TIC vertes et responsables, un accélérateur de transformations, ensemble avec les sciences des données et l'IA

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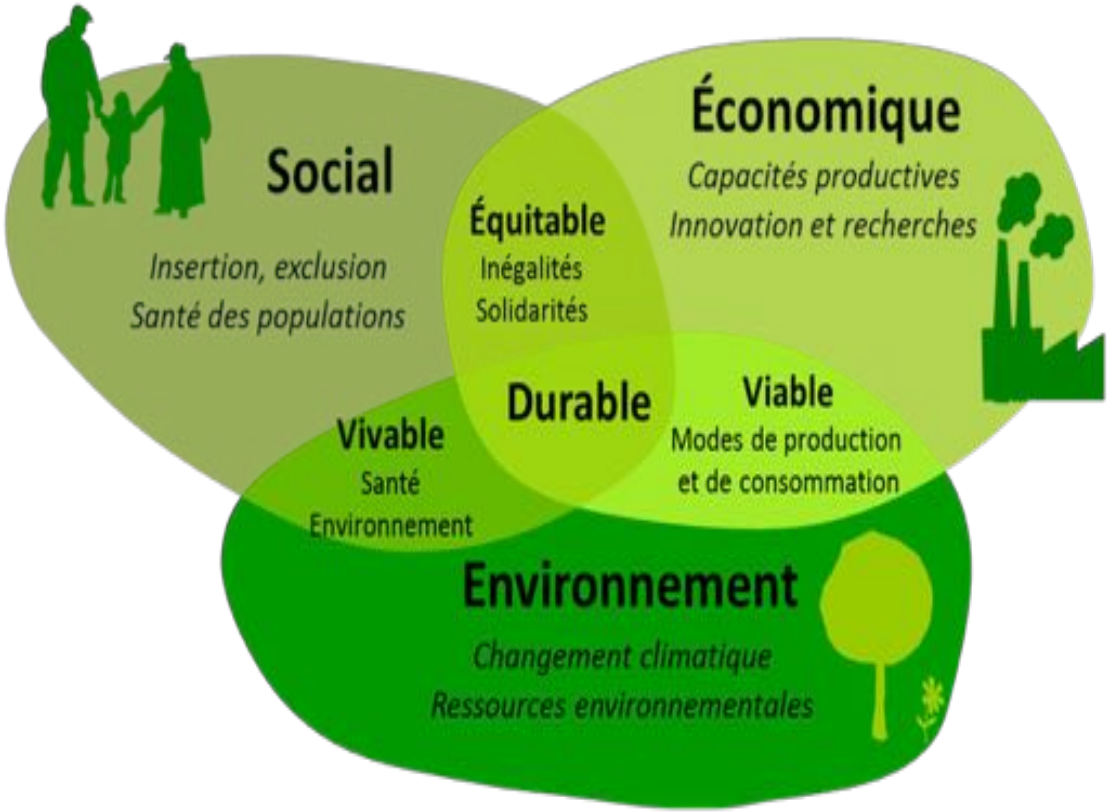
en opérationnalisation du développement durable

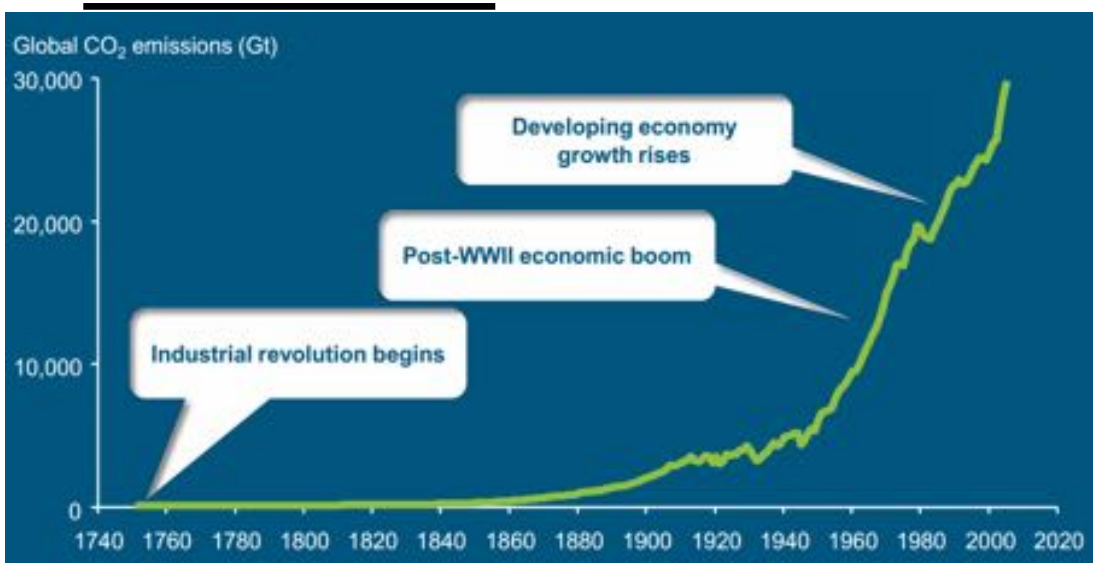
OUTLINE

1. Sustainability Challenges
2. Sustainability through/by ICT
3. ICT & SDGs : “Digital with Purpose”
4. ICT & Behavioral Change
5. ICT & Policies
6. ICT & Standards
7. Uses cases

Sustainability Challenges



GHG emissions & Resource extraction

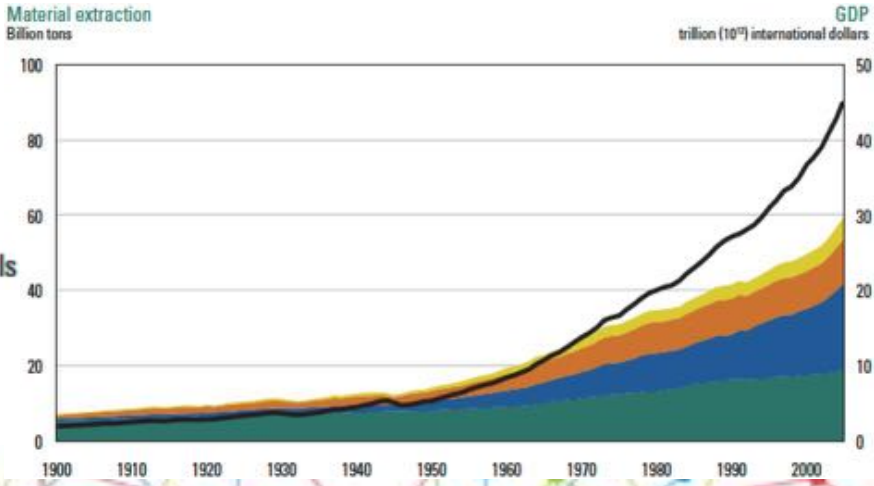


GeSI SMARTer 2020 – Keynote presented in ICT4S 2014

- Consequences
  - Temperature changes
  - Weather pattern shifts
  - Ice sheet melting
  - Rainforest dieback
  - Acidification of oceans
  - Species extinction

- Increasing human activities combined with limited emissions abatement result in exponential emissions

- **Can we decouple GDP from resource extraction?**



Dr. L. Hilty UoZurich– Keynote presented in ICT4S 2014

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Role of green sustainable ICT research

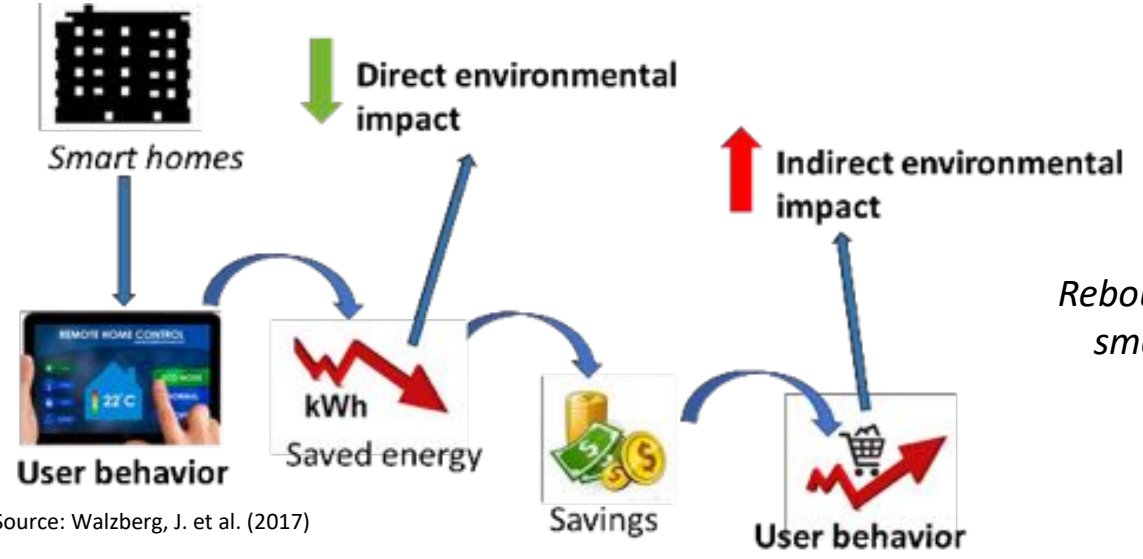
- **Decoupling is based on technological substitution**
  - ICT is a catalyst for substituting immaterial resources (information) for material resources
  - Research helps understand and improves the role of ICT in technological substitution

- **How can ICT contribute?**
  - Bring about direct efficiency gains
    - Measuring, monitoring, intelligent management and control, etc.
  - Help drive behavioural change
    - Provide reliable data to governments, industries, citizens about energy consumption / carbon emissions
    - Identify how much energy/resource is used and where
    - Enable comparative analyses: identification of common inefficiencies, best practices and opportunities

ICT ENVIRONMENTAL IMPACT

But ICT also causes environmental impact

- 2.3% of global GHG emissions
- Expected to enable a 20% reduction of global CO_2 in 2030
- May cause rebound effect (additional consumption due to resource savings from efficiency)



Rebound effect in smart homes

Source: Walzberg, J. et al. (2017)

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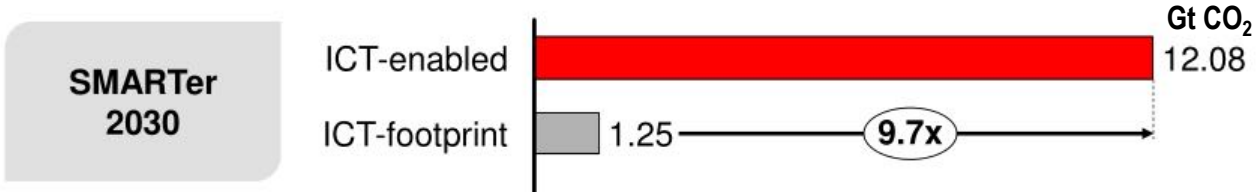
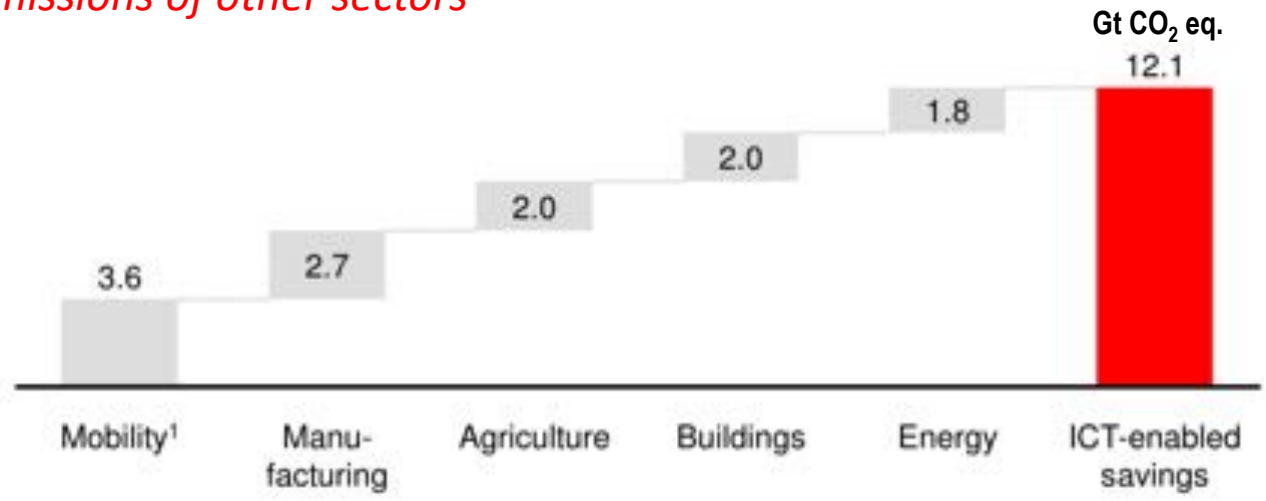
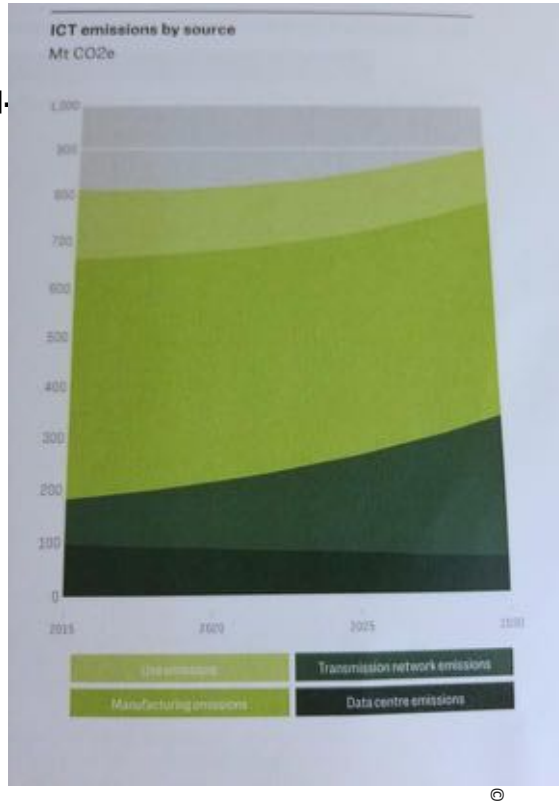
Emission reduction through ICT



«Smart» utilisation of ICT may mitigate its emissions by reducing emissions of other sectors





Source : GeSI Smarter2030 (2015 report)

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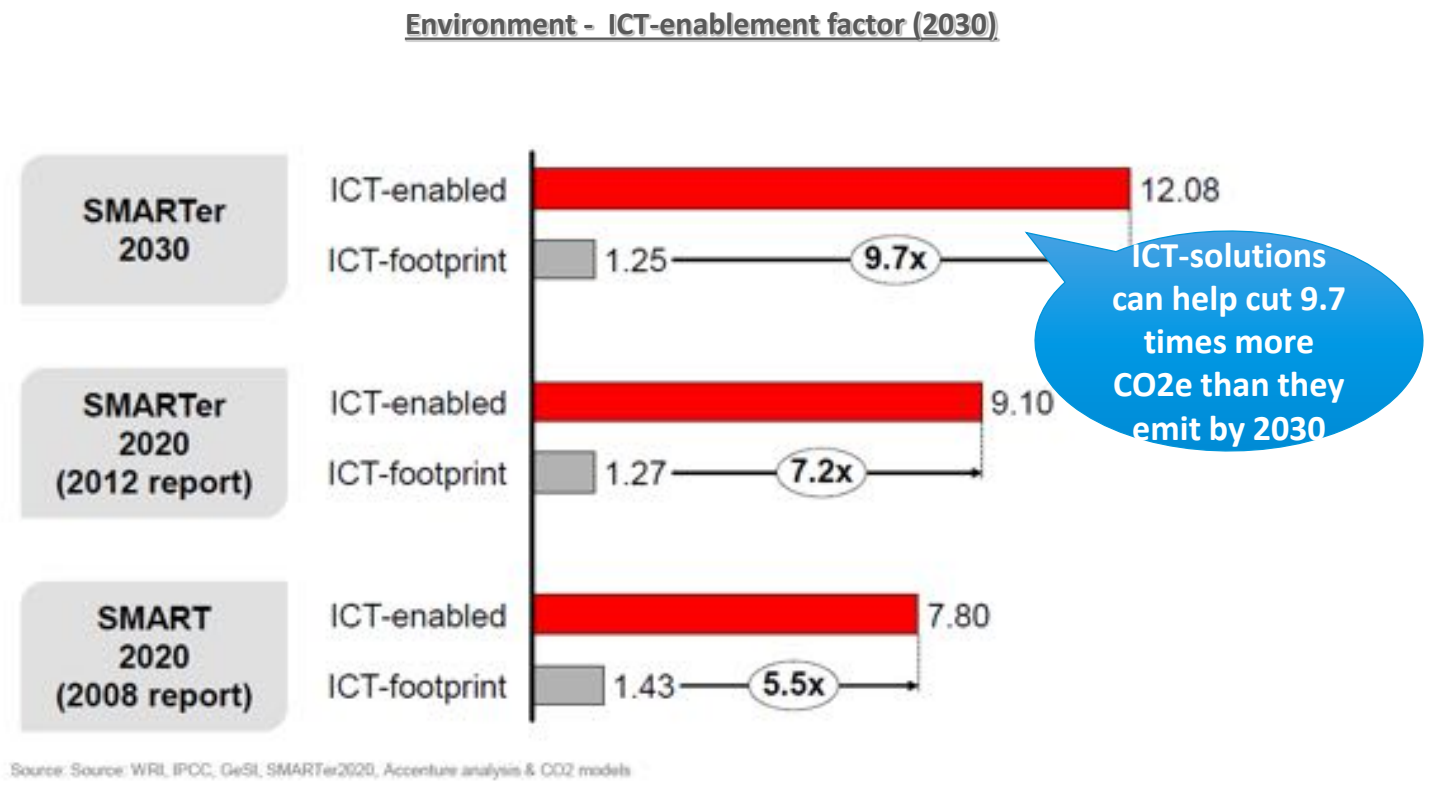
ICT ENABLING SAVINGS



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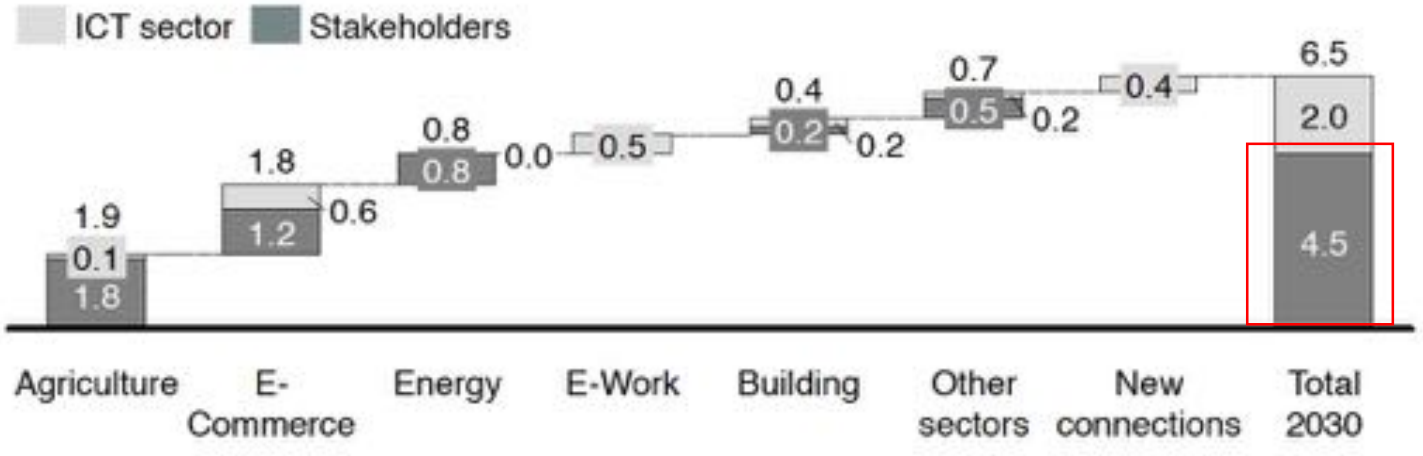
ICT ENABLES REVENUE OPPORTUNITIES

$4.5 trillion are enabled by ICT across eight sectors (2030)

Economic - ICT-enabled revenue opportunities across sectors (2030)



Référence: Smarter 2030 (http://gesi.org)

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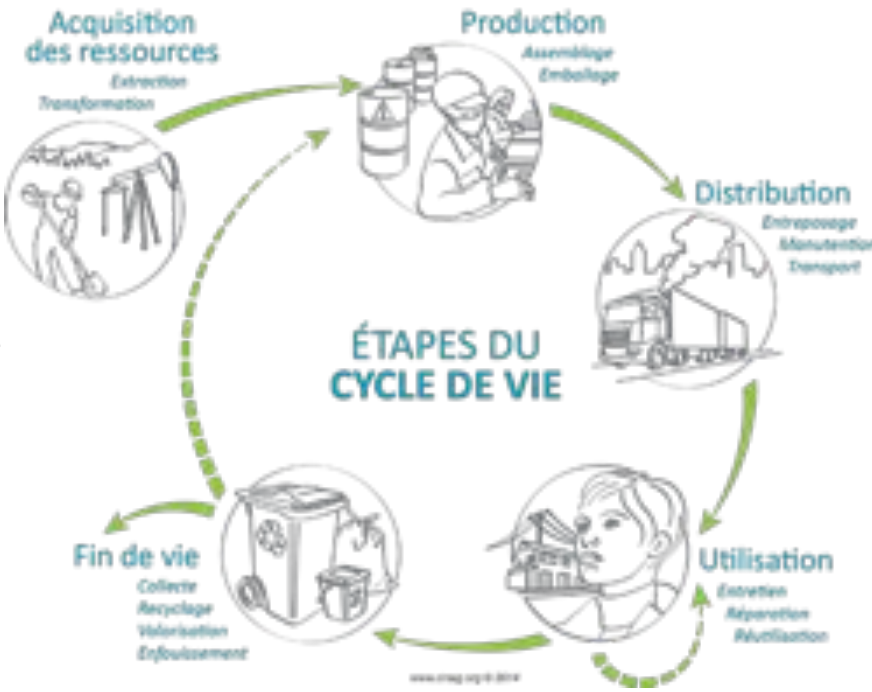
ICT & BEHAVIORS - ENVIRONMENTAL IMPACT

To what extent ICT may help reducing environmental impact?

- ICT could help reaching 130/169 of SDGs' targets
- We need metrics to quantitively assess environmental impact & benefits of ICT

Life cycle assessment (LCA) can provide some answers

- Assesses environmental impact along a product's life cycle & across different indicators
- Still limited to account for higher order effect (behavioral change, rebound effect…)



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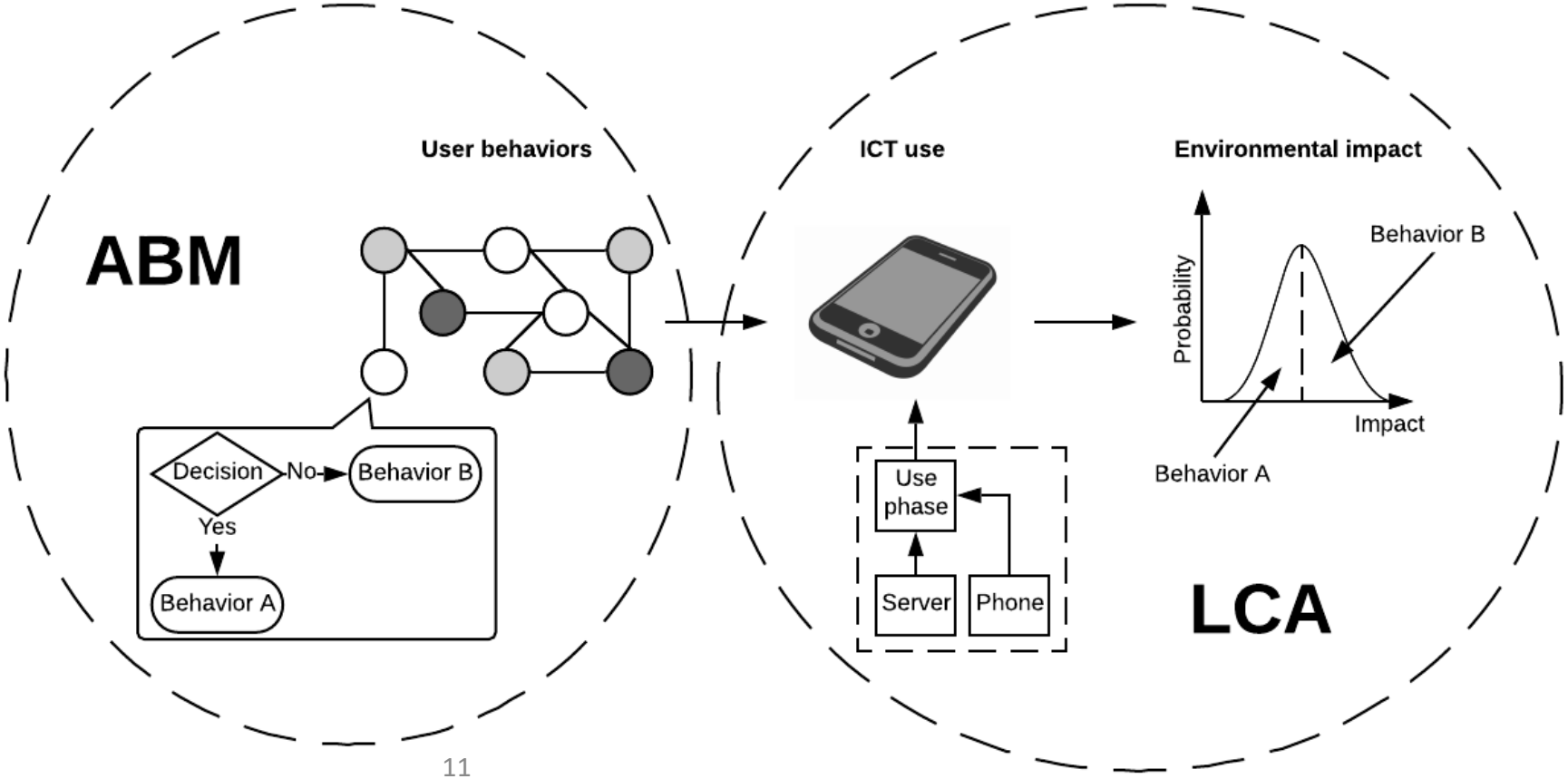
ICT & BEHAVIORS - **USE PHASE IN LCA**



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ICT & POLICIES

Sustainable development goal (SDG) 12, target 8:

> *"By 2030 ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature"*

ICT may help reaching that target through behavioral change → LCA may assess benefits of behavioral change

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ICT & POLICIES - NUDGING

One way ICT may change user behaviors is through nudging

- Nudging aims at influencing people's behaviors while preserving their freedom of choice
- Nudging is different from prescriptive and market-based policies

Most "everyday life" decisions:

- Prone to cognitive biases → thus, those decisions leads to sub-optimal outcomes (utility is not maximized)
- Nudging exploit or alleviate biases to restore an optimal outcome

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ICT & POLICIES - THE RISKS OF NUDGING

Privacy & autonomy issues:

- Many data on people's behavior and opinions may be necessary
- Requiring people to state their privacy preferences is already hindering on their privacy!
- Push of a decision rather than another is a form of coercion
- People's behaviors are already altered just by being watched (issue of privacy)

Other issues:

- Choice architect responsibility (must be conflicts of interest)
- Persistence

Cambridge analytica scandal: Mark Zuckerberg in front of the congress

Sources: Barton, A., Grüne-Yanoff, T., 2015; The Wll street journal

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IEEE SUSTAINABLEICT™

IEEE

Mission:
Build a holistic approach to sustainability through ICT by incorporating green metrics and design practices throughout IEEE technical domains.

Interactions among multiple IEEE societies and initiatives to implement energy-sustainable:

- Metrics
- Hardware design methods
- Energy-aware algorithms
- Power-proportional computing designs

Actions:

- Standards
- Conferences and events
- Publications
- Education

Deliveries:

- 9 standard proposals (approved in Nov 2016)
  - 3 new IEEE-SA working groups
- Green through ICT Summits (Paris,2017; Montreal, 2019)
- Publications:
  - IEEE Magazine "Sustainability and ICT"
  - IEEE Transactions on Green Communications and Networking
  - Courses and Webinars

Initiative Chairmen: Dr. Jaafar Elmirghani, Dr. Charles Despins and Dr. Thierry Klein

KEY TOOLS

ICT change our ways of: commuting, living at home, working…

- The effect of ICT on behaviors can be further harnessed through nudging

Studying nudges and behavioral change in LCA entails to represent the use phase accurately → ABM = suited tool: it represents individuals & their interactions

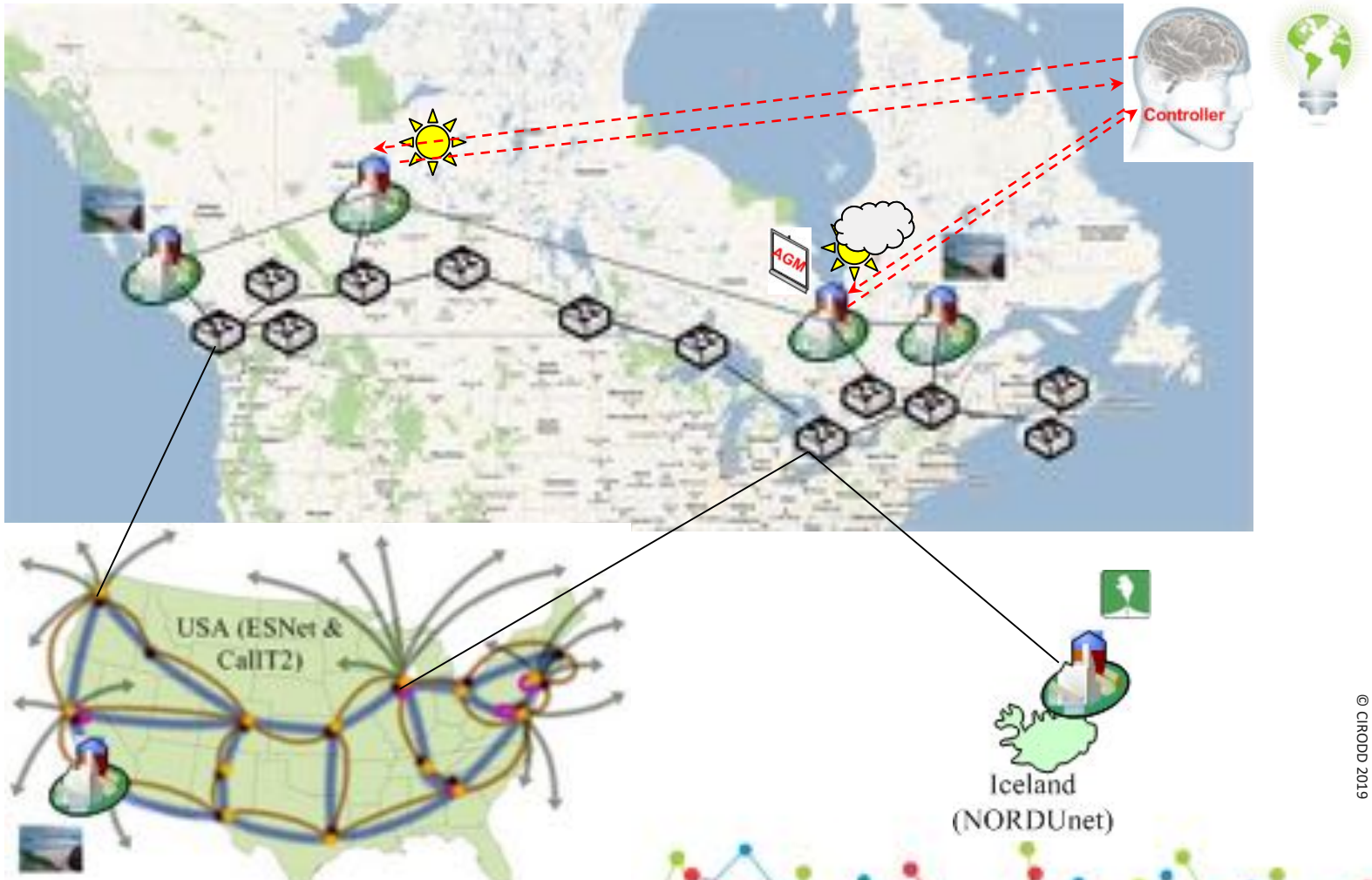
Nudging:

- Only one tool among policy-makers toolbox, sometimes incentives or regulations are more effective
- ICT allows personalizing nudges → increases their effectiveness
- Must be carefully designed to avoid autonomy & privacy issues

Combining ABM and LCA also allows to study an unwanted consequence of behavioral change: rebound effect

Development of standards is crucial.

Greenstar: Follow the sun, Follow the wind



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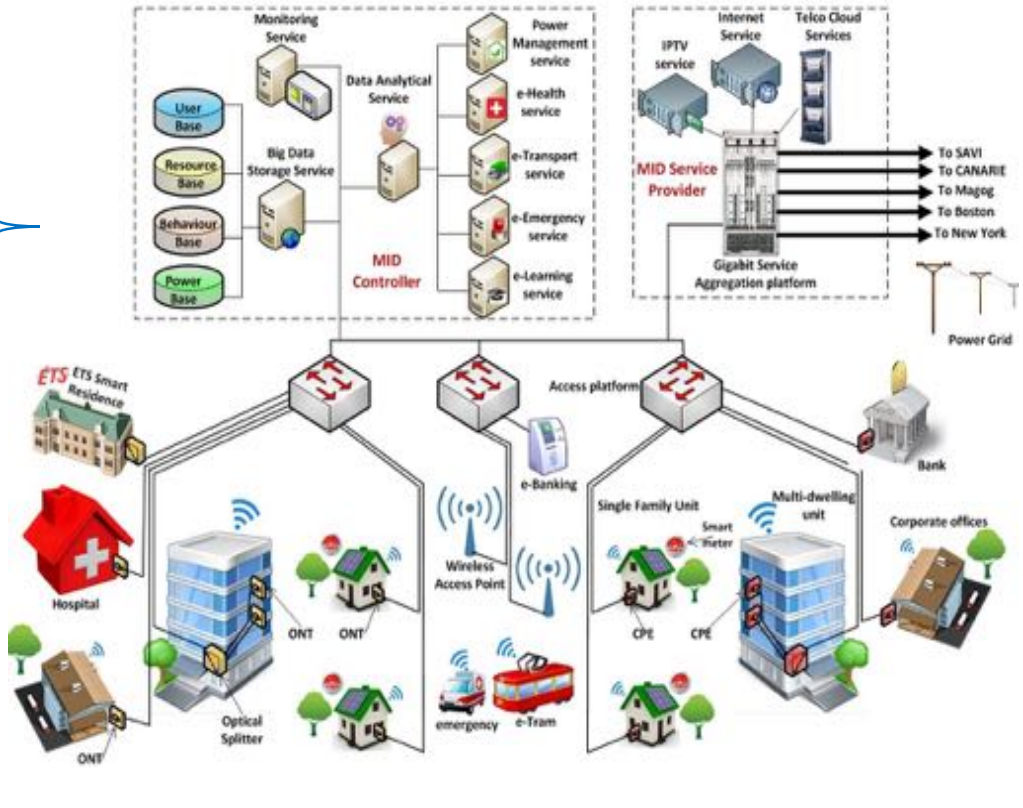
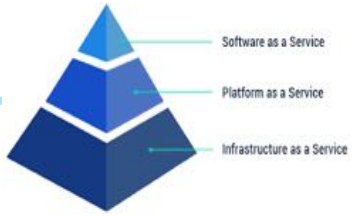
GREEN SUSTSAINABLE ICT

- Smart cities
- E-health
- E-banking
- Smart grid
- Smart building
- Smart mobilty





SERVICES

Big Data and Data Analytic

IOT

5G Connectivity

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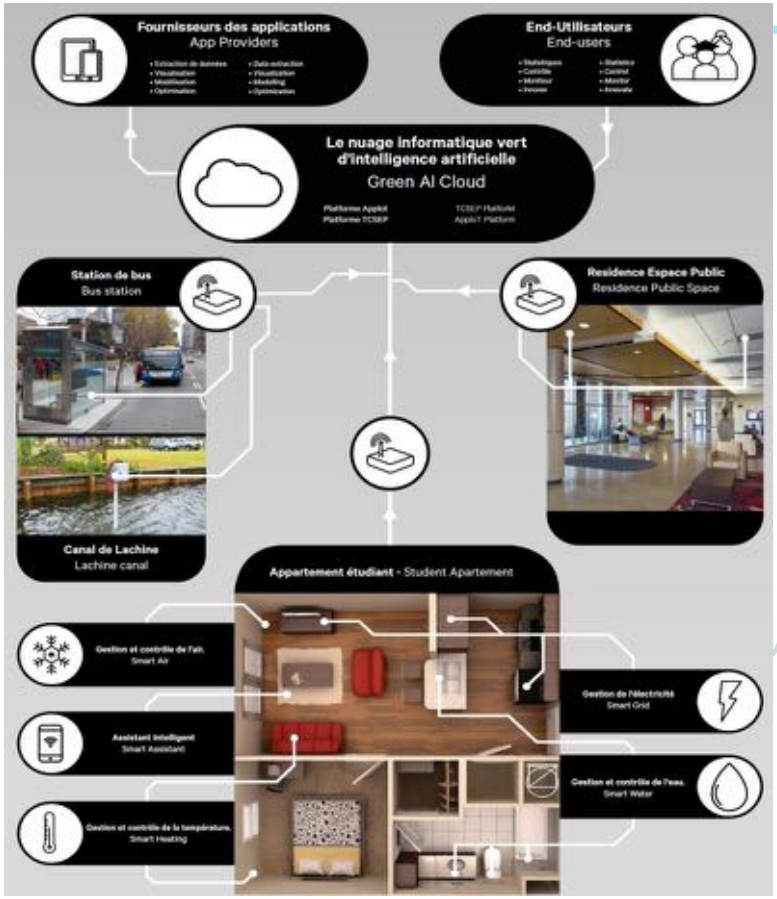
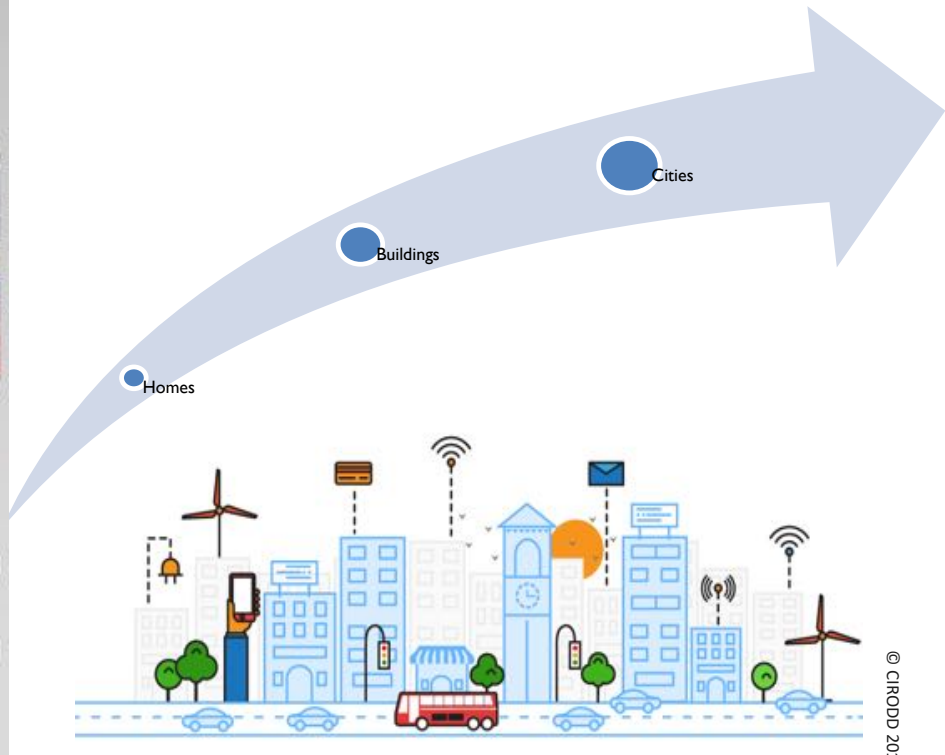
SMART CITIES





Mohamed Cheriet _ 11/2017

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Merci

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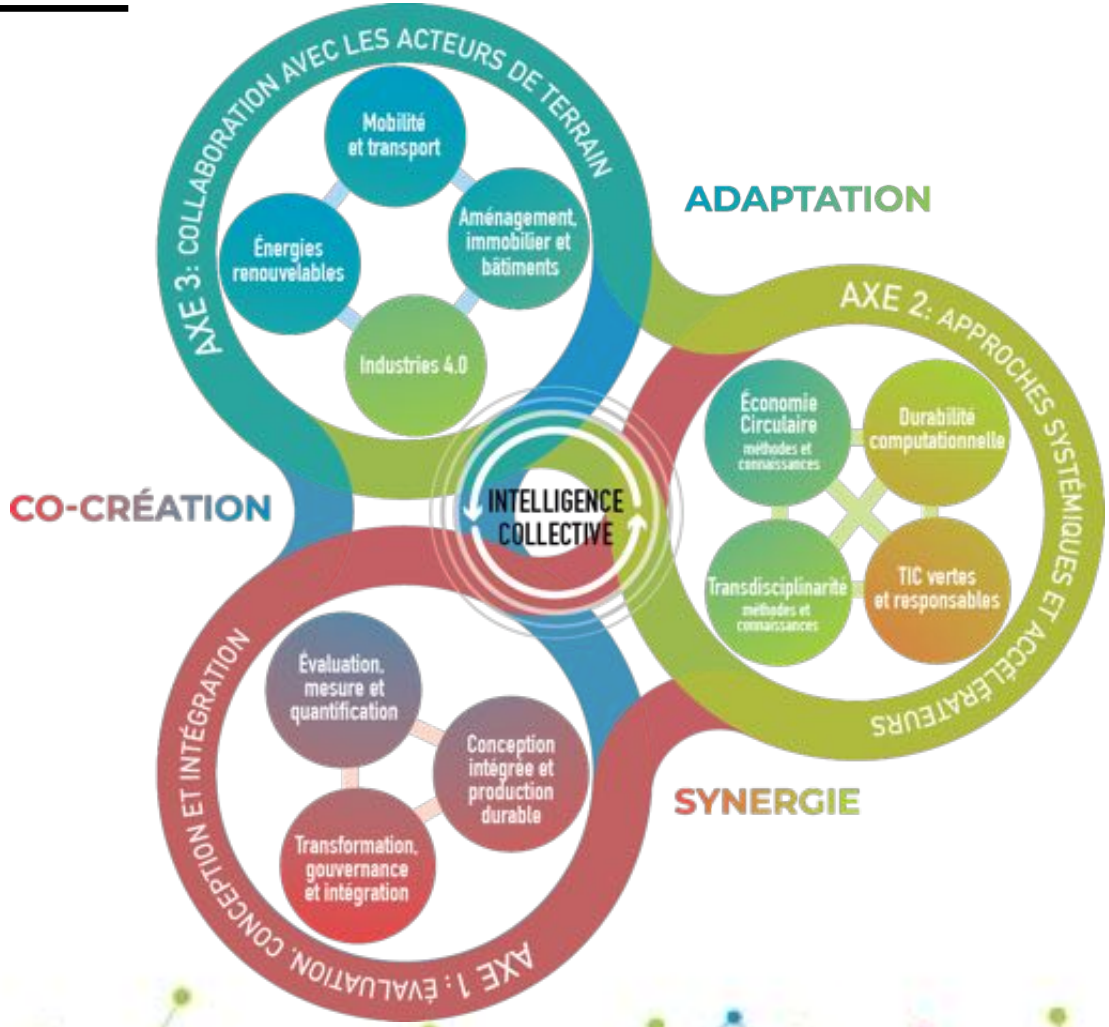
RETOUR VERS LE FUTUR
PROGRAMMATION SCIENTIFIQUE



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