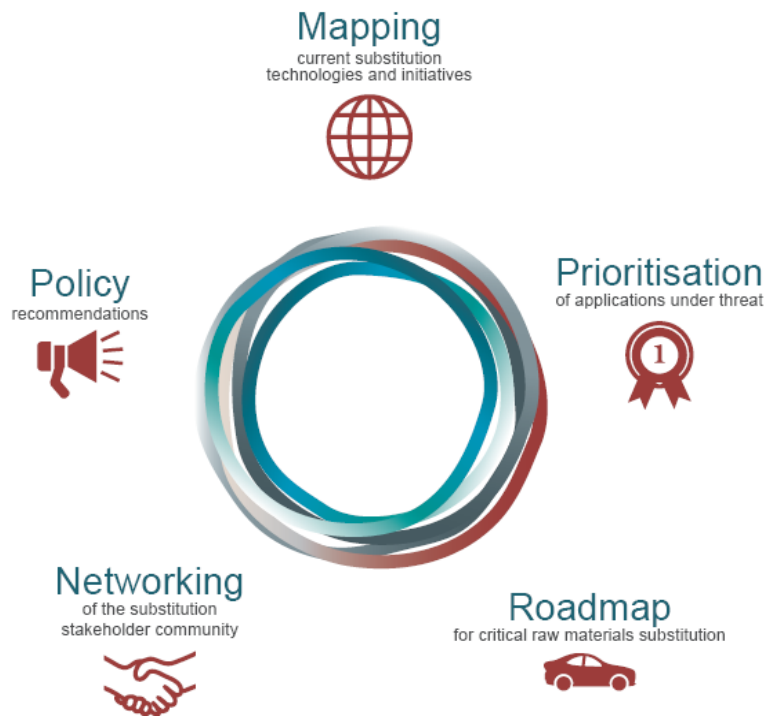


# Analysis of ICT and Electronics, Energy and Transport sectors



**CRM\_InnoNet,**  
2<sup>nd</sup> Innovation Network Workshop,  
Brussels, 14<sup>th</sup> of May 2014

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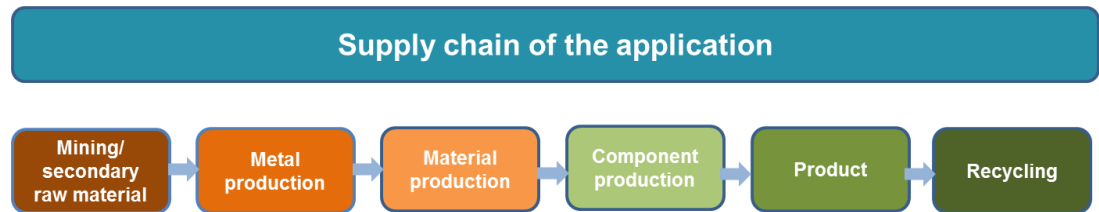
# Objectives

Supply chain analysis of the three sectors  
ICT and Electronics, Energy and Transport for:

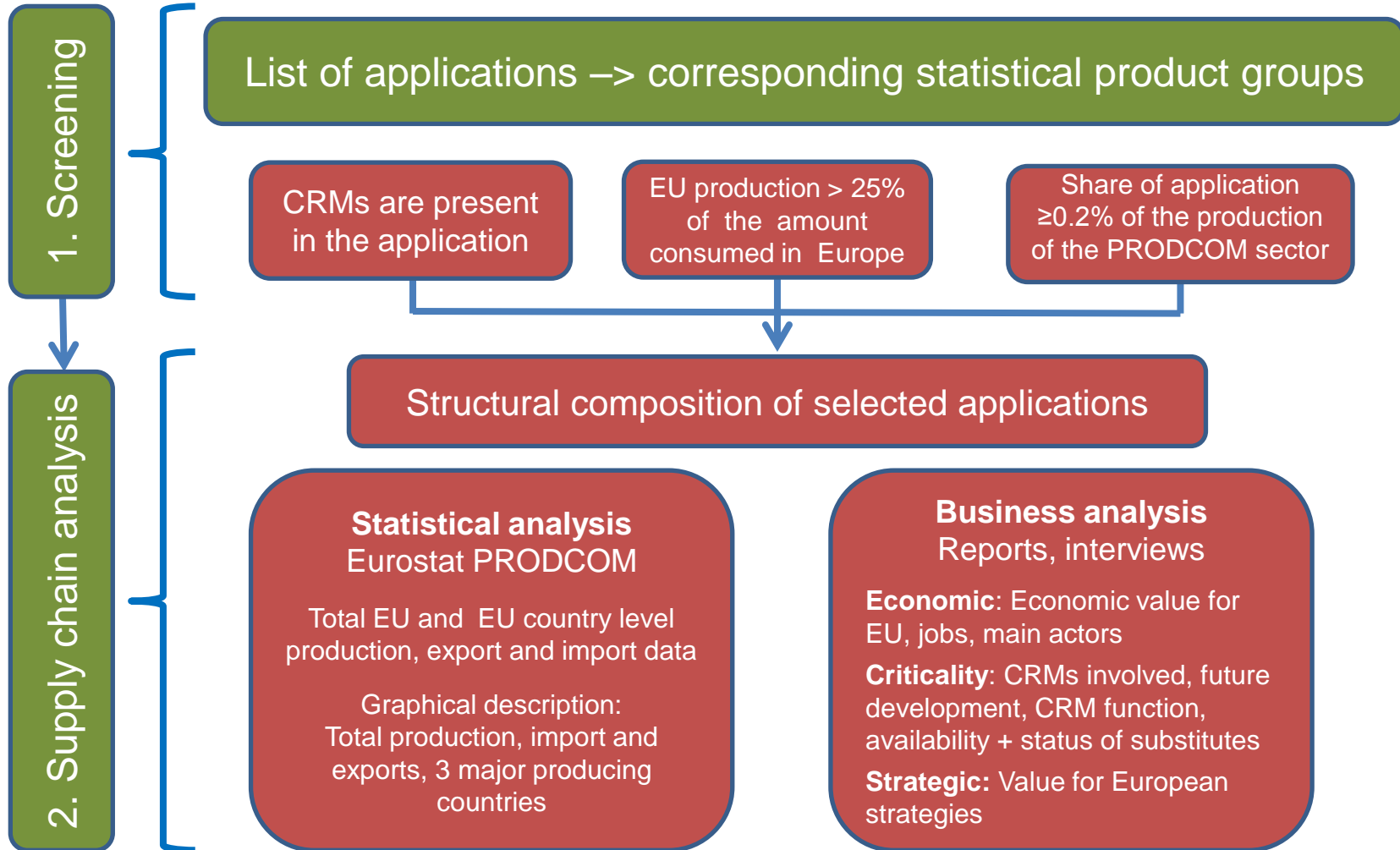
- Economic and strategic importance for Europe
- Dependence on materials potentially at risk

## Aims

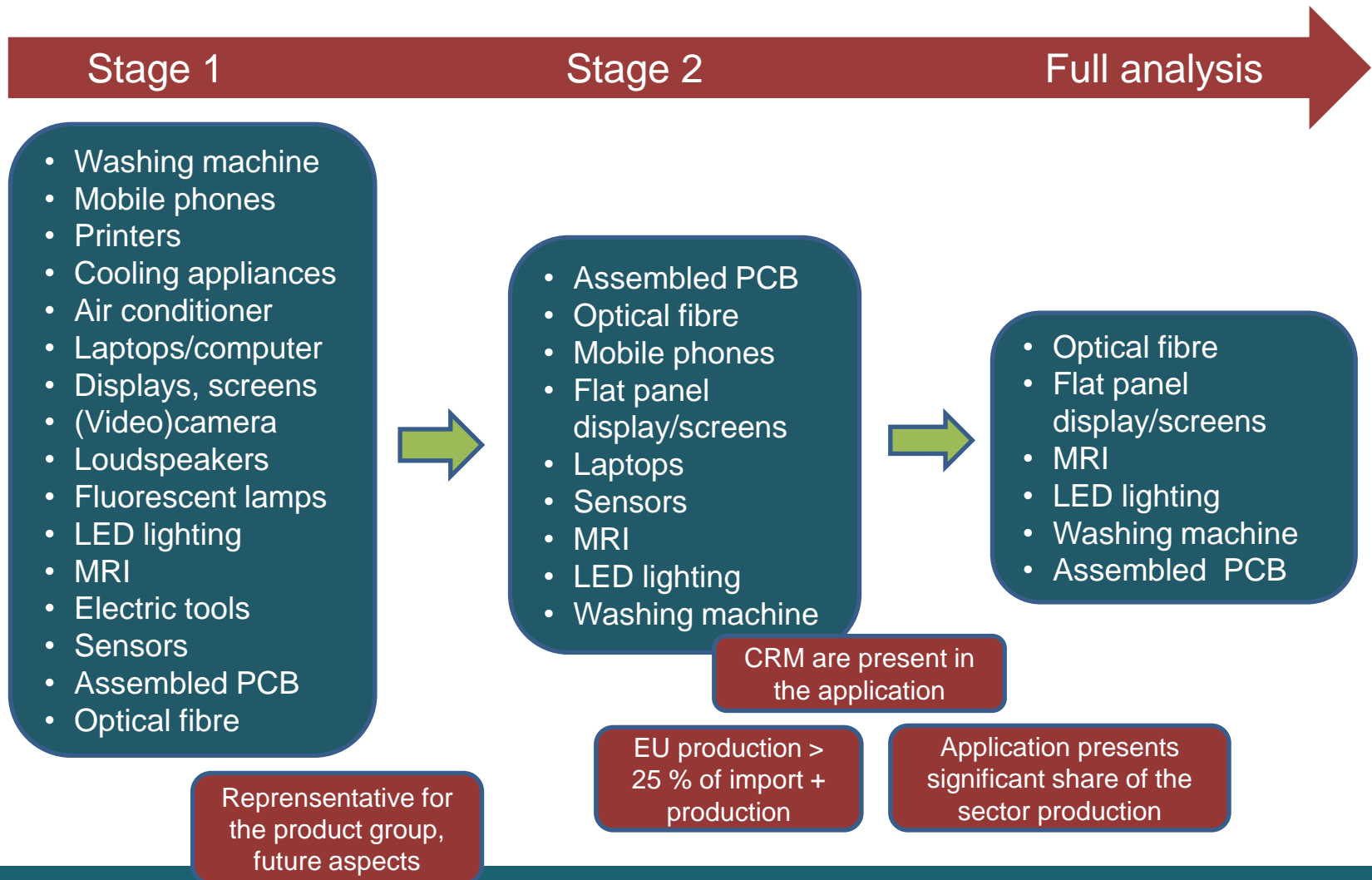
- To create more understanding about the relevance of critical raw material (CRM) containing applications for the European economy
- To give indications about applications which could be under threat
- To compile data for prioritisation of applications for substitution roadmap



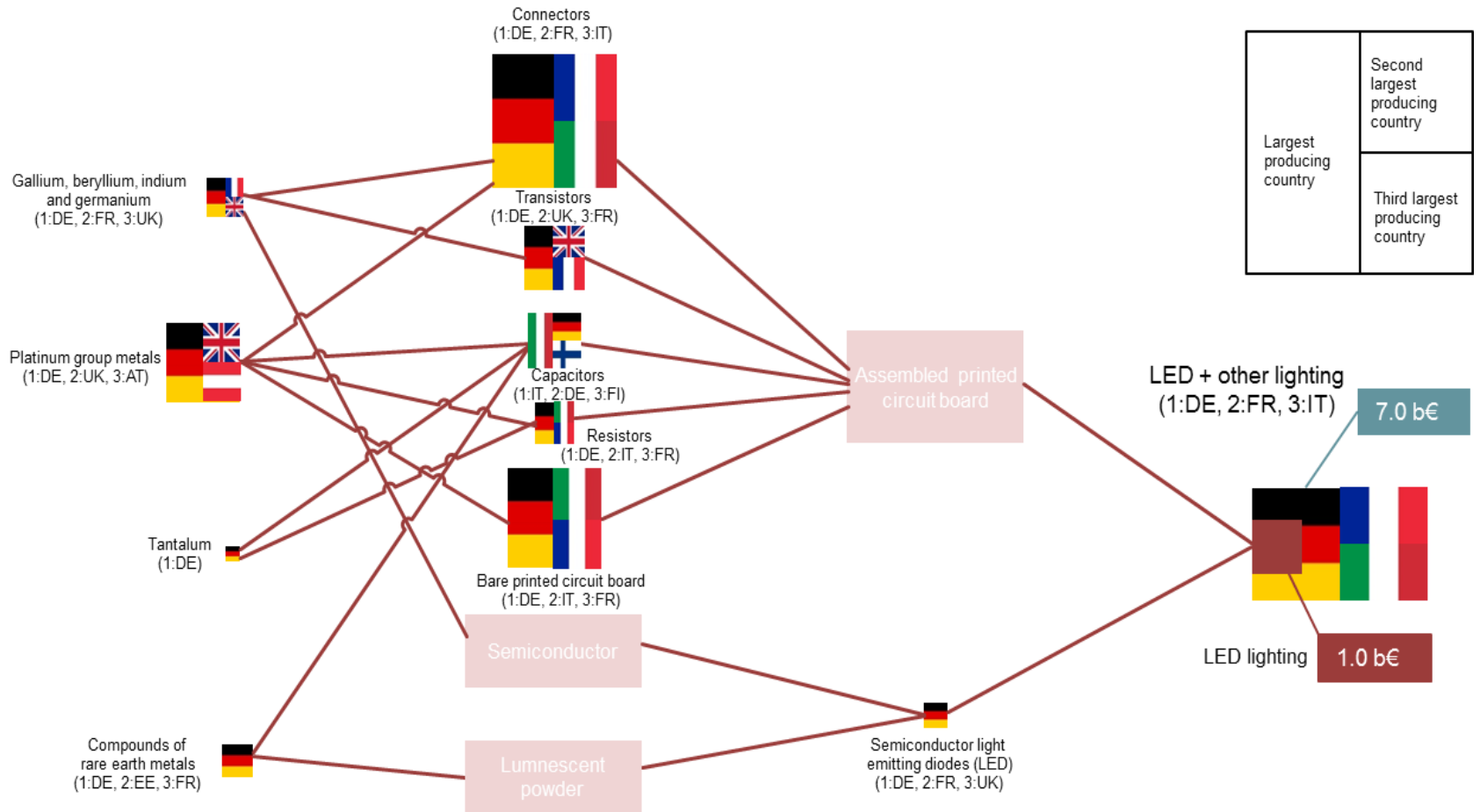
# Supply chain analysis methodology



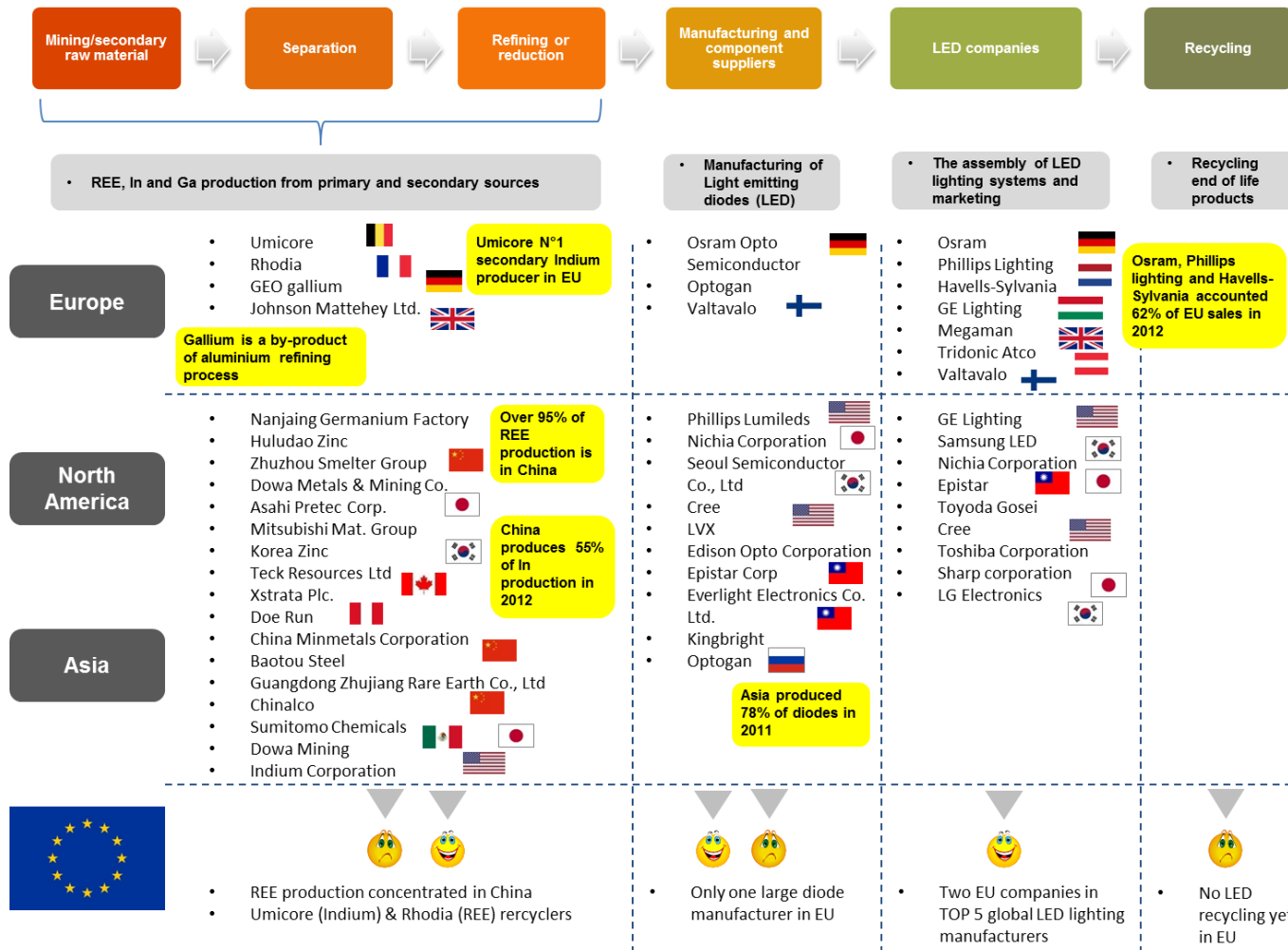
# Selection of applications for supply chain analysis



# Supply chain analysis EU production of LED lighting



# Position of Europe in LED supply chain



# Summary of Europe's position in supply chains

Supply chain	Application/component/material	MRI	LED	Optical fibre	Displays and screens	Washing machine
<b>End product</b>	MRI	Green				
	LED lighting		Green			
	Optical fibre			Green		
	Display and screens				Green	
	Washing machine					Green
<b>Component</b>	Display	Green			Green	
	Electric motor					Orange
<b>Sub-component</b>	Electrical circuit	Green			Green	Green
	Transistors	Orange	Orange		Orange	Orange
	Capacitors	Orange	Orange		Orange	Orange
	Resistors	Orange	Orange		Orange	Orange
	Bare printed circuit board	Green	Green		Green	Green
	Connectors	Green	Green		Green	Green
	Permanent magnet	Red			Red	Red
	Conducting electrodes (ITO)	Orange			Orange	
	Fluorescent tubes	Orange			Orange	
	Semiconductor light-emitting diodes (LED)	Red	Red		Red	
<b>Material</b>	Compounds of rare earth metals	Orange	Orange		Orange	Orange
	Tantalum	Red	Red		Red	Red
	Beryllium, gallium, germanium, indium and niobium	Orange	Orange	Orange	Orange	Orange
	Platinum group metals	Orange	Orange		Orange	Orange

- Europe strong in end products
- EU production 60-80 % of European demand
- Relatively strong in electronic components

Green	Production in EU, good position globally
Orange	Some production in EU
Red	Not much production in EU

# Conclusions - ICT and electronics applications

## Electronic components

- Highly dynamic, fragmented market, main producers outside Europe
- Production 20 - 25 b€, Europe strong in industrial and professional electronics
- Dependent of several CRMs, significant shares of total supply of Ga, Ru, Ta, Pd, Be consumed in electronics
- Risk: moving of the industry out of Europe
- Opportunity: Innovative, more efficient solutions, organic and flexible electronics with excellent properties

## MRI (Magnetic Resonance Imaging)

- Europe has a strong position in MRI, superconducting magnets (Siemens, Philips) and electronic components
- CRM dependencies: Nb in superconducting magnets (< 3 % of total demand), Be in tools and components, Ho + CRMs in electronics and displays
- Potential substitutes are investigated, e.g. MgB<sub>2</sub> for superconducting magnets – performance challenges

# Summary

- In terms of jobs and production value all six applications (LED, MRI, Optical fibre, Displays and screens, Washing machines and PCBs) are important to Europe
- CRMs are essential for all applications, least for washing machine
- Substitute solutions still suffer from performance problems
- In terms of strategies, links to energy efficiency targets: (LEDs, washing machines, electronic components) and digital Europe targets (optical fibre)
- European strength is creative application of electronics, professional and specialized applications – innovative producers and access to advanced electronics

## More information

### **CRM\_InnoNet: Internal Report Summarising the Results of ICT and Electronics Sector Analysis**

Bacher, John; Punkkinen, Henna; Mroueh, Ulla-Maija; Rietveld, E.

<http://www.criticalrawmaterials.eu/documents/>

# Conclusions ICT and electronics applications

## Led lightning

- Rapidly growing market
- Two European companies amongst top LED lighting producers, large number of SMEs producing innovative LED applications
- LED diode production mainly in Asia, may cause a bottleneck in the value chain
- Dependent on CRMs: small amounts of Ga In, Y, Eu, Ce, Tb
- OLEDs developed, some already in market

## Displays and screens

- European companies focused on professional and specialized applications
- Several international producers have assembly or production plants in Europe
- Dependent on CRMs, such as indium, REEs and PGMs
- OLED technology penetrating to market, indium still needed

# Conclusions – ICT and electronics applications

## Optical fibres

- Used for data transmission, sensors, etc.; consumption is expected to grow
- The main CRM dependence germanium- essential for the functionality.
- About 30% of Ge supply is consumed in fibre optics
- No substitutes with sufficient performance, yet
- Digital agenda for Europe – Access to very fast broadband for every European

## Large household appliances

- In a part of machines, permanent magnets (Nd, Dy) used in electric motors and compressors for improved performance/energy efficiency
- Electronics also included
- Washing machines studied as an example, about 80 % of European demand produced in Europe
- Permanent magnets currently in 20-30 % of machines (estimate)