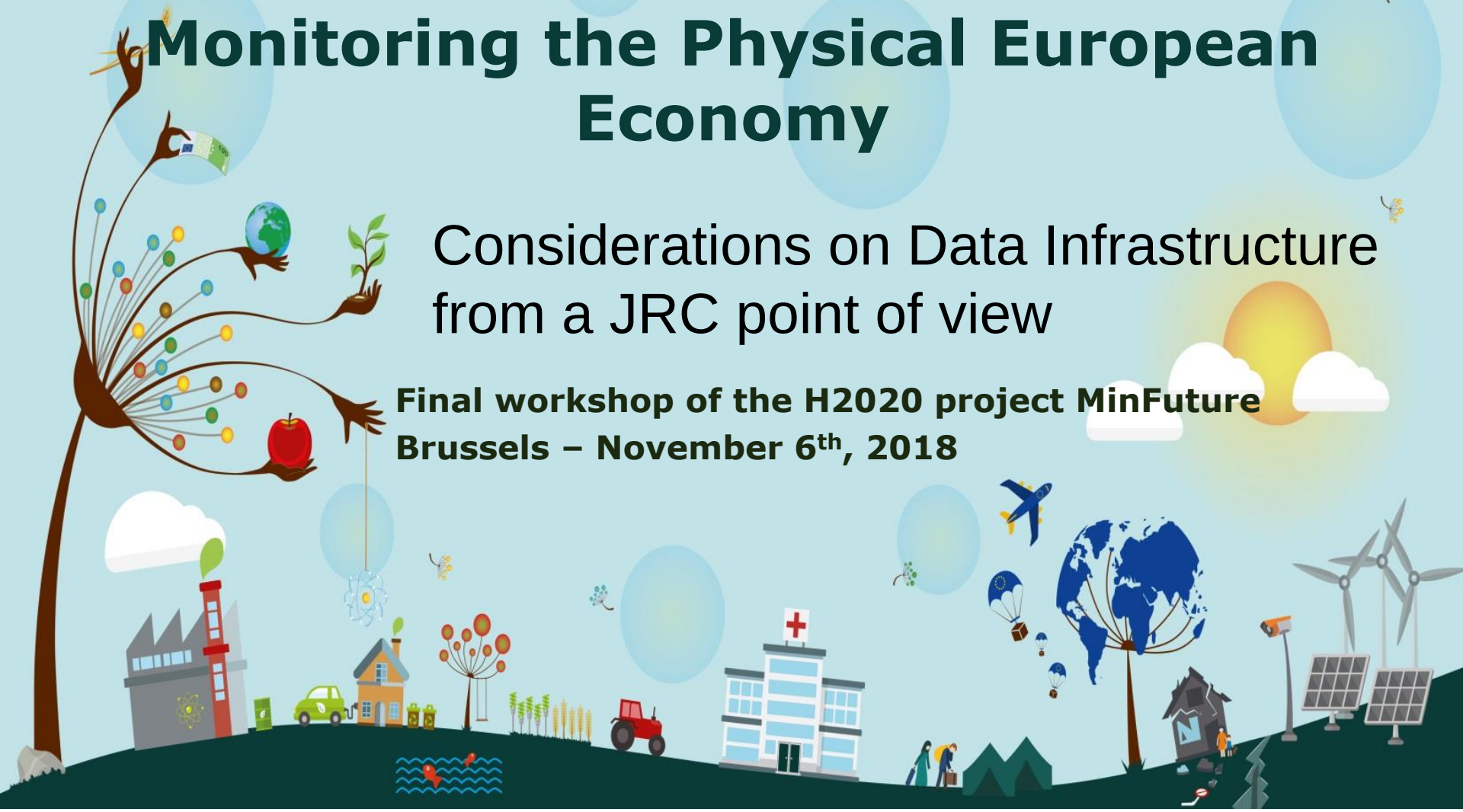
Monitoring the Physical European Economy

Considerations on Data Infrastructure from a JRC point of view

Final workshop of the H2020 project MinFuture
Brussels – November 6th, 2018



European Commission

Monitoring the Physical Economy

Considerations on Data Infrastructure
from a JRC point of view

The Raw Materials Team

Joint Research Centre

Directorate D - Sustainable Resources

rmis.jrc.ec.europa.eu

Presenter: Dominic Wittmer

Brussels – November 6th, 2018

Outline

- RMIS: context & mandate (a bit of history…)
- RMIS: the concept
- RMIS: homepage overview
  - Raw Materials' profiles
  - Supply Chain Viewer
  - Country profiles
- Data flows between applications
- Added value of MFA/MSA data

RMIS
Context & Mandate

2008: EU Raw Materials Initiative (**RMI**)

2013: Strategic Implementation Plan (**SIP**) of European Innovation Partnership (**EIP**) on RM highlights need for European Raw Materials Knowledge Base (**EURMKB**)

03/2015: JRC launches the **RMIS 1.0**

12/2015: specific action in **Circular Economy AP** focuses on the key role of the RMIS and mandates its further development

03/2017: RMIS 2.0 Roadmap & Progress report

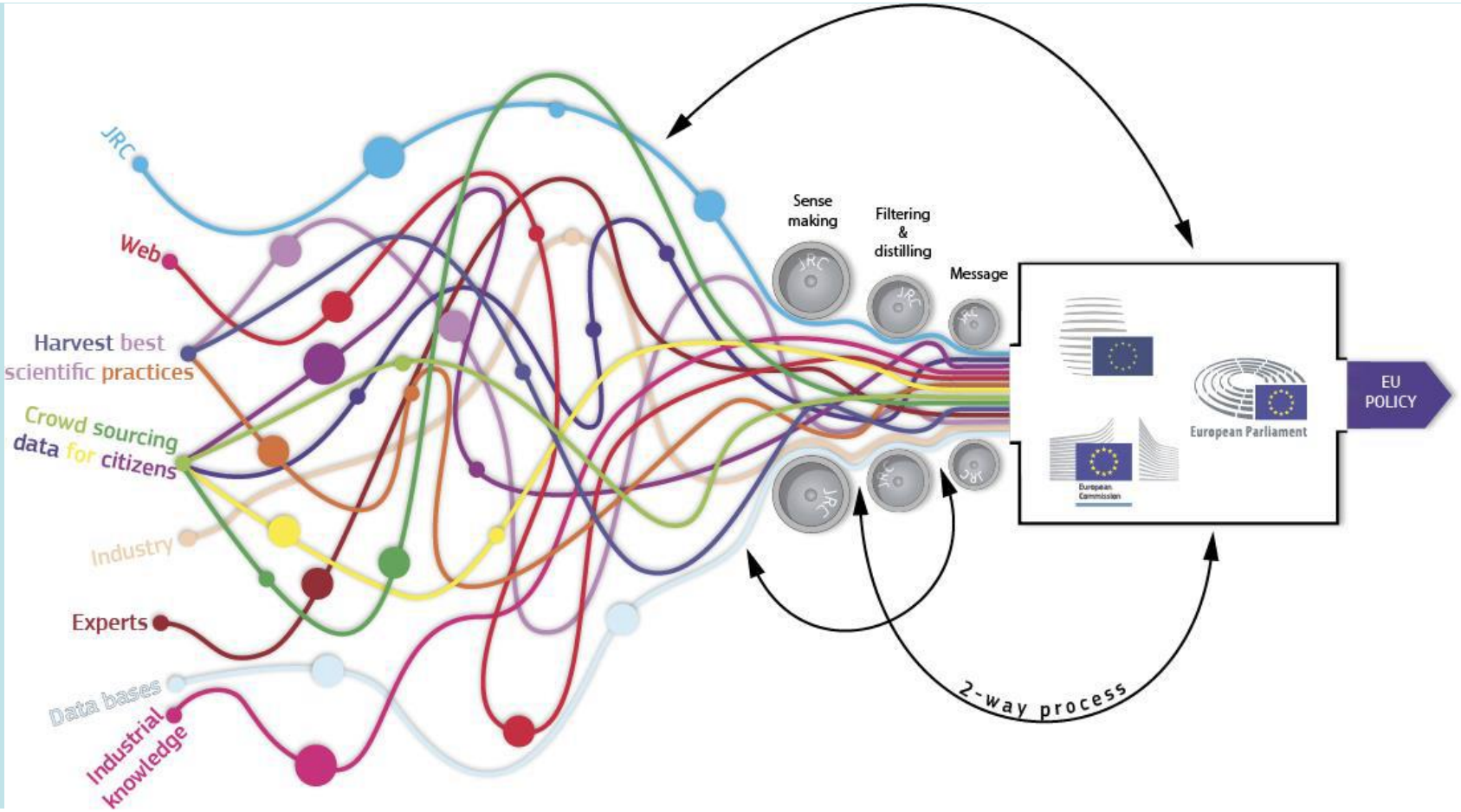
11/2017: launch of RMIS 2.0 (as part of the 2017 RM Week)

01/2018: adoption of 2018 CE Package: monitoring framework, CRM report, etc.

RMIS is… *the EC's knowledge platform on non-fuel, non-agricultural raw materials from primary (extraction/harvesting) and secondary (recycled/recovered) sources. Its scope includes both abiotic and biotic materials.*

RMIS acts as... *the reference access point to the EURMKB and facilitates the availability, coherence, and quality of knowledge required by specific EU raw materials policies and EC services.*

RMIS
overarching concept



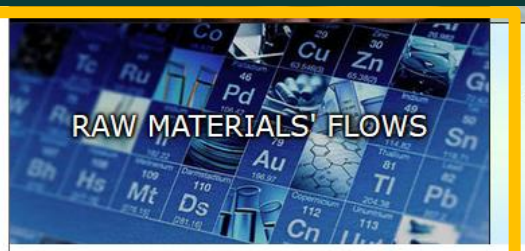
Abundance of knowledge scientific complexity

JRC knowledge management

Policy making complex process

RMIS
2018/2019 developments

Raw Materials Profiles



Raw Materials' Profiles

Alphabetically | **By groups**

Aggregates	Aluminium	Antimony	Baryte	[illegible]	[illegible]onite	Beryllium
Bismuth	Borate	Cerium	Chromium	Cobalt	Co[illegible]g coal	Copper
Diatomite	Dysprosium	Erbium	Europium	[illegible]	[illegible]spar	Gadolinium
Gallium	Germanium	Gold	Gypsum	Hafnium	Helium	Holmium
HREEs	Indium	Iridium	Iron ore	Kaolin clay	Lanthanum	Lead
Limestone	Lithium	LREEs	Lutetium	Magnesite	Magnesium	Manganese
Molybdenum	Natural cork	Natural graphite	Natural Rubber	Natural Teak wood	Neodymium	Nickel
Niobium	Palladium	Perlite	PGMs	Phosphate rock	Phosphorus	Platinum
Potash	Praseodymium	Rhenium	Rhodium	Ruthenium	Samarium	Sapele wood
Scandium	Selenium	Silica sand	Silicon metal	Silver	Sulphur	Talc
Tantalum	Tellurium	Terbium	Thulium	Tin	Titanium	Tungsten
Vanadium	Ytterbium	Yttrium	Zinc			

Raw Materials Profiles

revised structure & content

1. Key facts & figures
2. Overview (several subchapters)
3. Resources & Reserves
4. Supply
   - 4.1 Production
   - 4.2 EU imports
5. Demand
   - 5.1 EU exports
   - 5.2 EU consumption
6. RM Supply Chains
   - 6.1 Applications / end uses
   - 6.2 Circular economy aspects
   - 6.3 Circular economy indicators
7. Market
   - 7.1 Prices
   - 7.2 World trade
   - 7.3 Export restrictions
8. Research & Development
9. Environmental and social Sustainability Aspects
   - 9.1 Envir. Sust. Aspects
   - 9.2 Social Sust. Aspects
10. References and Methodological notes
    - 10.1 References and data sources
    - 10.2 Methodological notes

Raw Materials Profiles

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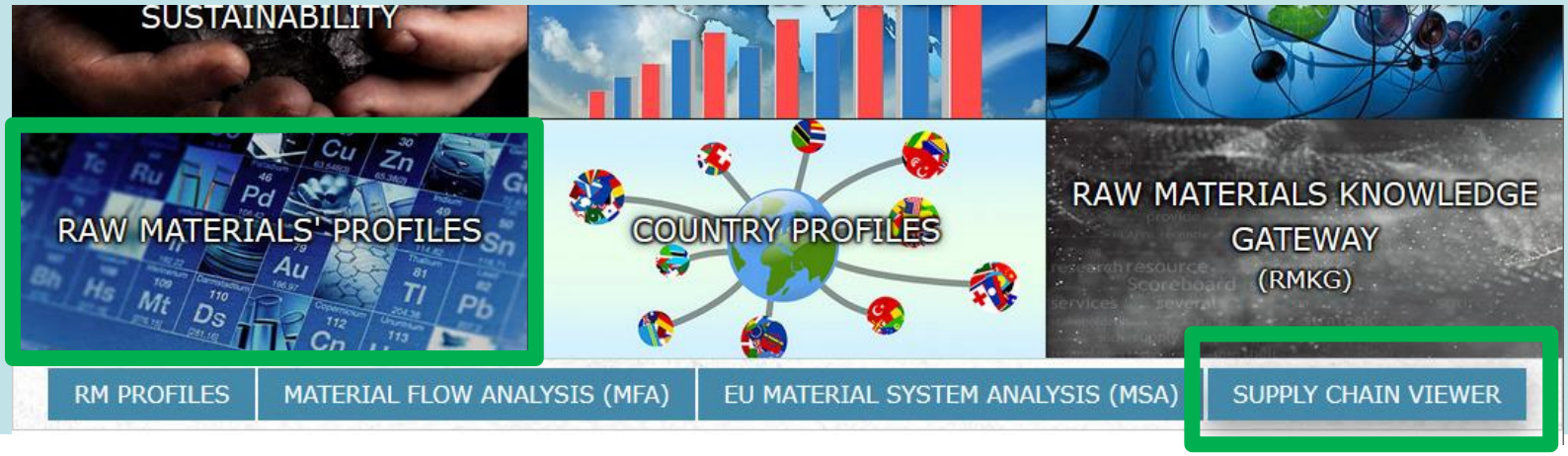
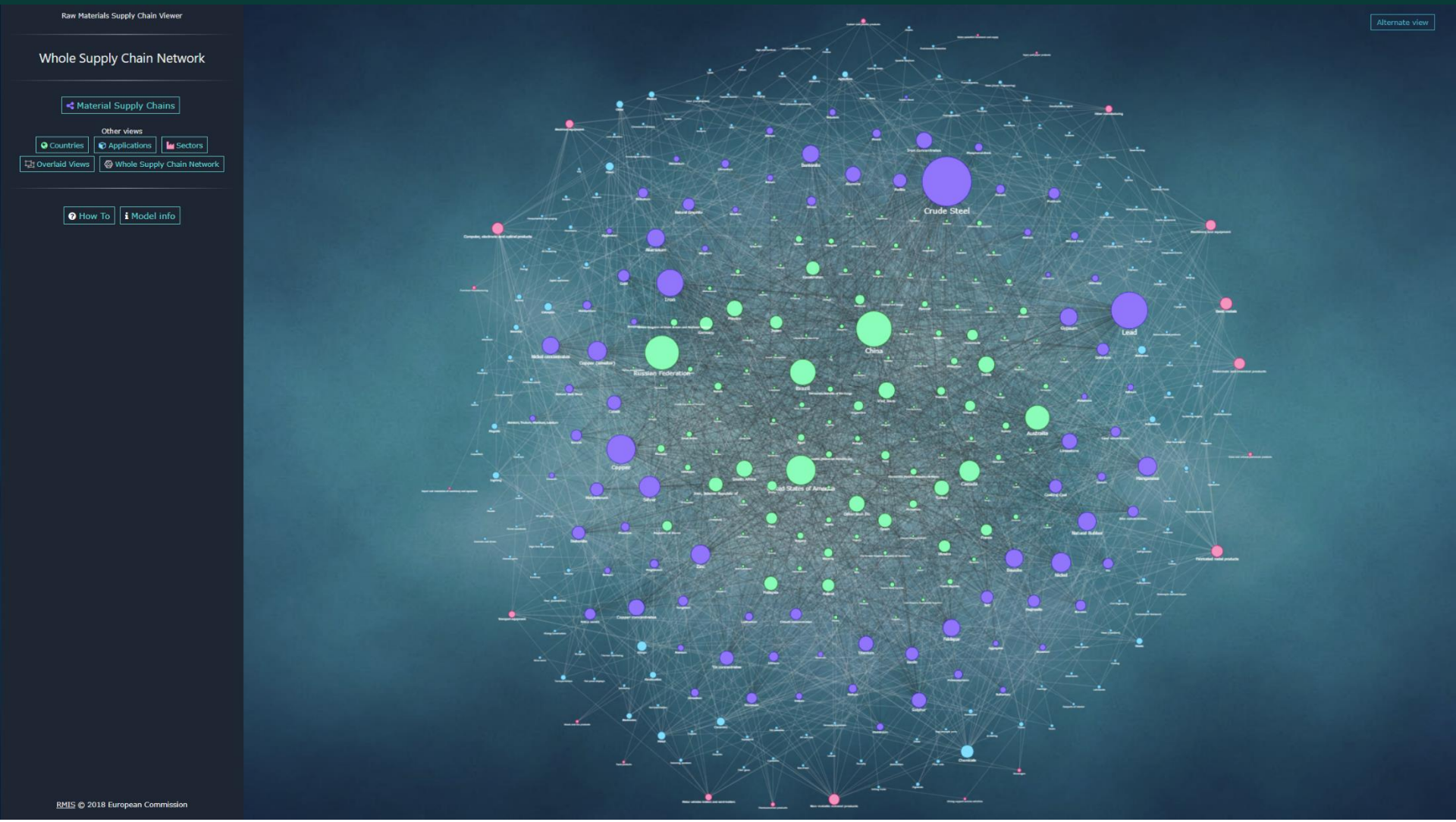
RMIS
Supply Chain Viewer

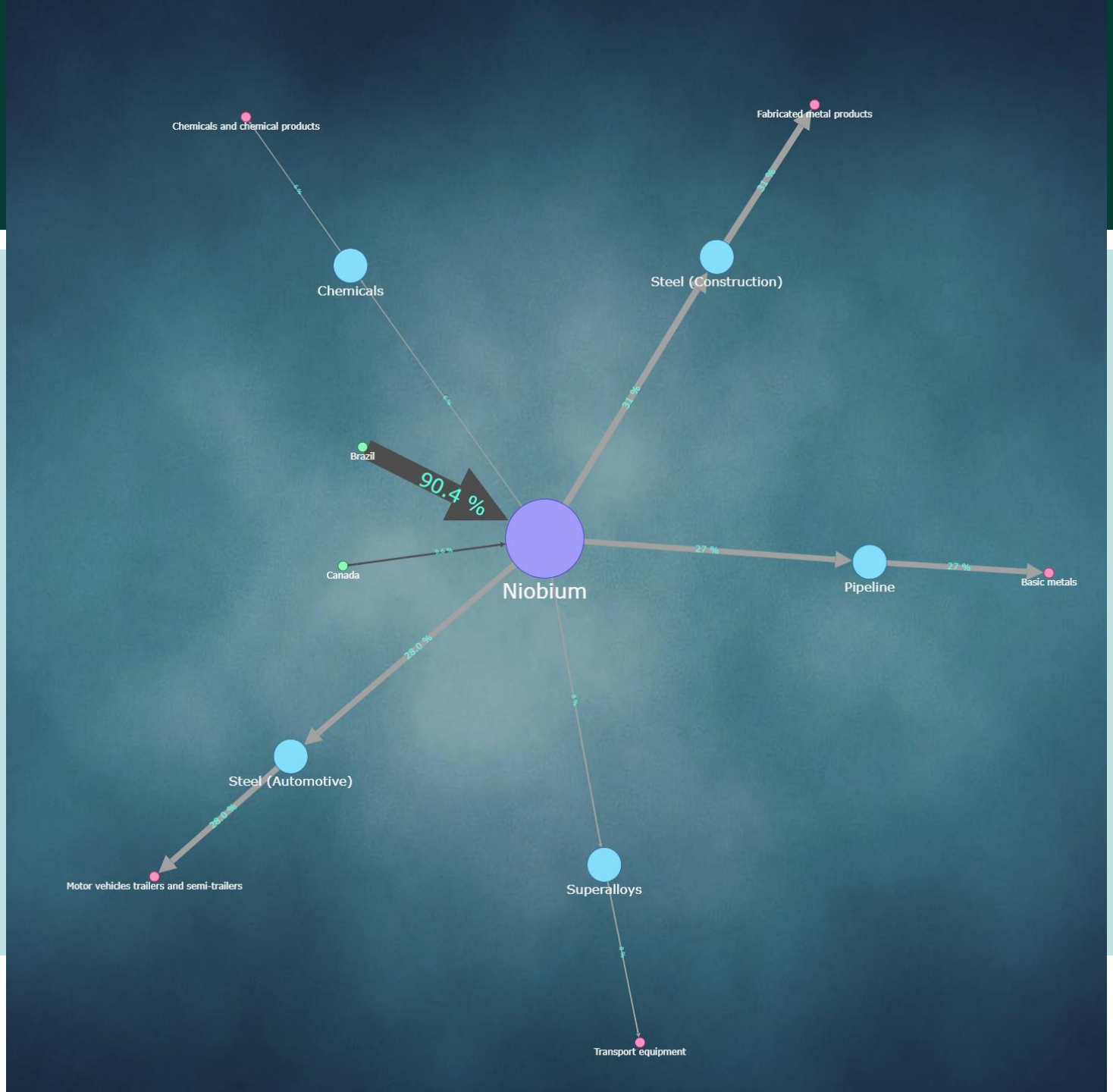
The (forthcoming) RMIS **supply chain viewer** provides a dynamic/interactive overview of the raw materials' supply chain network consisting of ***countries, materials, products,*** and ***sectors***.

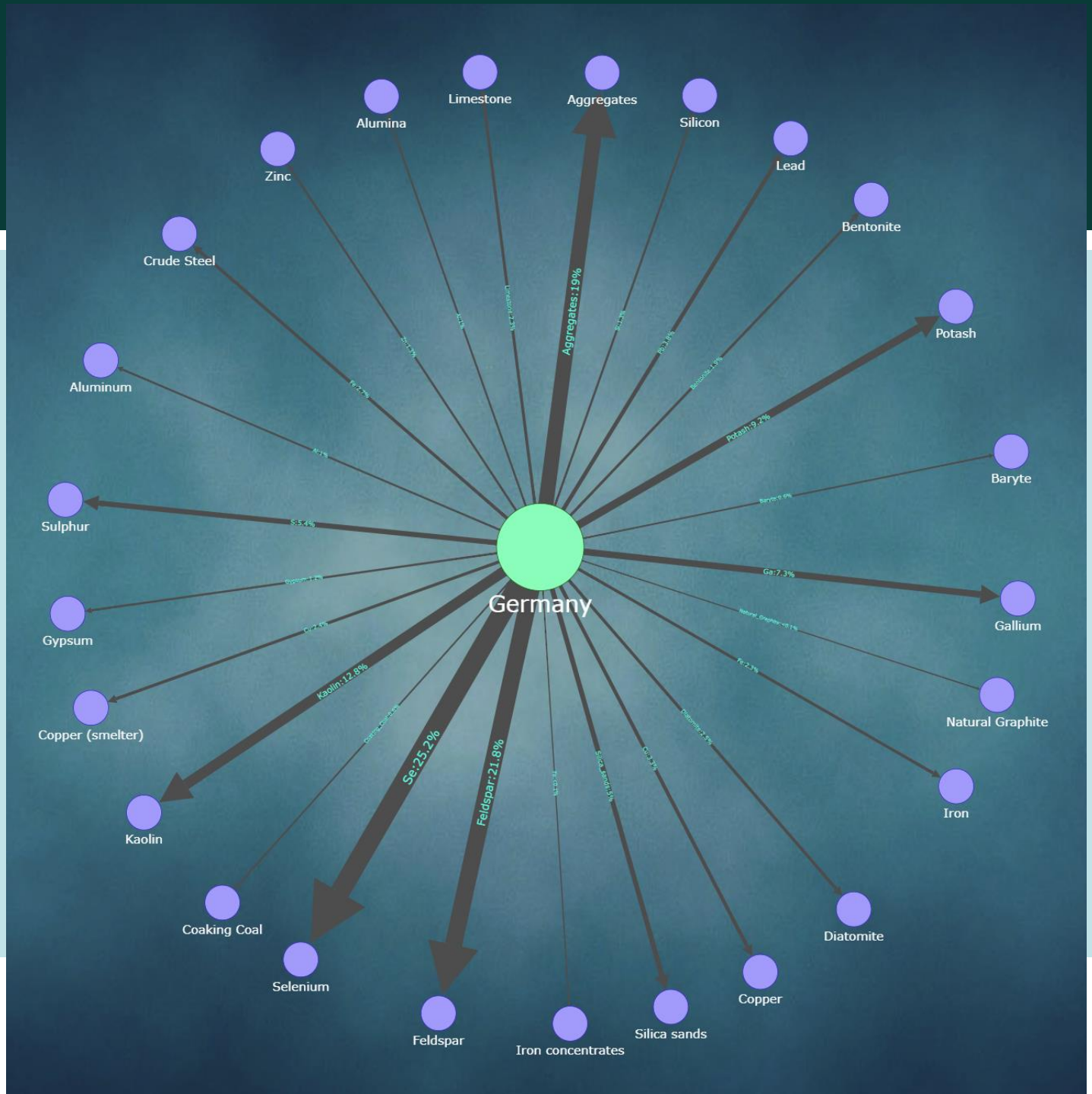
All underlying data come from the **EC criticality assessment**



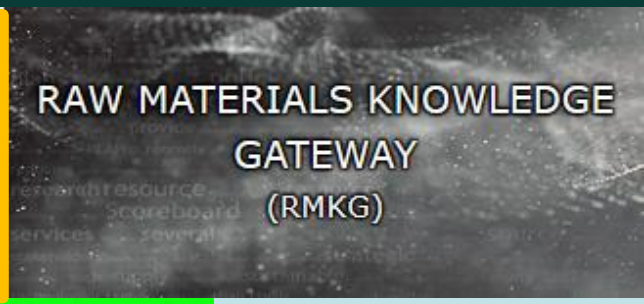
RMIS
Supply Chain Viewer




Chemicals and chemical products
Chemicals
Fabricated metal products
Steel (Construction)
Brazil
90.4 %
Canada
Niobium
Pipeline
Basic metals
Steel (Automotive)
Motor vehicles trailers and semi-trailers
Superalloys
Transport equipment


Germany
Limestone
Aggregates
Alumina
Silicon
Zinc
Lead
Crude Steel
Bentonite
Potash
Aluminum
Baryte
Sulphur
Gallium
Gypsum
Natural Graphite
Copper (smelter)
Iron
Kaolin
Diatomite
Coaking Coal
Copper
Selenium
Silica sands
Feldspar
Iron concentrates
Aggregates:19%
Potash:9.2%
Ga:7.3%
Kaolin:12.8%
Se:25.2%
Feldspar:21.8%

RMIS 2.0
Country profiles



Country Profiles

revised structure & content

1. Key Indicators

- 1.1 Sankey diagram of material flows
- 1.2 Value added in the raw materials sectors
- 1.3 Employment in the raw materials sectors
- 1.4 Output of mining and quarrying sector
- 1.5 Labour productivity of industry
- 1.6 Mining Contribution Index
- 1.7 Gross domestic product
- 1.8 Industry's and manufacturing's value added
- 1.9 Competitive Industrial Performance Index
- 1.10 Main five manufacturing sectors

2. Investment and regulatory framework

3. Research, development & innovation

4. Resources & reserves

5. Supply

6. Raw material use

....

Country Profiles

Material flow analysis (EW-MFA)

Germany

Material Flows and Stocks

See Germany in MFA Inv

Reserve and Production

Germany Reserve and P

Trade

Germany raw material tr

For more data please vis

Regulatory Framework

Minerals regulatory fram
exploration and exploitatio
Union, 2016

Environmental Dimension

Germany Environmental

Social Dimension

Germany Social Dimens

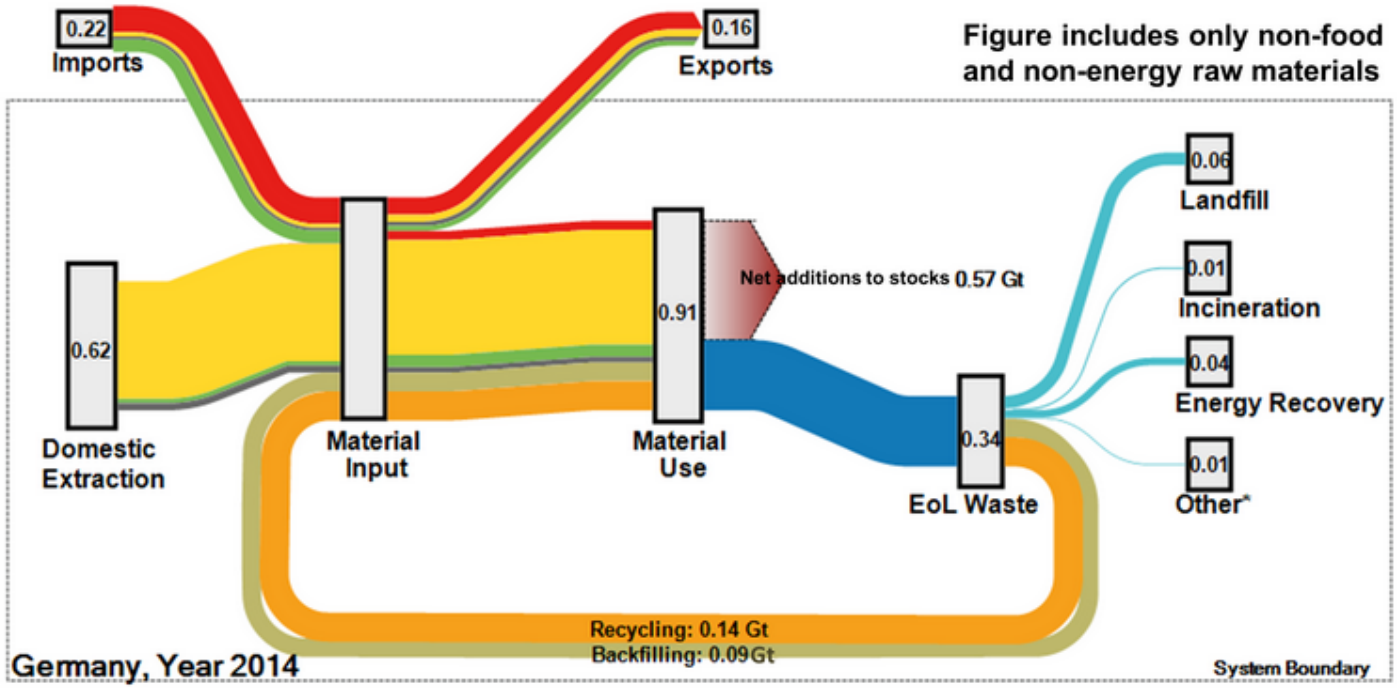
Links to Other Country Pro

Germany

Material flow visualization

Eurostat economy-wide material flow accounts (EW-MFA) and waste statistics are visualized in a Sankey diagram showing the flows of n
food and non-energy raw materials (i.e., excluding fossil fuels and biomass for energy purposes). The visualizations include four ma
material categories (metals, construction minerals, industrial minerals, and biomass (timber and products from biomass and animals)).

The resulting Sankey diagrams can help to show the magnitude of material flows (domestic extraction, imports, and exports) and end-of-
waste generation and treatment for different EU countries.



Country Profiles

revised structure & content

1. Key Indicators

2. Investment and regulatory framework

- 2.1 Total investment
- 2.2 Foreign direct investments: inward flows and stocks
- 2.3 Foreign direct investments: outward flows and stocks
- 2.4 Country's FDI flows in mining and quarrying sector
- 2.5 Annual exploration budget in metals and mining
- 2.6 Business environment
- 2.7 Regulatory framework

3. Research, development & innovation

4. Resources & reserves

5. Supply

6. Raw material use

7. Trade

8. Environment

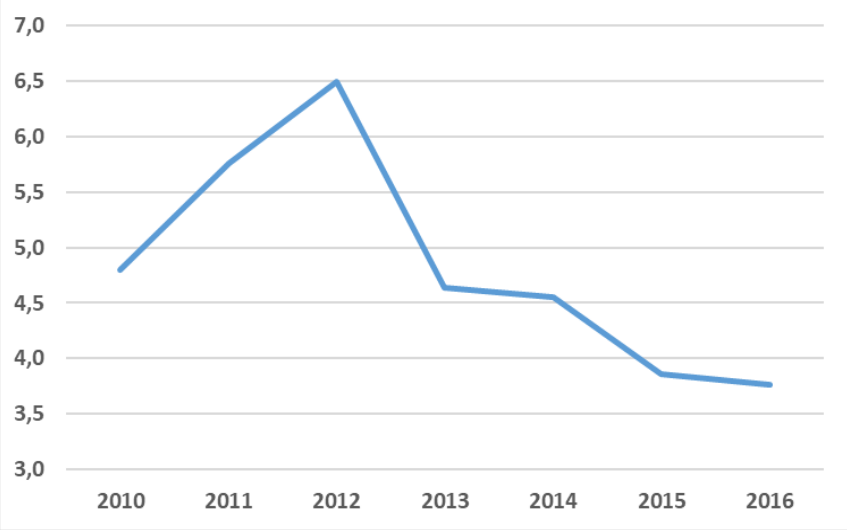
9. Social & Policy

10. References and Methodological Notes

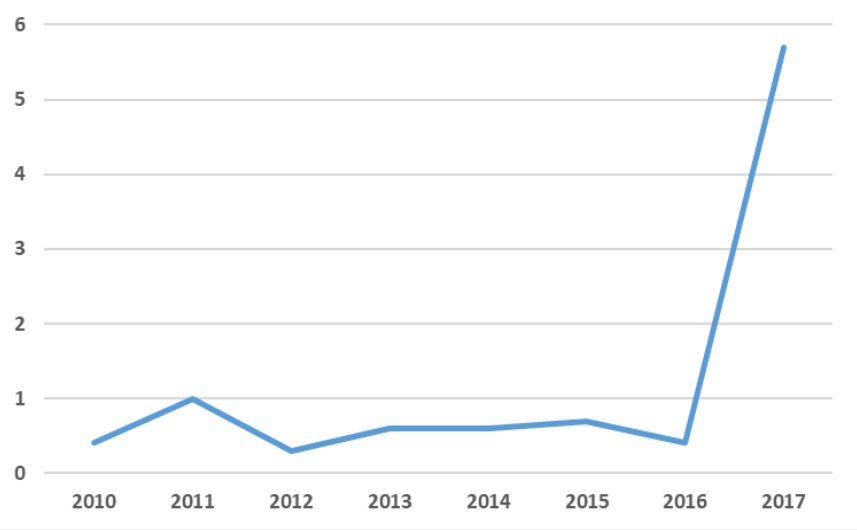
Country Profiles

Economic performance

1.4 Production of mining and quarrying sector (total industry %)



2.5 Annual exploration budget in Metals and Mining (million USD)



Mining Contribution Index 2016	***Score: 39***	***Rank: 109 (out of 183)***

Country Profiles

revised structure & content

3. Research, development & innovation

- 3.1 Gross domestic expenditure on R&D
- 3.2 Business expenditure on R&D by relevant NACE sector

4. Resources & reserves

- 4.1 Estimated resources
- 4.2 Estimated reserves

5. Supply

- 5.1 Domestic extraction by main category
- 5.2 Production of primary minerals
- 5.3 Production in relevant industrial sectors
- 5.4 Volume of imports of goods

6. Raw material use

- 6.1 Domestic material consumption by main category
- 6.2 Volume of exports of goods

Country Profiles

revised structure & content

7. Trade in raw materials commodity

- 7.1 Raw materials´ physical trade balance by main category
- 7.2 Raw materials' trade balance by broad commodity group
- 7.3 Trade in raw materials´ by HY chapter (referring to country)
- 7.4 Volume of imports of goods
- 7.5 Import value index
- 7.6 Export index value
- 7.7 Top 20 non-food, non-energy raw material commodities imported
- 7.8 Top 20 non-food, non-energy raw material commodities exported
- 7.9 Exports of mining equipment

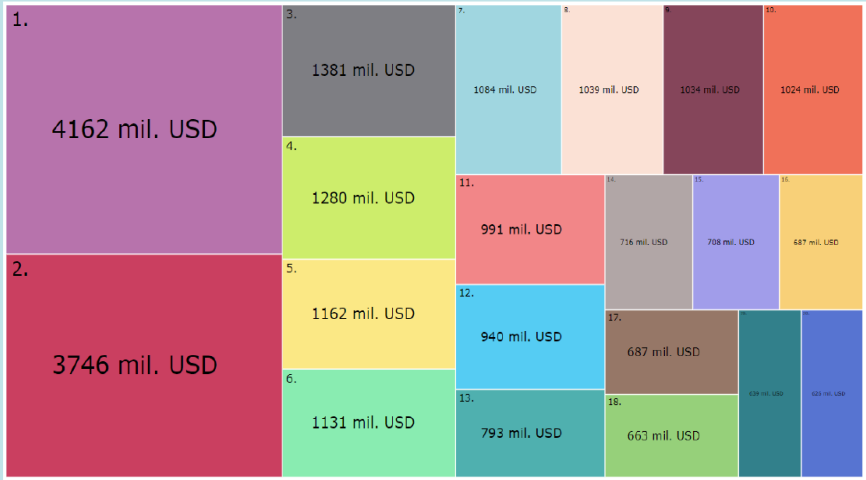
8. Environmental sustainability

- 8.1 Land used by mining sites and other activities
- 8.2 GHG emissions and emissions intensity by raw materials sector
- 8.3 PM2.5 emissions and emissions intensity by raw materials sector
- 8.4 Generation of waste by raw materials sector
- 8.5 WEEE management

Country Profiles

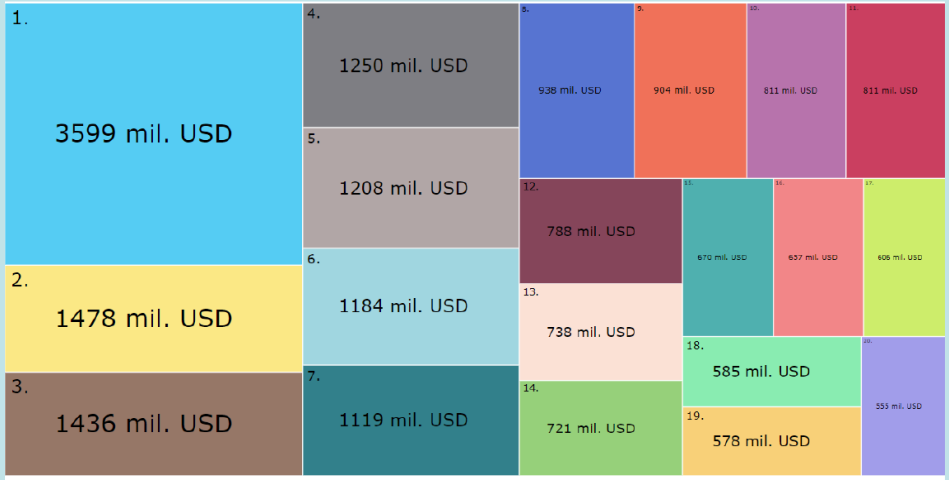
Trade in raw materials commodity

Top 20 non-food, non-energy raw material commodities imported in 2014



1. Cathodes & sections of cathodes, of refined copper, unwrought
2. Gold (incl. gold plated with platinum), in unwrought forms (excl. powder)
3. Aluminium alloys, unwrought
4. Ferrous waste & scrap (excl. of 7204.10-7204.41)
5. Waste & scrap of precious metal with precious metal; other waste & scrap containing precious metal, other than gold/platinum, n.e.s. of 71.12
6. Aluminium, not alloyed, unwrought
7. Semi-finished products of iron/non-alloy steel, containing by weight <0.25% of carbon, of rectangular (other than square) cross-section
8. Gold (incl. gold plated with platinum), non-monetary, in semi-manufactured forms
9. Flat-rolled products of iron/non-alloy steel, width 600mm/more, hot-rolled, in coils, not more than hot-rolled (excl. pickled), thickness<3mm
10. Inorganic/organic compounds of precious metals (excl. of 2843.21 - 2843.30), whether/not chemically defined; amalgams of precious metals
11. Wood sawn/chipped length wise, sliced/peeled, whether/not planed, sanded/end-jointed, of a thickness >6mm, coniferous
12. Copper waste & scrap
13. Aluminium waste & scrap
14. Flat-rolled products of iron/non-alloy steel, of a width of 600mm/more, of a thickness of <0.5mm
15. Diamonds, non-industrial other than unworked/simply sawn/cleaved/bruted
16. Non-alloy pig iron containing by weight 0.5%/less of phosphorus, in pigs/blocks/other primary forms
17. Iron ores & concentrates (excl. roasted iron pyrites), non-agglomerated
18. Flat-rolled products of stainless steel, width 600mm/more, cold-rolled (cold-reduced), thickness of 0.5mm/more but not >1mm
19. Flat-rolled products of stainless steel, of a width of 600mm/more, not further worked than cold-rolled (cold-reduced), of a thickness >1mm but <3mm
20. Flat-rolled products of iron/non-alloy steel, width 600mm/more, hot-rolled, in coils, hot-rolled (excl.pickled), thickness 3mm-4.75mm

Top 20 non-food, non-energy raw material commodities exported in 2014



1. Gold (incl. gold plated with platinum), in unwrought forms (excl. powder)
2. Flat-rolled products of iron/non-alloy steel, of a width of 600mm/more, othw. plated/coated with zinc (excl. electrolytically), other than corrugated
3. Structures and parts of structures of iron or steel; plates, rods, angles, etc., prepared for use in structures of iron or steel
4. Screws & bolts (excl. of 7318.11-7318.14), whether/not with their nuts/washers, of iron/steel
5. Tubes, pipes & hollow profiles (excl. of 7306.10-7306.30), welded, of circular cross-section, of stainless steel
6. Other tubes, pipes & hollow profiles (excl. of 7306.10-7306.40), welded, of non-circular cross-section, of square/rectangular cross-section
7. Tubes, pipes & hollow profiles (excl. of 7306.10 & 7306.20), welded, of circular cross-section, of iron/non-alloy steel
8. Bars & rods of iron/non-alloy steel (excl. of 72.13), containing indentations/ribs/grooves/other, produced during the rolling/twisted after rolling
9. Inorganic/organic compounds of precious metals (excl. of 2843.21 - 2843.30), whether/not chemically defined; amalgams of precious metals
10. Aluminium alloys, unwrought
11. Articles of iron/steel, forged/stamped but not further worked, n.e.s.
12. Bars & rods of stainless steel, not further worked than cold-formed/cold-finished
13. Plates, sheets & strip, rectangular (incl. square), of a thickness >0.2mm, of aluminium alloys
14. Flat-rolled products of iron/non-alloy steel, width 600mm/more, hot-rolled, not clad/plated/coated, not in coils, thickness >10mm
15. Bars, rods & profiles (excl. hollow profiles) of aluminium alloys
16. Palladium, unwrought/in powder form
17. Copper tube/pipe fittings (e.g., couplings, elbows, sleeves), of copper alloys
18. Cooking appliances & plate warmers , for gas fuel/for both gas & other fuels.
19. Copper waste & scrap
20. Line pipe of a kind used for oil/gas pipelines, other than of stainless steel.

Country Profiles

revised structure & content

9. Social and policy

- 9.1 Worldwide governance indicators
- 9.2 Natural resource governance index
- 9.3 Policy perception index
- 9.4 Country risk: INFORM index
- 9.5 Occupational safety: rate of fatal accidents at work

10. References and Methodological notes

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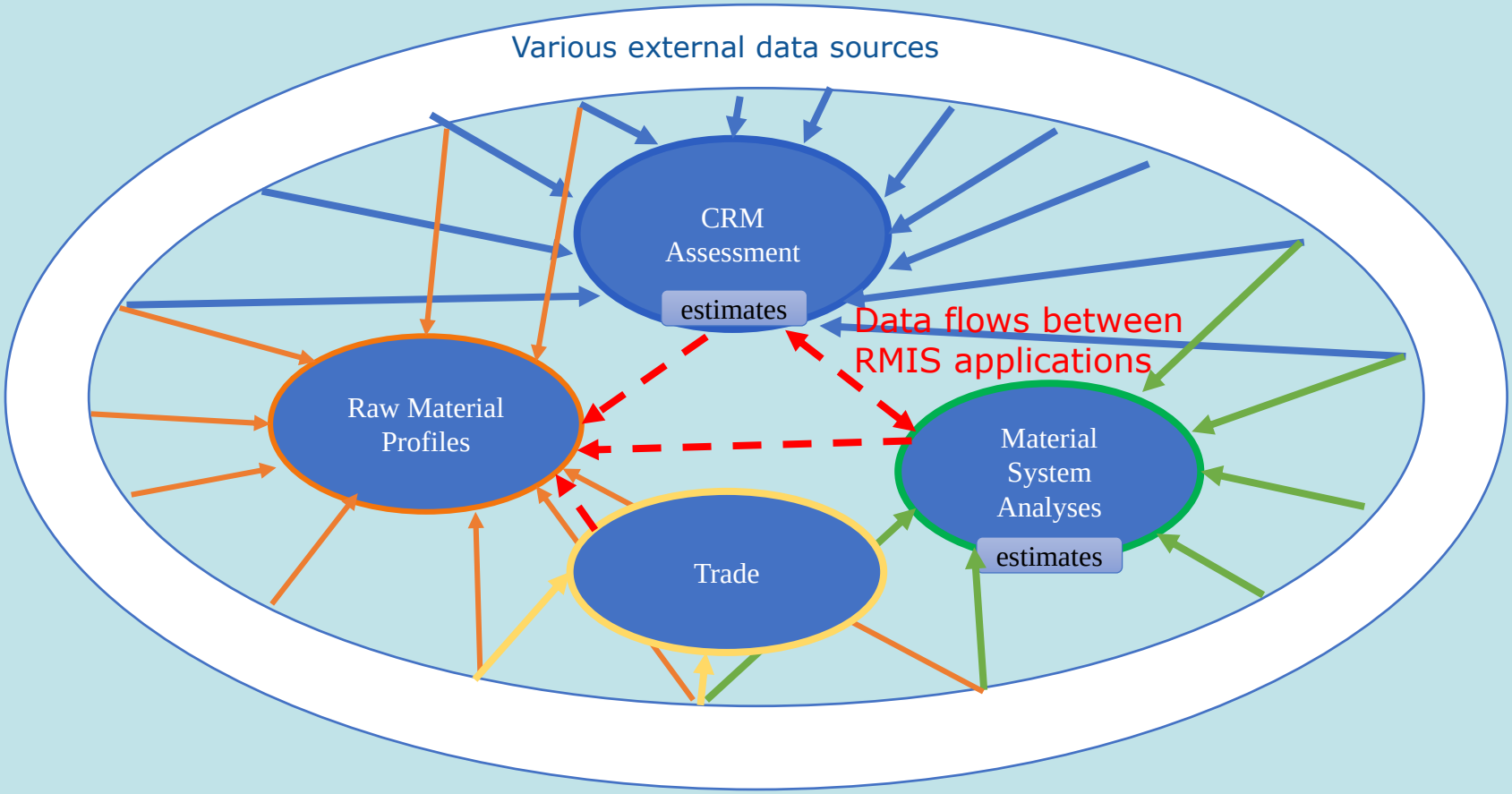
Data flows between RMIS applications



Challenges:
a) Filling data gaps on flows/stocks in a universal way
b) Avoiding over-determination

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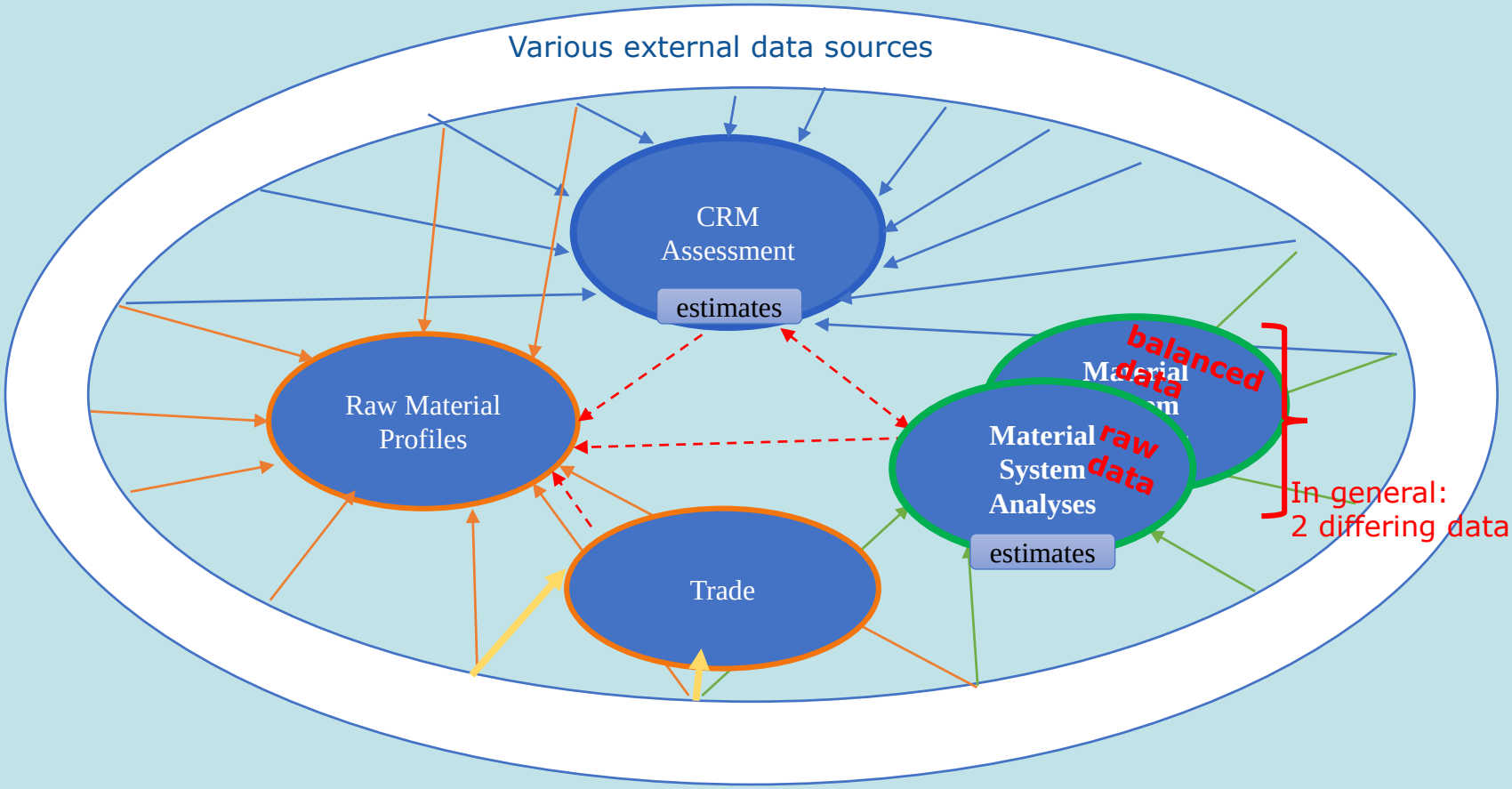
Data flows between RMIS applications



Added value of MFA data:

- **Consistent Systematic approach applicable on <u>all</u> physical flow/stock related data**
- **Balanced data allows to detect areas of inconsistent data and to enhance the consistency**

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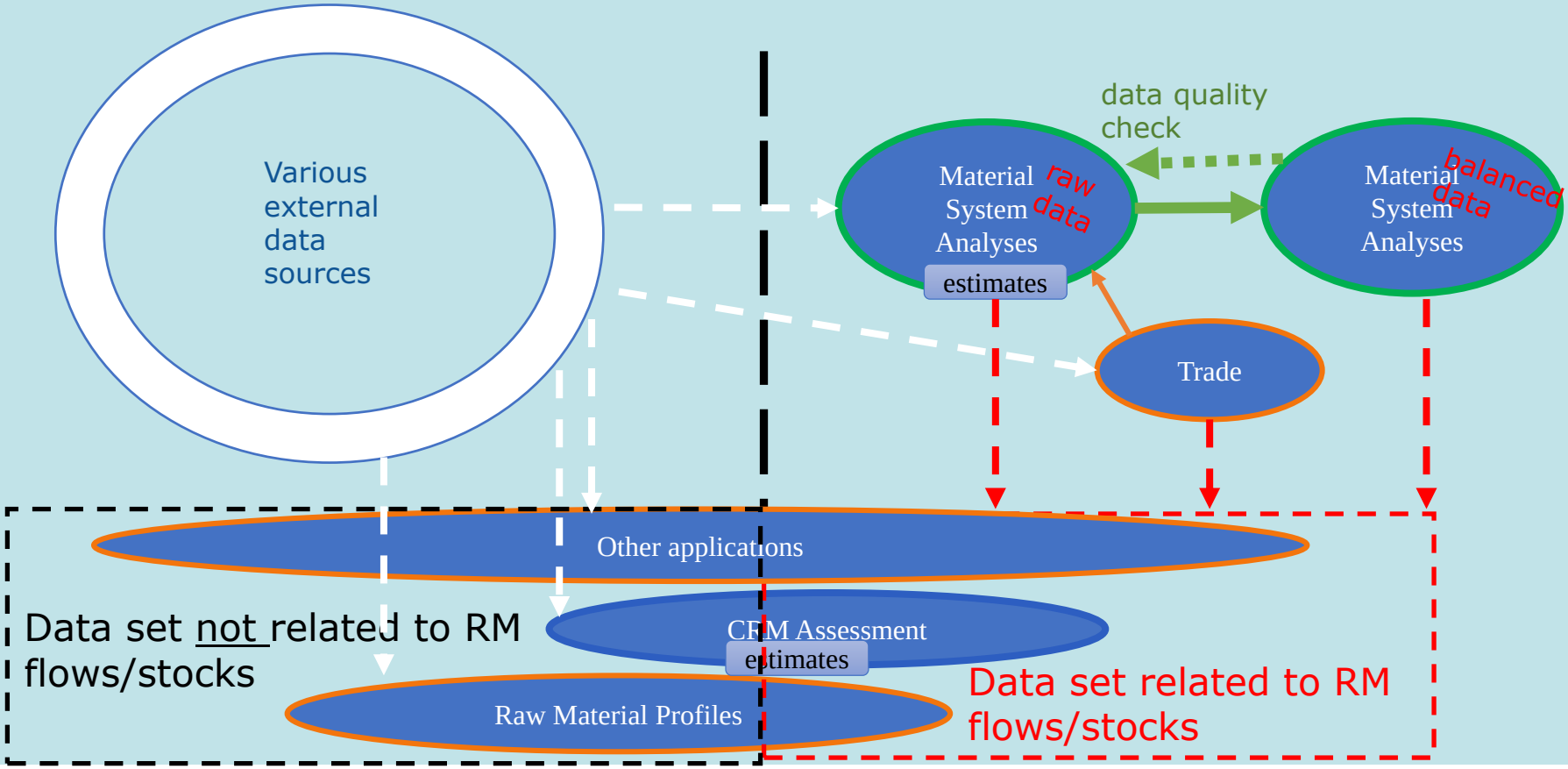
Potential added value of MFA data

- the potential of MFA data is to date not used comprehensively and systematically
- the role of MFA/MSA and its interplay with other (thematically overlapping) applications require sufficient definition
- once successfully implemented, the MFA framework can be used as key tool for harmonisation of data from different sources

Potential added value of MFA data



Increase overall consistency of all data related to physical flows/stocks of the economy by MSA/MFA

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Thank you for your attention!

rmis.jrc.ec.europa.eu

ec-rmis@ec.europa.eu

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