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HFE and the future of work: Lessons for a globally connected world

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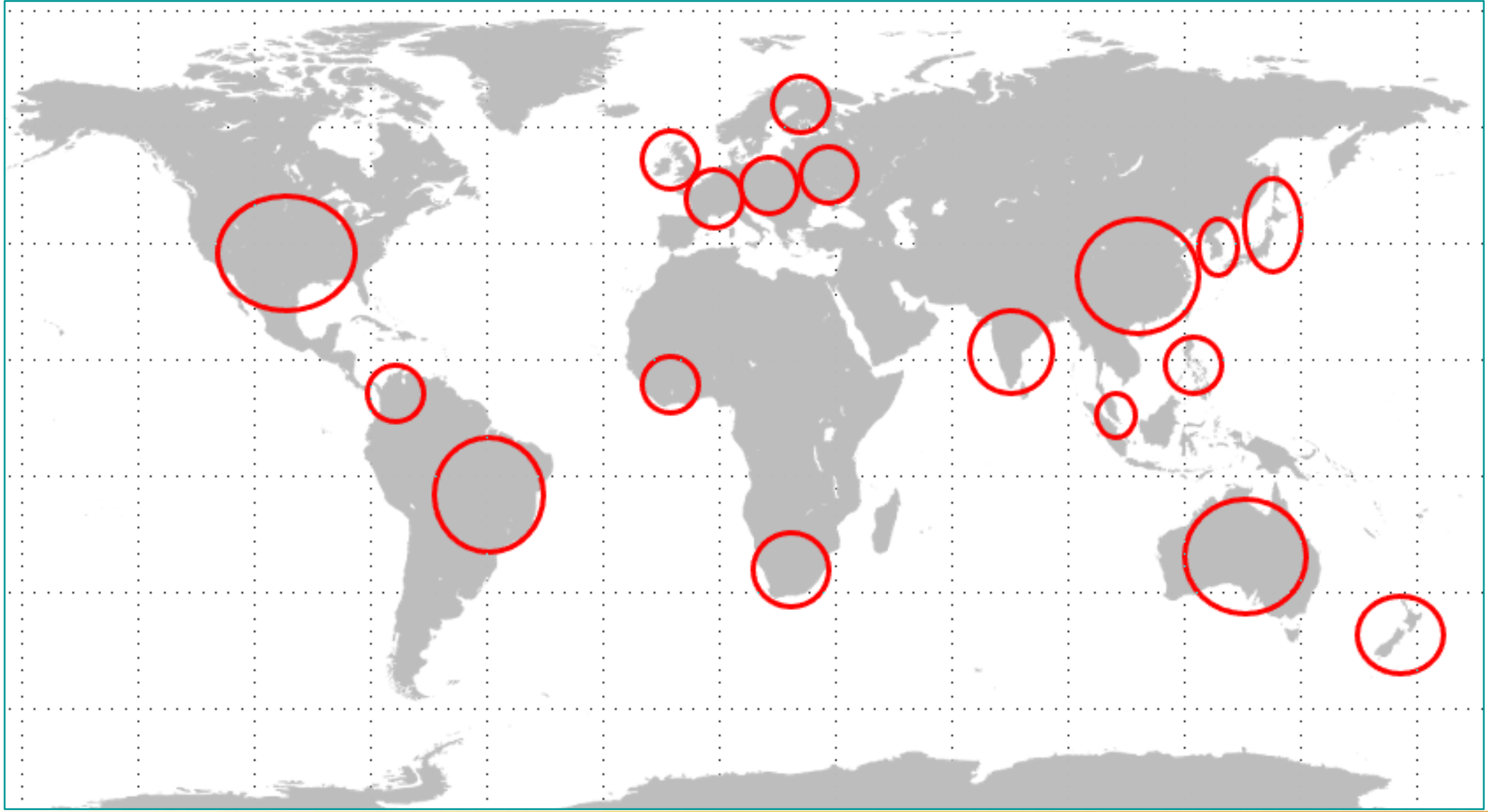
ILO Future of Work Centenary Initiative (2017)	UK Commission for Employment and Skills (UKCES): Future of Work: Jobs and Skills in 2030 [1]	E/HF: Dul et al. (2012)	E/HF: Bentley et al. (2021)
Globalisation (disruptions in where work is carried out through global supply chains) **Technology** (especially artificial intelligence and robotics) **Demographics** (particularly ageing and migration) **Climate change** (leading to extreme climate disasters, changes in food production systems, and transitions to green jobs).	**Business and the economy** (de-globalisation; shift to Asia; Internet/online disruptors) **Technology and innovation** (AI and robots; digitalisation of production; ICT; big data) **Society and the individual** (growing diversity; aging; fragmented and zero-hour contracts) **Law and politics** (growing populism; decreasing fiscal scope for legal and political action) **Resources and the environment** (growing scarcity of resources and disruptions to ecosystems; resource conflicts; climate disasters threaten supply)	**Globalisation** (shifts in where work and under what working conditions that work is carried out in global supply chains) **Information and communication technology** (changes where, when, and how work is carried out; remote work; new types of organisations) **Cultural diversity** (diverse workforces and diverse customer base) **Ageing** (work systems and products that fit ageing populations) **Competitiveness and innovation** (constant drive for innovation resulting in work intensification) **Sustainability and corporate social responsibility** (focusing on more than just corporate profits, but also people and planet)	**Globalisation and trade liberalisation** (migration, low-wage economy, and internationalisation of labour force) **Technological enhancements** (especially automation and robotics) **New organisational forms** (informal/gig economy, distributed, networked, and virtual organisations) **New ways of working** (distributed and virtual teams, activity-based working, telehealth, and flexible work arrangements) **Demographic shifts** (including shifts in ageing, gender, and diversity shifts) **Environmental pressures** (resource scarcities, renewable systems, and recycling systems)

Methods

- 1 junior and 1 senior researcher/practitioner
- Chosen by HFE society
- higher-order autobiographical thinking based on 3-4 major trends
- Be as detailed as possible by making detailed representations of the future
- Decrease the temporal distance by focusing on the near future.



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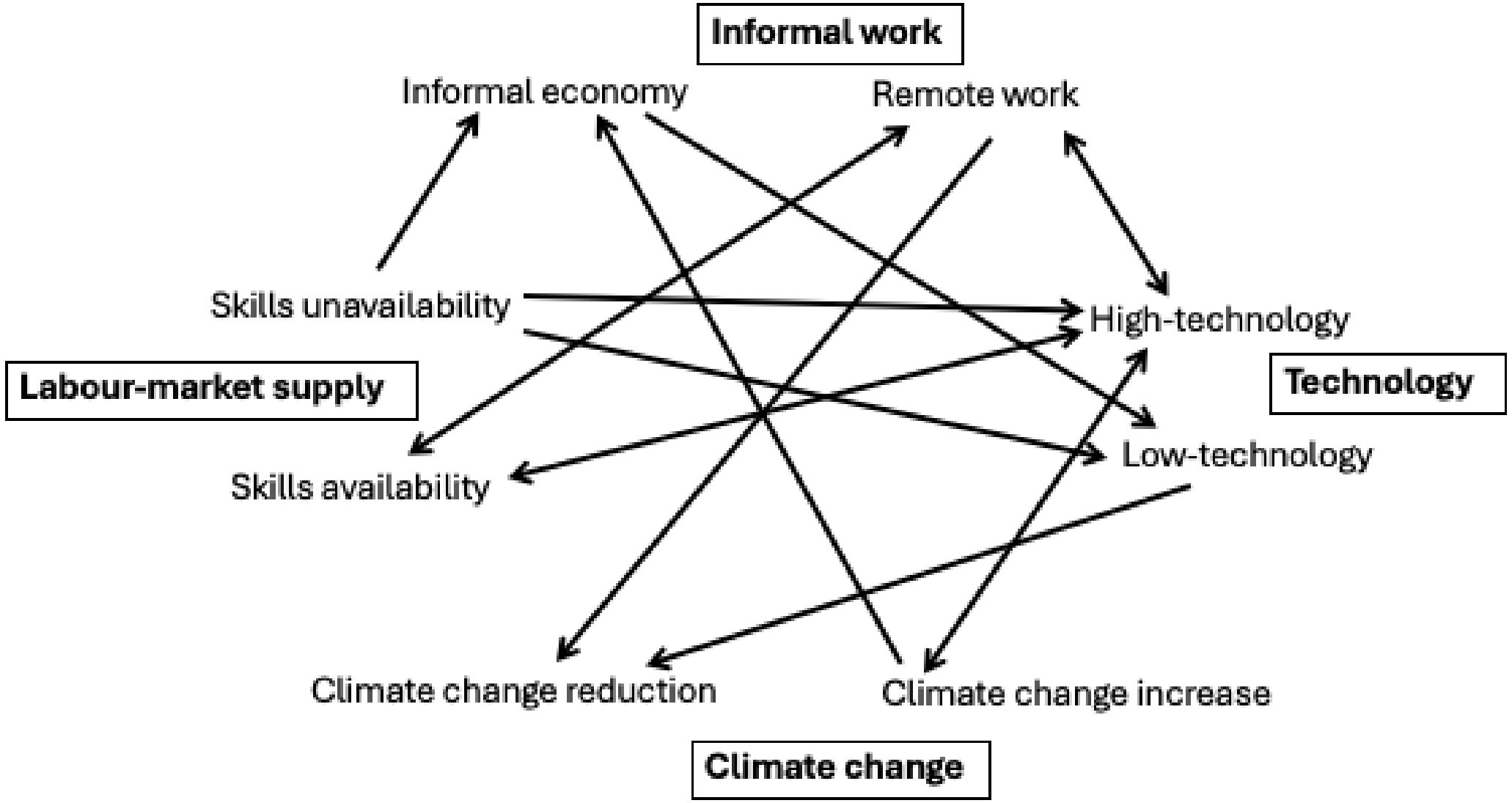
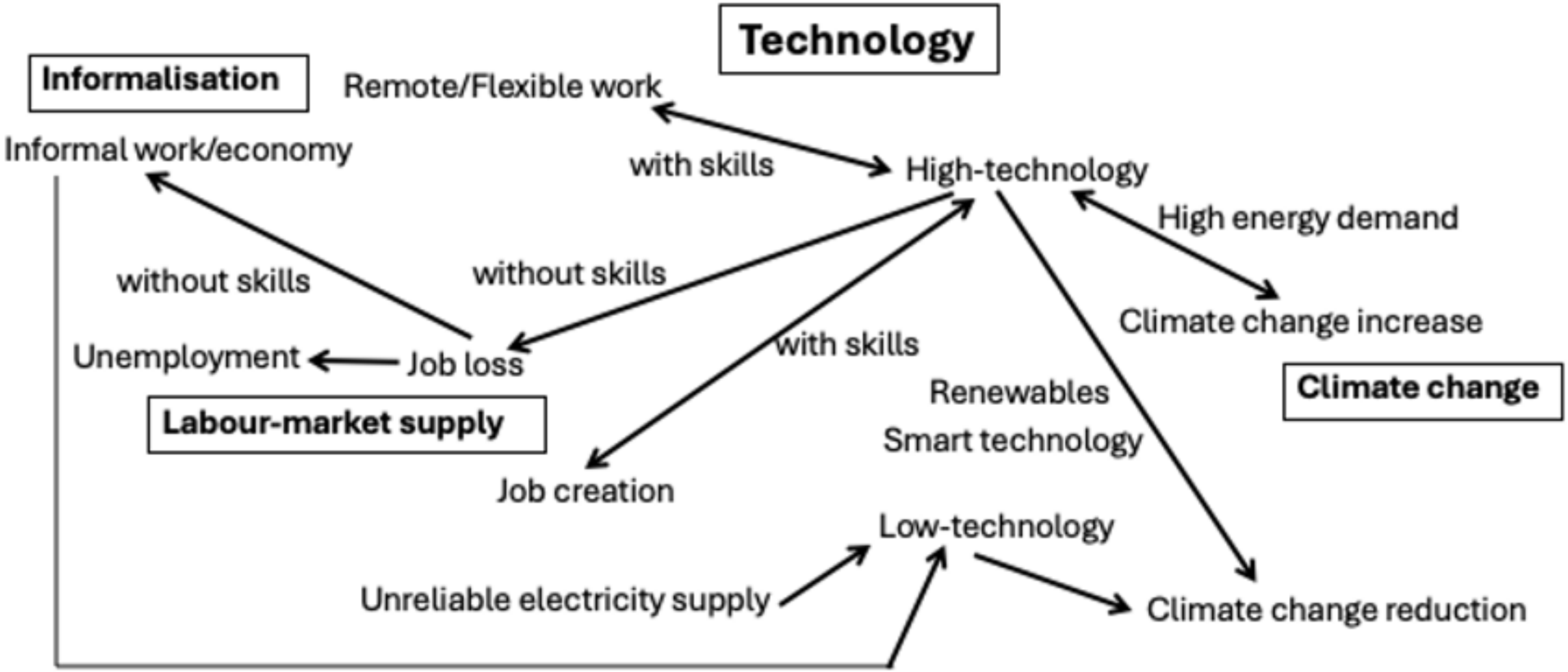
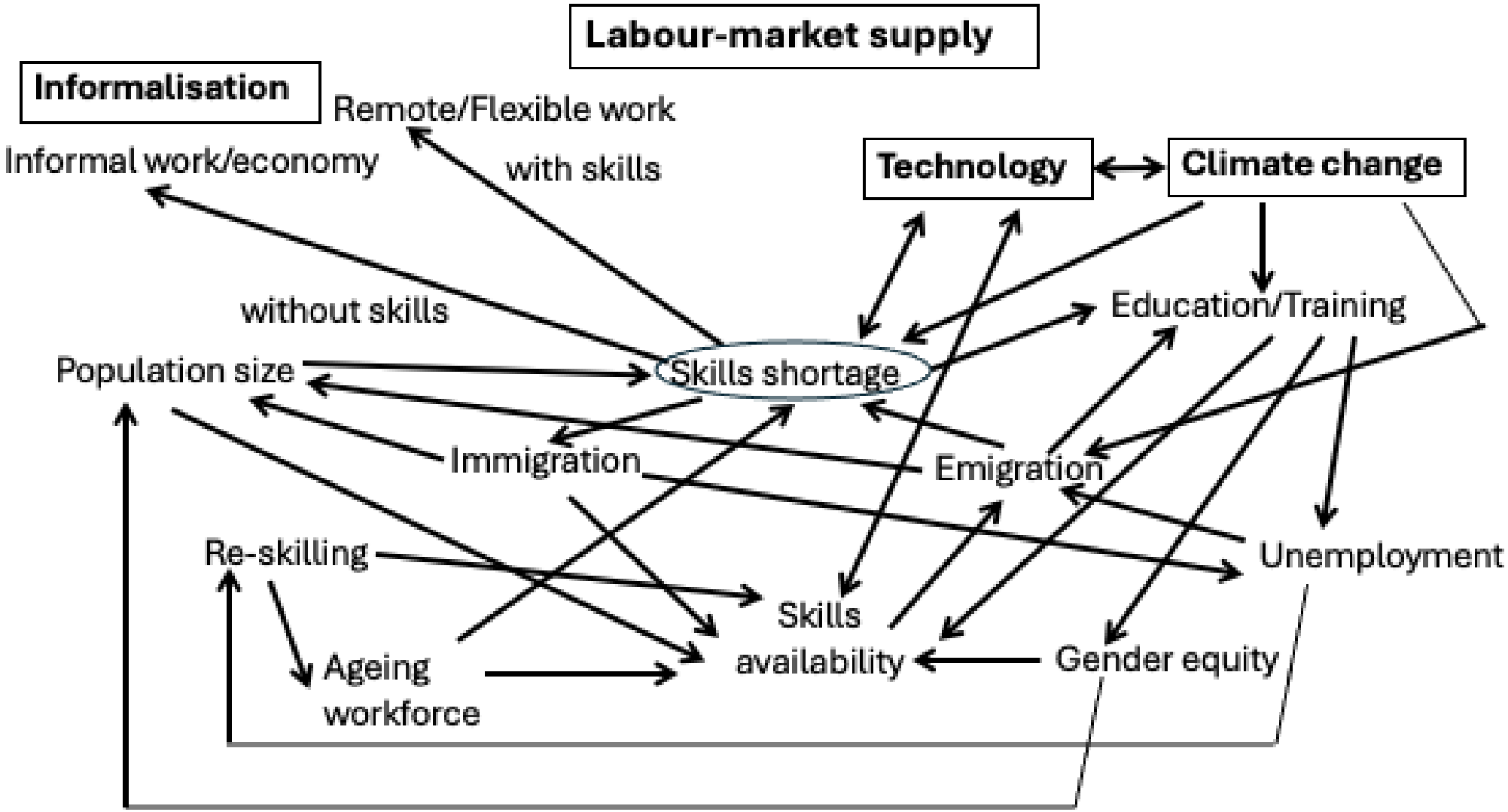
Megatrend	Aspects
Labour-market supply	- Gender (equalisation of opportunities) - Ageing (longer working life, healthcare requirements) - Migration (migratory patterns for best standard of living) - Skills availability (unequal distribution of skills)
Technology	- Artificial intelligence - Automation/Autonomy/Robotics - Big data/supercomputing - Biotechnology/Nanotechnology
Informalisation	- Casualisation of work - Lack of formal job opportunities - Increase in remote/flexible work
Climate change	- Work under extreme conditions - Disaster preparedness - Mitigation of climate change - Mitigation of other resource limitations

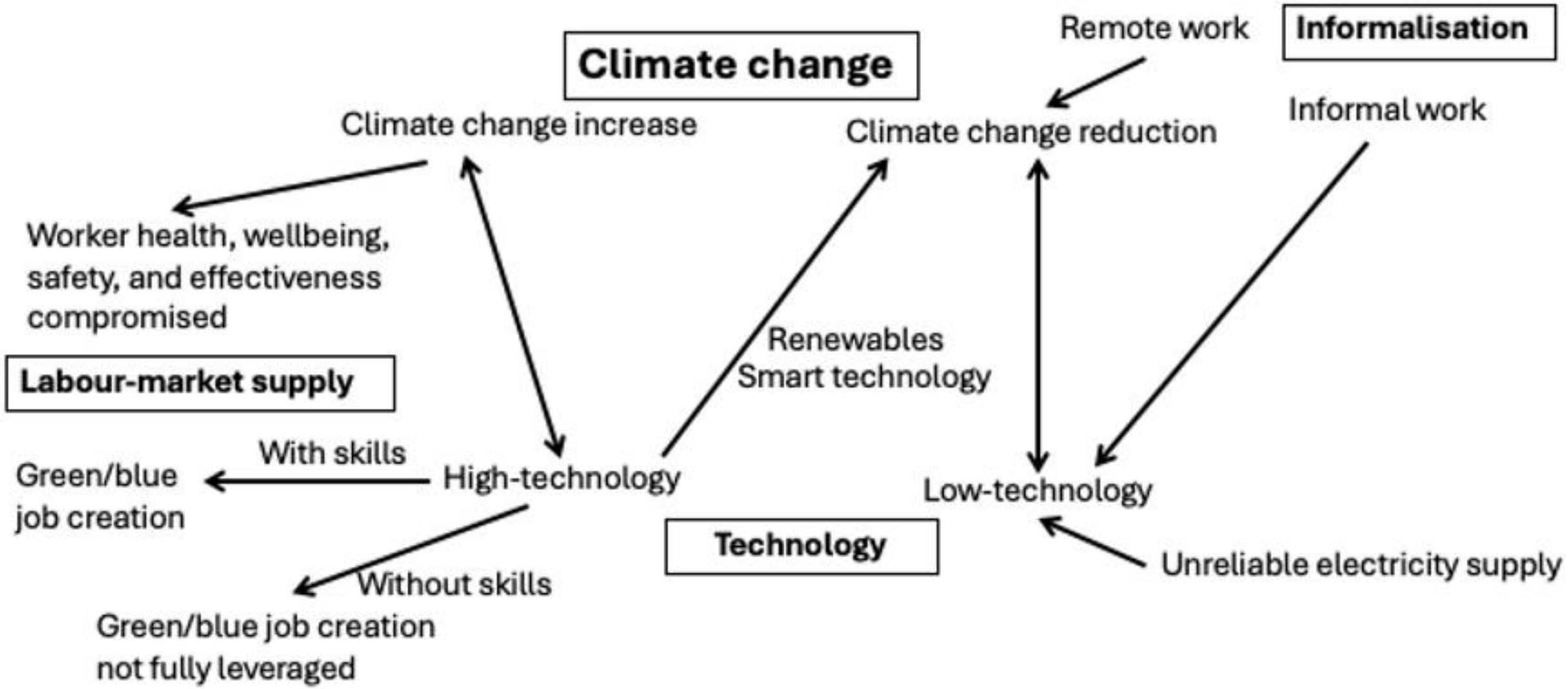
Lessons learned

- **Numerous similarities**: migration; skills shortages; reliance on technology (AI, automation, robotics) to design our way out of problems
- **Different causes:** similarities in solutions are often illusions because causes are different; impacts on people vary
- **Issues are interrelated:** immigration/emigration; geographically skill demands do not match skill supply; countries work in isolation to solve their domestic issues first


Informal work
Informal economy
Remote work
Skills unavailability
High-technology
Labour-market supply
Technology
Low-technology
Skills availability
Climate change reduction
Climate change increase
Climate change

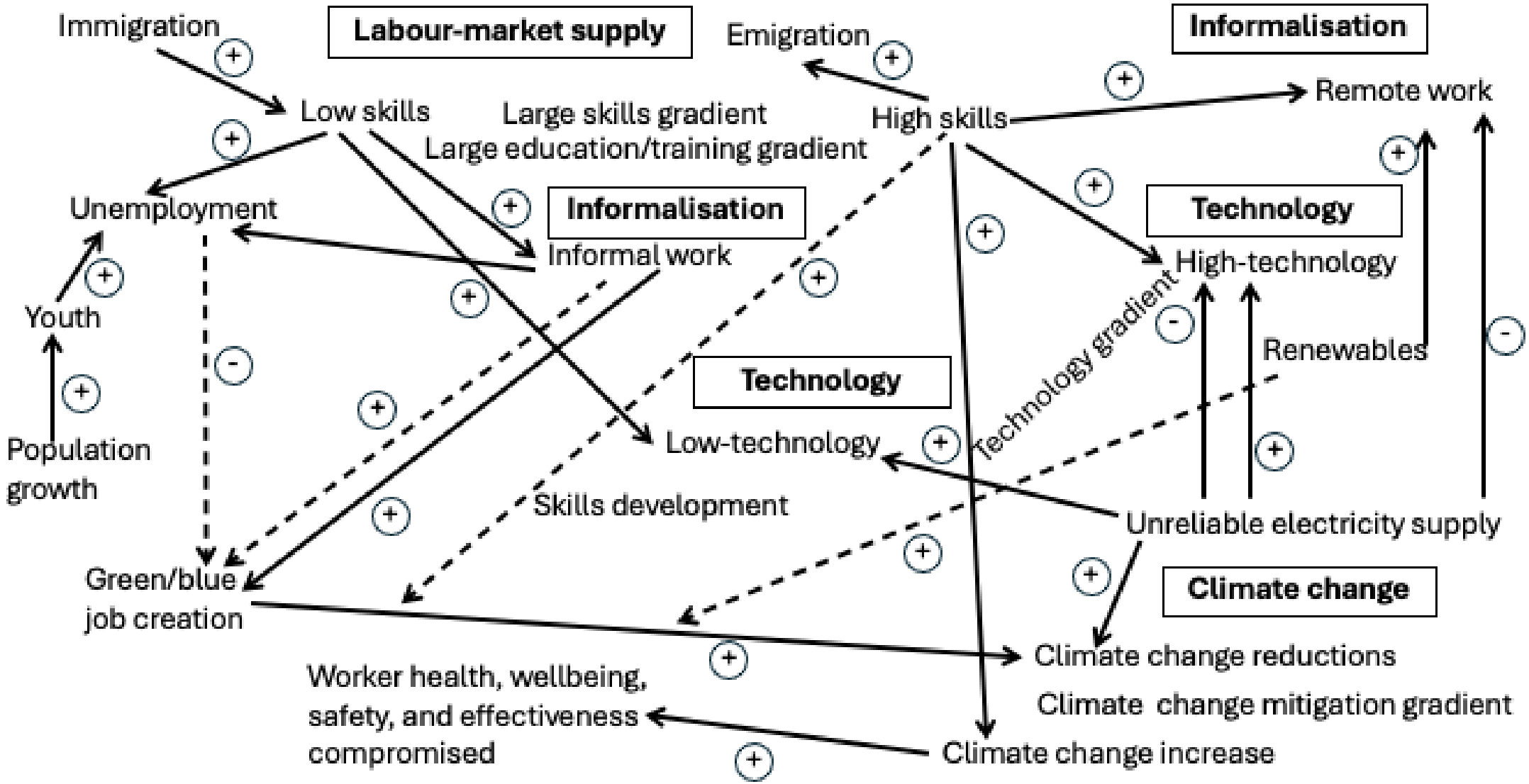

Technology
Informalisation
Remote/Flexible work
Informal work/economy
with skills
High-technology
High energy demand
without skills
without skills
Climate change increase
with skills
Unemployment
Job loss
Climate change
Renewables
Labour-market supply
Smart technology
Job creation
Low-technology
Unreliable electricity supply
Climate change reduction


Labour-market supply
Informalisation
Remote/Flexible work
with skills
Informal work/economy
Technology
Climate change
Education/Training
without skills
Population size
Skills shortage
Immigration
Emigration
Re-skilling
Unemployment
Skills
availability
Gender equity
Ageing
workforce


Climate change
Climate change increase
Climate change reduction
Remote work
Informalisation
Informal work
Worker health, wellbeing, safety, and effectiveness compromised
Labour-market supply
Renewables
Smart technology
With skills
Green/blue job creation
High-technology
Low-technology
Technology
Without skills
Green/blue job creation not fully leveraged
Unreliable electricity supply

Mexico's situation

- Growing population (0.7%)
- Higher emigration than immigration (-0.7%)
- High rate of obesity (29%)
- Low rate of elderly in the workforce (8%)
- Low proportion of women in employment (47%)
- High proportion of informal work (56%+)
- Low proportion of low carbon energy production (10%)


Immigration
Labour-market supply
Emigration
Informalisation
Low skills
Large skills gradient
Large education/training gradient
High skills
Remote work
Unemployment
Informalisation
Informal work
Technology
High-technology
Youth
Technology gradient
Renewables
Population growth
Technology
Low-technology
Skills development
Unreliable electricity supply
Green/blue job creation
Climate change
Climate change reductions
Climate change mitigation gradient
Worker health, wellbeing, safety, and effectiveness compromised
Climate change increase

E/HF considerations

Labour-market supply	Technology	Informalisation	Climate change
• Skills development initiatives • Workplace accommodations • Work schedule design • Supportive technology • Cultural integration • Decent work E/HF across supply chains • Cross-cultural considerations in system design	• Preventing harm to humans • Improving lived experience • Reducing work intensification • Making smart technology transparent • Inserting E/HF early in design process • Human-technology teaming • Telehealth systems • Function allocation (especially for decision making and responsibility)	• Low-cost solutions • Remote-working and collaborative tools • Managing remote work • E/HF at a distance • E/HF for multiple job-holders • Psychosocial risks of remote work • Labour protections for all informal work • Design of activity-based work	• Work under heat conditions • UV exposure • Work in extreme events • Disaster preparedness • Early warning systems • Organisational contingency plans • Climate change communication • Design work for resource efficiency • Design for recycling, re-use, and disposal • Design green jobs

Final considerations

- Taking a systems approach is a tool to understanding your own context, it is not an answer for all situations
- Current system diagrammes too complex; consider CLDs
- Which future? (5, 10, 15, 20, 50 years)
- Problems with prediction (timing, content, and “black swan” events)
- Systems thinking is a tool, it isn’t the answer. Depends on who is involved in deriving and analysing the data.
- Requires values-driven science, not finance-driven science

Some useful IEA links:

- NewsBriefs (subscribe on the IEA website: https://iea.cc)
- IEA publications (incl. HFE in a Nutshell series: https://iea.cc/publication/)
- IEA LinkedIn group (https://www.linkedin.com/groups/1114517/)
- IEA FaceBook group (https://www.facebook.com/InternationalErgonomicsAssociation)
- IEA YouTube channel (https://www.youtube.com/@iea-internationalergonomic9925)

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