

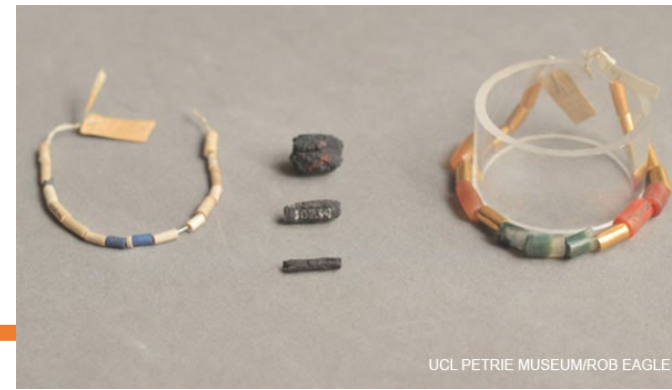
Critical Raw Materials Substitution

Critical Raw Materials in our everyday life - EU Raw Materials Week

12th November 2018

Susanne Coles, KTN (UK)

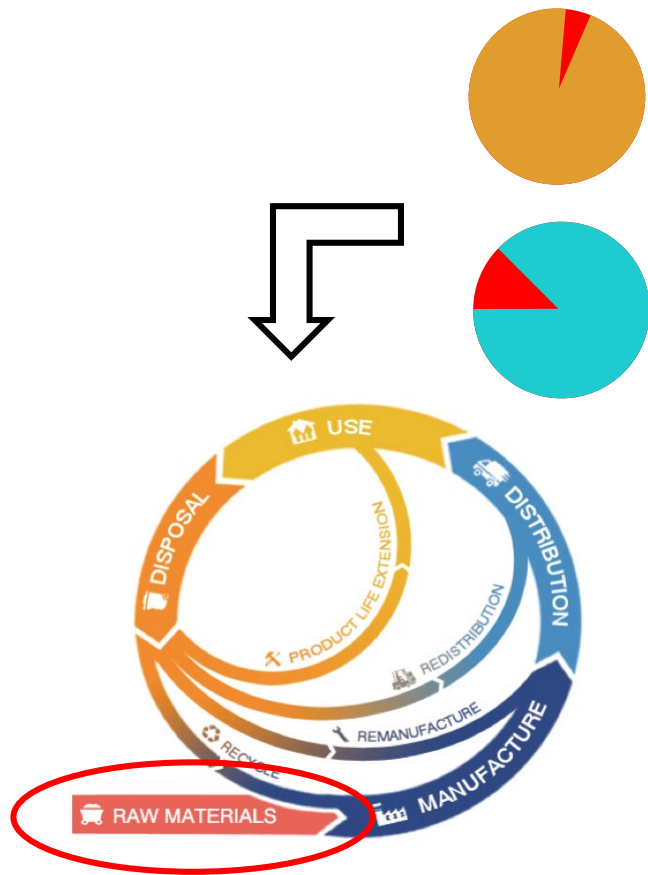
Perception



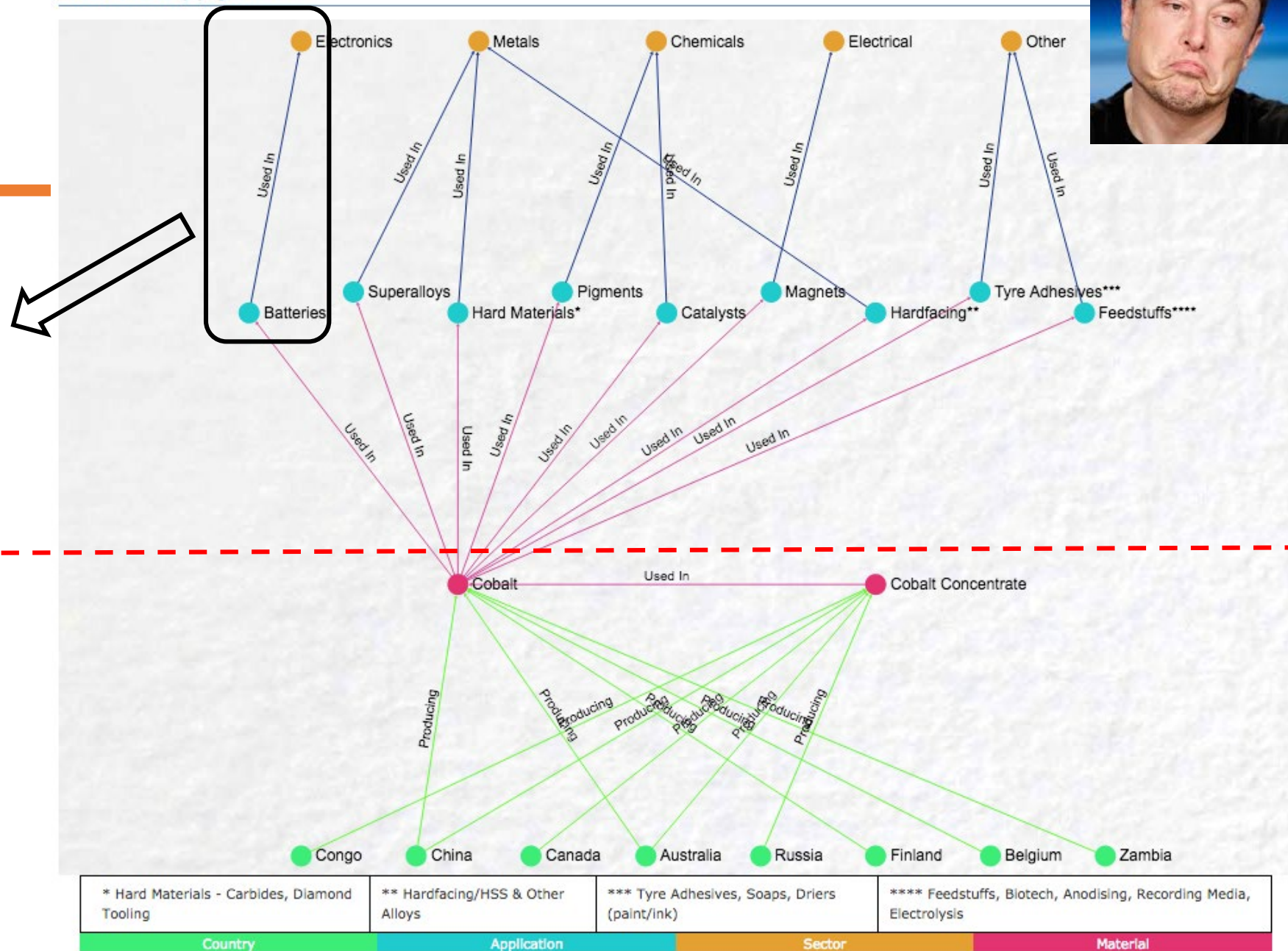
Substitution is....



Threat?



Cobalt Supply Chain



Substitution



Substance for Substance



Service for Product



Process for Process



New Technology for Substance

Substitution Potential



■ Electrical &

ALLOYS	ANTINOMY (59)	HEAVY RE (6)	SILICON METAL (42)		
MAGNETS	HEAVY RE (5)	LIGHT RE (4)	GALLIUM (42)		
BATTERIES	COBALT (17)	INDIUM (11)	LIGHT RE (9)	GRAPHITE (7)	
ELECTRONIC COMPONENTS	ANTIMONY (29)	INDIUM (70)	PLATINUM (1)	BERYLIUM (55)	PALLADIUM (5)
CATALYSTS	COBALT (5)	LIGHT RE (49)	PALLADIUM (83)	PLATINUM (78)	VANADIUM (30)

Substitute merit	
excellent	
good	
adequate	
poor	
none	

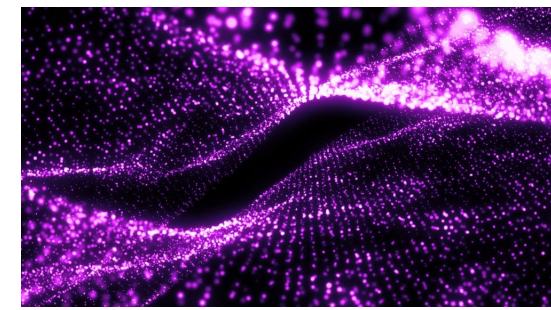
Drivers



- ➡ Global Markets and Supply – scarcity, price volatility, disruption of supply, geopolitics, trade tax
- ➡ Regulation & Legislation – REACH, Directives, etc.
- ➡ Discovery – Novel (abundant & non toxic) materials/technologies/processes/business models, new applications
- ➡ Consumer – product enhancements (e.g. performance, durability, cost), behaviour change

Public Interest





Substitution Readiness Level (SRL)

Proposed: Measure to evaluate, monitor/track the maturity of a substitution solution to be able to ensure uptake in the industry

Performance	Price Ratio	Sustainability Credits
Availability	Ease of Implementation	Ownership/IP FTO
Compatibility	Acceptance/MRL	Timescales

Value to Europe: Imports vs Exports, Employment, Supply Chain

Economic Assessment



Permanent magnets

- Validation of material flows needed
- Patent issues – FTO
- Multiple substitution options (material, technology, service)

Platinum catalysts

- EVs: less demand for Pt catalysts
- Fuel Cells: increase demand for Pd

Accumulators

- Increased production in Asia, thus higher EU imports
- EU could increase export of final product, growth through EoL market

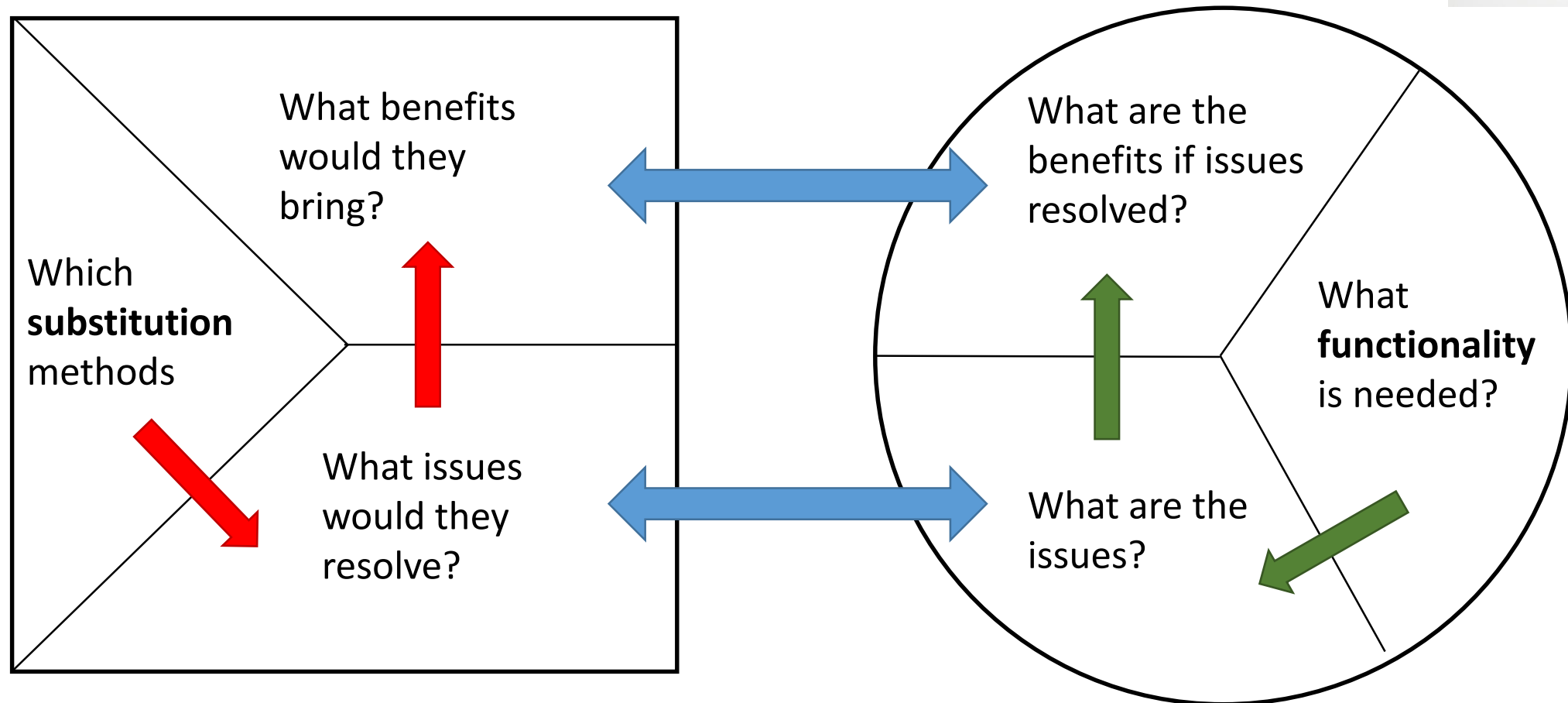
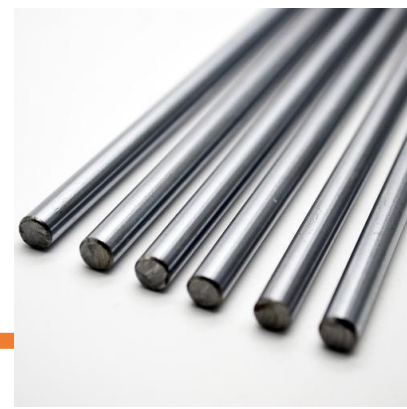
Multichip integrated circuits

- Manufacturing concentrated in Asia
- EU: high tech, niche and custom manufacture
- R&D exists for Ta capacitors

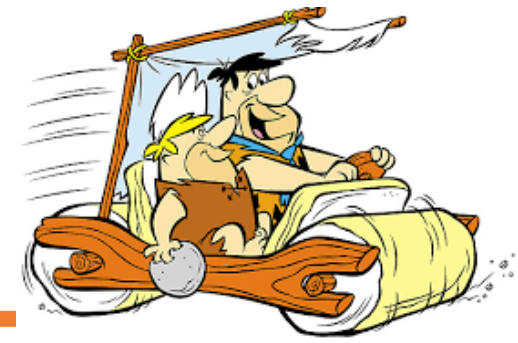
Other ferro alloys

- Distinction per specific alloy
- Technology or manufacturing (processes) as most likely options for substitution, but need to understand drivers (typically not criticality)

Value Proposition



Workshop Conclusions

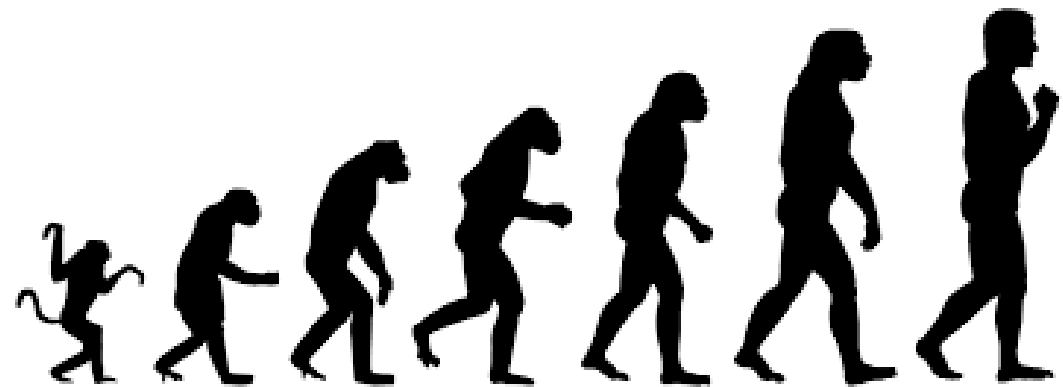


- Majority of CRMs lack alternative, it takes time to develop new materials and technologies and to embed them into (new) products, processes and services throughout the supply chain.
- Industry and policy cycles do not align, which makes it difficult to prioritize and focus on certain CRMs. Also, supply chain risks need to be understood.
- The image of substitution should change from being a challenge to an opportunity for the market, whereby sustainability aspects as asset should be taken into greater account.
- The SRL will be a useful tool for companies as it shows technological readiness, as well as economic potential and other factors.
- The economic assessment of substitution strategies should also focus on better functionality and quality and take into account technology, IP, environment in the EU, skills and industry.
- The value proposition canvas seems to be a good method to understand fundamental problems related to CRMs and stimulates a different way of thinking towards 'other solutions'.

Substitution is...

?

...(the development of) new ideas, designs, products, etc.



Thank you!

Get in touch for more information!



All of the reports produced in the project will be available for download on the SCRREEN website.



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