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Circular economy — Review of existing value networks

ISO/TC 323

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 323, *Circular economy*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

0.1 The global economy can be characterized as “linear” as it is mainly based on extraction, production, use and disposal. This linear economy leads to resource depletion, biodiversity losses, waste and pollution causing serious damage to the capacity of the planet to continue to provide for the needs of future generations. Moreover, several planetary boundaries have already been reached or exceeded.

To meet current and future human needs (welfare, housing, nutrition, healthcare, mobility, etc.), there is an increased understanding that a transition towards an economy that is more circular, based on a circular flow of resources, can create and share more value with society and stakeholders, while natural resources are managed and regenerated in a sustainable way, securing the quality and resilience of ecosystems.

Organizations recognize many potential reasons to engage in a circular economy (e.g. delivering more competitive and sustainable solutions; improved relationships with stakeholders; more effective and efficient ways to fulfil voluntary commitments or legal requirements; engaging in climate change mitigation or adaptation; managing resource scarcity risks; increasing resilience in environmental, social and economic systems) while contributing to satisfying human needs.

The ISO 59000 family of standards (see [Figure 1](#)) is designed to harmonize the understanding of the circular economy and to support its implementation and measurement.

These standards also support organizations, such as government, industry and non-profit, in contributing to the achievement of the United Nations (UN) Agenda 2030 for Sustainable Development.

ISO 59004 Circular economy — Terminology, principles and guidance for implementation

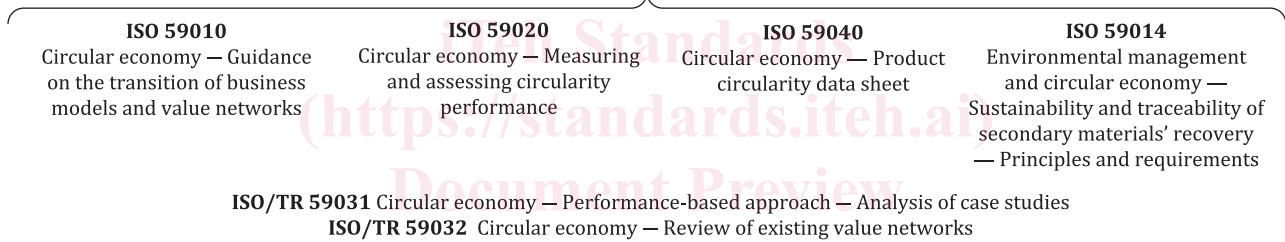


Figure 1 — ISO 59000 family of standards

0.2 ISO 59004¹⁾, ISO 59010²⁾ and ISO 59020³⁾ are interconnected, as shown in [Figure 2](#), and support organizations in implementing a transition towards a circular economy.

1) Under preparation.
2) Under preparation.
3) Under preparation.

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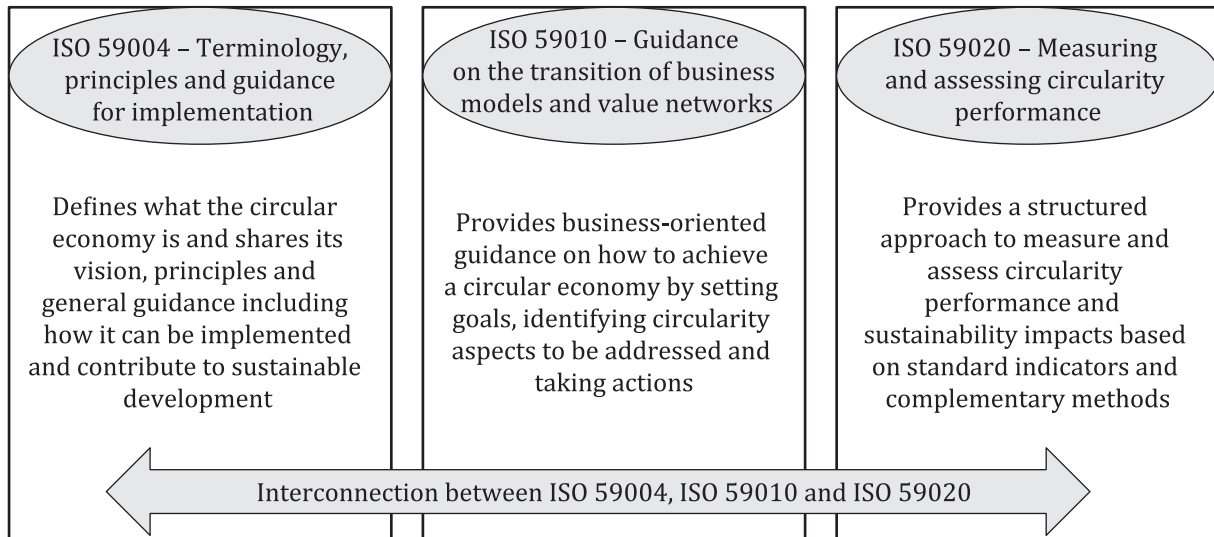


Figure 2 — Relationship between ISO 59004, ISO 59010 and ISO 59020

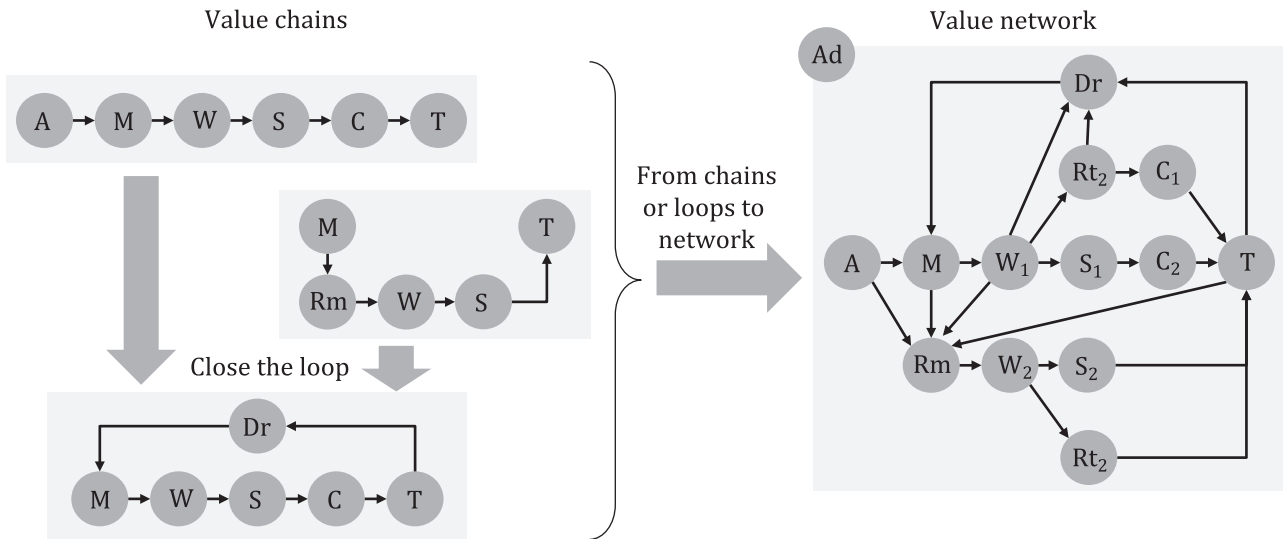
0.3 ISO 59010 provides guidance on supporting an organization’s business model and processes from linear to circular by transforming an organization’s business ecosystem into a value network. The contents of this document support the users of ISO 59010 in providing further detail on the development of value networks in a circular economy. In the development of ISO 59010, a survey was conducted to review and analyse the examples of globally existing value networks. This document provides an analysis of the survey results. It reviews examples of value networks to illustrate their characteristics and structures and how they can accelerate a circular economy transition process, and therefore supports ISO 59010.

This document investigates suitable examples of value networks to promote circular economy transition. The characteristics and structure of the value networks reflect multiple organization cooperation. The multiple organizations work together to advance their businesses and accelerate their circular economy transition process. A specific organization does not necessarily control the others. This document addresses the methods used to establish and organize a value network to meet the desired requirements.

This document collects and analyses existing relevant cases, examples of the creation of value networks, to demonstrate what is a value network in the context of the circular economy. A general image of the value network discussed in this document is shown in [Figure 3](#).

The objectives of this document are:

- to provide useful information by analysing existing value networks;
- to enhance understanding of the success factors and enablers for creating value networks derived from examples.



Key

- A raw materials acquisition
- M manufacturing
- W wholesaling
- S service
- C consumer
- T collection and take-back
- Rm remanufacturing and reusing
- Rt retailing
- Dr disassembling and recycling
- Ad research, association and administration

Figure 3 — General process from value chains to a value network

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Circular economy — Review of existing value networks

1 Scope

This document reviews the characteristics and structures of some existing value networks as examples in accelerating a circular economy transition process.

ISO 59010 gives guidance on a critical aspect in transitioning an organization's business model and processes from linear to circular and transforming an organization's business ecosystem into a value network. This document complements ISO 59010 by providing further information on value networks.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

circular economy

economic system that uses a systemic approach to maintain a circular flow of resources by regenerating, retaining or adding to their value, while contributing to sustainable development

Note 1 to entry: Resources can be considered concerning both stocks and flows.

[SOURCE: ISO 59004:—, 3.1.1, modified — “regenerating” replaced “recovering” in the definition. Note 2 to entry deleted.]

3.2

common infrastructure

systems shared among participants in a *value network* (3.6) for mutual benefit

Note 1 to entry: The system indicates an optimization system, traceability system, information exchange system, branding, equal relationship and internal standardization as a certification system.

3.3

governance

principles, policies and framework by which an *organization* (3.4) is directed and controlled

[SOURCE: ISO 21505:2017, 3.1]

3.4 organization

person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives

Note 1 to entry: The concept of organization includes, but is not limited to, sole-trader, company, corporation, firm, enterprise, authority, partnership, charity or institution, or part or combination thereof, whether incorporated or not, public or private (e.g. foundation, union, association, agency, municipality, region, country, intergovernmental agencies).

Note 2 to entry: A group of organizations can also be considered as an organization that has, alone or collectively, their own objectives.

[SOURCE: ISO 59004:—, 3.4.1]

3.5 value chain

set of *organizations* (3.4) that together in an organized way provide a solution that results in a value for them

3.6 value network

network of interlinked *value chains* (3.5) and interested parties

4 Review of existing value networks

4.1 Method

4.1.1 Survey process

The survey was conducted in accordance with the steps shown in [Figure 4](#). The process of collecting the cases was based on different experts voluntarily accepting an invitation to submit examples. The examples were selected based on the criteria shown in [Figure 4](#).

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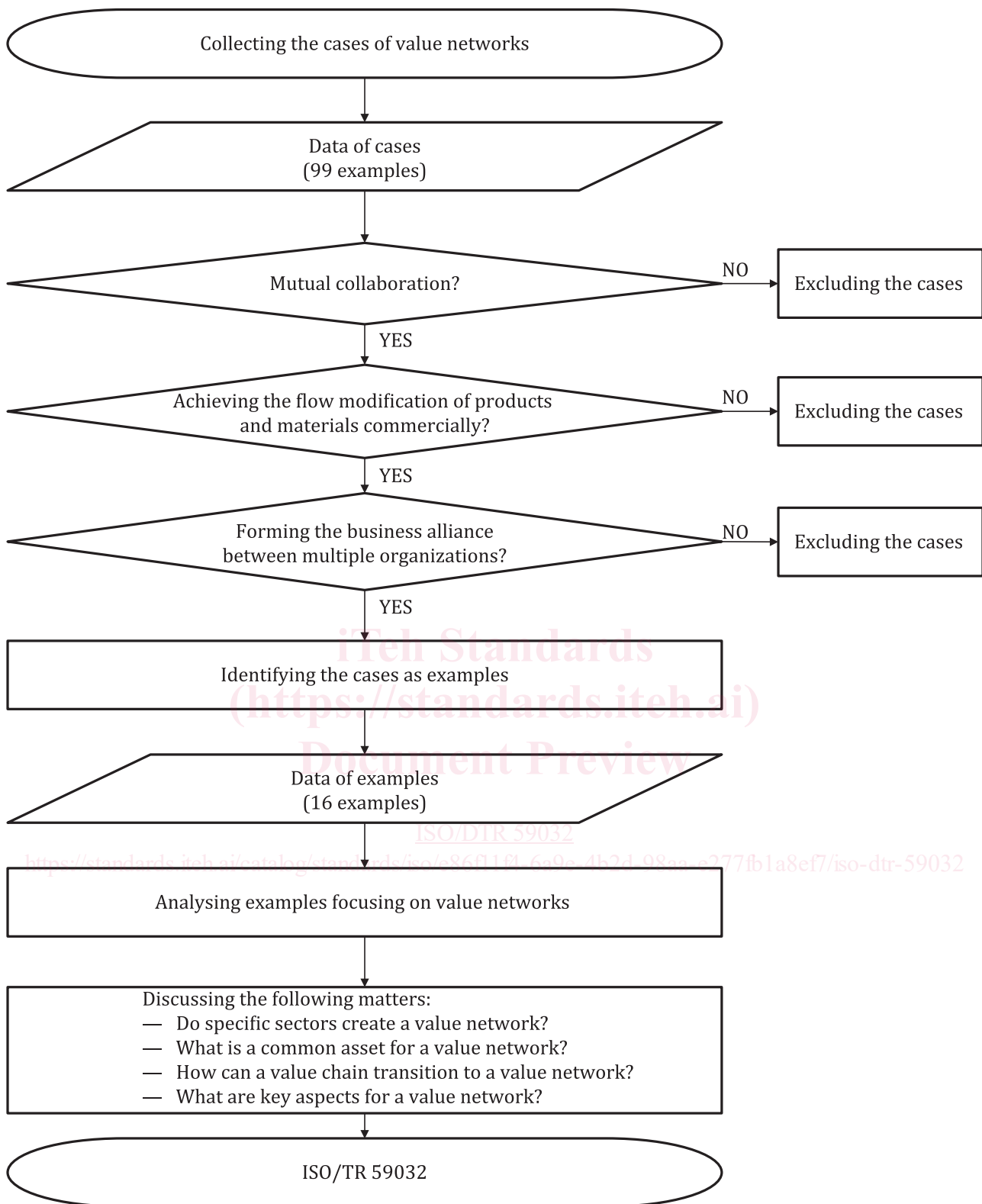


Figure 4 — Survey process

4.1.2 Preparing questionnaires

The survey was conducted by experts on existing value networks in each region, country or organization to collect the following information:

- a) type of case;

- b) title and basic information;
- c) overview of the implementation model;
- d) beneficial or detrimental impacts (listing and highlighting critical aspects);
- e) relevance to the Sustainable Development Goals (SDGs), including detrimental impacts;
- f) key aspects relevant to the circular economy ;
- g) implementation methodology;
- h) enablers, barriers and concerns;
- i) relevant information specific to businesses or individual projects.

4.1.3 Collecting the cases of value networks

The aim was to cover a wide scope of various types of existing value networks. Geographical and sectoral balance was considered when collecting the existing cases of value networks. There were 99 cases collected that fulfilled the questionnaire requirements for further analysis.

The collected cases are geographically diverse across countries or regions (Japan, Europe, the United States, Brazil, China, India, Canada, Mauritius and Singapore). The collected cases cover various sectors, including machinery and equipment, forest and bio-based industries, waste management, textiles, chemicals, food, drink, mining, metals, minerals, cement, construction, transport, furniture, glass and steel.

4.1.4 Selecting the examples

Sixteen examples were selected from the collected value network cases using the following criteria:

- a) Does the case have a mutually beneficial collaboration?
- b) Does the case achieve the flow modification of products and materials commercially?
- c) Does the case form a business alliance between multiple organizations?

The selected examples achieve a scale flow modification of products and materials commercially, and form a business alliance between multiple organizations. The status of the examples covers not only the aspects of the value network but also circular economy implementation and use case (see [Figure 5](#)).

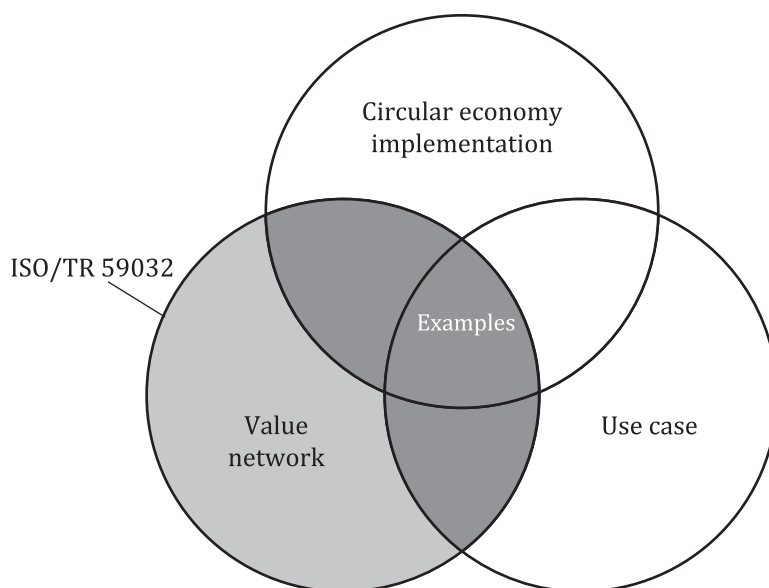


Figure 5 — Status of the examples

4.1.5 Selected examples

The examples shown in [Figure 6](#) and listed in [Table 1](#) were selected as examples of value networks from the 99 worldwide examples collected.

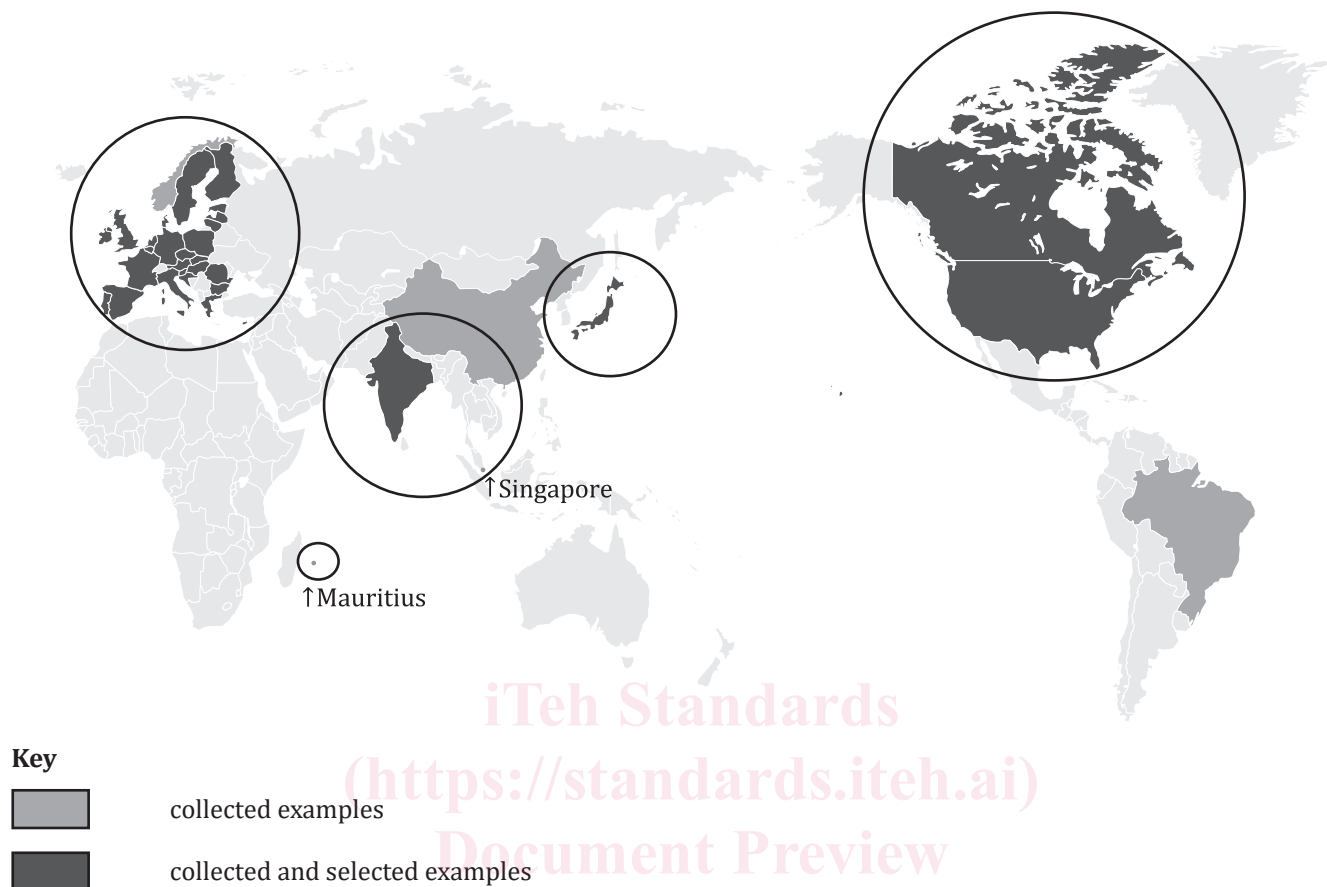


Figure 6 — Geographical distribution of collected and selected examples

Table 1 — Geographical location of collected and selected examples

No.	Title	Geographical location
1	Horizontal closed loop aluminium recycling system of Shinkansen	Japan
2	Improving the income levels of Indian farmers through better access to information	India
3	Case in the USA	USA
4	Effective industrial symbiosis	Denmark
5	CIRCULÉIRE – The National Platform for Circular Manufacturing	Ireland
6	Omnicanne’s “zero waste” industrial ecosystem	Mauritius
7	Eco-town business	Japan
8	Resources complex consortium	Japan
9	Case in Spain	Spain
10	Global case	Global
11	Aluminium recycling in the window and curtain walling industry	Germany
12	Close the Glass Loop – The European Union (EU) ambition to collect increased amounts of glass more effectively	EU
13	Lopyanko – AGRY_GAYA’18 Project for sustainable organic silk	Bulgaria

Table 1 (continued)

No.	Title	Geographical location
14	An open-access circular supply chain for fashion	UK
15	Cargo Carousel System	Canada
16	Case in Singapore	Singapore

4.2 Examples

4.2.1 Example 1: Horizontal closed loop aluminium recycling system of Shinkansen (Japan)

This example includes facilitators and participants from various sectors, including information and communication technology (ICT), transport, construction, machinery and equipment, mining, metals and minerals, power and utilities. The construction of a value network is expected to promote the construction of an advanced recycling system consisting of different industries. Key methodologies, including recycling process certification, recycled resources standards and sharing information, can help to create and maintain the value network. Some aspects, including reducing costs and improving the value of resources and resource efficiency, seem to be the key motivations for participation in this value network (see [Table 2](#)).

Table 2 — Horizontal closed loop aluminium recycling system of Shinkansen (Japan)

Parameter	Description
Facilitators (designers)	Sectors: <ul style="list-style-type: none"> — Transportation — Waste management Organizations: <ul style="list-style-type: none"> — Central Japan Railway Company — Harita Metal Co., Ltd.
Year of implementation	2020
Participating companies	Sectors: <ul style="list-style-type: none"> — Metal manufacturing — Other transport manufacturing — Machinery — Other (mining, power and utilities) Organizations: <ul style="list-style-type: none"> — Sankyo Tateyama, Inc. — Nippon Sharyo, Ltd. — Hitachi — Japan Aluminium Association
Geographic location	Asia (Japan)
Relevant matters	Machinery, metals, waste management (recycling), railway
Relevant products/services	Recycled products (aluminium, etc.)
Key aspects (activities)	<ul style="list-style-type: none"> — Manufacturing Shinkansen materials and parts — Recycling aluminium scrap — Manufacturing and sale of recycled resources — Construction business of recycling systems