FREE4LiB

WP5

DBP Validation workshop

10th of January 2024

We work for tomorrow

UNI GRAZ

Funded by the European Union

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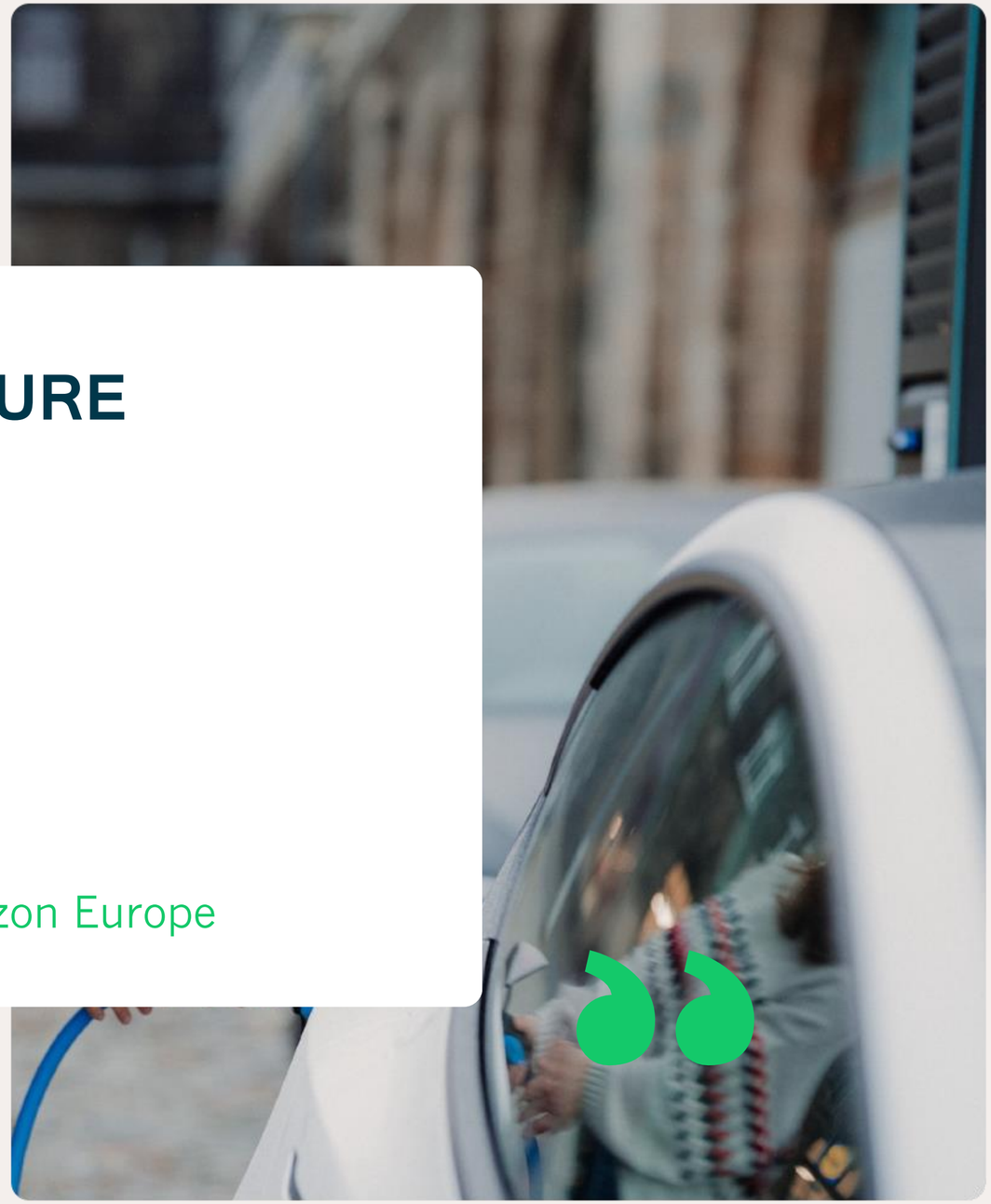
Investing in OUR FUTURE together

Horizon Europe



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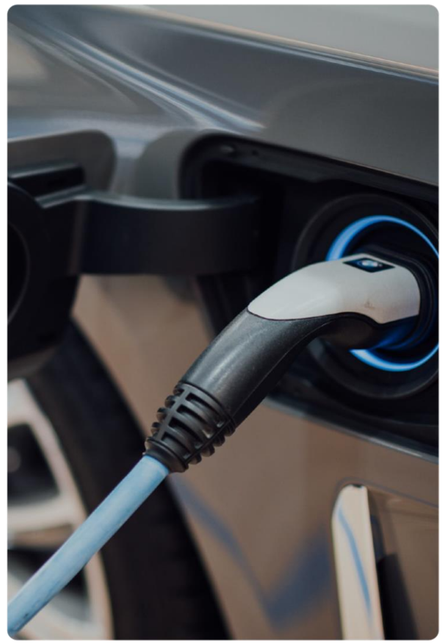
Welcome

Agenda

1. Warm up (20-30min)
    - Who is here today?
    - What is a battery passport?

3. Workshop core
    - Presentation of input slides
    - Collect answers through survey

4. Q & A, next steps & farewell



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#2797476

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FREE4LIB project overview

General Information

Feasible REcovery of critical raw materials through a new circular Ecosystem FOR a Li-Ion Battery cross-value chain in Europe.

www.freeforlib.eu

Funding: Horizon Europe – Grant Agreement No. 1069890

Call: HORIZON-CL5-2021-D2-01

Topic: HORIZON-CL5-2021-D2-01-06 - Sustainable, safe and efficient recycling processes (Batteries Partnership)

Duration: 4 years (from September 2022 to August 2026)

EC Contribution: 9.3 M€

Partners: 22 from 7 different countries

Coordinator: CARTIF

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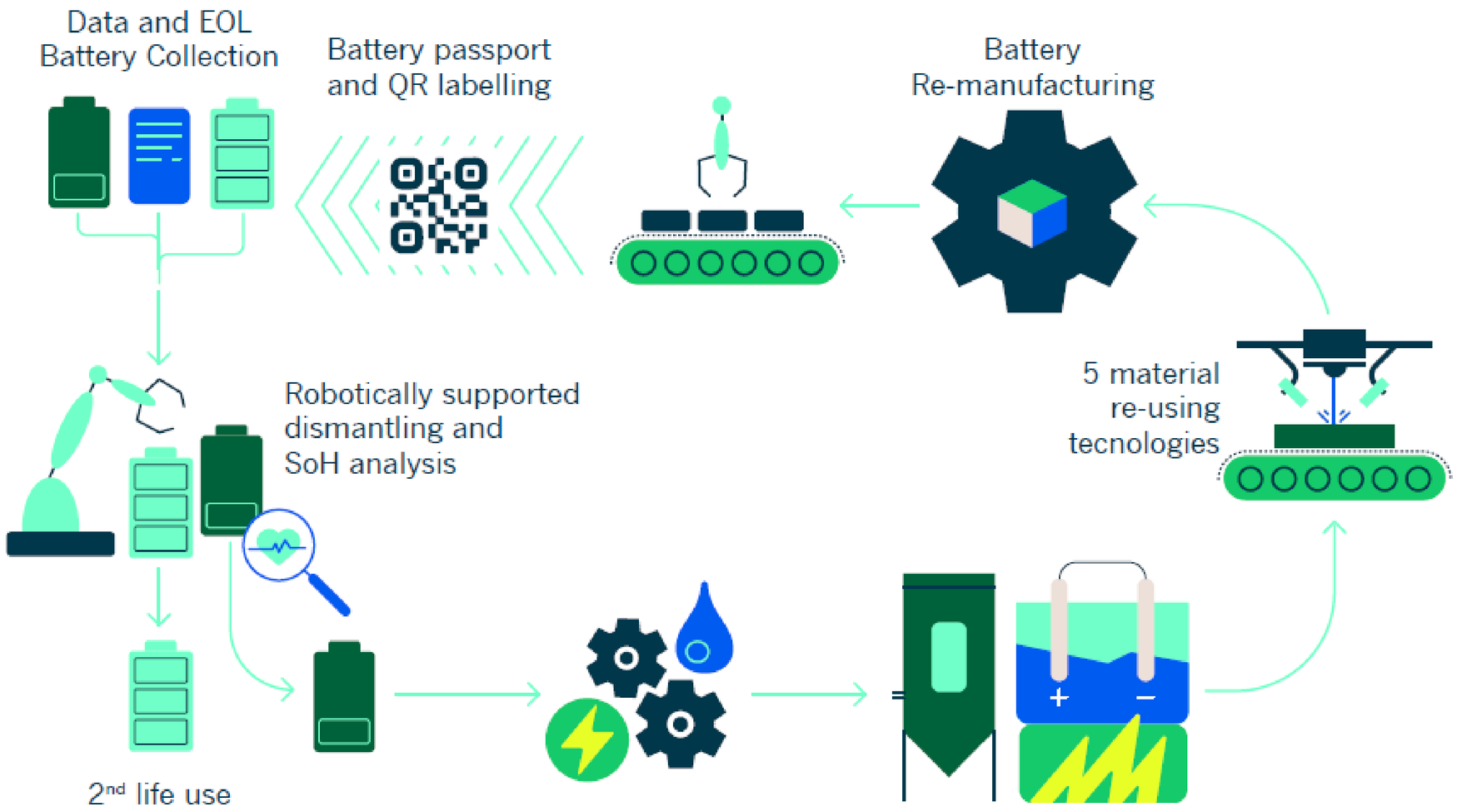
FREE4LIB concept



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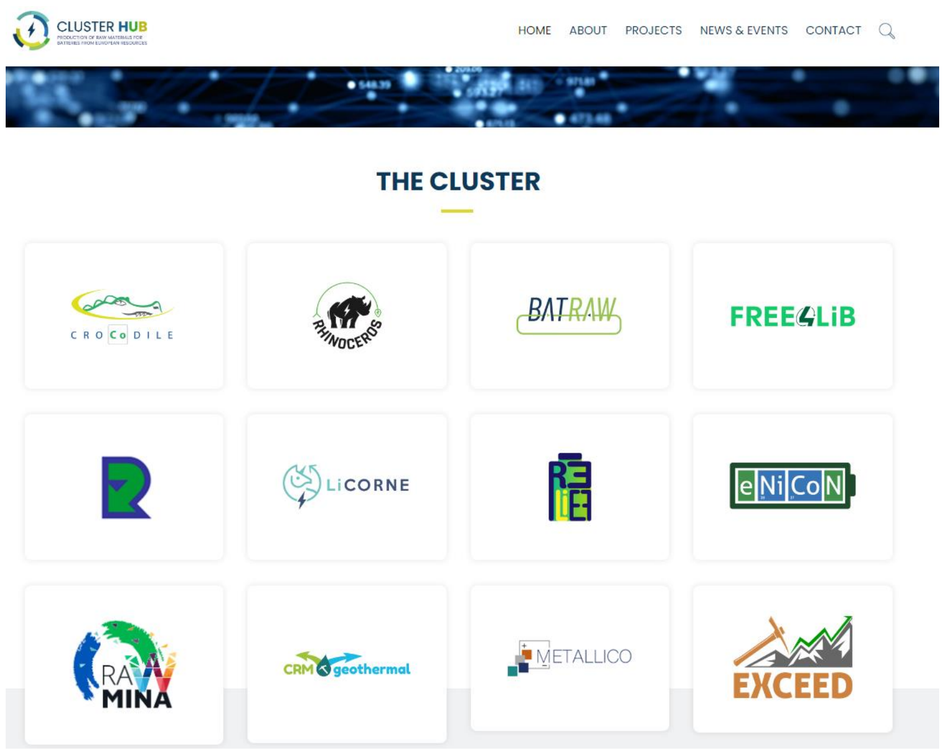
Today‘s audience

Cluster Hub

Rhinoceros, BATRAW, Respect

- Collaboration for a common data pool and prototype implementation
- Exchange of concepts and ideas



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Which project do you belong to?

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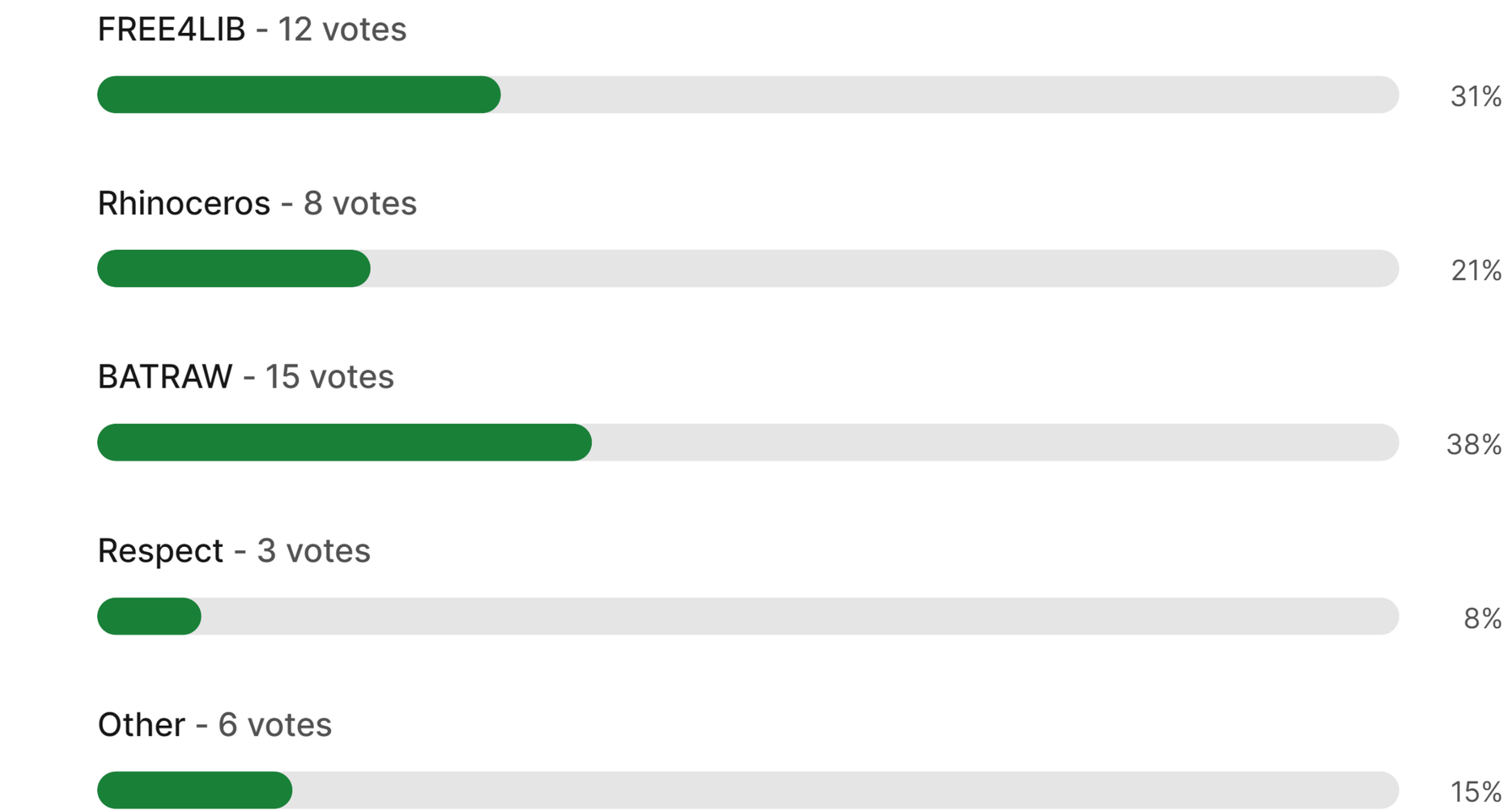
Which project do you belong to?

Multiple Choice Poll | 39 votes | 39 participants



Warm up

What is a battery passport (DBP)?

“The battery passport establishes a digital twin of the physical battery that conveys information about all applicable sustainability and lifecycle requirements based on a comprehensive definition of a sustainable battery.”

- Global battery alliance

Logistics	Data Model

Original	{
	"uniqueID": "AB123456",
	"timestampLocation": "2023.08.02-Graz-Austria",
	"composition": "25% copper, 75% Aluminum",
	"dimensions": "5x10x20 cm",
	"manufacturer": "0x432476E646F4E4058170f449d6F90455e1509304",
	"manufacturerDetails": "ID1234-Tokyo-Japan-Machining",
	"assemblerDetails": "FREE4LIB-Brussels",
	"userLocation": "Barcelona, Spain",
	"stateOfHealth": "Good",
	"userAnonymousID": "User1234",
	"state": "InUse",
	"descriptor": {
	"sensitivity": "Restricted",
	"granularity": "Detailed",
	"certainty": "Sure",
	"relevance": "VeryImportant"
	},
	"qrCode": ""
	}

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FREE4LiB

European Battery legislation (Art. 77-78)

Annex XIII Part 1 – **Publicly accessible info on battery model**	Annex XIII Part 2 **Info on bat. model only for COM and persons with legitimate interest**	Annex XIII Part 3 – **Info only for notified bodies. market authorities and COM**	Annex XIII Part 4 – **Info on individual battery only for persons with legitimate interest**
+ General info on Bats (Annex VI)	+ Detailed composition, including cathode, anode, electrolyte	Results of test reports proving compliance	+ Performance and durability parameters [Art. 10(1)], when the battery is placed on the market and when it is subject to change in status
+ Material composition	+ Part numbers for components + contact details of sources for replacement spares		+ SoH (Art. 14)
+ C- footprint; recycled content	+ Dismantling info		
+ Due diligence report Art. 52	+ Safety measures		
+ Lifetime, cells + pack resistence			
+ Renewable content share			
+ Rated capacity, voltage, power			
+ Declaration of conformity			
+ Other technical info			

Not necessarily in the passport, but possibly!

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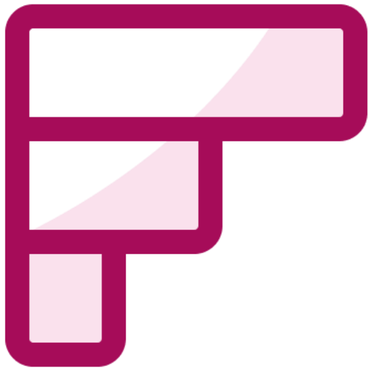

How would you rate your expertise in the field of battery passport?

ⓘ Start presenting to display the poll results on this slide.

How would you rate your expertise in the field of battery passport?

Ranking Poll | 35 votes | 35 participants

1. medium

0.4

2. rather low

0.2

2. very low

0.2

4. rather high

0.1

4. very high

0.1

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What is your main expertise (Job description)?

What is your main expertise (Job description)?

Wordcloud Poll | 54 responses | 40 participants

How can the battery passport (beyond legislative requirements) benefit the recycling of Li-Ion batteries?

Research question

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Core workshop

Questions

1) Data points
   - → Do you agree with the definitions?
   - → Is there still something missing?

2) User roles
   - → Is there any user missing?
   - → Which access rights should each user have?
   - → What is the role of the user in the process?

3) Use cases
   - → Background information
   - → B2U vs Recycling

4) Implementation & scale up
   - → Do you agree with the challenges?
   - → What could be possible solutions?

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Data definitions

SoH can be expressed in different ways but the battery passport should include information on **incidents** (e.g., accidents), expected **lifetime** and time in use to calculate the expected remaining lifetime. The **energy capacity** of cells should be given as well as further **internal electrical parameters**. The SoH can be further specified through different calculations of the state of certified energy (Patrone & Paffumi, 2023)

Material composition and chemistry is pretty self-explaining. The chemical composition of cells and cathodes should be given, all the way down to types and grades of the polymers.

The next field of data points covers everything that is related to the supply chain. This starts from the **origin** and manufacturer and **purpose of the battery**. For the transportation, **safety and handling instructions** as well as **transportation guidelines** are needed. This should be complemented by the **dimensions and type of battery** and the destination of course.

For the cluster **disassembly and repair instructions**, the same and additional **safety information** is needed. In addition to the **internal structure** of the battery and the **number of different parts**, it includes general **disassembly and assembly guidelines** and information.

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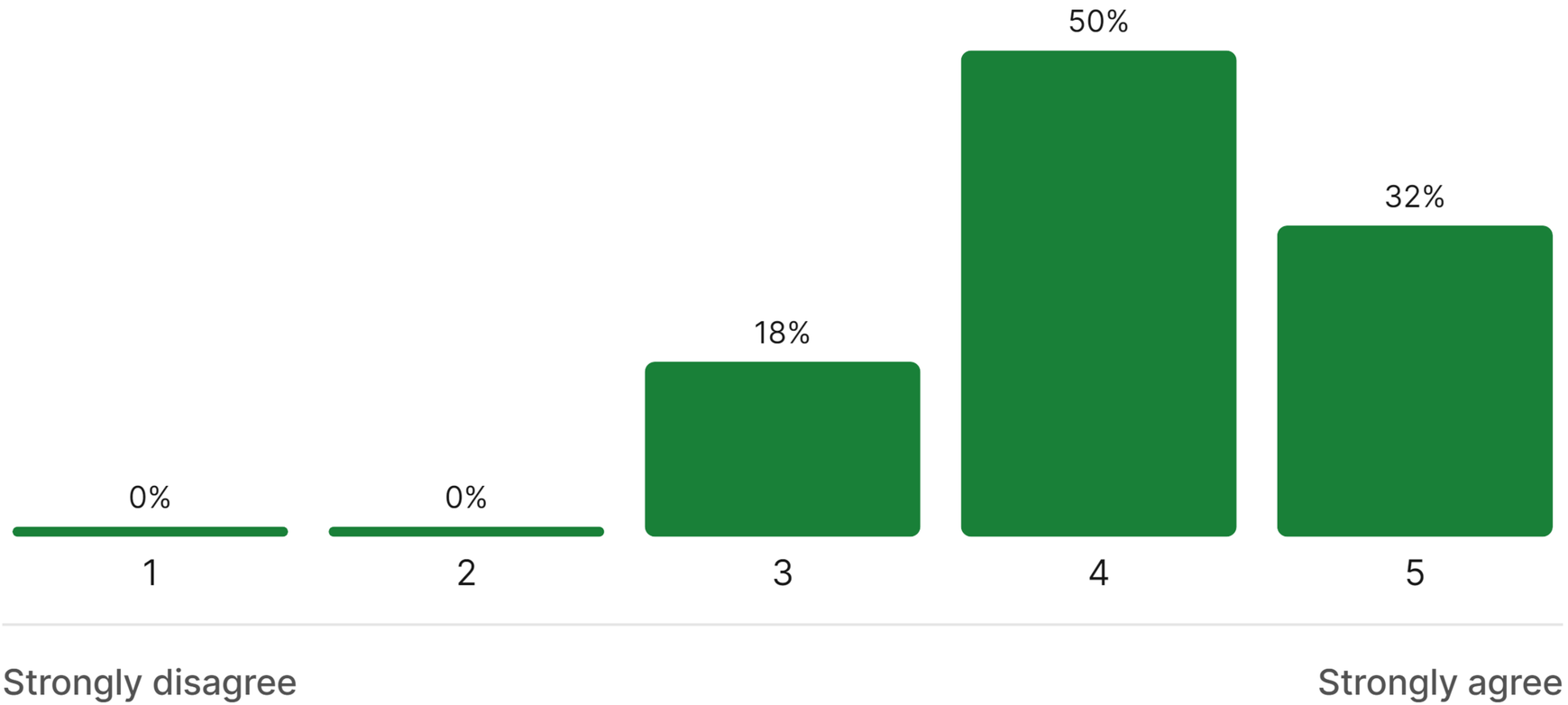
Do you agree with the data denifitions presented on slide 19?

ⓘ Start presenting to display the poll results on this slide.

Do you agree with the data denifitions presented on slide 16?

Rating Poll | 28 votes | 28 participants

Score: **4.1**



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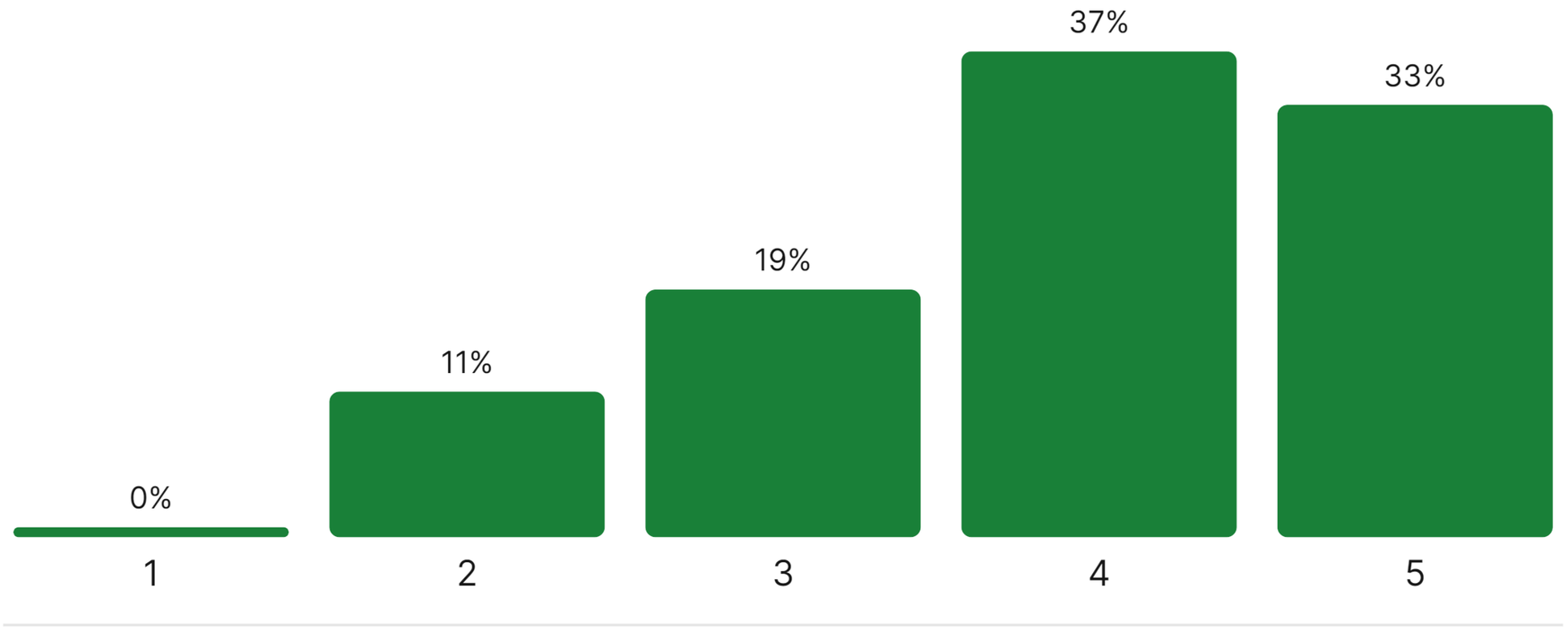
Material composition and SoH are the most important DBP data points for recycling

Material composition and SoH are the most important DBP data points for recycling

Rating Poll 27 votes 27 participants

Score: **3.9**



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Would you add a data point or category to the definitions presented on slide 19?

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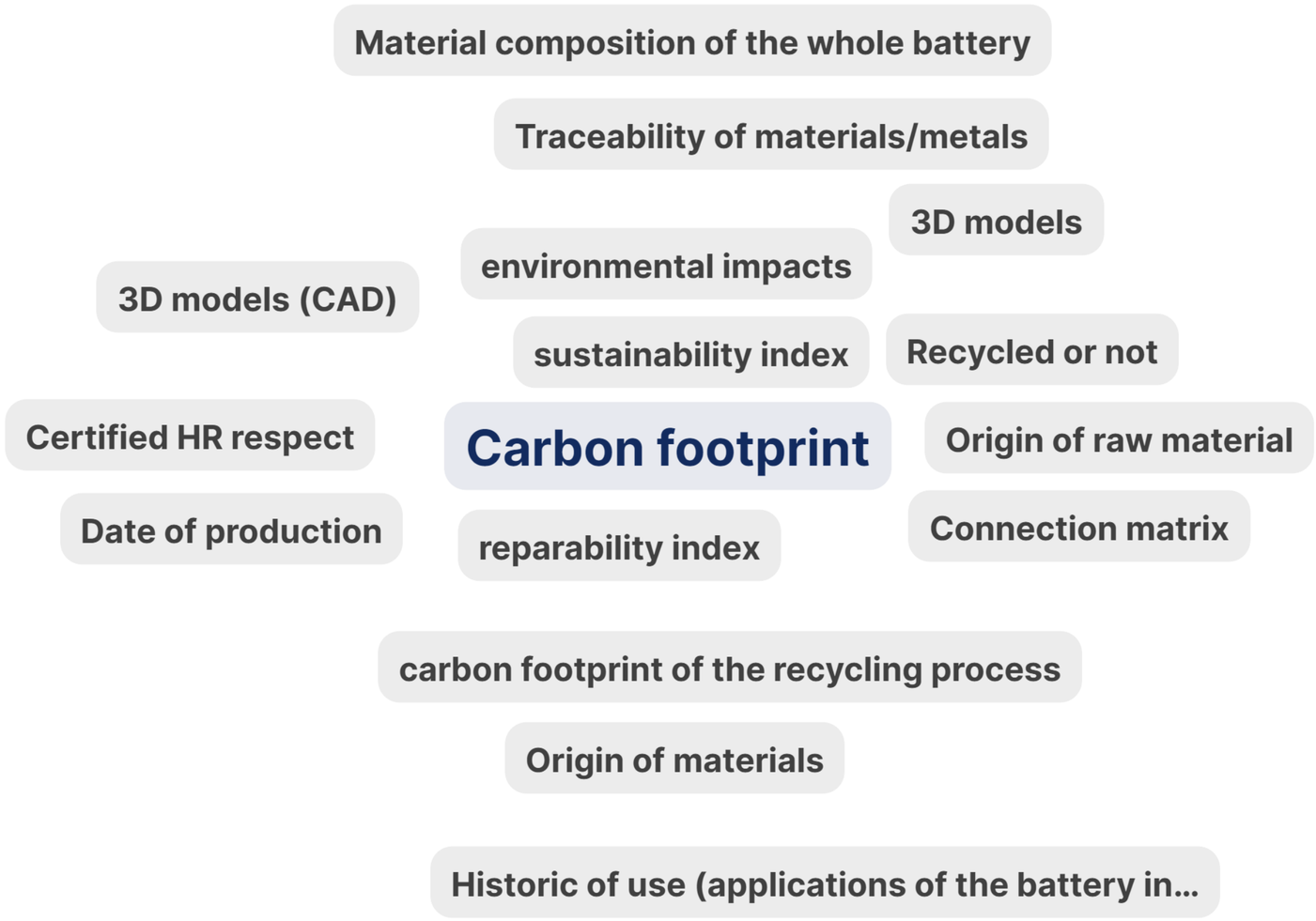
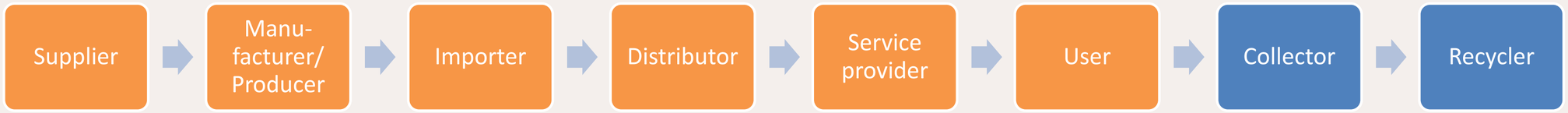
Would you add a data point or category to the definitions presented on slide 16?

Wordcloud Poll | 21 responses | 18 participants



User roles in battery regulation

Orange = only certain information
Blue = general access
Green = universal access



Competent authority

Government

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Would you add a user to the list on page 26? If yes, which one? (multiple answers possible)

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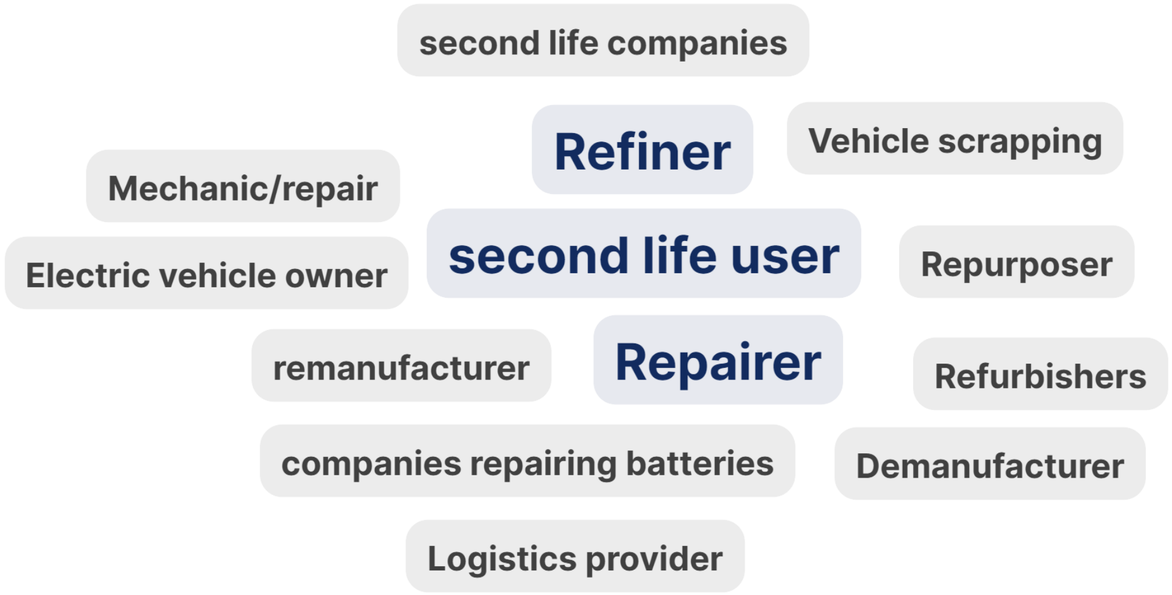
Would you add a user to the list on page 20? If yes, which one? (multiple answers possible)

Wordcloud Poll | 20 responses | 17 participants



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Which information should not be accessible for the orange entities on page 26?

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Which information should not be accessible for the orange entities on page 20?

Wordcloud Poll | 11 responses | 10 participants

Use cases

USER	IN LEGISLATION (EXCERPT)	IN FREE4LIB
Manufacturer/Producer	Registration, collection of waste batteries, provide information for user	2nd life production, obtaining selling permission, design of better batteries
Supplier	Provide information that manufacturer needs	-
Importer	Verification of manufacturer information, add contact information, handle battery in conformity with regulation, provide documents on request	-
Distributor	Take back batteries and handover to producer	-
Service provider	handle battery in conformity with regulation, cooperation with authorities	Repairment
User	Discard batteries seperately	-
Collector	-	Measure SoH and material composition (if possible), compare with collection target, sort between 2nd use and recycling, logistical decisions, transfer batteries
Recycler	Handover to producer and record transactions	Assure use of best technology, avoid thermal event
Competent authority	Cooperation with national authorities	Facilitate sorting, describes responsibilities, punishments, supervision
Government	Monitor and verify producers	
Research institutions	-	Life cycle assessment

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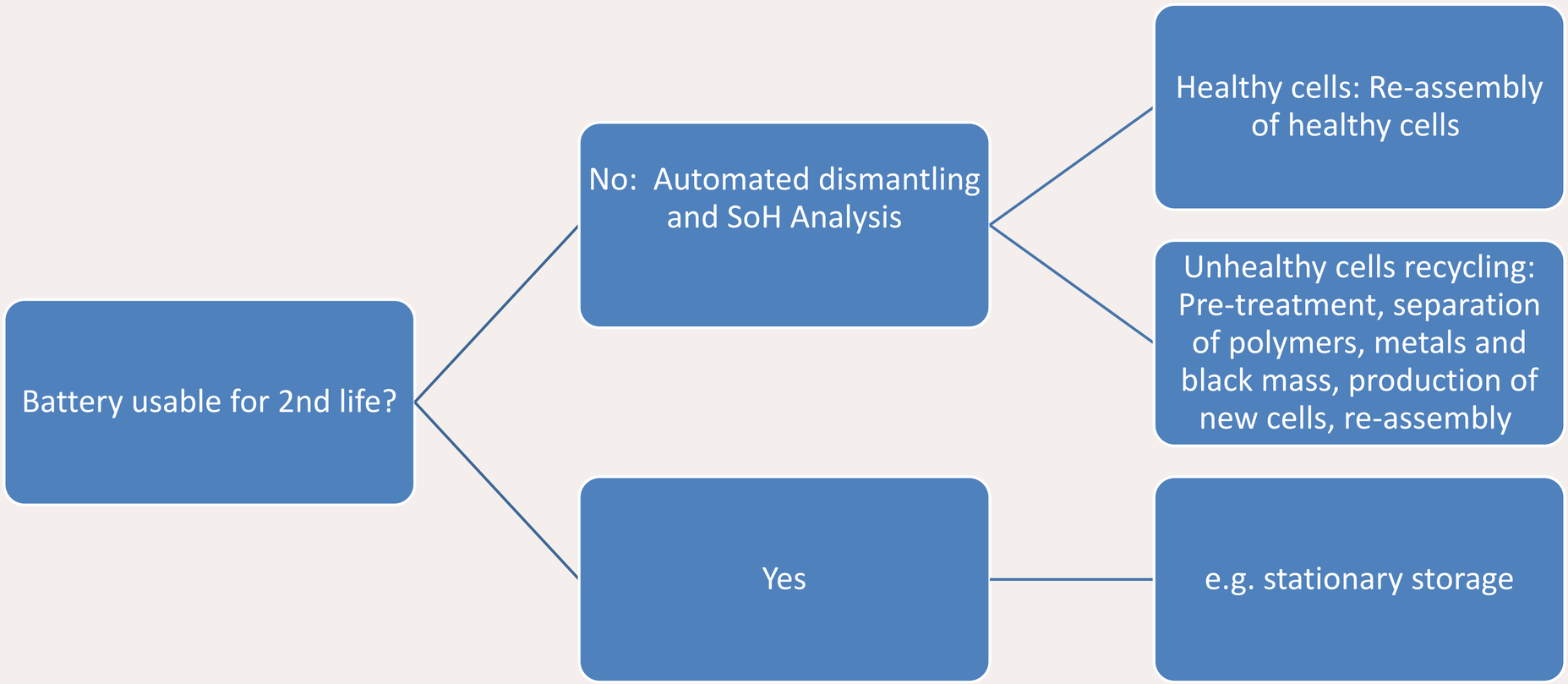
Recycling vs. battery second use



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What differences regarding battery passport, do you see between battery second use and recycling?

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What differences regarding battery passport, do you see between battery second use and recycling?

Open text poll | 17 responses | 13 participants

Anonymous
Second use: SOH but SOH of other battery modules/cells used in the same battery pack

Anonymous
remanufactured batteries will be a challenge for battery passport : which informations from which historic will we keep ?

Anonymous
For battery reuse, the battery passeport must allow to sort the modules

Anonymous
Efficiency

Anonymous
2nd life is useful follow the 3R rules, however, recycling always will be the last stop

Anonymous
Downgrading and so should be noted

Anonymous
Battery history for second use

Anonymous
Module/cell battery pasport for remanufactured batteries

Anonymous
Compliance with EU regulation for Recyxling

Anonymous
Remaining useful energy

Anonymous
In 2nd life, parts of the old DBP`s could be combined to a new DBP

Anonymous
for recycling: improve recycling efficiencies (e.g., material composition, SoH, SoS) for

B2U: indentification of healthy battery cells / modules whatnot (e.g., SoH)

Anonymous
Full composition of materials for safe recycling

Anonymous
The ownership ans responsability

Anonymous
The time of second use should be mentionned for the recycling stage

Anonymous
Recycling requires origin

Anonymous
The battery status will need to be updated

Challenges

- No willingness to share information
- Processes not standardized
- High variety of products
- Different options for second life
- Higher process costs then revenue in the EOL processes
- High environmental burden if not done right
- Dynamic development of the legislative framework

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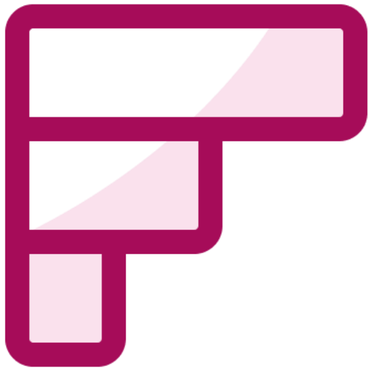

How would you rank the challenges presented on slide 36?

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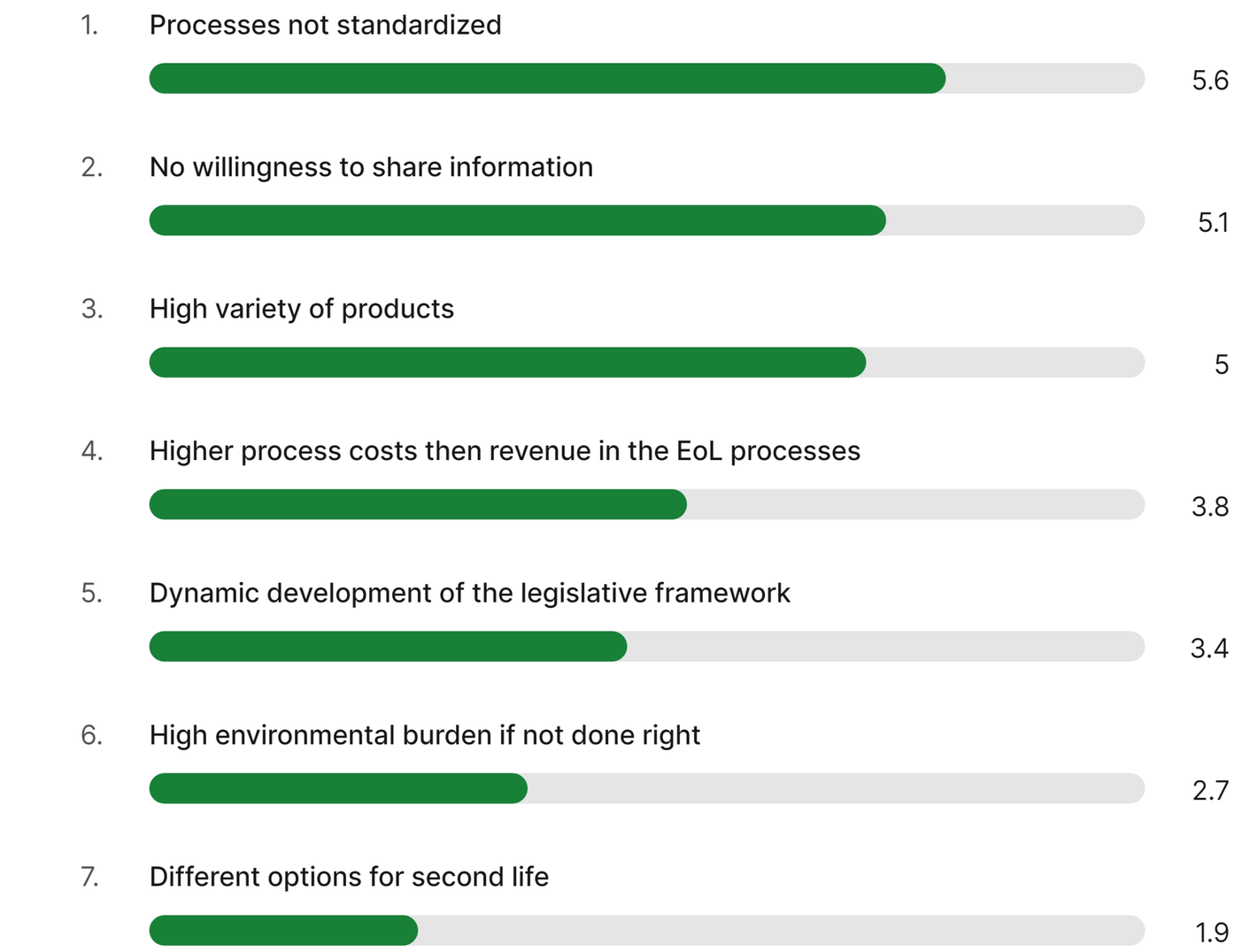
How would you rank the challenges presented on slide 26?

Ranking Poll | 21 votes | 21 participants



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Which further challenges (in addition to slide 36) do you see regarding the implementation and scale up of a DBP and how would you solve it?

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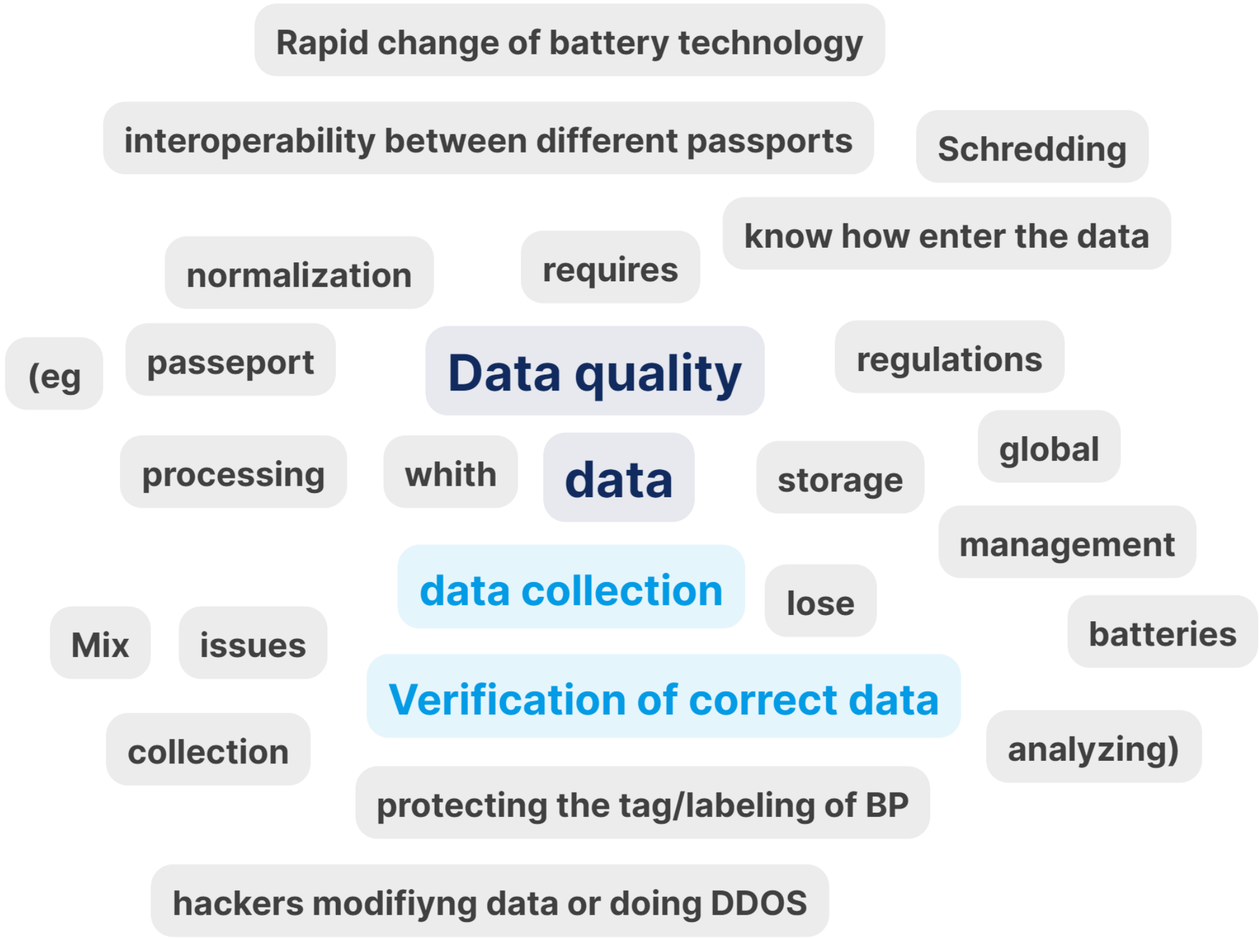
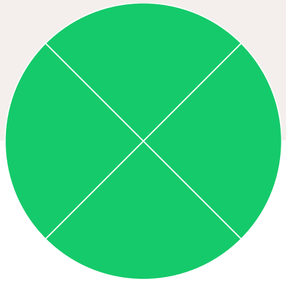
Which further challenges (in addition to slide 36) do you see regarding the implementation and scale up of a DBP and how would you solve it?

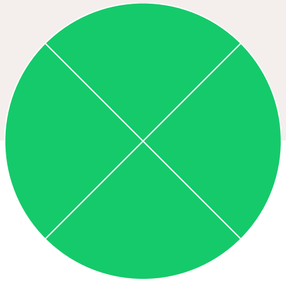
Wordcloud Poll | 21 responses | 14 participants



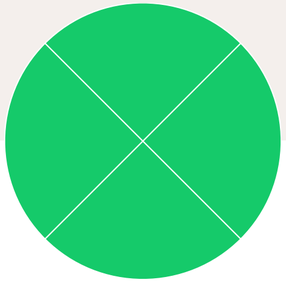
Q & A



Questions?



Thank you for your participation!



Lessons learned?

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Thank you

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