Annual Public Policy Conference 2018
Harnessing the Fourth Industrial Revolution

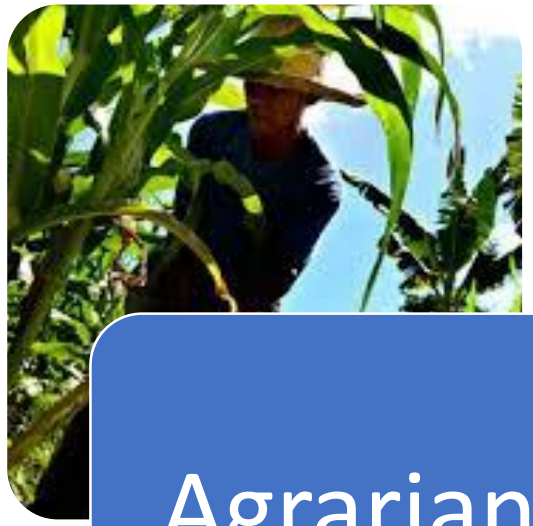
Better Future for All:
Responsible Policies for Smart Economies

Mia Mikic
Coordinator of ARTNeT
Director, Trade, Investment and Innovation Division
mikic@un.org

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

ARTNeT

From traditional structural transformation...



Agrarian economy

Industrial economy

Service economy

....to a smart economy /4IR

- **ICT/digital connectivity**
- **Innovative and adaptive governance framework**

Role of policymakers

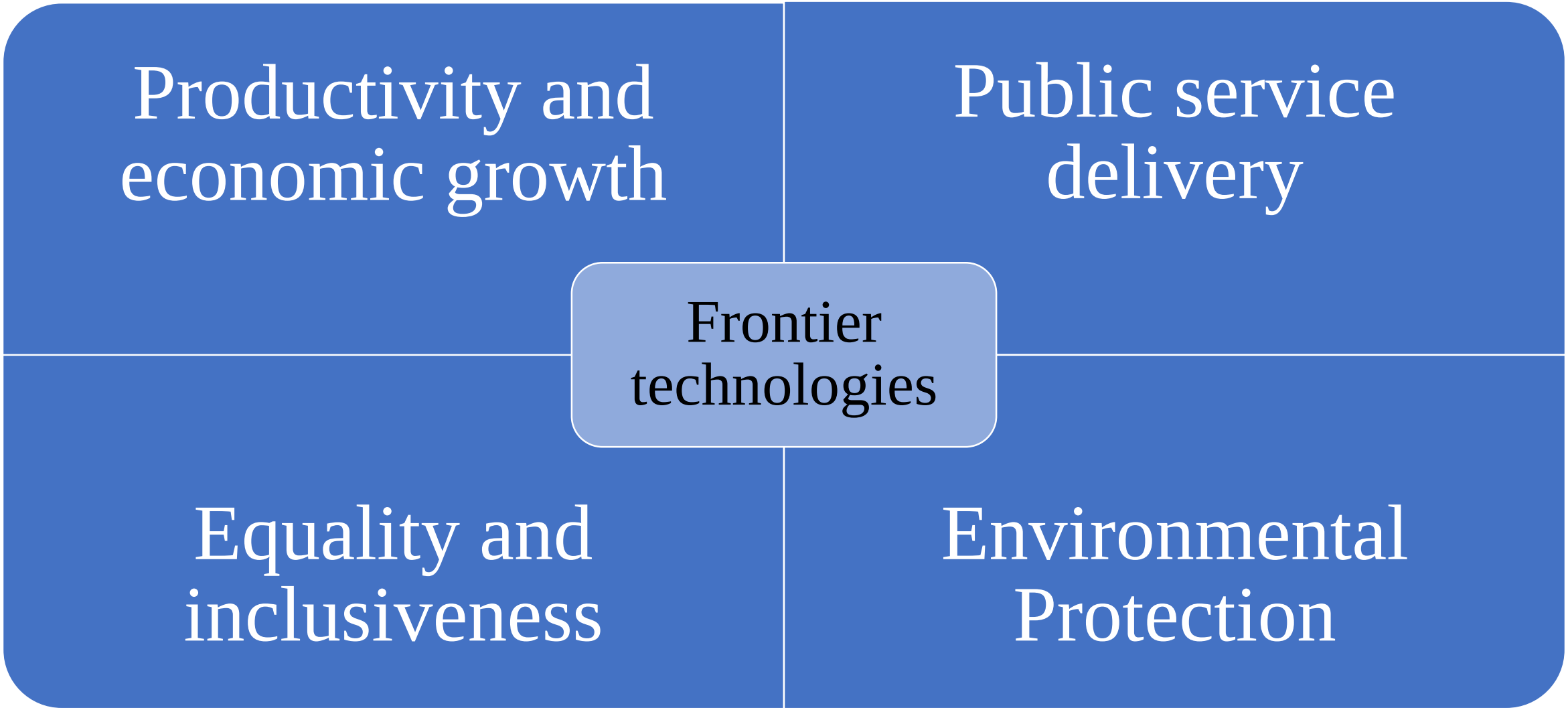
- Forward-thinking (prepare policies as 4IR has just started)
- Share effective policies and practices (effects of 4IR unpredictable)
- Supporting multi-stakeholder cooperation (ensure technological advancements follow sustainable development principles)

Picture sources
https://pngtree.com/freebackground/sky-architecture-city-tower-background_531161.html

Frontier technologies & the Fourth Industrial Revolution (4IR)

OECD	World Bank	World Economic Forum	McKinsey Global Institute	Institute of Development Studies	MIT Technology Review 2018
Internet of Things	Fifth-generation (5G) mobile phones	Artificial intelligence	Mobile internet	3D printing	3D Metal Printing
Big data analytics	Artificial intelligence	Robotics	Automation of knowledge work	Collaborative economy tools	Artificial Embryos
Artificial intelligence	Robotics	Internet of Things	Internet of Things	Alternative internet delivery	Sensing City
Neuro technologies	Autonomous vehicles	Autonomous vehicles	Cloud technology	Internet of Things	Artificial intelligence for Everybody
Nano/micro satellites	Internet of Things	3D printing	Advanced robotics	Unmanned aerial vehicles/drones	Dueling Neural Networks
Nanomaterials	3D printing	Nanotechnology	Autonomous and near-autonomous vehicles	Airships	Babel-Fish Earbuds
3D printing (additive manufacturing)		Biotechnology	Next-generation genomics	Solar desalination	Zero-Carbon Natural Gas
Advanced energy storage technologies		Materials science	Energy storage	Atmospheric water condensers	Perfect Online Privacy
Synthetic biology		Energy storage	3D printing	Household-scale batteries	Genetic fortune-telling
Blockchain		Quantum computing	Advanced materials	Smog-reducing technologies	Materials' Quantum Leap
			Advanced oil and gas exploration		
			Renewable energy		

Opportunities



Challenge 1: Impact on jobs

- Over five million jobs lost by 2020 (World Economic Forum)
- Up to two thirds of all jobs are susceptible to automation in the developing world (WB)
- Fast pace of changes (PWC):
  - 3% of jobs at potential risk of automation by early 2020s
  - 30% of jobs at potential risk of automation by mid-2030s
  - 44% of workers *with low education* at risk of automation by mid-2030s
- The question is **how fast** the technological displacement of labour will happen, rather than whether it will happen
- The other side of the story: boost to GDP / free up labour / "automating…increase the productivity and quality of workers by complementing their skills with…enabling them to focus on…that most need their attention."

https://www.forbes.com/sites/joemckendrick/2018/08/14/artificial-intelligence-will-replace-tasks-not-jobs/#1c90cc00a7fa

Challenge 2: Frontier technology divide

- Several billion people are still left behind in terms of accessing the Internet: 3.58 billion, or 48% of the world's population, are using the internet (UNESCO, 2017)
- Lacking access to ICT infrastructure: backbone of many frontier technologies
- The R&D expenditure as a percentage of GDP (OECD):
  - Republic of Korea: 4.2%
  - United Kingdom: 1.7%
  - Thailand: 0.63%
  - Cambodia: 0.12%

Source: Research and development expenditure (% of GDP), NESCO Institute for Statistics, accessed at data.worldbank.org

Challenge 3: Ethical issues

- 3D bioprinting: moral, ethical and legal issues
- Internet of Things: concerns relating to data security and privacy
- Artificial intelligence:
  - Unpredictable and inscrutable nature
  - Susceptibility to bias
  - Unemployment and distribution of wealth created by machines
  - AI rights / humane treatment of AI

Source: https://www.weforum.org/agenda/2016/10/top-10-ethical-issues-in-artificial-intelligence/

Six responsible policy areas of next-generation technology policies

- Ensuring inclusive ICT infrastructure
- Developing a workforce that is fit for the future as influenced by the fourth industrial revolution
- Developing innovative regulatory frameworks
- Incentivizing responsible development of frontier technologies
- Identifying the role of the Government
- Creating a platform for multi-stakeholder and regional cooperation

Leveraging trade and investment for building smart economies

- Trade is one of the fundamental drivers of innovation and growth because of:
  - Competition, technology transfer, spill-over, etc
- For governments and policymakers:
  - Continue liberalizing international trade and investment regimes
  - Incorporate social and environmental dimensions
  - Have complementary domestic policies in place
- However, in the new digital era, not all countries are able to capture the benefits of trade and investment…

Barriers to international trade in the digital age

- But there are many barriers *unique* to digital trade
  - Frictions in the enabling environment (content access restriction)
  - Technical trading restrictions (restrictions on payment method)
  - Technology barriers (security standards)
  - Data localisation requirements
- Access and affordability of ICT infrastructure are prerequisite
- Appropriate legislative and regulative mechanisms are key

Key takeaways

- While technological advancements in the form of 4IR are unstoppable, technology is not panacea
- There are realistic and serious threats arising from 4IR, hand in hand with wonderful promises
- To harness the benefits we need responsible public policies towards technological advancements
- Trade and investment remain a major engine of transformation into smart economies

Selected references

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The Economist, Smart Economies: Technology driven inclusive growth, https://www.economist.com/sites/default/files/em1465_smart_economies_2016_brochure_14122015_v10.pdf

Yuval Noah Harari, 21 Lessons for the 21st Century, Spiegel & Grau; 2018

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Thank you!

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