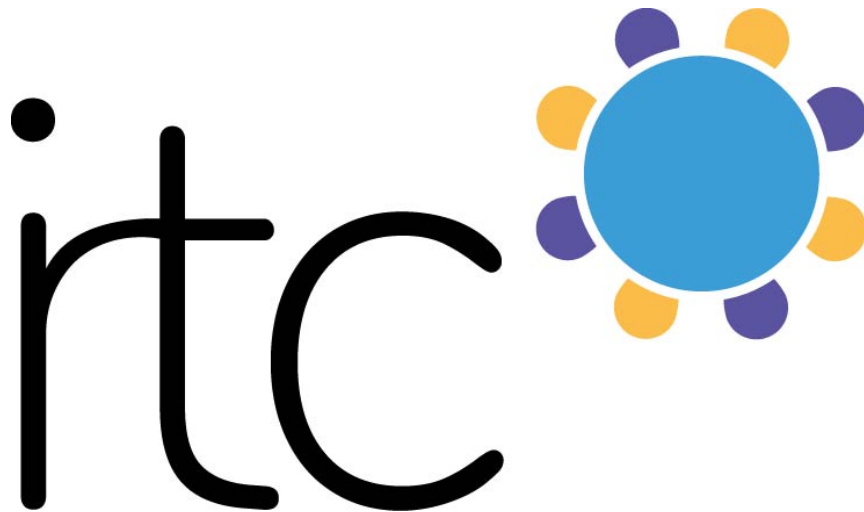
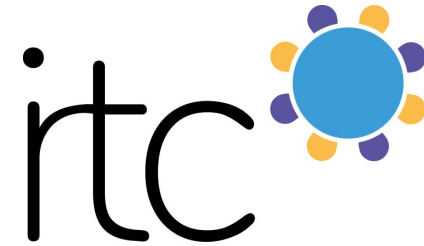


CIRCULAR ECONOMY AND SUSTAINABLE DEVELOPMENT GOALS



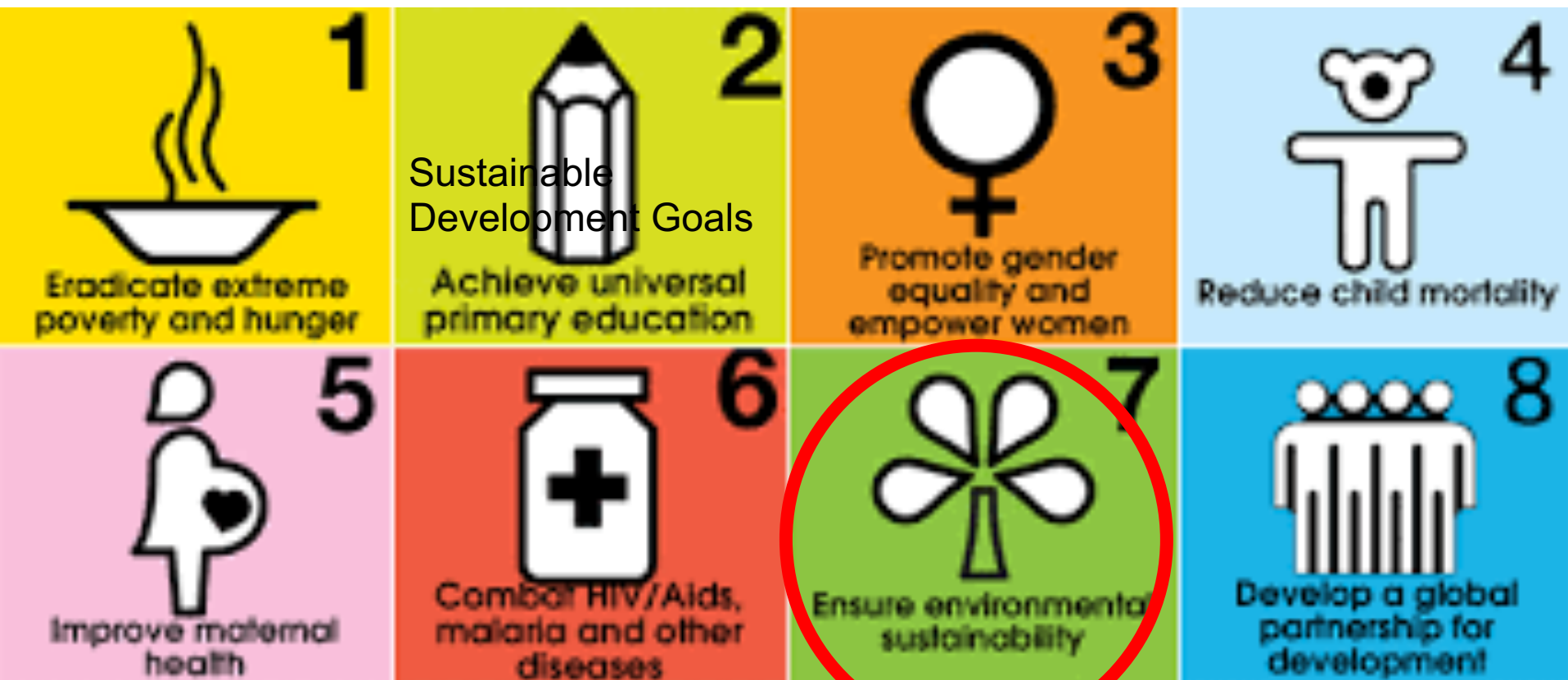
Guido Sonnemann
University of Bordeaux

Outline



- Introduction: From the Millennium Development Goals to the Sustainable Development Goals
- Clustering the Sustainable Development Goals (SDGs)
- The role of Circular Economy, resource efficiency and related assessment tools
- Conclusions and perspectives for critical raw materials

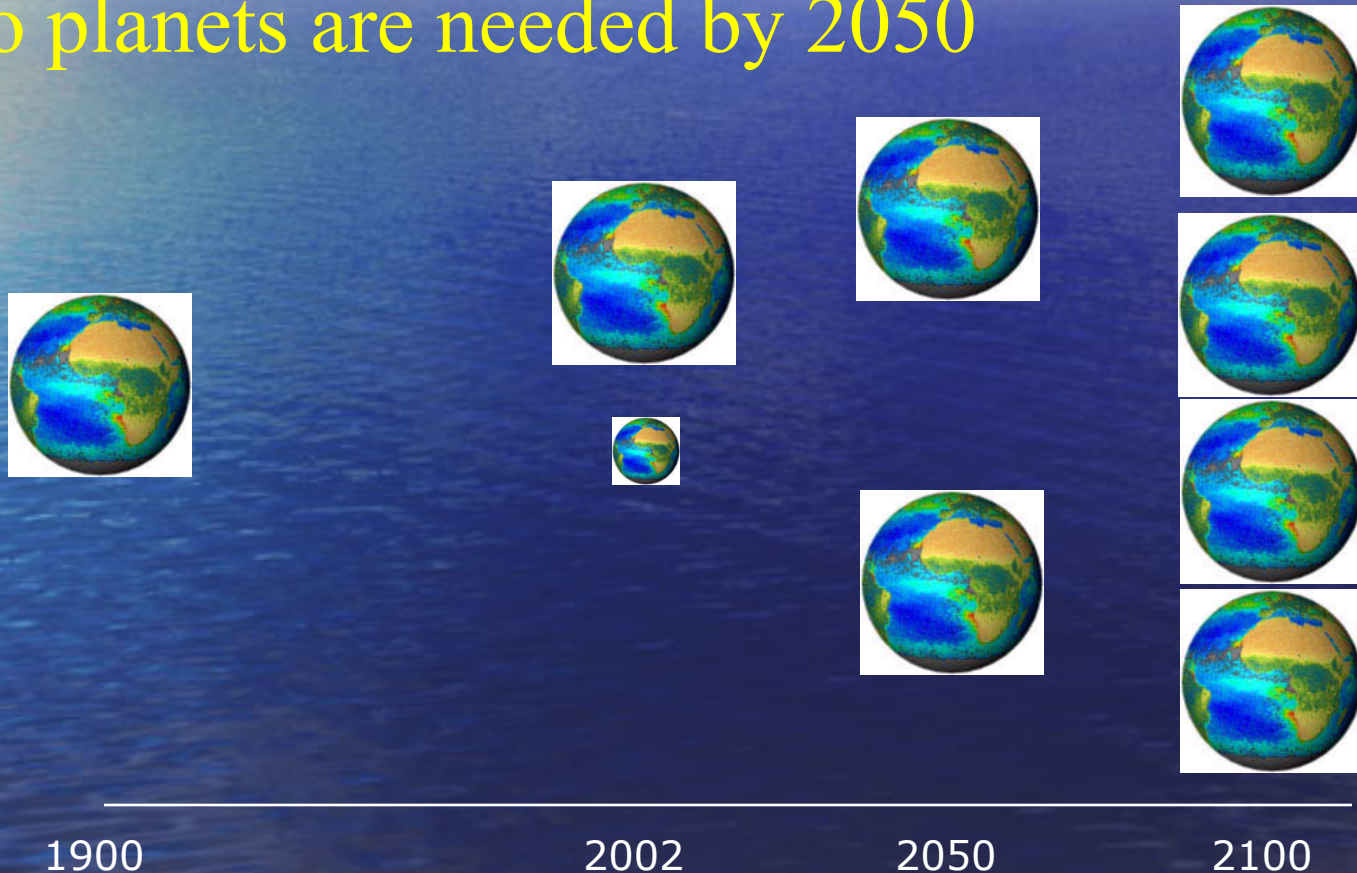
Millennium Development Goals



Environmental Sustainability: Ecological Footprint approach

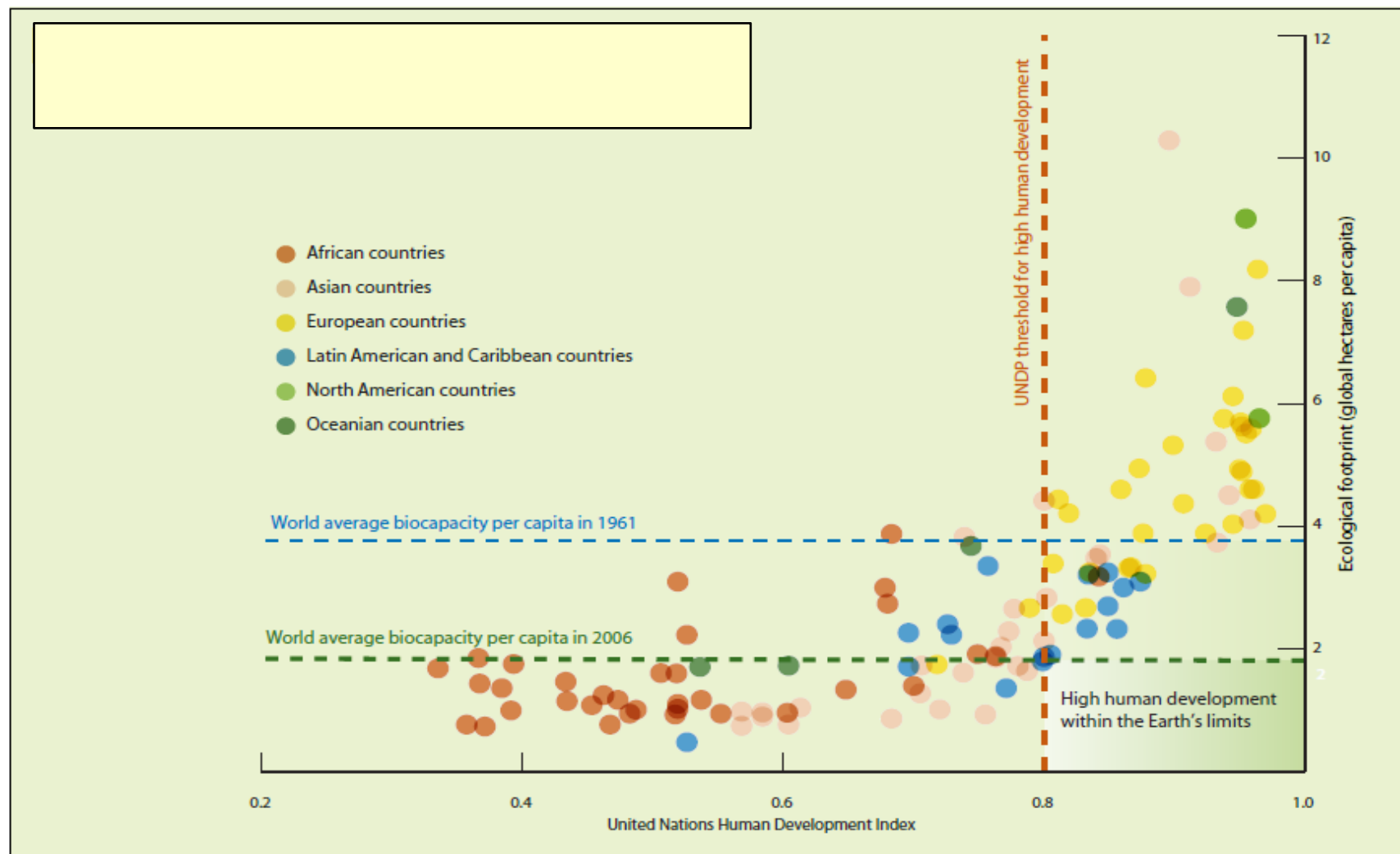
If we go on with current production and consumption patterns,

Two planets are needed by 2050



Source: Wackernagel M

Twin Challenge for Sustainable Development



Source: *The Ecological Wealth of Nations: Earth's Biocapacity as a New Framework for International Cooperation*. Global Footprint Network (2010), p. 13; *Human Development Index data from Human Development Report 2009 – Overcoming Barriers: Human Mobility and Development*. UNDP (2009).

SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY



2 ZERO HUNGER



3 GOOD HEALTH AND WELL-BEING



4 QUALITY EDUCATION



5 GENDER EQUALITY



6 CLEAN WATER AND SANITATION



7 AFFORDABLE AND CLEAN ENERGY



8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



14 LIFE BELOW WATER



15 LIFE ON LAND



16 PEACE, JUSTICE AND STRONG INSTITUTIONS

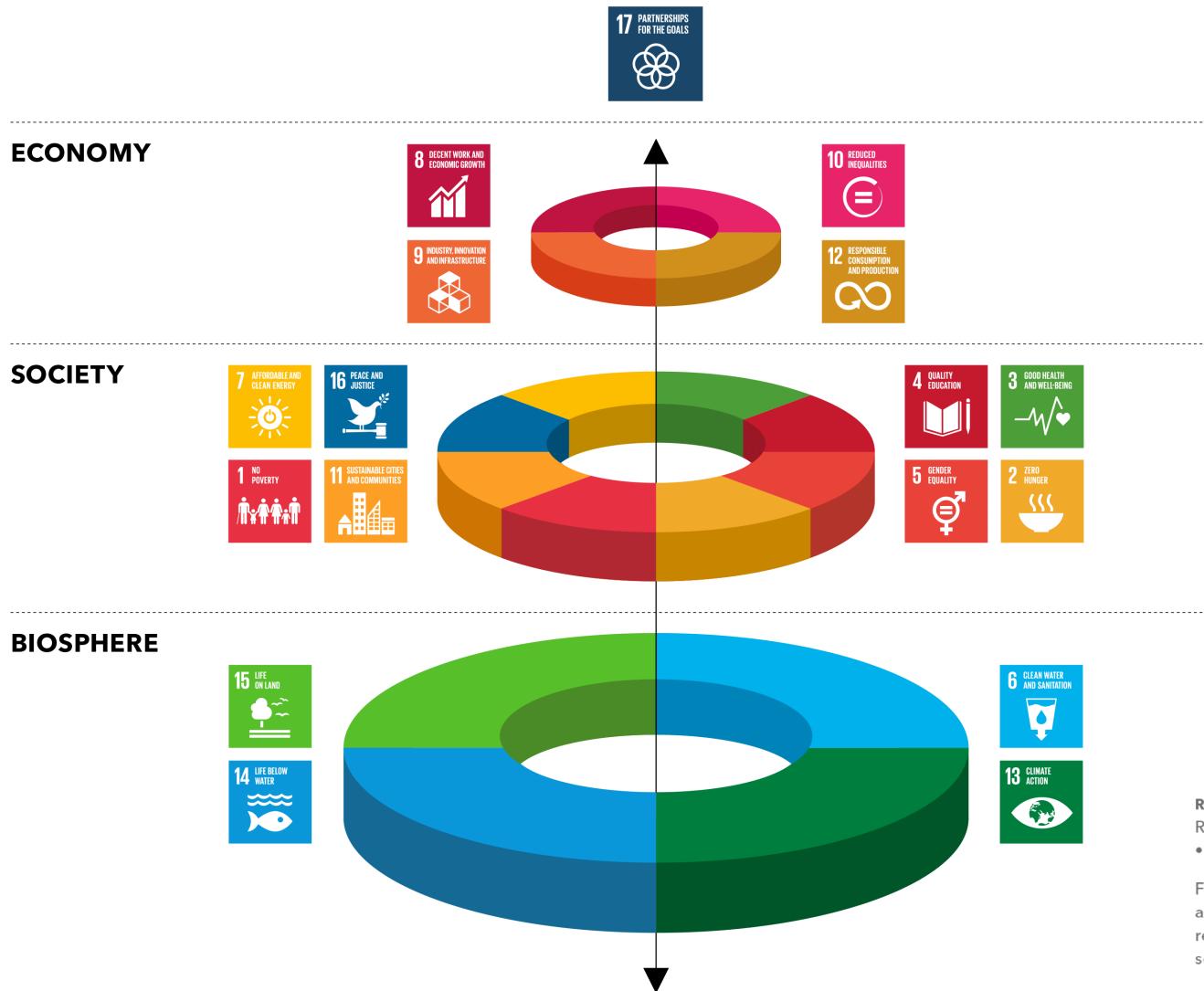


17 PARTNERSHIPS FOR THE GOALS



SUSTAINABLE DEVELOPMENT GOALS

Clustering of SDGs



REDRAWN FROM SOURCE: Stockholm Resilience Centre (SRC) • SRC & IIASA, 2016
• Rockström, J and Sukhdev, P. 2016

Folke, C., R. Biggs, A. V. Norström, B. Reyers, and J. Rockström. 2016. Social-ecological resilience and biosphere-based sustainability science. *Ecology and Society* 21(3):41

Circular Economy System Diagram

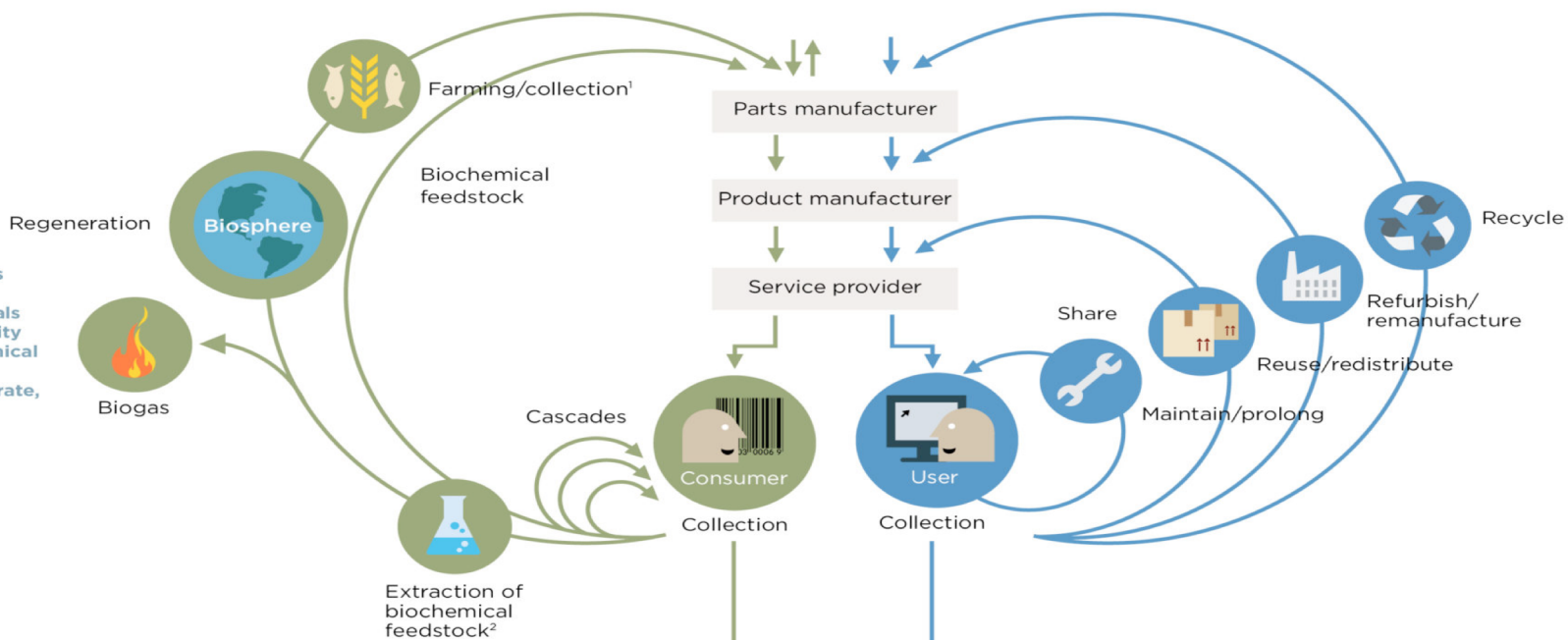
1
 Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows
 ReSOLVE levers: regenerate, virtualise, exchange



Renewables flow management

Stock management

PRINCIPLE 2
 Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles
 ReSOLVE levers: regenerate, share, optimise, loop



PRINCIPLE 3
 Foster system effectiveness by revealing and designing out negative externalities
 All ReSOLVE levers

Minimise systematic leakage and negative externalities

1. Hunting and fishing
 2. Can take both post-harvest and post-consumer waste as an input
 Source: Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Drawing from Braungart & McDonough, Cradle to Cradle (C2C).

The role of the Circular Economy (CE)

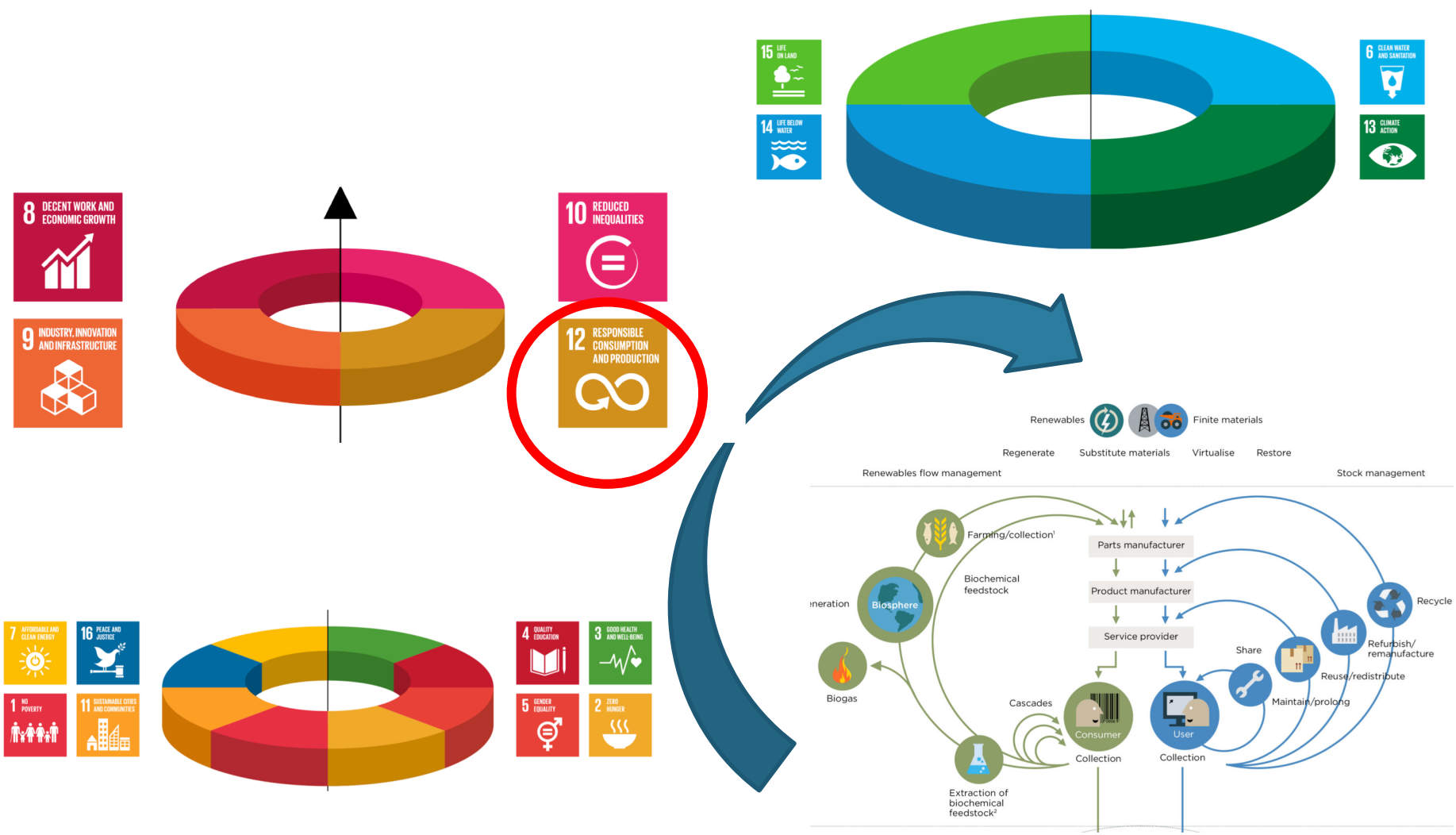
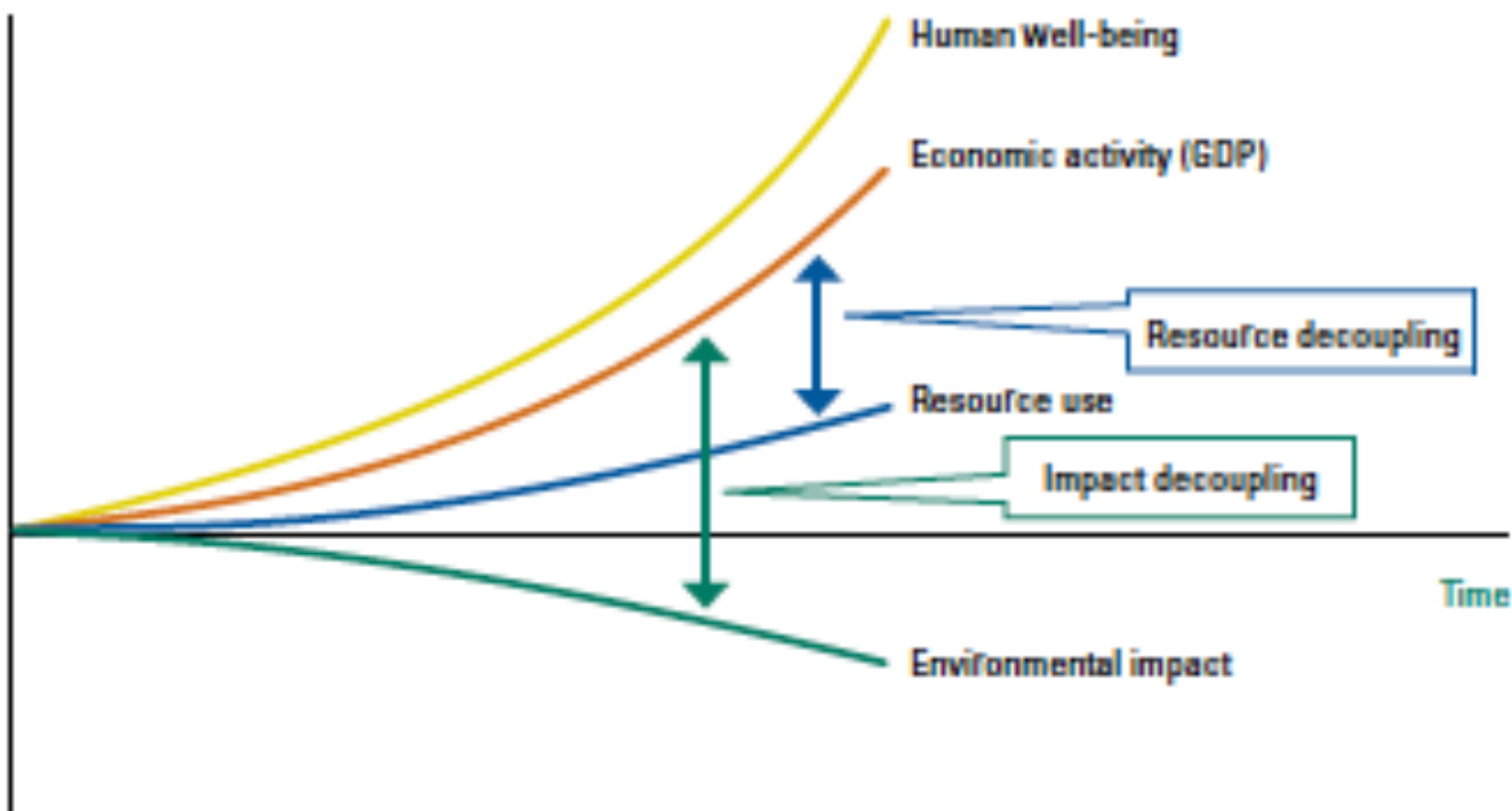


Figure 6. GDP per capita vs. municipal solid waste per capita.⁷⁸



Sources: US EPA 2007; Borzino 2002; Kumar and Gaikwad 2004; Methanetomarkets 2005; World Bank 2005; OECD 2008; Yatsu 2010 and GHK 2006.
 *Note: US\$ 23,000 represents the median point in the GDP data.

Two aspects of decoupling



Source: International Resource Panel

And what is with Resource Efficiency?

Efficiency at economic level

+

Environmental dimension

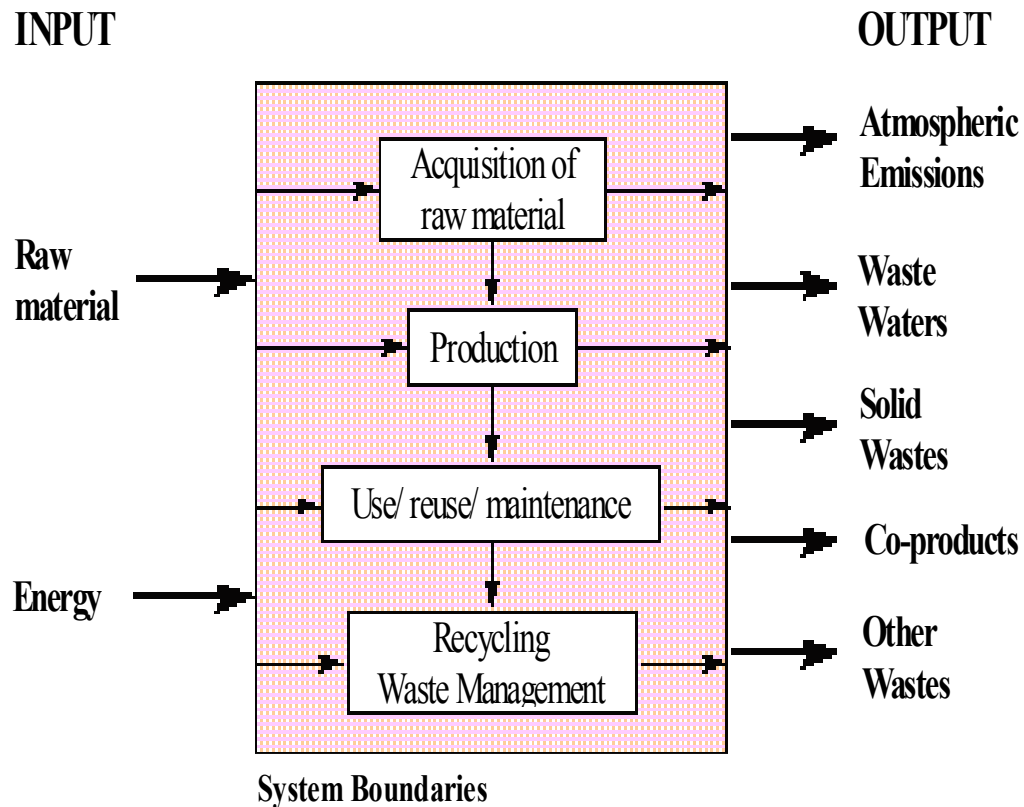
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**Resource efficiency (RE)
(raw materials, energy, water, land)**

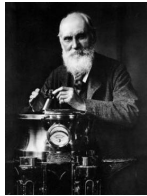
**Reducing the environmental impact
of consumption and production
of goods and services over their *full life cycles***

→ By producing more wellbeing with less material consumption, RE enhances the means to meet human needs while respecting the ecological carrying capacity of the Earth.

Supporting role of input-output based industrial ecology assessment tools

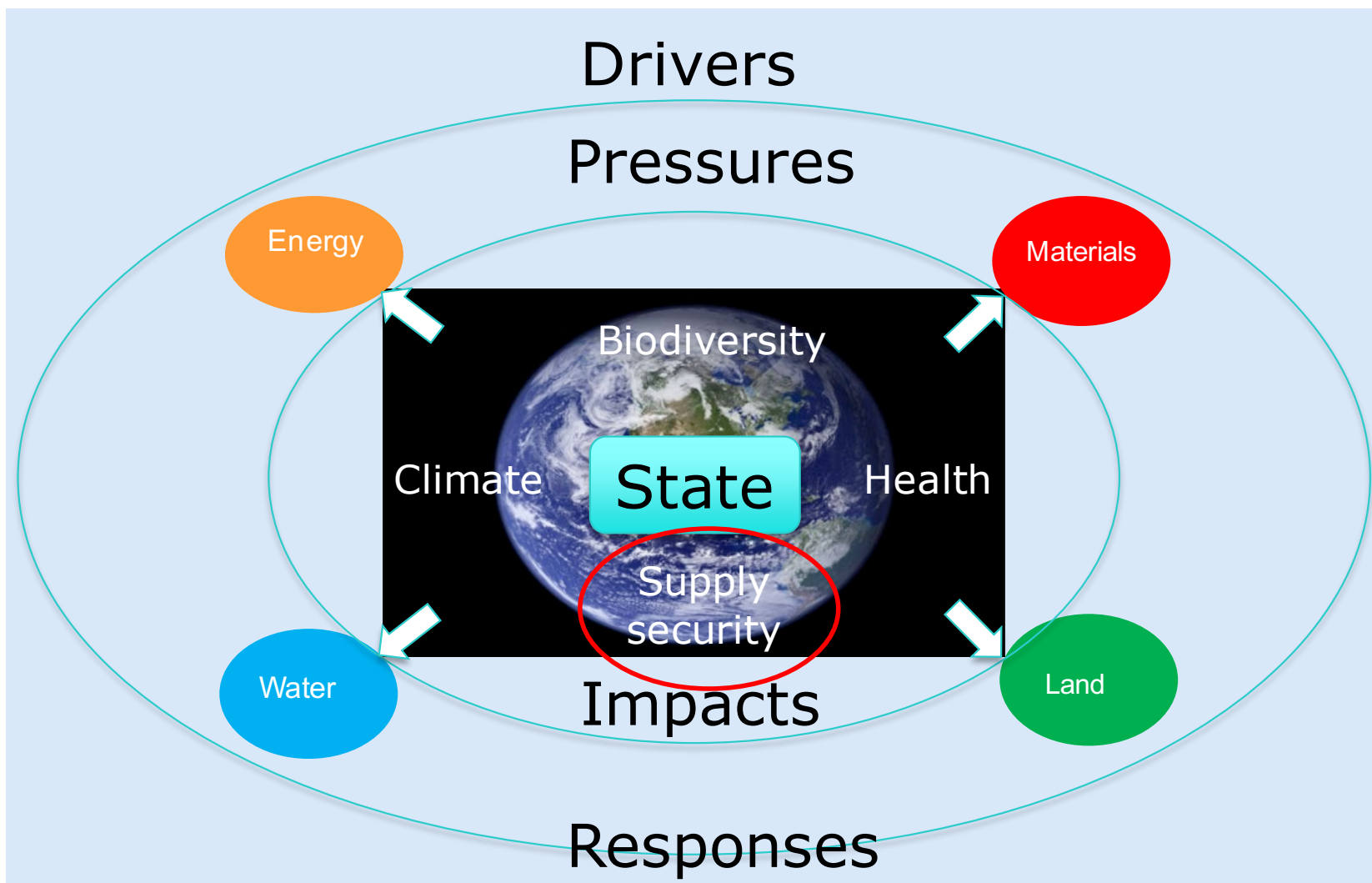


« If you cannot *measure* it,
you cannot *improve* it »
(Lord Kelvin)

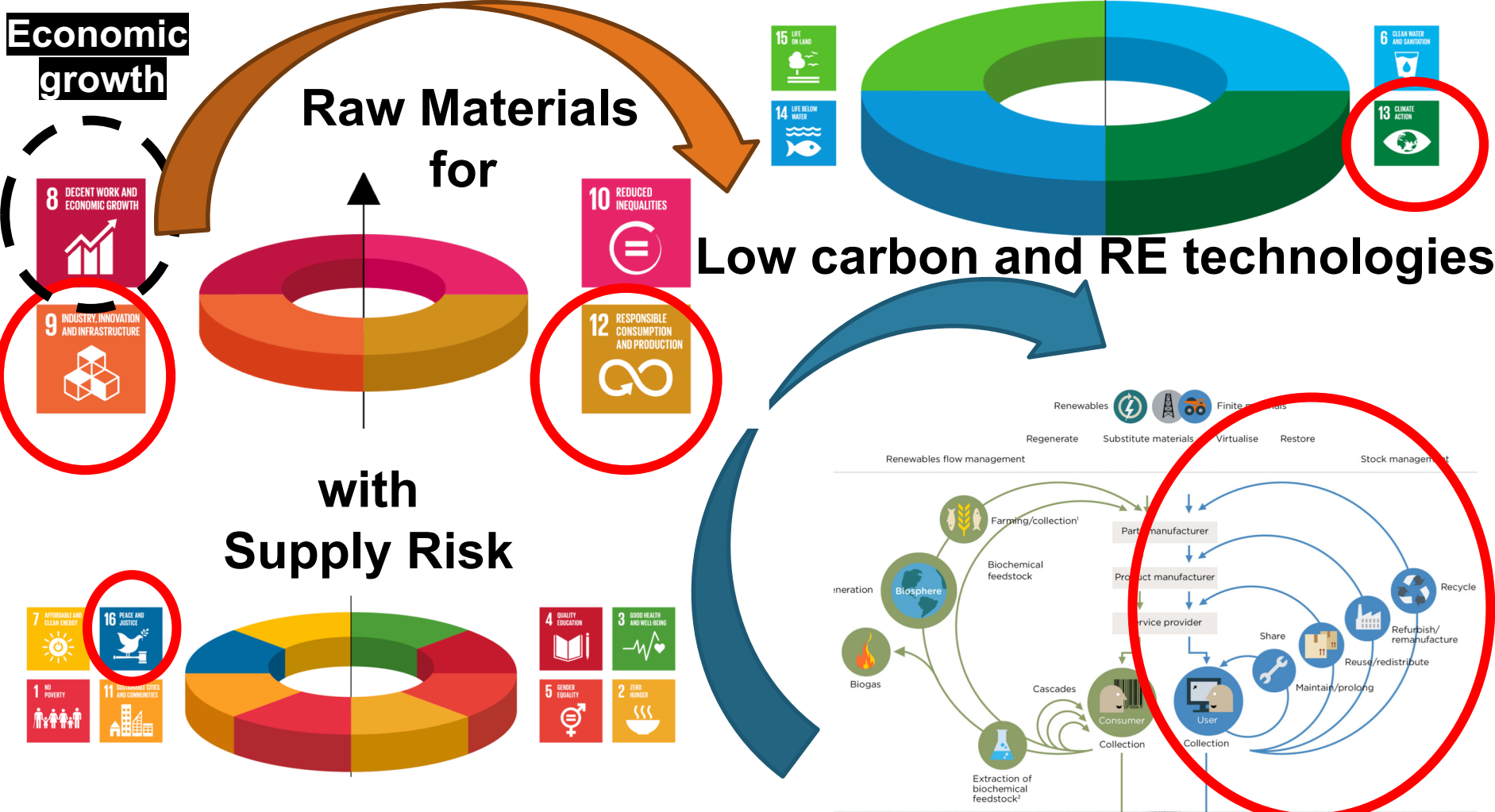


- Life cycle Assessment
- Material Flow Analysis
- Environmentally Extended Input Output Analysis

Key indicator areas for environmental sustainability assessment

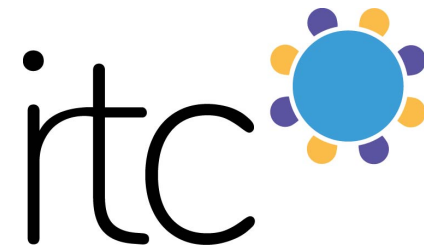


Which Raw Materials are critical in line with the SDGs and what is the link to CE?



Perspectives

- Develop a framework on the role of critical raw materials for sustainable development
- Consider the context of a circular economy
- Specify the scope of criticality assessment
- Discuss the potential complementary role of other industrial ecology assessment tools
- Embed the framework into the Sustainable Development Goals
- Rethink if current 3-dimensional SDGs clusters are best suited for considering the role of critical raw materials



Thank you for your attention!

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