Listening to all the stakeholders? The UN Sustainable Development Goals as Requirements in Systems Engineering.

Presentation by

Ian Brooks

Senior Lecturer in Sustainable IT, Sustainable Economies Research Group, University of the West of England

12 September 2023
V 1.0

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Nachhaltigkeit für Anfänger?

Die Bedürfnisse der Gegenwart so zu befriedigen, dass die Möglichkeiten zukünftiger Generationen nicht eingeschränkt werden.

Brundtland Commission 1987

Sources: (World Commission on Environment and Development, 1987). Image: WDR

Outline

- UN Sustainable Development Goals
- Adoption by Companies and Cities
- Goals and Targets
- Systems Engineering
- SDGs as Requirements
- Materiality
- Alternatives

Ian Brooks

- BSc Software Engineering
- IT and Business Strategy consultancy with PricewaterhouseCoopers and IBM
- MSc Environmental Consultancy
- Senior Lecturer in Sustainable IT, UWE Bristol
- Teaching on Sustainable Business & Computing, Environmental Consultancy
- PhD research (2016-). UN Sustainable Development Goals as requirements in Systems Engineering

Email ian.brooks@uwe.ac.uk

Twitter @sdg_brooks

http://uk.linkedin.com/in/ianmbrooks/

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BSc (Hons) Information Technology Management for Business (ITMB)

Issues of relevance
Place in the ITMB programme

1 NO POVERTY

IT enabling access to resources e.g. financial services, land registries and supporting resilience.
Modules: Induction Sustainable Technology team project, UFCF6X-30-2, UFCFP6-30-3 and 6 other modules

2 ZERO HUNGER

Role of logistics systems in food distribution. Productivity improvement through Smart agriculture.
Modules: Induction Sustainable Technology team project, UFCF6X-30-2, UFCFP6-30-3 and 6 other modules

3 GOOD HEALTH AND WELL-BEING

Use of telehealth to widen healthcare coverage and App-supported healthy behaviour change
Modules: UFCF6X-30-2, UFCFP6-30-3, UMSD7T-15-3 and 7 other modules

4 QUALITY EDUCATION

ITMB students have extensive learning in Entrepreneurship. Importance of lifelong learning in information systems. Changing nature of skills. Broadening access to education through online learning.
Modules: UMSD87-15-3, UFCF6X-30-2, UFCFP6-30-3 and 10 other modules

5 GENDER EQUALITY

Learning about leadership, gender and diversity. Role of IT in enabling work opportunities which improve gender equality e.g. working from home
Modules: UFCF6X-30-2, UFCFP6-30-3, UMSD7T-15-3, UMOD6F-15-3 and 7 other modules

6 CLEAN WATER AND SANITATION

Role of IT in Integrated Water Resource Management. IT systems for running Water companies.
Modules: Induction Sustainable Technology team project, UFCF6X-30-2, UFCFP6-30-3 and 6 other modules

7 AFFORDABLE AND CLEAN ENERGY

Carbon footprint arising from IT use of electricity (about 3% of global GHG emissions). Imperative to decarbonise IT. Smart Grids.
Modules: Induction Sustainable Technology team project, UFCF6X-30-2, UFCFP6-30-3 and 6 other modules

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8 DECENT WORK AND ECONOMIC GROWTH

Impact of technology on work. Role of entrepreneurship in creating work and growth.
Modules: UMSD87-15-3, UFCFA5-15-3, UFCFE6-15-3 and 15 other modules

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Guru lectures on areas of IT driven innovation. Role of IT in disrupting old business models and creating new value. Importance of IT infrastructure in enabling innovation.
Modules: UFCFP3-30-1, UMSD7T-15-3, UFCF6X-30-2 and 13 other modules

10 REDUCED INEQUALITIES

Key Issues raised by ICTs that give rise to ethical concerns. Impact of disruptive technologies on wealth distribution. Precarious work. Use of IT to widen equality of opportunity.
Modules: UFCFP6-30-3, UMSD7T-15-3, UFCFB5-15-3 and 7 other modules

11 SUSTAINABLE CITIES AND COMMUNITIES

Smart City systems. IT in management of city traffic. Role of IT in supporting citizen engagement in urban planning.
Modules: Induction Sustainable Technology team project, UFCF6X-30-2, UMODDP-15-1 and 8 other modules

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Role of IT in supply chain. Guru lectures on areas of IT driven innovation. Food waste reduction. IT in business sustainability reporting.
Modules: Induction Sustainable Technology team project, UFCF6X-30-2, UFCFP3-30-1, UFCFP6-30-3 and 9 other modules

13 CLIMATE ACTION

Key role of IT in carbon reduction (required for 20% of GHG reductions by 2030). Reducing the carbon footprint arising from IT use of electricity (about 3% of global GHG emissions).
Modules: Induction Sustainable Technology team project, UFCF6X-30-2, UFCFP6-30-3 and 7 other modules

14 LIFE BELOW WATER

Responsible management of eWaste to reduce water pollution. Use of remote sensing for fisheries management / protection.
Modules: Induction Sustainable Technology team project, UFCF6X-30-2, UFCFP6-30-3 and 6 other modules

15 LIFE ON LAND

IT in sharing benefits of genetic resources. Remote sensing for conservation.
Modules: Induction Sustainable Technology team project, UFCF6X-30-2, UFCFP6-30-3 and 6 other modules

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

Social consequences of technological innovation. Issues of surveillance and cybercrime. Socio-technical hybrid nature of information practice.
Modules: UFCFA5-15-3, UFCFB5-15-3, UMODDP-15-1 and 12 other modules

17 PARTNERSHIPS FOR THE GOALS

Ability to adapt to different academic and cultural settings. Technology sharing and cooperation. Role of the Technology Bank.
Modules: UFCFWJ-15-3, UFCF6X-30-2, UFCFP6-30-3 and 9 other modules

UNITED NATIONS INFORMATION SERVICE

Produziert und übersetzt vom UNO-Informationsdienst (UNIS) Wien.

Sources: (Vereinte Nationen, 2023)

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SUSTAINABLE DEVELOPMENT GOALS

Sources: (United Nations, 2017)

Company and City adoption

NOVARTIS

Kanton Basel-Stadt

USE OF PROCEEDS	CONTRIBUTION OR OBSTRUCTION	SUSTAINABLE DEVELOPMENT GOALS
Green Buildings (New buildings) *Energy-efficient and ecological criteria:* *– SNBS - Standard Gold*	Significant Contribution	11 SUSTAINABLE CITIES AND COMMUNITIES
Green Buildings (New buildings) *Energy-efficient and ecological criteria:* *- Minergie®-P/-A-/-ECO- Standard (administrative property)* *– 2000 Watt-Areal® - Standard*	Limited Contribution	11 SUSTAINABLE CITIES AND COMMUNITIES
Green Buildings (New buildings) *Energy-efficient and ecological criteria:* *– Compatible with the SIA energy efficiency path.*	Limited Contribution	7 AFFORDABLE AND CLEAN ENERGY, 13 CLIMATE ACTION

MAJOR INFLUENCE

8 DECENT WORK AND ECONOMIC GROWTH
- ORGANIC
- FAIR TRADE
- RAW MATERIALS

12 RESPONSIBLE CONSUMPTION AND PRODUCTION
- TRANSPARENCY
- FAIR TRADE
- RAW MATERIALS
- RESOURCES
- DEFORESTATION
- BIODIVERSITY
- ORGANIC
- PACKAGING
- WATER USE
- SUPPLY CHAIN EMISSIONS
- SOIL HEALTH
- FISHING
- ANIMAL WELFARE

coop

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Sources: (Novartis AG, 2023), (Coop, 2023), (ISS Corporate Solutions, 2022)

17 Goals, 169 Targets, 231 Indicators

SDG1.1 Bis 2030 die extreme Armut – gegenwärtig definiert als der Anteil der Menschen, die mit weniger als 1,25 US-Dollar pro Tag auskommen müssen – für alle Menschen überall auf der Welt beseitigen

Sources: (Vereinte Nationen, 2015), (Global Goals Campaign, 2017)

Integrated. Not all reinforcing.

Synergies

Trade-offs

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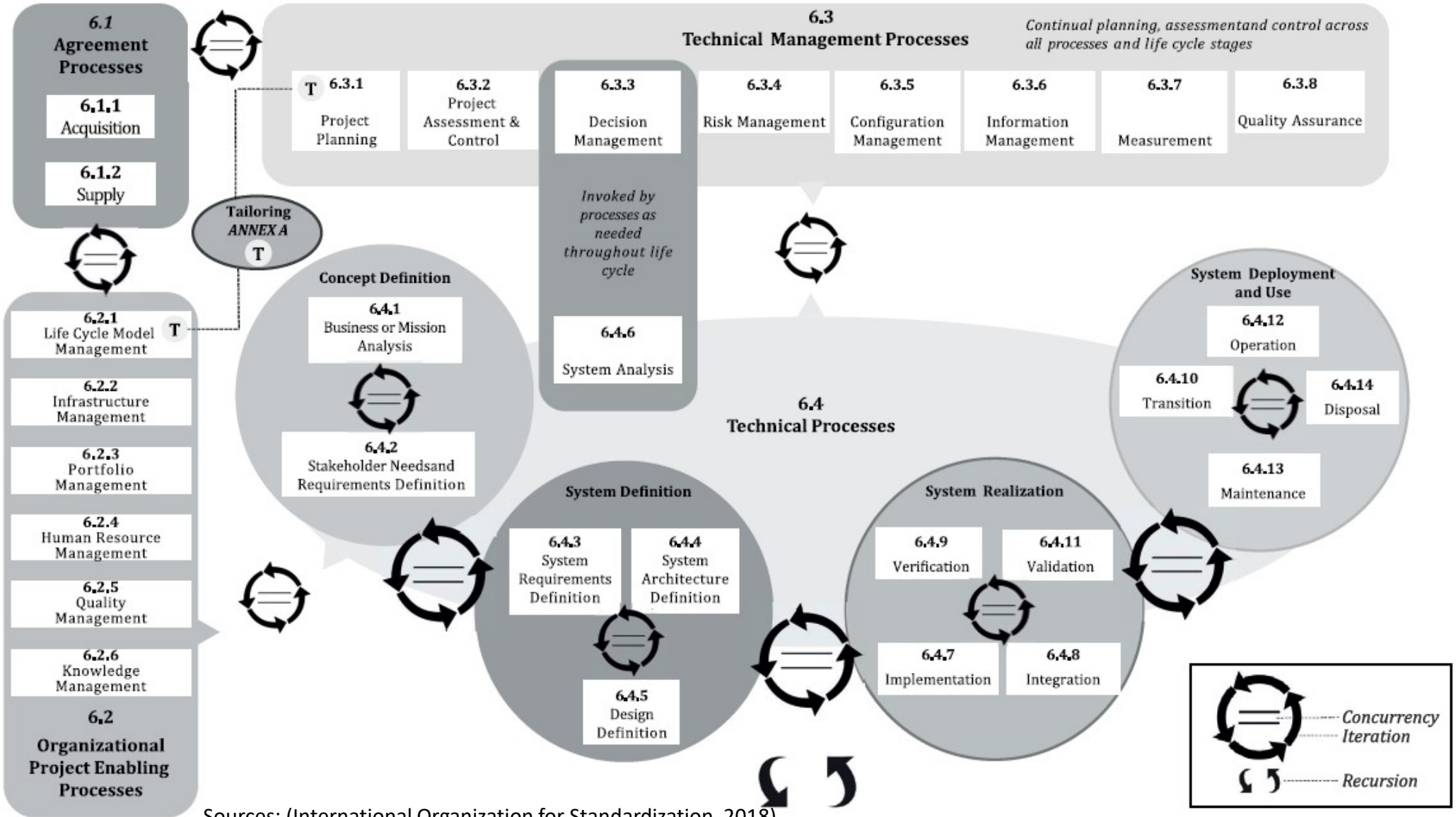
Sources: (European Commission, 2023)

Systems Engineering (ISO29148)



Sources: (International Organization for Standardization, 2018)

SDGs as Requirements?

SDG11.5 Bis 2030 die Zahl der durch Katastrophen, einschließlich Wasserkatastrophen, bedingten Todesfälle und der davon betroffenen Menschen deutlich reduzieren und die dadurch verursachten unmittelbaren wirtschaftlichen Verluste im Verhältnis zum globalen Bruttoinlandsprodukt wesentlich verringern, mit Schwerpunkt auf dem Schutz der Armen und von Menschen in prekären Situationen

Not ISO 29148 (Requirements Engineering) compliant.

"Out of 169 targets, 49 (29 %) are considered well developed, 91 targets (54 %) could be strengthened by being more specific, and 29 (17 %) require significant work."

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Sources: (Vereinte Nationen, 2015), (Global Goals Campaign, 2017), (ICSU and ISSC, 2015)

Requirements – Quality or Process?

Sustainability requirements often considered Quality (Non-Functional).

SDG-derived requirements may also be Process (Functional).

SDGs may help identify unrecognised stakeholders.

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Sources: (Global Goals Campaign, 2017)

Cancer Care Informatics impacts on the SDGs?

Negative Impacts

Positive Impacts

Sources: (Brooks et al., 2018)

Case: Additive Layer Manufacturing

Additive Layer Manufacturing BAU Requirements Elicitation

+ from SDGs at target level

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Materiality

Concept in Financial, Sustainability and ESG reporting.

Financial Materiality

Company

Impact Materiality

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Sources: (Garst, Maas and Suijs, 2022) (Delgado-Ceballos et al., 2023)

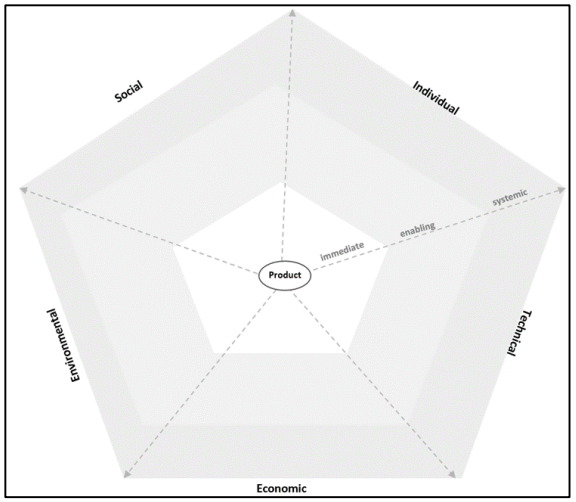
Alternatives?

Global Reporting Initiative
https://www.globalreporting.org/

International Sustainability Standards Board / Sustainability Accounting Standards Board
https://sasb.org/
https://www.ifrs.org/groups/international-sustainability-standards-board/

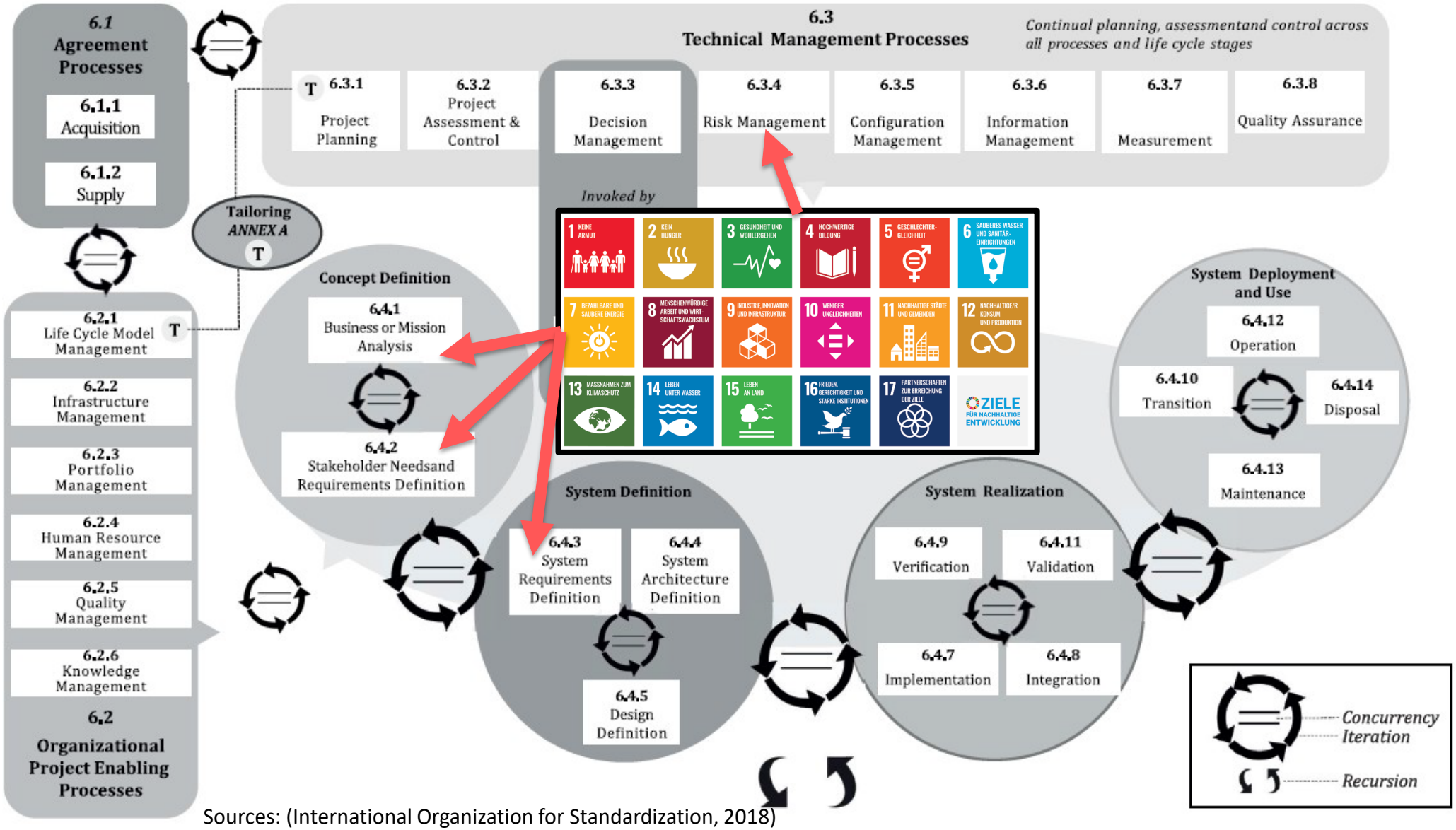
Sustainability Awareness Framework (SusAF)
Karlskrona Manifesto Alliance

SASB STANDARDS
Now part of IFRS Foundation



Sources: (Global Reporting Initiative, 2022) (Sustainability Accounting Standards Board, 2016) (Betz et al., 2022)

Systems Engineering + SDGs



Sources: (International Organization for Standardization, 2018)

SDGs as Requirements

DON'T…

- Work only at Goal level
- Only claim positive impacts (Greenwash)
- Cost-engineer out / Eliminate in tradespace

DO…

- Read the SDGs at Target level
- Think outside the narrow system scope
- Look for new requirements and stakeholders

Questions?

Ian Brooks

- Email: Ian.brooks@uwe.ac.uk
- Twitter: @sdg_brooks

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