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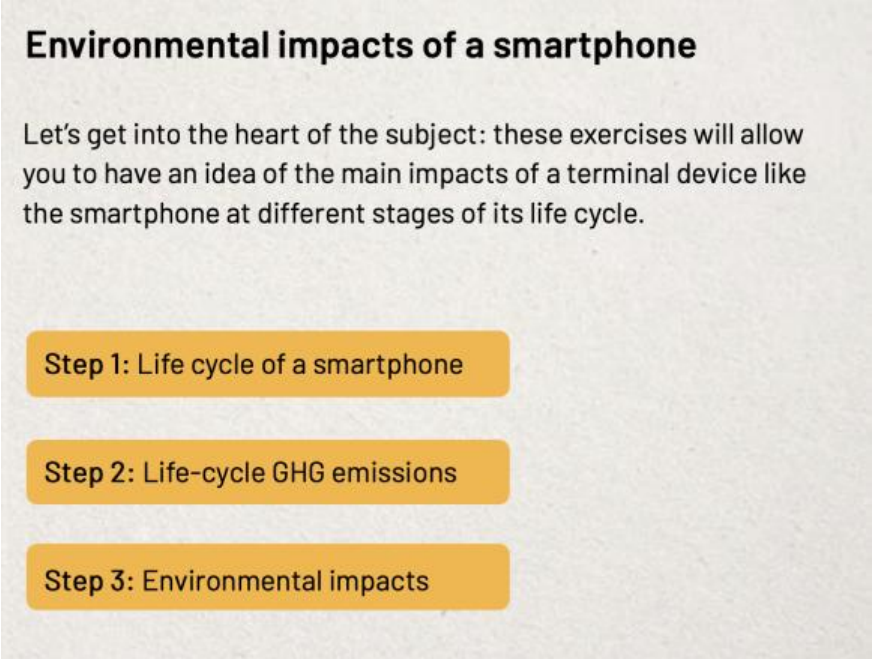
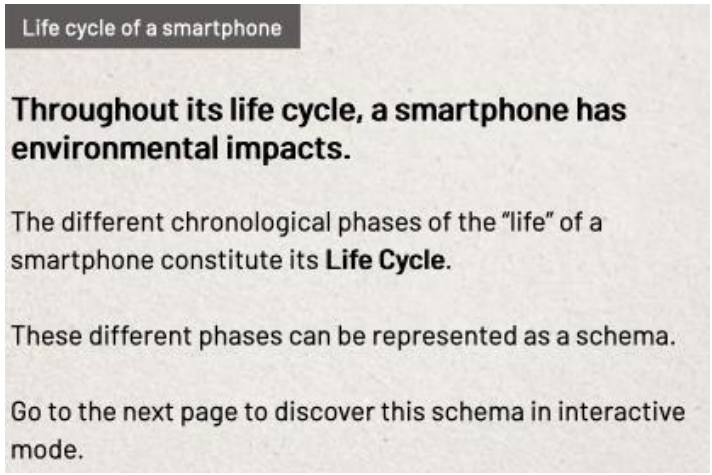
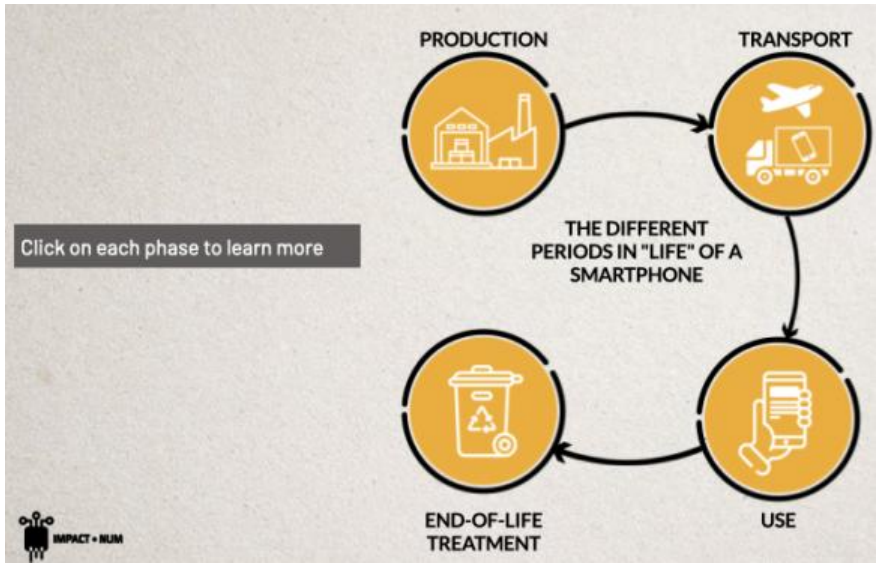
Activity 03: Environmental impacts of a smartphone

The reality of digital impacts is very complex and a Life Cycle Assessment methodology is needed to approach this reality. In particular, to study how digital equipment contributes to metal depletion, fresh water use, toxicity,... and of course to the potential for global warming. Let's go !

Capsule slide	Related text
	**Environmental impacts of a smartphone** Let's get into the heart of the subject: these exercises will allow you to have an idea of the main impacts of a terminal device like the smartphone at different stages of its life cycle. **Step 1:** Life cycle of a smartphone **Step 2:** Life-cycle GHG emissions **Step 3:** Environmental impacts

Capsule slide	Related text
Step 1 :  	**Step 1 : Life cycle of a smartphone** Throughout its life cycle, a smartphone has environmental impacts. The different chronological phases of the "life" of a smartphone constitute its **Life Cycle**. These different phases can be represented as a schema. Go to the next page to discover this schema in interactive mode.
 	**Click on each phrase to learn more.** **The different chronological phases of the "life" of a smartphone :** • Production • Transport • End-of-life treatment • Use

Capsule slide	Related text

The different chronological phases of the "life" of a smartphone :

(this description is displayed when clicking on one of the phases)

Production

The production of a smartphone requires tens of thousands of operations from the extraction and refining of each of its metals (about fifty) to the assembly of the components and the transport of all these metals/components/plastics throughout the planet.

All these processes use energy, water and matter and generate pollutants, materials, waste...

Transport

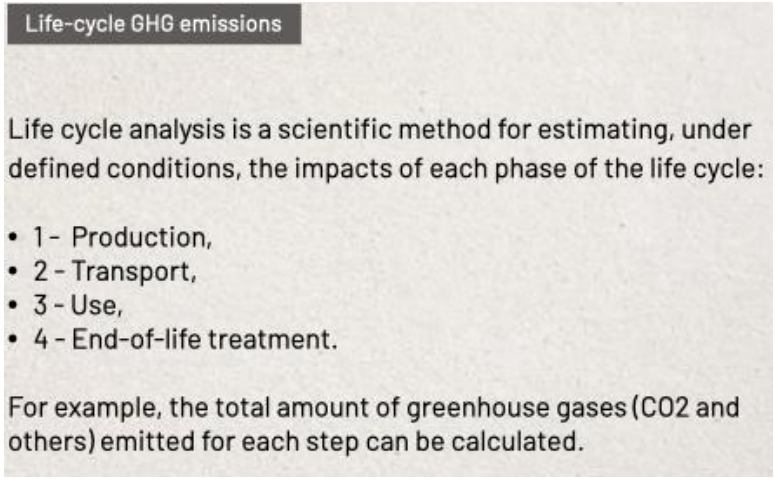
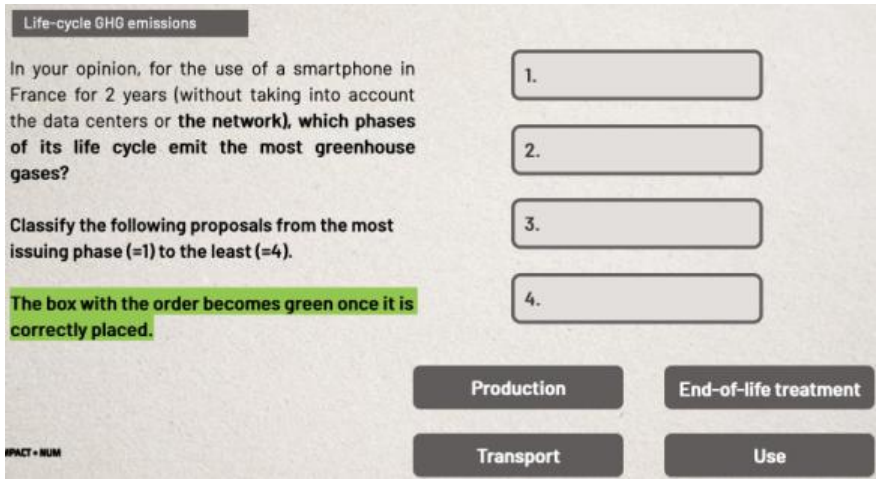
To transport a smartphone from its place of manufacture to its place of use, trucks, boats or planes must be used. All these modes of transport use fuel that generates greenhouse gases and other pollutants.

Use

To operate a smartphone, there is no need for anything other than electrical energy. When carrying out life-cycle analysis of equipment as an object, in general, other assets that would be necessary for its operation are not taken into account.

End-Of-Life Treatment

At the end of the period of use of a smartphone, it must be transported to a waste shop, then to sites of “massification”, clean-up, dismantling, recycling, etc.
All these operations require energy and generate pollution in different forms depending on the type and conditions of recycling.

Capsule slide	Related text
	**Step 2. Life-cycle GHG emissions** Life cycle analysis is a scientific method for estimating, under defined conditions, the impacts of each phase of the life cycle: 1 - Production, 2 - Transport, 3 - Use, 4 - End-of-life treatment. For example, the total amount of greenhouse gases (CO2 and others) emitted for each step can be calculated.
	**Step 2. Life-cycle GHG emissions** In your opinion, for the use of a smartphone in France for 2 years (without taking into account the data centers or **the network), which phases of its life cycle emit the most greenhouse gases?** Classify the following proposals from the most issuing phase (=1) to the least (=4). • Production • Transport • End-of-life treatment • Use

Capsule slide	Related text

Step 2

Correct answers: ranking of life cycle phases from highest to lowest consumption.

1. **Production (including extraction of raw materials)**

Small precision: production includes all necessary operations from the extraction of raw materials to the final assembly of the object.
If you look more carefully, it's the electronic card that emits the majority of greenhouse gases.

2. **Use**

In any case if you use your equipment in France.

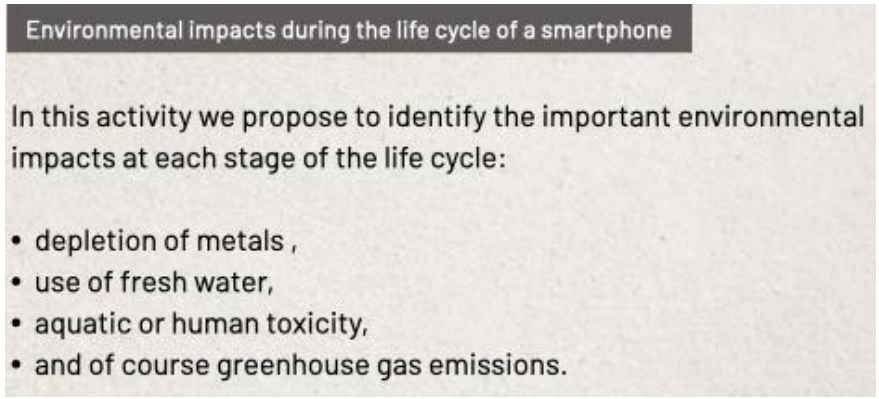
3. **Transport (equipment) finished in factory exit until the user)**

Finally, little precision: in this example, we assume that the transport is carried out by boat. By plane the result would be different!

4. **End-of-life treatment**

End-of-life treatment emits GHGs because of the necessary transport and the energy that needs to be mobilised to separate components and metals (for smartphones that are collected). Note that there are large differences depending on the country and the type of treatment.

Step 3



Step 3

Les impacts environnementaux pendant le cycle de vie d'un smartphone

Environmental impacts during the life cycle of a smartphone

In this activity, we propose to identify the significant environmental impacts at each stage of the life cycle:

- metal depletion (depletion),
- freshwater use,
- aquatic toxicity or human toxicity,
- and of course greenhouse gas emissions.

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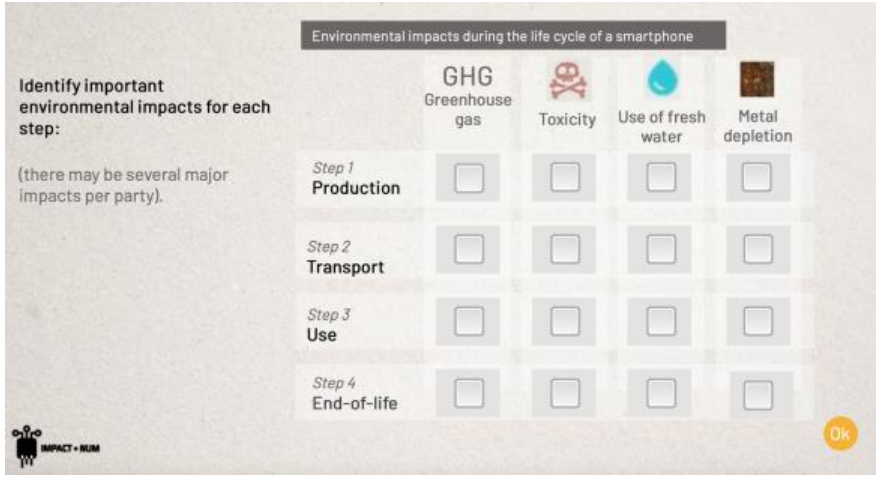
Step 3



Related text

Step 3

Identify for each stage the significant environmental impacts:
(there may be several major impacts per piece)

	GHG **Greenhouse gas**	**Toxicity**	**Use of fresh water**	**Metal depletion**
Step 1 **Production**	**correct**	**correct**	**correct**	**correct**
Step 2 **Transport**	**correct**			
Step 3 **Use**	**correct**			
Step 4 **End-of-life**	**correct**	**correct**		**correct**

Capsule slide	Related text
Feedback **The production and end-of-life phases concentrate the majority of environmental impacts (excluding GHG).** **The extraction of the necessary metals** has significant environmental impacts, despite environmental standards which, although more stringent, remain insufficient and are not applied everywhere. **At the other end of the chain**, 83 % of the world's electronic equipment is not recycled in the right sector, leading at best to dispersion and thus loss of non-recycled metals; but also to catastrophic health and environmental situations with many consequences for human life and biodiversity. Source : The Global E-waste Monitor, 2020 [accessed on 16/12/2021]	**Feedback** **The production and end-of-life phases concentrate the majority of environmental impacts (excluding GHG).** **The extraction of the necessary metals** has significant environmental impacts, despite environmental standards which, although more stringent, remain insufficient and are not applied everywhere. **At the other end of the chain**, 83 % of the world's electronic equipment is not recycled in the right sector, leading at best to dispersion and thus loss of non-recycled metals; but also to catastrophic health and environmental situations with many consequences for human life and biodiversity. Source : The Global E-waste Monitor, 2020 [accessed on 16/12/2021]
Conclusion Impacts at each stage • **Metal mining concentrates a large part of the impacts**, despite environmental standards which, although more stringent, remain insufficient and are not applied everywhere. • **Large amounts of water** are needed for metal extraction, especially as metal concentrations in ores are decreasing (with exceptions). • **More or less toxic products** come from mining waste, the storage of which is more or less secure in liquid form entails a risk of effusion in nature, but also from electronic waste which is still too often found in open dumps. • **GHG emissions** are due to the large amount of fossil fuels used throughout the process, fossil fuels used for transportation, and the generation of electricity needed for their use.	**Conclusion** **Impacts at each stage** • **Metal mining concentrates a large part of the impacts,** despite environmental standards which, although more stringent, remain insufficient and are not applied everywhere. • **Large amounts of water** are needed for metal extraction, especially as metal concentrations in ores are decreasing (with exceptions). • **More or less toxic products** come from mining waste, the storage of which is more or less secure in liquid form entails a risk of effusion in nature, but also from electronic waste which is still too often found in open dumps. • **GHG emissions** are due to the large amount of fossil fuels used throughout the process, fossil fuels used for transportation, and the generation of electricity needed for their use.

If you wish to go into more detail about certain concepts

What is the environmental footprint of a terminal at different stages of its life cycle? explains why assessing these impacts requires taking into account the entire life cycle of the appliance: production, distribution, use and end of life.

Life Cycle Assessment explains what a Life Cycle Assessment (LCA) is: principles, stages, analysis of results.

Crédits :

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