

## Housekeeping Rules

- the meeting will be recorded to ease compiling the minutes
- if you face technical issues during the meeting contact Gergana Dimitrova through the chat, not to all
- In the meeting mute yourself and switch off video
- After each agenda item we will have few minutes for Q&A
- If you have questions or comments, note them down during or after each presentation slot in the chat and we will answer them one-by-one at the end of each agenda item. In case your question or comment requires your oral intervention type in the topic AND #
- Limit your oral interventions to maximum 2 minutes, please. Don't forget to take down your virtual hand afterwards.
- In case we run out of time, we need to cut-off Q&A and will reply to remaining questions with the minutes

**Meeting kicks off  
at  
9:30 a.m. CEST**

July 13, 2020

# Welcome, Introduction of Agenda

## Agenda

9.30 – 9.40	Welcome, Introduction of Agenda – Fraunhofer IZM
9.40 – 9.50	Introduction - DG GROW
9.50 – 11.00	Task 1: 4 presentations with Q&A each
11.00 – 11.15	Break
11.15 – 12.30	Task 2: 5 presentations with Q&A each
12.30 – 13.00	Lunch Break
13.00 – 14.20	Task 3 and 4: 4 presentations with Q&A each
14.20 – 14.45	AOB
14.45 – 14.55	Next Steps
14.55 – 15.00	Closing Remarks



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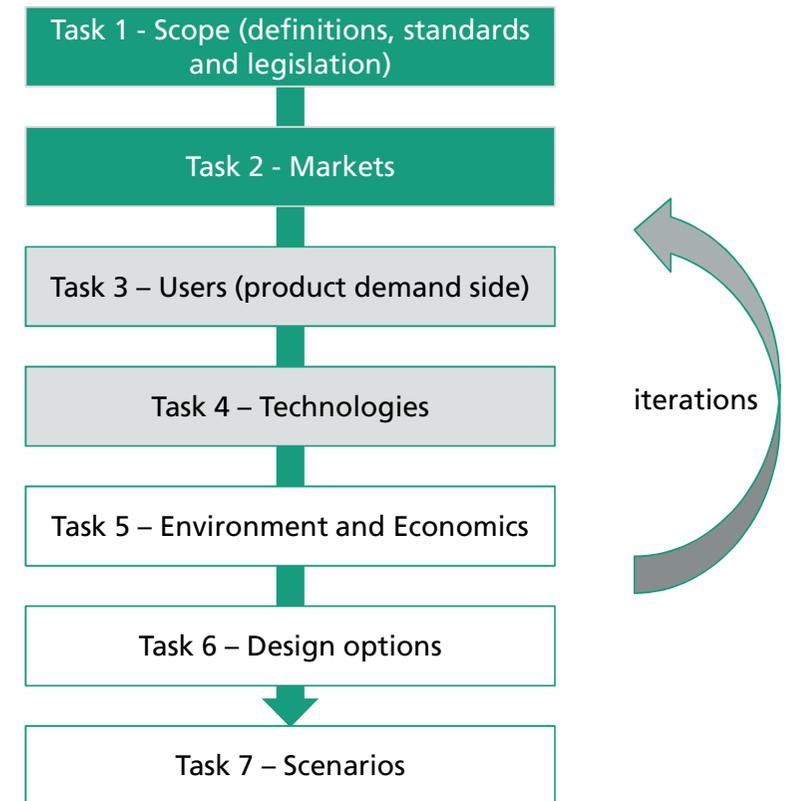
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# Welcome, Introduction of Agenda

## Published Documents

- Draft Task 1 Report
- Draft Task 2 Report
- Discussion Paper Tasks 3 and 4



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# Task 1 – Scope definition for the study

## Product group



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# Task 1 – Scope definition for the study

## Functional unit

Enabling voice traffic over a telecommunication network and – for tablets and smartphones in particular  
- data traffic over the internet per

- (1) one product lifecycle (i.e., calculating impacts per product),
- (2) one year of use.

# Task 1 – Scope definition for the study

## Out of scope

- E-Readers
- Digital photo frames
- Control panels
- Palm-top organisers
- Handheld radio transceivers (for bidirectional communication, but not through a provider operated telecommunication network, such as “walkie-talkies”)

# Task 1 – Scope definition for the study

## Product definition

A **mobile phone** is a cordless handheld electronic device designed for long-range communication over either a cellular telecommunications network or a satellite based telecommunications network, requiring a SIM card, eSIM or similar means to identify the connected parties *[to exclude other types of two-way radios, such as "walkie-talkies"]*, or over a landline telecommunications network *[to include DECT and other cordless landline phones]*. It is designed for battery mode usage, and connection to mains via an external power supply is mainly for battery charging purposes. A **smartphone** is furthermore characterised by an operating system, WiFi connectivity, mobile use of internet services, and the ability to accept original and third-party software applications. A smartphone has an integrated touch screen display with a diagonal size between 4 and 7 inches.

...

# Task 1 – Scope definition for the study

## Product definition

...

A **tablet** is a type of notebook computer designed for portability that includes an integrated touch-sensitive display with a diagonal size greater than 7 inches and less than 17,4 inches but does not have an integrated, physical attached keyboard in its as-shipped configuration *[including "detachables", but excluding "convertibles"; model specific keyboard or keyboard docking station might be supplied as an accessory]*. A tablet relies on a wireless network connection, which might or might not be a telecommunications network *[e.g., WiFi, 3G, LTE, etc.; but contrary to smartphones connectivity with a telecommunications network is not a required functionality, other means of at least internet connectivity are]*, and is primarily powered by an internal battery (with connection to the mains for battery charging, not primary powering of the device). A tablet is furthermore characterized by an operating system, mobile use of internet services, and the ability to accept original and third-party software applications.

...

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# Task 1 – Scope definition for the study

## Product definition

...

The scope includes accessories shipped with the device, such as external power supply, a charging cradle, a basestation for cordless landline phones, a headset, a detachable keyboard, cables.

## Task 1 – Scope definition for the study

# Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

# Task 1 – EN, ISO/IEC, ETSI, ITU test standards

## Overview

- Safety, Specific Absorption Rate (SAR ), health and ergonomics testing
- Main communication standards (e.g. LTE, Wi-Fi, VoIP, etc.)
- Performance testing (e.g. acoustic, graphics, etc.)
- Software testing (e.g. functional testing, performance testing, memory leakage testing, etc.)
- Material testing (e.g. plastics)
- Interface standards (e.g. USB)
- **Battery life testing (e.g. IEC 61960-3:2017, IEC 62133:2017)**
- **Durability testing (e.g. IEC 60529:1989/AMD2:2013/COR1:2019, IEC 60068-2-31:2008 )**
- **Broader standards and testing methods**
  - Material efficiency (e.g. ITU-T L.1020, ITU-T L.1022)
  - Recycling and substance analysis (e.g. ITU-T L.1100, ITU-T L.1101, ITU-T L.1102)
  - Life cycle assessments and environmental impact evaluation or environmental rating (e.g. ETSI ES 203 199, ITU-T L.1015, ITU L.Sup32, 1680.1-2018, **ETSI TR 103 679, EC Product Environmental Footprint**)

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# Task 1 – EN, ISO/IEC, ETSI, ITU test standards

## Battery life testing

- **IEC 61960-3:2017** - Secondary cells and batteries containing alkaline or other non-acid electrolytes. Secondary lithium cells and batteries for portable applications. Prismatic and cylindrical lithium secondary cells and batteries made from them.
- **IEC 62133:2017** - Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications
  - Part 1: Nickel systems
  - Part 2: Lithium systems

# Task 1 – EN, ISO/IEC, ETSI, ITU test standards

## Durability testing

- **ASTM C1895 – 20:** Standard Test Method for Determination of Mohs Scratch Hardness.
- **ASTM D7027 – 13:** Standard Test Method for Evaluation of Scratch Resistance of Polymeric Coatings and Plastics Using an Instrumented Scratch Machine.
- **IEC 60529:1989/AMD2:2013/COR1:2019** Corrigendum 1 - Amendment 2 - Degrees of protection provided by enclosures (IP Code).

Example:

IP codes	First Digit - SOLIDS	Second Digit – MOISTURE
<b>IP67</b>	Protected from total dust ingress.	Protected from immersion between 15 centimetres and 1 meter in depth.
<b>IP68</b>	Protected from total dust ingress.	Protected from long-term immersion up to a specified pressure.

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# Task 1 – EN, ISO/IEC, ETSI, ITU test standards

## Durability testing

- **IEC 60068-2-31:2008** - Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens.
  - Drop and topple
  - Free fall
  - Repeated free fall

This standard provides a test procedure for simulating the effects of rough handling shocks, primarily in equipment-type specimens, the effects of knocks, jolts and falls which may be received during repair work or rough handling in operational use.

# Task 1 – EN, ISO/IEC, ETSI, ITU test standards

## Broader standards and testing methods

- **ETSI ES 203 199 V1.3.1 (2015-02):** Methodology for environmental Life Cycle Assessment (LCA) of Information and Communication Technology (ICT) goods, networks and services;
- **ITU-T L.1015 (01/2019):** Criteria for evaluation of the environmental impact of mobile phones
- **ITU L.Sup32 (10/2016):** Supplement for eco-specifications and rating criteria for mobile phones eco-rating programmes
- **1680.1-2018:** IEEE Standard for Environmental and Social Responsibility Assessment of Computers and Displays
- **ETSI TR 103 679 (2019-05):** Explore the challenges of developing product group-specific Product Environmental Footprint Category Rules for Smart Phones
- **EC Product Environmental Footprint (PEF):** The European Commission initiated the development of PEFs for a range of products, but not yet for products in scope of this study. A pre-condition for comparing PEF assessments is the existence of Product Environmental Footprint Category Rules (PEFCRs), which have not been developed for smartphones yet. ETSI TR 1003 679 provides some guidance for such PEFCR.

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## Task 1 – EN, ISO/IEC, ETSI, ITU test standards

# Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

# Task 1 – CEN/CENELEC JTC10 Material Efficiency Standards

## Background

- 1st EU Circular Economy Action Plan (2015) called for standards on material efficiency.
- EC issued Mandate 543 on a standardisation request to the European Standardisation Organisations as regards ecodesign requirements on material efficiency aspects for energy-related products in support of the implementation of Directive 2009/125/EC.
  - Objective: Develop generic standards covering ecodesign requirements related to material efficiency aspects:
    - Extending product lifetime
    - Ability to re-use components or recycle materials from products at end-of-life
    - Use of re-used components and/or recycled materials in products
  - Working Groups: CEN/CENELEC JTC10 “Energy-related products – Material Efficiency Aspects for Ecodesign”.
  - **Output: Horizontal standards on material efficiency: EN4555X**

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# Task 1 – CEN/CENELEC JTC10 Material Efficiency Standards

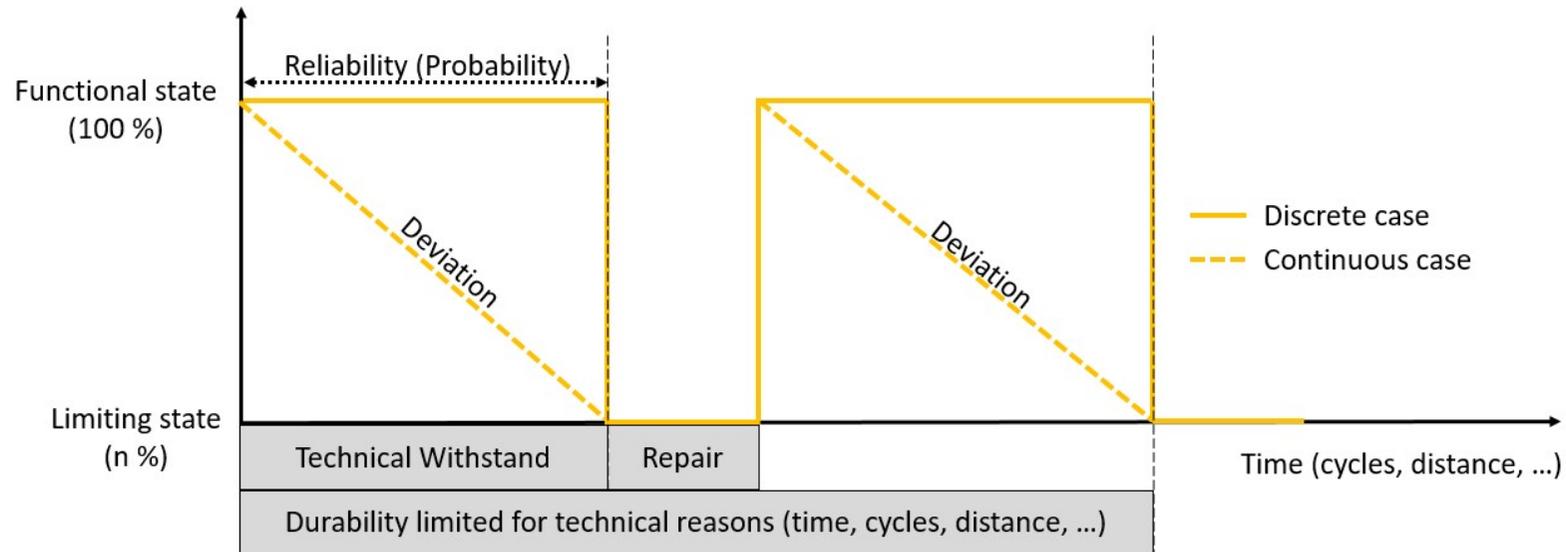
## Horizontal EN 4555X Standards (published and forthcoming)

Reference	Title
EN 45552:2020	General method for the assessment of the durability of energy-related products
EN 45554:2020	General methods for the assessment of the ability to repair, reuse and upgrade energy-related products
EN 45555:2019	General methods for assessing the recyclability and recoverability of energy-related products
EN 45556:2019	General method for assessing the proportion of reused components in energy-related products
EN 45557:2020	General method for assessing the proportion of recycled material content in energy-related products
EN 45558:2019	General method to declare the use of critical raw materials in energy-related products
EN 45559:2019	Methods for providing information relating to material efficiency aspects of energy-related products
EN 45553	General method for the assessment of the ability to re-manufacture energy-related products
TR 45550	Definitions related to material efficiency
TR 45551	Guide on how to use generic material efficiency standards when writing energy related product specific standardization deliverables.

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# Task 1 – CEN/CENELEC JTC10 Material Efficiency Standards

## Example: Definitions in EN 45552:2020 (durability of ErP)



### Reliability

Probability that a product functions as required under given conditions, including maintenance, for a given duration without limiting event.

### Repair

Process of returning a faulty product to a condition where it can fulfil its intended use.

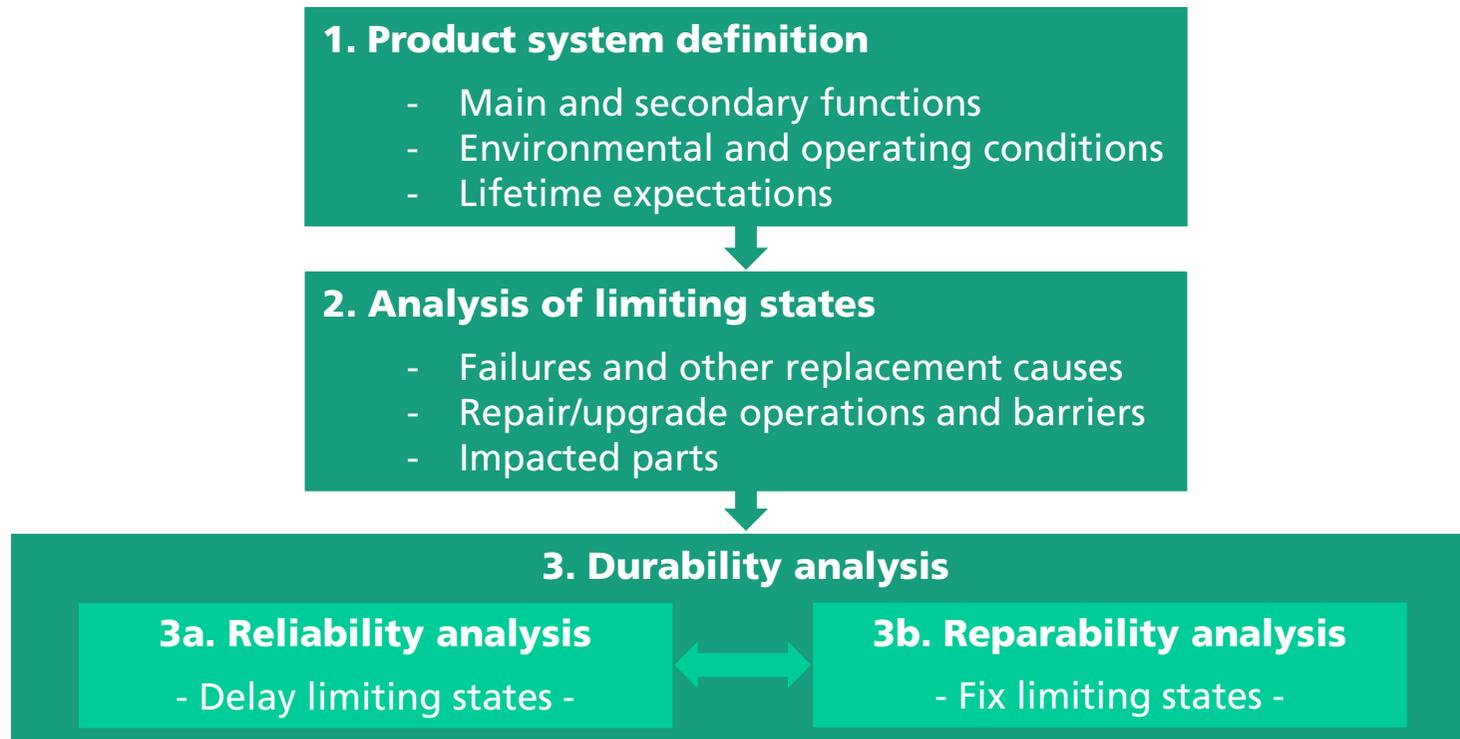
### Durability

Ability to function as required, under defined conditions of use, maintenance and repair, until a limiting state is reached.

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# Task 1 – CEN/CENELEC JTC10 Material Efficiency Standards

## Product-specific application for durability analysis



- Durability is a function of reliability/technical withstand and reparability/upgradability

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# Task 1 – CEN/CENELEC JTC10 Material Efficiency Standards

## Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

# Task 1 – other relevant standards, labels and initiatives

## Overview

- Eco-Label
  - Blue Angel: mobile phones, digital cordless phones, (software)
  - TCO: smartphones, tablets
  - EU Green Public Procurement guidance: mobile phones, tablets
  - **EPEAT: mobile phones, tablets**
- Third party and industry initiatives
  - iFixit Reparability Score
  - PAIA – Product Attribute to Impact Algorithm
  - Eco-rating

# Task 1 – other relevant standards, labels and initiatives

## Labels and rating schemes

### ■ EPEAT

- Criteria for tablets (IEEE 1680) and mobile phones (UL 110)
  - significant number of products in the registry for both product groups
  - comprehensive list of optional criteria (and means of verification)
  - compliance with optional criteria indicates what is achievable

# Task 1 – Legislation

## Overview

- Ecodesign Directive
- Energy Labelling Regulation
- General Product Safety Directive
- Radio Equipment Directive and policy initiative on common chargers
- CLP / REACH
- Conflict Minerals Regulation
- Sale of Goods: Software updates and guarantee
- WEEE Directive
- Waste Framework Directive and SCIP database
- Country specific legislation

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# Task 1 – Legislation

## Ecodesign Directive

- Commission Regulation (EU) 617/2013: computers and computer servers
- Commission Regulation (EU) 2019/1782: external power supplies
- Commission Regulation (EU) 801/2013: standby, off mode
  
- Other recent implementing measures include “material efficiency requirements” information on specific materials, spare parts availability, repair information,...

# Task 1 – Legislation

## Country specific legislation

### ■ France

- Law N°2015-992 on Energy Transition for Green Growth
  - includes measures against planned obsolescence
- Law N°2020-105: Anti-waste law for a circular economy
  - Jan 1, 2021:
    - introduction of a reparability index;
    - information about spare parts availability
    - mandatory information on the duration of the provision of software updates for smartphones and tablets
  - 2024
    - introduction of a durability index

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# Task 1 – other relevant standards, labels and initiatives, and legislation

## Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

**Break until 11:15**  
(next: Task 2)

## Task 2 – Market and Stock Data: Mobile Phones

### Units sold in EU 27

- EU 27 PRODCOM original data for NACE 26302200 - Telephones for cellular networks or for other wireless networks, 2018

	exported quantity (units) EXPQNT	imported quantity (units) IMPQNT	produced quantity (units) PRODQNT	apparent consumption (PRODQNT+IMPQNT- EXPQNT)
EU 27	26.651.118	178.866.893	2.000.000	154.215.775

## Task 2 – Market and Stock Data: Mobile Phones

### Units sold in EU 27

EU 27 PRODCOM original data for NACE 26302200 - Telephones for cellular networks or for other wireless networks, 2007-2018

	apparent consumption	sold units
2007	265.176.446	
...	...	
2011	183.237.867	
2012	178.877.483	141.500.000
2013	175.747.530	144.500.000
2014	172.104.432	146.900.000
2015	171.180.009	147.700.000
2016	163.085.566	147.600.000
2017	163.046.932	147.500.000
2018	154.215.775	147.800.000
2019		148.200.000
2020		134.600.000
2021		141.300.000
2022		145.200.000
2023		147.900.000

Sold mobile phones (statista)

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## Task 2 – Market and Stock Data: Mobile Phones Devices in use in EU 27

	Individuals use a smartphone for private purposes in % (Eurostat)	Proportion of individuals using a mobile cellular telephone in % (ITU)
<b>European Union - 27</b>	<b>73</b>	<b>n.a.</b>
Belgium	71	97,3 (2017)
Czech Republic	68	96,0 (2018)
Denmark	91	88,5 (2018)
Germany	77	n.a.
Spain	84	96,9 (2019)
France	69	n.a.
Italy	76	91,5 (2017)
Netherlands	87	n.a.
Austria	82	n.a.
Poland	67	n.a.
Portugal	58	n.a.
Romania	57	60,8 (2018)
Slovenia	71	96,2 (2018)
Slovakia	59	n.a.
Finland	86	n.a.
Sweden	86	83,6 (2017)

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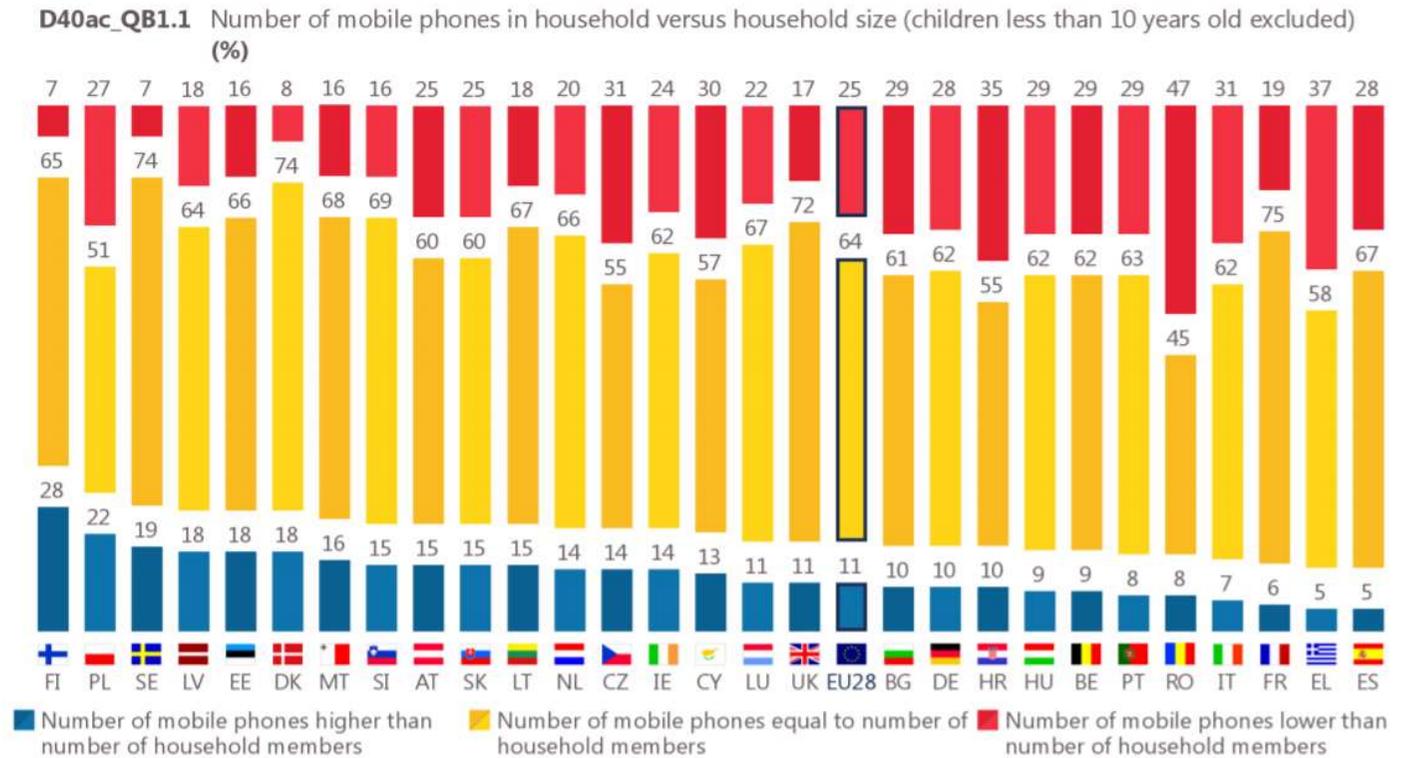
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# Task 2 – Market and Stock Data: Mobile Phones

## Devices in use in EU 27

EU 28, Number of mobile phones in households, 2017 (European Commission 2018)



Base: Respondents who answered 'Don't know' are excluded from the base (N= 27,995)

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## Task 2 – Market and Stock Data: Mobile Phones Subscriptions

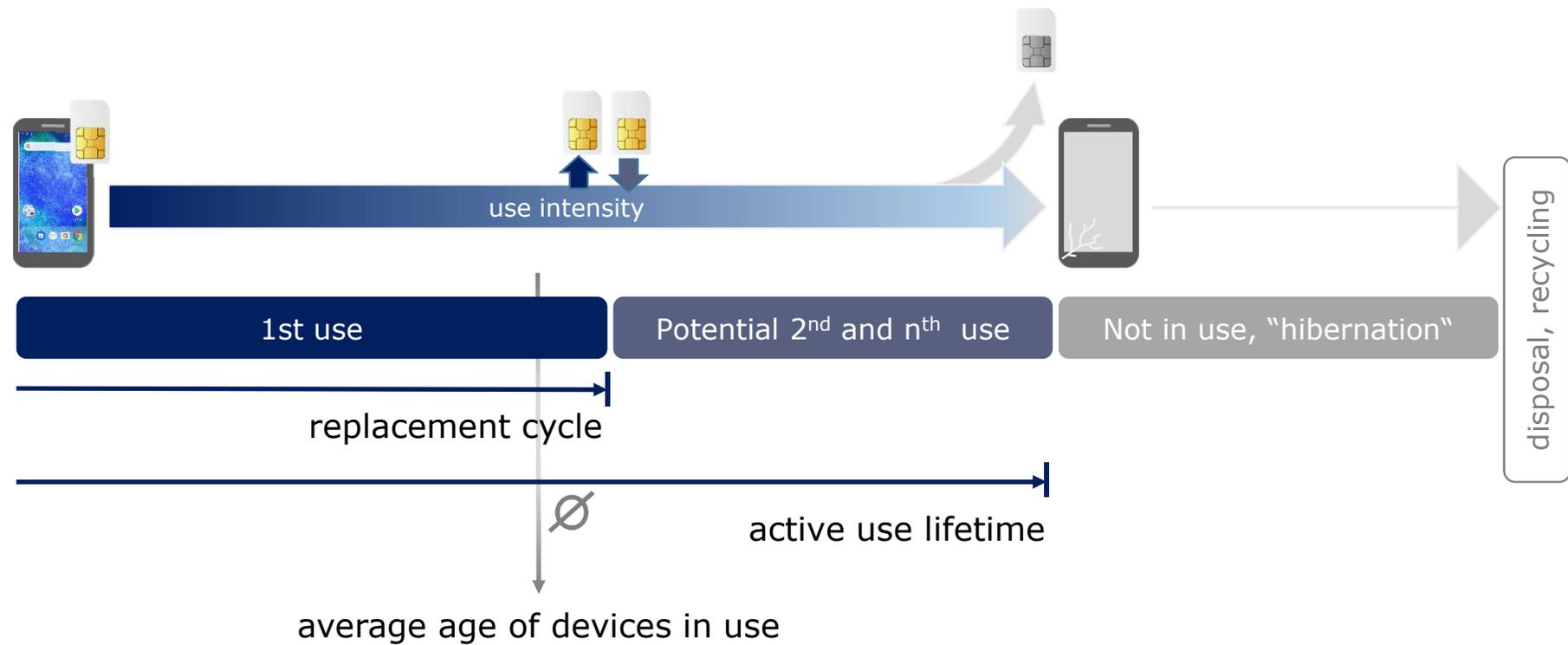
EU 27 Mobile cellular subscriptions, 1990-2018  
(ITU based on Eurostat,  
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## Task 2 – Market and Stock Data: Mobile Phones

### Lifetime terms



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## Task 2 – Market and Stock Data: Mobile Phones

### Product lifetime

	years	source
Average age of devices in use	1,7	iPhones, 2016, coconutBattery, Clemm et al.
Replacement cycle	1,75	Germany, 2017, Counterpoint Research
	2,18	France, Germany, Great Britain, Italy and Spain, 2018, Kantar Worldpanel
	2,8	Global forecast 2020, Morgan Stanley
Active use lifetime	4,3	Belgium, FNAC DARTY, harris interactive, ADEME 2019
	3	France, FNAC DARTY, harris interactive, ADEME 2019
	4,1	iPhones, end of 2018, active base of iPhones as published by Apple vs. sold units reported by market research
	3,7	2018, mobile subscriptions divided by annual sales
	<b>3</b>	<b><i>assumption stock model</i></b>

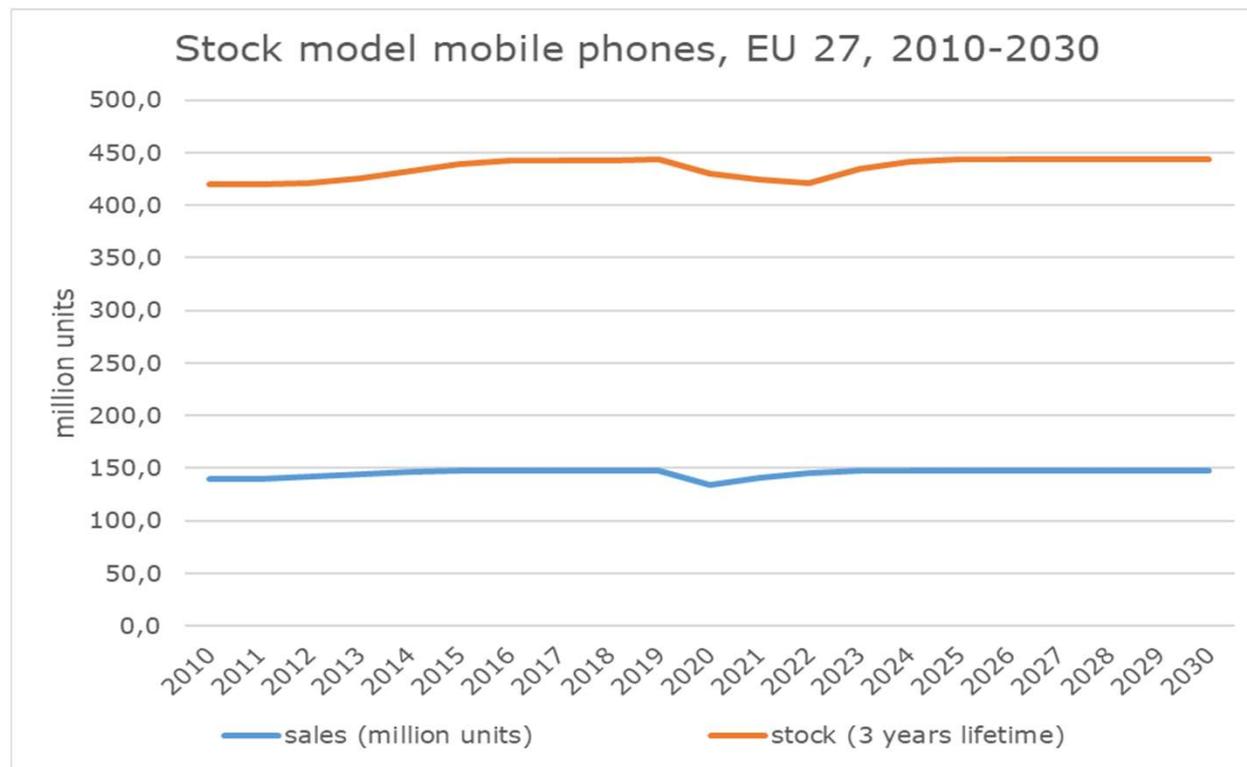
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## Task 2 – Market and Stock Data: Mobile Phones

### Total devices in use – Stock model



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## Task 2 – Market and Stock Data: Mobile Phones

# Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

## Task 2 – Market and Stock Data: Cordless Phones

### Units sold in EU 27

- EU 27 PRODCOM original data for NACE 26302100 - Line telephone sets with cordless handsets, 2018

	exported quantity (units) EXPQNT	imported quantity (units) IMPQNT	produced quantity (units) PRODQNT	apparent consumption (PRODQNT+IMPQNT- EXPQNT)
EU 27	1.704.713	9.478.019	6.000.000	13.773.306

## Task 2 – Market and Stock Data: Cordless Phones

### Units sold in EU 27

EU 27 PRODCOM original data for NACE 26302100 - Line telephone sets with cordless handsets, 2008-2018

	apparent consumption
2008	38.425.338
2009	33.115.683
2010	28.923.461
2011	29.965.058
2012	28.866.846
2013	19.168.258
2014	23.097.282
2015	16.850.253
2016	14.033.810
2017	18.324.905
2018	13.773.306

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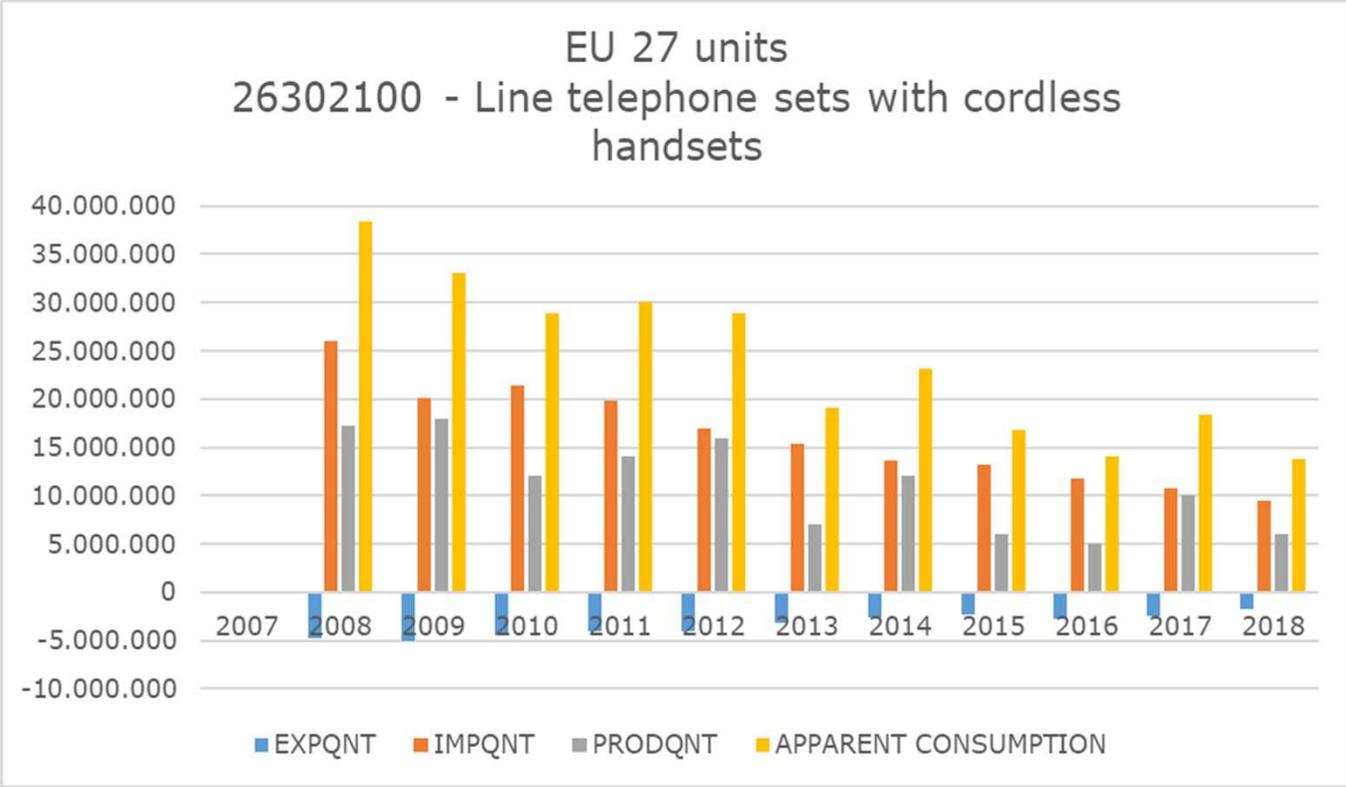
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# Task 2 – Market and Stock Data: Cordless Phones

## Units sold in EU 27

EU 27 PRODCOM original data for NACE 26302100 - Line telephone sets with cordless handsets, 2008-2018

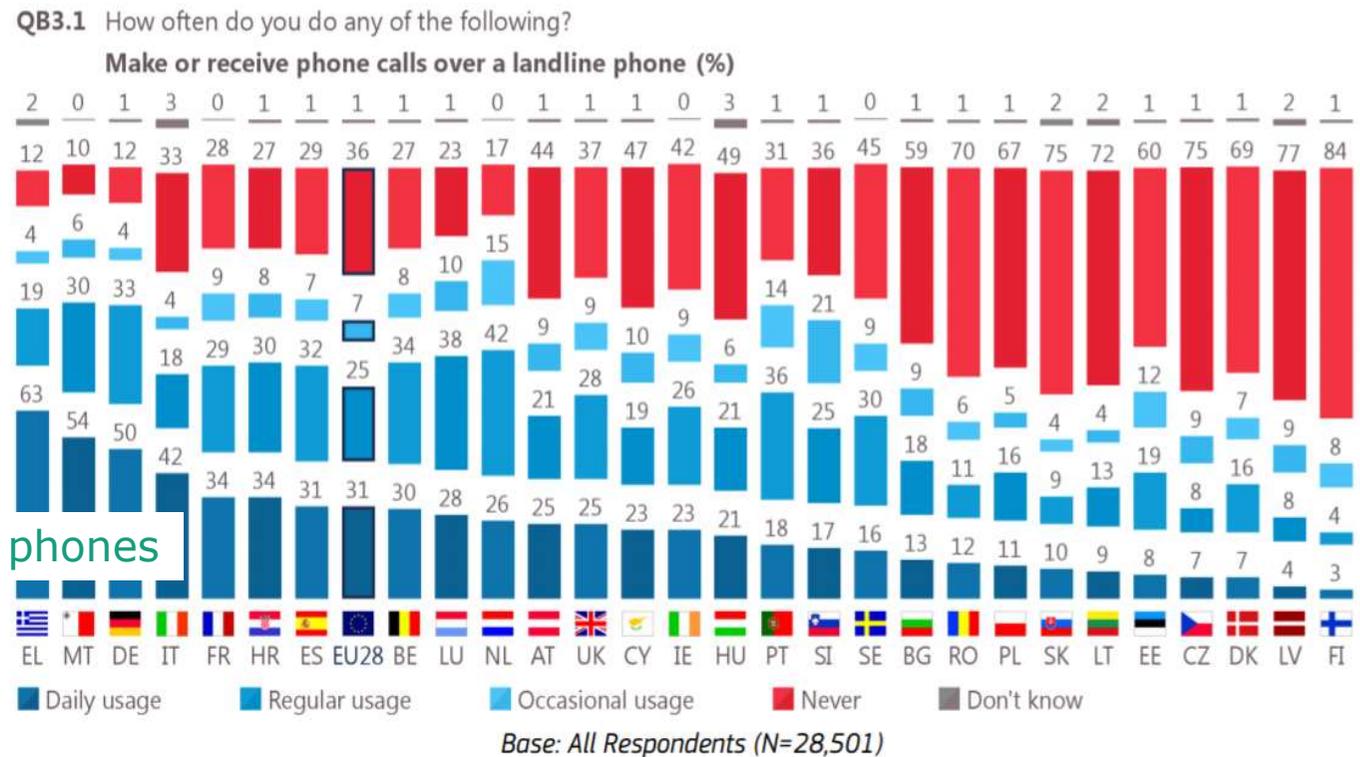


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# Task 2 – Market and Stock Data: Cordless Phones

## Devices in use in EU 27

EU 28, Use of landline phones (European Commission 2018)



Landline phones > cordless phones

# Task 2 – Market and Stock Data: Cordless Phones Subscriptions

EU 27 Fixed telephone subscriptions, 1990-2018 (ITU, License : CC BY-4.0)

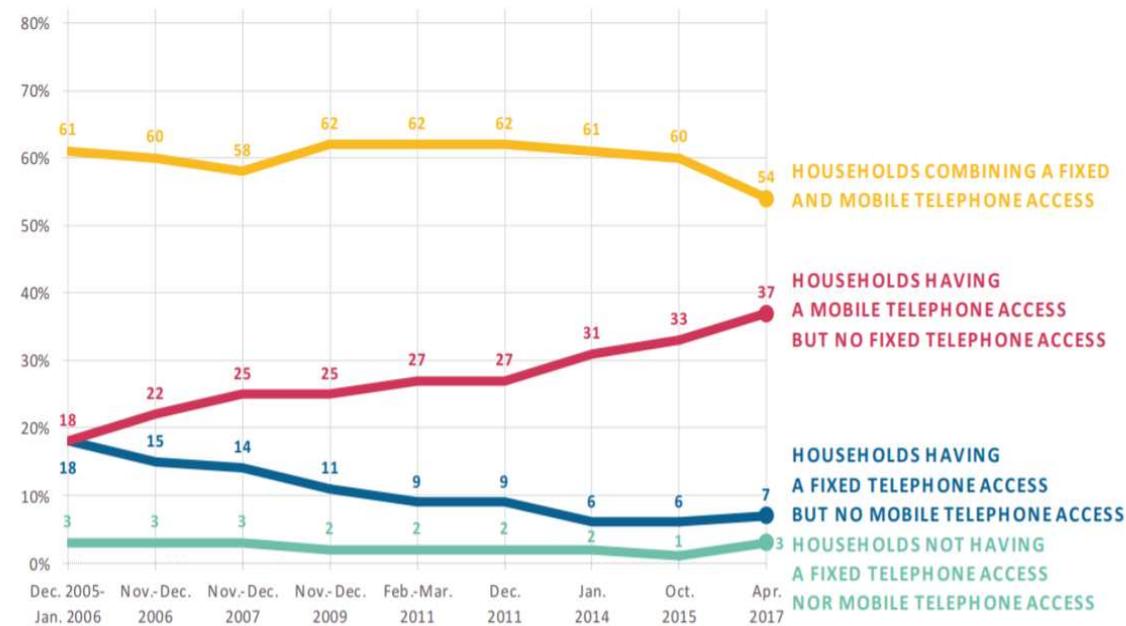


# Task 2 – Market and Stock Data: Cordless Phones

## Telephone access

EU 28, Access to mobile and fixed phones, 2005 - 2017 (European Commission 2018)

D43\_QB1 Household telephone access (% - EU)



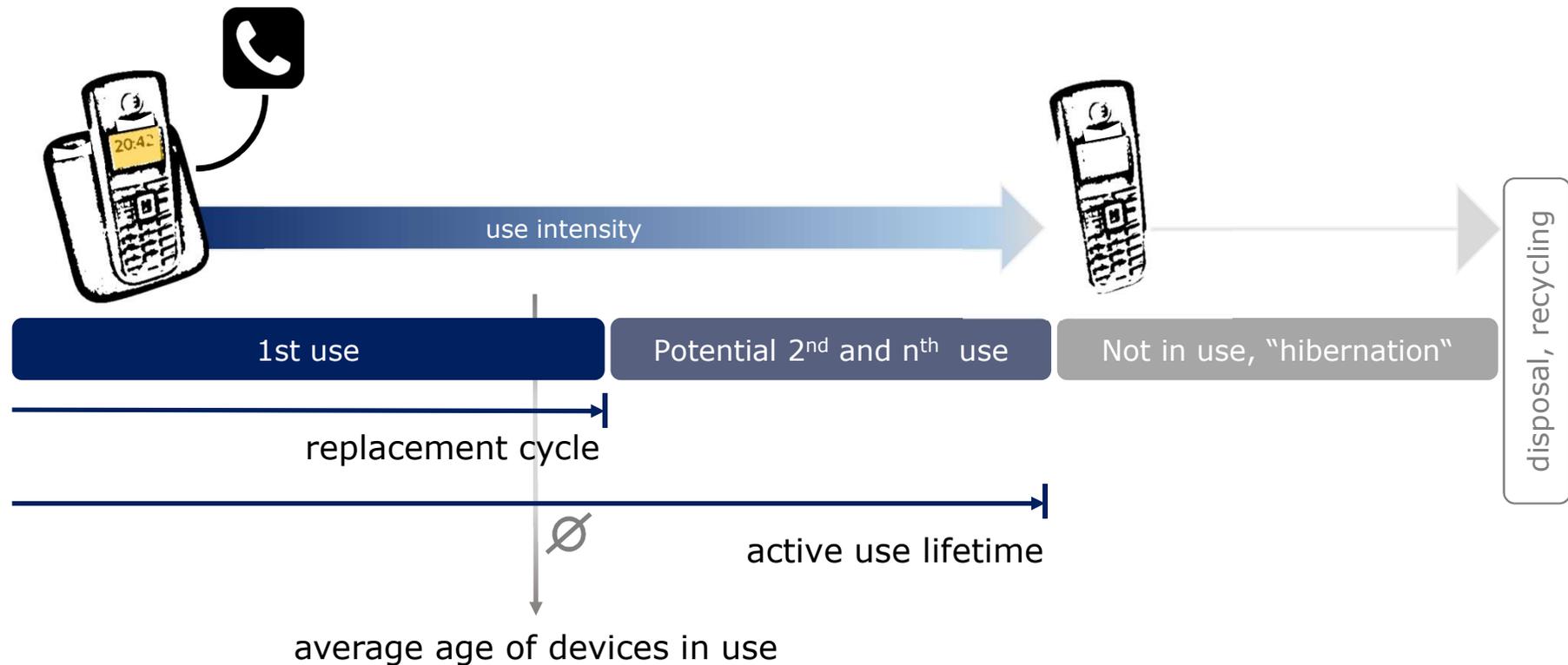
Fixed lines ≠ cordless phones

Base: Respondents who answered 'Don't know' are excluded from the base (N= 27,995)

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## Task 2 – Market and Stock Data: Cordless Phones

### Lifetime terms



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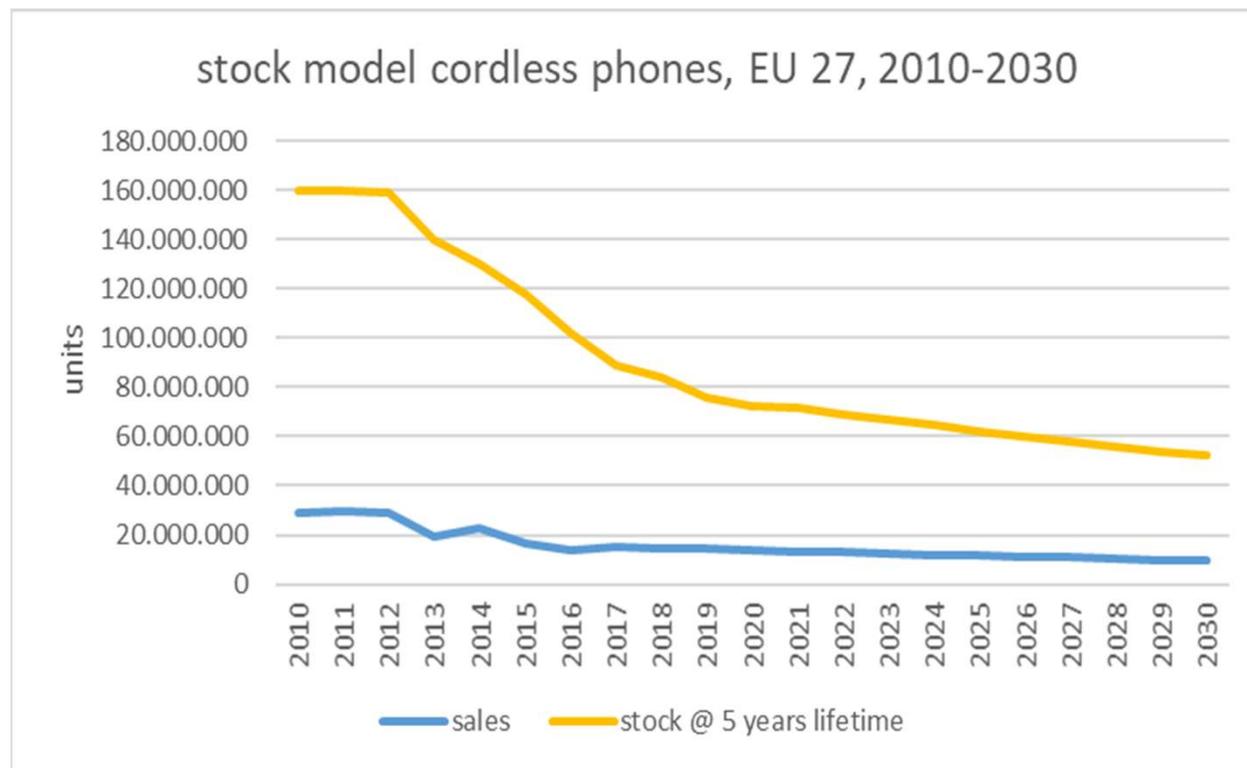
## Task 2 – Market and Stock Data: Cordless Phones

### Product lifetime

	years	source
Average age of devices in use	n.a.	
Replacement cycle	10	(Hurley and Keller 1999)
	3 - 5	Placetel
	4 - 4,5	fixed telephone subscriptions / market size
Active use lifetime	8	(Stobbe et al. 2015)
	<b>5</b>	<b><i>assumption stock model</i></b>

## Task 2 – Market and Stock Data: Cordless Phones

### Total devices in use – Stock model



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## Task 2 – Market and Stock Data: Cordless Phones

# Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

## Task 2 – Market and Stock Data: Tablets

### Units sold in EU 27

- EU 27 PRODCOM original data for NACE 26201100 - Laptop PCs and palm-top organisers, 2018  
Includes tablets, but also notebooks!

	exported quantity (units) EXPQNT	imported quantity (units) IMPQNT	produced quantity (units) PRODQNT	apparent consumption (PRODQNT+IMPQNT- EXPQNT)
EU 27	9.945.983	60.953.750	928.646	51.007.767
UK	3.546.396	17.491.985	170.765	13.945.589
EU 28	6.628.616	71.293.816	1.099.411	64.665.200

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## Task 2 – Market and Stock Data: Tablets

### Units sold in EU 27

- EU, tablet sales, Computer Review Study (EU 28) and approximation for EU 27, 2010-2030; including pre-COVID-19 forecast

	Sales, million units				
	2010	2015	2020	2025	2030
Tablets/slates as defined in (EU) 617/2013, EU 28	3,65	40,79	38,38	38,47	38,56
Tablets/slates as defined in (EU) 617/2013, EU 27	2,88	32,22	30,32	30,39	30,46

## Task 2 – Market and Stock Data: Tablets

### Units sold globally

- Global tablet unit shipments 1Q20 (IDC 2020)

	Sales, million units		
	1Q19	1Q20	Year-over-year growth
Tablets, total	30,1	24,6	-18,2%

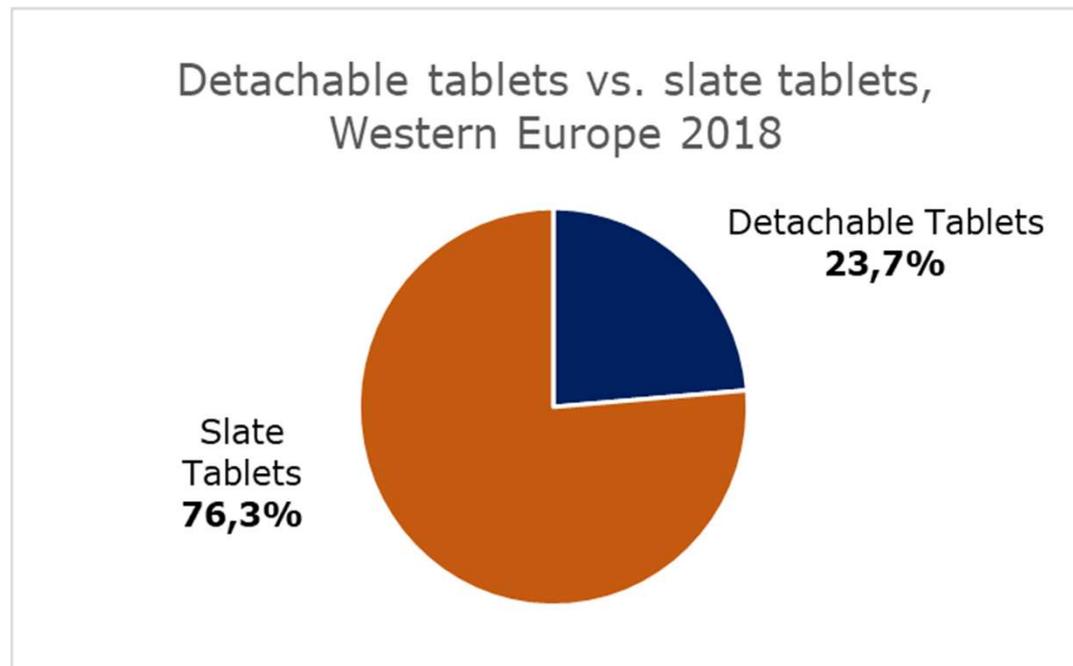
- recovery of the tablet market?
- tablet sales figures need to be corrected downwards compared to Computer Review Study, EU27 annual sales of max. 25 million units is more likely

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## Task 2 – Market and Stock Data: Tablets

### Units sold in EU 27

- Western Europe, Market share of detachable tablets and slate tablets, 2018 (data by IDC)



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## Task 2 – Market and Stock Data: Tablets

### Products in use in EU 27

- Various EU member states, tablet users (2014-2017, data by eMarketer)

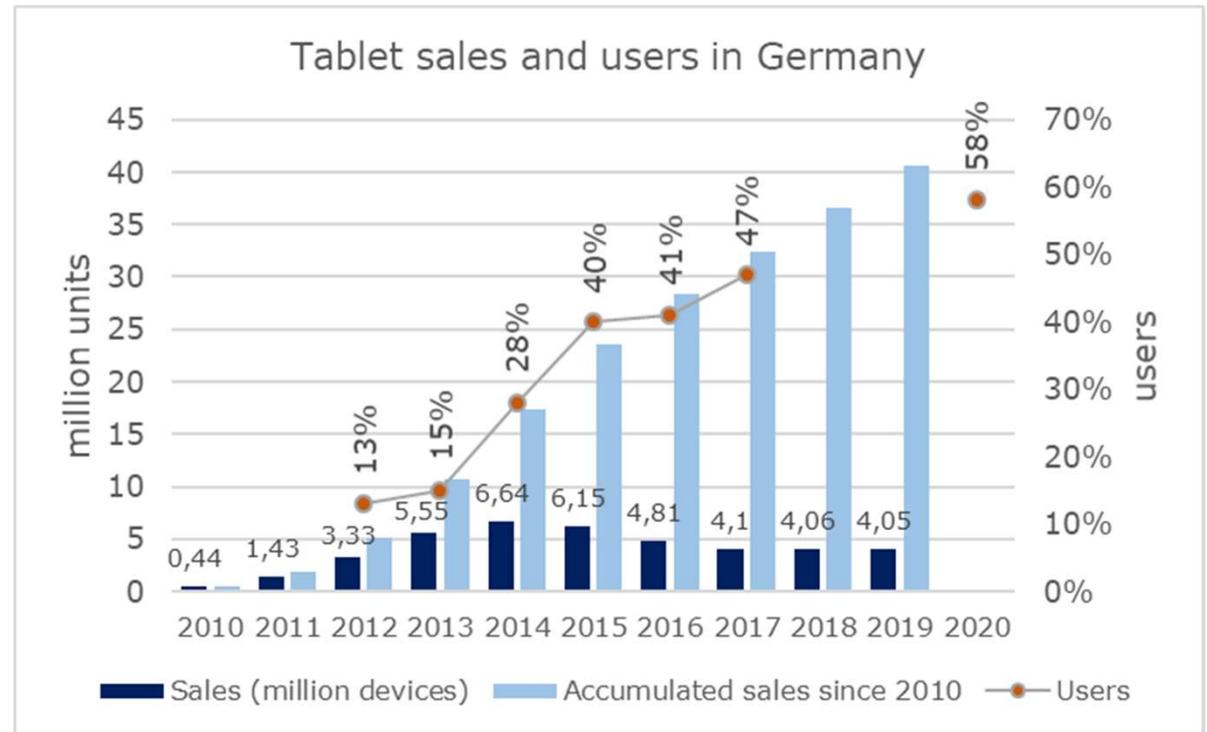
	Users			
	2014	2015	2016	2017
Germany	27,7	31,0	34,3	36,9
France	21,8	24,3	26,6	28,6
Italy	15,6	17,9	19,8	21,6
Spain	15,1	17,1	19,8	21,0
Netherlands	8,4	9,1	9,7	10,2
Sweden	4,3	4,8	5,1	5,5
Denmark	2,6	2,8	3,0	4,2
Finland	1,8	2,1	2,4	2,6
Ireland	2,0	2,2	2,4	2,6
Poland	6,7	7,4	8,1	8,8
Czech Republic	1,9	2,2	2,4	2,6
<b>Total</b>	<b>107,9</b>	<b>120,9</b>	<b>133,6</b>	<b>144,6</b>

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## Task 2 – Market and Stock Data: Tablets

### Products in use

- Germany, tablet computer sales and use, 2010 – 2020 (based on data by statista and own calculations)



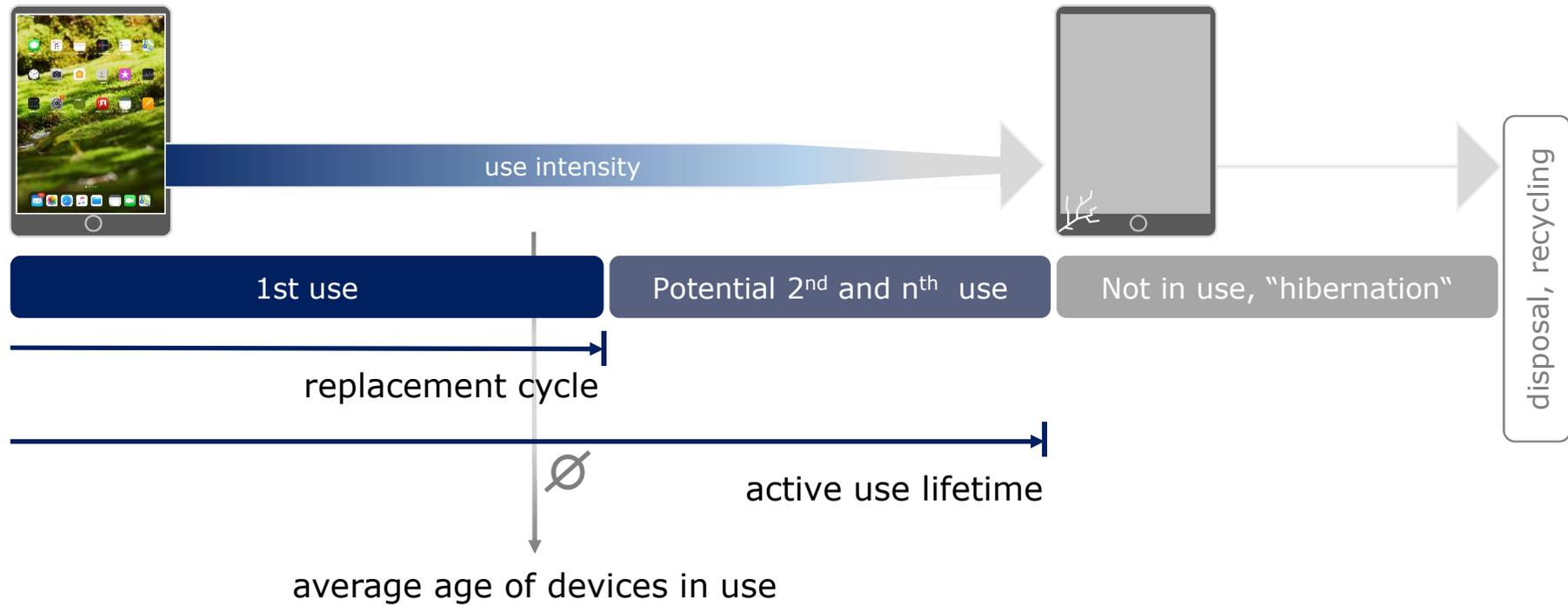
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# Task 2 – Market and Stock Data: Tablets

## Lifetime terms

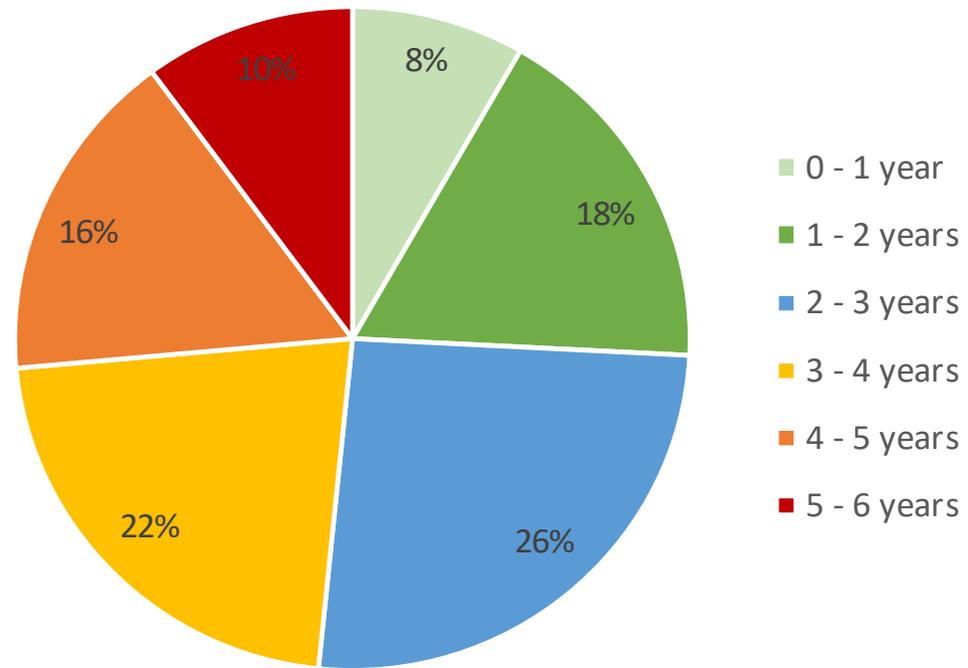


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## Task 2 – Market and Stock Data: Tablets

### Lifetime

- iPad battery data, 2016, (Clemm, Sinai et al.): Age structure of active tablet batteries



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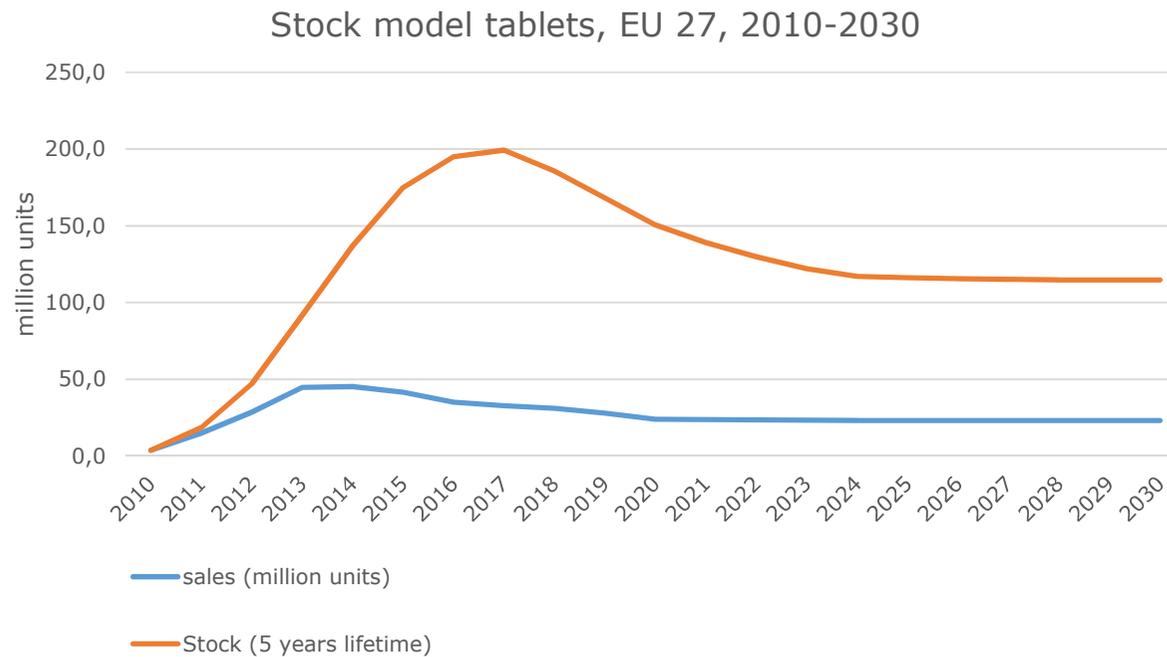
# Task 2 – Market and Stock Data: Tablets

## Product lifetime

	years	source
Average age of devices in use	3	iPads, 2016, coconutBattery, Clemm et al.
Replacement cycle	6,72	USA, 2023 forecast, statista
Active use lifetime	<b>5</b>	<b><i>assumption stock model</i></b>

## Task 2 – Market and Stock Data: Tablets

### Total devices in use – Stock model



scenario: 4 years lifetime, recovery of the market from 2021 onwards to 2018 level

scenario: 5 years lifetime until 2017, then gradually increasing to 6,5 years in 2023

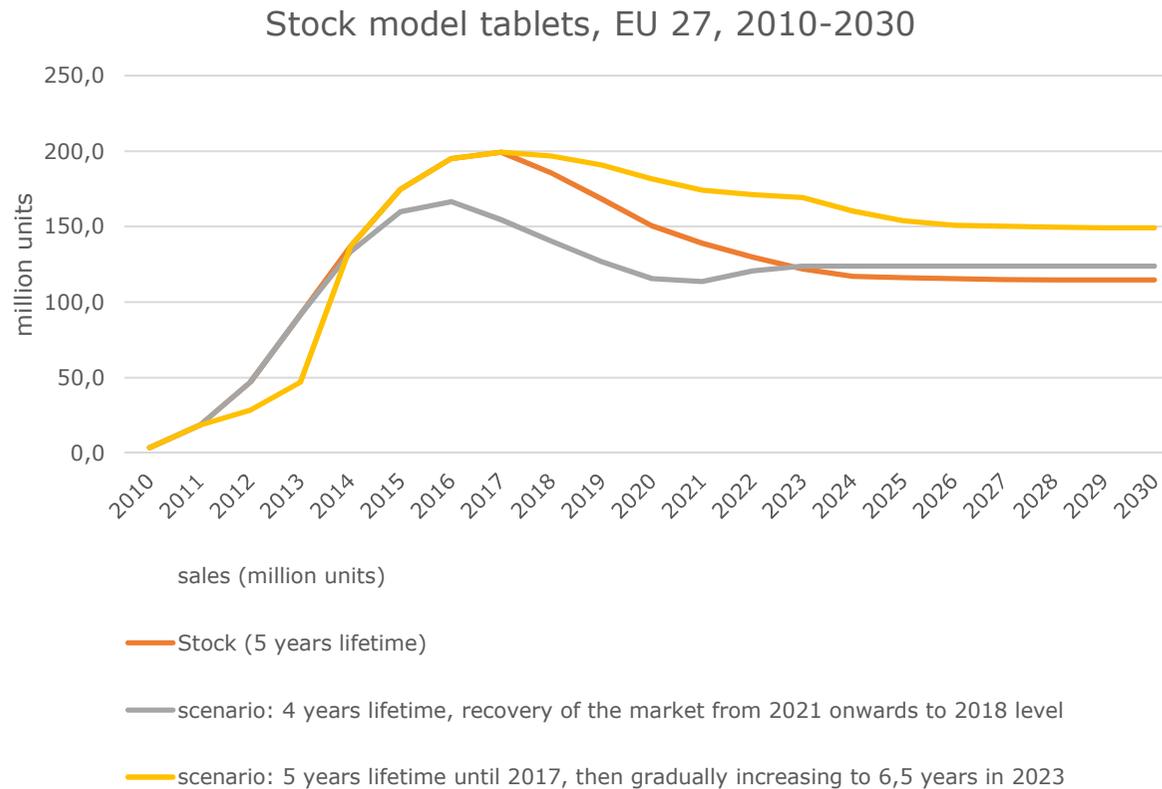
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## Task 2 – Market and Stock Data: Tablets

### Total devices in use – Stock model



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## Task 2 – Market and Stock Data: Tablets

# Q&A

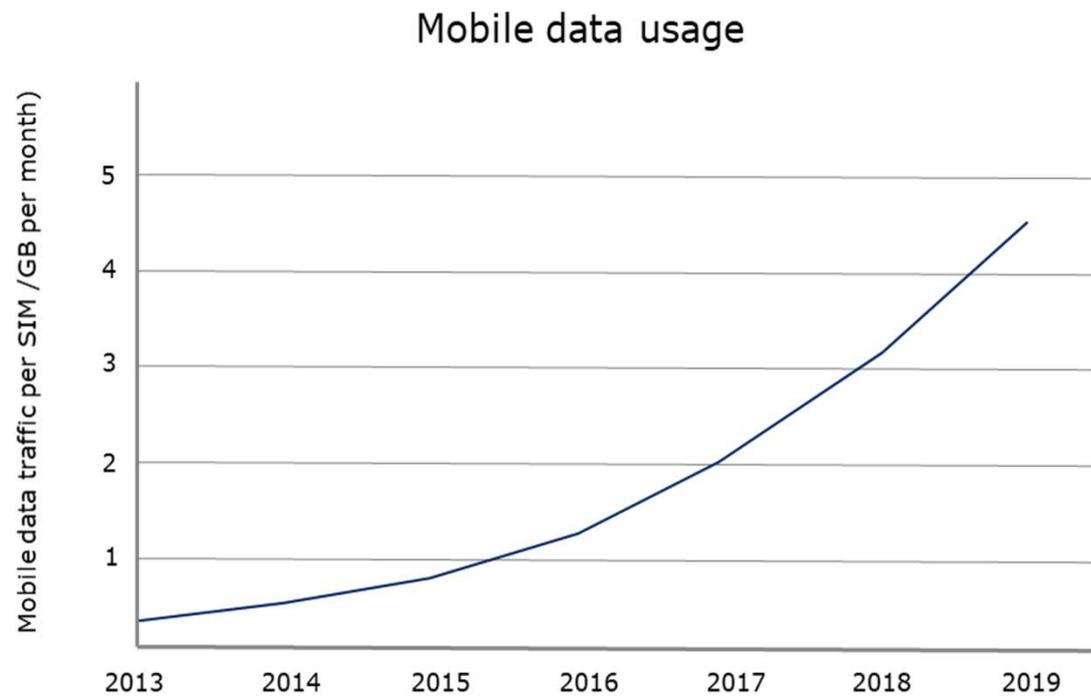
short comments or questions: chat

complex comments or questions: topic -> chat AND #

## Task 2 – Market Trends

### Mobile data traffic

- Mobile data usage per SIM, per month, Europe (data by ETNO)

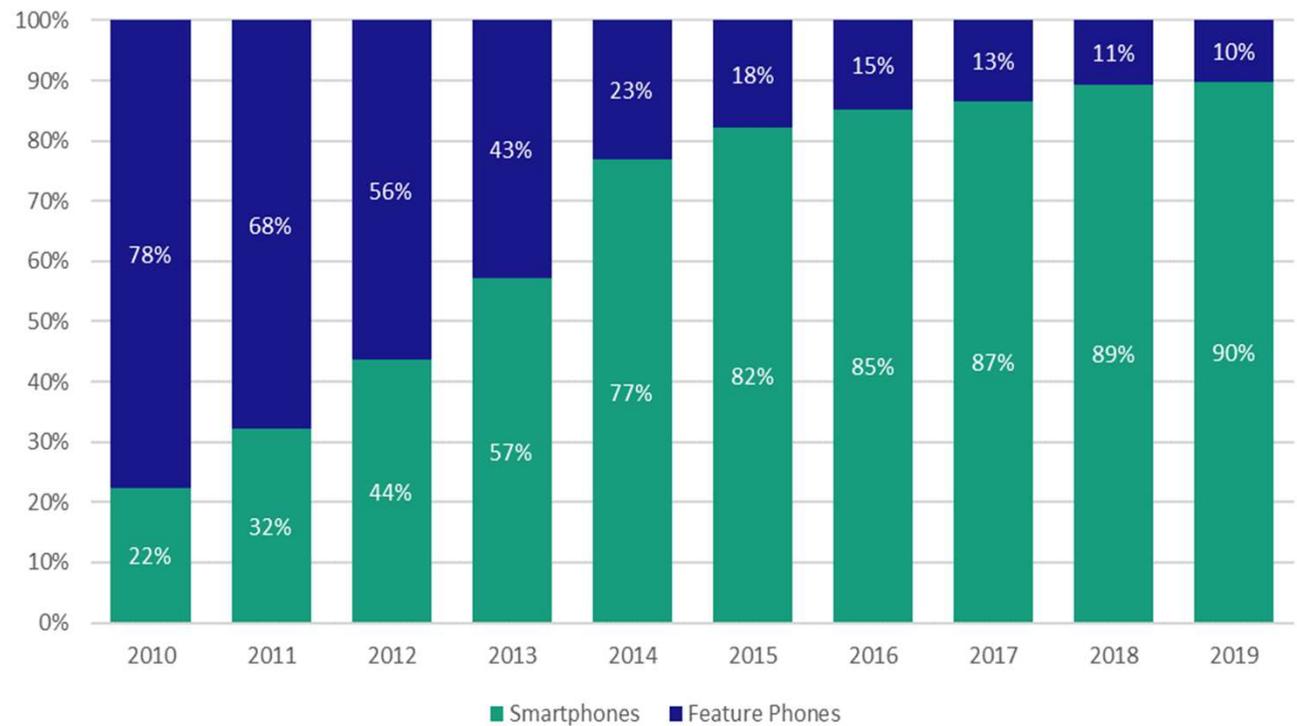


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## Task 2 – Market Trends

### Smartphones and feature phones

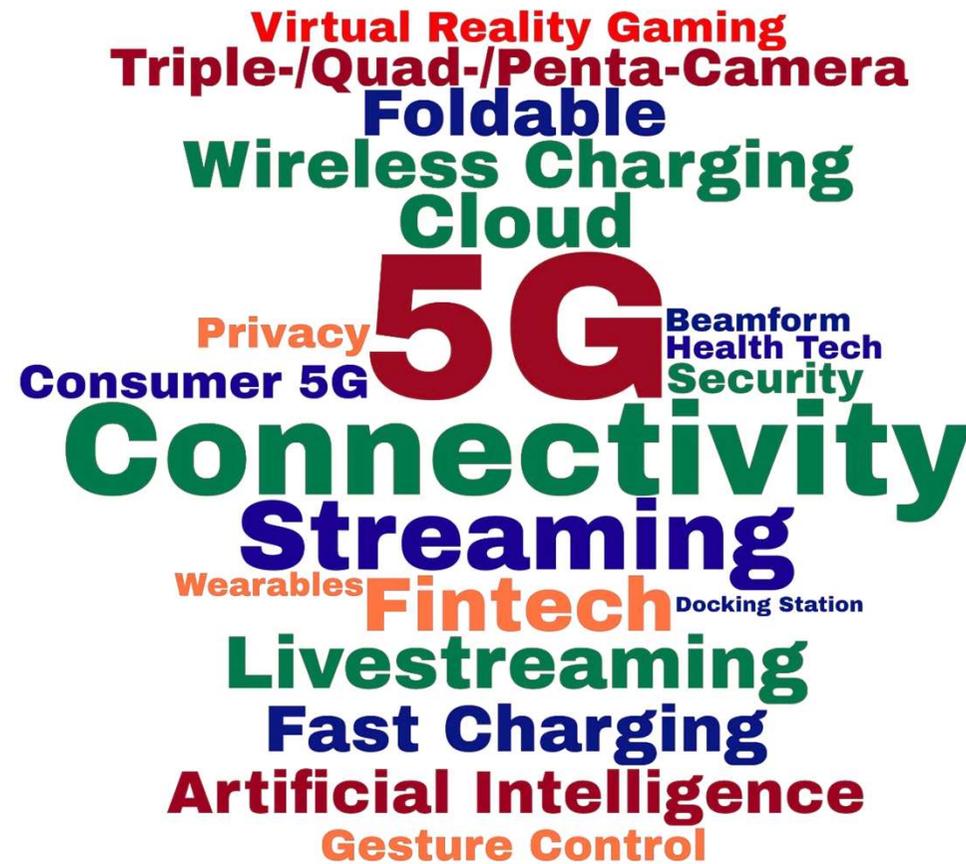
- Market share of smartphones and feature phones in Europe (2010-2019) (data by Counterpoint)



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## Task 2 – Market Trends

### Overview



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## Task 2 – Market Trends

# Q&A

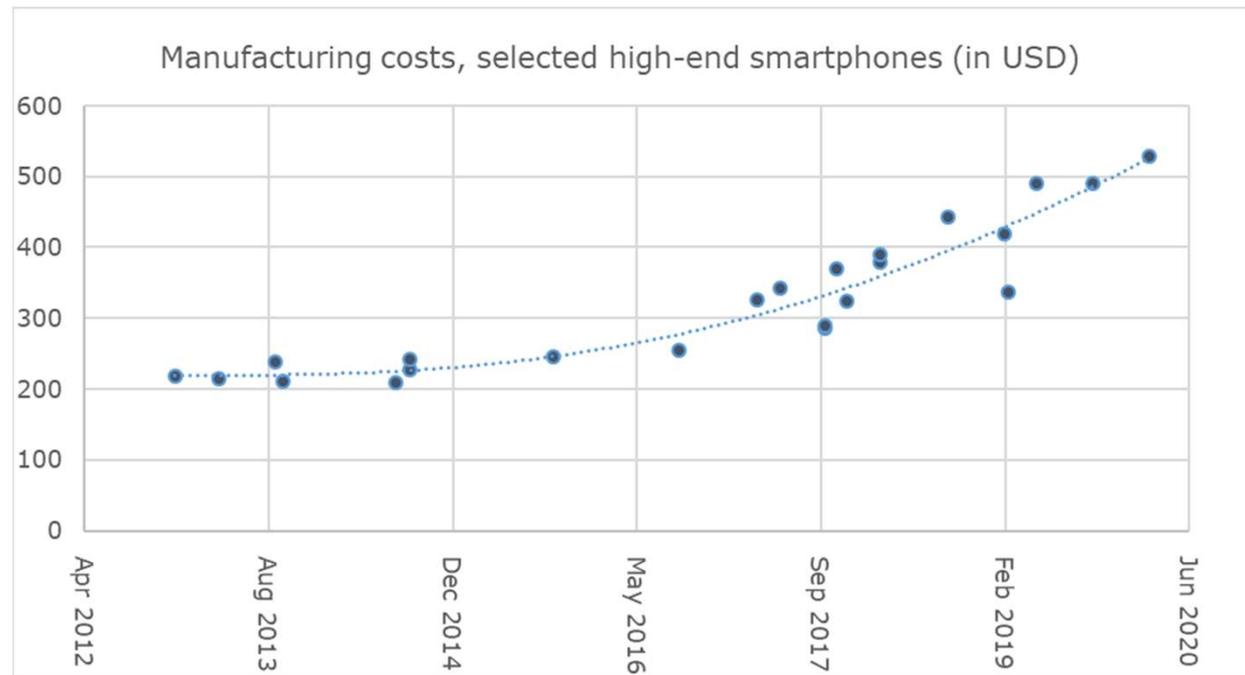
short comments or questions: chat

complex comments or questions: topic -> chat AND #

## Task 2 – Consumer Expenditure Base Data

### Manufacturing costs for high-end smartphones between 2012-2020 (USD)

- Manufacturing costs for high-end smartphones exceeded 500 USD for components (bill of materials) and final test and assembly.



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## Task 2 – Consumer Expenditure Base Data

### Manufacturing costs for high-end smartphones between 2012-2020 (USD)

Category	Samsung Galaxy S8 SM-G950F <i>Apr 2017</i>	Samsung Galaxy S8+ SM-G955F <i>Jun 2017</i>	Apple iPhone 8 A1905 <i>Oct 2017</i>	Huawei Mate 10 <i>Oct 2017</i>	Samsung Note 8 SM-N950F <i>Nov 2017</i>	Apple iPhone 8+ A1864 <i>Dec 2017</i>	Samsung Galaxy S9+ SM-G965F/DS <i>Mar 2018</i>	Apple iPhone X A1865 <i>Mar 2018</i>	Google Pixel 3 XL G013C <i>Feb 2019</i>	Samsung Galaxy S10+ SM-G975F <i>Feb 2019</i>	Samsung Galaxy S10 5G SM-G977N <i>May 2019</i>	Apple iPhone 11 Pro Max <i>Oct 2019</i>	Samsung Galaxy S20 Ultra 5G <i>Mar 2020</i>
Applications Processor	-	-	52,00	-	-	52,00	-	52,00	-	-	-	64,00	-
Applications/Baseband Processor	71,00	71,00	-	52,50	68,50	-	68,00	-	64,17	70,50	70,50	-	81,00
Baseband Processor	-	-	14,50	-	-	12,50	-	12,50	-	0,00	32,08	25,50	26,50
Battery	4,00	4,00	4,00	6,00	4,00	4,50	5,50	6,50	10,33	10,50	11,50	10,50	7,50
Camera / Image	25,50	32,00	20,00	35,00	40,50	35,00	48,00	43,00	47,94	56,50	62,50	73,50	107,50
Connectivity	10,50	11,00	11,50	6,50	11,00	10,00	12,00	9,50	4,95	10,50	10,00	10,50	9,50
Display / Touchscreen	76,50	78,50	36,00	31,00	82,00	47,50	72,50	77,00	54,45	86,50	90,00	66,50	67,00
Memory: Non-Volatile	22,00	22,00	20,50	24,00	21,00	21,00	12,00	19,50	6,81	11,50	18,00	58,00	23,50
Memory: Volatile	18,00	18,00	16,50	31,50	36,00	26,50	39,00	25,50	21,81	39,00	37,50	11,50	44,00
Mixed Signal	-	-	-	0,50	-	-	-	-	2,40	0,50	0,50	1,50	0,50
Non-Electronics	21,50	26,50	21,50	17,00	23,50	28,00	29,00	46,00	21,79	29,00	32,50	61,00	30,50
Other	15,50	15,00	15,50	17,50	16,50	15,00	15,00	18,00	16,24	17,00	18,00	21,00	28,00
Power Management / Audio	8,50	8,50	12,00	10,50	7,00	12,00	8,50	14,50	10,39	7,00	10,00	10,50	9,50
RF Component	18,50	18,50	25,00	20,50	19,00	23,00	23,50	22,50	25,65	31,00	46,00	30,00	33,00
Sensor	4,50	4,00	4,00	5,50	4,00	4,00	5,00	5,50	6,15	3,50	2,50	1,50	11,00
Substrates	11,00	13,50	9,00	9,50	12,50	10,00	19,50	13,50	17,54	12,50	26,00	16,50	12,50
Supporting Materials	7,50	8,00	7,00	8,00	9,00	7,00	9,00	7,00	9,34	8,50	8,50	7,50	9,50
Final Assembly & Test	12,00	12,50	16,00	14,50	14,50	16,50	12,50	17,00	17,16	14,00	14,00	21,00	27,50
<b>Total</b>	<b>326,50</b>	<b>343,00</b>	<b>285,00</b>	<b>290,00</b>	<b>369,00</b>	<b>324,50</b>	<b>379,00</b>	<b>389,50</b>	<b>337,12</b>	<b>420,00</b>	<b>490,08</b>	<b>490,50</b>	<b>528,50</b>

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## Task 2 – Consumer Expenditure Base Data

### Average retail prices for mobile phones in selected EU MS and EU 27 (EUR)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
France	336	362	386	408	424	435	442	447	450	451	452	452
Netherlands	333	349	364	378	392	406	418	430	441	451	459	466
Germany	240	269	296	332	371	402	421	431	437	440	442	443
Italy	305	324	344	359	370	377	381	382	383	384	384	384
Denmark	364	376	386	397	408	419	430	440	449	456	463	468
Greece	307	332	357	381	403	423	440	455	468	478	487	495
Portugal	345	350	354	357	360	361	362	363	363	363	363	363
Spain	329	337	346	353	359	363	365	366	367	367	367	367
Belgium	355	366	381	398	417	438	459	478	495	509	520	529
Sweden	344	355	365	375	384	392	399	406	412	417	421	425
Finland	318	319	321	322	324	325	326	327	327	327	328	328
Austria	352	367	380	392	403	412	421	428	435	441	445	450
Estonia	287	303	318	333	347	362	375	387	398	407	414	421
Latvia	251	271	289	304	315	322	325	326	327	327	327	327
Poland	263	312	331	349	365	379	392	403	412	420	427	433
Czech Republic	291	305	320	333	346	358	369	379	388	396	403	408
Hungary	294	318	341	362	381	399	414	428	440	451	460	467
Romania	279	308	332	351	365	375	383	389	394	398	400	402
Bulgaria	270	277	283	290	297	305	311	317	322	326	328	331
<b>EU 27</b>	<b>290</b>	<b>311</b>	<b>330</b>	<b>348</b>	<b>364</b>	<b>377</b>	<b>385</b>	<b>391</b>	<b>395</b>	<b>399</b>	<b>401</b>	<b>403</b>

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## Task 2 – Consumer Expenditure Base Data

### Component and assembly costs for selected high-end tablets (USD)

- The most cost-relevant components in tablets are display/touch panel/glass, processor and mass storage.

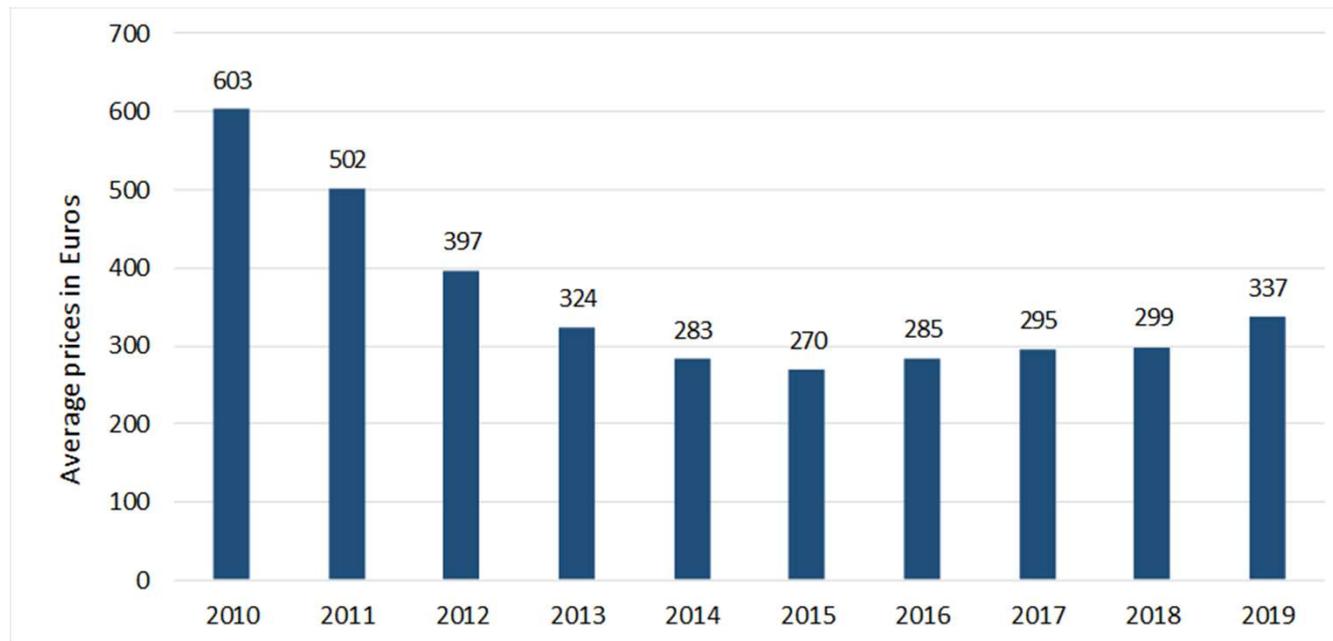
Category	Apple iPad 4 LTE A1459 (32GB) Nov 2012	Apple iPad mini LTE A1454 (32GB) Nov 2012	Apple iPad Air A1475 (32GB) Nov 2013	Apple iPad Air A1475 (128GB) Nov 2013
Display / Touch Panel / Glass	111,91	61,07	106,00	106,00
Battery	20,27	9,10	17,50	17,50
Camera	16,31	13,82	15,50	15,50
Connectivity	10,54	9,79	9,00	9,00
NAND	15,15	16,32	15,15	84,00
SDRAM	4,84	2,54	5,50	5,50
Processor	39,54	19,49	36,40	36,40
BB+XCR	28,18	24,23	24,07	24,07
Power Mgmt/Audio	7,34	6,78	4,25	4,25
Non-Electric	17,75	11,69	17,75	17,75
Other	39,09	29,49	38,50	38,50
Supporting Materials	5,20	3,80	5,20	5,20
Final Assembly & Test	12,04	9,64	12,00	12,00
<b>Total</b>	<b>326,16</b>	<b>217,76</b>	<b>306,82</b>	<b>306,82</b>

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## Task 2 – Consumer Expenditure Base Data

### Average price of tablets sold in Germany from 2010 to 2019

- The average tablet price in Germany dropped from 603 Euros in 2010 to 337 Euros in 2019. This indicates a trend towards more affordable lower-end devices in this market over the past decade.



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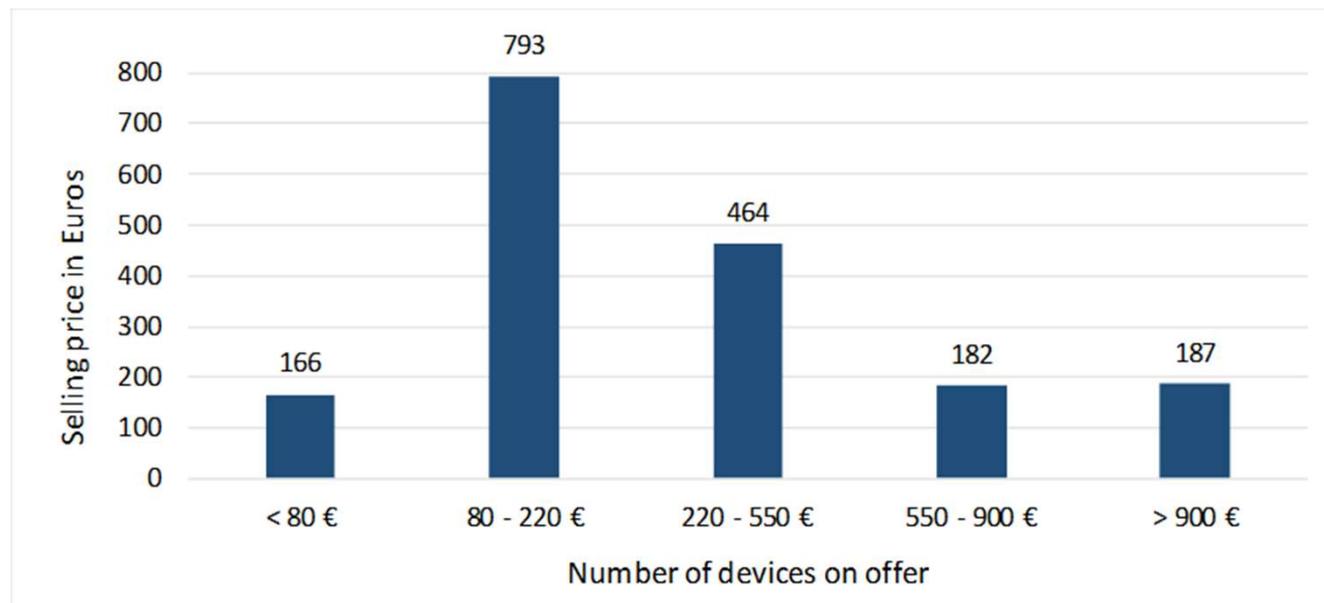
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Source: Fraunhofer IZM, based on Statista

## Task 2 – Consumer Expenditure Base Data

### Number of tablet models offered in different market segments on the German market

- Lower market devices with a price range 80-200 EUR clearly dominate the offer, followed by higher-end devices in the price range 220-550 EUR. These segments outnumber the bottom-end and high-end devices in the market.



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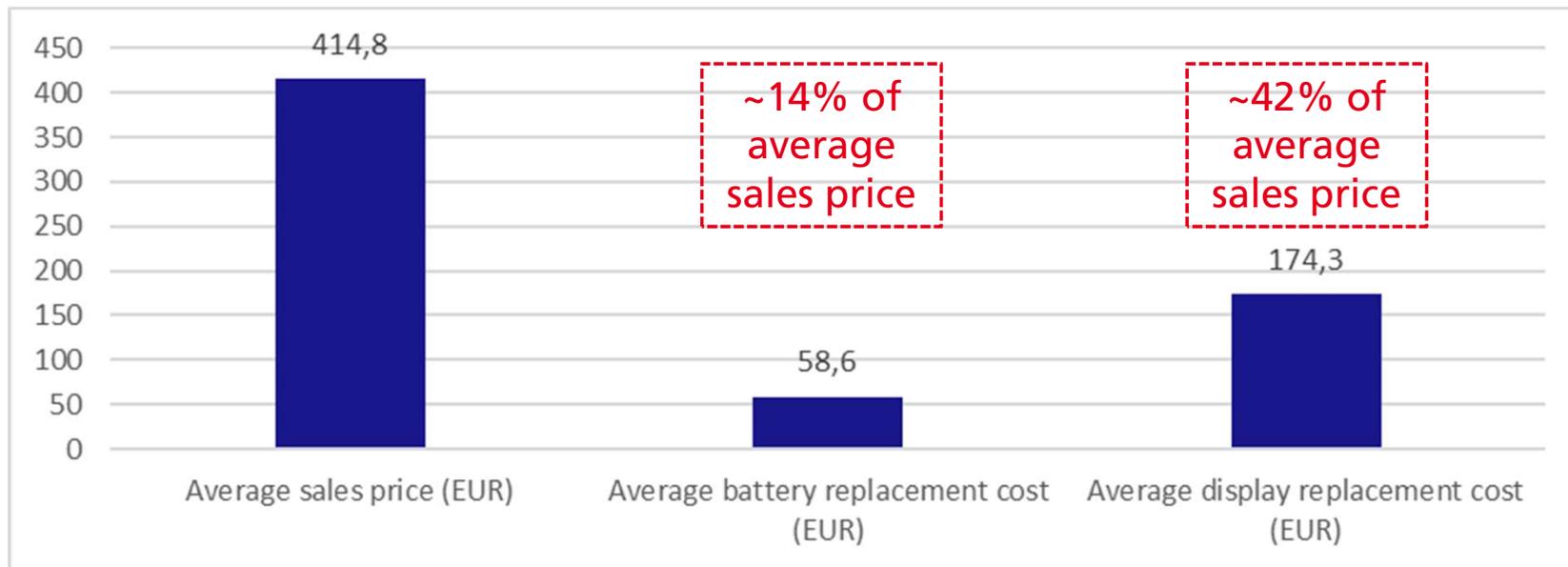
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Source: Fraunhofer IZM, based on indealo.de

## Task 2 – Consumer Expenditure Base Data

### Repair and refurbishment (mobile phones)

- An alternative data set of purchase prices, battery replacement costs as well as display replacement costs of 52 mobile phones from seven different manufacturers was collected from OEM websites and price comparison portals.



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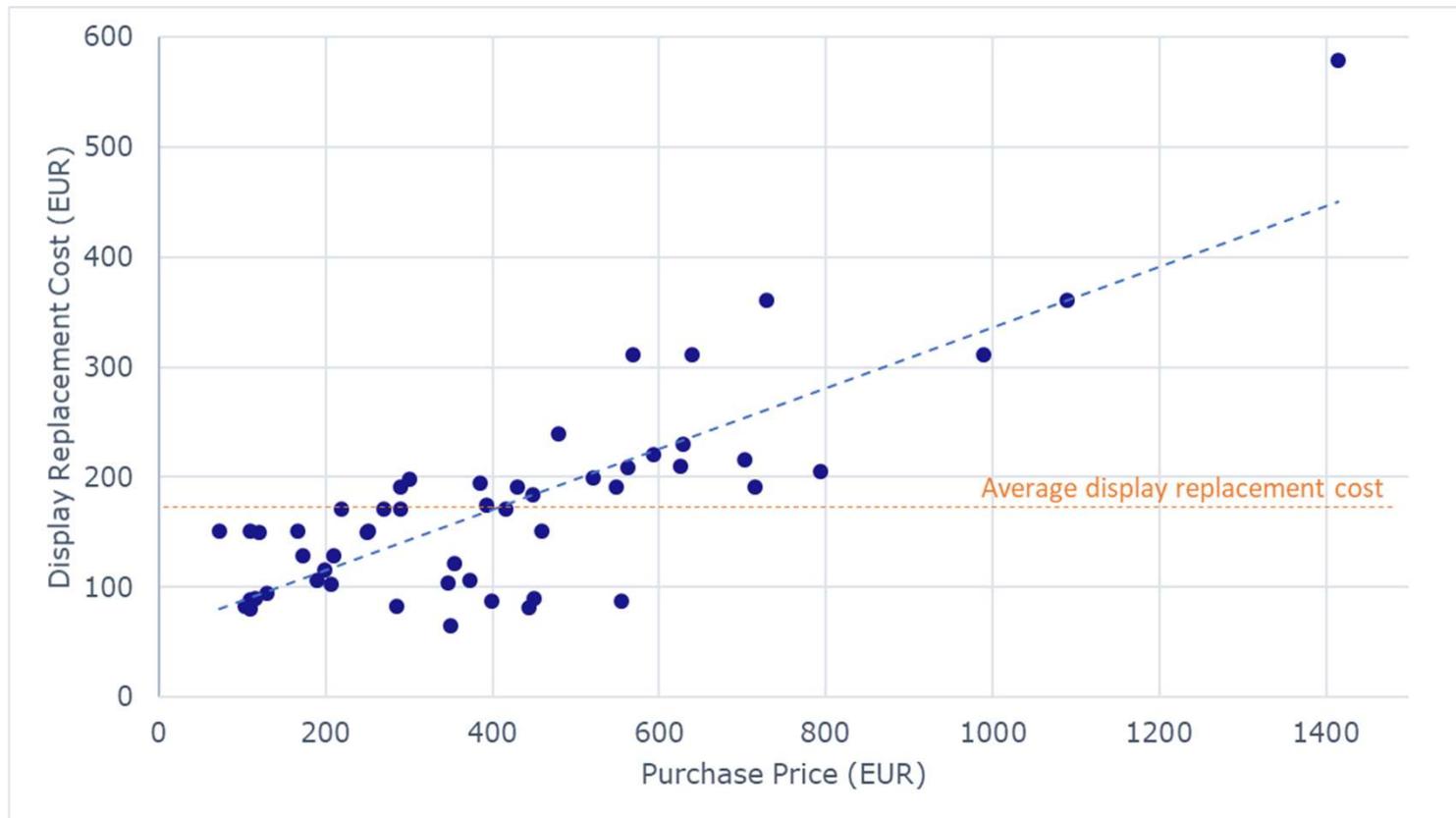
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Source: Fraunhofer IZM, based on OEM websites and price comparison portals



## Task 2 – Consumer Expenditure Base Data

### Mobile phones – Display replacement costs

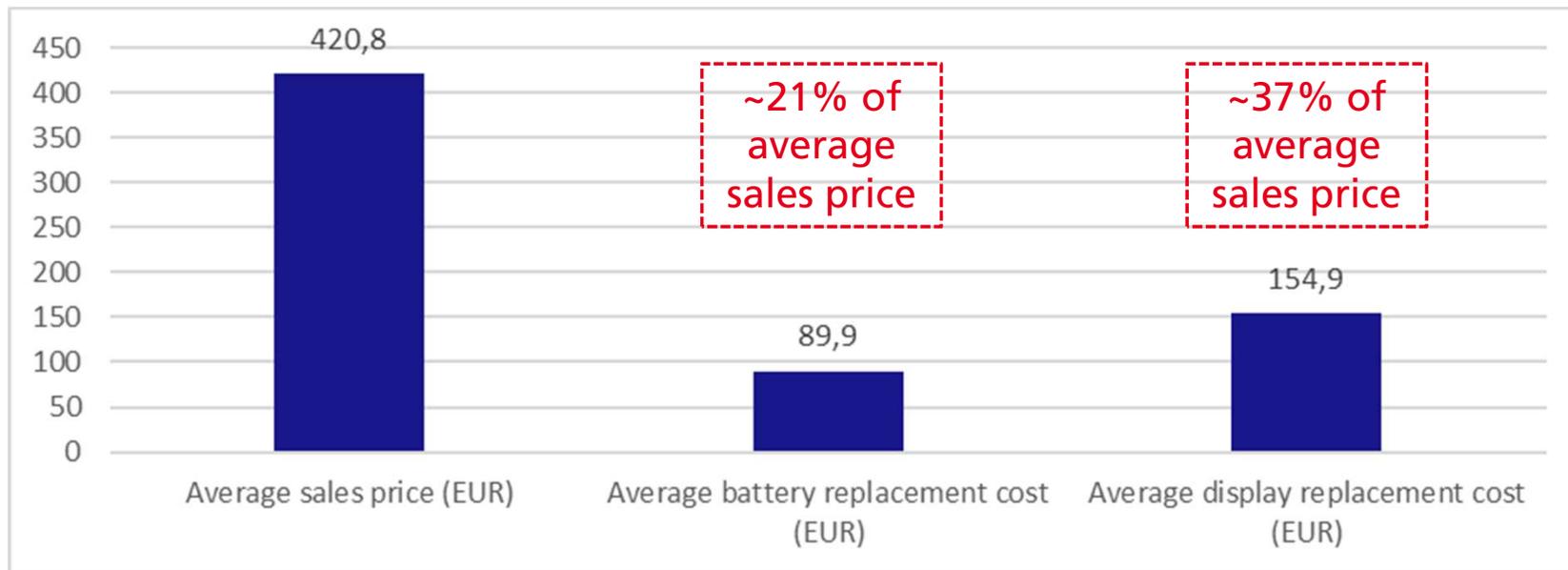


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## Task 2 – Consumer Expenditure Base Data

### Repair and refurbishment (tablets)

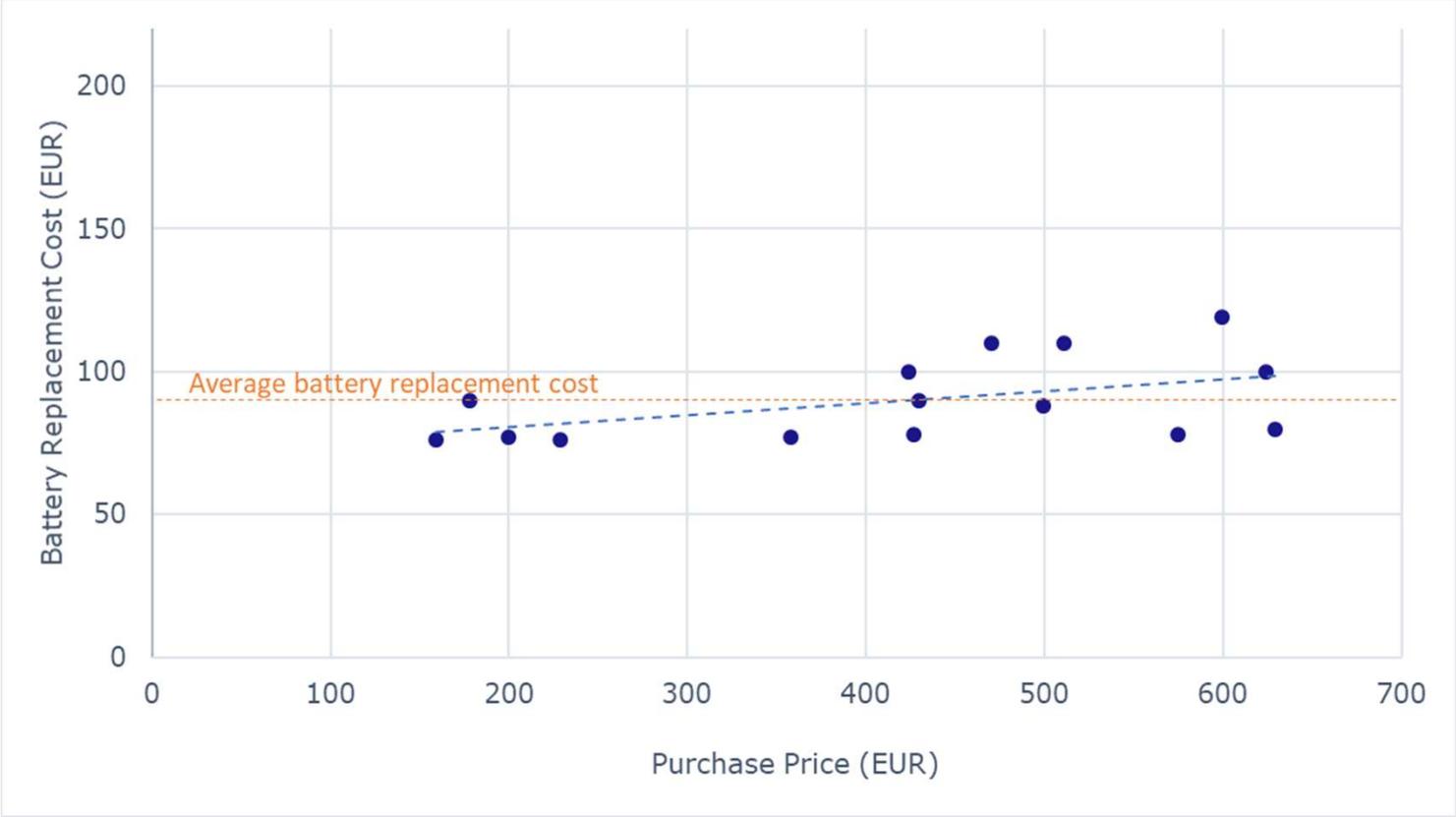
- Data for 15 tablets from four manufacturers was collected from OEM websites and price comparison portals. The price range of the analysed tablets is between 159-629 EUR. The average sales price of a new tablet was 420.80 EUR.



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# Task 2 – Consumer Expenditure Base Data

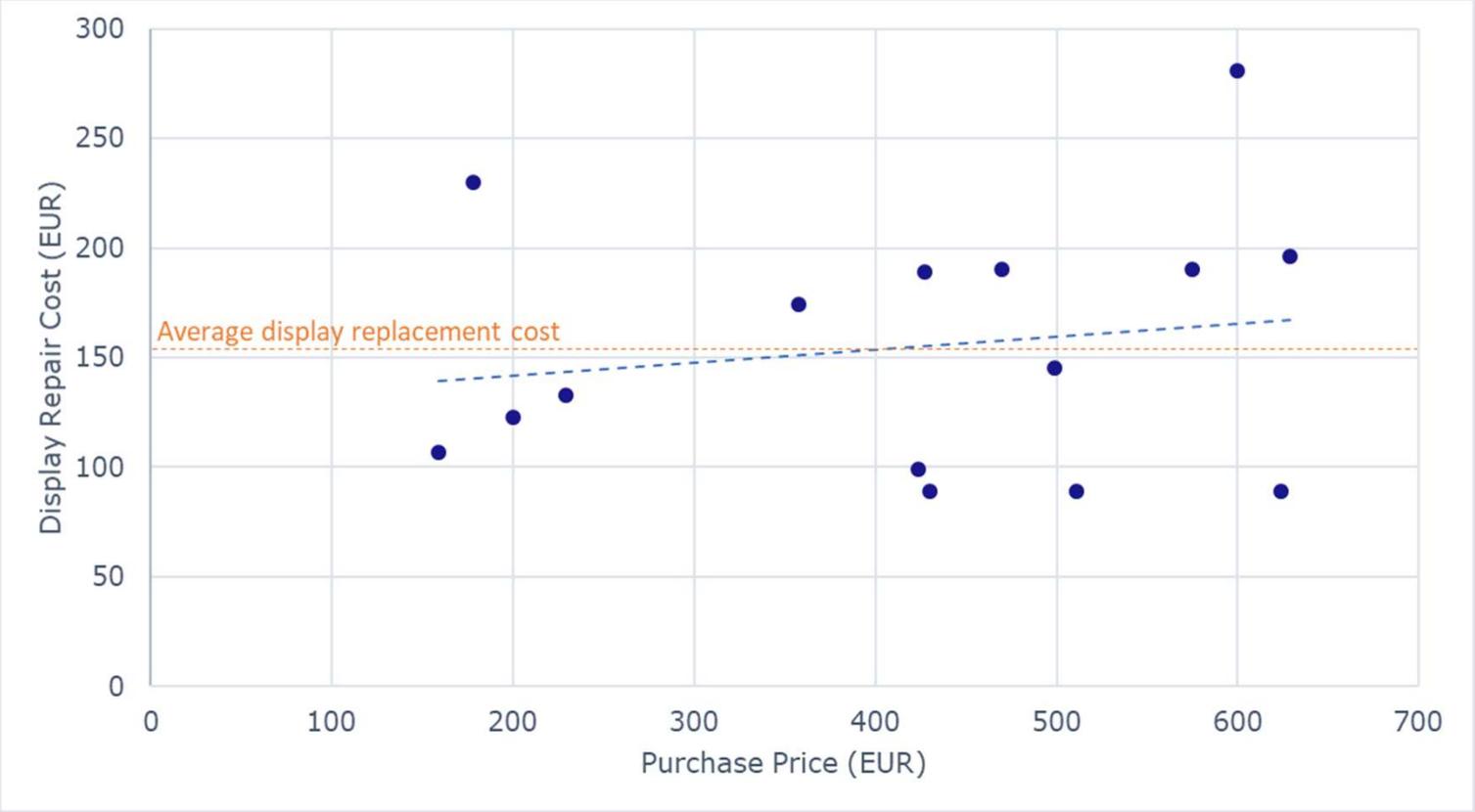
## Tablets – Battery replacement costs



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# Task 2 – Consumer Expenditure Base Data

## Tablets – Display replacement costs

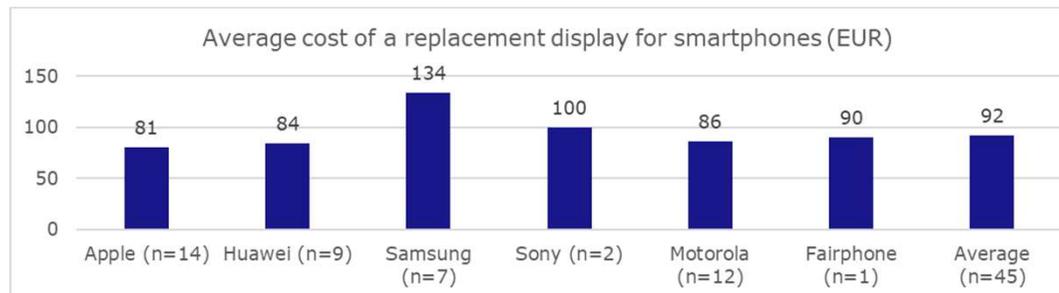
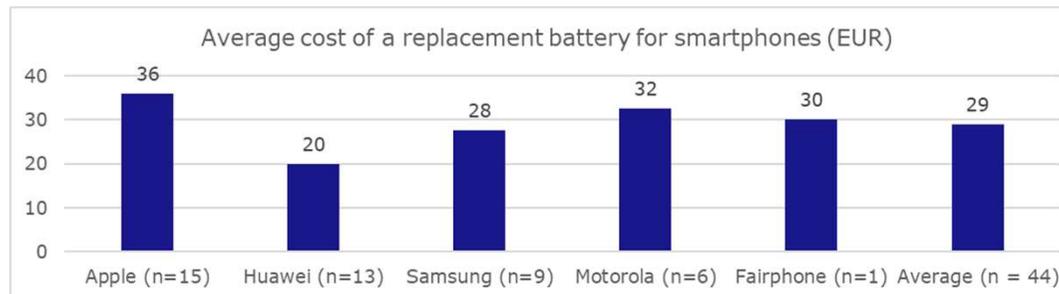


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## Task 2 – Consumer Expenditure Base Data

### Self-repair initiatives

- Price data for the replacement of batteries and displays was collected from the German iFixit website in May 2020. The average cost for a replacement battery amounted to 29 EUR and for a display to 92 EUR.



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## Task 2 – Consumer Expenditure Base Data

### Refurbished devices

- A price comparison between new phones (lowest price from the price comparison site idealo.de) and refurbished phones (refurbed, rebuy, BackMarket) was performed on 31/5.

Product		Price (EUR)			
Brand	Model	Idealo (new)	Refurbed (like new)	Rebuy (like new)	BackMarket (like new)
Apple	iPhone 8 (64 GB)	<b>420.99</b>	314.00	356.99	288.00
	iPhone X (64 GB)	529.00	499.00	<b>570.99</b>	534.00
	iPhone 11 (64 GB)	679.00	669.99	639.99	<b>729.00</b>
Samsung	Galaxy S10 (128 GB)	528.57	509.99	512.99	<b>588.99</b>
	Galaxy S9 (64 GB)	<b>449.00</b>	389.99	393.99	375.99

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## Task 2 – Consumer Expenditure Base Data

### ICT service prices per price basket, selected MS and EU 27 (EUR, 2019)

	Fixed-broadband basket 5GB	Mobile-cellular basket low usage (70 min + 20 SMS)	Low usage voice and data (70 min + 20 SMS + 500 MB)	Data-only mobile broadband 1,5 GB	High usage voice and data (140 min + 70 SMS + 1,5 GB)
<b>EU 27</b>	<b>29,84</b>	<b>18,03</b>	<b>16,48</b>	<b>11,20</b>	<b>22,76</b>
Austria	29,33	3,78	9,54	10,51	14,80
Bulgaria	10,64	13,42	12,88	5,90	17,38
Czech Republic	20,43	21,66	21,66	8,15	32,73
Denmark	39,32	23,82	23,82	16,78	23,82
Estonia	16,82	5,25	5,25	12,61	12,61
Finland	34,58	14,83	14,83	31,32	23,53
France	24,16	8,40	17,85	10,50	28,36
Germany	36,73	36,77	19,75	13,13	30,79
Hungary	18,44	11,17	11,33	13,15	35,87
Ireland	55,70	36,78	36,78	36,78	36,78
Italy	36,78	20,92	18,92	6,29	18,92
Netherlands	44,67	16,82	22,07	31,53	22,07
Poland	17,25	9,61	9,61	2,47	11,09
Portugal	23,11	9,46	9,46	15,65	16,82
Romania	6,77	9,46	8,01	9,46	9,46
Spain	42,04	14,60	14,60	7,31	19,69
Sweden	39,83	23,85	20,37	15,25	20,37

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## Task 2 – Consumer Expenditure Base Data

# Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

**Break until 13:00**  
(next: Task 3 and 4)

## Task 3 and 4 – Questions to Stakeholders

### Goals for the Stakeholder Meeting

We have some initial data on user behaviour and technology trends. User behaviour in general is highly important as many material efficiency benefits require the cooperation of the user to change consumption patterns. The better insights we have, the more realistic is the later analysis of ecodesign options.

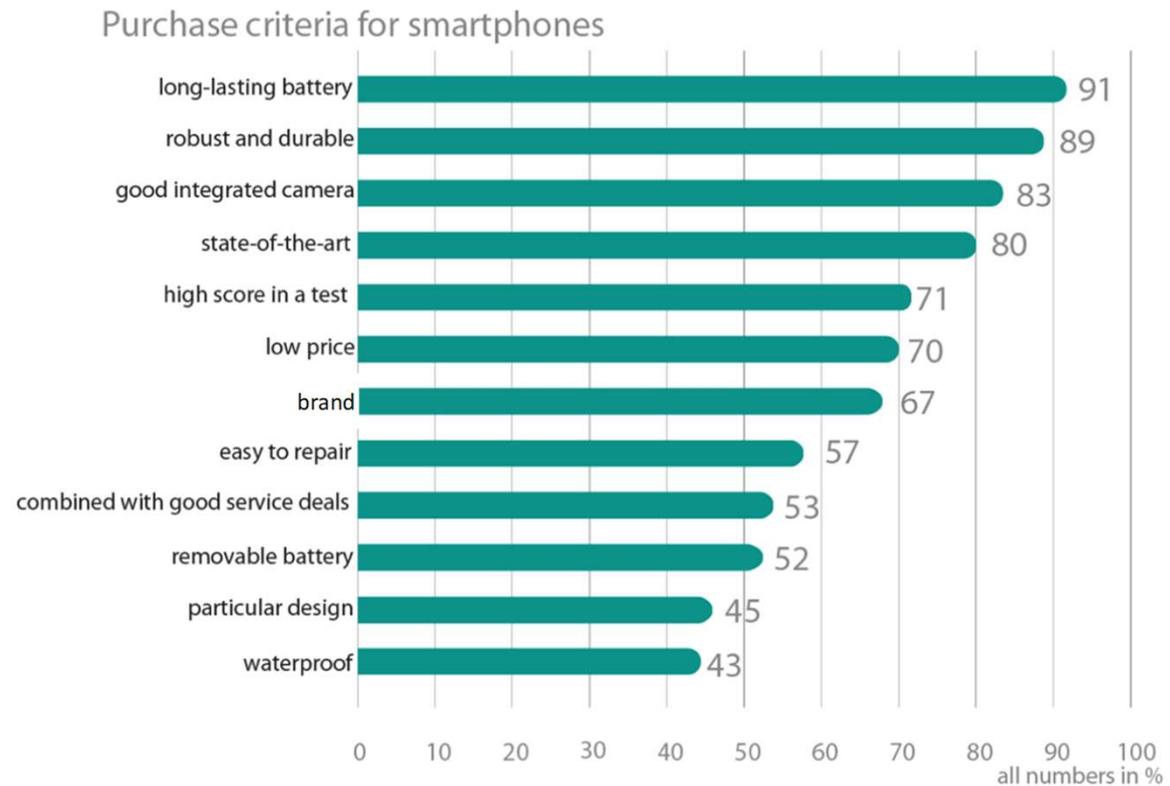
We do not expect to get detailed answers to the following questions in this meeting, but we want to know

- (1) are the questions phrased precisely enough?
- (2) are you immediately aware of any good (third-party) data on the matter?
- (3) can you give a first signal that you might be in the position to provide further insights?

# Task 3 – Questions to Stakeholders: Use Phase (battery life, use patterns, repair)

## Initial data

- Most important criteria for buying a new mobile phone or smartphone in Germany



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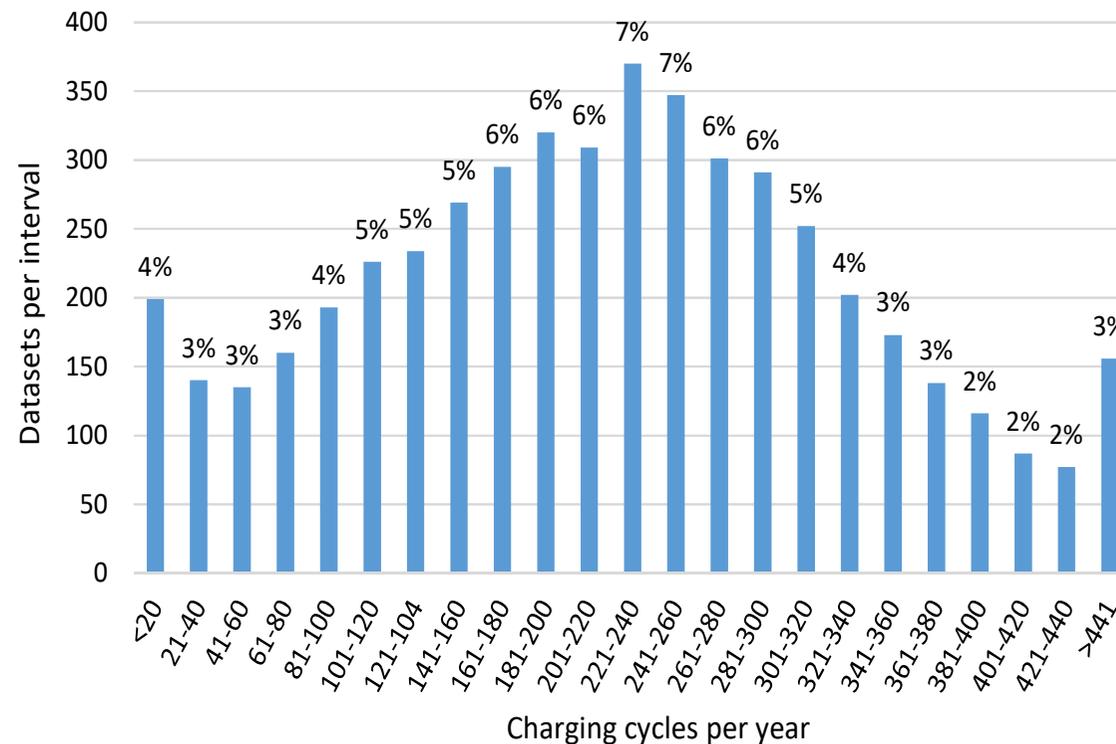
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# Task 3 – Questions to Stakeholders: Use Phase (battery life, use patterns, repair)

## Initial data

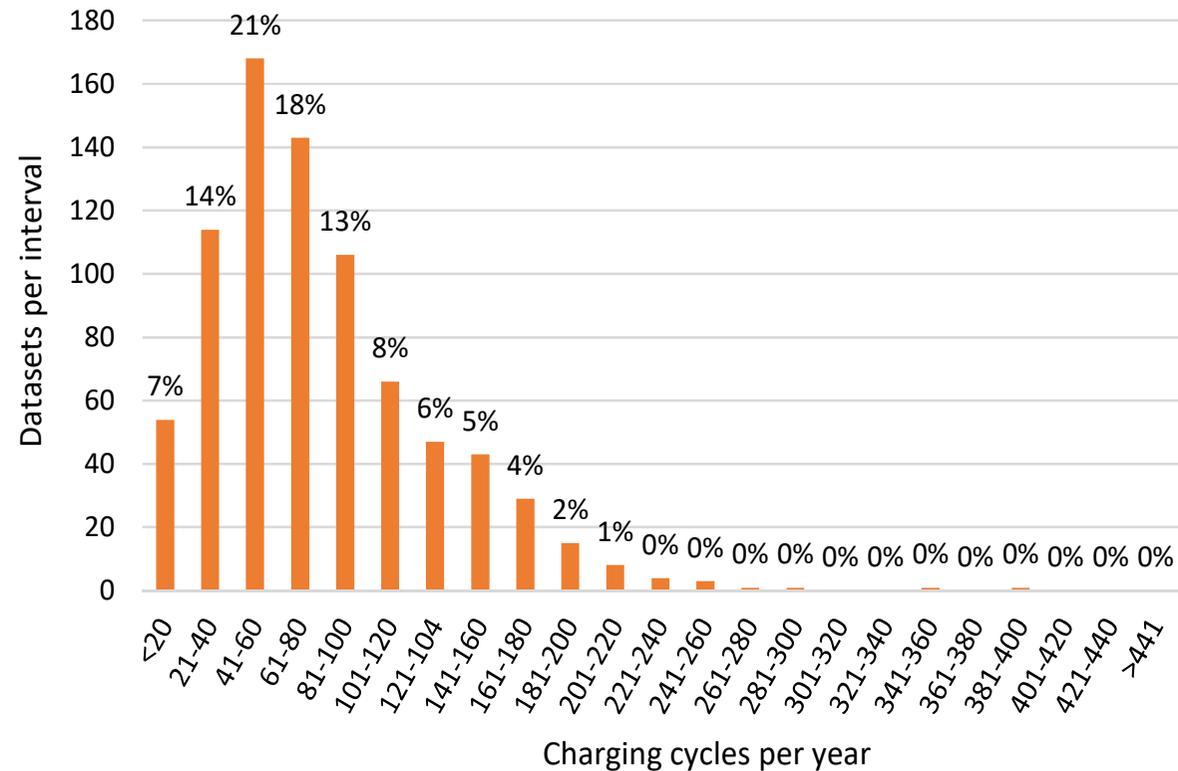
- Distribution of the cycle frequency of smartphone batteries, 2016, (Clemm, Sinai et al.)



# Task 3 – Questions to Stakeholders: Use Phase (battery life, use patterns, repair)

## Initial data

- Distribution of the cycle frequency of tablet batteries, 2016, (Clemm, Sinai et al.)



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# Task 3 – Questions to Stakeholders: Use Phase (battery life, use patterns, repair)

## Questions

### Battery life

- (3-1) Is there any evidence available how (e.g. overnight charging, partial charging, fast charging) and how often users charge (full charge cycles per unit of time) their devices? This information is needed to correlate battery testing data with product lifetime.
- (3-2) Is there any field data, how charging behaviour affects battery ageing? (fast charging, charging / discharging levels, wireless charging)
- (3-3) Is there any data on the state of health (SOH) of batteries after several years of use in the field, such as SOH after 2, 3 or 5 years of use? This data helps to determine at which point a battery replacement may become necessary.

# Task 3 – Questions to Stakeholders: Use Phase (battery life, use patterns, repair)

## Initial data

- Defects in smartphones, Germany, 2019 (clickrepair 2019)

Defects	Share
Display	67,4%
Casing	50,0%
Battery	33,9%
Connectors	16,1%
Camera	7,9%

- Kind of damages of dropped tablets, Germany, 2018 (WERTGARANTIE 2018)

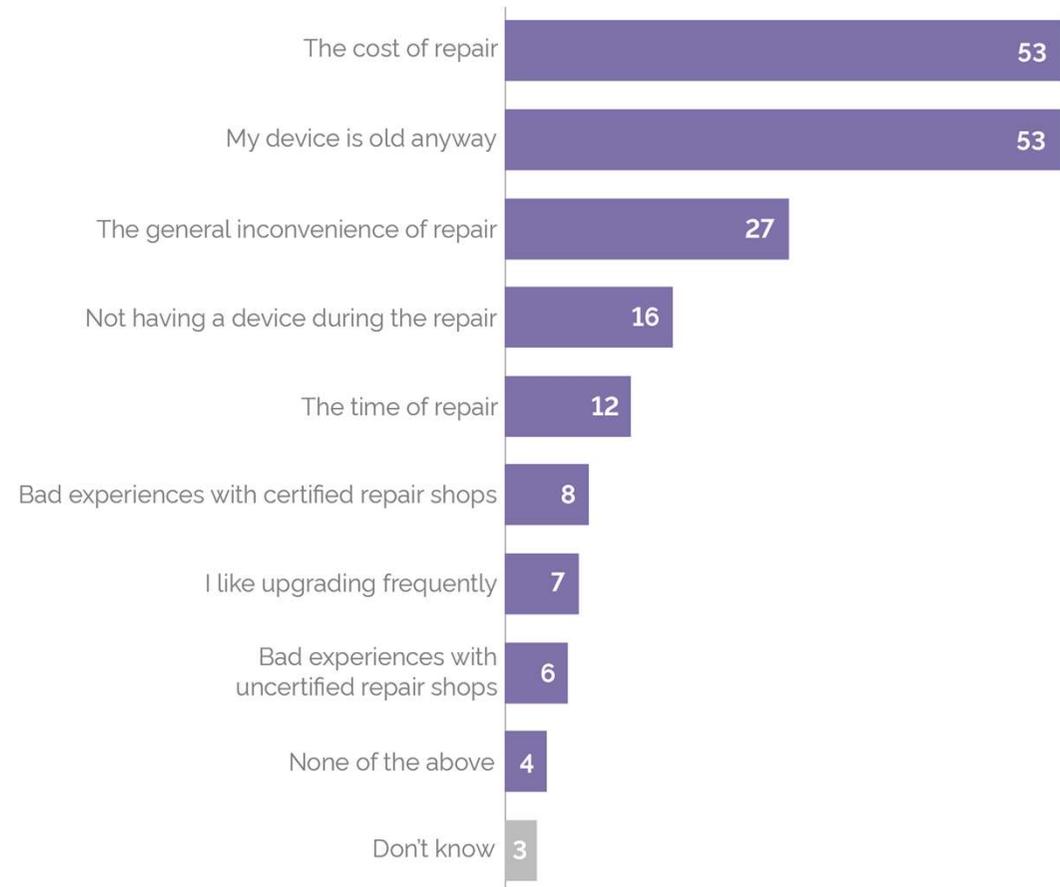
Defects	Share
Display	64,1%
Casing	47,1%
Camera	18,1%
Blemish to the appearance	17,5%
Ports	13,6%

## Task 3 – Questions to Stakeholders: Use Phase (battery life, use patterns, repair)

### Initial data

- You said you would buy a new device [in case your smartphone / tablet / laptop stops working]. Which of the following reasons describe why?

(2019, Survey in UK by YouGov)



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# Task 3 – Questions to Stakeholders: Use Phase (battery life, use patterns, repair)

## Questions

### Real life use patterns

- (3-4) Is any evidence available on how often certain incidents (with and without resulting defect) happen in real life? (Drops, water incidents (drops in water, spillage...), etc.)

### Repair

- (3-5) Is any evidence available on how users deal with damaged phones / tablets?
  - Getting repairs done (DIY vs. professional repair vs. OEM authorised repair)
  - Not getting repairs done: under which conditions (device age, initial product price, kind of damage) is the user
    - continuing using the device
    - taking the device out of service

# Q&A

short comments or questions: chat

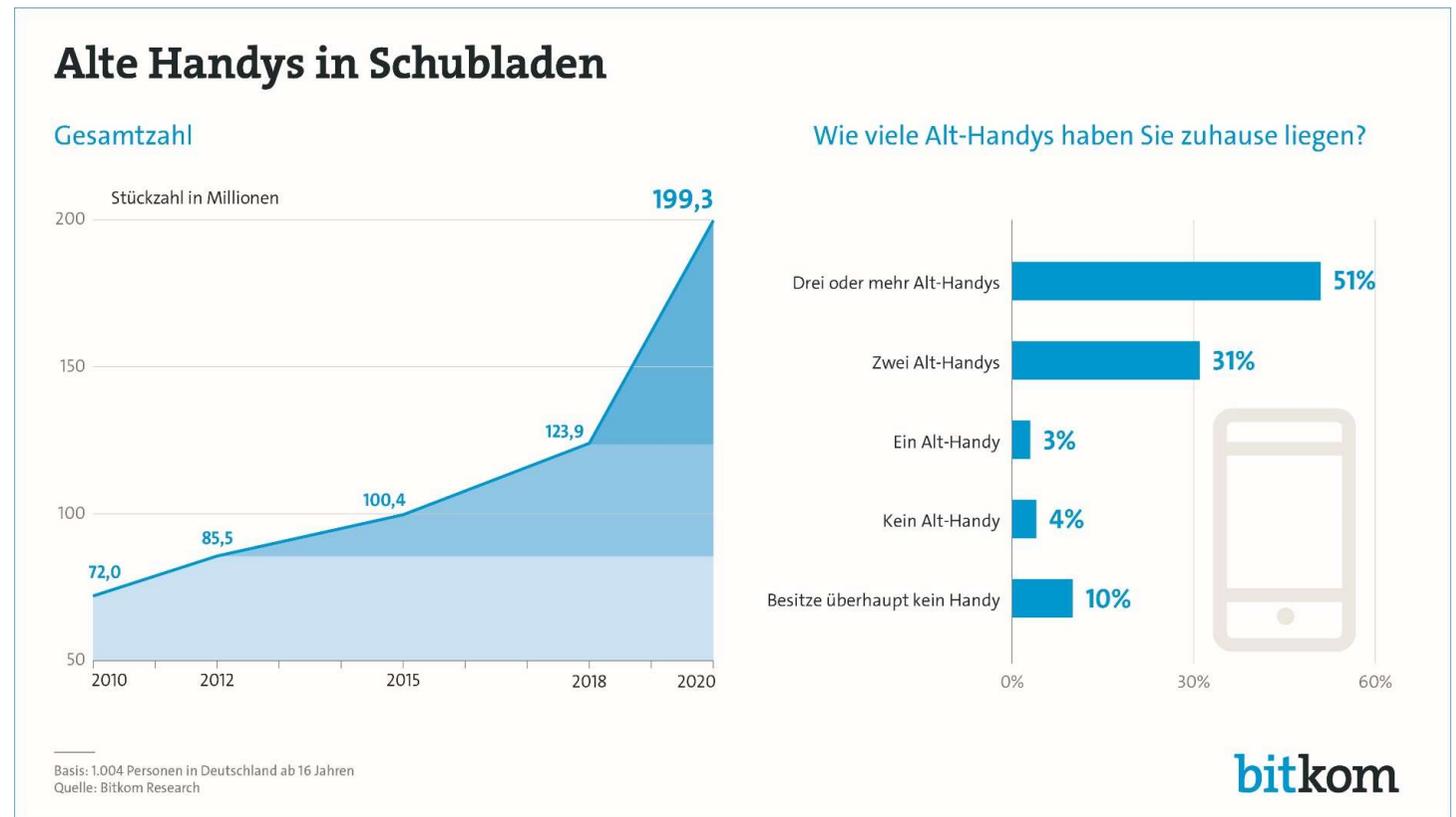
complex comments or questions: topic -> chat AND #

# Task 3 – Questions to Stakeholders: Use Phase (hibernating devices, subscriptions, software, recommerce / refurbishment)

## Initial data

- Mobile phones in hibernation in Germany, Bitkom Research

(data documented in Task 2 report)



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# Task 3 – Questions to Stakeholders: Use Phase (hibernating devices, subscriptions, software, recommerce / refurbishment)

## Questions

### Hibernating devices

- (3-6) Is there any evidence available on the reasons why users store / hoard devices which are out of service? How important are security/privacy aspects related to data erasure for keeping business devices / private devices?

### Subscriptions

- (3-7) Is any data available on the kind of phone contracts in the EU27 or selected EU countries? Contracts can offer new devices after a certain period of time. Are there statistics on duration of post-paid contracts, and which incentives are provided (subsidies, device upgrade, takeback / buy-back of used devices) for renewing contracts?

# Task 3 – Questions to Stakeholders: Use Phase (hibernating devices, subscriptions, software, recommerce / refurbishment)

## Questions

### Software

- (3-8) How long are devices used after the (security) updates are discontinued? Is any data available on users abandoning their phone/tablet because of missing software/firmware updates?
- (3-9) What is the current OS update policy of OEMs? What are the technical / economic barriers to OS updates?
- (3-10) How often are devices being put out of service because their hardware/OS does not anymore allow to run the latest version of (commonly used) apps?

### Recommerce / refurbishment

- (3-11) Is there evidence for a significant uptake of remanufactured devices? What are the differences between the EU countries? What are the main drivers (besides price)? Is there evidence for better reusability of certain designs?

# Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

## Task 3 – Questions to Stakeholders: End-of-Life Phase

### Initial data



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## Task 3 – Questions to Stakeholders: End-of-Life Phase

### Questions

(3-12) If data on hibernating smartphones and tablets in use (see Task 2 report) is correct, then hardly any devices are recycled. Is there any data on the amount of mobile phones, smartphones and tablets being recycled?

(3-13) Which design features ease / complicate recycling of products? What information / documentation / design features would be enablers to improve recycling?

# Q&A

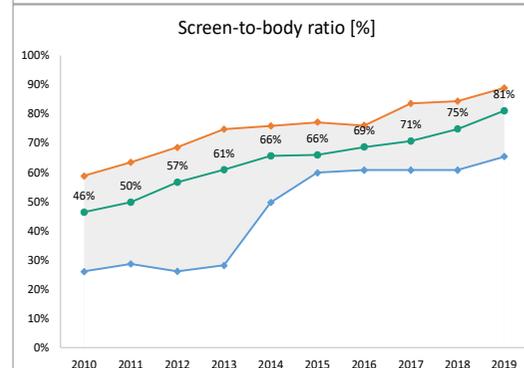
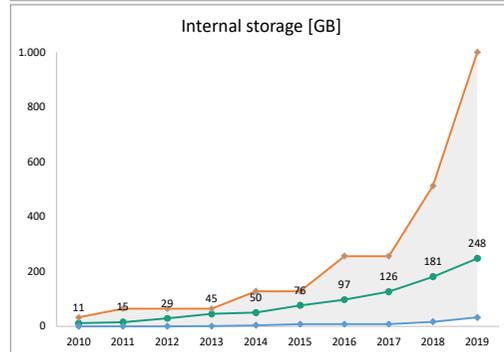
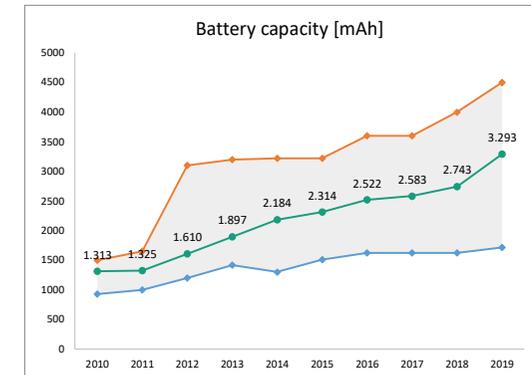
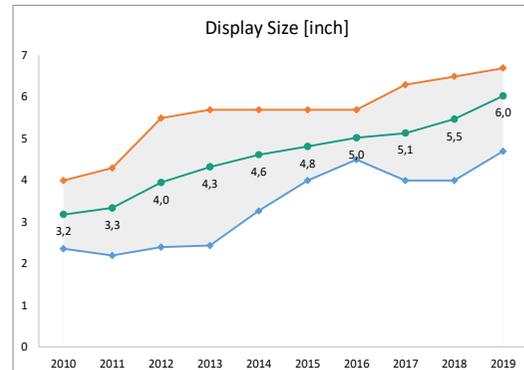
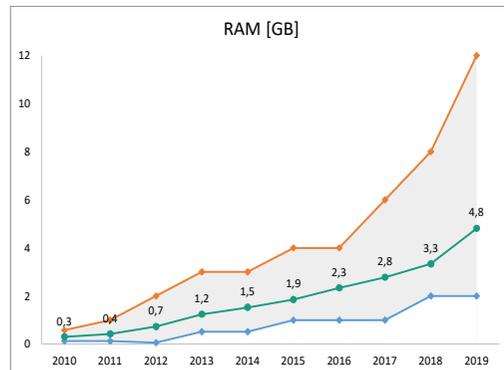
short comments or questions: chat

complex comments or questions: topic -> chat AND #

# Task 4 – Questions to Stakeholders: Technology Trends

## Initial data

### Smartphones, 2010-2019 (Clemm et al.)

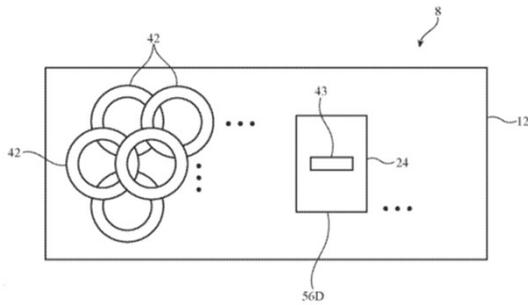


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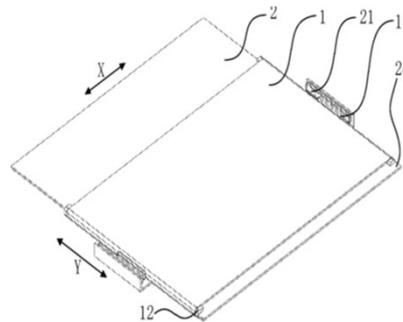
# Task 4 – Questions to Stakeholders: Technology Trends

## Initial data

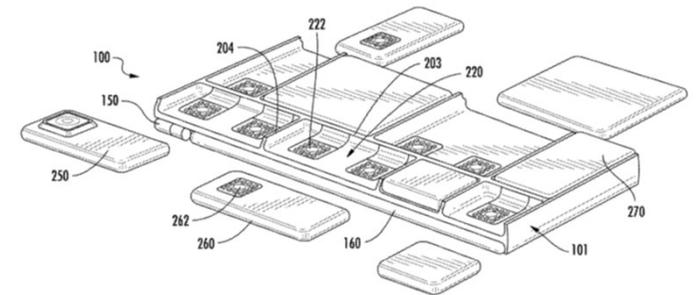
### ■ Patents



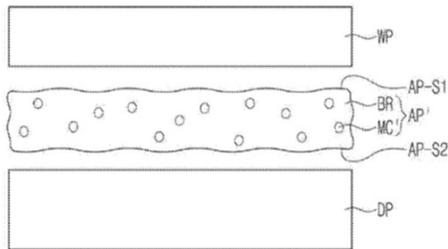
multi-device charging pad



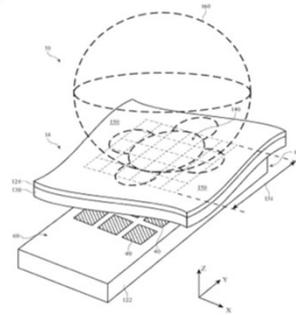
slide-rail



modularity



thermally releasable adhesive



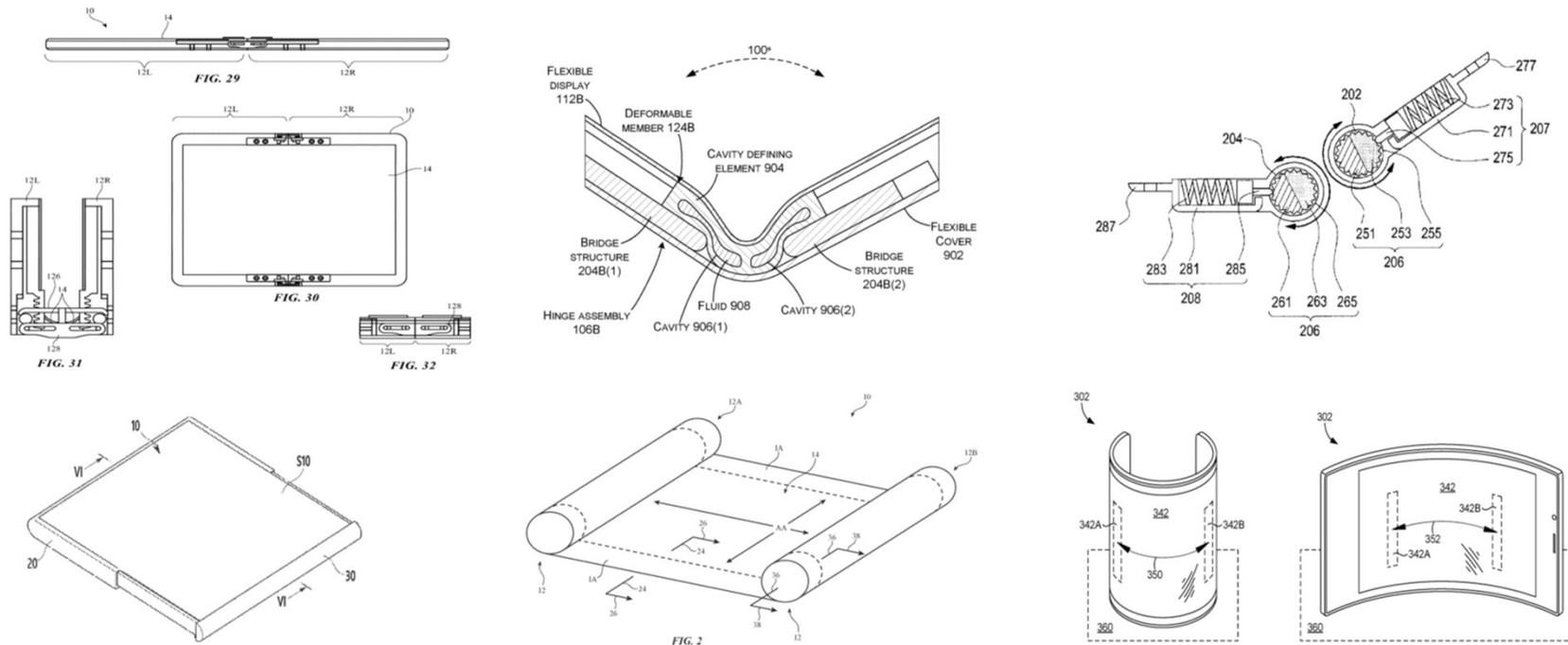
antennas radiating through display

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# Task 4 – Questions to Stakeholders: Technology Trends

## Initial data

- Patents: hinges, expandable displays, rollable displays, bendable displays....

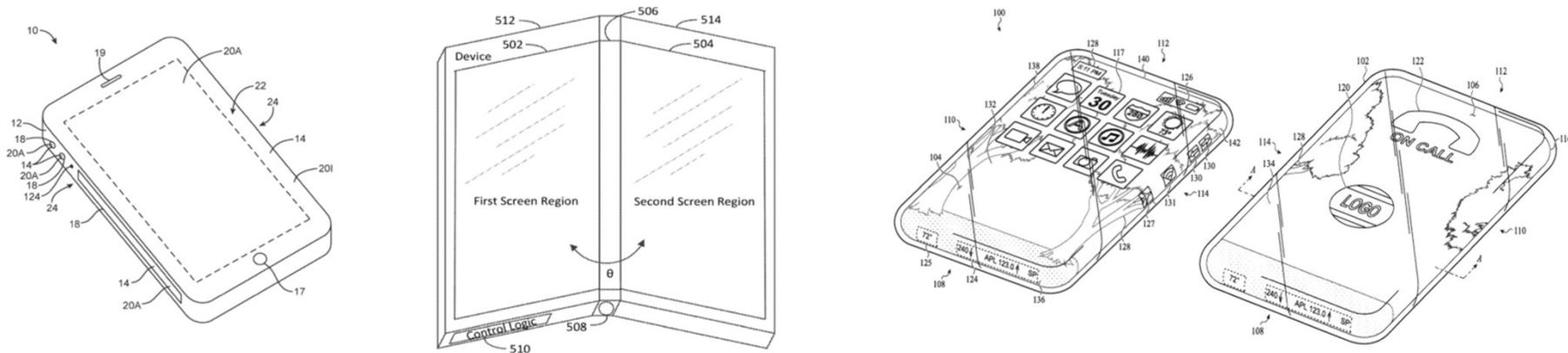


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# Task 4 – Questions to Stakeholders: Technology Trends

## Initial data

- Patents: sidewall displays, displays on hinges, all-around displays....



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# Task 4 – Questions to Stakeholders: Technology Trends

## Questions

(4-1) In this subchapter some technical smartphone trends are analysed, which all show a clear upwards trend in past years until now. How do you predict these trends to continue in coming years?

(4-2) Which of these technologies covered by the patents in Table 5 or other technologies which are not covered by these patents are more likely than others to be integrated in future products?

(4-3) Which implications do you foresee of such technologies on eco-design aspects such as

- environmental footprint of manufacturing,
- resource consumption and material use,
- durability,
- reparability,
- power consumption in use.

# Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

# Any Other Business

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# Next Steps

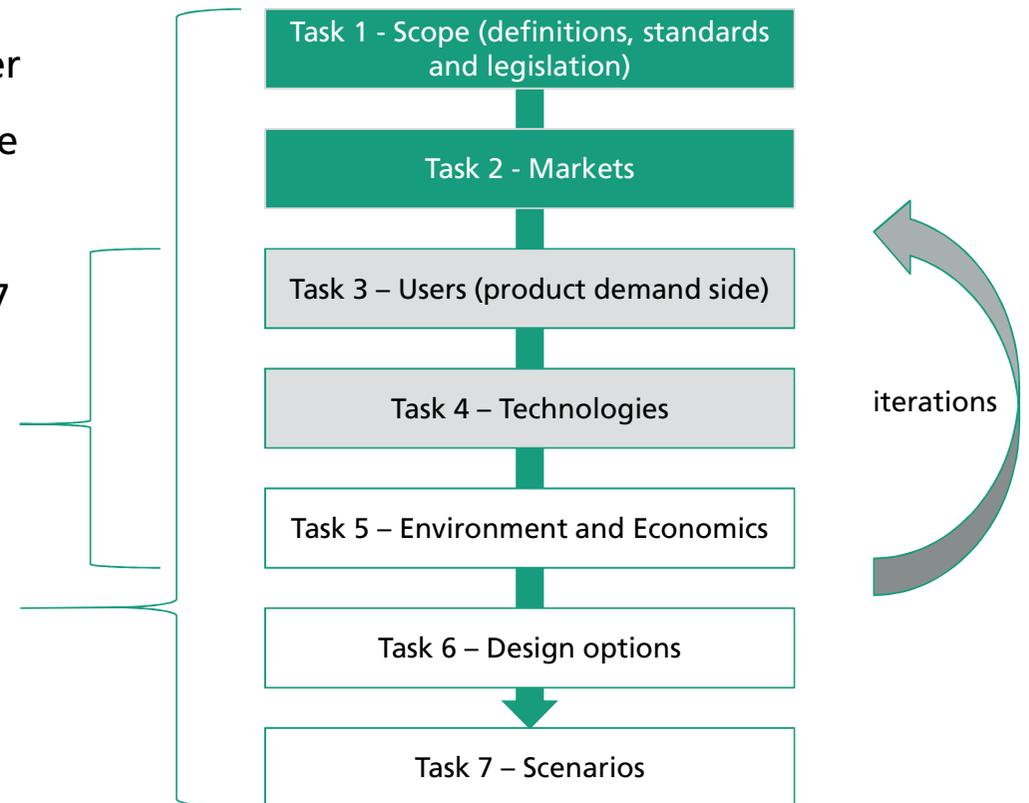
## Stakeholder Meeting Follow-up

- Compilation of meeting minutes in the next few days, documenting Q&A
- Written feedback on Task 1 and 2 by August 10, 2020, please
  - make use of the feedback template on the website
  - comments will be made public, unless you indicate selected information explicitly as confidential
- Indicate by August 10, 2020, if you can contribute to any of the Task 3 and 4 questions with further insights / background information
  - e-mail to [contact@ecosmartphones.info](mailto:contact@ecosmartphones.info)

# Next Steps

## Reports and Final Stakeholder Meeting

- **Final Stakeholder Meeting** tentatively on December 18, 2020 (individual registration required, will open in due time before the meeting)
  - Brief discussion on tasks 3, 4 and 5
  - Focus of the final meeting will be on Tasks 6 and 7
- **Draft Task Reports for Tasks 3, 4 and 5** will be published in September/October
  - Period for comments on draft task 3-5 reports: minimum 3 weeks
- **All Draft Final Task Reports** to be published by November 15, 2020
  - Final comments until January 4, 2021



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## Next Steps

# Q&A

short comments or questions: chat

complex comments or questions: topic -> chat AND #

# Thanks for joining Get involved!

- [www.ecosmartphones.info](http://www.ecosmartphones.info)
- [contact@ecosmartphones.info](mailto:contact@ecosmartphones.info)

Closing remarks...



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