

What makes a Material Critical?

CRM_InnoNet at
Semicon Europa 2014



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Cefic
October 6th 2014

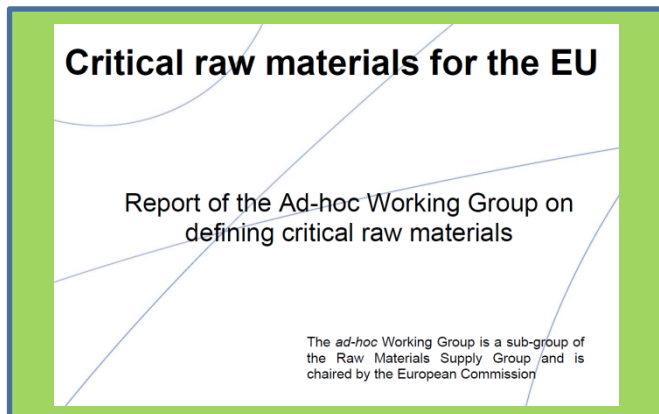
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“Critical” Raw Materials, the origin

- The Raw Materials Initiative launched by the European Commission, had as a result the “report of the Ad-hoc group on defining Critical Raw Materials” (30 July 2010). http://ec.europa.eu/enterprise/policies/rawmaterials/documents/index_en.htm
- On 2nd February 2011, the European Commission published the communication “**Tackling the challenges in commodity markets and on Raw Materials**” (COM(2011) 25 final).
- Both documents show the list of the 14 raw materials classified as “Critical”, framing the scope of future initiatives.



Concentration of production of critical raw materials, and recycling and substitution rates (I)

Concentration of production of critical raw materials, and recycling and substitution rates					
Raw Materials	Main producers (2008, 2009)	Main sources of imports into EU (2007, or 2006)	Import dependency rate	Substitutability	Recycling rate
Antimony	China 91%	Bolivia 77%	100%	0,64	11%
	Bolivia 2%	China 15%			
	Russia 2%	Peru 6%			
	South Africa 2%				
Beryllium	USA 85%	USA, Canada, China, Brazil (*)	100%		
	China 14%				
	Mozambique 1%				
Cobalt	DRC 41%	DRC 71%	100%	0,9	16%
	Canada 11%	Russia 19%			
	Zambia 9%	Tanzania 5%			
Fluorspar	China 59%	China 27%	69%	0,9	0%
	Mexico 18%	South Africa 25%			
	Mongolia 6%	Mexico 24%			
Gallium	NA	USA, Russia (*)	(*)	0,74	0%
Germanium	China 72%	China 72%	100%	0,8	0%
	Russia 4%	USA 19%			
	USA 3%	Hong Kong 7%			
Graphite	China 72%	China 75%	95%	0,5	0%
	India 13%	Brazil 8%			
	Brazil 7%	Madagascar 3%			
		Canada 3%			

(*) subject to strong fluctuations

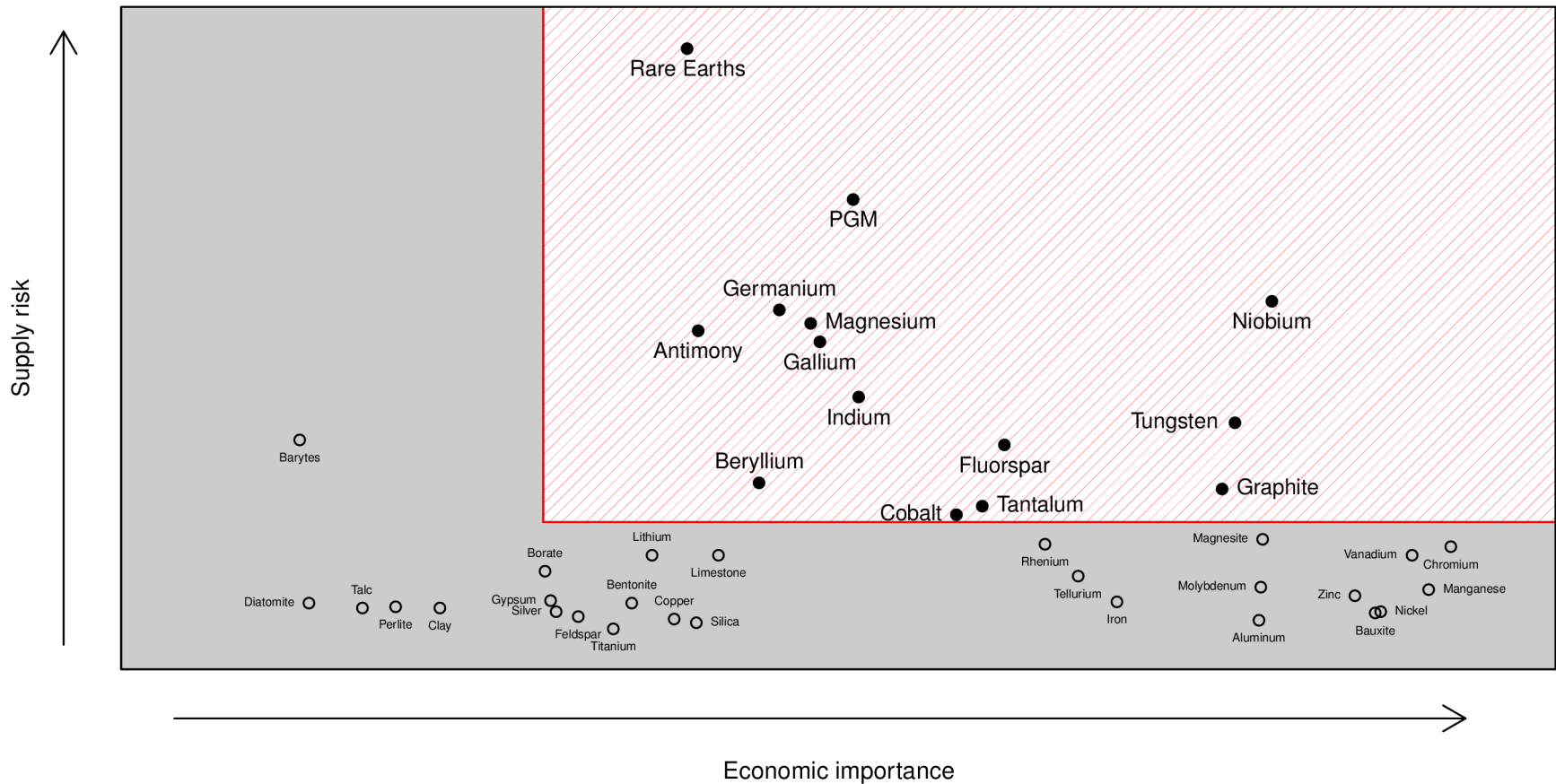


Concentration of production of critical raw materials, and recycling and substitution rates (II)

Concentration of production of critical raw materials, and recycling and substitution rates					
Raw Materials	Main producers (2008, 2009)	Main sources of imports into EU (2007, or 2006)	Import dependency rate	Substitutability	Recycling rate
Indium	China 58%	China 81%	100%	0,9	0,30%
	Japan 11%	Hong Kong 4%			
	Korea 9%	USA 4%			
	Canada 9%	Singapore 4%			
Magnesium	China 56%	China 82%	100%	0,82	14%
	Turkey 12%	Israel 9%			
	Russia 7%	Norway 3%			
		Russia 3%			
Niobium	Brazil 92%	Brazil 84%	100%	0,7	11%
	Canada 7%	Canada 16%			
Platinum group Metals	South Africa 79%	South Africa 60%	100%	0,75	35%
	Russia 11%	Russia 32%			
	Zimbabwe 3%	Norway 4%			
Rare earths	China 97%	China 90%	100%	0,87	1%
	India 2%	Russia 9%			
	Brazil 1%	Kazakhstan 1%			
Tantalum	Australia 48%	China 46%	100%	0,4	4%
	Brazil 16%	Japan 40%			
	Rwanda 9%	Kazakhstan 14%			
	DRC 9%				
Tungsten	China 78% (6,1)	Russia 76%	73%	0,77	37%
	Russia 5% (6,5)	Bolivia 7%			
	Canada 4%	Ruanda 13%			



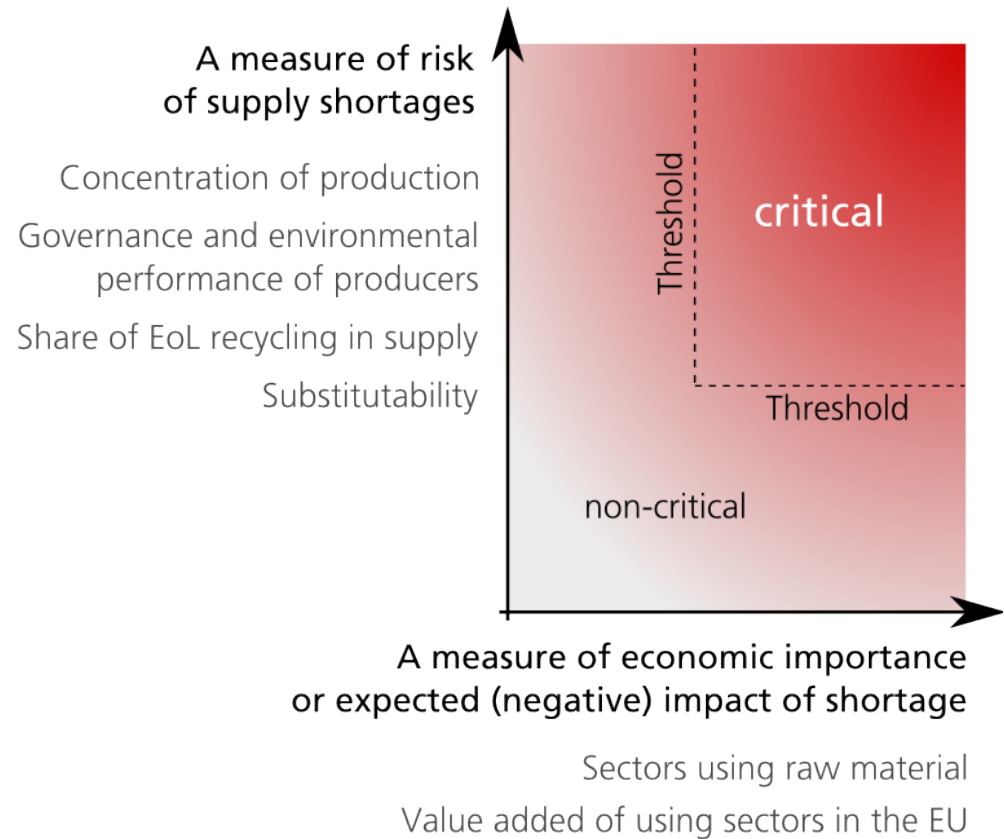
The 14 Critical Raw Materials for the EU Results from 2010



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Defining “critical” raw materials for the EU

- Three reasons why some materials may be considered critical
 - “first, they have a significant economic importance for key sectors,
 - second, the EU is faced with high supply risks [...]
 - and third, there is currently a lack of substitutes.”
- Need to define metrics for each in order to determine criticality.



COM (2008) 699 – The Raw Materials Initiative

Indicators from “Critical raw materials for the EU” (Ad-hoc working group on defining critical raw materials, 2010)



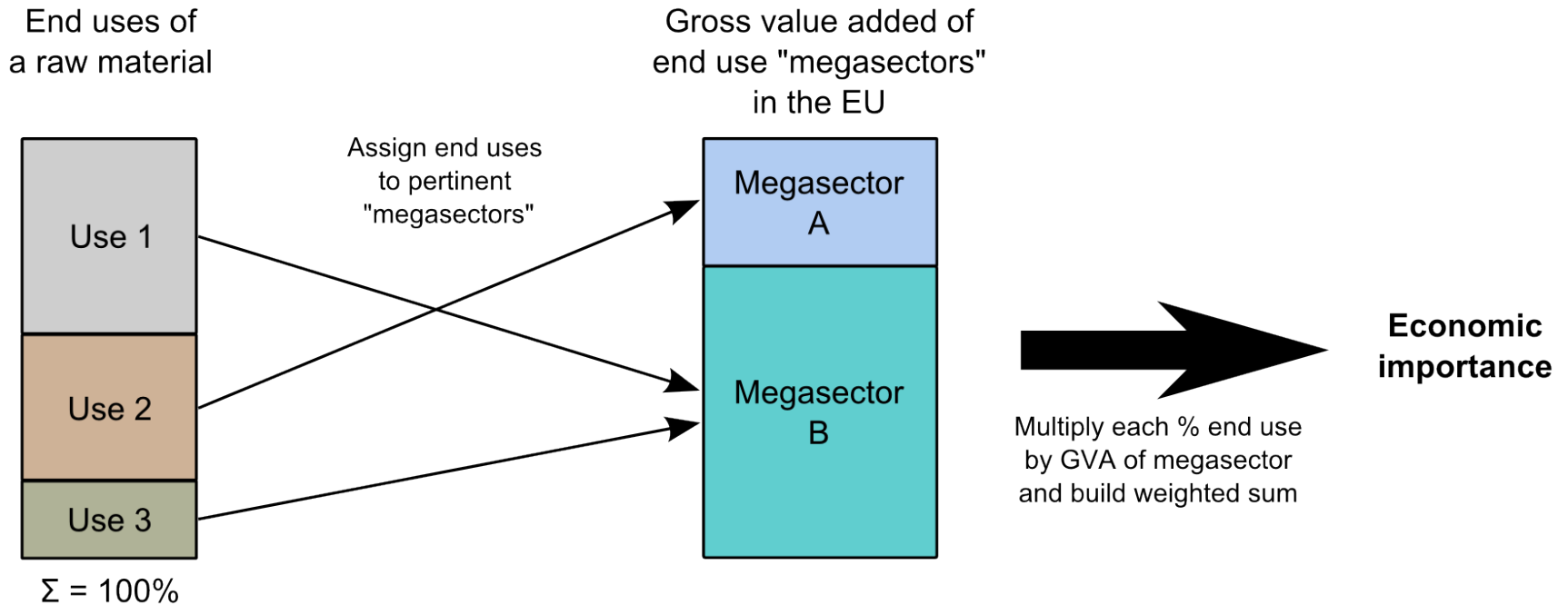
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Criticality analysis Criteria

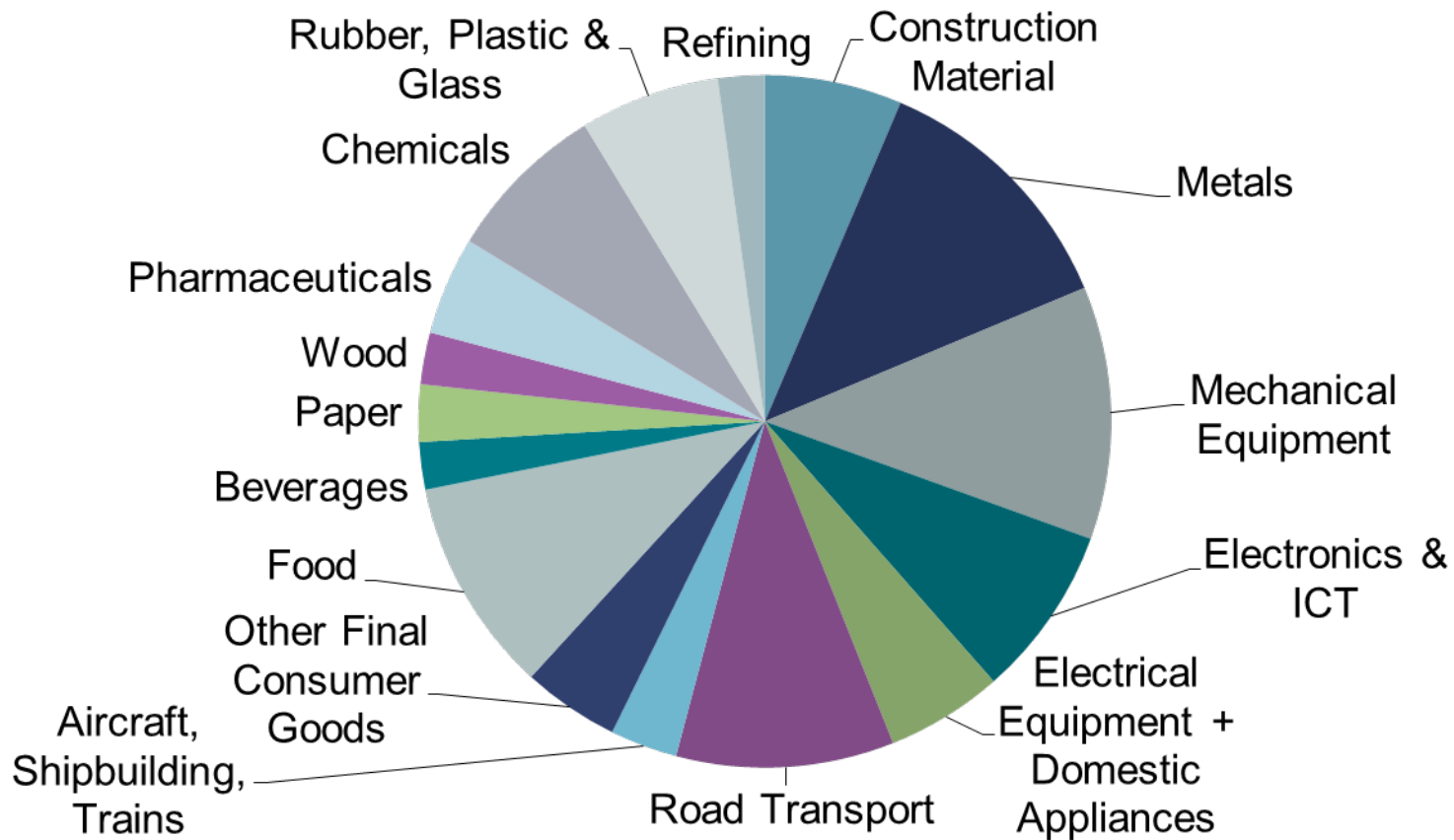
- Economic importance:
 - The analysis is achieved asesing the proportion of each material associated with industrial megasectors at a EU level. This proportions are associated with the megasectors' gross added value (GAV) to the EU's GDP. The total is then scaled according to the total EU GDP to define an overall economic importance for a material



Methodology: Economic importance



Defining „Megasectors“ Values used in update (2013)

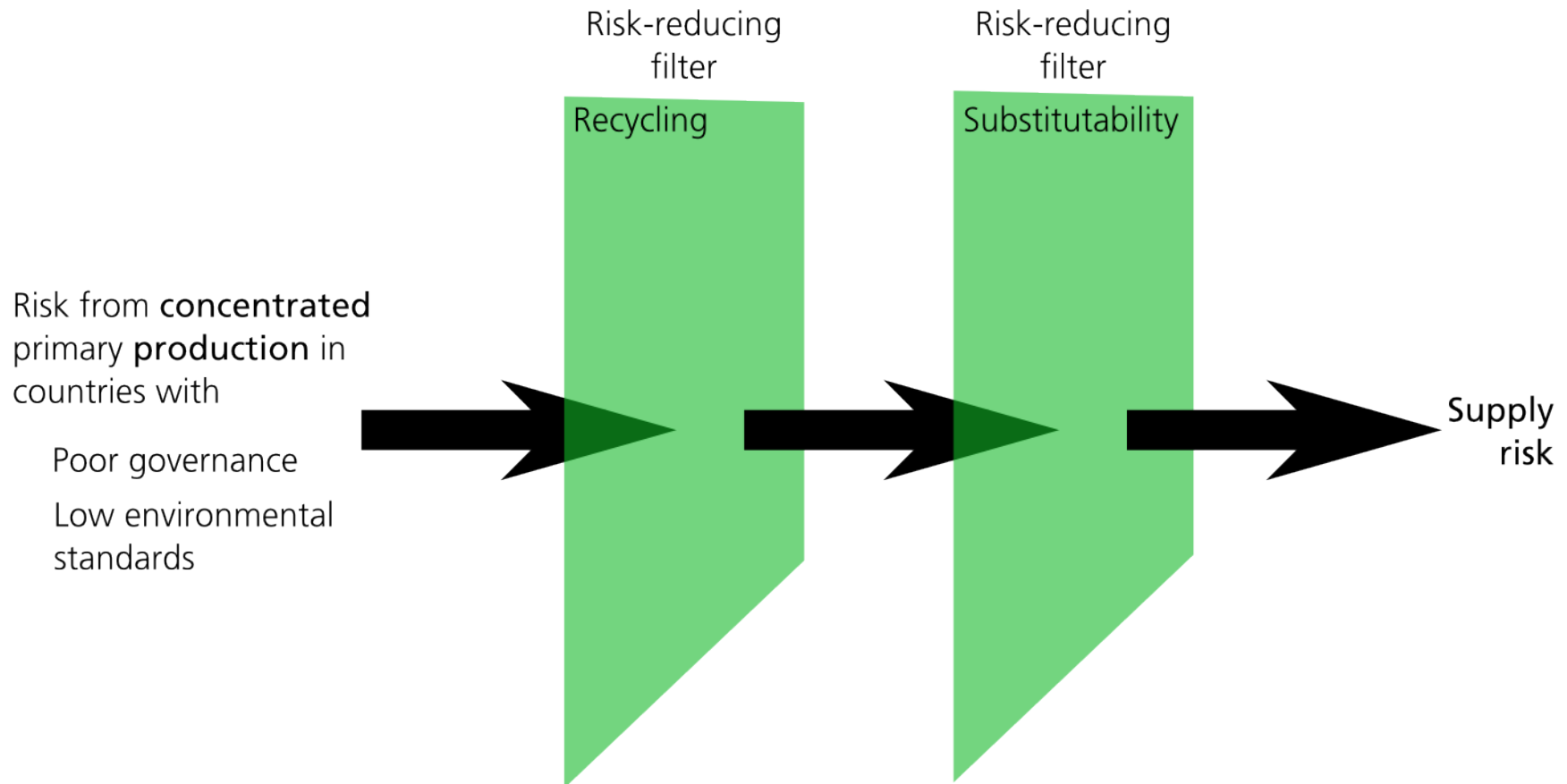


Criticality analysis Criteria

- Supply Risks(poor governance and low environmental standards):
 - Large influence on supply risk for primary supply is assumed, from countries exhibiting either poor governance (e.g. political unrest) or low environmental standards (large accidents leading to supply disruption).
 - No measure of geological availability is included in the methodology.
 - If any secondary production takes place, the supply risk is seen to be reduced by the availability of secondary supply from end-of-life products. Substitution, if possible, is another factor than reduces the risk of supply

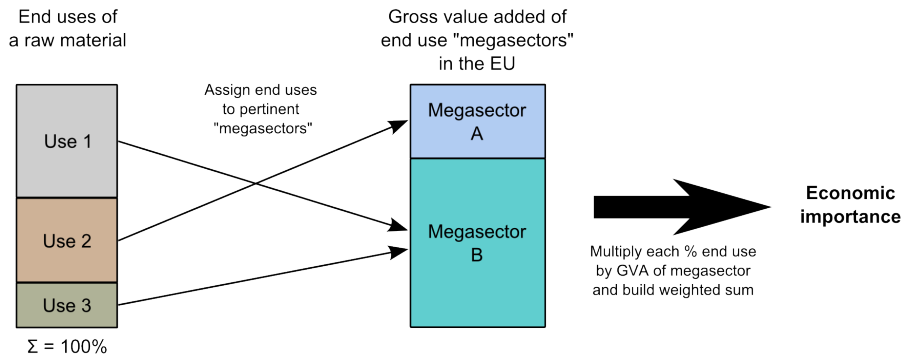


Methodology: Supply risk



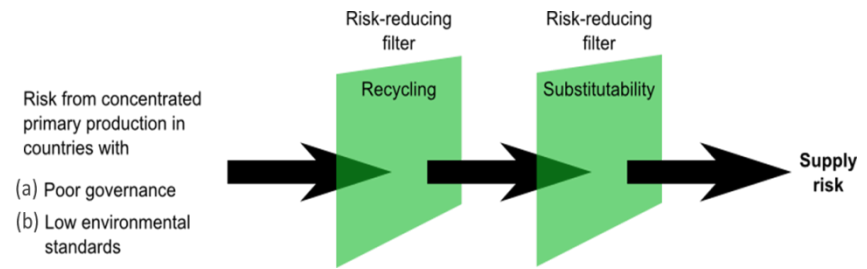
Why do points move in the 2D graph?

Economic importance



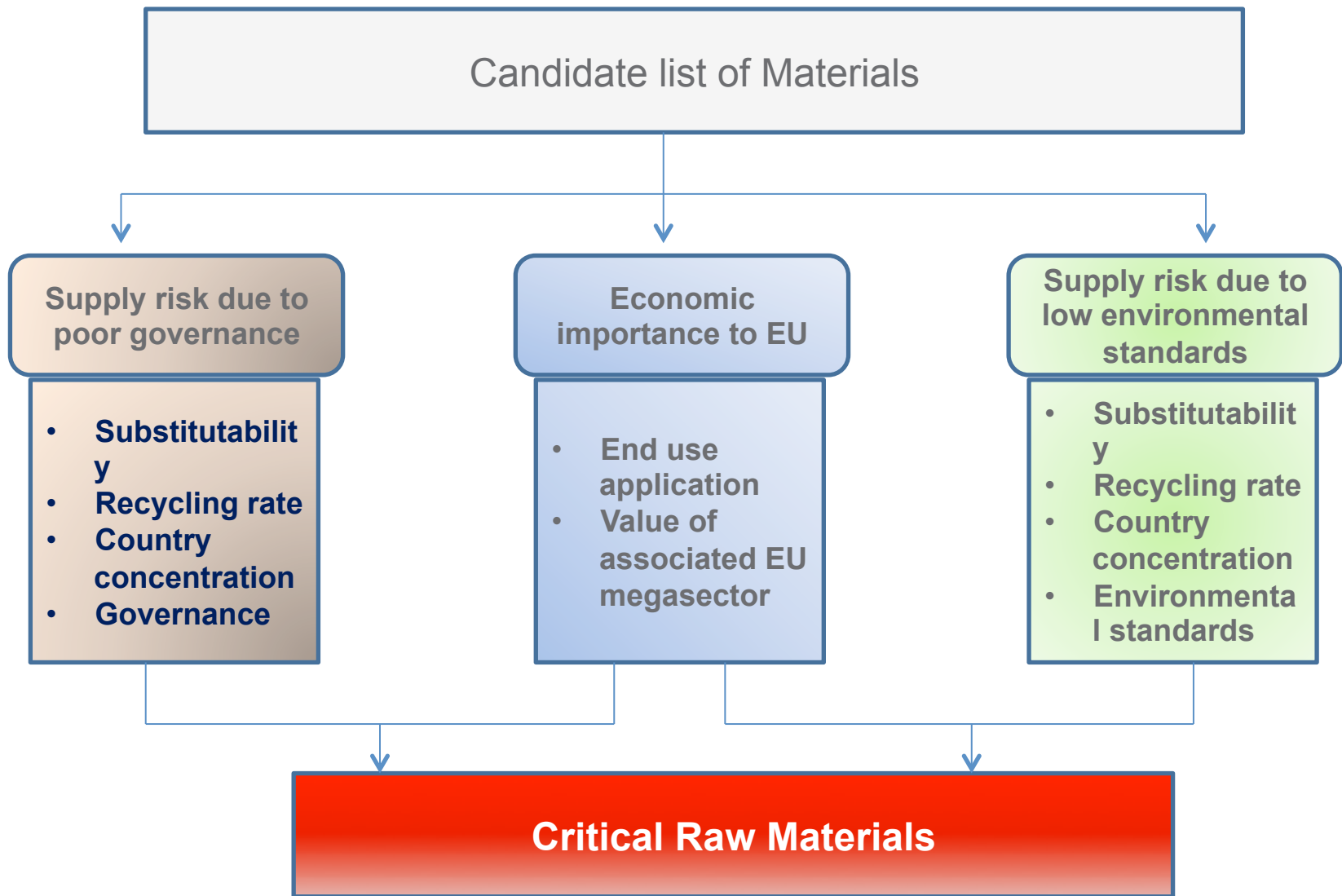
- Changes in the end-use structure (or end-use data)
- Changes in the "value added" assigned to the megasectors

Supply risk

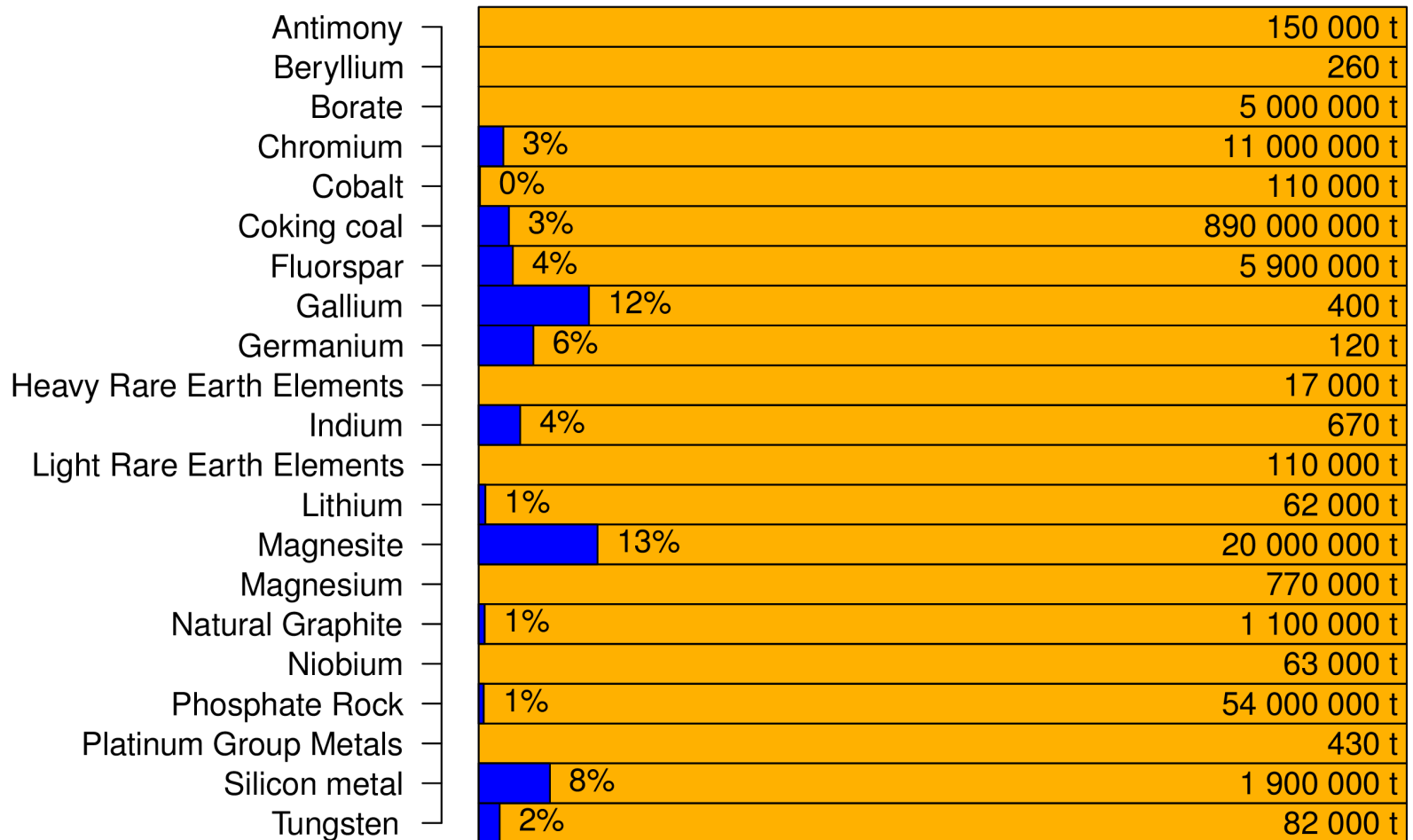


- Changes in the concentration of production
- Changes in governance / environmental performance rating of producing countries
- Changes in recycling rates
- Changes in assessment of substitutability





Share of EU28 in global primary production

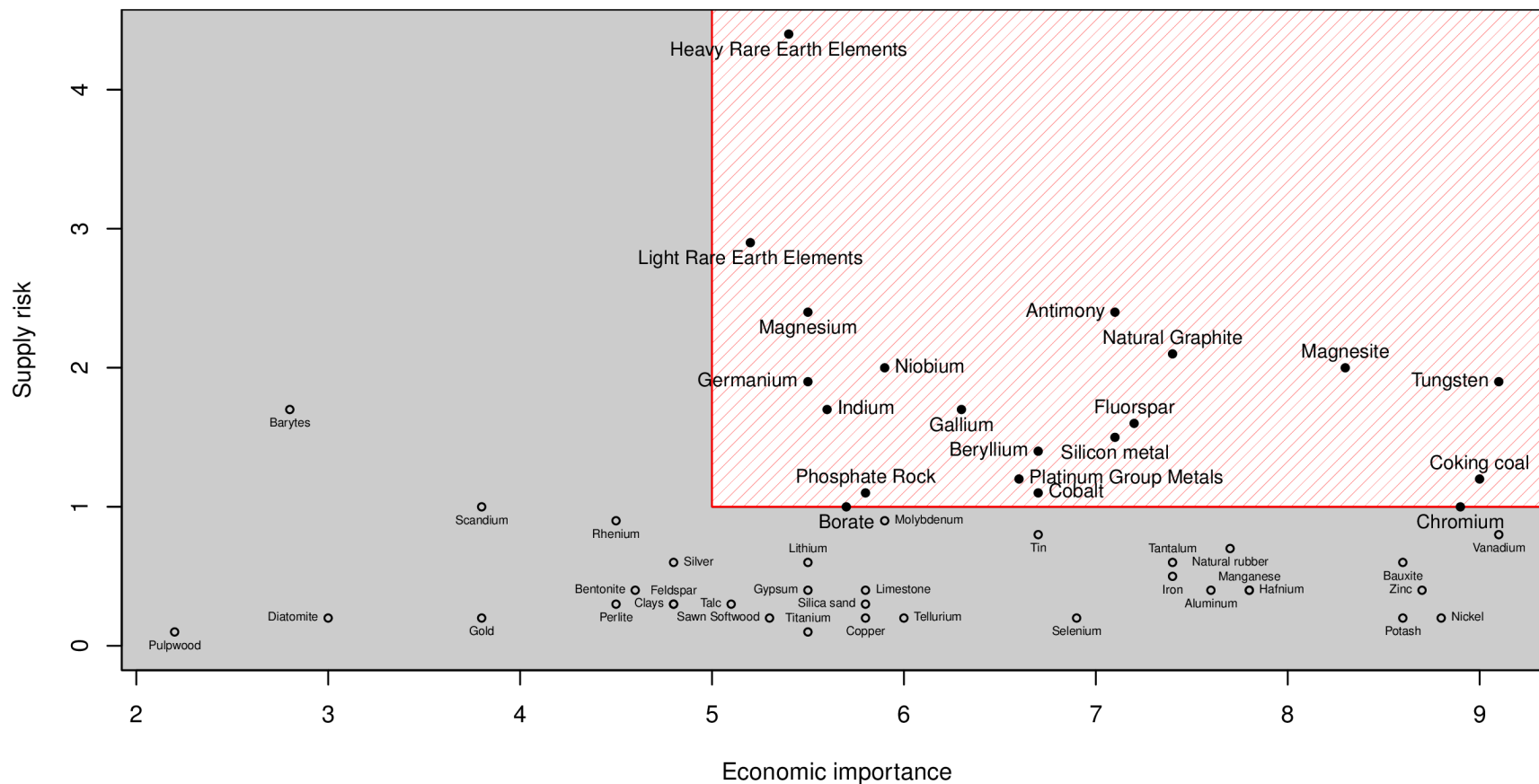


Data from World Mining Data, U.S. Geological Survey, Germanium Corporation, Roskill, IMCOA, Johnson Matthey & British Geological Survey



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Critical raw materials for the EU: Results from 2014



Ad-hoc Working Group on defining critical raw materials (2014)



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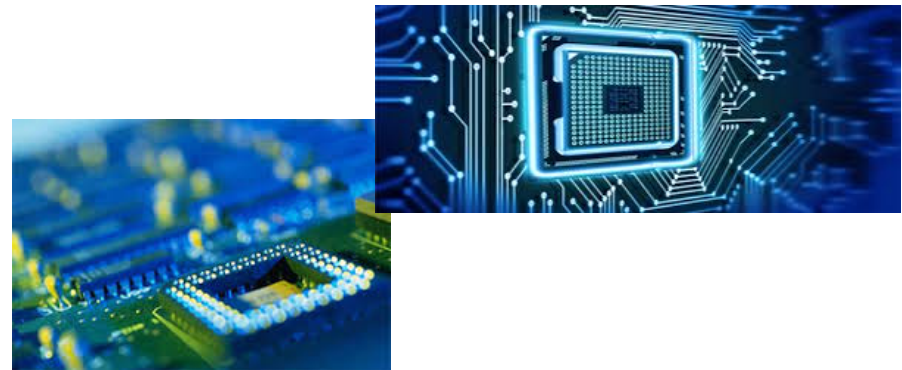
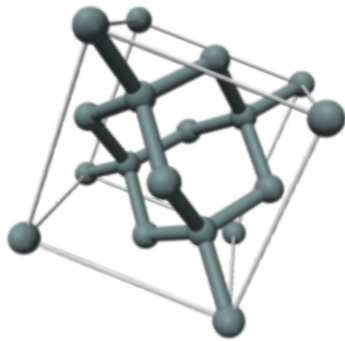
EU Critical Raw Materials (2014)

Abiotic Materials

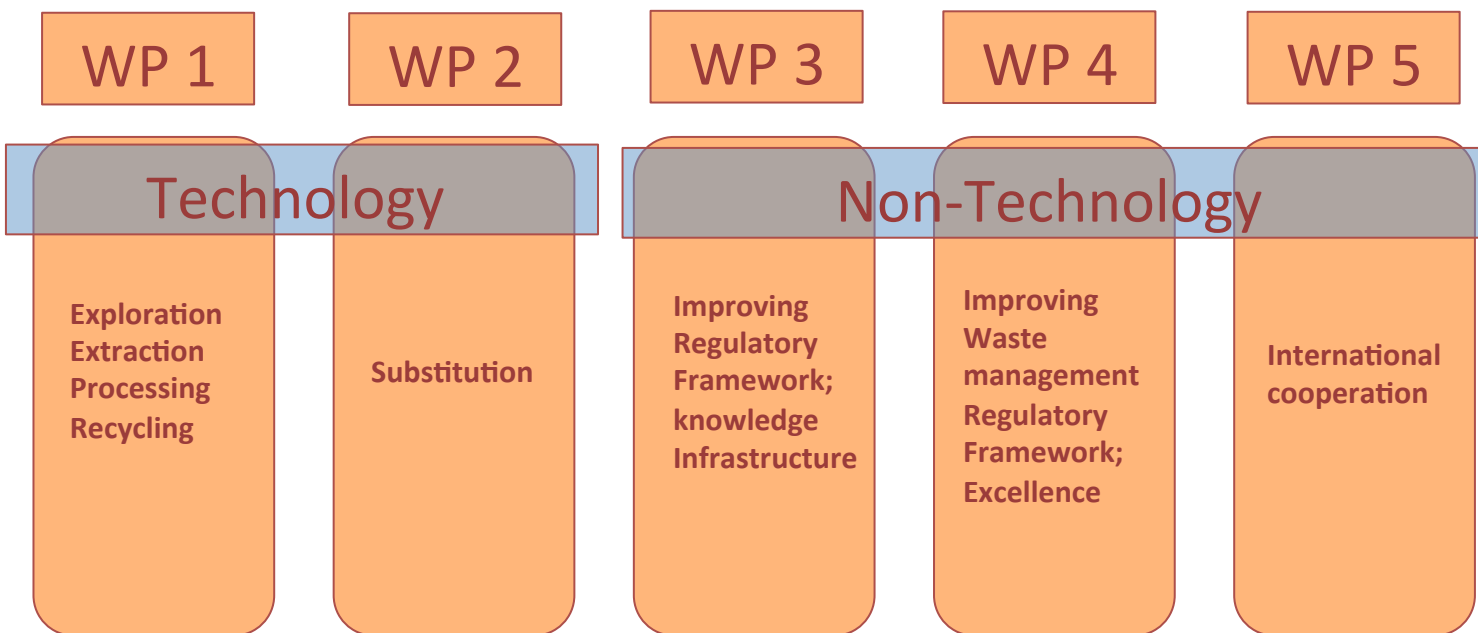
Antimony	Beryllium	Borates	Chromium	Cobalt	Coking coal	Fluorspar
Gallium	Germanium	Indium	Lithium	Magnesite	Magnesium	Natural Graphite
Niobium	PGMs	Phosphate rock	REEs (heavy)	REEs (Light)	Silicon metal	Tungsten

Biotic Materials

Natural rubber	Pulpwood	Sawn Softwood
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European Partnership on Raw Materials and the Critical Raw Materials



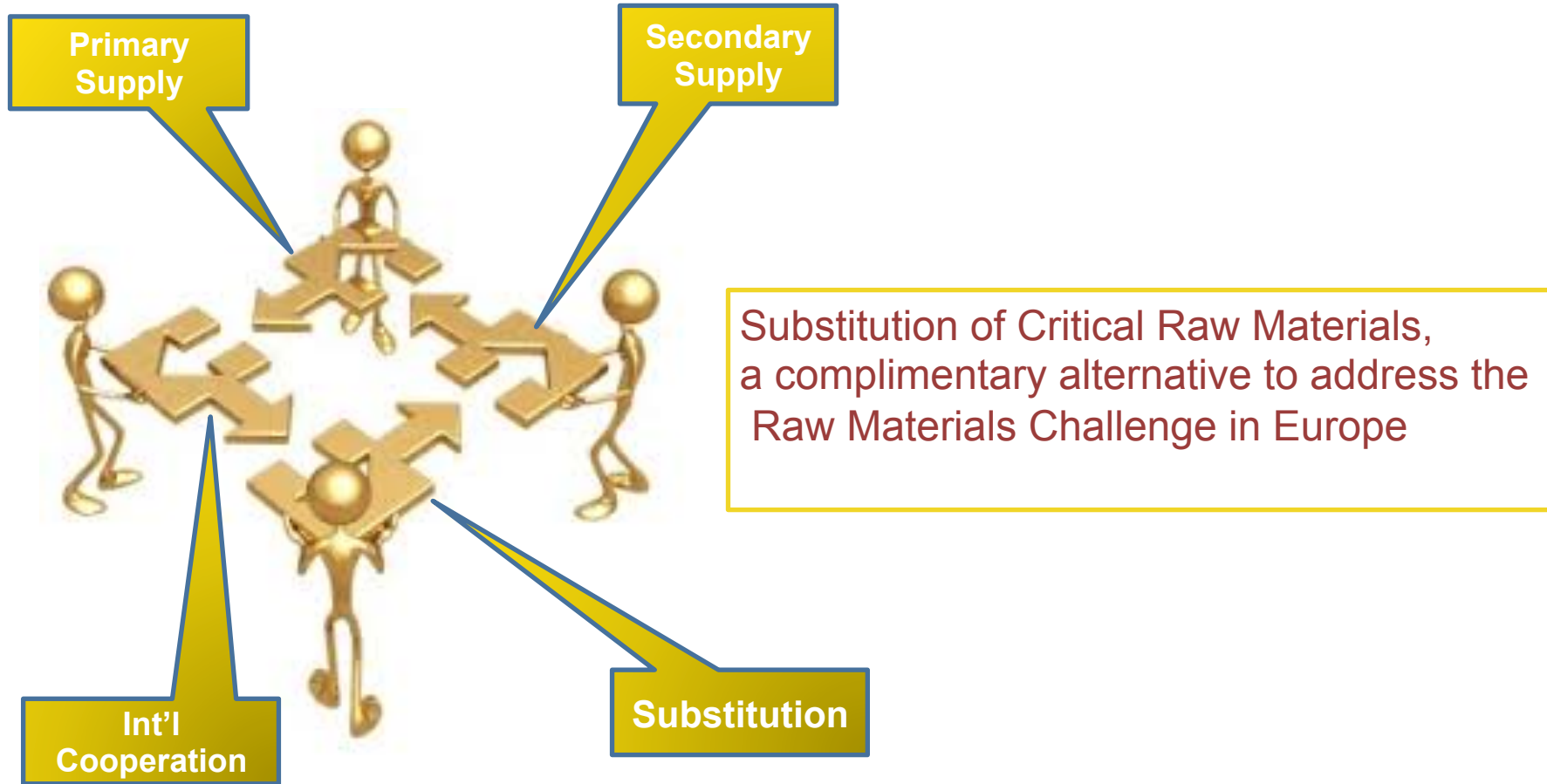
EIP's priorities:

Inputs to Horizon 2020 programmes (Societal Challenge 5 and others)

Actions related to non-technological aspects



Europe's access to CRM



CRM_InnoNet

Substitution models



Substance for Substance



Process for Process



Service for Product



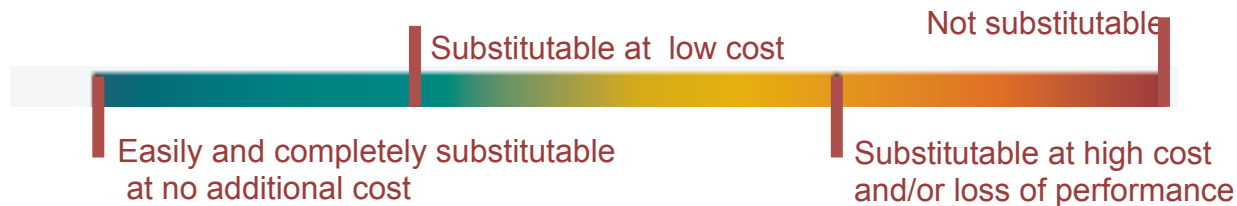
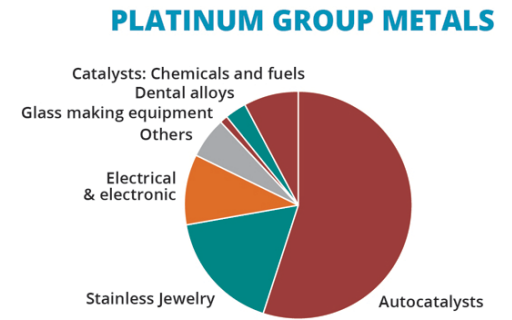
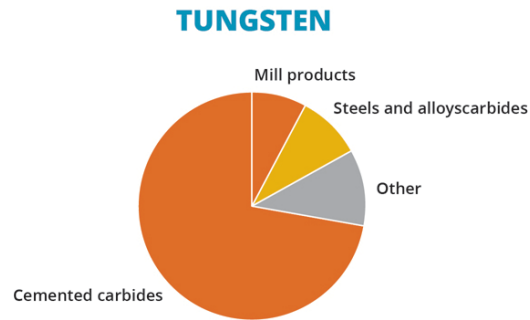
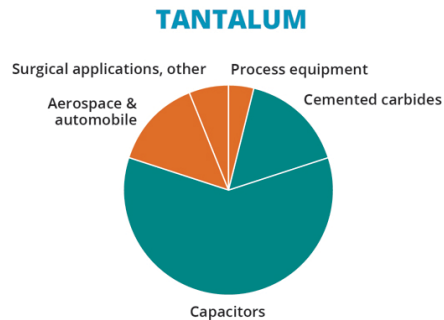
New Technology for Substance



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CRM_InnoNet Materials profiles

- Analysis carried out as part of the tasks in WP3
 - “Report Critical Raw Materials Substitution Profiles”. September 2013.



www.criticalrawmaterials.eu



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