



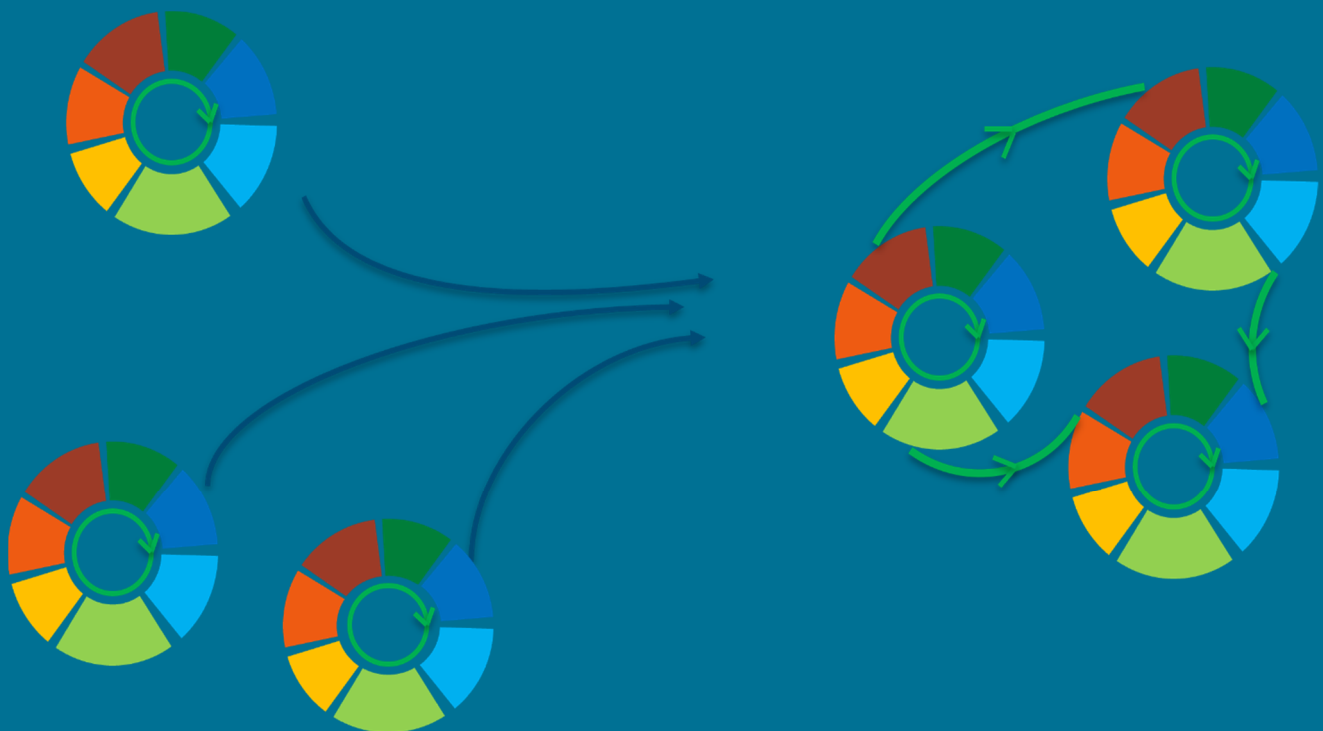
Federal Ministry  
of Education  
and Research



# Circular Value Creation

An International Innovation Initiative

Ideas for Discussion



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Ideas for Discussion

## Content

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A contribution to



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# #vision #circularvaluecreation

The vision of circular value creation goes far beyond the idea of recycling. It is an idea that is characterized by international collaboration. Circular value creation enables international competitiveness and technological sovereignty. It creates the flexibility for dynamic adjustments and thus opens up the opportunity for sustainable economic development, prosperity and jobs. It offers great potential for new, innovative solutions and effective climate and resource protection. This is precisely why research and development for circular value creation is indispensable.

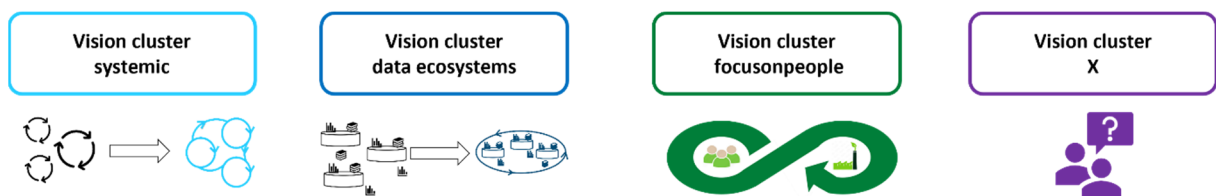
*In 20 years' time, we will no longer be talking about individual cycles. The increasing interlinking of material and component flows as well as production and service processes will blur the boundaries between the cycles. Numerous sub-processes interlock and form the system that will be the "future of value creation": Data-oriented, sustainable and resilient.*

*Our image of the circular economy will change. We will look at sub-processes and analyze the interfaces through which they are connected to other sub-processes. Digital tools will be used to control material and component flows so that the right material is in the right place at the right time. Contributions to climate and environmental protection will become systemic indicators.*

## #centralidea

Circular value creation pursues a systemic approach that takes into account different areas of innovation, for example:

- New services for collecting, sorting, trading and distributing
- Data ecosystems
- New methods of process control based on Industry 4.0
- (Technological) advances in the field of artificial intelligence and their impact on the world of work
- ...



## #designthinking #transparency #visibility: the road to implementation

During the year of the Canadian-German EUREKA Chairmanship, a series of Design Thinking Workshops will be held. Each workshop will take up a different aspect of the vision, discuss it in a group of experts and develop it further. The result will be an idea of how circular value creation can become a reality. Workshop by workshop, we will create a roadmap in an agile process.

The roadmap will contain political recommendations that we need to address in an appropriate manner, as well as research needs that can/should lead to a joint international funding measure at the end of the chairmanship year.

## #objective #march2024: a living, continuous process

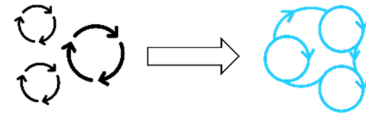
#dataecosystems #systemic and #focusonpeople are important aspects. However, they are neither the only aspects nor are the respective contents finalized.

Our aim is to discuss the vision and the planned design thinking process. We want to find out which technical priorities and (funding) measures are in focus from a Canadian perspective and could be important contributions to the process. Ideally, we will start the chairmanship year with a joint Canadian-German vision of circular value creation.

Individual workshops will take place at the EUREKA network meetings. We will hold further workshops in Germany and possibly in Europe. A workshop in Canada would be a great opportunity to integrate the expertise of local experts. We would be happy to discuss the process and possible topics.

We would also like to talk about the process towards a joint funding format at the end of the chairmanship year.

# #dt01 #systemic



## measuring and evaluating the circularity of systems

A circular economy increases our resilience and supply security and helps us shoulder our environmental responsibility. However, circular systems are a relatively new form of value creation, which have not yet been established as the standard, meaning that the above-mentioned potential can as yet only be exploited to a limited extent.

- Recycling rates show that resources are recycled, in part, after use. In general, this takes the form of materials recovery - i.e. breakdown into the materials contained in a given resource.
- More complex circular value creation systems can be found in sector- or product-specific approaches. These are usually isolated regional cases rather than systems implemented across the board.

These activities are already making an important contribution to sustainable economic activity. The vision cluster #systemic, however, goes beyond these approaches and addresses no less than the feasibility of a circular value creation system that straddles different sectors and products and extends beyond national borders.

Systemic thinking and transparency are becoming more important when it comes to measuring, evaluating and comparing the circularity of systems. This foundation enables us to assess the potential of how this approach can be translated into different circumstances, other sectors, companies of different sizes, as well as other regions and countries.

In order to achieve this, the management of circular systems, flexible product design, reconfigurable production systems, updatability as well as the structuring of organizations all have to be addressed simultaneously. Materials recovery, the recycling of components and re-assembly update factories are interrelated with regard to reusing and recycling materials.

## Focus

In a design thinking workshop, multinational experts from science and industry will look at the international system of value creation and the transition to a value creation system that is mainly circular.

## Topics

### Key question:

How can a complex value creation system be designed to follow the guiding principle of circularity?

### Measuring and evaluating the circularity of systems

A diverse range of options for reusing and recycling products, components and materials is changing the circular economy as we currently know it.

- How can these new, diversified circular systems be recorded and presented?
- How can we assess whether a value creation system is suitable for being made circular, and if so to what extent?
- Do we need to focus more on the level of the company or of the product?
- What do the evaluation methods look like for circular strategies such as rethink/redesign, repair, re-use and re-manufacture? What data is needed?

- e. How can we ensure that the issue of problematic waste is addressed? Why should we recycle waste that does not contain any valuable components and that costs money to treat?
- f. Can a block chain (with minimal data) be useful for trailing valuable components (as a combination of a digital product passport and block chain)?

Control question: What can cause the system to break down? Products, materials, framework conditions?

### Business models and value propositions

- a. How can we increase the likelihood of products being re-used and recycled?
- b. What incentives could there be to encourage products designed with the entire life cycle in mind?
- c. How do logistics systems have to change? How does the idea of cost-efficiency change?
- d. Social acceptance – result or precondition of the circular economy?

Control question: What can cause business models to fail?

### Portability, need to adjust, and transfer

How to use circular approaches in different circumstances, sectors, companies of different sizes, different regions or countries is a challenge that has, for the most part, not yet been overcome.

- a. Are there design principles (with the exception of standardization) for circular machines, technologies, equipment and facilities that minimize the need for adjustment and make it easier to apply these systems in different scenarios?
- b. How can the potential for transfer be recognized and used?

## Setup of the design thinking workshop

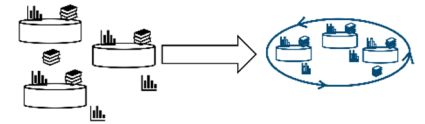
### Working titles of the event (proposals):

- Measuring and evaluating the circularity of systems
- Knowledge of the system paves the way for circular value creation

### Event details

- Event: Title, date & venue t.b.c.
- Planned schedule:
  - Introductory talk on the circular value creation vision
  - Two design thinking workshops running in parallel: (A) Measuring and evaluating the circularity of systems,
  - (B) Business models and value propositions
  - Presentation of results
  - Final discussion: (C) Portability, need to adapt, and transfer
- Participants to include: Multinational group of experts from science, research and industry
- Language: English

# #dt02 #dataecosystems



## basis for networking along new and circular value creation structures

In early 2024, the notion of a circular economy is still dominated by materials recovery policies which aim to close material cycles. Recycling rates are often considered to be product-specific indicators of sustainable product design. This is a good starting point at the beginning of 2024.

If circular value creation becomes a guiding principle in the design of an international value creation area, this will change the way our economy looks like. A growing number of interfaces will emerge between an increasing number of different cycles. People will pursue the objective of exploiting this potential. New technologies will open up new opportunities. Established regional policies will develop and reach beyond regional and national borders. Company- or sector-specific approaches will also reach beyond current borders.

Data is a key element in this transformation.

More specifically, it will be about collecting the right data and making it available at the right time. At the same time, steps must be taken to ensure that the quality of this data is suitable for the management of international value creation structures. The data ecosystem to be designed is a prerequisite for realizing circular value creation which exploits the full potential of digitalization.

It is both a major challenge and a major opportunity that, designing this data ecosystem, we do not need to start from scratch, but can draw on an enormous variety of existing, specifically designed platform solutions.

### Focus:

At a Design Thinking Workshop, multinational experts from science, industry and the ranks of employers and unions will discuss the perspectives of “Networking and cooperation” and the “Dynamics of value creation systems“. They will focus on the requirements to be met by a common data ecosystem and the challenge of continuous, agile adaptation to a highly dynamic value creation system.

### Topics

#### Key question:

How can the data ecosystem of circular value creation be designed?

#### Networking: Cooperation beyond the borders of companies, sectors and regions

- Which data do we need? For new services? For successful cooperation?
- How and for whom do we make data available? What is the value of this data?
- Is data protection an issue? Or are open data models an option?
- What do we have to know about data? To what extent can/must we trust data? Do we need data certification?
- Blockchain vs. product passport. Should the focus be on the current state of the material/component/product or on its previous life cycle? Modular digital twins?

#### Dynamics: The data ecosystem in a state of constant change

- What must the data ecosystem provide to companies?
- How can/must the data ecosystem change? Standardization vs. agile design.
- Centralized or decentralized structure?
- How can existing platforms be linked? Are there best case approaches?

## Organization of the Design Thinking Workshop

Working title of the event (proposals):

- Data ecosystems
- The question of data, usage and everything

Details of the event

- **Event:** Title, date & venue to be determined
- **Planned schedule:**
  - Introductory talk on the vision of "Circular value creation"
  - Two parallel Design Thinking sessions: (A) Networking, (B) Dynamics
  - Presentation of results from both sessions
  - Merging of results
- **Participants:** Multinational panel of experts from science, research and industry
- **Language:** English



# #dt03 #focusonpeople



## people at the centre of the circular economy

The transition from a linear economy to circular value-adding structures requires a holistic approach that takes into account technology, organization and work simultaneously.

Developing and establishing circular value creation goes hand in hand with fundamental changes in the world of work. Compared to linear economic activity, the processes in circular business models, for example those based on re-using components and closing materials cycles, often require more work and qualifications. They are also more likely to call for intensive cooperation between different disciplines, professions and businesses/business levels.

New circular skills will become increasingly important along entire value chains, and new jobs and job profiles will emerge.

- New services will need to be developed in the areas of “collecting”, “sorting”, “trading” and “distributing”.
- Product development has to focus more strongly on the entire life cycle.
- The use of secondary raw materials in production changes what is required of processes.
- The recovery and processing of components and materials often rely on semi-automatic or manual processes.

Systemic thinking, communication skills, the willingness to change and being open to innovation are becoming increasingly important along the entire value chain. The aim is to create a pro-circular mindset – i.e. thinking about circular processes in a comprehensive manner – and to firmly embed it in industry, politics and society. Transitioning towards circular value creation is therefore not “just” a business task, but a challenge for the whole of society.

All stakeholders in science, industry and society must have the necessary skills for centring future value creation around people and for meeting the economic, ecological and social targets of the circular economy. Lifelong learning and in-service learning provide this transition with a broad social foundation.

## Focus

In a design thinking workshop, multinational experts from science, industry and social partners will consider things from the perspective of people in value creation. With regard to employees and companies, the experts look at (new?) jobs and fields of activity as well as evolving skill requirements.

## Topics

### Key question:

What will change for people in value creation?

### Employees: new skills for circular value creation

- a. How do jobs and job profiles need to change?
- b. What skills will become more/less important?  
(subject-related, methods-related, social, business management, legal, scientific...)
- c. What needs to be covered in initial and continuing training?
- d. What skills already exist and can be further developed in the work process?

### Companies: skills and ethos

- a. What motives and values are the foundation for a successful business in a circular economy?
- b. Can business models that focus on economic targets as well as social, commercial and ecological ones be successful? What are the framework conditions needed for this?
- c. How can a pro-circular mindset be established that encourages and empowers employees to broaden their skills in this way?
- d. How do the skills setup and roles have to change?

## Possible starting point: key competencies for sustainability

*Extract from “Education for Sustainable Development Goals: learning objectives” (UNESCO) 1*

**Systems thinking competency:** the abilities to recognize and understand relationships; to analyse complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty.

**Anticipatory competency:** the abilities to understand and evaluate multiple futures – possible, probable and desirable; to create one’s own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.

**Normative competency:** the abilities to understand and reflect on the norms and values that underlie one’s actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.

**Strategic competency:** the abilities to collectively develop and implement innovative actions that further sustainability at the local level and further afield.

**Collaboration competency:** the abilities to learn from others; to understand and respect the needs, perspectives and actions of others (empathy); to understand, relate to and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.

**Critical thinking competency:** the ability to question norms, practices and opinions; to reflect on own one’s values, perceptions and actions; and to take a position in the sustainability discourse.

**Self-awareness competency:** the ability to reflect on one’s own role in the local community and (global) society; to continually evaluate and further motivate one’s actions; and to deal with one’s feelings and desires.

**Integrated problem-solving competency:** the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution options that promote sustainable development, integrating the above-mentioned competences.

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<sup>1</sup> <https://unesdoc.unesco.org/ark:/48223/pf0000247444>, page 10

## Setup of the design thinking workshop

### Working titles of the event (proposals)

- People and organizations in the circular economy
- Competent individuals and organizations shaping the path towards circular value creation

### Event details

- **Event:** 1st network meeting, 5-8 November 2024, Berlin; thematic workshop on last day of the meeting
- **Main room:** panel discussion on the “circular value creation” vision, possible press presence
- **Two additional rooms/areas:** design thinking workshops focusing on (A) employees and (B) companies.
- **Participants to include:** representatives from the EUREKA network, multinational expert group from the worlds of science, research, and industry as well as social partners.
- **Language:** English