Future of Digital Economy in Economic Perspective

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LECTURER

1. Digital Economy

- For the fast changing world, the main driver is digital transformation
  - Digital transformation
    - It is more than internet
    - It is using latest technology to do what we already do, but better
  - Global economy is undergoing digital transformation at a breakneck speed

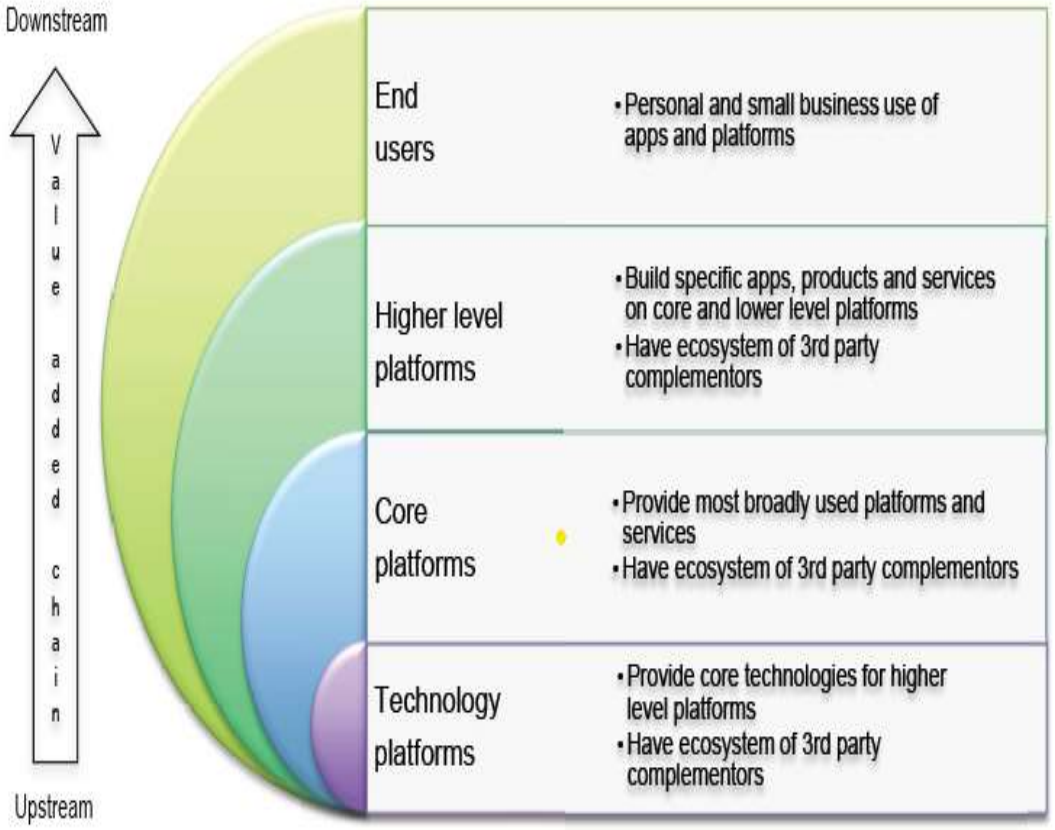
- "Digitization is transforming our lives"
- "Digitalization can hold the key to a brighter future"
- "Digital technologies drive the ongoing transformation of economies and societies" (OECD, 2017a)
- Many Questions to Ask
  - How can we make digital transformation conducive for more inclusive and sustainable development?
  - How can we make it beneficial for growth and well-being?
  - How can we harness the economics and social benefits of the digital economy in countries of various levels of development?

1. Digital Economy

- Digital economy?
  - It's the economic activity that results from billions of everyday **online connections among people, businesses, devices, data, and processes** (Deloitte)
  - **A broad range of economic activities** that use **digitized information and knowledge as key factors of production** (ADB, 2018)
    - The internet, cloud computing, big data, fintech, and other new digital technologies are used to collect, store, analyze, and share information digitally and transform social interactions
- **'New' Digital Economy** (UNCTAD, 2017a)
  - A set of technologies and processes including
    1) Advanced manufacturing, robotics and factory automation
    2) New sources of data from mobile and ubiquitous Internet Connectivity (IoT)
    3) Cloud Computing
    4) Big Data Analytics
    5) Artificial Intelligence
    - With the main exponentially growing information and telecommunication technology (ICT)
  - Or, **a platform-based ecosystem of ICT-based products and services** (UNCTAD, 2017a, p.13)
    - Rapidly evolves through a combination of ubiquitous and continuous measurement and data collection

1. Digital Economy:
Platform layering as a Value Chain in the New Digital Economy Ecosystem

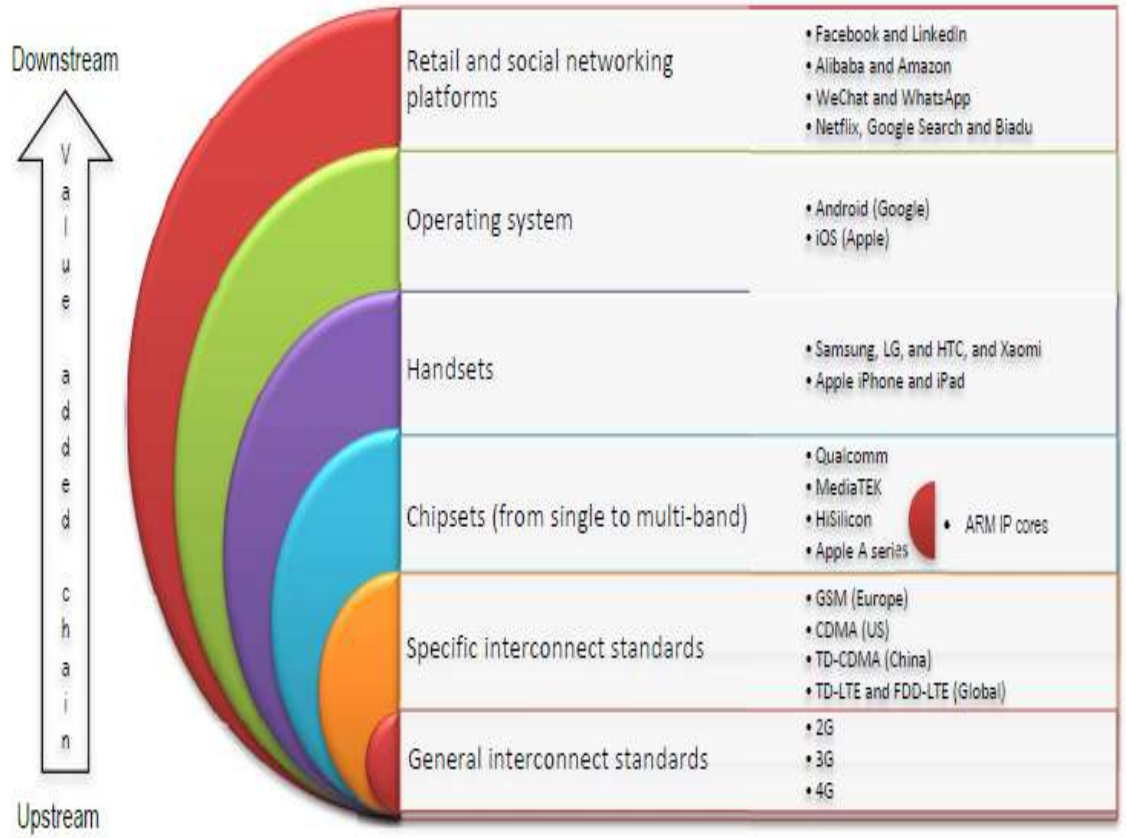
Figure 1. Platform layering as a value chain in the NDE ecosystem



Source: T. Sturgeon, for UNCTAD.

Source: Quoted from UNCTAD (2017a), p. 10

Figure 2. Platform layering in mobile telecom



Source: Thun and Sturgeon (2017).

Source: Quoted from UNCTAD (2017a), p. 11

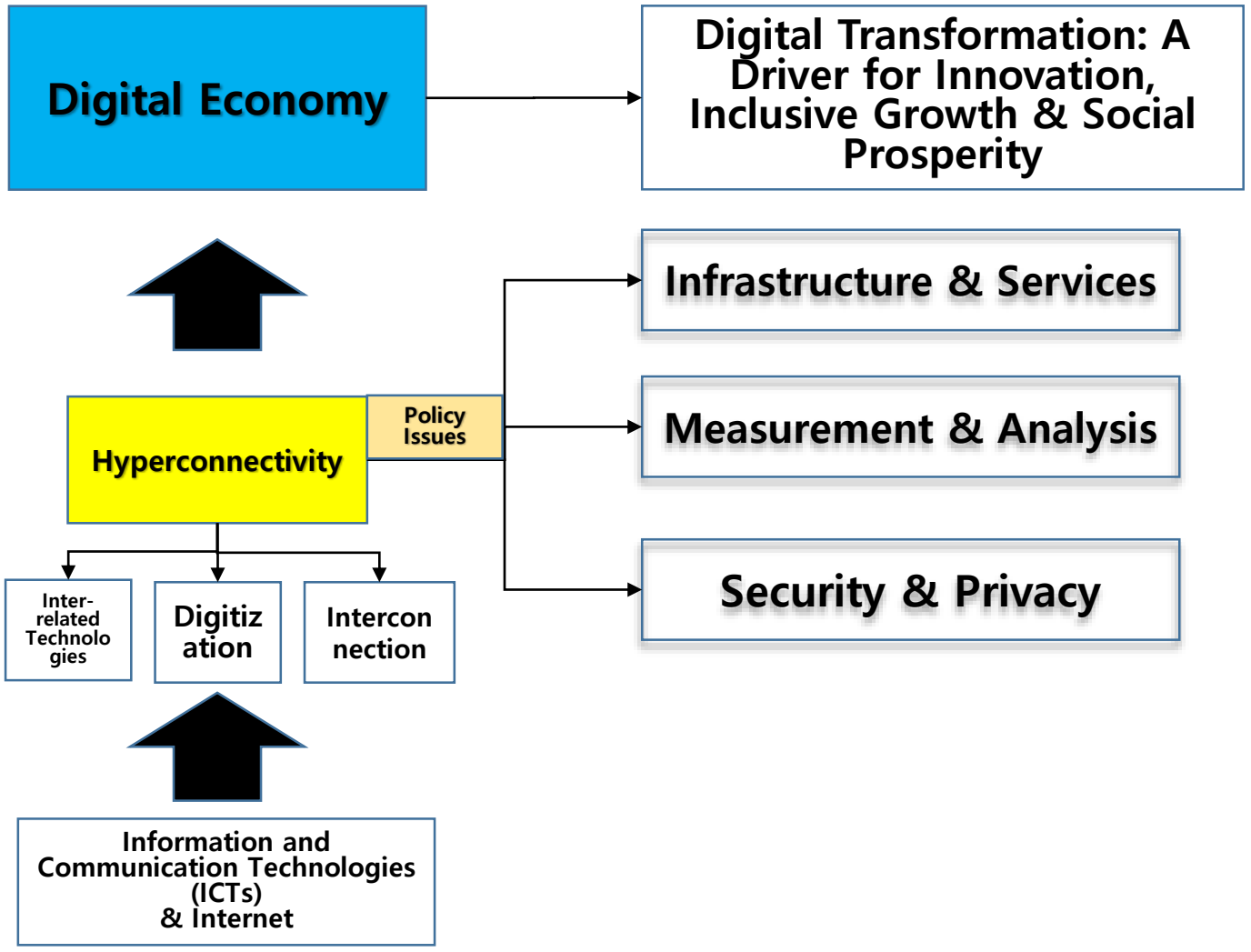
1. Digital Economy

- **Open Innovations**
  - **Lowers the cost of information search** and **new knowledge creation** (UNCTAD, 2017a, p.14)
  - Generating **collaborations across competitors**, setting up "Frenemy" relationships (Ezrachi and Stucket, 2016) in a dynamic landscape of virtual competition
  - Creating **opportunities and barriers for firms**, smaller and located outside the core technology clusters
    - Access to resource is free
    - High capability requirement for full participation
    - Advantage of co-location

1. Digital Economy

- **Computerization of work**
  - Enabled the geographic fragmentation of industries due to the rationalization of work processes and explicit rules
  - Facilitated standardization
  - Made easy the transfer of tasks from one state of the next
    - Across organization (outsourcing)
    - Across borders (Offshoring)
    - Or both (Offshore outsourcing)
  - With plummeting costs for the movement of goods and also with voice and data connections
  - Such a **creation and standardization of value chain modularity** underpinned the **development of GVCs**
  - **Value Chain modularity will be further enabled by the technologies, tools and platform ecosystem of the New Digital Economy (UNCTAD, 2017a. p.15)**

2. Digital Economy: Origin and Policy Issues



2. Digital Economy: Origin and Policy Issues

- The backbone of digital economy
  - Hyperconnectivity
    - Meaning growing interconnectedness of people, organizations, and machines
    - Resulting from the Internet, mobile technology and the internet of things (IoT)
    - Interconnectedness, Digitization, complemented by related technologies
- Digital Transformation
  - A drive for Innovation
  - Inclusive growth and Social Prosperity

3. Digital Economy: Digitization

- Digitization
  - **Conversion of analogue signal conveying information to binary bits**
    - Can be stored as data
    - **Digital data can be used infinitely by digital devices**
      - That is, processed, stored, filtered, tracked, identified, duplicated and transmitted globally
      - **Without degradation**
      - **At very high speed**
      - **At negligible marginal cost**
      - Through internet
  - In sum, **digitization reduces physical constraints to information sharing and exploitation** (OECD, 2015)
    - Empowered by exponentially growing computing power (*i.e.* the Moore's Law)

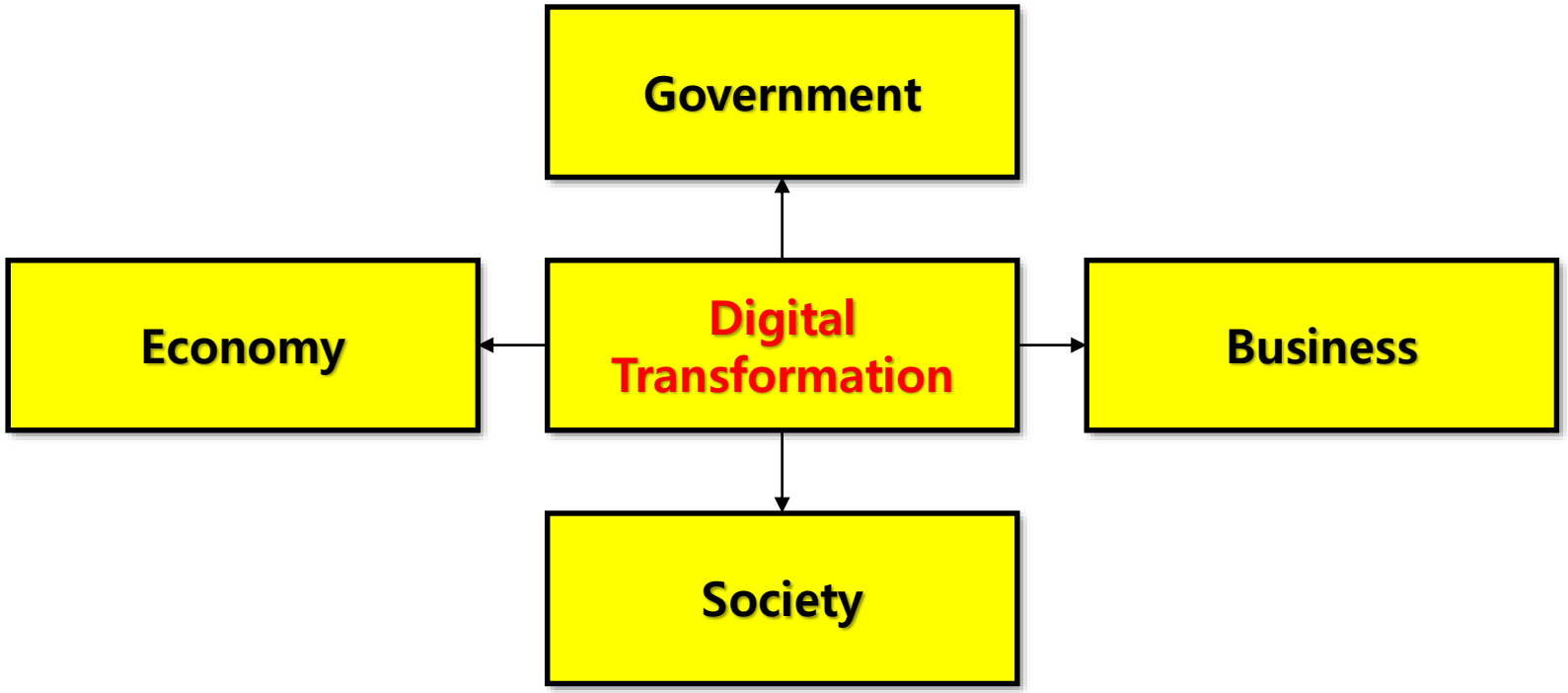
4. Digital Economy: Underlying technologies

- **IoT (the Internet of Things)**
  - Devices or objects whose status can be altered via the Internet, with or without active involvement of individuals (OECD, 2015)
  - Serve to monitor the health, location and activities of people and animals, the state of production processes, the efficiency of city services, and the natural environment (OECD, 2016)
  - These devices are **a key sources of data feeding big data** analytics
- **Big Data Analytics**
  - A set of techniques and tools used to process and interpret large volume of data generated by the increasing digitization of content, the greater monitoring of human activities and the spread of the IoT (OECD, 2015)
  - Used to infer relationships, establish dependencies, and perform predictions of outcomes and behaviors
  - Accessed by firms, governments and individuals for real time decision makings
  - **Enables machine learning**, a driver of artificial intelligence (AI)

4. Digital Economy: Underlying Technologies

- **Artificial Intelligence (AI)**
  - Machines performing human like cognitive functions
    - Driven by machine learning
  - Makes devices systems smart
  - Empowers software or robots
    - Acting as self-governing agents
      - Operating more independently of creators or operators
  - Helps to solve complex questions, generates productivity gains, improve decision making efficiency and reduce costs
- **Blockchain**
  - A decentralized and disintermediated technology facilitating economic transactions and peer-to-peer interactions
  - Enables trusted and transparent transactions
- Other general purpose technologies
  - Cloud computing, robots, neural computing, virtual reality, etc.
- **The wide-ranging and rapid digital transformation shits markets and economic behaviors differently from the analogue era**

5. Digital Economy: Changing Our Lives



5. Digital Economy: Changing Our Lives

- The digital economy changes Business Models
  - Hyperconnectivity
  - Taking shape and undermining conventional notions about how businesses are structured;
    - how firms interact;
    - how consumers obtain services, information, and goods
  - Aggressive use of data is (Professor Walter Brenner, University of St. Gallen, Switzerland)
    - Transforming business models
    - Facilitating new products and services
    - Creating new processes
    - Generating greater utility
    - Ushering in a new culture of management

5. Digital Economy: Changing Our Lives

- Examples of new business models
  - Uber
    - Owning no taxies
  - Facebook
    - Creating no contents
  - Alibaba
    - Having no inventories
  - Airbnb
    - Owning no real estate
  - All re-imagine traditional boundaries and value propositions of the industry

5. Digital Economy: Changing Our Lives

- Digital technologies
  - create innovation,
  - Fuel job opportunities and economic growth, and
  - Improve how people live their lives
- The digital economy also **permeates all aspects of society**, **influencing the way people interact** and **bringing about broad sociological changes**
  - The ways in which people connect with others, with information, and with the world is being transformed through a combination of technologies
- These technologies will help us solve increasingly sophisticated problems,
  - Big data will assist us in complex decision-making

5. Digital Economy: Changing Our Lives

- It's **the Fourth Industrial Revolution**
  - Will have a massive impact on economy
    - **Rise of the sharing economy**
      - A model in which people and organizations connect online to share goods and services
      - Also known as collaborative consumption or peer-to-peer exchange
        - Uber, Airbnb
    - Blockchain technology
      - A **digital "ledger" technology** that allows for keeping track of transactions in a distributed and trusted fashion
      - Crytocurrencies like Bitcoin
    - Changes in manufacturing driven by 3D and/or 4D printing

5. Digital Economy: Changing Our Lives

- It's **the Fourth Industrial Revolution**
  - Will also **have impact on government**
    - On their delivery of government services
      - Thus, enabling more agile governance
    - Increasing government efficiency,
    - Improving government programms,
    - Encouraging a more empowered and engaged citizenry
    - Eventually redefining the relationship between government and their citizens
  - Issues to tackle in future
    - Trust, privacy and transparency
      - Because people continue to share, collaborate and interact on line

5. Digital Economy: Changing Our Lives

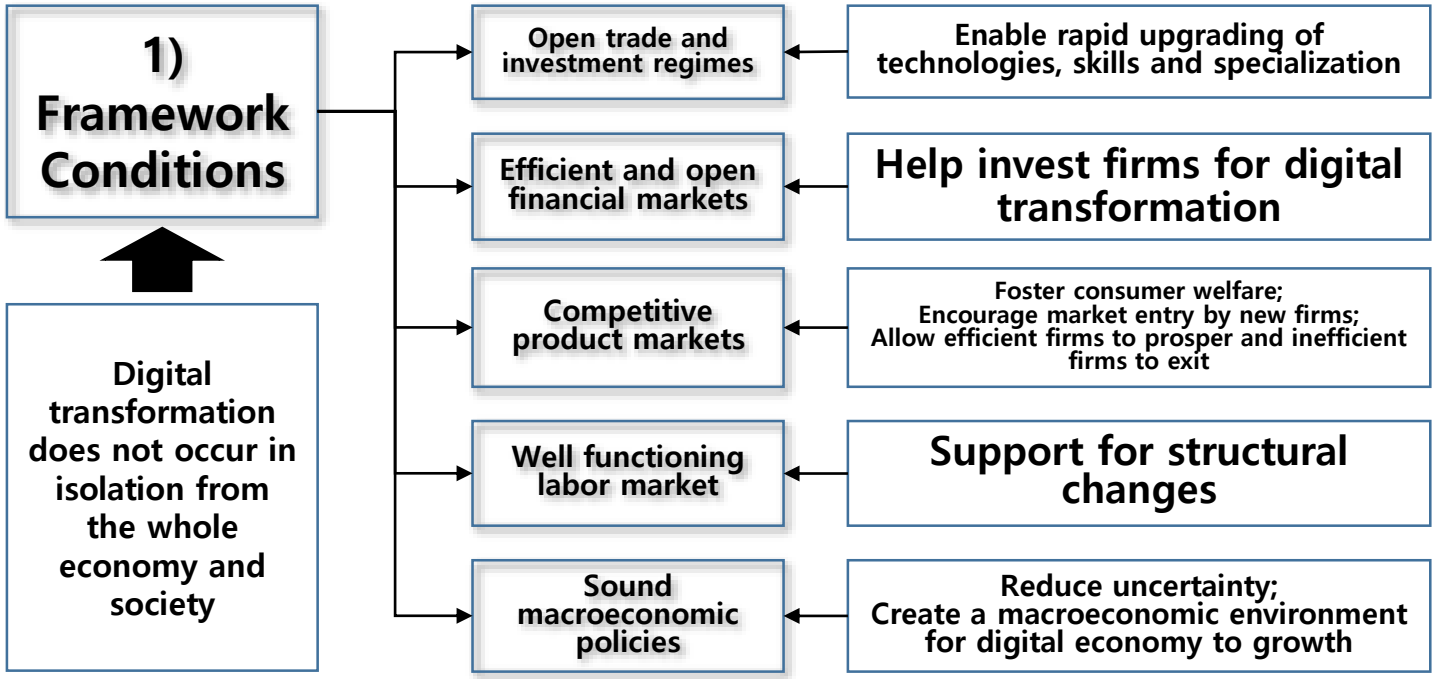
- In this disrupting era of the digital economy, such soft skills as will be high in demand
  - **Essential skills or foundational skills, skills of leadership** (World Economic Forum, 2018)
    - Communication, observation, empathy, logical thinking, coordination, social perceptiveness, active listening, complex problem solving, global competencies such as culture awareness, language, adaptability
    - Most thought after by globally leading organizations
- Our **education needs to change** in this era of disruption
  - What we will learn versus how we will learn
  - Even in hardcore STEM and business education has to change
- **Education in humanities** is becoming more important as

  Because we need people with digital literacy, not many coders and many of STEM jobs will be automated

  "It is in Apple's DNA that technology alone is not enough — it's technology married with liberal arts, married with the humanities, that yields us the results that make our heart sing." (Steve Jobs)

6. Digital Economy: Foundations for Digital Transformation

Foundations for Digital Transformation



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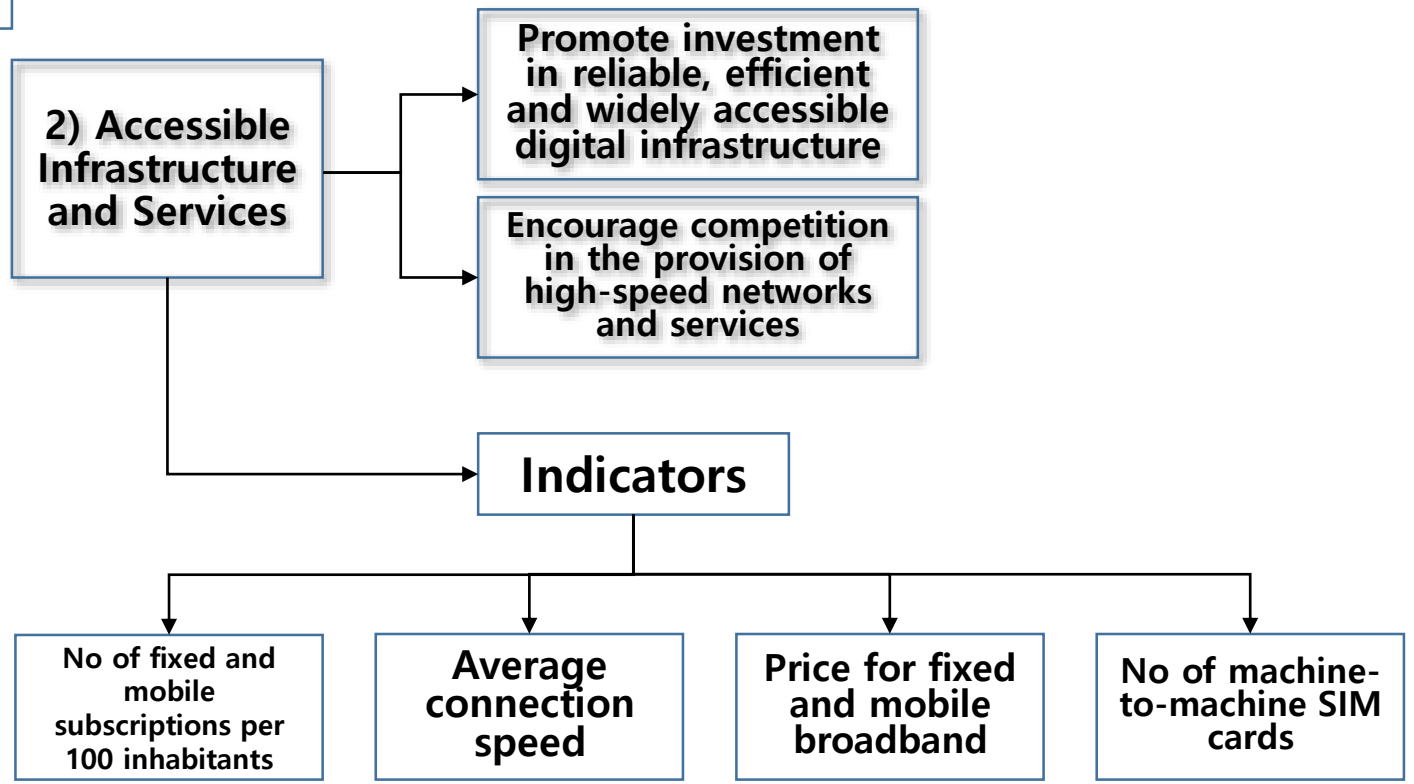

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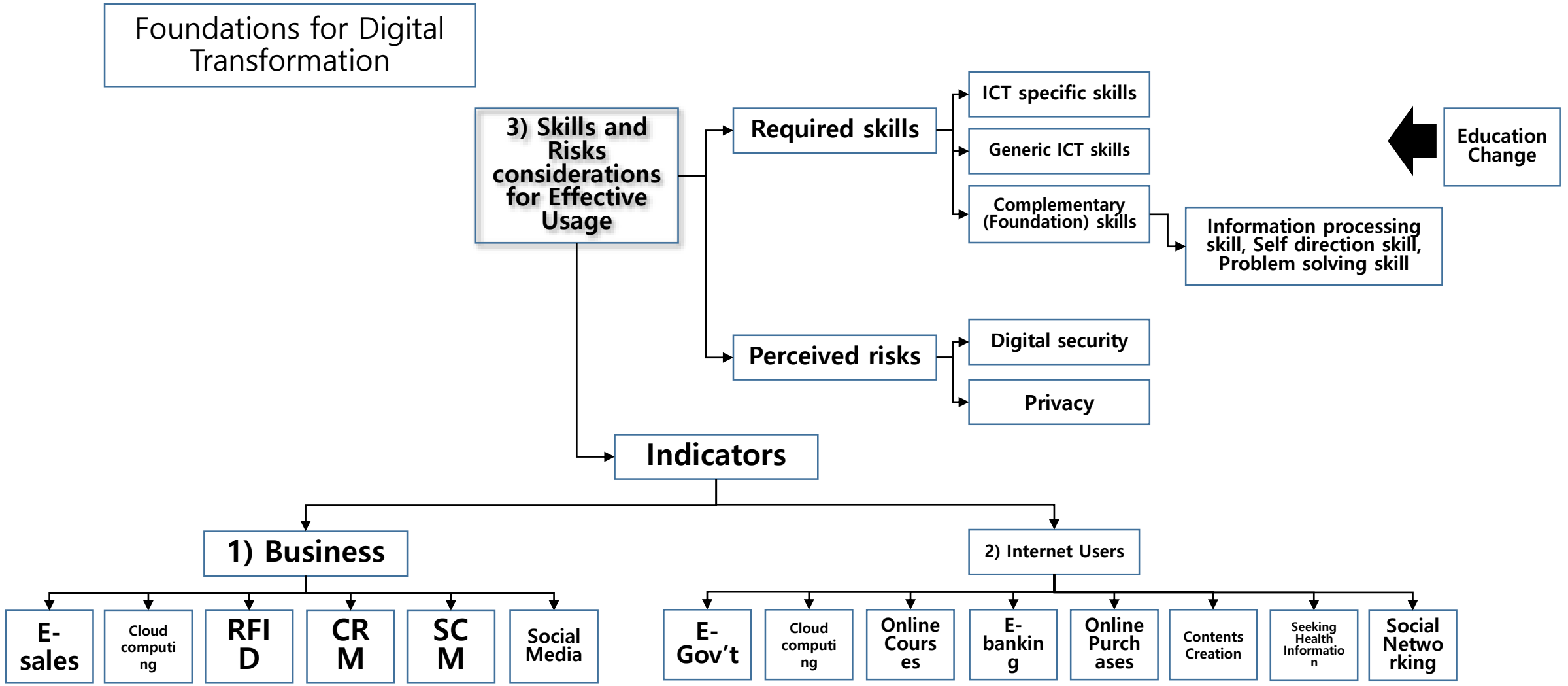

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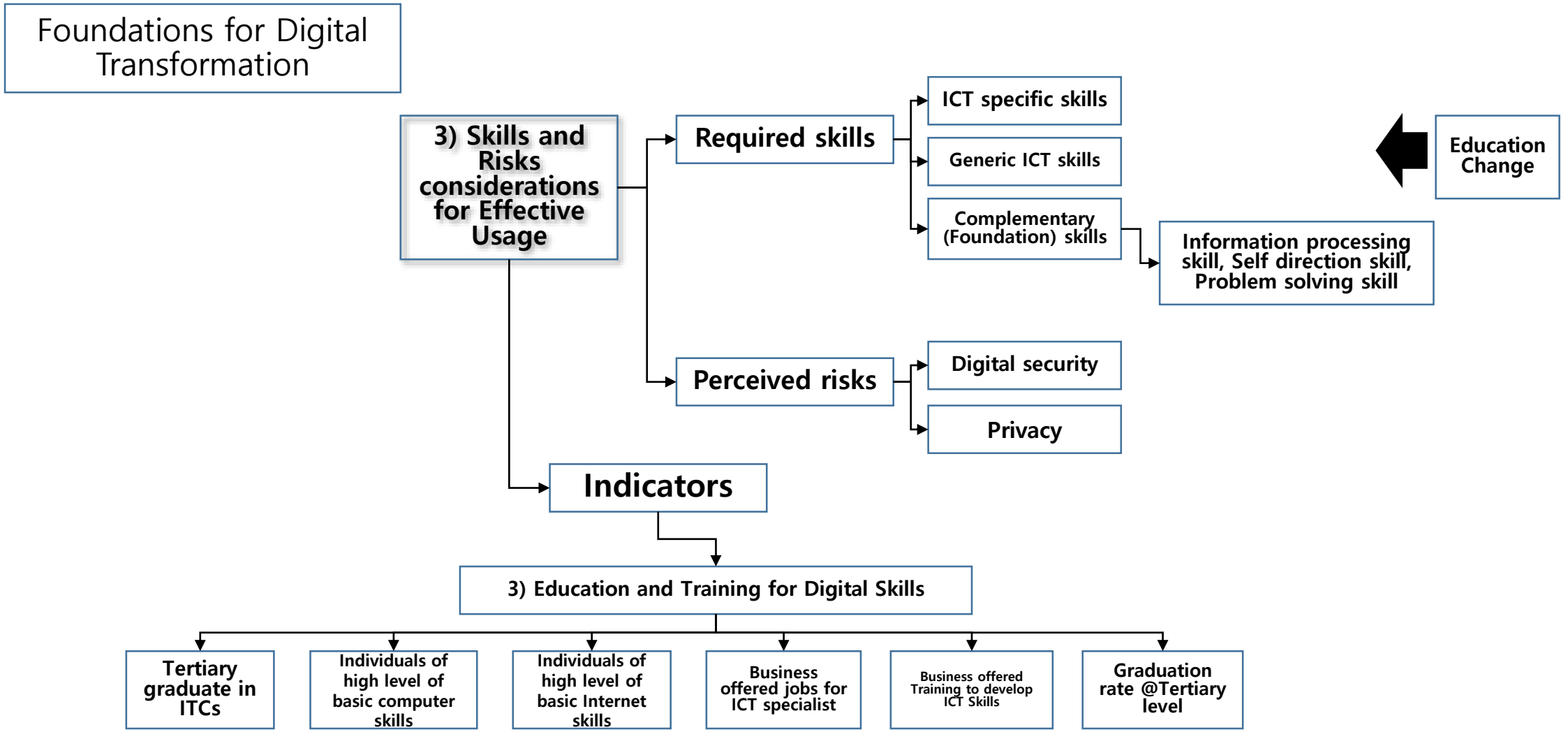

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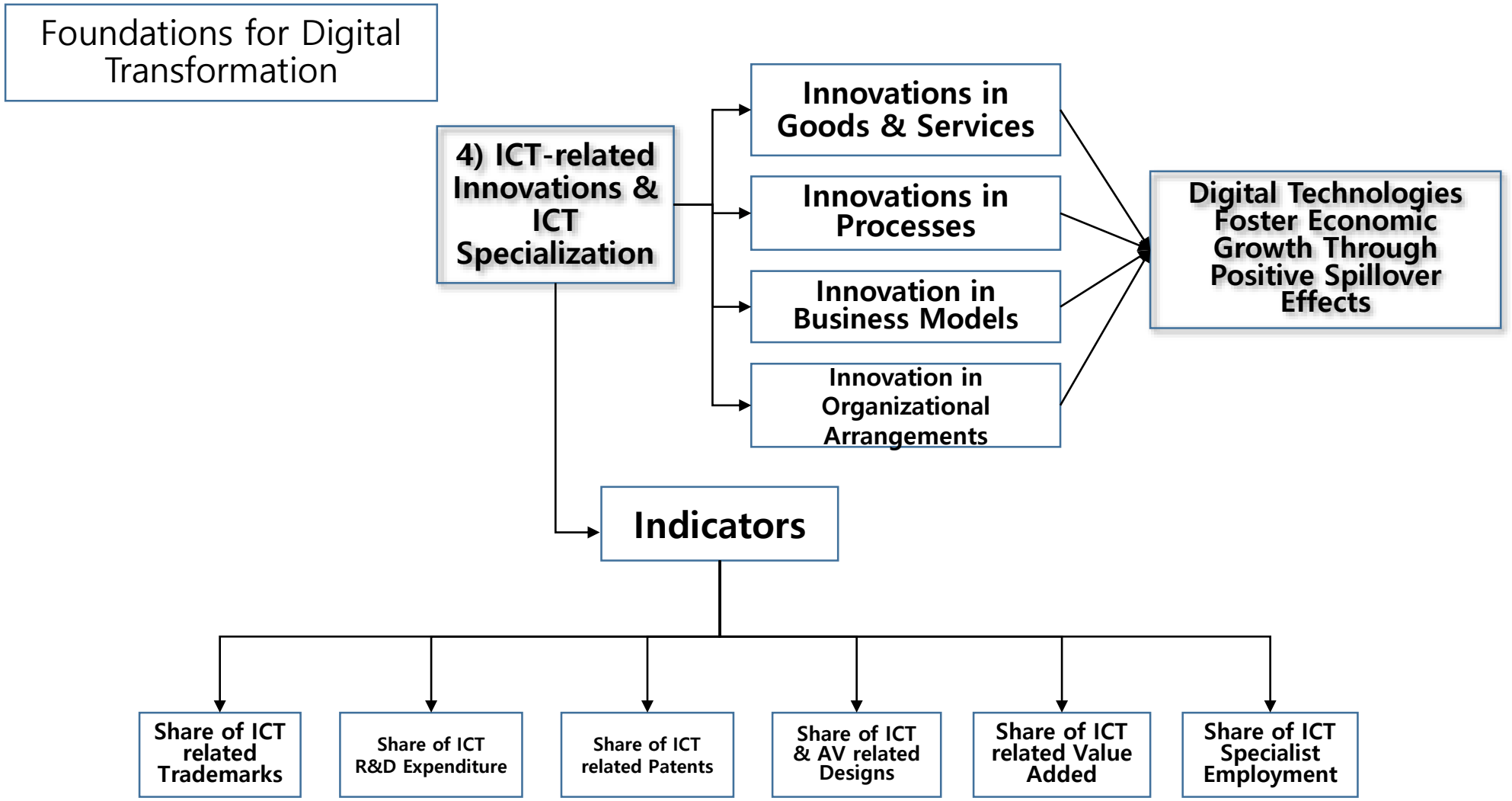

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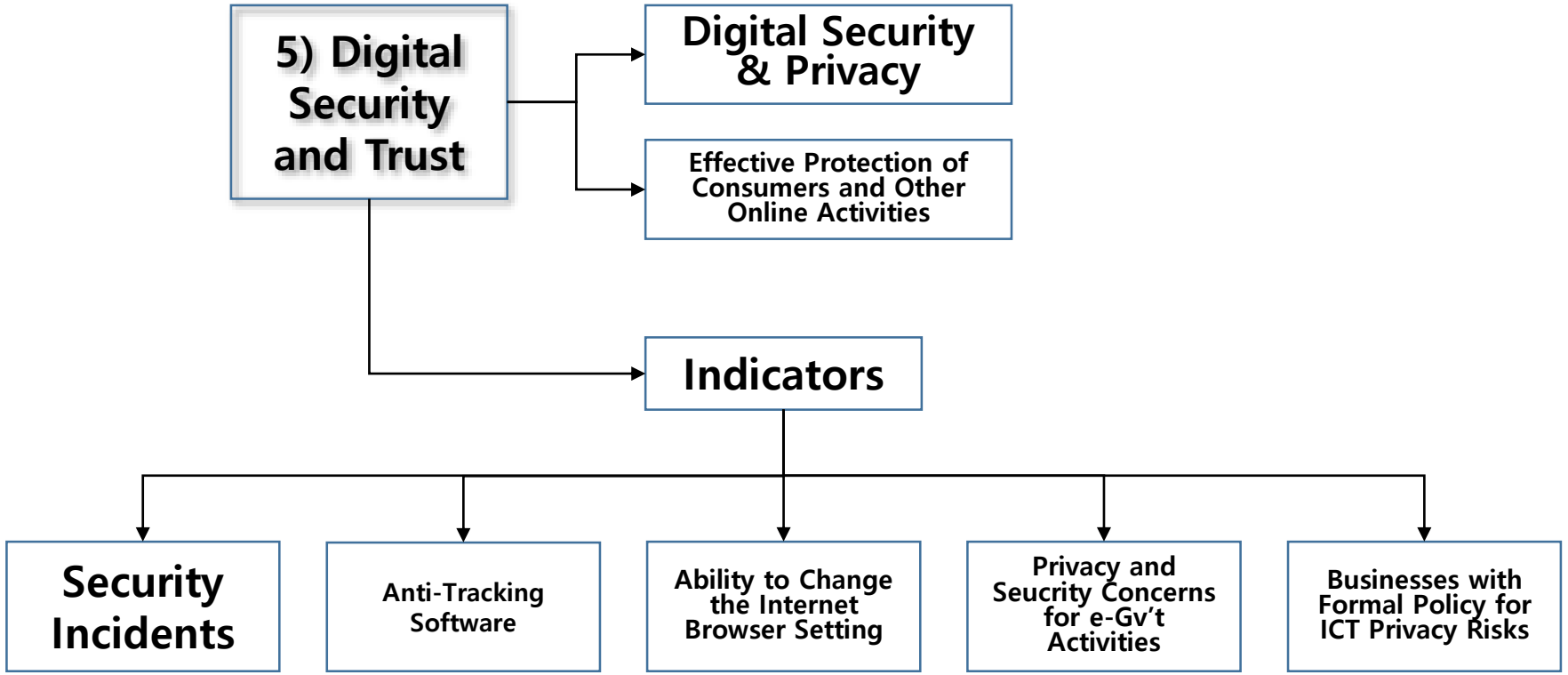
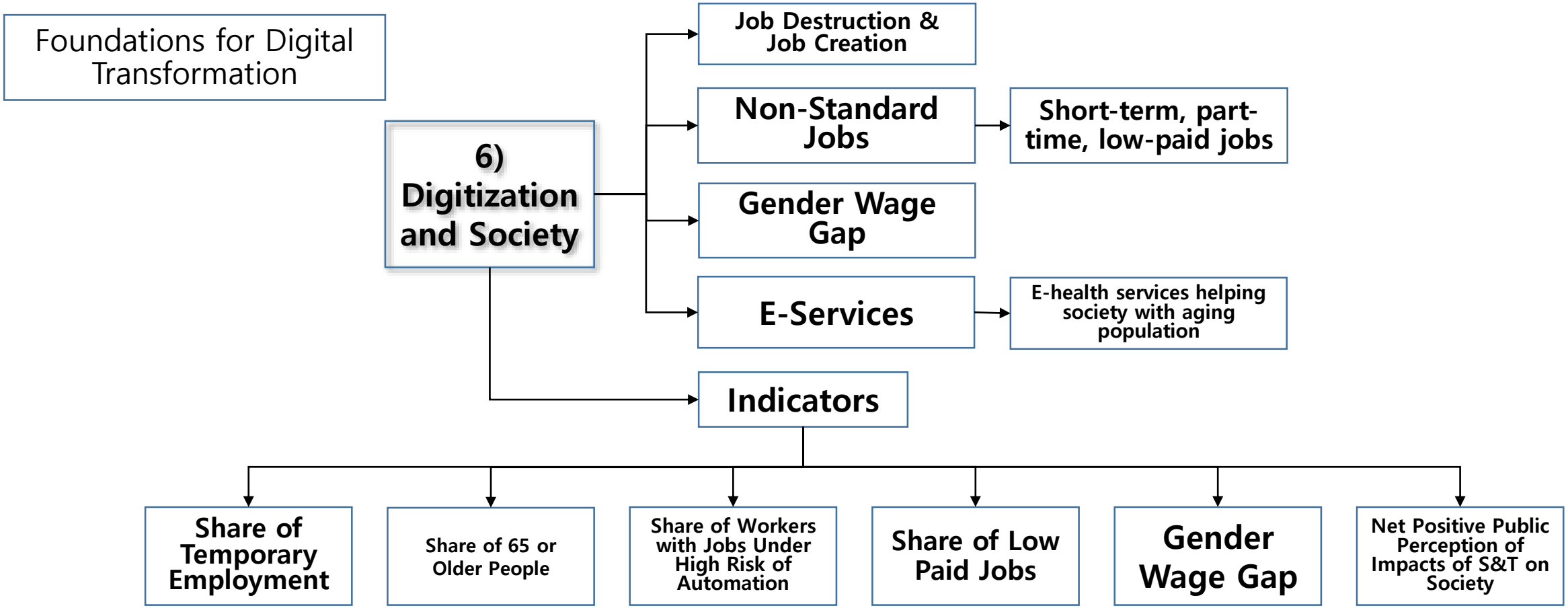
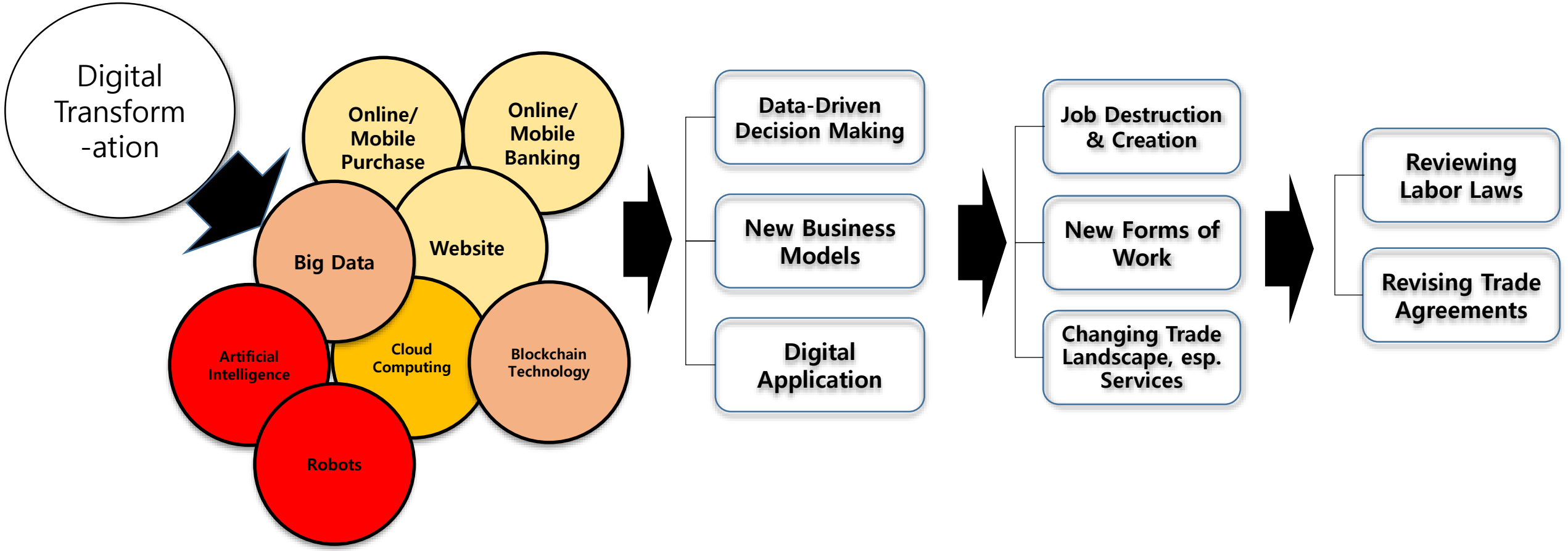


Digital Economy: Foundations



7. Digital Transformation: Impacts and Consequences



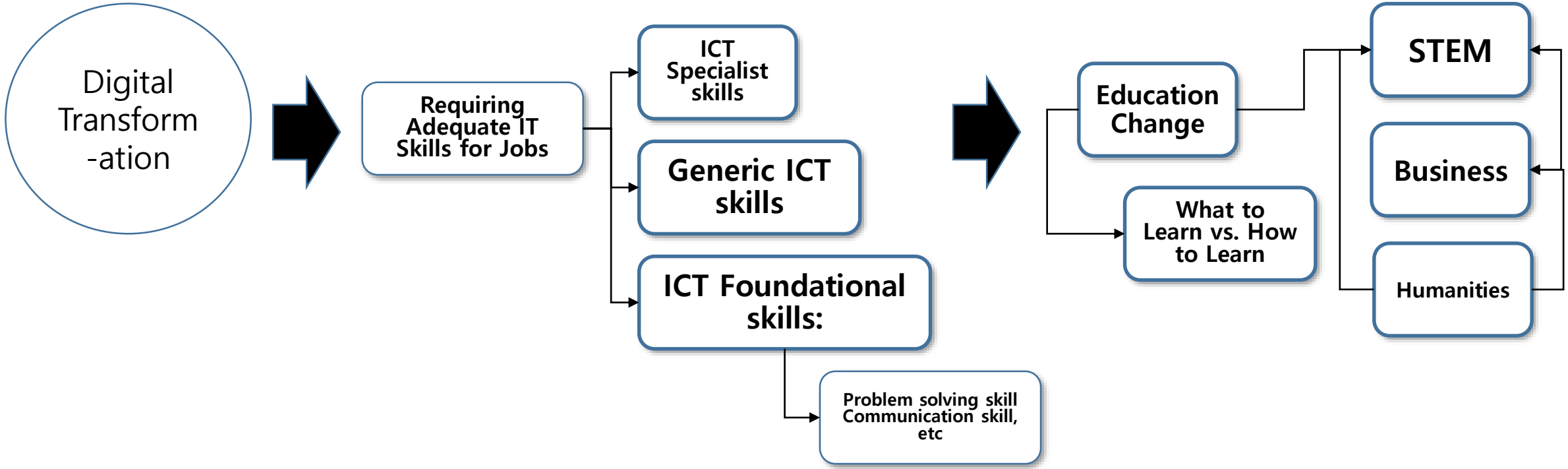
7. Digital Transformation: Impacts & Consequences

- **Emergence of new business models technology and product platforms**
  - **Change the organization of industries** and **the terms of competition** in a wide range of leading-edge industries and product categories
- **Transformation the location, organization, and content of knowledge work**
  - **Change locations of innovation and manufacturing**
  - By extending the organization and geographical fragmentation of work into new realms, including R&D, product design, and other knowledge-intensive and innovation-related business functions
- **Reduction in demand for routine tasks**

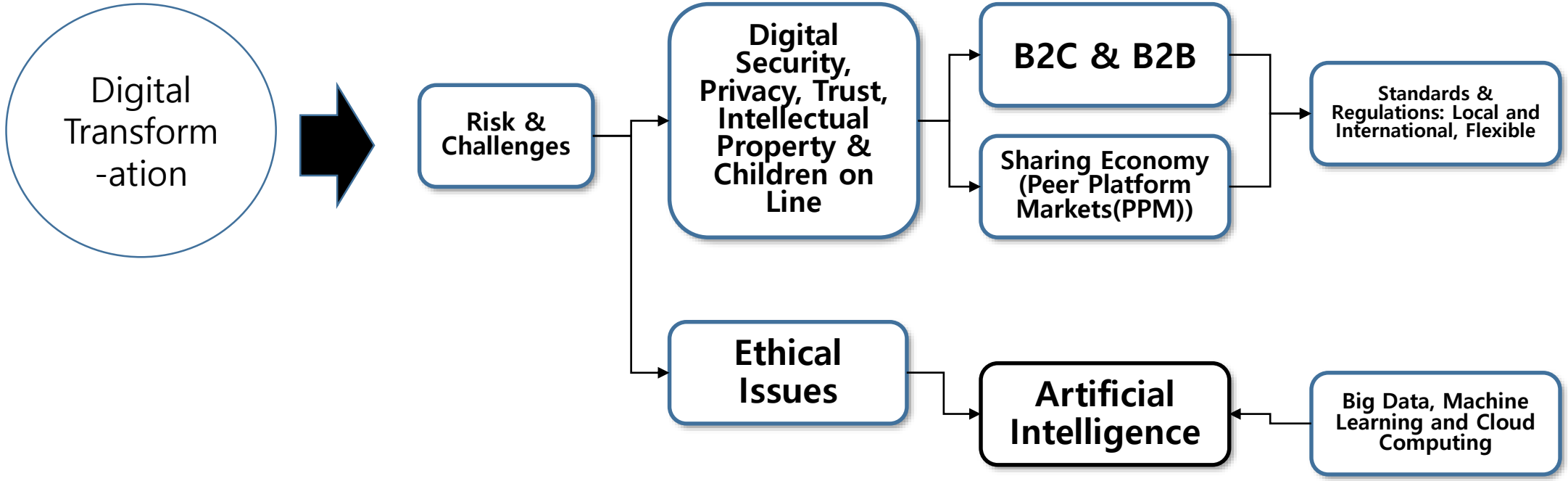
7. Digital Transformation: Impacts & Consequences

- Many of digital economy transactions are electronic and cross borders with easy detection
- Affecting measuring such basic economic activities as investment, trade, and profits
- Dynamics and location of innovation and manufacturing will affect developing countries

8. Digital Transformation: Skills & Jobs



9. Digital Transformation: Risks and Challenges



10. Digital Economy and Development

- Impacts of Digital Economy on Developing Countries?
  - They are already behind in the use of digital tools
  - Traditionally, **industrialization, i.e. manufacturing, is a path to development**
    - In the traditional concept of manufacturing, **trade-offs** resided between production scale, product variety and unit costs/labor hours
      - High volume manufacturing vs. High Mix manufacturing vs. Custom-made manufacturing
      - In essence, **Variety vs. Scale trade-offs**
- But "**Industry 4.0**" (Germany) or "**Advanced Manufacturing**"(US) of the digital economy with additive manufacturing (3D printing) or intelligent and adaptive robots
  - Can fast manufacture customized and lower-volume production at lower costs
  - Speed up the innovation process
  - Support "on-demand" manufacturing of products
- In near future, no longer trade-offs between variety and scale may be possible

10. Digital Economy and Development

- Where will the advanced manufacturing be located? (3 possibilities)
  - Small scale advanced manufacturing facilities will be located **close to consumers**
    - Linked networks of distributed virtual factories (Markowsky, 2012) or distributed manufacturing
    - Jobs close to end markets
    - Low transportation costs
    - Less CO_2 emissions
    - Mild inventory requirements
    - Consumers' needs are met in variety and for their taste
  - Or alternatively it could be located **where mass production is taking place**
  - Or **advanced manufacturing could be deployed without altering the location of production** but dramatically increasing productivity, quality and traceability
    - **Lower demand for direct manufacturing labor**

10. Digital Economy and Development

- The Winner-Take-All game of core platform competition for Innovation
  - May create spatial inequality domestically and internationally
  - But still significant opportunities are provided by the digital economy for firms outside of established technology clusters
- For high-level platforms, platform complementors, and platform users however, more significant opportunities open up
  - A vast and growing set of digital resources are available for start-ups, smaller, and globally remote companies to innovate, grow and improve operations and connect to markets

10. Digital Economy and Development

- For **geographical linkage between Innovation and Production** in the digital economy
  - In traditional understanding, **strong spatial linkages** exist
    - Product life cycle
    - Innovation spawns new industries and generate a large scale employment
      - "**Innovation here/production here**" (Bonvillian, 2012)
    - Investment attraction policies attract manufacturing to create employment, followed by knowledge-intensive activities as a spill-over effect
  - **In some industries**, however, linkages between innovation and production can facilitate geographically **a separation of innovation and production**
    - "**Innovation here/Production there**" (Bonvillian, 2012)

10. Digital Economy and Development

- Pressures **for these industries for co-location of innovation and production** in the digital economy will increase
  - “Re-shoring” or a replacement of “hollowing out”
  - Due to
    - Increased productivity in production and thus unimportant labor cost differentials
    - Industrial and trade policies shifting incentives toward domestic manufacturing
    - Impact on reshoring will vary between industries
- With further maturing the digital economy, however, spatial ties between many business functions will loose
  - Innovation, production, logistics, marketing, distribution, after-sales services

10. Digital Economy and Development

- The questions
  - Will the digital economy **open up new opportunities for developing countries** or deepen existing geographical divides?
  - Will automation allow production to migrate closer to the point of consumption by decreasing the importance of large-scale direct labor which was the engine of growth for many developing countries?
  - Will it, alternatively, drive recently successful developing countries more quickly into higher value activities with AI provided platforms for developing more sophisticated products?

10. Digital Economy and Development

- Routine business functions
  - Such as manufacturing, software coding, back office services
  - **Could be re-shored** or even eliminated by advanced manufacturing and automation
  - Meaning a retreat from GVCs
  - Creating massive disruptions to export oriented factories in developing countries
- Digital economy may **empower developing countries**
  - To move up value chains
  - To less dependent on the innovation and coordination functions of lead firms in GVCs
  - To produce globally competitive products
- Stable innovate here/produce there geographical division