

**Team Defence Information  
Snack session  
14<sup>th</sup> January 2026**

# The Where of 'Waste'

Michael Groves & Caroline Mooney

Why the **'where'** ?



# Waste Process



Resordinate



**Sites**

**Receivers**

**Waste Flow**

**Pause**

**Materials (37/37)**

**Deselect All**

- ☒ Cooking Oils
- ☒ Contaminant Recycling
- ☒ Solid Waste
- ☒ Bulk Waste
- ☒ Mixed Waste



## GLOBAL IMPORT AND EXPORT FLOWS\*

\* The flows do not specifically point to individual countries, but to the regions. These flows are based on the available data. A higher level of reporting may result in certain regions or countries having higher levels of import/export.



Uncontrolled  
e-waste and  
used EEE



Movement of hazardous e-waste  
with prior informed consent un-  
der the Basel Convention



Printed circuit  
board waste



Flow within  
the region



# **‘Waste’** Policy & technology landscape



Extended Producer Responsibility - packaging

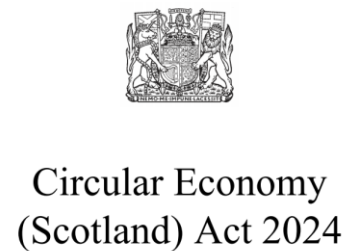


Passed






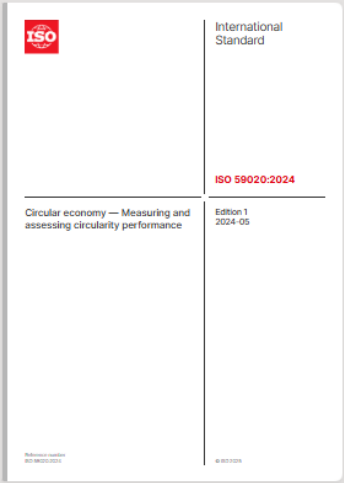
# Regulations



## Standards



StandardsSectorsAbout ISOInsights & newsTaking partStore



International Standard


ISO 59020:2024

Circular economy — Measuring and assessing circularity performance

Edition 1  
2024-05

Read sample

# ISO 59020:2024



Circular economy — Measuring and assessing circularity performance

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**Published** (Edition 1, 2024)





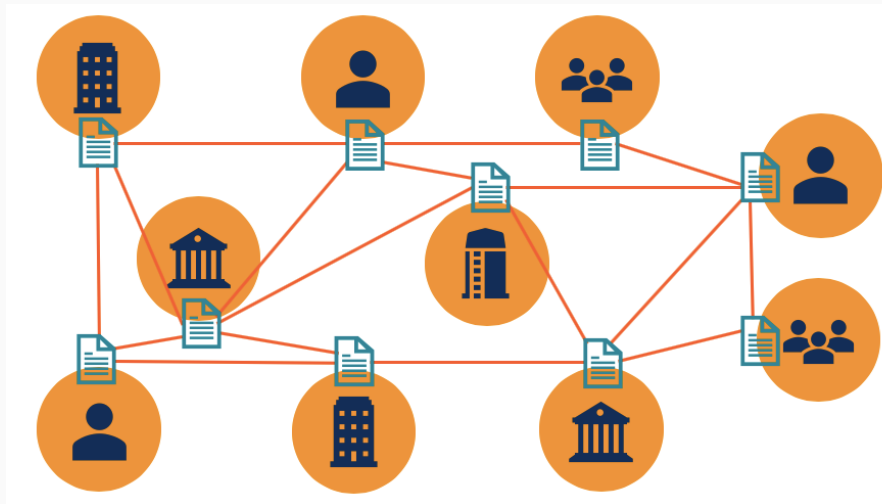
# The Internet of Bins

*Improves logistics....but does it stop waste or improve outcomes*





# Circular systems & business models



## Recycling tech



## ReElement Technologies Partners with Transition Equity Partners to Expand Global Critical Mineral and Rare Earth Refining Capacity and Strengthen U.S. Supply Chains

Jan 5, 2026



*\$200 Million Strategic Equity Facility Accelerates U.S. and Allied Critical Mineral Refining Capacity*

*Marion, Indiana Facility Anchors Scalable Platform for Heavy Rare Earths, Defense Minerals, and Magnet Supply Chains*

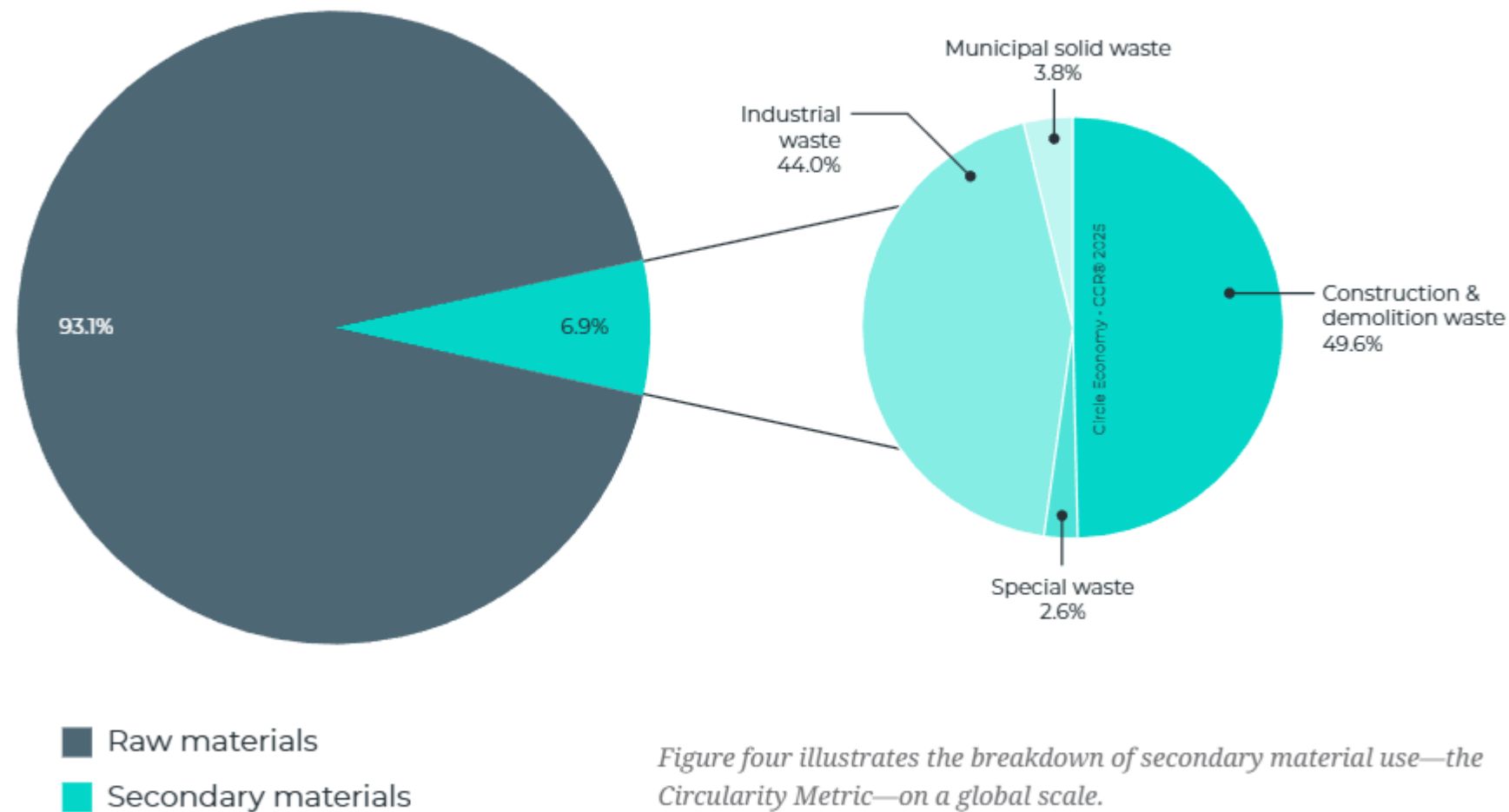
January 5, 2026 | **Source:** ReElement Technologies Corporation

**FISHERS, INDIANA / EIN Presswire / January 5, 2026 /** ReElement Technologies Corporation ("ReElement" or the "Company"), a leading U.S. innovator in rare earth element (REE) and critical mineral refining for the commercial and defense industries, today announced the closing of a \$200 million strategic equity facility from [Transition Equity Partners, LLC](#) (TEP).



Yet....

## Global secondary material consumption



*Figure four illustrates the breakdown of secondary material use—the Circularity Metric—on a global scale.*



Yet....





# Materials utility Challenges

# What information do we need to track material

## Producer



When and where  
was the material  
picked up from?

Key Data  
Lift Date  
Producer Address

## Material



What was the  
material and  
weight?

Key Data  
Description  
Code  
Weight  
Container Type

## Carrier



Who moved the  
material?

Key Data  
Carrier Name  
Carrier Licence

## Receiver



Where was the  
primary  
destination of the  
material?

Key Data  
Site Address  
Site Licence



# Lack of consistency – data, formats, definitions



Island Recycling Ltd.  
IWC Compound  
Sparky Drive  
Industrial Park, George Town  
Office Phone: (345) 516 3333  
admin@iwc.ly

## Purchase Ticket

Paid

Purchase Ticket Number: I250620351  
Purchase Ticket Date: 06/20/2025  
Payment Terms: Due On Receipt  
Purchase Ticket Due Date: 06/20/2025  
Purchase Ticket Creation Date: 15:32  
Purchase Ticket Amount: -73.50  
Created By: Island Recycling Yard

Bill To  
Ritz Carlton

Item #	Item Name	Quantity Lbs	Price Per Lbs	Total
Auto Battery	Auto Batteries sealed	-1,050.00	0.07	-73.50
Total Quantity Lbs:		-1,050.00		
Subtotal:				\$ -73.50
Purchase Ticket Amount				\$ -73.50
Cash on 07/02/2025:				(-73.50)
Purchase Ticket Balance:				\$ 0.00

North East Bottle Depot  
5497 Falsbridge Drive NE  
Calgary, AB  
(403) 280-1200

Order # 1141239 9/4/2024 2:05:25PM  
Station: OfficePC  
Clerk: admin

Description	Quantity	Price	Total
0 - 1L Container Mix	2,060	0.10	206.00
Over 1L Container Mix	5	0.25	1.25
PET <= 1L (Clear & Light Bl	100	0.10	10.00
Tetra Brik <= 1L	45	0.10	4.50
	<b>2,210</b>		<b>(221.75)</b>

Order # 1143363 9/10/2024 1:01:46PM  
Station: OfficePC  
Clerk: admin

Description	Quantity	Price	Total
0 - 1L Container Mix	1,584	0.10	158.40
Over 1L Container Mix	1	0.25	0.25
PET <= 1L (Clear & Light Bl	251	0.10	25.10
	<b>1,816</b>		<b>(181.75)</b>

Order # 1146095 11/19/2024 11:48 48AM

Agreement N	Container Ty	Material	EWC	Job Type	Qty	Job Status	Weight Li	Total Weight	Overweight Am	Disposal Ch	Movement C
99920	Offcon	Confidentia	20 01 01	Empty	2.00	Completed				£ 0.00	£ 52.00
99920	Offcon	Confidentia	20 01 01	Empty	2.00	Completed				£ 0.00	£ 52.00
99920	Offcon	Confidentia	20 01 01	Empty	2.00	Completed				£ 0.00	£ 52.00
99920	Offcon	Confidentia	20 01 01	Empty	2.00	Completed				£ 0.00	£ 52.00
99581	Euro 1100	Zero	20 03 01	Empty	4.00	Completed	280			£ 0.00	£ 57.36
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210	212	2	£ 0.38	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210	176	0	£ 0.00	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210			£ 0.00	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210			£ 0.00	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210	326	116	£ 22.04	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210			£ 0.00	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210	212	2	£ 0.38	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210	312	102	£ 19.38	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210			£ 0.00	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210	194	0	£ 0.00	£ 43.02
99581	Euro 1100	Zero	20 03 01	Empty	3.00	Completed	210	248	38	£ 7.22	£ 43.02
99578	Euro 360	Glass	15 01 07	Empty	4.00	Completed				£ 0.00	£ 21.92
99579	Euro 240	Food	20 01 08	Empty	4.00	Completed				£ 0.00	£ 28.80
100033	Bales	Cardboard	20 01 01	Collection	5.00	Completed				£ 0.00	£ 0.00
99578	Euro 360	Glass	15 01 07	Empty	4.00	Completed				£ 0.00	£ 21.92
99579	Euro 240	Food	20 01 08	Empty	4.00	Completed				£ 0.00	£ 28.80

2, JALAN PERMAS 11,  
BANDAR BARU PERMAS JAYA,  
81750 MASAI, JOHOR, MALAYSIA

ATTN. : MS.CORRINE LAI  
TEL. : 07-3813477 & 012-5164928  
A/C NO. : 3000/R08  
TAX REF. :

NO. : 00005469  
DATE : 31/10/2023  
TERM : 30 DAYS  
YOUR REF :  
AGENT :  
PAGE : 1

ITEM NO.	DESCRIPTION	QUANTITY	UPRICE	TOTAL EXCL. SST	SST	TOTAL INCL. SST	TAX CODE
1 CTC	CONTRACT	31	180.00	5,580.00		5,580.00	SV-0
	DOMESTIC WASTE COLLECTION						
	14TH CLAIM : OCTOBER 2023						

OIL COLLECTION FORM										
ზეთის შეგროვების ჟურნალი										
DATE & TIME	NAME OF WASTE	UNIT	COLLECTED	BUYER	ID CODE	DRIVER'S ID	VEHICLE NUMBER	WAYBILL NUMBER	START OF TRANSPORTATION	END OF TRANSPORTATION
თარიღი და დრო	ნარჩენის დასახელება	ერთეული	შეგროვდა	მყიდველი	ს/კ	მძღოლი	მანქანის ნომერი	ზედგადების ნომერი	ტრანსპორტირების დაწყება	ტრანსპორტირების დასრულება
25/01/2024 10:46	USED OIL	KG	100	OILIO LLC	404492483	59001091660	UC 010 OC	0794440571	Telavi Street #20	Tsalaskuri village, Gardabani Municipality
26/02/2024 13:39	USED OIL	KG	96	OILIO LLC	404492483	59001091660	OI 016 LL	08010880054	Telavi Street #20	Tsalaskuri village, Gardabani Municipality
26/03/2024 13:16	USED OIL	KG	144	OILIO LLC	404492483	59001091660	OI 016 LL	0807413703	Telavi Street #20	Tsalaskuri village, Gardabani Municipality

Complex supply chain –  
from single vehicle  
operators to listed entities

Hauler Name
Al Rabee Shelter
Renewables for used c
Antilla Energy
EcoTech
EcoTech
Dulsco
Reloop
The Abu dhabi EditionA
DULSCO
Baotou green energy Ji
A&R INVERSIONES Y
Ayuntamiento de Barce
Fundación Roure (kitch
Fundación Aurea (matt
JUNAN SERVEIS SOL
MARESME (kitchen oil
NESPRESSO
北京佳阳物业管理有限
北京佳阳物业管理有限
Biofilter Környezetvéde
MOHU MOL Hulladék
MOHU MOL Hulladék
Chamical Residuos Ind
Casa Garrahan – Fund
Colegio Didascalio Sta
Cooperativa De Trabaj
Cooperativa El amanec
Ecobaires
Ejercito de Salvación
RBA AMBIENTAL

GWR GmbH



LOCATION DETAILS

CITY  
Frankfurt, Germany

COORDINATES  
50.096283, 8.592814

MATERIALS RECEIVED

E-WASTE  
401.31 kg

METAL - MIXED  
455 kg

VEOLIA MIDDLE  
EAST RECYCLING



LOCATION DETAILS

CITY  
Dubai, United Arab Emirates

COORDINATES  
25.108707, 55.227261

MATERIALS RECEIVED

BATTERIES  
140 kg

CARDBOARD  
29,849 kg

GLASS  
50,030 kg

METAL - MIXED  
3,220 kg

MIXED RECYCLING  
2,112,596 kg

PAPER  
1,300 kg



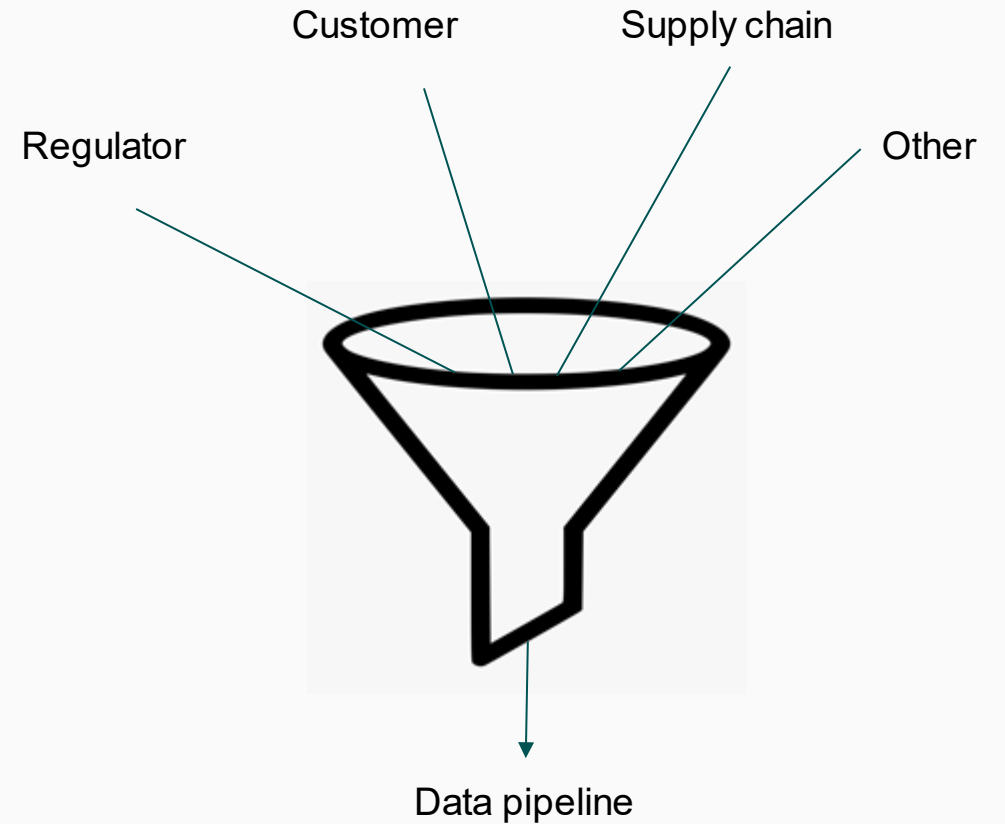
Resordinate



# Materials utility Principles

# #1 Supply chain with many entities, locations, data types

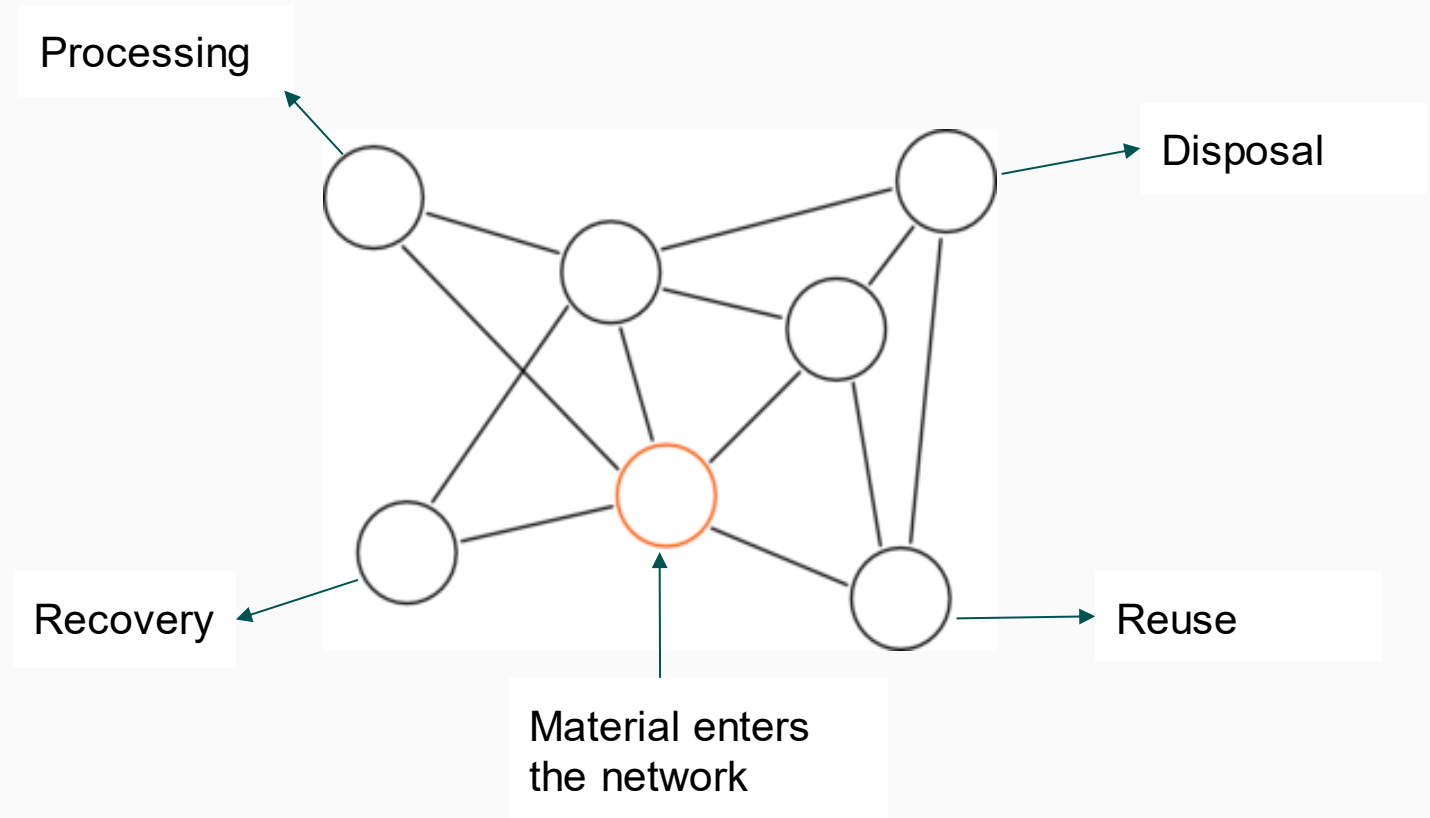
- 'Rubbish' data: identify and accommodate missing and errors
- Value chain entity - multiple locations & IDs.
- Clean and normalise from many datasets for the 'truth'
- AI to automate and identify patterns





## #2 It's a dynamic network with multiple transformations & fates

- Understanding the material network
- Verify who & what happens to material at nodes through the network.
- Multiple paths through the network
- A particular path depends on:
  - *Transformations within sites*
  - *Site attributes*



# Team Defence Information Snack session 14<sup>th</sup> January 2026

## Thank you

Michael Groves [michael.groves@resordinate.com](mailto:michael.groves@resordinate.com)  
Caroline Mooney [caroline.mooney@resordinate.com](mailto:caroline.mooney@resordinate.com)

[www.resordinate.com](http://www.resordinate.com)