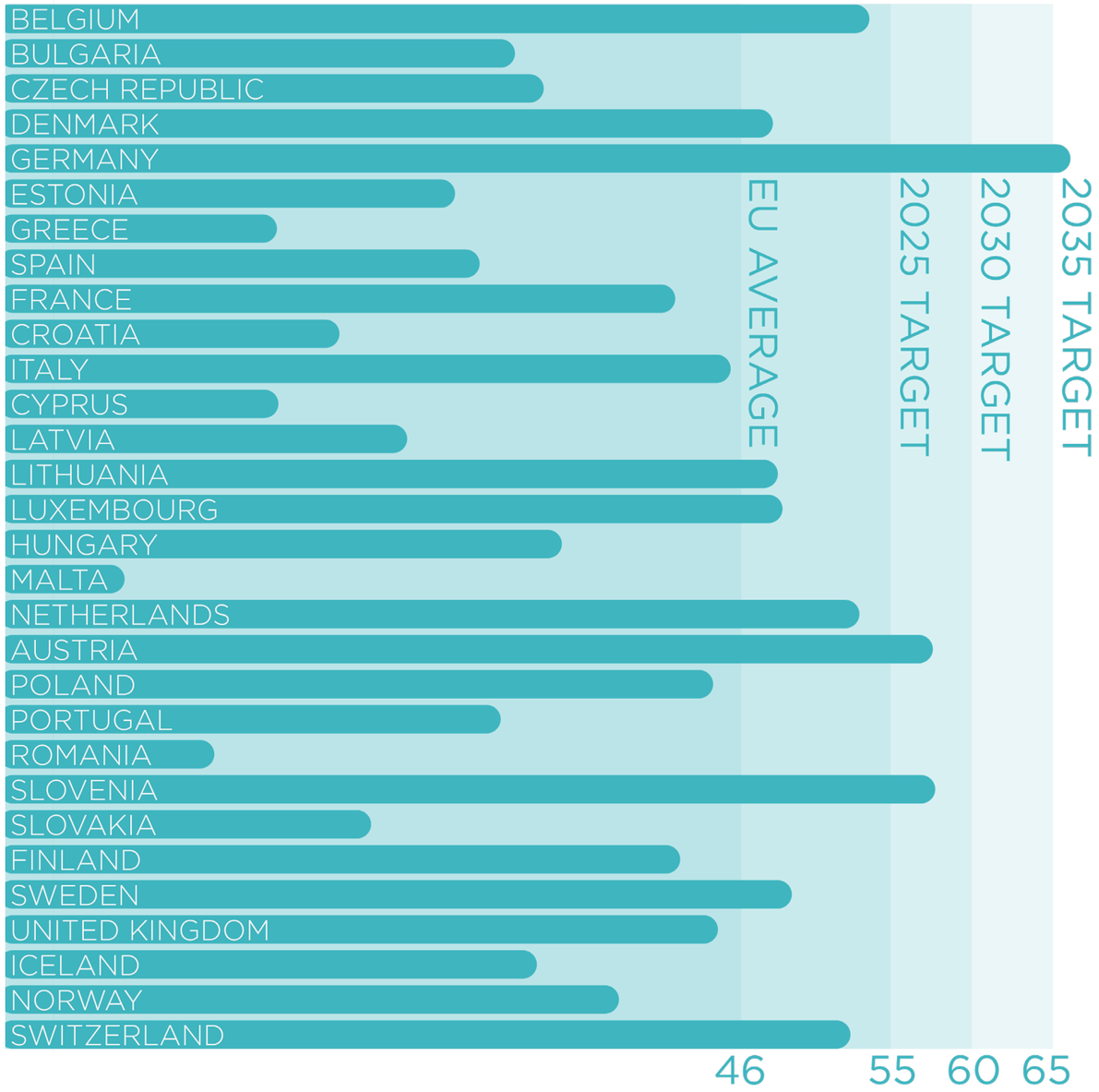
CIRCULAR EUROPE

Educating to stop the EU from generating 2.5 million tonnes of municipal waste.

Increasing source separation and overall recycling rates.

Providing future proof solutions with case examples.



EDUCATED, ENGAGED CITIZENS

It is important to treat the citizen as an active rather than passive element of the system.

The process of implementing a user identification system should be based on completing various stages of technological, participative, logistic and communicative nature. The citizens need to be aware of the changes and involved in their development.

WASTE FRACTIONS TO MONITOR

61% of waste is sent for final treatment in Catalonia, studies say this should only be 32%

It is clear that the residual waste could be better separated. Therefore, when applying technology to waste collection containers, so as to reduce the amount of residual waste and get higher recycling levels in other waste fractions; it is highly recommended to lock the residual waste container, control and monitor user access.

EFFECTS ON WASTE STREAM

Connecting the user to their waste through user identification and changing waste management models can cause a change in the habits of most residents

A decrease in waste generation and an increase in selective waste collection is to be expected. Undeniable results have been generated in pilots and fully implemented systems across the world.

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CIRCULAR DESIGN

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TRASH COURSE | USER ID

Voluntary or Mandatory
USER IDENTIFICATION TECHNOLOGY

RFID

QR

NFC

Combined with
EFFECTIVE WASTE MANAGEMENT

Reliable Technology

PAYT

User Adoption

Developing an
IMPLEMENTATION STRATEGY

Waste Fractions to Control

Test, Monitor and Control

Economics

2. USER ID TECHNOLOGY

A user identification system is based on the implementation of a mechanism by which the user of the waste collection service is identified and their waste habits recorded. This technology can be mandatory or voluntary for residents to use, depending on the type of technology and system implemented.

MANDATORY IDENTIFICATION

In systems that are mandatory to use, user identification solutions rely on the integration of electronic locks into containers, with RFID, NFC or PIN access.

As the containers are locked, residents have no choice but to use the system.

These systems provide more accurate data and better results on waste management since residents feel more controlled than in voluntary systems.

There is potential for increased misbehaviours or fraud with mandatory to use locked containers. Waste can be illegally dumped outside locked containers, in city bins or in the unlocked containers for different waste fractions.

VOLUNTARY IDENTIFICATION

In systems that are voluntary to use, NFC and QR tags are popular choices. These systems involve tagging each container with an NFC chip or QR sticker, then having users identify themselves by scanning the NFC chip or QR sticker with their phone when disposing their waste.

This gives municipalities data on when each container is used and by which user.

The results of waste management tend to be better when identification is required, but if they are voluntary, it can be less reliable, subject to more fraud, but there is also less illegal dumping of waste, less bags lying on the ground and less impurities.

NOTE: *Distributing standardised bags with user identification can also connect the user to their waste. This system involves integrating the technology into the bags instead of the containers. Bags can be identified through QR-, alphanumeric- or bar-codes. Standardised bags can also incorporate RFID technology.*

This has not yet been proven in many municipalities. This could be understood as a way to control user behaviour when implementing a pilot of open or closed containers in a high-density context, so as to control their waste volume.

RFID NFC QR

2.1 RADIO FREQUENCY IDENTIFICATION

Radio-Frequency-Identification, better known as RFID, is the method of uniquely identifying items using radio waves. At minimum, an RFID system needs a tag, a reader and an antenna. The reader sends a signal to the tag via the antenna, after which the tag responds with its unique information.

RFID can be used for identification, authentication, and data storage with minimal human intervention. They are engineered to be tamper resistant by implementing cryptographic algorithms. RFID has recently emerged in the waste management industry.

RFID tags are either Active or Passive:

ACTIVE RFID tags contain their own power source giving them the ability to broadcast with a read range of up to 100 meters. Their long-read range makes active RFID tags ideal for where asset location and other improvements in logistics are important [7].

PASSIVE RFID tags do not have their own power source. Instead, they are powered by the electromagnetic energy transmitted from the RFID reader. As the radio waves must be strong enough to power the tags, passive RFID tags have a read range from near contact up to 25 meters [7].

LOCKED CONTAINERS

RFID can control and monitor the waste being deposited in communal waste containers by installing RFID readers with electronic locks onto communal waste containers. These containers require passive RFID tags (like smart cards) to open. When an access key is held over the RFID panel, the access tag is checked against a white/black list. Once the access tag is checked and approved, the container opens and waste can be deposited. Each use is recorded.

Containers can also be fitted with other sensors such as weight or fill level sensors, which can be used to provide more accurate data on citizen's waste disposal habits and/or to optimise the waste collection system. These sensors are discussed in detail in section 2.5 Additional Technology.

[7] Wikipedia, Radio-Frequency Identification

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DESIGN PROCESS

RESEARCH

Observe
Users
MSW management systems

Analyse
EU frameworks
Local targets
MSW management systems

Plan
Case study mapping

IDEATION

Explore
Global cases
Content options

Conceptualise
Possible solutions
Content structure
User interaction

Map
Information architecture

DETAILING

Develop
Content
Case studies

Iterate
Content structure
Best practice solutions
Information visualisation

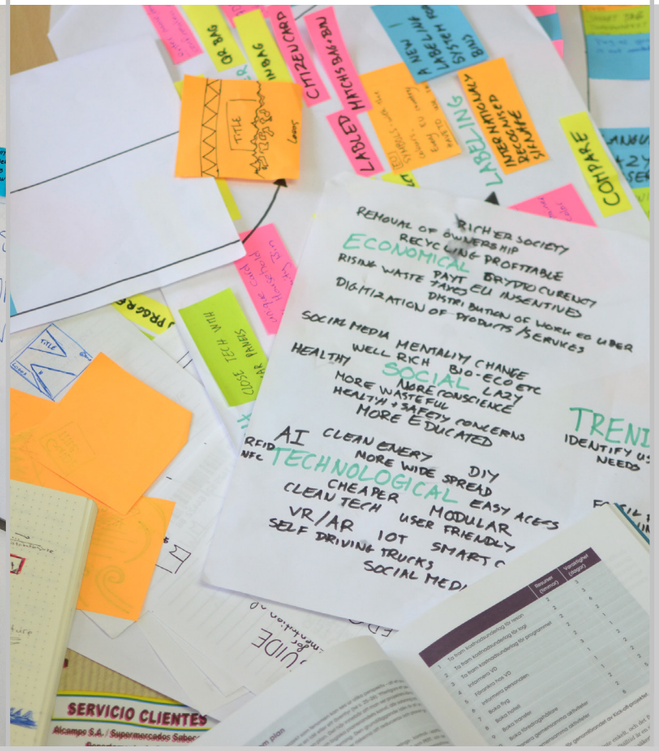
Execute
First Draft

PROTOTYPING

Test
Client feedback
Industry testing

Finalise
Content reduction
Visualisation of data
Information architecture

Communicate
Open source resource



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