



# Future of Robotics With 6G Connected Intelligence

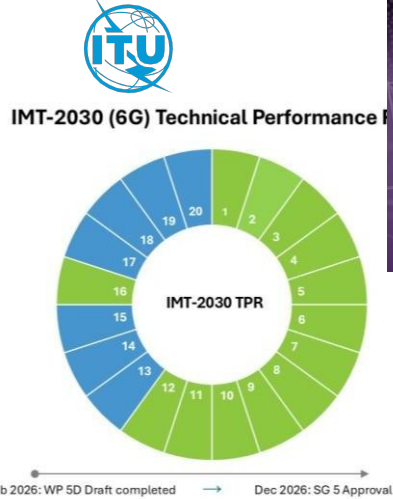
Javan Erfanian  
Veezhen Consulting  
Chair, 6G Architecture WG - one6G

July 15, 2026

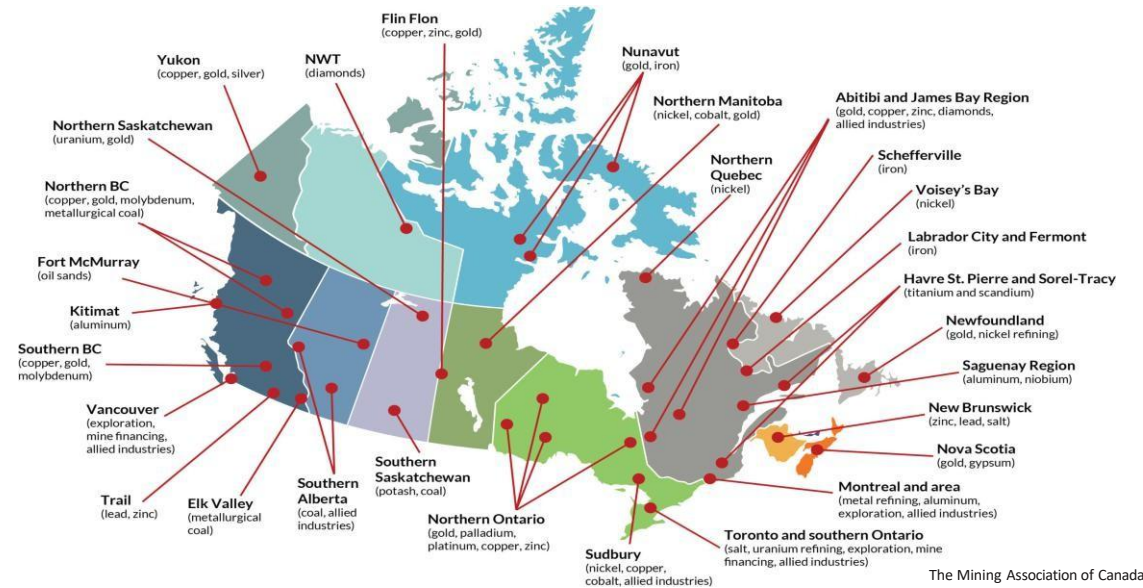


O. Khodeli et al. "Satellite communications  
in the new space era – a survey and future  
challenges" 2020 (Simplified)

# one6G – Sample of related activities



# Motivation – Case Study



A view of mining industry strengths and locations distributed across Canada

- Need for ubiquitous connectivity and reliable coverage
- Competitive digitization and intelligent autonomous operation with enhanced productivity
- Safety, predictive anomaly prevention and resilience, environmental sustainability
- Man-machine interaction & cooperation/augmentation, autonomous vehicles, and teleoperation
- Simplified, modular, flexible / scalable, and efficient solutions and dedicated communication networks

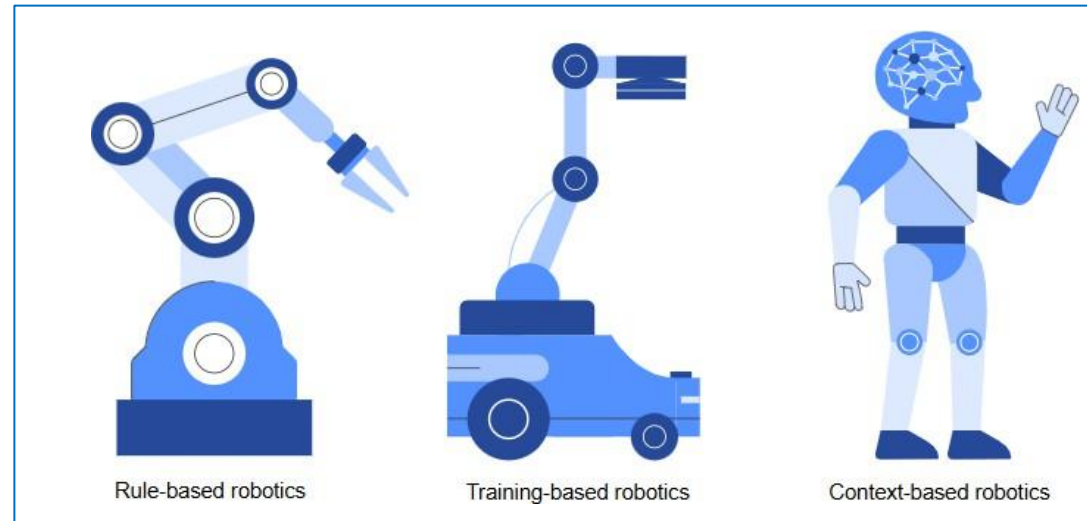
# Industrial Automation & Robotics

Evolution

Use cases

Requirements

Trends



(Source: World Economic Forum)

Intelligence Sensing Mechanics/Senses/Control Energy Software Hardware others

Mobility Safety Productivity Efficiency / Sustainability Modularity ...

# Autonomous Cognition, Learning, and Collaboration

AI-Enabled towards AI-Native & AGI

Generative / Agentic / Physical

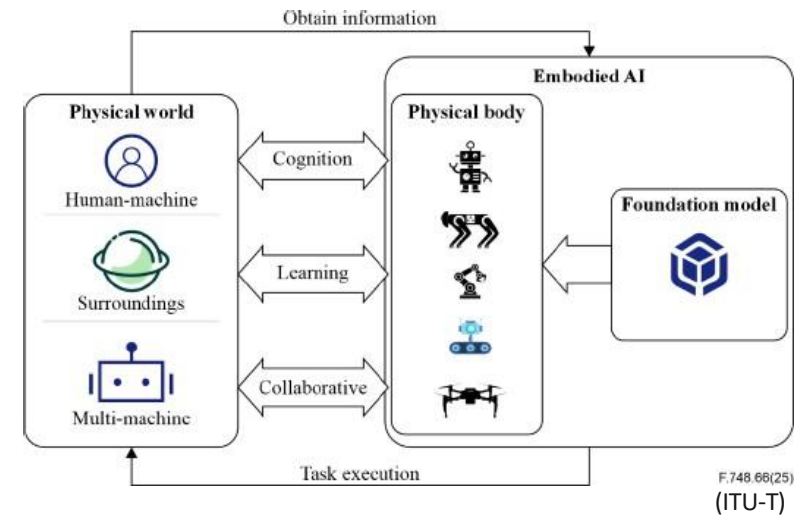
Sensing & Perception  
Cognition & Reasoning / Comprehension  
Competence, Decision-Making &  
Actuation / Execution

Interaction / Communication /  
Collaboration

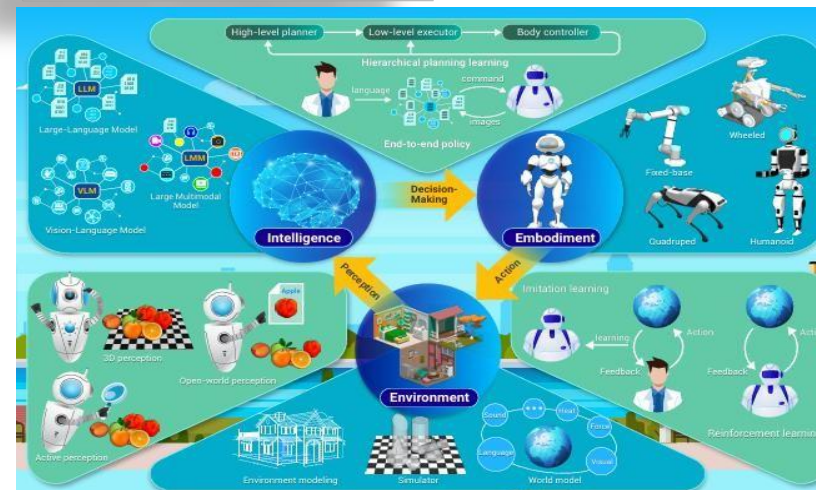
Self-learning

Embedded Governance

AGI – Artificial General Intelligence



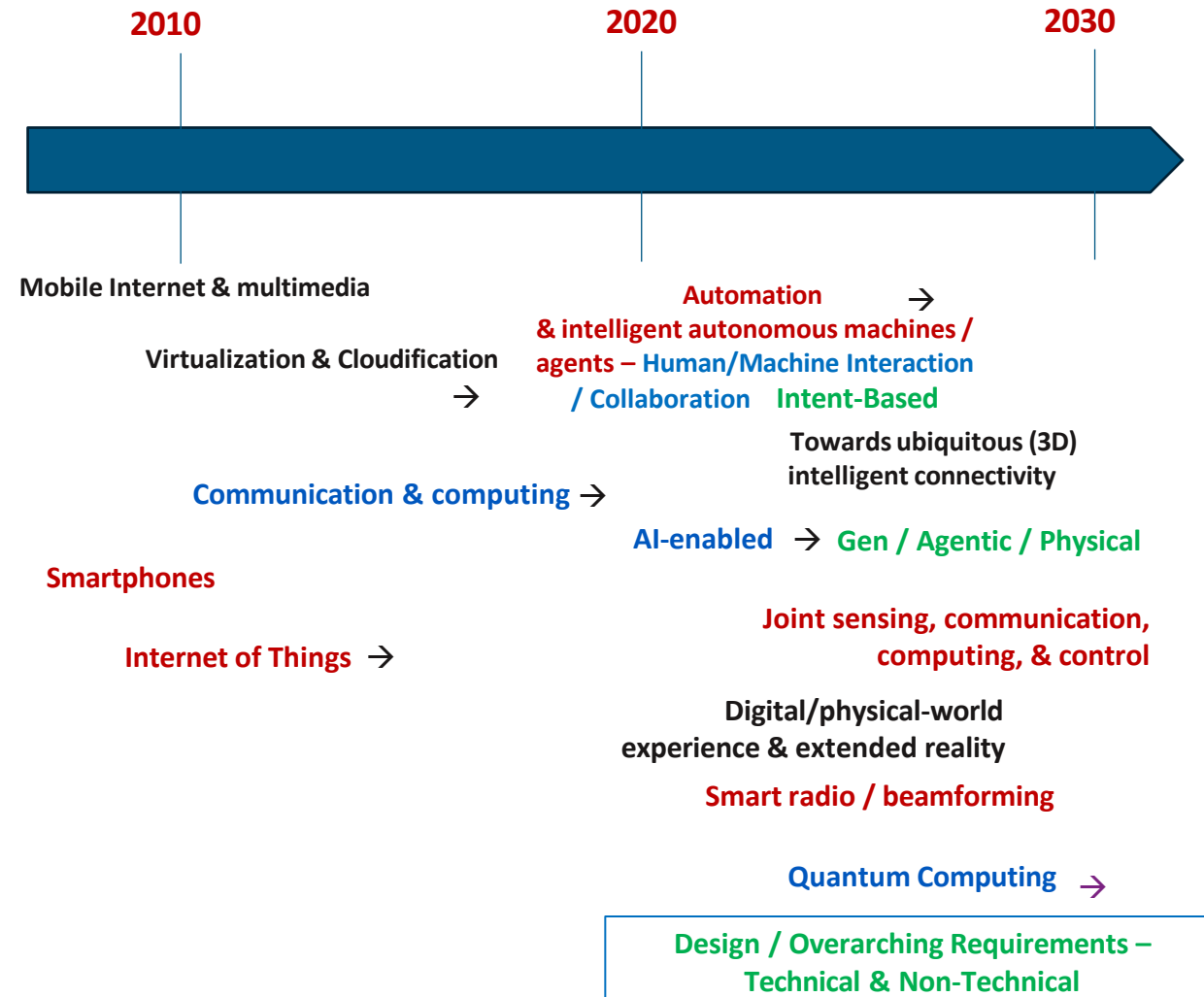
Embodied Intelligence



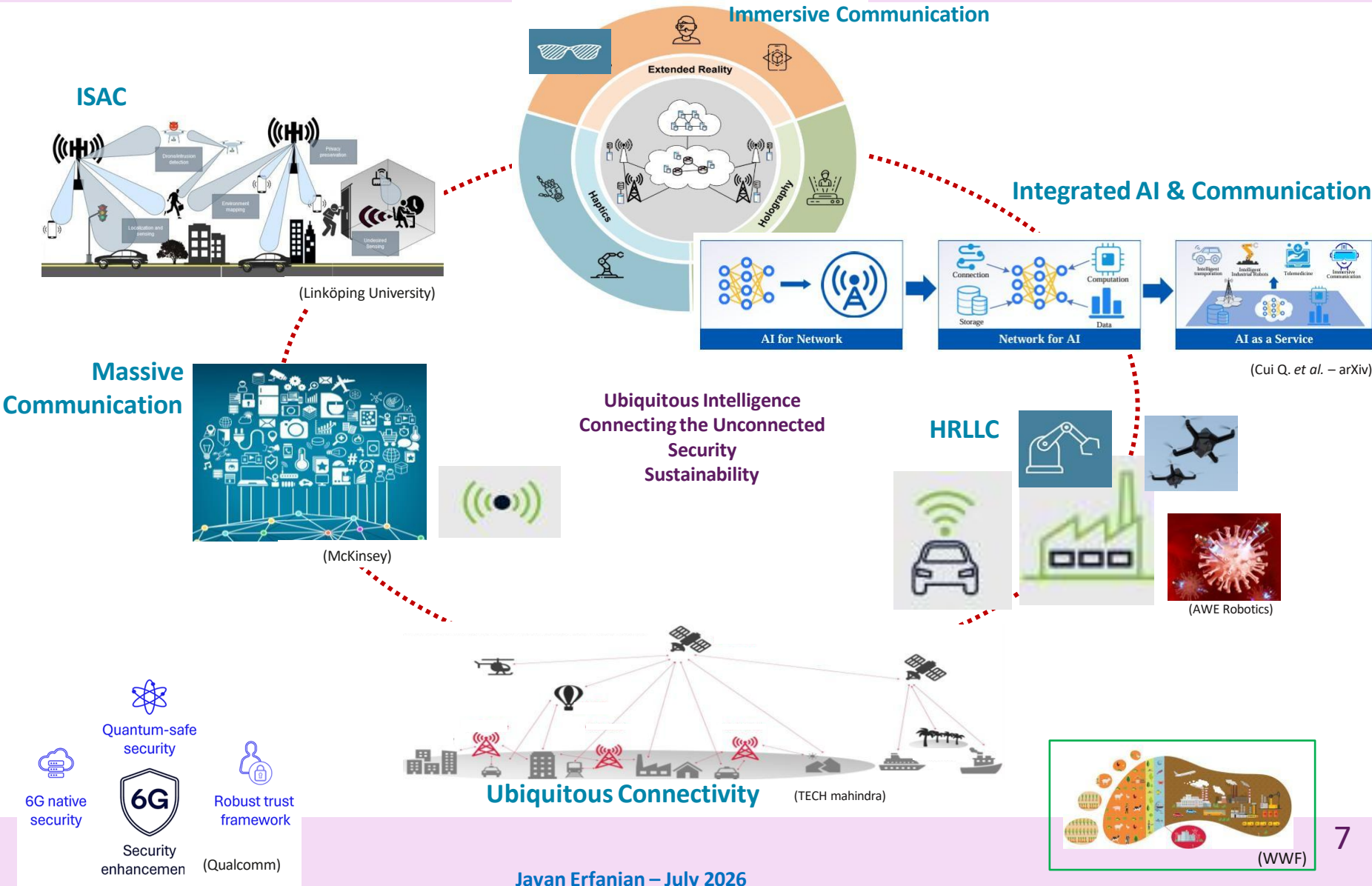
An Z., Yu X., Wang C., et al. (2025). Embodied intelligence: Recent advances and future perspectives. The Innovation Informatics

# Intelligent Mobile Communication Journey

## Man-Machine & Machine-To-Machine Communication & Collaboration



# Expected 6G Usage Scenarios



# Intelligent Mobile Communication Journey

## Expected / Required Targets!

**INCLUSIVE & RESPONSIBLE DIGITAL INTELLIGENCE SOCIOECONOMIC TRANSFORMATION**

**Societal, Economic, and Environmental Sustainability**

**Machine/Agent-Type Communication – Human/Machine/Environment Interaction**  
**Contextual/Adaptive and Service-aware**

**INTENT-BASED**

**Multi-Agent Cross-Layer Orchestration - Multimodal Collaborative Computing**  
**Sensing Semantics Knowledge - Self-learning/optimizing/organizing**

**Ubiquitous intelligence, data, and embedded governance across layers – Infrastructure!**

**Research & Innovations**  
**Cultural/Operational Models**

**Alliances & SDOs**  
**Governance**

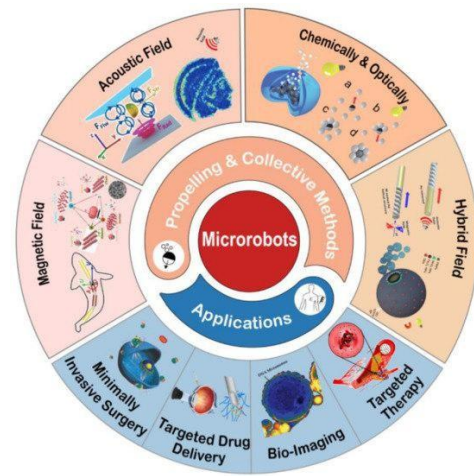
**Technologies**  
**Global Ecosystem & Collaborations**

**Standardization**

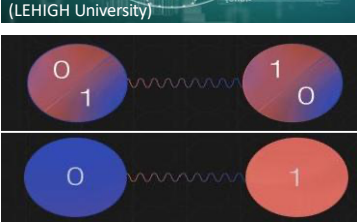
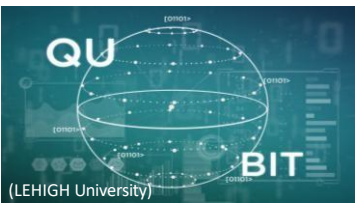
# Harnessing new frontiers and building new paradigms!



(UN Climate Action)



(Denver South)

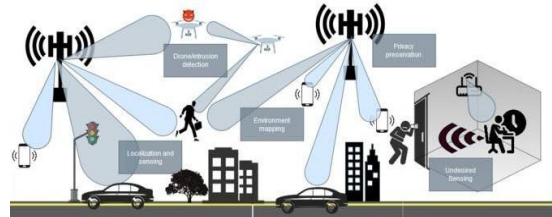


NIST

Wu, R.; Zhu, Y.; Cai, X.; Wu, S.; Xu, L.; Yu, T. Recent Process in Microrobots: From Propulsion to Swarming for Biomedical Applications. *Micromachines* **2022**, *13*, 1473. <https://doi.org/10.3390/mi13091473>



(LG ur)

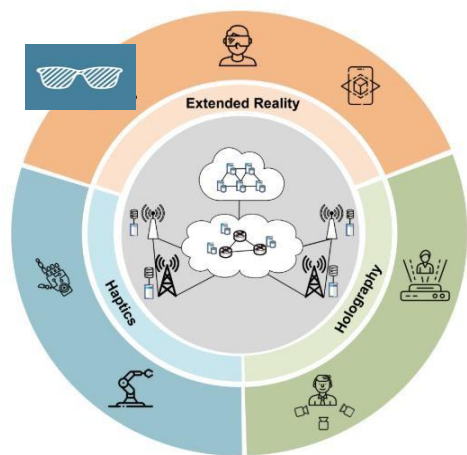


(Linköping University)



(IEEE – Liu et al)

# Harnessing new frontiers and building new paradigms!



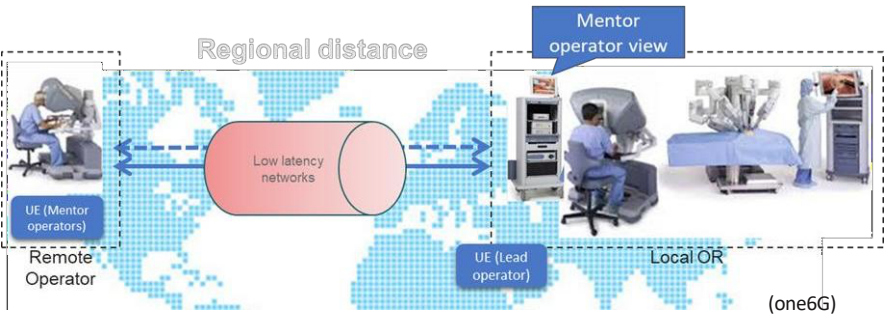
(X.Shen et.al, frontiers)



(Next-G Alliance)

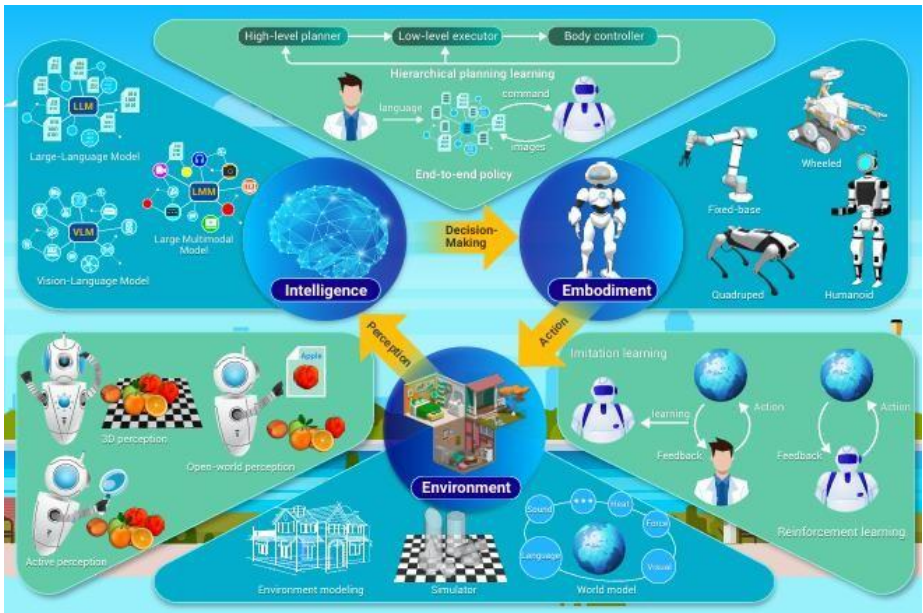


(5G Americas)



(Siemens)

(Huawei)



An Z., Yu X., Wang C., et al. (2025). Embodied intelligence: Recent advances and future perspectives. The Innovation Informatics

# Digital Intelligence Socio-economic Transformation

## Fueling Industrial Development and Adoption



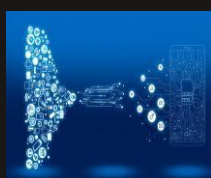
Embodied Intelligence  
Services

Smart Terminal  
Services

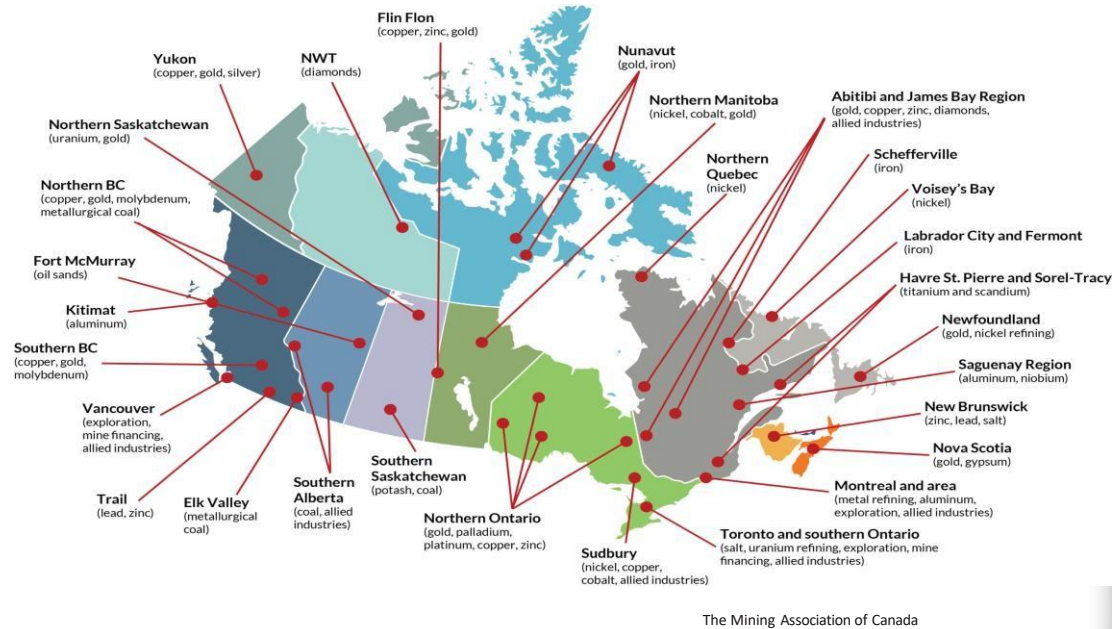
Multi-agent  
Collaboration Services

Space-Air-Ground  
Integrated Services

Intelligent Production  
Services



# Case Study - Revisited



## Success factors

- Simplified modular and efficient/sustainable solutions towards productivity and new opportunities
- Work with and for humans
- Governance – Safety, security, ethics, accountability
- Others

Intelligent and autonomous connectivity  
IoT & fleet management

Mobility & teleoperation  
Security & resilience  
Safe interaction, hazard detection & prevention, emergency response

New use cases & augmentation

Integrated sensing – tracking, localization, mapping, gesture recognition, pick & place / grasping

Collaborative computing  
Immersive interaction, digital twins  
Resource and waste management

Others

# Convergence of Many Fields



...

# Save The Date!





Thank you!