become wireless while retaining processing power
BLOCKCHAIN		6-10 years	• Ability to perform high-volume transactions in a secure way • Regulatory frameworks for payment application

Source: Accenture/World Economic Forum analysis

res

Estimated potential economic impact of technologies from sized applications in 2025, including consumer surplus

$ trillion, annual



Notes on sizing

- These estimates of economic impact are not comprehensive and include potential direct impact of sized applications only.
- These estimates do not represent GDP or market size (revenue), but rather economic potential, including consumer surplus.
- Relative sizes of technology categories shown here cannot be considered a "ranking" because our sizing is not comprehensive.
- We do not quantify the split or transfer of surplus among or across companies or consumers. Such transfers would depend on future competitive dynamics and business models.
- These estimates are not directly additive due to partially overlapping applications and/or value drivers across technologies.
- These estimates are not fully risk- or probability-adjusted.

SOURCE: McKinsey Global Institute analysis

Global Industry 4.0 Initiatives

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Industry 4.0 Opportunities

- Can developing countries leapfrog?

A key question will be whether Industry 4.0 and the continued rollout of Industry 3.0 will weaken the industrialization prospects across a broad range of developing countries or whether they will create new potential to boost manufacturing output and exports and leverage them for growth.

- Premature deindustrialization?
  - Production of advanced manufactured goods (e.g. wearable tech, autonomous vehicles, biochips and biosensors, and new materials) is most likely to co-locate with R&D facilities in high-income economies.
  - While previously FDI followed cheap labor, labor cost differentials might no longer play such an important role with Industry 4.0.

Industry 4.0 Opportunities

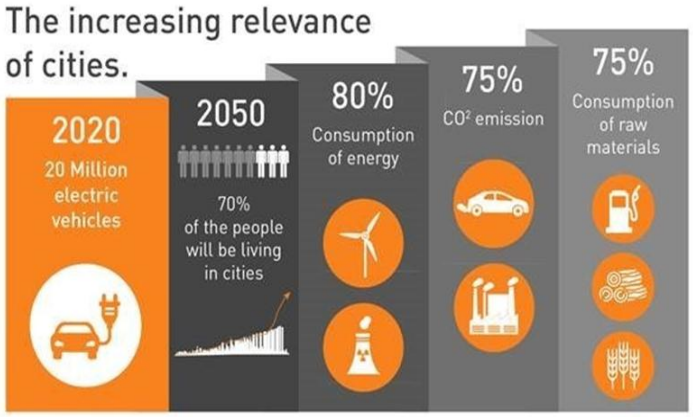
- Some developing countries might be able to leapfrog thanks to their high-skilled, ICT heavy skilled workforce
- Industry 4.0 technologies create opportunity for developing countries to bypass traditional phases of industrial development:
  - Online and mobile banking is reducing the need to build networks of physical bank branches.
  - Localized renewable energy production, such as solar power coupled with new battery storage technology, could reduce the need for investing in expensive power distribution networks
  - Drones could help to deliver lightweight, high-value goods such as medical supplies to remote regions with poor transport infrastructure

Industry 4.0 Opportunities

- *Changes for companies*

  - Bringing products to market faster
  - Machines perform independent quality checks ➡ errors detected and remedied faster
  - Smarter resource management based on energy data leads to optimized equipment maintenance
  - Improved stock management via using chips and sensors
  - Improved prediction for demand through data mining ➡ improved supply chain and inventory management

Smart cities opportunities



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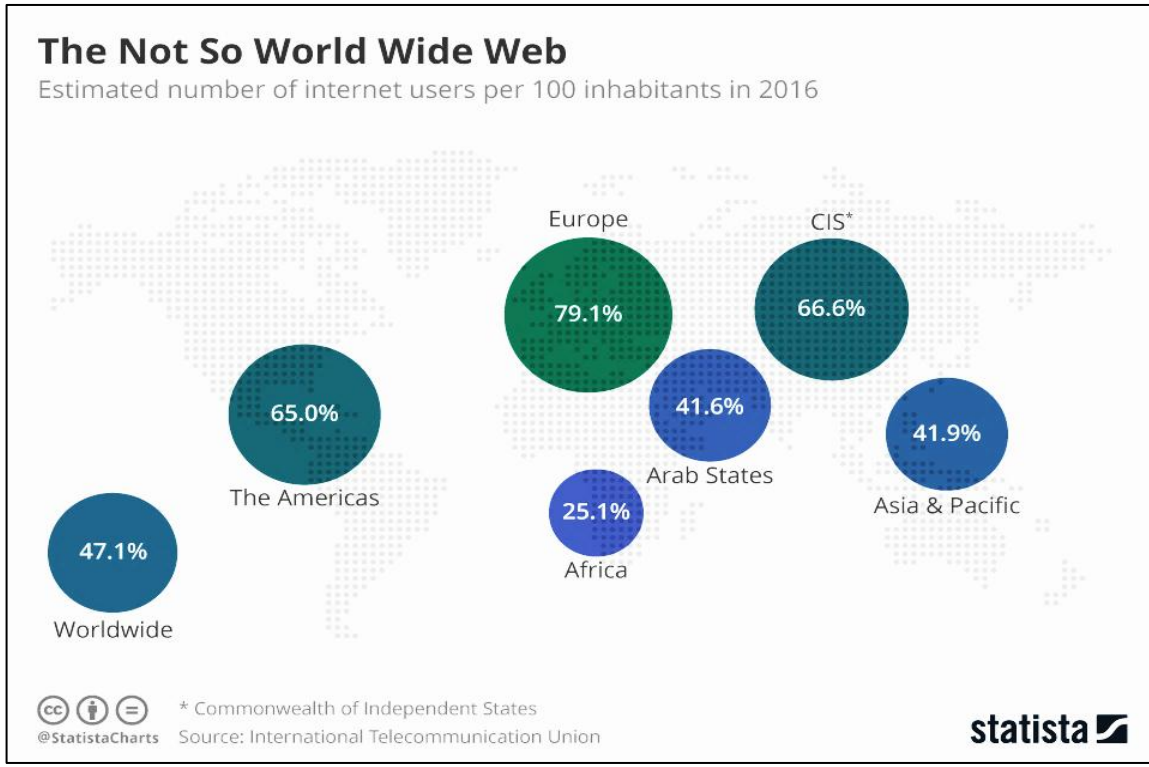
Industry 4.0 Challenges

- Underdeveloped Energy 4.0 infrastructure
- ICT infrastructure
- Digital divide
- Gender divide
- Job/skills/education
- Labor markets disrupted
- Cultural norms/mores
- Algorithmic bias
- Invasion of privacy
- Human rights
- Lack of standardization



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Human Centered Governance Model in Industry 4.0

- Create flexible, informal process involving business, government & social actors to better manage new technologies' risks.
- Shorter feedback loop between innovators and society (policymakers track rapid advances in science/better understand when & what formal rules are appropriate)
- Standardization and interoperability: voluntary principles, standards & pilot programs agreed among key stakeholders (manufacturing, academic & insurance industry experts work on common safety protocol for digital security in IoT).
- Reliable physical and digital infrastructure needed

Human Centered Governance Model in Industry 4.0

- Governments need to place social inclusion at the heart of the economic policy.
- Develop alternative measures of national economic performance: e.g. the Inclusive Development Index, developed by WEF.
- Education. The children of today will be the leaders of the 4th Industrial Revolution. Reconsider how we educate them.
- Replace exam-focused approach with empowerment and support of children's ability to curate, analyze and evaluate what they're reading or seeing online, not merely consume it.
- Build trust. People should participate in the digital economy on a level playing field with their peers, without fear of abuse.

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Industry 4.0 and Smart Specialization

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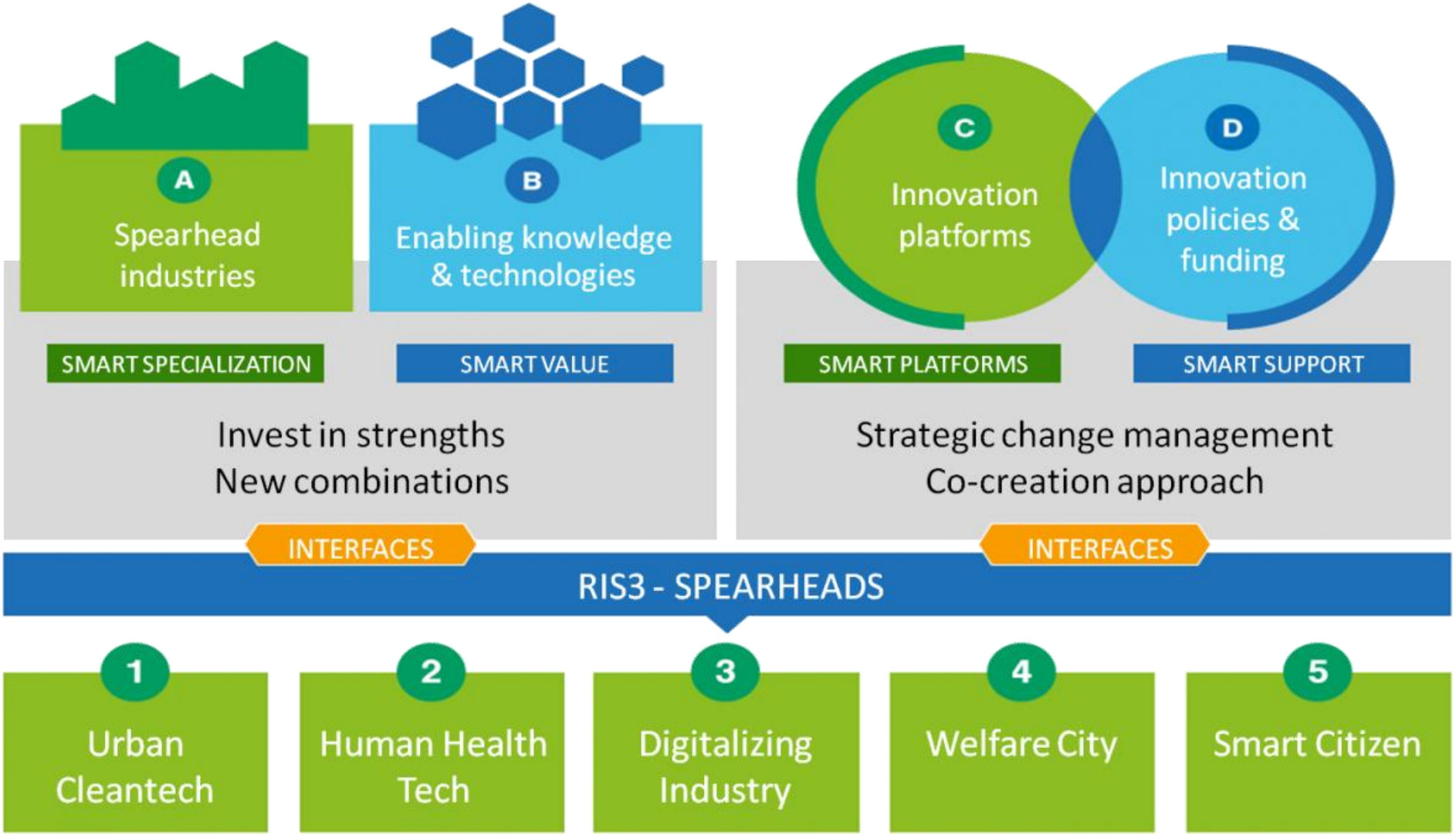

All Permeating Drivers of Change: Digitalization & Open Innovation Platform

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Smart Specialization Strategies in the Western Balkans

- Regional approach?
- Regional strategy for R&I - advocacy of policy reforms at national level and joint investments in selected regional initiatives
- S3 complement the work of RCC and WISE facility - the countries could benefit from focusing on research areas of common interest with partners from the Danube and Adriatic Ionian EU macro-regions also actively preparing Smart Specialisation Strategies

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Smart Specialization Western Balkans

- Job creation stagnant & Economic growth stalled
- Academia - prone to inertia. Some academic disciplines might be more entrepreneurial than other (biotech, chemistry, and ICT);
- Private sector is somewhat more entrepreneurial but lacks access to risk capital. Some islands of excellence and champions. However, these are oftentimes isolated, with no connections to the local economy and oftentimes gobbled up by red tape and corruption;
- No agglomeration economies and no sustainable links between academia and the private sector;
- High brain drain rates (especially in the medical field) affect human capital formation.

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Smart Specialization Western Balkans

- Drivers of growth - related to physical investments, production capability, human capital and skills, openness and acquisition of foreign knowledge
- In addition to R&D and capability to generate new technologies policy should consider the role of production capability and capability to import effectively and adopt foreign technologies
- Is this applicable given all the challenges posed by Industry 4.0 – automation and deindustrialization?

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In the future, it will not be the big fish that eats the small fish, it will be the fast fish that eats the slow fish. In the past, we had creative destruction. Jobs destroyed by innovation could be replaced by new roles in new sectors.

Today, we are no longer certain how this will happen.

Technology will replace many jobs in emerging economies. Only countries that are preparing for this, by upskilling and reskilling, will win.

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Smart specialization and Industry 4.0

- In addition to S3 the region needs to focus on the potential of exploiting emerging technologies and their convergence
- WB countries might be able to leapfrog and take advantage of having good digital networks/infrastructure in order to enable growth in sectors pertinent to the region's development (smart agriculture, HealthTech, EduTech).
- Entrepreneurship, creativity, empathy and agility – skills of the future
- Global value chains will be disrupted; export led growth and low labor costs might become obsolete growth strategies due to automation, artificial intelligence, blockchain, 3D printing (Industry 4.0)

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Frugal Innovation?

- Use ICT talent + creativity + emerging technologies to create niche innovation capabilities?

- Cheap computers, sensors, smartphones, and 3D printers are enabling small teams to invent and prototype in ways that were only available to large corporations or government labs in the past.
- Maker movement where budding inventors can tinker in Make Spaces and Fab Labs with other like-minded people and develop solutions to problems they face in their communities. Ideas that have come out of Tech Shops and Make Spaces include the Embrace Baby Warmer and Simprints, a biometric device to manage medical records.

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Frugal Innovation?

- Innovate not just in traditional domains, but also introduce public governance/social sector innovations through use of AI and blockchain – e.g. use of blockchain in delivery of public services; use of block chain for property/IP rights registration and management; use big data to improve governance through PPP?
- Use the example of Estonia?

E-Estonia

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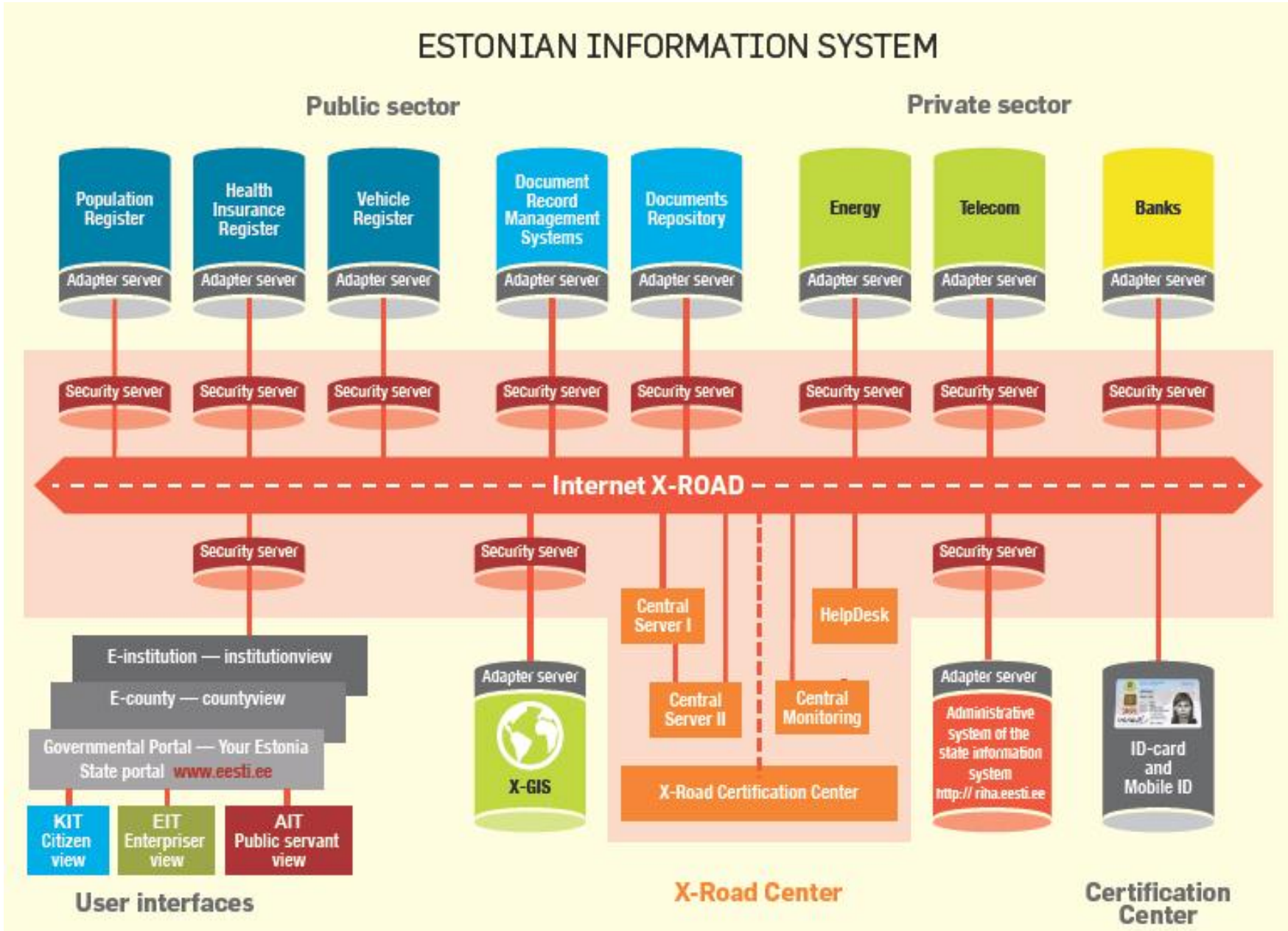

ESTONIAN INFORMATION SYSTEM
Public sector
Private sector
Population Register
Health Insurance Register
Vehicle Register
Document Record Management Systems
Documents Repository
Energy
Telecom
Banks
Adapter server
Security server
Internet X-ROAD
Central Server I
Central Server II
HelpDesk
Central Monitoring
X-Road Certification Center
X-GIS
Administrative system of the state information system http:// riha.eesti.ee
ID-card and Mobile ID
E-institution — institutionview
E-county — countyview
Governmental Portal — Your Estonia State portal www.eesti.ee
KIT Citizen view
EIT Enterpriser view
AIT Public servant view
User interfaces
X-Road Center
Certification Center
X-Road was launched in 2001

guardtime

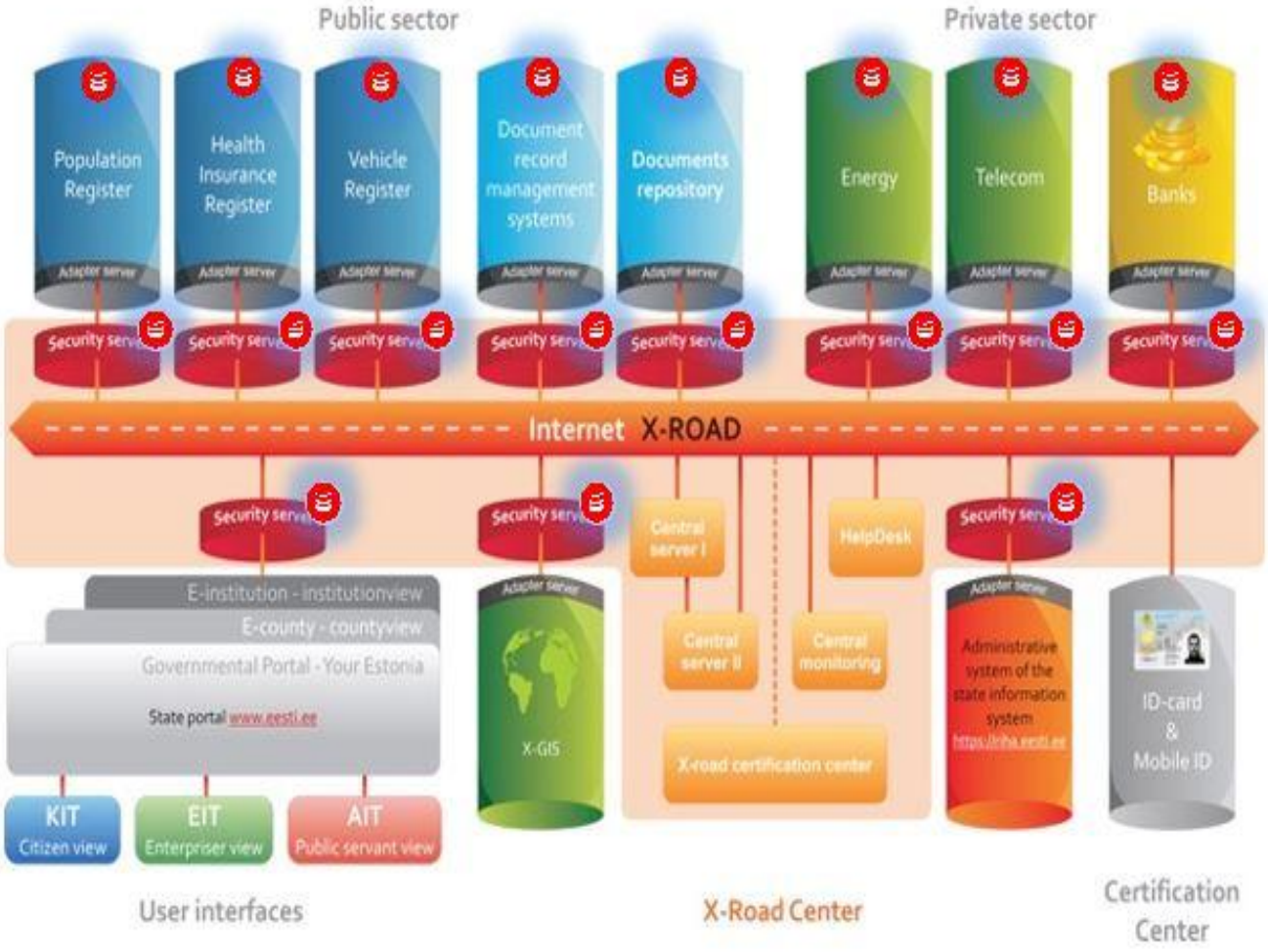
Blockchain Integration Points

Estonia: 100% Government Data on Blockchain

Blockchain is implemented as an integrity layer throughout Estonian Government Networks.

Network Segregation of Government Departments

There is complete transparency and accountability between citizens and government.



Republic of Estonia
Government

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