

TOOL - KEY FIGURES IN ICT

OPERATION OF DEVICES > 0.1 OPERATING COMPUTERS

| TARGET GROUP | AGE GROUP | PROFICIENCY LEVEL | FORMAT | COPYRIGHT | LANGUAGE |
|--------------|-----------|-------------------|-------------------|--------------------------|-----------------|
| Facilitators | N/A | Level 0 | Preparatory guide | Creative Commons (BY-SA) | English, French |

This document contains background information for facilitators before they run the workshop with participants. It gives some interesting information about the digital world based on statistical data.

General Objective Knowledge acquisition

Preparation time for facilitator less than 1 hour

Competence area 1 - Information and data literacy

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Resource originally created in French

WORKSHOP DIRECTIONS

1 ICT tools

Globally:

- 45 million servers
- 800 million server equipment devices (routers, modems...)
- 15 billion online devices in as of 2018 and 46 billion expected by 2030!
- 10 billion phones sold since 2007
- In Western Europe, there will be 8.9 connected devices per person as of 2021, as opposed to 5.3 in 2016.

([Source](#) (in French))

In the European Union:

ELEMENTS OF A SMARTPHONE

ELEMENTS COLOUR KEY: ● ALKALI METAL ● ALKALINE EARTH METAL ● TRANSITION METAL ● GROUP 13 ● GROUP 14 ● GROUP 15 ● GROUP 16 ● HALOGEN ● LANTHANIDE

SCREEN

- Indium tin oxide is a mixture of indium oxide and tin oxide, used in a transparent film in the screen that conducts electricity. This allows the screen to function as a touch screen.
 - 49 In Indium
 - 50 Sn Tin
 - 8 O Oxygen
- The glass used on the majority of smartphones is an aluminosilicate glass, composed of a mix of alumina (Al₂O₃) and silica (SiO₂). This glass also contains potassium ions, which help to strengthen it.
 - 13 Al Aluminium
 - 14 Si Silicon
 - 8 O Oxygen
 - 19 K Potassium
- A variety of Rare Earth Element compounds are used in small quantities to produce the colours in the smartphone's screen. Some compounds are also used to reduce UV light penetration into the phone.
 - 39 Y Yttrium
 - 57 La Lanthanum
 - 65 Tb Terbium
 - 59 Pr Praseodymium
 - 61 Eu Europium
 - 62 Dy Dysprosium
 - 64 Gd Gadolinium

ELECTRONICS

- Copper is used for wiring in the phone, whilst copper, gold and silver are the major metals from which microelectrical components are fashioned. Tantalum is the major component of micro-capacitors.
 - 29 Cu Copper
 - 47 Ag Silver
 - 79 Au Gold
 - 73 Ta Tantalum
- Nickel is used in the microphone as well as for other electrical connections. Alloys including the elements praseodymium, gadolinium and neodymium are used in the magnets in the speaker and microphone. Neodymium, terbium and dysprosium are used in the vibration unit.
 - 28 Ni Nickel
 - 66 Dy Dysprosium
 - 59 Pr Praseodymium
 - 65 Tb Terbium
 - 60 Nd Neodymium
 - 64 Gd Gadolinium
- Pure silicon is used to manufacture the chip in the phone. It is oxidised to produce non-conducting regions, then other elements are added in order to allow the chip to conduct electricity.
 - 14 Si Silicon
 - 8 O Oxygen
 - 51 Sb Antimony
 - 33 As Arsenic
 - 31 P Phosphorus
 - 31 Ga Gallium
- Tin & lead are used to solder electronics in the phone. Never lead-free solders use a mix of tin, copper and silver.
 - 50 Sn Tin
 - 82 Pb Lead

BATTERY

- The majority of phones use lithium ion batteries, which are composed of lithium cobalt oxide as a positive electrode and graphite (carbon) as the negative electrode. Some batteries use other metals, such as manganese, in place of cobalt. The battery's casing is made of aluminium.
 - 3 Li Lithium
 - 27 Co Cobalt
 - 8 O Oxygen
 - 6 C Carbon
 - 13 Al Aluminium
- Magnesium compounds are alloyed to make some phone cases, whilst many are made of plastics. Plastics will also include flame retardant compounds, some of which contain bromine, whilst nickel can be included to reduce electromagnetic interference.
 - 6 C Carbon
 - 12 Mg Magnesium
 - 35 Br Bromine
 - 28 Ni Nickel

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[Source](#)

2 Uses of IT

In the European Union (data from surveys conducted between 2016 and 2018):

- 76% of people accessed the internet on a daily basis, with a further 7% on a weekly basis (but not daily)
- 71% of people aged 16 to 74 know that cookie's can be used to trace people's online activity
- 60% of internet users have bought good online as of 2018, representing a 13 point increase since 2013
- 90% of people aged 16-24 have used social media
- 83% of people aged 16-24 have watched Netflix
- 80% of people aged 16-24 have streamed music

Sources:

- https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Digital_economy_and_society_statistics_-_households_and_individuals#Internet_access
- <https://ec.europa.eu/eurostat/cache/infographs/ict/bloc-1b.html>

3 Online activity

Globally, there are:

- 8 to 10 billion emails exchanged every hour (excluding spam)
- 180 million searches on Google

Digital data (emails, downloads, videos, web requests...) travels on average 15000 kms. ([Source](#) (in French))

4 IT jobs

In the EU :

- By 2017, value added by the EU's ICT sector was equivalent to 3.6 % of GDP
- Between 2012 and 2017, value added by ICT services in the EU grew each year and increased by 18.3 %, while value added by ICT manufacturing increased by 22.5 %.
- In 2017, the largest ICT services subsector in the EU, computer programming, consultancy and related activities, was more than 10 times the size of the largest ICT manufacturing subsector, electronic components and boards.
- Of the 8 million people working in ICT, only 17% are women

Sources:

- https://ec.europa.eu/eurostat/statistics-explained/index.php/ICT_sector_-_value_added,_employment_and_R%26D#Apparent_labour_productivity
- https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1544171130419&uri=CELEX%3A52018AE2156#ntr26-C_2018440EN.01003701-E0026

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IT and the environment

• Environmental impacts of ICT

Of the carbon emissions generated by the digital sector, 25% come from data centres, 28% from network infrastructure, and 47% from consumer devices (computers, phones, tables, GPS...) ([Source](#) (in French)) Paradoxically, the smaller our devices get, the more material we use. The more complex components become, the larger their environmental impact. On average, 50 to 350 times the weight of an electronic device is required to produce that device, for example 800 kgs for a laptop computer or 500 kgs for a modem. Manufacturers of these devices use precious minerals at an unbelievable pace, such that the mines that produce these minerals espouse unacceptable working conditions and bring about significant environmental damage. ([Source](#) (in French))

• Good Practice

The best way to reduce the impact of our devices is to ensure they last as long as possible. Using a table for four years instead of two years reduces its impact by 50%. ([Source](#) (in French)) Another way to reduce impact is to choose devices based on their uses, but also due based [on their energy consumption](#).

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Going further

- [Interesting and comprehensive study on the digital divide in Europe and the US](#)
- [Energy Footprint of the Digital Economy](#)
- [Eurostats: digital economy and society](#)