Excellence in Higher Education and Research Establishments: Digital Transformation & Waste Management as Twin Vectors for the Transition towards Sustainability

Professor Sylvie FAUCHEUX,
Dean of IFG Executive Education, Director of Academic Innovation & Chairman of the Sustainable Development Commission, INSEEC U Paris, France.

Professor Martin O’CONNOR,
Ecological Economics & Sustainability Studies, University Paris Saclay, France.
We propose ‘twinning’ Waste Management & Digital Transformation, as key ‘virtual’ and ‘material’ dimensions of societal transitions.

• **Section §1** gives an overview of excellence in higher education and research establishments (HERE) as a multi-criteria multi-stakeholder problem.

• **Section §2** looks at Waste Management as a theme of the INSEEC U Group’s CSR strategy, situating this with reference to French and international frameworks for transition (e.g., EU circular economy) and excellence (e.g., AASHE ‘STARS’).

• **Section §3** reviews INSEEC U strategy at the interface between Digital Transformation (DT) and improved waste management (‘smart systems’ and ‘dematerialisation’).

• **Section §4** suggests next steps for exploiting TICE for HERE capacity-building: opportunities for Stakeholder Engagement in INSEEC U Waste Management Strategy.
1. INSEEC U – A Strong Commitment in Sustainable Development Policy and in Digital Transformation

1.1. Who are INSEEC U?

- Created in 1975;
- President: Catherine Lespine;
- The French leader in private sector higher education.

MULTI-SECTORIAL & MULTI-DISCIPLINARY SCHOOLS
<table>
<thead>
<tr>
<th>WHO?</th>
<th>WHAT?</th>
<th>WHY?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Classes of Actors around Science</td>
<td>Categories of Actions or Events</td>
<td>Criteria of Quality &amp; Responsibility</td>
</tr>
<tr>
<td>Policy and Funding institutions</td>
<td>“Upstream” Activities providing for R&amp;D capacity</td>
<td>“Extrinsic” Institutional Performance imperatives</td>
</tr>
<tr>
<td>Researchers &amp; immediate associates</td>
<td>“Inside” the Research Sector (proposing, performing, reviewing, reporting)</td>
<td>“Intrinsic” considerations of Scientific Integrity</td>
</tr>
<tr>
<td>Civil Society “at large”</td>
<td>“Downstream” actions (Uses of knowledge in society)</td>
<td>“Extrinsic” considerations of Societal Acceptability</td>
</tr>
</tbody>
</table>
GREENMETRIC: HERE QUALITY & SUSTAINABILITY
Waste Management in wider HERE Quality Context

• AASHE ‘STARS’ specifies four domains: Academics, Engagement, Operations, Planning & Administration, and has recently added ‘Innovation’ as a 5th. Waste management is addressed in the Operations domain: sub-categories of ‘Waste’ and ‘Purchasing’.

• The French ‘EVADDES’ framework (‘Outil d’auto-Evaluation du Développement Durable dans l’Enseignement Supérieur’), developed during 2009-2013, specifies 5 focus areas: strategy and governance; training; research; social policy and regional presence; environmental management. The latter includes: ‘Non-hazardous waste’; ‘Hazardous waste’; and ‘Waste Electrical and Electronic Equipment’ as sub-domains.

• GREENMETRIC, focused on environmental sustainability, defines 6 major performance categories: Setting and Infrastructure; Energy and Climate Change, Waste, Water, Transportation, Education and Research. So in this case, ‘Waste’ is top-level.

Sustainability concerns may also be addressed through teaching and research and through institutional management and governance processes — that is, contributions to capacity building for sustainability at societal and institutional levels.
Waste Management as a Facet of INSEEC U ‘RSE’ Strategy

INSEEC U has, since 2014, put in place a collaborative approach for continuous improvement in sustainability performance, as a core feature of its CSR strategy. We define Actions, Indicators and Results around 5 commitments:

• Implement Exemplary Participatory Governance in SD;
• Train up internal and external stakeholders and improve their awareness;
• Advancing knowledge of CSR and promote responsible research and innovation;
• Implement effective and coordinated environmental management;
• Develop a social and societal policy.

Waste management relates, in operational terms, to the 4th of these goals. But it depends also on effectiveness in the 1st, 2nd and 3rd themes.
Categories of Waste & Waste Management

The INSEEC U Waste strategy has focussed on a small number of categories of waste materials with high visibility to staff and students and with high “returns on investment”:

- Collection & recycling of bottles; used plastic cups, paper cups; and aluminium cans;
- Attention to consumption of paper in teaching and administration (including ‘dematerialisation’), and to the recycling of used paper;
- Pro-active strategy for the purchase and use of digital technology equipment, with consideration for ‘life cycle’ disposal as well as energy efficiency in use.

There is a tension in setting priority actions between:

- “Bottom up” actions targeting “low hanging fruit” at institutional, campus or building scales;
- Systematic attention to the full spectrum of classification schemes permitting synthetic views at territorial, national or international scales.

This tension can be exploited as a basis for monitoring and for continuous improvement.
The EU Framework for Observing the Circular Economy (1)

The EUROSTAT monitoring framework on the circular economy was set up during 2017-2018 by the EC. It consists currently of 10 indicators, some of which are broken down into sub-indicators.


This set of indicators is selected in order to capture the main elements of a circular economy, taking account of statistics measurement and aggregation quality issues. The four domains are:

- Production and consumption;
- Waste Management
- Secondary raw materials
- Competitiveness and Innovation.
The INSEEC U Waste Management Strategy

The EU Framework for Observing the Circular Economy (2)

Overview **recycling rates** of different waste streams

<table>
<thead>
<tr>
<th>Waste Stream</th>
<th>Recycling Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>All waste excluding major mineral waste</td>
<td>55% Recycled</td>
</tr>
<tr>
<td>Municipal waste</td>
<td>46% Recycled</td>
</tr>
<tr>
<td>Overall packaging</td>
<td>66% Recycled</td>
</tr>
<tr>
<td>Plastic packaging</td>
<td>40% Recycled</td>
</tr>
<tr>
<td>E-waste</td>
<td>32% Recycled</td>
</tr>
<tr>
<td>Construction and Demolition Waste</td>
<td>88% Recovered</td>
</tr>
</tbody>
</table>
In May 2018 the French government published its *Roadmap for the Circular Economy*. This sets out “50 Measures for a 100% Circular Economy”: Better Production (7 measures); Better Consumption (9); Better Managing Our Waste (24); and Mobilising All Actors (10).

<table>
<thead>
<tr>
<th>No.</th>
<th>Measures for Better Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Strengthen the range of services offered by actors involved in reuse, repair and the economy of functionality (product-service systems)</td>
</tr>
<tr>
<td>10</td>
<td>Mandatory simple information logo on reparability from 1 Jan 2020 for electrical and electronic products</td>
</tr>
<tr>
<td>13</td>
<td>Improve consumer information</td>
</tr>
<tr>
<td>14</td>
<td>Step up the fight against food waste</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Measures for Better Managing Our Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Launch a &quot;general mobilization&quot; drive to accelerate the collection of recyclable packaging, plastic bottles and cans through returns for charitable purposes.</td>
</tr>
<tr>
<td>18</td>
<td>Extend the scope of the EPR “packaging” scheme to professional packaging and aim to increase the percentage of bottles and cans collected in the cafe, hotel and restaurant sector.</td>
</tr>
<tr>
<td>31</td>
<td>By 2019, study the deployment of a financial mechanism to promote the recovery of old mobile phones.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Measures for Mobilizing all Actors</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>Raise awareness and educate</td>
</tr>
<tr>
<td>47</td>
<td>Mobilize the scientific and technical community with a multidisciplinary approach</td>
</tr>
</tbody>
</table>
Positioning INSEEC U relative to international HERE Frameworks

The GreenMetric framework establishes 6 sustainability performance categories, including Waste (WS) weighted as 18% of the overall GreenMetric score. The ‘WASTE’ indicators address:

- Recycling program for university waste; Program to reduce the use of paper and plastic in campus; Organic waste treatment; Inorganic waste treatment; Toxic waste handled; Sewerage disposal.

The GreenMetric framework also highlights the pertinence of ‘Education and Research’ activities in support of sustainability.

The AASHE ‘STARS’ framework covers similar categories to GreenMetric, and gives emphasis to operational considerations, notably under Purchasing, where sub-categories include:


INSEEC U strategy has components for: (1) Recycling of wastes on campus, (2) Reduction of waste streams through purchasing policy, and (3) Building of capacity through teaching and research programmes.
Exploiting TICE for HERE
Capacity-building in Managing Waste

The INSEEC U Strategy of Digital Transformation (DT)

• An innovative ecosystem of digital learning at INSEEC U since 2012.

• During 2018 a strategic reorganisation of these activities has been implemented, with the creation of a Digital Learning Department whose cross-cutting mission is “… to conceive, develop and integrate digital learning services dedicated to our students on campus and to new markets.”

In parallel with pedagogic DT strategy, we are experimenting with the use of “smart systems” and other digital technologies in order to improve performance of the group in Waste Management as well as other sustainability challenges.
At INSEEC U - Strategic reinforcement and an integrated digitalization organization since 2018:

- Director for Digital Transformation
- 7 millions euros in digitalization investment for 3 years
- Smart and Sustainable Buildings
  - Campus of Lyon : BREEAM
  - Headquarter (paris) : HQE, BBC, BREEAM
“Green IT” signals a low or decreasing environmental impact profile of IT production and activities themselves (e.g., laptops or portable telephones).

“IT for Green” signals the application of IT in order to improve environmental performance in other sectors.

Some actions of the INSEEC U group fall into the category “Green IT” category, e.g., the down-sizing and upgrading of the group’s servers. But most are instances of “IT for Green”.

ECOSYSTEM of DIGITAL LEARNING

DIGITAL LIBRARY
Collection unifiée de ressources digitales (fiches, revues, presse, vidéos...)

SERVEUR VIDEO
Hébergement privé et diffusion internationale en streaming

STUDIO
Enregistrement et diffusion de contenus en directe

Office 365
Collaboration et communication avec les outils professionnels

xperteam
Architecture Management System
Plateforme d’apprentissage pour gérer des formations longues, courtes, multimodales

ANALYTICS
Suivi, analyse et reporting des comportements élèves

EXPERIENCE UTILISATEUR
• Contenu et accès mobile
• Compte + email institutionnel
• Single-Sign-On
• Intégration amont (SS/CRM)
• Intégration aval (Alumni)
The IT Department applies solutions proposed by our partner Econocom: Watt's Green. Actions initiated since 2015 involving the implementation of INSEEC U's smart methods for estimating energy consumption of digital and IT equipment.

Ex. Employee tools

Ex. Infrastructure tools

**Consommation énergétique 2016**

- 297 632 kWh / an

- 214 590 kWh / an

**Consommation énergétique 2017**

- 187 151 kWh / an

- 142 790 kWh / an

**BONNE PRATIQUE**

Les postes fixes et portables ont été changés par des postes moins énergivores de classe A

**BONNE PRATIQUE**

Rationalisation des équipements notamment des imprimantes multifonctions locales

Tous les genres d’équipements sont en diminution ce qui engendre une forte baisse de la consommation énergétique
Positive Environmental Impacts expected from “IT for Green” (Digital Transformation for SD)

- Visio-conferencing -- Drop in transportation for general meetings in France and abroad, and for students and teachers in courses, etc....
- Drop in overall paper use (through elimination of paper registration forms, of internship agreements, of contracts and pay slips);
- Drop in water and energy consumption with generalization of smart buildings;
- Drop in waste production thanks to our general smart re-use policy.
A Smart Circular Economy Policy: a pro-active strategy

Since 2015, INSEEC U. has been firmly committed in a circular economy policy:

- **We work with service provider Elise.**
- **We can follow directly our results as well as environmental and societal impacts thanks to a smart system using sensors and other digital means.**

**LES DÉCHETS COLLECTÉS EN 2017**

- **22 174 kg** ont été collectés au total sur les sites du Groupe INSEEC U.
- 21 920 kg de papier
- 176 kg de bouteilles
- 27 kg de canettes
- 51 kg de gobelets

**LES BÉNÉFICES ENVIRONNEMENTAUX**

- 7 306 kg de CO₂ non rejetés : 1 345 A/R en TGV Paris - Marseille
- 148.9 litres de pétrole épargnés : 1 086Km en Clio essence
- 112 795 kWh non utilisés : la consommation de 24 foyers / an
- 504 641 L d'eau économisés : 2 823 bains de 200 litres

**L’IMPACT SOCIAL**

Notre action a permis de contribuer à l’emploi de 402 heures de travail pour des personnes en situation d’handicap.
In 2017, 22 tonnes of paper, bottles, cans and cups were collected by ELISE on the 19 sites of INSEEC U. Group. Paris accounts for 67%, followed by Bordeaux (20%), Lyon (9%) and Chambery (4%). These collections are estimated as equivalent to: over 505 m³ of water, 6.5 T of CO2 not emitted, and 110 MWh.
A Smart and Convivial Circular Economy Policy

*With our partner, LEMON TRI,* we use “smart machines” appealing to students with several different waste types collected in the same place, in a fun way.

Incentives in form of tokens convertible into coffee, encourage participation.

Our students become our “ambassadors” for good practices in eco-gestures.
A Smart and Convivial Circular Economy Policy

The recycling performance for each category (bottles; plastic cups; paper cups; metal cans) is certified by independent partners, e.g.,

- SAM Montereau SAS for metal recycling;
- Papeterie Emin Leydier for paper cups and cardboard materials;
- Atlan for plastic goblets ground up for the fabrication of plastic composite products;
- Plastipack for plastic bottles recycled.

Equivalences:
The importance of the quantities recycled can be expressed not just in mass terms, but also with various "equivalences".

- The 12,250 metal cans collected, correspond to the metal needed for 18 bicycles.
- The 7,618 plastic goblets recycled are enough to fabricate 63 composite coat-hangers.
Consider HERE stakeholders as members of a knowledge-innovation community.

- A corporate or campus-level sustainability strategy is made up of many bricks, the *Actions*.
- Participating members of the community can be invited to contribute suggested Actions, and to give their opinion on the *pros and cons* of existing or proposed Actions.
- Each of these Actions (and, in a composite way, a Strategy as a whole), can be situated in one or more domains (or sub-domains) in the HERE life cycle.
- An Action is to be judged — *ex post* (for an existing or past situation) or *ex ante* (for any scenario) — for its *Qualities* relative to an agreed spectrum of Sustainability Performance Considerations (e.g., GreenMetric, ‘STARS’, the UN SDGs).

**Auto-evaluation**

Evaluation of the *quality of actions* can be undertaken by people in community.

With current *social networking* technologies, we can envisage *nested judgements*:

(a) moving upwards from individual Indicators, to Actions, to an overall vision of a HERE sustainability strategy; and

(b) moving from Individual participants to Stakeholder Classes, and to an overall judgement about a HERE’s sustainability performance.
SUMMING UP:

The challenge of an alliance of ‘Bottom-up’ and ‘Top-down’ initiatives for Digital Transformation and Transition towards Sustainability.

The new digital networking technologies offer new opportunities for collaborative learning about sustainability challenges, for monitoring performance, for sharing suggestions for action, for materially improving energy, material flows and environmental performance, and for evaluating the quality of institutional strategies — action by action — in a multi-stakeholder vision relative to multiple excellence considerations.

THANK YOU
ANNEX

Overview of INSEEC U Expertise in Teaching, Training, Research and Innovation at the interface of Sustainability and Digitalization
INSEEC U: Expertise in Training as well as Research and Innovation at the interface Sustainability and Digitalization

New Academic & Executive training: Examples of new programmes

- **For all students**: since 2017 Start-up Factory Programs in San Francisco Campus for trainings and visits of enterprises in Silicon Valley for Big Data, Cloud, Artificial Intelligence And in same time a certificate on line on "Sustainable Development and CSR Management".

- **Engineering School (ECE)**: Programs: “New Energy and Environment”; “Health Quality and IT Technology”

- **Executive School (IFG)**: eMBA "Management of Smart Energy Transition", eBachelor in "Smart and Sustainable Building Management".

- **Learning Expeditions**: for Alumni and Executive students in our San Francisco Campus on the topics on Renewable Energy and Digital & Smart City Management.
INSEEC U - Expertise in Training as well as Research and innovation at the interface Sustainability and Digitalization

A "Sustainable & Digital" Innovation Cluster

INSEEC U. set up, in 2015, an innovation & entrepreneurship ecosystem, INNOV'INSEEC U, with a network of 6 Incubators focused on digital technology and artificial intelligence solutions with strong environmental and societal impacts. For example:

- Annual Tech for Goods competition in partnership with “la Ruche” (the French top incubator for social entrepreneurship in France) to select winners starts-up in acceleration programme with professionals in social innovation and new technologies.

Tech for Goods concerns digital solutions applied to societal entrepreneurship needs, primarily solving environmental, social and local needs.
INSEEC U - Expertise in Training as well as Research and Innovation at the interface Sustainability & Digitalization

- Partnership since 2016 with incubator at UC Berkeley dedicated to technological innovations of the energy transition

- This partnership has specifically translated into investment in Blue Bear Ventures (BBV), a venture capital fund intended to help start-ups use digital and artificial intelligence in the fight against climate change. This focuses on innovation in smart grids, smart buildings and smart mobility.

- Partnership with Savoie Technolab: incubator of start-ups in smart grids and e-Health

A "Sustainable & Digital" Innovation Cluster
INSEEC U - Expertise in Training as well as Research and Innovation at the interface Sustainability and Digitalization

Research dedicated to Smart Eco-innovation

Chair of Research about "Digital and Artificial Intelligence" on Lyon Campus in partnership with Cegid Group and Asker for Research and Innovation to prepare Digital Transformation of Human Resources Management in a CSR context.
INSEEC U - Expertise in Training as well as Research and Innovation at the interface Sustainability and Digitalization

Research dedicated to Smart Eco-innovation (2)

Smart Ecomobility Program for our Engineering School (ECE)

Since 2015, ECE has been a member of VEDECOM, a French public-private partnership research and training institute dedicated to low-carbon and smart sustainable individual mobility.

Project "New secure communications and cooperative safety" of the ecomobility programme

DEFORM EUROPEAN Research PROJECT

Since 2016, DEFORM analyses the impact of research projects (and particularly digital ones) funded by Europe that do not include SD and highlights the financial and social impacts.