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Sustainable Cycles Programme

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**Programme**

## E-waste statistics

How to track “sales of EEE” and how to measure e-waste generated

October, 2017 – E-waste statistics workshop - Arusha



# Outline



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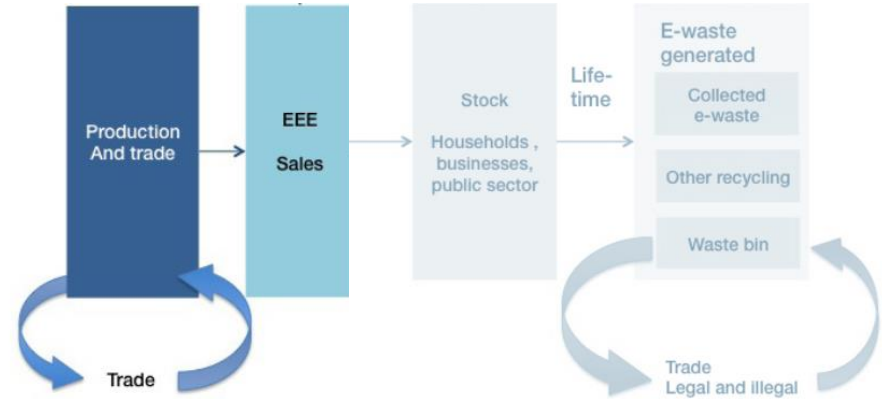
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- Track EEE sales
- Track EEE stock
- EEE lifespan
- Measure e-waste generated
- Framework implementation
- UNU methodology
  - *Data source and preparing the database*
  - *Track sales*
  - *Statistical routines*

# Track EEE sales



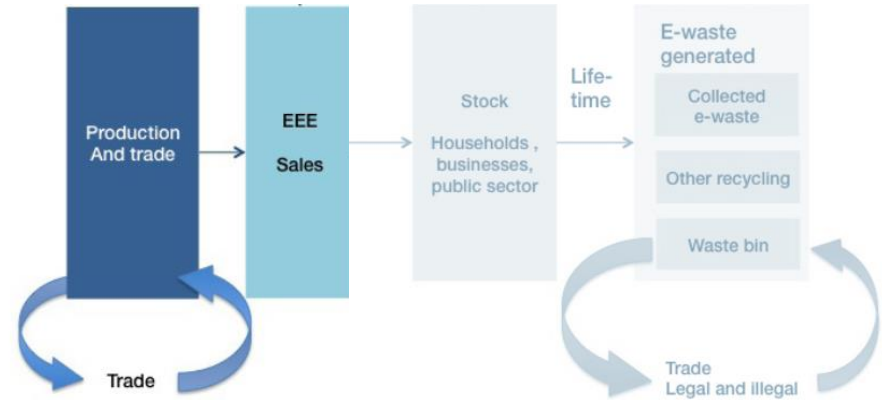
- Long time series, detailed for types of equipment.
- 1980 to now
- 54 products in UNU-KEYS
- Physical data (kg or pieces)



# Track EEE sales – data sources



- Environmental Producer Responsibility Register
- Sector organizations and/or
- National statistical institutes
  - Tax authorities, business, or household surveys
- “Apparent consumption method”:
- Link between trade statistics and national production statistics



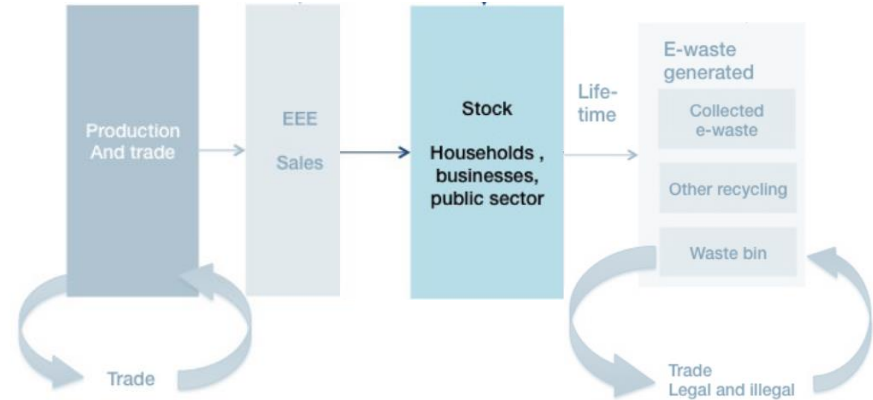
$$SALES = \text{domestic production} + \text{imports} - \text{exports}$$

# Track EEE stock

*Equipment in households, business and public sector destined to become waste (“urban mine”)*



- Data available in national statistical institutes from households survey about:
  - Household possessions
  - Penetration rate
- Number of subscriptions
- Penetration rates of ICT use (statistics are compiled by ITU)
- Can be extended to all 54 UNU-KEYS

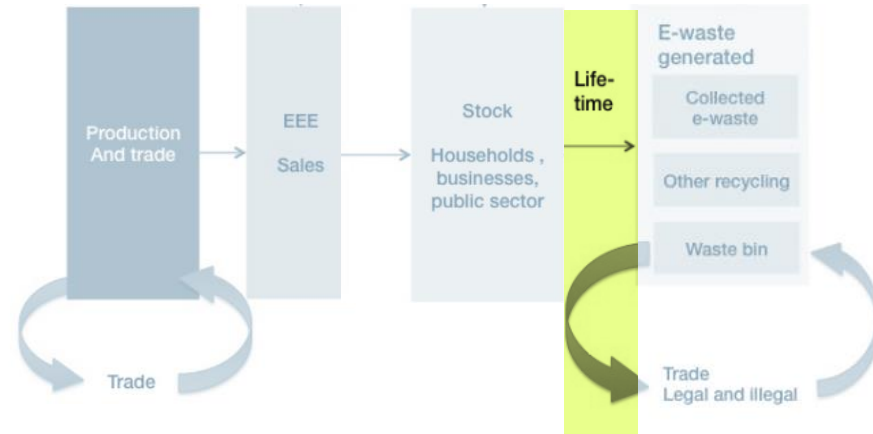


# EEE lifespan

*Time spent at household, business or public sector*



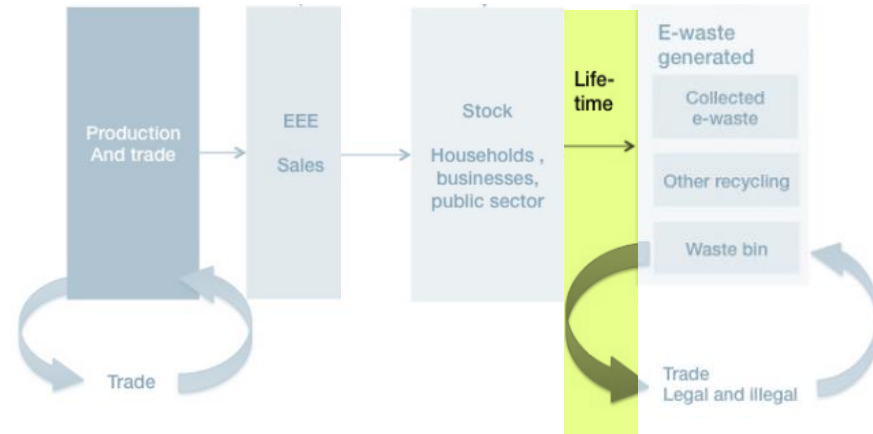
- Includes the lifetime of second-life within the country
- Should ideally be determined empirically per product
- UNU calculates the lifespan using Weibull functions (Wang et al., 2013)
- All formulas are in the guidelines



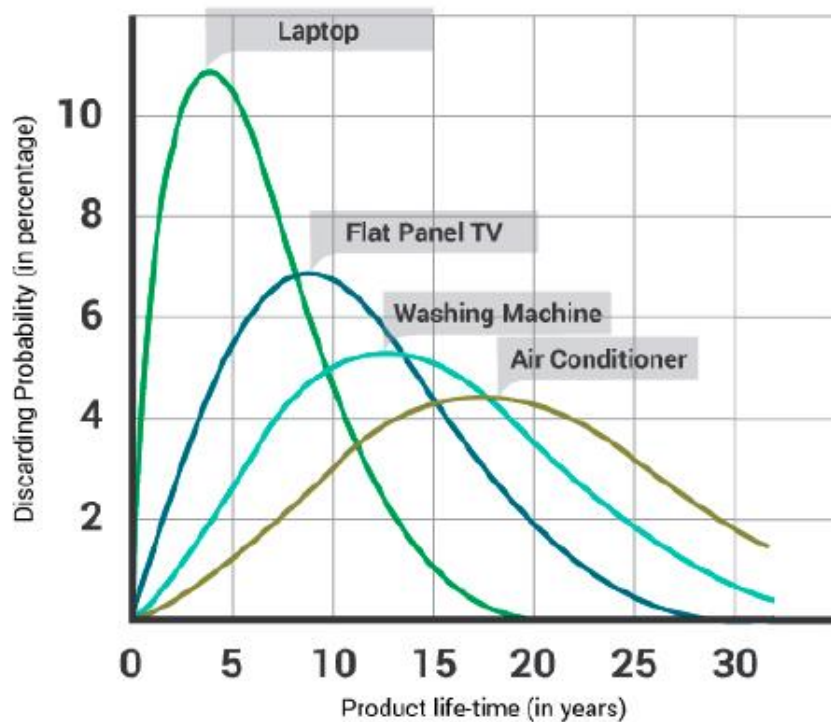
# EEE lifespan – data sources



- Household surveys
  - How old was the appliance when discarded?
  - How old is the appliance in use?
- Work with universities / Literature
- Get lifespan data from other comparable countries



# EEE lifespan

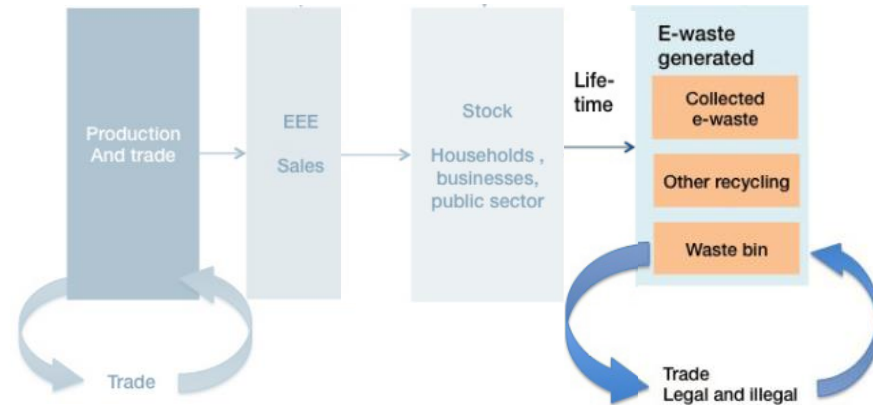




# Measure e-waste generated

*EEE is disposed of after a certain lifetime and becomes e-waste (generated)*

- Amount of e-waste prior collection and recycling
- E-waste generated in a given year in a specific country is based on:
  - Amount of EEE placed on the market (POM) in the preceding years
  - Corresponding product lifespan



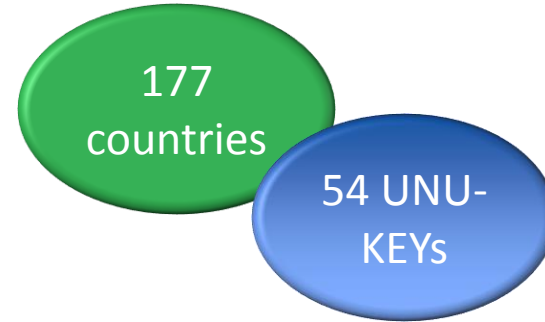
# Framework implementation



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- Estimates from UNU are already available !
- UNU developed a methodology to estimate:
  - EEE placed on the market (POM)
  - EEE stock
  - E-waste generated
- Countries can do and review their own estimates:
  - Methodology and scripts are published here:  
<https://github.com/Statistics-Netherlands/wot-world>
  - E-waste toolkit



# UNU methodology:

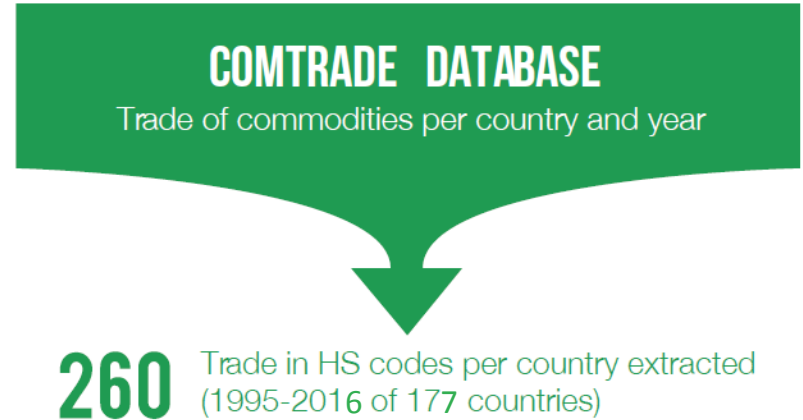
## *Data source and preparing the database*

- Imports and exports from the UN Comtrade database (**non EU countries**)
  - 177 countries
  - 260 HS codes
  - 1995 to 2016
- Imports, exports and domestic production from EUROSTAT (**EU countries**)
- Countries classified according to the Purchasing Power Parity (PPP) in 5 groups:
- Conversion of units into weight using average weight data per e-waste type



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# UNU methodology: *Track sales*



- Sales= imports – exports (**non EU countries**)
- Sales= imports – exports + domestic production (**EU countries**)
- Link to the 54 UNU-Keys



# UNU methodology: *Statistical routines*

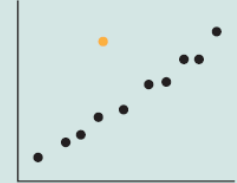


- Automatic corrections:
  - Outlier detection on time series
  - Outlier detection international comparison
  - Missing value replacement
- Manual corrections using knowledge of the market
- Extending time series of sales:
  - Back to 1980 using trends of available years and market entry of EEE
  - To 2021 using sophisticated extrapolation methods (e.g. ratio sales/PPP per country)

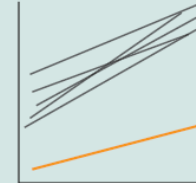


## STATISTICAL CORRECTION

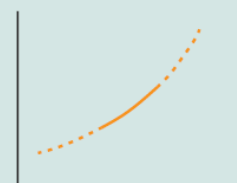
Outlier detection



International Comparison



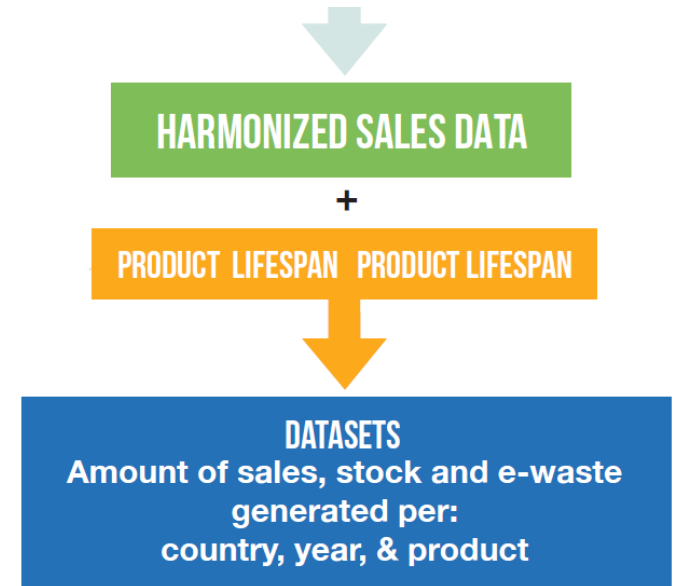
Extrapolation of time series to 1980 - 2021



# UNU methodology: *Measure e-waste generation*



- E-waste generated by country using:
  - Sales
  - Lifetime distributions
- Lifetime distribution:
  - Per UNU-KEYs and EU country
  - Standard among NON EU countries
- Stock= (historical sales) – (e-waste generated over the years)



# Summary

- Methods are globally applicable
- Data are used in the Global E-waste Monitor
- Method is an official methodology in the European Union



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Thank you for your attention!