HORIZON EUROPE - The Framework Programme for Research and Innovation

CIRCULAR

Project: CircularPSP
Title: Public Service Platforms for Circular, Innovative and Resilient Municipalities through PCP
Grant Agreement Number: 101092208
Call Identifier: HE-CL4-2022-RESILIENCE-02-PCP

CHALLENGE BRIEF

TD2

Version: 1.0
Last update: 19.12.2023

BUYERS GROUP

SUPPORTED BY

Abstract:

The EU pre-commercial procurement project CircularPSP is calling for Suppliers to design, develop and test an innovative 'circular economy solution' (CE-solution) that enables municipalities and their staff as well as businesses in the local economy to apply circular practice more quickly, frequently, widely and effectively. Individual users at City and Business are empowered through access to information, knowledge, circular wisdom, guidance and training to act more circular more often and increasingly impactful whilst transitioning to a CE mindset.

Keywords:

pcp, circularpsp, call for tenders, procurement preparation, tender profile, evaluation

Circular PSP project has received funding from the European Union's Horizon Europe Research and Innovation Programme under the Grant Agreement No. 101092208. The sole responsibility for the publication lies with the editor and does not necessarily reflect the opinion of the European Commission or Agency. The European Commission is not responsible for any use that may be made of the information contained herein.

Foreword – reading recommendation

We advise Suppliers to read the entire main part before acting. This document aims to avoid repetition. Hence, the full picture will only emerge after comprehending sections 1 and 2.

Mandatory requirements and minimum functionality/performance requirements are identified with '**must'** or — in case of principle-based requirements lists —as **bold fonts within bullet lists**. Shall/should identifies items of importance to the Buyers Group. Can/may/optional implies considerations or additional features.

Suppliers actively writing the proposal are further advised to use the Technical Application Template (TD6) from the very beginning.

The documents are connected as follows:

- TD2 describes the CE-solution and vision.
- TD6 is instructive regarding the expected content and constitutes the delivery format.
- TD1 section 2.1 describes the expected outcomes (i.e. progress on minimum functionality/performance requirements) across Phases including supplier deliverables, milestones as well as the specific intermediate results until complete delivery of the CE-solution.

Further remarks on the Challenge Brief for successful tenderers

Importance of the Challenge Brief for initial tender, expected outcomes and call-offs

The Challenge Brief sets out both the problem and vision without stating the specifics or design of the CE-solution. The Challenge Brief will remain the 'main guiding document' for the entirety of the project's duration, including expected outcomes (see TD1 section 2.1), evaluation of Call-off proposals for Phase II and Phase III and (as a refined and reflective version) the final procurement guide for the Follower Network.

Continuous CE-solution design and later procurement

Supplier responses to the Challenge Brief are expected to evolve with insights gathered during R&D effort. If Suppliers discover that an alternative approach would verifiably yield better results, Suppliers are not bound by a design or business model initially proposed. Suppliers are expected to improve their initial technical description based on comments from evaluation, monitoring calls, general exchange with Procurers and most of all own insights gathered during the R&D effort. The content generated for sections 1 and 2 will be continuously developed through project work, call-off proposals. Finally, it leads to a comprehensive and high-quality description of the commercial CE-solution to be offered to the Buyers Group, the Follower Network and general public for further procurement.

TABLE OF CONTENTS

Abbreviations

The following is a joined table of abbreviations for TD1 and TD2.

Abbreviation	Definition
AI	Artificial Intelligence / short-hand for any relevant data analytics
API	Application Programming Interface
CE	Circular Economy
CSR	Corporate social responsibility
CPV	Common Procurement Vocabulary
ERP	Enterprise Resource Planning
GDPR	General Data Protection Regulation
GPA	Government Procurement Agreement
IP(R)	Intellectual Property (Rights)
KPI	Key Performance Indicator
MOOC	Massive online-only course
NLP	Natural language processing
OECD	Organisation for Economic Cooperation and Development
OMC	Open Market Consultation
PCP	Pre-commercial procurement
PPI	Public Procurement Innovation
PSP	Public Service Platform
R&D	Research & Development
SME	Small and medium enterprise
SoA	State-of-the-art
UI	User interface
VET	Vocational Education and Training
WTO	World Trade Organisation

*See also the **Terminology** section for short descriptions on terms used by CircularPSP.*

Challenge Summary

Background, current situation, expected demand

Realising a green, sustainable and circular economy (CE) in Europe is essential to the European Green Deal, improving economic and societal resilience and promoting strategic autonomy. A more circular economy will help achieve climate neutrality by 2050, help meet 2030 SDG goals and ensure the long-term competitiveness of European enterprises. The pandemic and the war in Ukraine make the need for increased autonomy and resilience obvious; local economies which have started the CE transition have already proven to be more resilient and competitive.

Given its importance, it is unfortunate that the transition to a CE has been stalling. Globally, circularity declined from 9.1% in 2018 to 7.2% in 2022. The Organisation for Economic Cooperation and Development (OECD) reported that only 10% of cities defines themselves as advanced on circular transition. It seems that the CE transition is particularly complex. Key signs of complexity include a plethora of existing websites collecting information, the large number of individuals that need to be involved and hundreds of relevant CE indicators in the current OECD inventory. Meanwhile, research typically focuses on developing isolated technologies without tackling slow replication and uptake. To unlock the full potential of CE, we must navigate this complexity, encourage collaboration, and prioritise scalable and adoptable solutions.

The Buyers Group of Procurers is representative of municipalities and regions which are linked to local economies in eight Cities associated through the CircularPSP consortium. In addition, the CircularPSP project is continuously building and growing the Follower Network of municipalities and other interested organisations. Followers are convinced that the concept of CircularPSP is universally transferrable to any organisation aiming to improve and grow its own circularity practices, whilst seeking means to efficiently and effectively integrating specialised external services. Hence, a large number of organisations ambitious or required to transition towards a CE is expected to adopt a well-priced and effortless entry into the complex transition.

The Common Challenge

Suppliers are to design, develop and test an innovative 'circular economy solution' (CE-solution) that enables municipalities and their staff as well as businesses in the local economy to apply circular practice more quickly, frequently, widely and effectively. Individual users at City and Business are empowered through access to information, knowledge, circular wisdom, guidance and training to act more circular more often and increasingly impactful whilst transitioning to a CE mindset.

Suppliers are to holistically solve the Common Challenge across four interlinked **areas of need** reflected in the sections to follow:

- **Information**: Cities and Business require support in accessing, understanding and applying the growing body of highly distributed and often unorganised knowledge on CE transition which is often not available in their native language. Fundamentally, the CE is lacking a common language and classifications, hindering not only the use of data but also the exchange between stakeholders. Suppliers are to use AI (see definition below) capable of localisation and limited personalisation for their CE-solution. The AI will identify and combine relevant data using Natural Language Processing (NLP) or other technologies of equal value, summarise knowledge and provide circular wisdom with transparency on sources and confidence about results. Critically, the model(s) and outputs are validated, tested and overseen by CE experts.
- **Operation**: Cities need a roadmap for their sustainable transition whilst all staff (municipal and business) must be enabled to act more circular in their day-to-day tasks taking their sector, experience and framework conditions into account. Currently, City strategies and targets for CE are incomplete or simplified. For instance, many Cities begin their circular

journey in the procurement department without full understanding of what CE strategies could achieve at earlier stages including during concept (e.g. 'rethink', 'refuse' to 'reduce' the need for procurement), design and planning (e.g. 'repair' existing stock). Lastly, strategies and operation need to be tracked for results and impact through simple and robust CE indicators.

- **Organisation**: Many organisations including Cities and Business are eager to begin with CE transition but need to improve and expand organisational capacity to act circular. Only few Cities established specialised teams to implement CE transition; other Cities and most local Businesses do not have the resources to invest in long-term strategies. Other complications are legacy software not adequately reflecting circular action and the need to establish new relationships. Hence, Cities and Business need an advanced tool in which circular data and knowledge come together. Where novel CE strategies are made transparent for all staff and users are supported in their increasingly circular day-to-day activity. This includes improved communication and networking within and beyond municipal borders. Suppliers are to provide a platform which has simple and appealing interface and is interoperable to the largest possible degree.
- **Change & Upskilling**: A CE transition requires a new organisational culture. Individuals need a new mindset and knowledge as well as means to exchange experience to overcome the personal risks of acting differently to what has been done in the past decades. The motivation, initiation, encouragement and entrenchment of the CE-solution and the users' attempts to act circular must be supported by personalised upskilling (i.e. capacity building and training). This must be linked to problems a staff member is currently solving, rather than presenting abstract content. The expected organisational change requires the involvement, commitment and validation from City administration and/or departments.

The CircularPSP challenge is technology neutral (i.e. any technology can be used as part of the CE-solution as long as it aids to solve the Common Challenge) and not industry specific (i.e. value chains).

The Buyers Group is seeking a viable and reliable CE-solution to their Common Challenge which is to be procured and implemented in their organisations and local economy beyond the end of the project. Hence, Suppliers are to develop:

- A **Business Model** documenting how the CE-solution can be viably and reliably provided beyond the end of the project. Suppliers are to develop a commercial vision and Business Model suitable for both Suppliers and Cities.
- A **Commercialisation Plan** documenting how Suppliers plan to recruit a large number of Cities to achieve economies of scale to reduce costs and maximise the available circular knowledge and wisdom accessible through the CE-solution.

User groups, City and Business/SME users in the local economy

The CE-solution will be developed for and initially tested with municipal users including circular experts (intermediaries) and a range of staff in various departments as well as procurement officers. Near all functionality developed for the City operation is expected to be scalable and transferable and to be relevant for Businesses in the local economy. Hence, the platform will open the AI, Workflows, Upskilling and other features to Business, for example SMEs, via the second tier of the platform. Business will be able to list their circular products/services and especially SMEs will be supported to bid in local procurements through a matchmaking feature The growing network of CE-minded Businesses is critical for the ability of the City to achieve the goals set in CE Missions. The platform will facilitate exchange between City and Business and between Businesses to grow circular economic activity.

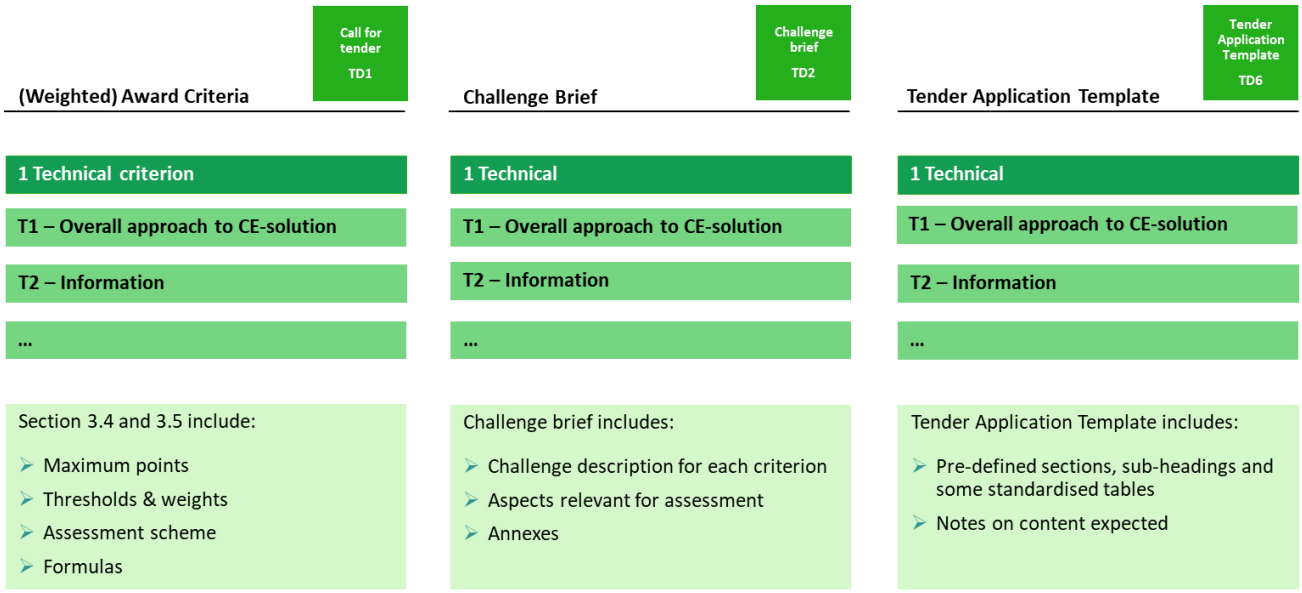
Demonstration Sites

The Demonstration Sites are municipalities and City organisations represented by the CircularPSP consortium and the Follower Network. The sites will involve City and Business users. For further detail see TD1 section 2.1.

Structure of the Challenge Brief (TD2) and Technical Application Template (TD6)

To achieve a high degree of transparency for tenderers, the award criteria (TD1 section 3.4.2) are aligned with the description of the Common Challenge as stated in the Challenge Brief (TD2) and the Technical Tender Application Template (TD6), as depicted below. Each criterion is represented in Level 1 headings, and each sub-criterion is represented in Level 2 headings in the Challenge Brief and the Technical Tender Application Template. This ensures transparency as to where input is expected and how many points any given section will contribute to the overall score.

Figure 1. Aligned structure of weighted award criteria, challenge brief, and tender template



The description of sub-criterions is structured by:

- **Context** explaining the status quo and/or rationale of the Buyers Group.
- **Challenge** explaining the innovation and R&D expected from Suppliers.
- **Assessment** listing and nuancing how Procurers will assess technical applications.

Information completing the description of the Challenge (sections 1 to 3) are publicly available:

- CircularPSP website: The most recent version of the Pitch Deck, OMCs recordings and large-scale version of graphics used in Tender documents can be downloaded.
- Call for Tenders: The intermediate milestones, results and supplier deliverables expected throughout the R&D effort are described in TD1 section 2.1.
- Technical Application Template: The application format prepared to the Common Challenge is provided as an editable Word document (TD6).

and collected in the Annex:

- Annex I: CE Taxonomy (Summary of links).
- Annex II: Personas.
- Annex III: Results from focus groups.
- Annex IV: Survey among other procurers.

Terminology

To improve readability, the document will refer to (by appearance):

- **Common Challenge** as a detailed description of the needs and requirements of the Buyers Group described within the Challenge Brief.
- **CE-solution** as a generic term for the response to the Common Challenge including design and entirety of the technical and non-technical product and service to be developed, tested and provided by each Supplier.
- **CE Taxonomy** as a systematic classification system that categorises economic activities based on their environmental sustainability and adherence to circular economy principles.
- **Suppliers** as a collection of all tendering and later contracted consortia of any composition.
- **Procurers, Buyers Group** referring to the CircularPSP consortium and representatives.
- **City/Cities** as generic term for public organisations, here municipalities as demonstration sites, including all its users from Buyers Group and other organisations on the demand side (i.e. the Follower Network, see TD1).
- **User** groups include Intermediaries, City and Business staff and workers. Focus groups were organised with all user groups
- **Intermediaries** as are CE experts who drive the transition and Change towards CE across the City or within a department. They act as multipliers of knowledge and CE practice.
- **Business/Businesses** as generic term for all companies and entities in the local economy also representing users on the CE-solution.
- **AI** as shorthand for any Artificial Intelligence solution qualifying under the AI Act or other algorithmic system creating new knowledge from existing knowledge. The Buyers Group has no preference to the technology used (including but not limited to large-language models, advanced pattern analysis, machine learning etc.).
- **Mission** describing the mid to long-term strategy and plan of a City for CE transition.
- **Workflow** describing a specific user activity or task within an operational process that considers the aspects and principles of CE. Workflows are comprised of a varying number of **Modules**.
- **Public Service Platform or PSP** is the host and universal interface of all technical CE-solution components (AI, Mission, Workflows etc.) for all user groups.
- **Matchmaking** refers to a feature of the PSP making relevant Business aware of each other and bringing them together in relevant context (e.g. a public procurement).
- **Change** (capitalised) refers to the process of implementing the (digital) CE-solution and adopting CE principles, including all related organisational and cultural transformations to address circularity-related challenges and opportunities.

These terms are capitalised. Abbreviations are listed at the beginning of the document. Suppliers are invited to copy, apply and expand the table if required.

1 Technical Criterion

1.1 T1 – Overall approach to CE-solution

Context: The shift from a linear to a circular economy is – in many ways – a fundamental change of our societal system defined through core principles: “use less”, “use longer”, “use regeneratively” and “recover, recycle” (Kirchherr et al., 2023). It is a shift in structures, mental models and paradigms of the current system. It is not only a shift in parts of society and economy, but in the whole with few precedents or instructions to follow. It is not limited to a specialised segment of the economy but reaches into all parts of society.

Ath the current stage, CircularPSP identified three core user groups: intermediaries, municipal staff and Business. represented by a larger number of evolving personas (Annex II: Personas):

- **Intermediaries** are CE experts who drive the transition and Change towards CE across the City or within a department. They act as multipliers of knowledge and CE practice.
- **Municipal staff** conduct their day-to-day job and their action is to become more circular.
- **Business** are either already offering CE products and services or wish / need to become more circular.

Challenge: Suppliers must develop their overall approach to the Common Challenge and the CE-solution. The description must include a problem statement, approach to address the problem, target groups, high-level and detailed graphical representation of the solution, and expected impact of the CE-solution towards CE transition. In case of success, Suppliers will be required to share the graphics in a software which allows for detailed comments and coordinated co-editing.

Assessment: The Buyers Group will assess comprehensiveness, clarity and convincing evidence for the design and architecture of the CE-solution.

1.2 T2 – Information

Context: The Buyers Group seeks a specialised AI overseen by human CE experts which is capable of adopting taxonomies on relevant linked open and local data. The AI will be able to detect and classify most recent circular practices across Europe, based on criteria defined in the CE Taxonomy and relevant EU sources. Users will receive contextualised results (e.g. case studies, existing circular procurements, applicable criteria) which provide valuable input to solve the user’s current challenge in a circular rather than linear way. The AI is capable of applying NLP both for reading content such as local circularity strategies and for creating output into local language.

The challenges below define the CE-solution envisaged. The Technical Application Template provides detail on which documenting information is needed to comply with the upcoming AI Act.

1.2.1 CE Taxonomy

Context: In order to utilise data, enable knowledge and create circular wisdom, the CE-solution must decode, understand, sort and display data and offer inspiration, information and advice to users following CE principles.

The European Union has introduced the EU taxonomy, which aims to establish a standardised classification system for sustainable activities across the EU with focus on the financial domain. Additionally, ISO 59000 series are actively engaged in standardization efforts related to CE. As these frameworks are currently evolving, CircularPSP requires a CE Taxonomy with a focus on municipalities. This CE Taxonomy will be commonly developed and must be universally applied by all CE-solutions. For detail on the need for a common Taxonomy, see the CE Taxonomy White Paper and proceedings of the Working Group Kick-off. CircularPSP will contribute the results to the wider European discussion.

Challenge: Suppliers must commit to use and apply the most recent version of the CE Taxonomy in their CE-solution (including terms, data sets and standards) and participate in CE Taxonomy Working Group sessions.

Contributions to CE Taxonomy: Suppliers can list classifications, terms or data sets in their offer. Suppliers are not required to disclose such information before the evaluation concluded but agree to openly share thereafter as content to be shared with the CE Taxonomy Working Group. The Buyers Group reserves the final decision as to whether input will be discussed, put up for vote or included. Suppliers remain free to repeatedly suggest and/or use additional input freely and without reason as long as it does not replace or contradict the CE Taxonomy.

IP / background: Suppliers are free to mark their own (i.e. non-public) terminology or non-public data sets as confidential. Suppliers must list such information as background and have the necessary rights.

Assessment: The Buyers Group will validate commitment to the CE Taxonomy. Procurers will consider all not yet documented contributions towards the CE Taxonomy positively.

1.2.2 AI model and design

Context: The availability of Artificial Intelligence (AI) technologies is increasing day by day. Suppliers can choose from a range of existing AI tools and combine them if required (AI tools can be those qualifying under the AI Act or other algorithmic systems).

This project primarily aims for a tailored and specialised application of AI in context of CE.

Challenge: Suppliers must choose, identify and describe suitable AI solutions that they are able to reliably operate, scale, update, maintain and oversee. AI technologies chosen by the Supplier are able to convincingly solve the multiple challenges and use cases described throughout the document. Suppliers must describe the architecture, core features and the upgrade paths envisaged for their model of choice; in case of multiple AIs, the interactions must be described. Suppliers must state how NLP is utilised for input and output, including the ability to translate into languages covered by the Buyers Group. Suppliers must state whether their approach is reliant on any given AI or whether an AI could be replaced. The NLP can cover languages beyond those represented by the Buyers Group.

Assessment: The Buyers Group will assess the technical feasibility, completeness of description and reasonable availability of the chosen solutions. Clear reasoning or evidence for selecting any given method is welcome; though the size of a model matter it is not sufficient. The Buyers Group will only assess functionality relevant to the challenges related to CE transition.

At least one specialised AI expert is expected to support the Buyers Group in the assessment of this and the following sections.

1.2.3 AI training, learning and oversight

Context: CircularPSP is seeking a specialised AI, capable in the domain of CE and producing responses with very high reliability and precision. Evidence on weaknesses of current LLM AIs is emerging (e.g. hallucinations, privacy risks, inconsistent quality), the Buyers Group believes that good design can mitigate this to a wide degree.

Challenge: Suppliers must transparently describe, develop and test their concept on training, learning and overseeing the AI results. All three concepts are mandatory and should include the description of the iterative approach to improve results over time. In the context of this study, the terms used are as follows:

- **AI Training**[1] refers to the AI applying the CE Taxonomy on dedicated CE information and data sources (e.g. scientific research on CE-principles, case study databases) to gather a better understanding of CE. Over time this includes knowledge generated within the CE-solution. The trained AI must be equally accessible to all Cities, Businesses and their users. By design, it must be possible to redo or repeat training, for instance, when a new CE Taxonomy version is released.
- **AI Learning** refers to the AI adapting to the local circumstances defined through the CE-Mission, locally available data, local progress on CE and the skillset and experience of any given user. Hence, learning is typically limited to an instance (i.e. City) of the CE-solution. As a consequence, non-public information may under no circumstances leak into general training information or other instances (see also 1.4.4 Security, data governance and privacy). If possible, learnings should not be forgotten even if training is repeated.
- **AI Oversight** refers to CE and other relevant human experts optimising and tweaking the AI training or learning to improve quality and/or performance. This process involves regular proactive and reactive validation and testing activity. Proactive actions seek to find weaknesses and blind spots of the AI, to improve either training or adjust parameters. Reactive actions are triggered by users (both intermediaries and regular users) through flags or feedback. Most likely, actions require ordinary and extraordinary planning.
- **Data Sets** refers to any data used for the training, learning and as well as intermediary steps such and validating and testing of the AI. Following practice in context of the AI Act, the Framework Agreement (TD8) distinguishes 'Procurer Data Sets' and 'Supplier and Third-Party Data Sets'. Third Party Data Sets are expected to include Open (Linked) Data. The identification of data sets is a continuous process conducted through the joined efforts in the CE Taxonomy by Procurers and Suppliers. IPR must have been cleared for any Data Sets used.

Assessment: The Buyers Group will assess the concept for its quality, completeness and evidence (e.g. papers as well as prior experience) provided. For initial tender, Suppliers are invited to identify different approaches to AI to they wish to test in the very early phase of the project. Transparent description of methods for testing performance and quality is necessary for a high score. The identification, integration and validation of suitable Data Sets is considered a necessary but also distinguishing activity.

It is expected that this section will evolve with data and experience to be gathered during R&D in all phases. Suppliers will be free to readjust their approach and are not locked in initial design, as long reasoning on the resulting improvements is provided.

1.2.4 AI interaction and prompting

Context: For any question humans might have, the 'search engine' has become the default first step. Advanced search engines and increasingly chat-modes anticipate the intentions of the user offering more than a list of highest-ranking results. Hence, the fields for user prompts are considered the entry point for many following interactions between the user and the CE-solution.

The users' ability to interact or prompt the system strongly determines the quality of the outputs received. The Buyers Group states no preference on the interface between AI and user.

The challenge is split into an overall description of user interaction and an exemplary use case:

Challenge – overall interaction: Suppliers must describe, develop and test their approach(es) of user interaction and prompting. Suppliers must list and depict the means by which users will interact

[1] The training applied by the AI product owner to assemble or compile the LLM itself, is considered exogenously given. A reference is required but does not constitute a proof of quality if it does not explicitly cover CE.

with the AI. Furthermore, Suppliers must create a list of use cases they envisage to evolve from initial interaction with the AI. Different interaction modes can have different list of use cases.

Challenge – case study search (use case example): Users are expected to frequently search for examples or lists on current circular issues (e.g. case studies, CE practices, local businesses). Suppliers must describe any step-wise process and output to be generated for the example of "case study reports". The format should be standardised and well-designed.

Remark on this and all following principle-lists[2]: Suppliers must find the best-possible design and solution to combine these principles. Items in bold are minimum functionality/performance requirements.

Independent of the current use case, the development should attempt to achieve the following principles for the CE-solution with regard to all AI interaction and prompting:

- **Provide feedback if no information, answer or advice is available.**
- **Provide generated filters or grouping in case of multiple results.**
- **Provide generated or translated summaries in local language for individual results.**
- **Provide relevant interactive meta tags from the CE-Taxonomy** (e.g. CE strategies such as reduce, repair etc).
- Provide sources wherever useful.
- **Provide options for contact information where available (e.g. case study author/owner).**
- **In case of advice, recommendations or rankings, inform the user on the level of accuracy of confidence in "circular wisdom" offered in this given instance.**
- Provide suggestions on better prompts replacing or complementing the prior prompt.
- Where applicable, answers:
  - **define and use common and accepted indicators;**
  - maximise use of existing data and data from other solutions;
  - integrate data (different sources using standardisation).
- Functionality enables the user without friction to:
  - bookmark a result;
  - **remark whether the result was helpful/not helpful.**
- Quality and curation:
  - **Unanswered prompts or answers the AI or users considers weak / not helpful must be logged.**
  - **The log must be aggregated and made available to local intermediaries (City level), as well as Supplier curators and developers (platform level).**
  - The log should identify what kind of critical information (e.g. local databases) are missing to achieve better results and provide examples for existing databases in other Cities.
  - Statistics on 'not helpful' results classified by context (e.g. search, Workflow) must be kept and made transparent to Intermediaries (City level), Supplier curators and developers (platform level).

Assessment: The Buyers Group will assess the overall concept of user interaction and prompts, the completeness of envisaged use cases, as well as how the concept was implemented in the exemplary use case.

[2] 'Principles' (not to confuse with CE principles) as used in IT domain make a statement about the envisaged CE-solution which should be achieved to the best possible degree. As multiple principles are stated, they typically require weighing against each other. How the highest state of combination can be achieved is unknown and to be resolved by the Supplier. As a consequence, the order does not necessarily reflect the rank of priority but is mostly follows from logical structure.

During the project, this R&D result will be one of the first and most often tested, being representative of the AI capabilities and output design. The list of principles constitutes the basis for testing to be conducted by the Buyers Group, to assess whether R&D was successful.

1.2.5 AI risk management system

Context: The interaction between AI and user sparks a wide range of ethical questions which need to be assessed. Due diligence is required regarding the trustworthiness of all artificial intelligence-based systems or techniques. AI-based systems or techniques must be developed in a safe, secure and responsible manner, with a clear identification of and preventative approach to risks. To a degree matching the type of risk that the AI application presents, AI-based systems or techniques should be, or be developed to become (implicitly or explicitly contributing to one or several of the following objectives):

- technically robust, accurate and reproducible, and able to deal with and inform about possible failures, inaccuracies and errors, proportionate to the assessed risk posed by the AI-based system or technique;
- socially robust, in that they duly consider the context and environment in which they operate;
- reliable and to function as intended, minimising unintentional and unexpected harm, preventing unacceptable harm and safeguarding the physical and mental integrity of humans;
- able to provide a suitable explanation of its decision-making process, whenever an AI-based system can have a significant impact on people's lives.

The CE-solution is being developed in context of upcoming AI regulation, in particular **the EU AI Act.** To ensure widest possible compliance, the Buyers Group is deploying the currently being developed AI procurement clauses (see schedule 2 in Framework Agreement TD8) in the Procurement for AI Community on the Public Buyers Platform operated by the European Commission (DG GROW).

Challenge: Suppliers must conduct a risk assessment and describe their risk management system. Other aspects required for compliant documentation are embodied in the sections above and/or deliverables foreseen.

Suppliers must provide resources and foresee procedures to deploy AI Act related ethical tests which are expected to emerge or are already required. In case the obligation lies with a third-party, the results must be stated, assessed and properly referenced.

Assessment: The Buyers Group will assess the completeness of the risk assessment and whether all risks were minimised to the largest possible degree.

The Buyers Group will be supported by an ethical expert at each state of evaluation.

1.2.6 AI Key Performance Indicators (KPI) – subject to revision for call-offs

Context: The efficient and effective operation of AI is critical for economic and environmental feasibility. However, defining Key Performance Indicators (KPIs) for an AI which has not been used is flawed and probably outdated quickly. Hence, this criterion will be revised with fixed requirements for the second call-off after having developed a test methodology and gathered the necessary data during Phase I and II.

Challenge: For the initial tender, Suppliers must commit that the AI (and other parts of the CE-solution) uses servers which are supplied by renewable energy (including the cooling systems).

From Phase I, Suppliers must document the system used and then state the results for the following exemplary KPIs to be further developed:

- Computing time to run the test prompts on an idle system.
- Average latency of response across all prompts.

- Total energy consumption during test in kWh.

In addition, for transparency only (acknowledging that more sophisticated training and non-standardises hardware would potentially punish some tenderers):

- Computing time during training in hours.
- Energy consumption during training in kWh.

Further detail for Phase II is to be provided with the call-off invitation and the updated Technical Application Template.

Assessment: During initial tender, the Buyers Group validates the commitment to operate AI on system supplied by renewable energy. During the first call-off, the CE-solutions are ranked regarding KPIs. In addition, during the second call-off, the systems are validated against required thresholds.

1.3 T3 – Operation

Context: Cities and Business lack the ability to plan locally relevant CE transition strategies. Even if attempts have been made, strategies are often not operationally implemented but an (often forgotten) afterthought to current practice. Staff is often not aware or does not know how circular action could be implemented. Due to the lack of procedures, it is also often not possible to track progress and impact.

1.3.1 CE Mission

Context: Through insights gained from OMCs and Focus Groups, it becomes evident that formulating a robust, long-term CE transition strategy at local and regional level remains a complex challenge. The challenge lies in the fragmented representation of CE within existing City strategies, as it is currently often scattered across various diverse long-term objectives and frameworks across different departments. Only few Cities have complete and reflected strategies which merely need integration into the CE-solution. Some might lack detail in areas where CE action would be possible. Most organisations, especially smaller, require assistance to create realistic targets and give them point of departure towards the CE transition.

Challenge: Suppliers must design, develop and test a CE Mission concept, in which a local CE Mission is co-designed as a first step of implementing the CE-solution. The process must follow an iterative approach of AI generation and interaction between Suppliers (i.e. CE experts) and City Intermediaries (and other local core stakeholders) to refine the local CE Mission.

The must develop a CE Mission process and outputs which follow these principles:

- Co-design with local Intermediaries and decision makers, and provision of documentation:
  - **is inclusive, actor-centred, iterative, evaluative and focused on achieving outcomes;**
  - **is initiated, organised and documented (i.e. meetings, input, minutes) by the Supplier;**
  - **considers local challenges (e.g. resources, political, financial);**
  - **is supported by CE expertise provided by the Supplier especially where little local CE experience prevails;**
  - is implemented within the CE-solution to the degree possible (fallback on documents etc. in rare cases where decision makers proof unable to use the CE-solution are permissible);
  - is transparent and easy to follow (i.e. the Supplier acknowledges that for each new City it will be a first-time experience, whilst Suppliers will develop a routine);
  - can be completed at high quality within no longer than four months;
  - **is documented in a step-wise timetable provided to all stakeholders at an early stage;**
  - minimises effort, training and personal required within the City;
  - **is highly replicable.**

- AI generation:
  - **analyses existing national, regional and local strategies and relevant public information;**
  - **respects and reflects any prior political achievements, stemming from, policy documents, strategies etc.;**
  - **learns from local data and identifies local opportunities;**
  - **suggests overall targets and yearly milestone targets for a five-to-ten-year duration;**
  - suggests focus areas for each milestone;
  - **prioritises areas of action** (e.g. departments, CE principles, value chains) by impact whilst taking the expected ability of staff into account (i.e. high impact but highly complex action is delayed);
  - suggests CE Indicators (see 1.3.3) which could be applied for the given Mission;
  - takes into consideration current and upcoming funding streams (e.g. EU, national);
  - identifies and considers reasonably expectable bottle necks (e.g. staff, resources, funding).
- Mission targets:
  - **cover all relevant areas where the City and/or local economy can achieve impact within the timeframe;**
  - **are ambitious but achievable;**
  - are decomposable (i.e. ability to add up over milestones or across departments);
  - are cross-validated against regional, national and European targets.
- Missions:
  - **provide a timeline on city and department level;**
  - **provide reference to wider targets such as SDGs, EU or national targets where relevant;**
  - **provide contact references of department heads and Intermediaries where relevant;**
  - identify other Cities which have achieved relevant and comparable milestones of the Mission as best practices and provide contact details to Intermediaries;
  - identify other Cities aiming to implement a similar Mission.

Assessment: The Buyers Group will assess the quality and completeness of the CE Mission concept. The feasibility and reliability of the generation and co-design process will be assessed. Consistency checks with other sections will be conducted to assess whether the envisaged output can reasonably be implemented in the foreseen PSP.

1.3.2 CE Workflow

Context: Strategies, Missions, and corporate social responsibilities (CSRs) are essential, but they are insufficient to achieve circular impact. Staff in Cities and Business must be empowered to confidently embrace CE practices. Currently, regular staff members lack guidance and experience in adopting new circular practices, and they often find themselves unsupported and solely accountable. Staff members need tools to overcome these procedural barriers, gain confidence in taking their first CE steps, and progressively achieve more ambitious CE actions.

CircularPSP introduces the term **Workflow** to distinguish from existing organisational processes (see T4 – Organisation for the distinction). A CE Workflow consists of **Modules** (i.e. activities or steps.) needed to implement CE action.

For example, a Workflow outlines the steps necessary to reduce "linear" (term as the opposite to circular) procurement by applying CE strategies like ‘refuse’ and ‘reuse’. Due to the nature of CE principles, Workflows can occur sequentially (e.g., first reducing items from 10 to 8, then finding items for reuse or repair, limiting procurement to 5). The Buyers Group expects that Workflows vary depending on the User's tasks, requiring different steps, stakeholders, and measures. At the same

time, we expect that Modules can be used in varying context. Hence, the combination of Modules should enable an AI to create a suitable Workflow in the context of the user's problem and ability.

Challenge: Suppliers must design, develop and test a modular CE Workflow Framework, following these principles:

- The overall Workflow Framework:
  - **is modular by design enabling (logged) curation of each Module;**
  - enables Workflow generation requests within context (e.g. after reading a case study);
  - **contains a finite number of Modules so that User become familiar with Modules over time.**
- For any Workflow:
  - The assembly of Workflow takes into consideration:
    - **User profiles for whom the CE Workflow is created** (e.g. area of responsibility);
    - **User experience for whom the CE Workflow is created** (see 1.5.2 Self-assessment, progress and behavioural science);
    - Local circumstances to demote unfeasible options.
  - **A Workflow displays the progress and status of each Module;**
  - A Workflow makes the level of complexity transparent (i.e. degree of challenge for the user) resulting from either Modules and/or the CE strategies or applications involved, enabling self-selection of users;
  - **A Workflow displays the range of impact that could and ultimately was achieved;**
  - Avoid parallel Workflows on the same current circular issue (i.e. same task assigned to the user) unless required by constraints;
  - Modules within a Workflow are clustered or structured where helpful or relevant;
  - **Multiple Workflows can be open for different circular issues** (i.e. different tasks assigned to the user);
  - Workflow length should decline with increasing user experience;
  - **First-time users are offered initial training on the use of Workflows;**
  - **Training or guidance is provided as part of the Workflow** if users lack knowledge or experience about a CE-principle, strategy or methods used in the module;
  - Towards the end of a Workflow:
    - **For users with limited experience, an voluntary "discuss with Intermediary" Module is placed;**
    - **If further CE action is possible and achievable based on experience, additional Workflows are suggested;**
    - **If procurement is the next activity, Modules preparing procurement are included** (e.g. searching procurement criteria, creating summaries in interoperable and readable formats suitable for local procurement experts);
    - Users are triggered to record insights and wisdom (see 1.5.4 Knowledge and wisdom creation).
  - **Intermediaries have access to all open and closed Workflows.**
- Modules:
  - **A Module has a clear objective and a result which is recorded in the Module;**
  - **A Module is self-contained where possible** (i.e. all necessary or relevant templates, functions, resources are immediately accessible);
  - **A Module is clear and visually appealing;**
  - Time and effort to complete a Module should be minimised;

- Modules can be skipped if not critical;
- A Module supports decision-making and gives confidence in the final outcome of the Workflow.

- Quality assurance:
  - **Users can flag issues with Modules and Workflows;**
  - **Suppliers implement a Q&A process: CE experts select and review random and user-flagged Workflows;**
  - **A regular review meeting between Supplier and Intermediaries is implemented to discuss the Workflows design and experience;**
  - When prior used Modules are updated, the changes are made transparent after first use or for a limited duration.

Assessment: The Buyers Group will assess the quality, creativity and completeness of the CE Workflow Framework. Suppliers are free in their means of presenting the concept. The concept should include a preliminary list of Modules foreseen. During initial tender, a limited number of mock-up graphics is considered a plus but not mandatory.

1.3.3 CE Indicators

Context: As "one cannot improve what cannot be measured", policymakers, practitioners and scholars urge the need of measurement frameworks for CE. Assessing the impact of CE action is extremely complex and does require external research and action on EU level. The ISO standard 59000-series on measuring circularity, which is close to be released, has been designed to harmonise the understanding of the CE and to support its implementation. Since common EU indicators are not expected for several years, it is likely that multiple and sometimes incompatible regulations or practices exists across Member States. In fact, even short-term or limited purpose criteria such as for circular procurement remain under development. Finally, whether the data needed for the use of indicators is available and accessible will differ from city to city.

Hence, the Buyers Group acknowledges that the CE-solution will *not* be able to implement a fully coherent indicator framework. Instead, the Suppliers are to find a pragmatic approach to 'CE indicators for Cities'.

The Buyers Group will consider adding a minimum set of specified indicators in the CE Taxonomy or as part of the Challenge Brief at a later stage.

Challenge: Cities need indicators to i) assess the status quo and track progress, ii) create clarity to raise awareness and trigger specific action and iii) be able to publicly make the case for CE through documenting success.

Suppliers must identify, develop and implement a simple and robust set of indicators, which coherently is applied within each Mission and across the CE-solution. Indicators are capable of tracking progress on milestones and assessing the impact of any given Workflow. Wherever possible, indicators should be used to offer the user means to understand and assess costs-versus-benefits (i.e. CE impact) of multiple alternatives. The indicator set must be compliant with EU regulation.

'Simple' refers to the ease of measurement as well as comprehension by the user. For instance, the count of units (e.g. chairs) or metric units (e.g. kg) are considered simple. 'Robust' refers to separate comparable calculations resulting in the same figure and that results across different applications lead to approximately coherent results (e.g. a chair is lighter than a bench). We acknowledge that local data will yield better results. Wherever possible, the CE-solution shall further allow conversion into widely acknowledged indicators such as CO_2-equivalents, utilising official EU (or other well-documented) conversion factors.

Benchmarking the Cities active on the platform is an optional feature. Cities do not need to be mentioned by name, but benchmarks provide an indication of progress possible in comparable circumstances.

Challenge – circular procurement criteria: Suppliers must enable the AI to provide users with a list of circular procurement indicators relevant to the current context, using the data sets listed in the CE Taxonomy and self-identified sources. Further, suppliers should investigate whether it is possible to extract indicators from data published in procurement platforms.

To make circular procurement criteria accessible to all municipal staff and local businesses (including SMEs), indicators must be clustered and aligned with the essence of CE principles. Suppliers may consider the following three dimensions[3]:

- Material recirculation: to which degree material is recovered from prior use, rather than primary "virgin" material, as well as the extent to which materials are designed to be recovered / recycled after use.
- Utilisation: the frequency at which products are used rather than sitting idly (e.g., in storage).
- Endurance: the extent to which products retain value over time, rather than becoming physically degraded or socially irrelevant (e.g., physically or socially obsolete).

The design of content and features of circular procurement should follow these principles:

- The content of indicator sets (or individual indicators):
  - **states the source or prior application;**
  - assesses the reliability and/or quotes experience by a procuring organisation;
  - lists and ideally provides contact information to organisations using the indicator (set).
- The circular procurement feature:
  - **is accessible as a standalone feature;**
  - is automatically offered, where relevant, as a Module in Workflows;
  - **provides well-structured means to tag indicators to a procurement (ex-ante);**
  - **provides well-structured means to share experience with an indicator (ex-post);**
  - for specialised staff (i.e. procurement officers): it should promote and distribute new developments and insights.

Assessment: The Buyers Group will assess the overall viability of the 'CE indicators for Cities' concept along the dimensions of simplicity and robustness, as well as its ability to cover the City operation. Descriptions must include unit examples. The use of existing or currently being developed frameworks or research is encouraged and must be referenced.

1.3.4 CE Procurement

Context: The CE-solution is expected to achieve a reduction of procurement whilst inducing a more circular focus and overall better preparation of procurements. Nevertheless, a significant volume of public procurements will have to be organised and therefore be checked for coherence and consistency with CE principles in general and the CE Mission in particular.

The Buyers Group acknowledges that the act of procurement can be highly complex due to national context and local circumstances, including IT-systems and culture. Hence, the CE-solution is to complement the existing procedures at least at two generic and common points of any procurement procedure:

- Identification of circular procurement criteria and enforcing contractual clauses.

[3] Boyer, R. H. W., Mellquist, A.-C., Williander, M., Fallahi, S., Nyström, T., Linder, M., Algurén, P., Vanacore, E., Hunka, A.D., Rex, E. & Whalen, K. (2021). Threedimensional product circularity. Journal of Industrial Ecology, 25(4), 824. https://doi.org/10.1111/jiec.13109

- Circular quality control of a procurement package.

The motivation for the former results from considerable effort being undertaken on national levels to produce reliable criteria and clauses to guarantee the intended performance, as well as linking these to references. Once procurement officers select circular criteria suitable in local context, it becomes easier to identify existing tender packages (using these criteria) which can then be more readily adopted. Finally, good criteria reduce the complexity of and effort required for a procurement.

The motivation for the latter is given procurement officers the chance to conduct a scan of their tender package for circular opportunities not yet identified.

Challenge: Suppliers must devise a dedicated Modules and Workflow(s) for procurement officers accessible as a standalone feature. At least two specialised Modules must be provided.

Circular procurement criteria and/or enforcing clauses: Suppliers must design a Module in which the AI provides users with a list of circular procurement criteria and/or enforcing clauses relevant to the context of the prompt, using the data sets listed in the CE Taxonomy and self-identified sources. Further, Suppliers can utilise the AI to extract high-quality criteria and/or clauses from data published on procurement platforms relevant in the context of the prompt.

To make circular procurement criteria accessible to all municipal staff and local businesses (including SMEs), indicators should be clustered and aligned with the essence of CE principles.

The design of content and features of circular procurement should follow these principles:

- The content of indicator / clauses sets:
  - **states the source or prior application;**
  - assesses the reliability and/or quotes experience by a procuring organisation;
  - **lists and ideally provides contact information to organisations using the indicator (set).**

Quality assurance of procurement packages: Suppliers must design a Module in which the AI scans a procurement package submitted by the procurement officer for circular opportunities not yet utilised. High confidence on relevance of compared tenders must be assured through applying relevant taxonomies (e.g. CPV).

Wherever the AI identifies gaps towards the City Mission, Milestones, used Indicator sets, suitable procurement criteria and contractual clauses etc., as well as overall circularity principles, it will highlight these gaps.

Wherever opportunities exist to improve circularity of the procurement package, the AI shall give clear indication where these opportunities are and provides relevant input or generated suggestions on how to implement them. The AI shall utilise trained knowledge to spot weaknesses directly and compare the procurement package with relevant existing data on public procurement platforms or other sources. The Supplier must apply the quality assurance process described in section 1.3.2). The Supplier must ensure that human oversight of procurement officers is guaranteed.

Assessment: The Buyers Group will assess the design, viability and content of the dedicated CE Procurement Workflow(s). Listing relevant but yet unidentified sources for circular procurement criteria, clauses or reference procurements will be considered a plus. Public collections will be made part of the CE Taxonomy for future iterations.

1.3.5 CE Finance and incentives

Context: Organisations, especially SMEs, need easy access to public and private financing to support to conduct Upskilling, cover up front costs to adopt technologies for CE-practises and update business logic. Public organisation could potentially spur lasting (local) innovation further by use of innovation procurement, challenges, and utilising incentive schemes.

Challenge: Suppliers must provide a list of locally relevant public and private funding opportunities or existing incentives to advance circularity in Cities and Business. Suppliers shall build on AI and other established data approaches to collect up-to-date data. The information shall be provided in the context of the current prompts or Workflows as well as a stand-alone feature. The standalone feature can lists new opportunities in a suitable format.

Assessment: The Buyers Group will assess the overall quality and completeness of the concept.

1.4 T4 – Organisation

Context: Currently, society and economy are run on an "operating system" optimised for the linear economy. Many organisations including Cities and Business are eager to begin with the CE transition but need to improve and expand organisational capacity to act circular. Only few Cities established specialised teams to implement the CE transition; other Cities and most local businesses do not have the resources to invest in long-term strategies. Other complications are legacy software which do not adequately reflect circular action and the need to establish new relationships. Hence, Cities and Business need an advanced tool in which circular data and knowledge come together. Where novel CE strategies are made transparent for all staff and Users are supported in their increasingly circular day-to-day activity including through improved communication and networking within and beyond municipal borders.

To provide City and Business with the tools needed, the CE-solution is deployed on a **Public Service Platform** (PSP). The PSP is both the host and interface of all technical CE-solution components (AI, Mission, Workflows etc.). The universal "public infrastructure" will be provided to all organisations and minimise friction and effort.

1.4.1 Public Service Platform (PSP)

Context: All organisations have wide-reaching and detailed legacy software and processes. It is unrealistic to assume these can be replaced or disappear to solve this challenge on a blank canvas. Instead, the CE-solution is to provide a coherent yet minimal toolset which is complementary to existing solutions. The user visits the CE-solution to research CE content, prepare, plan and conduct Workflows and uses the results to "make it official" in existing legacy systems, such as procurement software or Enterprise Resource Planning (ERP) platforms. It is the Buyers Group's position that the apparent division will dissolve over time through uptake of interoperability and web-based or web-powered applications, which can be (bi-directionally) embedded.

Challenge: Suppliers must develop, design and test a white-label, scalable, two-tier, sustainable and inclusive web-based platform. The platform provides structure, classifies progress, and displays the CE Mission on city, department, and personal level using an appealing user interface (UI) for all functionalities accessible to the user group. These available functionalities must include, among others, the AI interface (1.2.4), Missions (1.3.1), Workflows (1.3.2), communication and networking (1.4.2) and Upskilling (1.5.3), as well as any other opt-in services or features foreseen by the Supplier in the Business Plan.

Suppliers must choose, identify and describe suitable technologies that they are able to reliably operate, scale, update and maintain.

'White-label' describes the ability to customise language and design elements for each City. '**Scalable'** refers to the ability of adding more organisations with minimal IT-related effort (not including customisation and Mission creation). '**Two-tier**' refers to the full-featured entry provided to Cities and a separate entry for Business in the local economy with fewer features. Businesses can register via a website but remain linked to the instance of the City. '**Sustainable'** refers to the use of a green infrastructure and renewable energy sources. '**Platform'** refers both to the concept of running the CE-solution on a platform as well as the ability to host or provide additional services

through the platform. **Inclusive** refers to not excluding and appropriately representing any social/cultural factors (such as ethnicity, disability and sexual orientation).

The **City-tier** has been described in detail through sections above. The **Business-tier** (i.e. market platform) mirrors the feature set and allows local companies, particular SMEs, to register their circular offerings (products, services) using relevant taxonomy to make them accessible to the local (and nearby) municipality and the local economy. The possibility to use the AI to search for circular solutions, upskilling material and to create workflows to implement circular change will enable Businesses to transition their sourcing, operation and offerings towards circularity. The PSP will enable communication, matchmaking, networking and consultations on upcoming tenders and changes the City is planning (see 1.4.2). Hereby SMEs are empowered to bid jointly in public tenders.

The PSP must allow for user management within an instance for any given City. Local economy users are not to be managed by the City.

The PSP UI must include the features needed by (or offered to) different user groups, which are Intermediaries, municipal staff and businesses.

Assessment: The Buyers Group will assess the overall concept and technology of the PSP for quality, clarity, scalability, flexibility and sustainability both for City instances and as well as to future versions of the PSP.

The web-enabled CE-solution should be in principle easily transferable as a thin client to iOS or Android. However, an adoption as part of the PCP is considered optional and only at minimal costs.

Ability to embed the CE-solution into existing ERPs or other systems with wide distribution in municipalities will be considered a plus.

1.4.2 Communication, matchmaking and networking

Context: Rapidly advancing knowledge driven societies rely on frictionless and reliable knowledge and experience exchange. Staff are empowered in taking or preparing novel decisions if they can clarify detail and gather a second opinion. The OMCs uncovered that intermediaries are involved in strategy development, but later excluded from supporting the implementation, hitherto the staff, due to a lack of infrastructure.

Challenge: Suppliers must design, develop and test a reliable (i) written communication approach, (ii) a catalogue of businesses and (iii) dedicated network and matchmaking formats. If an integration is not possible or desirable and an external system needs to be used, the Supplier must reason and argue advantages. Suppliers may not invest effort to implement a video meeting solution, unless it is an already existent feature of their platform (as sufficient options exist and can easily be integrated).

Communication

Written communication is expected to take place and must be facilitated between:

- **Municipal staff and intermediaries within the City.**
- **Municipal staff and Businesses within the City and/or nearby region.**
- **Municipal staff/intermediaries between different Cities.**
- **Businesses within and beyond the City.**

The written communication solution should follow these principles:

- **Asynchronous written communication must be provided offering local translation.**
- **Users have access to a list of contacts and list of all communication.**
- Any exchange in context of a Workflow (or other traceable activity) should be linked to the Workflow.

Matchmaking

The CE-solution must provide a **catalogue of all registered CE-minded Businesses** accessible to all users. The catalogue uses relevant terms of the CE Taxonomy to enable users to browse possible supplying companies. The catalogue complements and feeds the search functionality. Building on the catalogue, a **matchmaking tool** must be provided within the Business-tier utilising AI to **match local CE-minded Businesses to find each other and facilitate cooperation on:**

- **Bidding jointly in local CE procurements** (to support especially SMEs which are underrepresented in public procurements). The matchmaking tool must help companies to reach the necessary size of a bid of and the necessary complementarity to cover the bid. Companies are expected to use established and to jointly develop new CE approaches. For this purpose, the CE-solution should provide Business with a co-creation space to develop ideas and prepare bids (e.g. ability to create and share a canvas-like Module between Businesses).
- Advancing the sharing economy at least with the ability for Business to flag interest in sharing.

Networking

Suppliers must suggest and design **dedicated networking formats** which can serve the following use cases (all formats will be tested/implemented in Phase III):

- **Inner-city exchange format for City-Business meetings to exchange on upcoming circular demands and procurements.**
- **Platform-wide events bringing forward new municipal approaches to fasten knowledge transfer and capacity building.**
- Loose interest-based or voluntary formats for exchange and (virtual and on-side) meet-up (e.g. circular cafés or communities), ideally linked to and embedded in existing local formats (implementation and operation would be in the hands of the City).
- A simple tool to organise, conduct and track circular challenges across the local economy.

Following the modular design of the PSP, Suppliers are invited to innovate on further networking use cases and formats which can selectively deployed by a City, without endangering the wider concept.

Assessment: Procures will assess the quality, completeness and practicality of the concepts. Simplicity and interoperability of the communication feature are considered a plus. Networking formats must be able to engage a large number of users with minimal effort required from Suppliers and Cities. Transparent and convincing integration with the Change framework, Mission, Workflows or Upskilling is considered a plus.

1.4.3 Interoperability and standards

Context: The context and need for interoperability of the CE-solution is extensively documented in the CE Taxonomy White Paper (see Annex I: CE Taxonomy). As to the state-of-the-art (SoA), Smart Cities tend to require minimum data standards. Simultaneously, European common data spaces are being developed which might offer a default location for data storage.

Challenge: Suppliers must explain their overall concept of interoperability and standards. This must include a list of approaches it already implemented or plans to implement. Suppliers must describe the Application Programming Interface (API) to be implemented.

Assessment: Procures will assess the level of interoperability both in terms of ambition as well as completeness regarding data input and output. State-of-the art technologies are considered a minimum. Use of turnkey-ready standards, protocols or widely used APIs are considered a plus.

1.4.4 Security, data governance and privacy

Context: The CE-solution has to operate in a complicated environment. It gains access to public and potentially restricted data, uncontrolled it has the potential to influence users or unduly track employees whilst having relevant security and privacy obligations.

Challenge: Suppliers must describe their overall cyber security and risk design. Suppliers must list identified risks and describe the measures to ideally prevent them from occurring or mitigate them.

Suppliers must describe how data governance is implemented. This includes how local data sets are to be shared with the Supplier and how they are transparently managed. Further, Suppliers must describe the process of revoking access to a data source and how it is ensured that the data does not remain within and/or is not available to AI.

The CE-solution has to comply with GDPR regulation.

Assessment: The Buyers Group will assess the quality, completeness, clarity and transparency of the concept.

1.5 T5 – Change and Upskilling

1.5.1 Change

Context: Transition to a CE represents a dramatic change comparable to the yet uncompleted digitisation. Heavily relying on digital tools, the cultural change of CE is a challenge for the public sector and the myriad of small and medium enterprises. It is the Buyers Group's position is that such transition fails due to lack of clarity and coordination at all levels.

Challenge: Suppliers must develop, design and test a coherent approach and framework to trigger Change and seal the acceptance for the CE-solution and wide application of circular action. This shall include SoA methods, for instance, playbooks or customer journey, as well as the preparation of core materials. To ensure scalability, the concept is generic so that the content can be customised with Intermediaries and decision makers in Cities before being rolled out to all parties in accordance with the agreed timeline.

Assessment: The Buyers Group will assess the overall Change Framework for quality, completeness and coherence. In particular, the framework will be checked for whether it can reliably achieve Change at all relevant levels ensuring uptake of CE and the CE-solution.

1.5.2 Self-assessment, progress and behavioural science

Context: Individuals have different starting points which must be recognised, acknowledged and taken into consideration when expecting circular action. Taking record and acknowledging the starting point can help to reduce frustrations of users and make progress and therefore success transparent.

Challenge: Suppliers must develop, design and test a self-assessment feature able to record the initial state of knowledge and skills. The feature shall be as minimal as possible, but sufficiently informative for the AI and User to make distinctions in the complexity of results presented to the User. Building on the tool, progress on the self-assessment shall be tracked and also fed back to the User to ensure high motivation on the short and long-term. Suppliers shall enrol concepts of behavioural economics / behavioural science. Suppliers must be aware of ethical implications without crossing the line to manipulation or omitting information needed to make fully self-determined decisions.

Assessment: The Buyers Group will assess the quality, completeness and creativity of the concepts. Concepts which include tangible benefits for the user will be considered a plus.

1.5.3 Upskilling

Context: Cities and Business will need to upskill their staff to unlock the social, economic, and environmental potential of the CE transition. The CE skills gap is largest for SMEs who further struggle to innovate, due to certification and administrative burdens. At the same time, training material on CE is becoming increasingly available. The concept of massive online-only courses (MOOCs) and tutorials have revolutionised how vocational education and training (VET) can be customised. However, individual users are not able to find and select the content which will educate or help them with solving their current circular issue.

Challenge: Suppliers must design, develop and test means of integrating Upskilling activities (i.e. training, education and capacity building) into the overall use of the PSP. Integration shall be possible through Modules during Workflows, triggered by Intermediaries and in response to User action (e.g. self-assessment, repeated search on specific topic, most viewed/completed by other users, following a training path). Suppliers must assemble and curate diverse, innovative and traditional information and formats, including attractive core materials made available in local language. Translation can be performed by NLP. Readily available and curated sources should be preferred and complement with materials including about and in context of the CE-solution.

Efforts in Upskilling should be considered an opportunity to bring people within and across Cities and Business together and is ideally connected with networking activities (see 1.4.2).

Assessment: The Buyers Group will assess the overall quality and completeness of the concept. Concepts which are able to lay a clear training path relevant in context of the User's professions are considered a plus. Concepts which integrate certification or other forms of degrees, ideally via recognised organisation, platforms or MOOCs, are considered a plus.

1.5.4 Knowledge and wisdom creation

Context: Organisations often struggle to record successful practices. This is due to staff not having the time or not knowing how to record successful practices.

Challenge: Suppliers must design, develop and test simple means to record knowledge on successful CE action and make it available within the City and across the PSP. The focus should be on Users recording key insights or wisdom that can easily be noticed by staff in their organisation to whom they are connected, or by other comparable users. Additionally, it should be possible to convert a Workflow into a case study with the help of the AI. The output must be self-standing case study shared across the CE-solution.

The AI should use insights gathered through Workflows and new case studies in future training and learning.

Assessment: The Buyers Group will assess the overall quality and completeness of the concept. Simplicity and low effort are a plus.

2 Commercial Feasibility Criterion

2.1 CF1 – Innovativeness compared to market state-of-the-art (SoA)

Context: Innovativeness involves new solution or approaches that deviate from or improve upon what is already available changing how society acts. This stand in contrast to self-standing 'inventions' of ground-breaking or novel nature. Rather, the proposed CE-solution are expected to deploy highly advanced features, technologies, methodologies or combinations thereof to the user groups of municipal staff and SMEs in a highly scalable format. Innovation is not only considered to be IT-related but also includes procedural aspects, behavioural and socio-technological concepts, if coherently embedded in the CE-solution.

The challenge is not to develop individual components (e.g. expanding a large langue model) but to utilise and sharpen components and to combine them into one holistic and comprehensive CE-solution.

Challenge: Suppliers must document how their proposed CE-solution goes beyond the current SoA of CE transition tools and how the CE-solution can be deployed in municipalities with minimal friction, added value to users and with high replicability. Whilst innovation on individual technological components might be limited; the combination of different components is also challenging and therefore innovative.

Assessment: The innovation of the CE-solution as a whole is being assessed. Hence, Suppliers are not expected to forcibly push innovation in each area if it is not required for their CE-solution. Only innovations expected from R&D services during the project are assessed. Procedural, societal and behavioural innovations must be underpinned by scientific evidence or references whereas well established concepts do not require further explanation (e.g. AI chats, nudging).

The application of taxonomies and applying interoperability are not considered an innovation but are a pre-requisite for the Challenge, unless being applied beyond SoA.

2.2 CF2 – Business Model

Context: The Buyers Group is seeking a viable and reliable CE-solution to their Common Challenge, which is to be procured and implemented in their organisations and local economy beyond the end of the project. Hence, the technological innovation must be complemented with a commercial Vision and Business Model suitable for both Suppliers and Cities.

2.2.1 Vision and impact

Challenge: Suppliers must describe the **vision for the CE-solution** as to what would be provided once CircularPSP was completed successfully and numerous Cities are actively using it. In this context, Suppliers must remark on the **impact** the CE-solution is expected to have.

Optional: Being built on interoperability, the CE-solution should be in principle capable to exchange with competing CE-solutions without disclosing IPR or access to tools. If interoperability for such functionality is technically possible, Suppliers shall briefly describe (i) how exchange of knowledge or wisdom created on the PSP can be shared and (ii) how to exchange communication across platforms. Neither of which is to undermine cybersecurity, privacy and GDPR compliance.

Assessment: The Buyers Group will assess the overall coherence and viability of the approach. Ambition is welcome but must be well explained ideally using the language defined in the sections on Missions, Workflows and Indicators above. Aspects which cannot be assessed due to omission of detail, will be assessed with a low score depending on severity. Consequently, in case of uncertainty, ranges can be stated. The optional ability of inter-platform exchange is considered a plus.

2.2.2 Business Model

Context: It is the Buyers Group's position that multi-stakeholder and multi-revenue-stream business models based on platform designs are well established and widely available. The issues mostly reside in transparency such as where one offering ends and another begins, control over necessary Intellectual Property (IP) and reliance on revenue streams since each item listed can result in discontinuation of offerings due to decisions by third parties.

Challenge: Suppliers must develop a **Business Model** which is compatible with the requirements of public procurement across the EU and targeted countries. The Business Modell must ensure long-term and wide-scale operation of the CE-solution at low costs.

Suppliers must provide information about the intended **revenue streams for all customer segments** such as municipal, local Business and third parties to be stated (e.g. those offering services through the CE-solution) and the **overall cost structure**, identifying overall viable cost volume and key cost drivers as estimated percentages (e.g. server operation, CE-expertise, maintenance, development, support, sales). Suppliers must describe the envisaged **contracting model**.

----ONLY RELEVANT FOR CALL-OFFS IN PHASE I AND II ----

Full transparency must be achieved on the life-cycle-cost of the CE-solution for Cities (i.e. cost of ownership). This involves transparency on the costs of the contracting model, including any maintenance and renewal at minimal administrative effort.

Suppliers must state the envisaged pricing model for their product and service line. Multiple price categories (e.g. depending on user numbers) are permitted. Structuring the product and service line as packages (e.g. free, baseline, premium) or offering payable add-on services beyond the Challenge Brief (e.g. consultancy) or other models are permitted. In all cases, it should be simple to calculate average total costs per user for any given timeframe for the features required by the Challenge Brief.

Assessment: The Buyers Group will assess the overall viability and sustainability of the envisaged business model from a customer's perspective. Ownership, open-source or otherwise guaranteed control / access to all critical components are a plus. Ability to utilise revenue streams beyond public procurers without endangering the success is a plus. Simplicity and flexibility of the product and service line are a plus. Aspects which cannot be assessed due to omission of detail, will be assessed with a low score depending on severity. Consequently, in case of uncertainty, ranges can be stated. Procurers do not state a requirement or specific preference for any contracting model.

2.2.3 Strategic autonomy

Context: A successful roll-out of the CE-solution will serve a viable function of public interest for a significant share of public procurement in Europe. Hence, the operation of the CE-solution should contribute to strategic autonomy and increase resilience (i.e. avoid any risks of external shocks) to the operation of the CE-solution itself and by extension the local economies supplied by it. Further, in cases of external shocks the functionality foreseen could be utilised to shape how public organisations could best react.

Challenge: Suppliers must explain all **dependencies**, including critical partnerships, IP and functional boundaries of their own offering constituting or surrounding the CE-solution. Suppliers must explain the access and control over the components, including but not limited to the underlying AI-model and all critical platform components. Suppliers must disclose any dependencies of the CE-solution to other offerings by one or more companies and which measures are taken to ensure continuity.

Suppliers shall further explain how **strategic autonomy** of the European Union will be achieved.

Assessment: The Buyers Group will assess the overall completeness of information provided. Gaps will lead to a mark down. Ownership, open-source or otherwise guaranteed control / access to all

critical components from within the EU results in the maximum score. AI and PSP must be hosted within the EU with the exception of individual City instances running as local host for local data. If establishment of entities or control from within the EU cannot yet be fully exercised a viable staged plan during and beyond the project lifetime is expected.

----ONLY RELEVANT FOR CALL-OFFS IN PHASE I AND II ----

2.3 CF3 – Commercialisation Plan

Context: The Buyers Group is convinced that multiple direct and indirect benefits would arise if the customer base of the CE-solution would increase rapidly. Direct benefits are economies of scale for the costs of the AI and PSP, as well as the available data and contact points. Indirect benefits include the overall use of CE practices, improving the quality of knowledge and circular wisdom provided through the platform which then can be replicated. Hence, wide commercialisation of the CE-solution must be ensured.

Challenge: Suppliers must describe the strategy and methods by which they attempt to commercialise the solution and grow the customer base beyond the Buyers Group and the Follower Network recruited by the CircularPSP project. This implies at least two critical components:

(1) Measures which improve the fundamentals of the solution (e.g. certification or standardisation).

(2) The envisaged pre-contract customer journey(s) and their relevant touchpoints of becoming aware of the CE-solution, trailing, exchange and support to convince superiors.

Assessment: The Buyers Group will assess the overall soundness of both components. Transparency must be achieved regarding the targeted markets within and beyond the Buyers Group over a reasonable timeframe. Commercialisation must be planned in the demonstration sites. Excluding areas from commercialisation (service and/or marketing) is permissible if justified.

3 Project Management Criterion

Context: The criterion envelopes the project tendered across Phases I, II and III. The **focus** is on 'how' the concept presented above will be developed, deployed and validated.

The description of expected outcome in each Phase is documented in TD1 section 2.1. The content is critical for the description requested below.

3.1 PM1 – Quality and completeness of the work-plan as well as detail of task and result descriptions

Context: The current proposal constitutes an R&D innovation project. The outcomes are milestones and supplier deliverables as described in TD1 (Call for Tender) and therefore well understood by all parties. The expected outcomes are described in detail in TD1 section 2.1.

Challenge: Suppliers must design an efficient, effective and comprehensive work plan to include work packages, tasks, responsibilities, as well as milestones and supplier deliverables as listed in TD1. The workplan must be drawn out for all PCP phases with the opportunity to revise and improve the workplan during call-offs including the final implementation of the CE-solution for each allocated demonstration site.

Assessment: The Buyers Group will assess the quality and completeness of the work plan to achieve the intended outcomes in the framework laid out in the Technical and Commercial Feasibility criteria. Attention will be given to the next upcoming phase. Suppliers are discouraged from adding supplier deliverables beyond those defined in TD1.

3.2 PM2 – Feasibility of plan and resources to meet the objectives

Context: The current proposal constitutes a R&D innovation project of almost two years with active customer involvement. Hence, the Supplier must be able to ensure following the intended development plan whilst being able to react to feedback, R&D results and emerging technologies.

Challenge: The Supplier must describe by which means the work and R&D results are to be achieved.

The Supplier must describe the choice of any subcontractors for the tender and / or during the project lifetime.

Overall, the details on the resources needed to achieve the workplan have to be provided for each organisation involved in the tender. Other required resources, such as those for travel and licenses, must be quantified and provided.

The operational capacity of the suppliers aligned with the plan and resources must be convincing and address all Phases (for details of each Phase see TD1 section 2.1). A convincing operational capacity could be reflected in e.g. the consortium composition, or by having a plan and reserved budget for involving local (sub)contractors, while complying with the limit on use of subcontracting.

The Supplier shall describe how it will provide timely operational and maintenance services after the end of the project.

CircularPSP requires Suppliers to integrate systems. Suppliers must take over responsibility for system-wide optimisation and shall be responsible for interoperability with local data sets. The process of collecting local requirements, applying (and further developing) the CE-solution to any given Procurer will have to be complete and smooth.

Assessment: The Buyers Group will assess the overall feasibility of the project management plan. This includes whether the plan itself is feasible and sufficiently supplied with the necessary resources, as well as the ability to incorporate input and results gathered over time.

The Buyers Group will conduct consistency checks with the Administrative Application, the organisations and key personnel described therein. Should key personnel for described roles or tasks be missing or insufficient, it might trigger follow-up questions on the Administrative Application, lowered scores for this criterion or both.

Announcing to identify subcontractors for critical R&D tasks in the future (thereby implying a risk for their CE-solution), will lead to low scores even if the selection criteria are technically fulfilled. Tenderers are advised to complete their consortium or document expressions of interests for later phases where possible.

Annex I: CE Taxonomy

The use of CE Taxonomy during the project is mandatory.

All materials on the CE Taxonomy are available on our website. This includes in particular:

- The initial version of the White Paper.
- The Working Documents on terminology and standards and on data sets.
- The recording of the Working Group Kick-off.

Suppliers must expect a revised version of the CE Taxonomy including a reference version of the Working Documents at the beginning of Phase I as the basis for R&D work during Phase I, Phase II and Phase III respectively.

Preliminary collection of data sets to be used by Suppliers

The following represents an indicative list of mandatory data sets to be used provided i) no IPR issues arise, ii) no technical issues impeding work exist and iii) they do not lower the quality of the AI results.

An updated version will be shared with Suppliers at the beginning of each phase. It is the responsibility of suppliers to validate the IPR access for below listed data. The ambition is to solve the question jointly and for all Suppliers.

Note: Data sets could be listed twice for different purposes.

Taxonomy and data

Data sets on taxonomies and large-scale procurement data bases.

ISO 59000 series	open-access	international
EU taxonomy for sustainable activities	open-access	EU
Database and Monitoring Framework- Circular economy - Eurostat (europa.eu)	open-access	EU
TED Data	open-access	EU

CE Case Studies

Data sets to train AI to understand CE.

Ellen MacArthur Foundation - Case Studies Collection	unclear	international
Ellen MacArthur Foundation - Circular Design Tools	open-access	international
UNSDG - SDG Global Database	open-access	international
Municipality-led circular economy case studies	open-access	international
Knowledge Hub Circle Lab case studies	open-access	international
Circularity Gap Report 2023	open-access	international
EU taxonomy for sustainable activities	open-access	EU
Knowledge Hub | European Circular Economy Stakeholder Platform (europa.eu)	open-access	EU
Good Practices EU CE Stakeholder Platform	open-access	EU
Good Practice Library EU DG ENV	open-access	EU
Tools & Methods for Circular Systemic Solutions	open-access	EU
CITYCIRCLE - Interreg Project (newsletter archive, presentations & other documents)	open-access	EU
REFLOW Best practices database	open-access	EU
Interreg NSR ProCirc case study report	open-access	EU
Circular Flanders case database	open-access	EU

Circular Business Models: Building a Database of Case Studies	unclear	EU
World bank: Squaring the Circle: policies from Europe's Circular Economy Transition	open-access	EU
Scottish government sustainable procurement examples	open-access	national
Platform for Sustainability Management with Resources Communities	open-access	national
European Project about CE	open-access	national
Turkey Circular Economy Platform	open-access	national

Procurement criteria and clauses

UNSDG - SDG Global Database	open-access	international
National (FIN), Public Procurement Strategy 2020 (FI/SE)	open-access	national
Public procurement Handbooks (FIN) 2023 edition	open-access	national
The National Agency for Public Procurement (SE)	open-access	national
The National Agency for Public Procurement - Services for reuse and recycling of computers and monitors (SE)	open-access	national
The National Agency for Public Procurement – Buildings (SE)	open-access	national
Procurement Criteria (FI/SE) - Sustainable procurements	open-access	national
Procurement data of Greater Helsinki Region from HRI.FI (UK/FI/SE)	open-access	regional

Procurer data sets

The following list is work in progress and exemplary (e.g. some items need to be classified as case study lists etc). Work will proceed during Phase I and validated through joint meetings of Suppliers with relevant IT personnel at each site to ensure and expand access to relevant data sources.

Online Annual Report 2022 - Municipal Cleaning Services Berlin	open-access	Berlin	municipal
Resourcify Sustainability Index Report 2023	open-access	Berlin	national
Federal Statistical Office (Statistisches Bundesamt) - Waste management	open-access	Berlin	national
Share of processed and recycled municipal waste in the total amount of municipal waste	open-access	Berlin	national
Sustainable Development in Germany - Indicator Report 2022	open-access	Berlin	national
Berlin Climate Energy and Transition Act - EWG BIn 2016	open-access	Berlin	municipal
Reports on the yearly implementation of the Berlin Climate Energy and Transition	open-access	Berlin	municipal
The Energy Atlas Berlin	open-access	Berlin	municipal
Feasibility Study for Climate Neutral Berlin 2050	open-access	Berlin	municipal
BEK 2030 - Berlin Energy and Climate Protection 2030	open-access	Berlin	municipal
Waste balances of the state of Berlin	open-access	Berlin	municipal
Law to promote the circular economy and ensure the environmentally friendly management of waste	open-access	Berlin	national
Economic Atlas Berlin	open-access	Berlin	regional
Circular Economy Focus on Safety	open-access	Berlin	national

Annex II: Personas

The use of personas during the project is currently deemed optional.

The following information is supplementary. In case of any contradiction with the Challenge Brief, the Challenge Brief supersedes the following content.

Based on the user groups (Intermediary, municipal staff and Business), the following municipal (Table 1) and business personas (Table 2) were developed. The set and exact description is expected to evolve including through and driven by inputs from Suppliers in their application and during exchange in design of CE-solutions.

Table 1. Municipal Personas

	Intermediary	Municipal – Officer (any unit)	Municipal – Procurer	Elected Official
Personal Information	Sandy, 45  Consultant for circular economy	Richard, 32  Specialist in the infrastructure unit	Susanna, 40  Head of the public procurement unit	Nadeen, 57*  Mayor (politicians, local community, etc.)
Education/ Previous CE Knowledge	Sandy holds a Master's degree in Sustainable Engineering. She has 20 years' experience in CE for private and public sectors across multiple value chains and CE planning.	Richard completed his secondary education and technical domain-specific apprenticeship. He has 4 years' experience in public administration in a mid-sized city. He is not familiar with CE and has limited insights on recycling of materials.	Susanna has a Bachelor's degree in Public Administration. She has been working in procurement for 15 years. Her municipality wants her to implement circular principles, but she has only a basic understanding of how CE value chains works.	Nadeen has completed secondary education. She started as voluntary and she now holds a part-time paid position as mayor in a small rural town. The town recieves limited funding.
Motivations	Sandy aims to implement strategies for a future with lower emissions rate. She aims to help municipalities transit to circular systems and raise awareness about CE principles. She looks for collaboration with a varied group of stakeholders and municipalities.	Richard's motivation is to create positive environmental impacts through his work. He wants to encourage citizens to reduce consumption and waste and to engage stakeholders, within the municipal department and outside, to drive changes effectively.	Susanna's main motivation is to optimise procurement processes. She wants to implement a new strategy that is value for money and aims to buy resource-efficient goods. She believes that implementing CE principles can lead to more sustainable and long-lasting	Nadeen acknowledges the climate crisis and sees the increasing risks of natural disasters and limited resilience for her town. Nadeen wishes to act but is under permanent political pressure and has limited resources to create or approve comprehensive circular economy transition strategy.

			procurement decisions.	
Frustrations	Sandy sees that the public and officers know little about CE and circular design processes. As she wants to work with larger groups of municipalities and businesses, she does not have the means to reach and train them all. She is also worried about the lack of synergies between municipality departments and external partners.	Richard is concerned about inefficient waste management because citizens are unaware of the problem. It is difficult for him to measure the progress as there is no standardisation of processes. Specific CE matrices are unclear, which makes the work slower and more complicated.	Susanna sees the main problem on the way to implementing CE strategies in the lack of human resources and bureaucracy. To implement circularity in each procurement is time-consuming because it needs to be sourced and matched against moving targets. Election cycles and other external factors are also affecting her work.	Nadeen is currently a policy taker having to follow and implement federal and regional policies which are not properly targeting for the local conditions and economy. Rather than customising a long-term mission with departments she is merely pushing to ensure compliance and thereby public finance streams.
Desired Features	Sandy hopes for an effective tool for engaging and educating the public, local businesses, and other stakeholders about the benefits of CE practices. The tool should provide functions for lifecycle analysis, material flow analysis and circular design processes as well as context-relevant examples. She wants to facilitate pilot projects investing more in R&D. The process should become less bureaucratic.	Richard hopes to see the digitalised processes thus reducing bureaucratic red tape. He would like to develop innovative strategies to bring together SMEs with potential consumers. He wants better communication and synergies across public administration departments as well as virtual forums for various departments and stakeholders to brainstorm ideas and share challenges.	Susanna wants to have a user-friendly tool in the local language that will help her and her colleagues to validate circular requirements, measure value for money, and make work more efficient. She would like to see market research support for circular and regular products as well as a comprehensive database of (local) suppliers offering sustainable products and services.	Nadeen hopes for a reliable CE Mission which can be politically communicated and is operationally doable so that success is likely. The progress should be tracked and results communicated whilst producing compliant data. For bigger decisions (e.g. procurement), she hopes for clear information which compares costs as well as circular impact achieved in design and afterwards.

* Elected Decision Makers are not expected to be direct users of the CE-solution but make decisions with relevance for the CE-solution or based on output created by the CE-solution.

Table 2. Business Personas

	Business – Circular	Business – Linear
Personal Information	Alex, 35  CEO	Ahmet, 45  Business executive
Education/ Previous CE	Alex holds a degree in Sustainable Business Management. He has been working for 10 years in the sustainability field in a major city and has a background in industrial product design. Alex understands the role of CE in ensuring value chain sustainability.	Ahmet has a Bachelor's degree in Mechanical Engineering and 20 years' experience in a traditional linear business. Ahmet has a deep understanding of linear business operations but CE is a new field for him.
Motivations	As Alex sees the perspective of CE, he aims to promote sustainability by inspiring others to adopt eco-friendly practices. He wants to build partnerships with local governments and organisations to create a collaborative network focused on sustainable solutions.	Ahmet wants to be compliant with industry standards and aims to increase his commitment to sustainability. It will help him improve the company's long-term resilience and profitability and enhance his brand reputation.
Frustrations	**B2B**: Alex often faces scepticism from potential clients who are not accustomed to circular practices about the implementation of CE principles. This makes it difficult to bring new investments to his business and build new collaborations. **B2P**: For an SME, it is hard to bid for public procurements as they are often too large or require too many elements.	Ahmet worries about how to become sustainable without losing profits. Redesigning products and processes is especially expensive in the beginning. He has also found out the discrepancy in competence levels of companies and governments.
Desired Features	He would like to find more business clients willing to act circular and partnerships both on input and output side to increase the depths of circularity and find and innovate new CE practices. He wishes to interact with municipalities early to know reliably what is requested and hopes for features enabling him to find suitable partners for a bid.	Ahmet wants a tool that helps him to communicate with more experienced circular businesses and provides an open-source platform for database and data sharing because he prefers to rely primarily on data and analysis in decision making. He would also like to have a possibility to impact assessment of the transition from linear to circular economy.

Annex III: Results from focus groups

The following information is supplementary. In case of any contradiction with the Challenge Brief, the Challenge Brief supersedes the following content.

The content is a copy of content provided in deliverable D1.1. Requirements. Conclusions at the time (i.e. take away insights) have been removed in this annex.

Interviews and focus groups were conducted with relevant stakeholders and representative users from all sites. Based on the user groups defined, the participants were categorised as "Intermediaries", "Municipal users" and "Businesses".

The purpose of the focus groups was to gather insights from future users of the CircularPSP solution; how do they perceive CE practices in their organisation and which features are required to accelerate the CE transition.

Preparation of focus groups

Building on initial drafts by RISE and EMPIRICA the consortium jointly defined questions in a PowerPoint format. Three templates were prepared, one each for each user group. The majority of questions are shared across user groups with some additional questions for Intermediaries and Business. Once the set was agreed, procurers took a copy of the template and translated the slides into local language and occasionally selected or modified slides to serve the local context.

Procurers were individually in charge of recruiting participants of focus groups and organising the events. All personal detail remained solely at local level. The procurers conducted the events and subsequently analysed their recordings and reported their local results for each question.

Participants of the events were notified that they could be approached as test users at Phase 2 of the project (i.e. Case Study Support Team) and will be invited to test supplier solutions in Phase 3.

In total, 70 intermediaries, 60 municipal staff members and 69 business and SME representatives participated in the focus groups and interviews.

Structure of results

The analysis of the focus groups starts with the Common questions asked in each group. The results for each question are broken down per user group, and concluded with a take-away insight. Finally, specific questions for each user group are examined.

Common questions

Q1 – What do you understand by "circular economy"? (open question, all)

Intermediaries

There is overall agreement across sites concerning the circular economy's scope. It is understood as an approach to maximise resource efficiency (including water management) and durability of products, as well as to promote access to goods rather than ownership (e.g. new business models via servitisation was mentioned in Helsinki and London). The regenerative role of CE to combat climate change was also mentioned (Guimarães, Sandyford and London) Lastly, R-strategies[4] are well known and referred to during the discussion.

[4] The R-strategies based on the 9R Framework from Potting et al. (2017), model and constitute a conceptualisation of the circular economy, focusing on resource efficiency and extended durability. These strategies are refused, rethink, reduce, re-use, repair, refurbish, remanufacture, repurpose, recycle and recover.

Municipal staff

Most municipal staff members did not emphasise the R-strategies explicitly, except for the focus group in Helsinki and Guimarães. However, in all focus groups different R-strategies were mentioned separately. Several staff members highlighted the importance of closing the loop, by using resources as long as possible in the most efficient way and maintaining its value at the end of the life cycle. Waste prevention by changing the product design was another prominent answer provided.

Businesses and SMEs

A similar understanding as the one expressed by intermediaries. However, participants emphasised the role of CE in ensuring value chains sustainability, and the necessity to include the concept early on in the production process, e.g. through ecodesign. Additionally, the possibility of new businesses models was brought up recurringly in this user group across sites. Overall, R-strategies were not widely mentioned, and when referred to, it was mostly in relation to 'recycle'.

Q2 – How are you advancing circular economy in your sphere of influence? (open question)

Intermediaries

Several actions were mentioned, including short training offers (e.g. workshops or one-time session lectures) to raise awareness about CE potential, linking CE principles with local priorities and culture, or seeking partnerships/building communities to face CE from multidisciplinary approaches. Intermediaries in Sandyford explained how relevant stakeholders are trained through research. In Istanbul and Slovenia, waste management guidance and infrastructure popped up among participants as a relevant action (and the most developed, so far).

Overall, during the first set of questions, intermediaries shared several examples on the activities they implemented within their scope, and most of these were deployed without involvement of other stakeholders. Participants expressed a sense of dissatisfaction about CE's pace of development, linking it often to failures by the municipality, e.g. interventions not advancing as fast as needed/expected, coordination issues (further developed in next question). Where intermediaries were external actors (e.g. university or consultancy representatives) an experience of "disconnection" was described. Over the course of the following questions, the input shifted towards a gap analysis and the aspects which could be improved.

Municipal staff

The answers provided are biased by the departments and roles already applying circular principles which is often is only the waste department. The focus in some sites was on waste management and recycling (i.e. R-strategies with lower degree of circularity) instead of R-strategies achieving a higher degree of circularity (like refuse or repair)[5]. In contrast, other sites (Helsinki, Guimarães and Slovenia) explained that CE is included in procurement and policies by requiring reparable and reusable products for example. In Slovenia, several strategic documents, programmes and best practices were mentioned. A different angle was discussed in Sandyford, where circular solutions were applied to the housing crisis in Dublin.

Businesses and SMEs

Participants mentioned they were actively promoting products with less plastic (for packaging) or sustainable packaging, along with recycling and repairing as ways to deepen awareness about CE. In London, it was mentioned that although the term has gained momentum (mostly politically and ins strategic documents), there is still a need to operationalise it with surrounding concepts, such as carbon emissions and net-zero targets to further advance its measurement and avoid the

[5] Refuse, rethink and reduce are the strategies in the 9R Framework with higher degrees of circularity because the less inputs required. Recycle and recover are strategies with lower degrees of circularity because they require more inputs since the original structure or value is not maintained. Source: Gupta, N (2021) https://www.malbaproject.com/post/what-the-r-the-9r-framework-and-what-you-should-know-about-it

misunderstanding/misuse of the term (as in greenwashing, for instance). In Berlin, the discussion also emphasised the importance of extending products longevity in particular to reduce e-waste.

Q3 – Which of the following factors do you perceive as the most challenging to strengthening circular economy? (ranking, all with some fields varying across user groups)

Intermediaries

All sites stressed the need for speeding up awareness and cultural change within organisations, particularly local administrations, to combat the fear of change (or failure) around CE innovations. In Sweden, for example, intermediaries from four (out of seven) municipalities identified this as the most challenging factor. The former is also linked with the challenge of limited knowledge and expertise to foster awareness about the CE potential among decision-makers, also this factor was mentioned in every site. In Slovenia, intermediaries observed that public organisations do not have enough resources to educate their procurement departments around CE topics.

In general, intermediaries agreed that communication among agencies dealing with CE is limited and responsibility for those topics is scattered (particularly in Berlin and Istanbul). Usually, CE has been linked to waste management, and this needs to be broaden to other sectors/applications to make further progress. Additionally, participants of London's focus group stated concerns about a potential misalignment of expressed political will to advance CE and what local administrations do in their day-to-day activities/procurement. This can be explained by:

- Lack of guidance on how to apply CE in the procurement process.
- Insufficient representation of CE expertise throughout the procurement process.

Also, in London and Slovenia, intermediaries expressed that, there is often a fear of innovation or doing things differently embedded in some national or organisational cultures, hampering the development of CE pilots. This may result in a lack of circular business plans, which is identified as a challenging factor in Sweden.

Concerning the legal barriers, attendees to Slovenia's session mentioned that legislation is traditionally established to support the linear economy framework and this is currently an obstacle for CE solutions. Table 3 presents the results for this user group.

Table 3. The five most challenging factors to strengthen CE per site according to intermediaries

	Berlin	Guimarães (2)	Helsinki	Istanbul	London	Sandyford	Slovenia	Sweden	Count
Financial resources	✓	✓	✓	✓		✓	✓	✓	7
Technological resources		✓				✓			2
Knowledge/expertise	✓	✓	✓	✓	✓	✓	✓		7
Coordination across units	✓		✓		✓		✓	✓	5
Indicators, methods	✓			✓	✓			✓	4
Access to local economy (i.e. companies)								✓	1
Legal framework			✓	✓	✓	✓	✓		5

Awareness/ organisational culture	✓	✓	✓	✓	✓	✓	✓	✓	8

Notes: (1) in case of differences within one focus group or multiple focus groups, the selected factors correspond to the five most mentioned factors or, when this was lacking, discussion. (2) Guimarães only reported on the four most challenging factors.

Municipal staff

This question resulted in diverse answers. In six (from the seven participating) sites 'awareness and organisational culture' was identified as a barrier to strengthening CE. 'Coordination across units' was also mentioned in six sites. For example, in London, staff members experience difficulties with internal coordination to deliver a project.

Staff members also emphasised the legal framework as a challenge. A lack of knowledge and expertise was in five sites considered as a challenge, in Berlin municipal staff concluded that it still remains unclear what is really circular for example. A barrier identified in London was the lack of an established way of including CE in the procurement process. Other factors pointed out were that that the supply of circular products is too low (in Berlin) and that staff struggled with knowing where to find CE solutions (in London).

Finally, a lack of financial resources and a legal framework were often identified as barriers to implement CE. In Slovenia it was stated that the legal framework does not keep pace with the facilitation of CE solutions, in Berlin the staff concluded that the central government should be more active with the R-strategies. The specific results across sites can be found in Table 4.

Table 4. The five most challenging factors to strengthen CE per site according to municipal staff

	Berlin	Guimarães	Helsinki	Istanbul	London	Sandyford	Slovenia	Count
Financial resources	✓	✓		✓	✓		✓	5
Technological resources	✓	✓	✓		✓	✓		5
Knowledge/expertise		✓	✓	✓		✓		4
Coordination across units			✓	✓	✓	✓	✓	5
Indicators, methods						✓	✓	2
Access to local economy (i.e. companies)	✓	✓			✓			3
Legal framework	✓		✓	✓	✓		✓	5
Awareness/organisational culture	✓	✓	✓	✓		✓	✓	6

Notes: in case of differences within one focus group or multiple focus groups, the selected factors correspond to the five most mentioned factors or, when this was lacking, discussion.

Businesses and SMEs

A challenge identified in all sites is to find information on fiscal or financial incentives, attendees talked for example about difficulties in finding access to funding allowing them to pilot or implement novel CE initiatives. Businesses in all sites said they struggle to interact with the municipality, for example knowing who the relevant CE decision-makers are in local administrations. This suggests that exchange with municipalities needs to become easier to develop innovative ideas and co-create solutions around CE. Additionally, businesses voiced that benefits are not yet fully perceived by local administrators, which slows down the opportunities to discuss how the CE could help sorting out the sites' needs.

Private sector participants also expressed CE implementation has not kept pace and that skills, knowledge and expertise are lacking. This observation applies independent of how well the responding business knows CE.

Access to reliable market intelligence data also emerged as a challenging factor for companies to develop CE solutions based on updated consumer preferences (as stated in Slovenia). A final challenging factor discussed is the need for more awareness and behavioural change towards circular solutions (e.g. in Istanbul, refusing single-use plastic and migrating to products with sustainable packaging). Table 5 shows the results for businesses and SMEs for the different sites.

Table 5. The five most challenging factors to strengthen CE per site according to businesses and SMEs

	Berlin	Guimarães[3]	Helsinki	Istanbul	London	Sandyford	Slovenia	Count
Information on fiscal or financial incentives	✓	✓	✓	✓	✓	✓	✓	7
Technological resources								0
Skills/Knowledge/expertise	✓	✓	✓	✓		✓	✓	6
Coordination across units					✓			1
Market intelligence data (e.g. consumer behaviour/trends)		✓	✓		✓	✓	✓	5
Exchange with municipality	✓	✓	✓	✓	✓	✓	✓	7
Exchange/collaborate with other companies			✓					1
Indicators, methods, tools to track progress				✓				1
Legal framework	✓			✓				2
Awareness/organisational culture	✓				✓	✓	✓	4

Notes: (1) in case of differences within one focus group or multiple focus groups, the selected factors correspond to the five most mentioned factors or, when this was lacking, discussion, (2) the options for businesses and SMEs differ to the other user groups to capture specific challenges for this groups. (3) Guimarães reported on the four most challenging factors.

Q4 – Which features do you believe useful for a technological solution to advance circular economy? (ranking)

Intermediaries

Intermediaries brought up the need for a search engine for case studies, mentioned in seven sites. Participants explained that such an engine would be helpful to guide staff involved in CE processes and to create actionable steps to implement CE practices (mentioned in five sites). The actionable steps focus on e.g. required knowledge, differentiating among levels (in Berlin, this was referred to as a 'cities journey guidance', which is 'user-centred').

Additionally, it was noted that good practices should be context-relevant, i.e., regional or national examples, which are directly applicable to the site of interest (based on, for instance, municipalities' size, or capacity/knowledge level). The former points to the need for some sort of curated pool of options, which might vary from city to city. This was linked with the need to provide platform users with an estimated/potential impact (ex-ante) of such case studies based on the municipalities'

priorities (included in strategic views by government bodies or business associations) to facilitate the decision-making process, as well as monitoring. Table 6 tracks the results across sites.

Table 6. The five most useful features for a technological solution to advance CE per site according to intermediaries

	Berlin	Guimarães[2]	Helsinki	Istanbul	London	Sandyford	Slovenia	Sweden	Count
Actionable steps to implement CE practices	✓	✓	✓		✓		✓		5
Search engine for CE case studies	✓		✓	✓	✓	✓	✓	✓	7
Translation into local language							✓		1
Analysis tool (to estimate impacts locally)			✓	✓		✓	✓	✓	5
Integration with planning/management systems			✓	✓	✓	✓			4
Procurement information (e.g. evaluation criteria)	✓	✓			✓	✓	✓	✓	6
Automated monitoring & evaluation				✓		✓		✓	3
Online training content	✓	✓							2
Data gathering and analytics tools	✓		✓	✓	✓			✓	5

Notes: (1) in case of differences within one focus group or multiple focus groups, the selected features correspond to the five most mentioned features or, when this was lacking, discussion, (2) Guimarães reported on the three most challenging features.

Municipal staff

In all sites municipal staff members considered a potential analysis tool useful to advance CE to estimate impacts of case studies locally. In Berlin, from a range of existing tools, the Zero-Waste Agency was mentioned as positive example of an initiative that helps to quantify impacts.

Another prominent answer was the search engine for CE case studies, in Slovenia a search engine was considered as the most useful feature and in London it was even described as a ‘must’.

A third feature often mentioned was procurement information (e.g. evaluation criteria), in Helsinki assessed as the most useful feature.

In addition to the features listed in the table, staff members in Istanbul emphasised the importance of gaining access to intermediaries during daily work. The results for all sites can be found in Table 7.

Table 7. The five most useful features for a technological solution to advance CE per site according to municipal staff

	Berlin	Guimarães	Helsinki	Istanbul	London	Sandyford	Slovenia	Count
Actionable steps to implement CE practices	✓	✓		✓		✓	✓	5

Search engine for CE case studies			✓	✓	✓	✓	✓	6
Translation into local language			✓				✓	2
Analysis tool (to estimate impacts locally)	✓	✓	✓	✓	✓	✓	✓	8
Integration with planning/management systems	✓	✓	✓	✓	✓	✓		6
Procurement information (e.g. evaluation criteria)	✓	✓	✓		✓	✓	✓	7
Automated monitoring & evaluation		✓						2
Online training content	✓							1
Data gathering and analytics tools				✓	✓			3

Notes: in case of differences within one focus group or multiple focus groups, the selected features correspond to the five most mentioned features or, when this was lacking, discussion.

Businesses and SMEs

In general, businesses expressed that reliable, market exploitable data is lacking and that the CircularPSP solution needs to address this by offering a data gathering and analytics tool[6] that users can easily access. In Istanbul, some suggested to make this information accessible for everyone interested, which could lead to targets (e.g. x% of recycled content achieved) or impactful KPIs.

A second feature mentioned in six of the sites was the integration with planning and management systems. In London's focus group, businesses expressed that the solution should be integrated with existing procurement applications, as well as other data sources, which should also use standardised data for comparability (in Slovenia, link with open data was emphasised as a requirement).

Similar to the other focus groups, actionable steps to implement any given circular practice is a useful feature desired by almost all sites. Businesses in Berlin phrased this as tools to create actionable steps, because they experience that solutions from the market are not tailored sufficiently. Table 8 presents these results.

Table 8. The five most useful features for a technological solution to advance CE per site according to businesses

	Berlin	Guimarães	Helsinki	Istanbul	London	Sandyford	Slovenia	Count
Actionable steps to implement circular practices	✓	✓	✓	✓		✓	✓	6
Search engine for CE case studies			✓	✓		✓	✓	4
Analysis tool (to estimate impacts locally)	✓			✓	✓	✓	✓	5

[6] To this respect, the 'Circular Transition Indicators v4.0 – Metrics for business, by business', published by the World Business Council for Sustainable Development (WBCSD) is suggested by the horizontal partners as an up-to-date, relevant reference for measuring their circular performance.

Integration with planning/management systems	✓	✓	✓	✓	✓		✓	6
Better access to municipal procurement information		✓	✓		✓	✓		4
Online training content	✓	✓			✓	✓		4
Data gathering and analytics tools	✓	✓	✓	✓	✓		✓	6

Notes: (1) in case of differences within one focus group or multiple focus groups, the selected features correspond to the five most mentioned features or, when this was lacking, discussion, (2) the options for businesses and SMEs were slightly different to the other user groups to capture specific features for this groups.

Q5 – If you think of IT solutions for municipal staff, what makes them good and what makes them bad?[7] (open question, intermediaries and municipal staff)

This question was phrased slightly differently in the different sites. For instance, in Istanbul it was more general (IT solutions for the CE domain in general), in Helsinki it focused more on the administrations' procurement viewpoint.

Intermediaries

Good aspects that were mentioned related to an easy-to-use interface with readily available support, inclusion of SDG monitoring and evaluation (e.g. internal targets via dashboards) and compatibility with existing IT systems in the organisation. The training component also emerged, for example with transmedia content like articles and podcasts.

Participants explicitly mentioned bad characteristics of IT solutions, which refer to complex, non-intuitive designs, as well as limited integration with other data sources and transferability to other (Cities') platforms.

Municipal staff

An easy user interface was the most prominent and important aspect of IT solutions in municipalities. Other technical aspects mentioned were website-based solutions, integration with other municipal software and different levels of access rights. Next to technical aspects, a focus on CE and, for instance, on estimated CO_2 savings was stressed by focus groups in Sweden and Berlin.

Negative remarks focused on complexity of solutions. For example, in Slovenia systems were discussed which had too many unneeded features and poor interfaces. Other examples were large sets of unsearchable information (Sweden) or irregular updates (Istanbul).

Case study exercise to practice CE and trigger mindset

To lighten the focus group discussion and in order to give specific context, a short case-study was conducted. The case study focused on circular office furniture for a municipality or company, based on a two-step approach of which the second step is of relevance for the Common Challenge:

- Step 1: How could office furniture become more circular? (All possible R-strategies were shared with the participants).
- Step 2: What do you need to act on the case study (i.e. Workflow)?

[7] Although this question was initially proposed for all user groups, most procurers decided to address this only with the intermediaries and local administrations.

This section follows the same user-group structure as the previous section on Common questions. The case study was not part of every focus group.

Istanbul did not include intermediaries and businesses/SMEs for the case study, London conducted a case study focused on construction (excess material exchange) and a second on food procurement, intermediaries were not involved in both of these.

Q6 – Imagine you are in charge of the "Workflow" to make office furniture more circular across the city/your organisation: How could office furniture become more circular? How should the platform make the "Workflow" actionable? (open question)

Intermediaries

Intermediaries concluded in this case study that the entire process should be controlled by the municipality. Participants in Helsinki discussed a process model to make the platform actionable and they described such a model in detail, which included inventory management, quality examination and best practice evaluation. Similar conclusions were reached in most other sites, although intermediaries in Sandyford proposed a specific solution in the form of a marketplace for furniture swapping.

Regarding needs, two sites argued that a platform should be able to check availability of repair and reuse services. Related to reuse, intermediaries in Berlin expressed that there should be contact possibilities with other administrations to check whether there is a real need for new products. Specific needs discussed in Helsinki included evaluation criteria for best practices and information on successful use cases.

Municipal staff

Circular office furniture should comply with several criteria according to municipal staff, of which a modular and repairable design is most often mentioned. Related to the latter, a repair contract was considered in Sandyford. Other criteria discussed focused on the location of production (local or not), and whether the furniture is made from recycled and/or recyclable materials. Renting office furniture was overall considered as unfeasible.

Four sites identified inventory data banks as a need for reusing furniture. A second important need was a library with case studies available in local languages (reported by three sites). In London, staff members argued that municipalities should also engage with suppliers to understand what solutions are available on the market, suggesting an exchange feature between businesses and municipalities. A final need discussed in two sites was specific purchasing criteria for circular products.

Businesses and SMEs

Participants in this user group gave provided similar furniture requirements as municipal staff members. These requirements focused on the design of office furniture, which should be modular, repairable and made from recycled and recyclable materials. An additional aspect discussed in Sandyford was the sourcing of materials, for example the origin of wood. Interestingly, one participant in Berlin did consider furniture renting as a possible option, as opposed to the municipal staff members.

Needs discussed in these focus groups varied among the participants. Businesses in Helsinki discussed the need for winner cases of procurements and information on how CE is embedded in public procurement. In Berlin a CO_2 savings calculator was considered as an important feature for a platform.

Specific questions intermediaries

Q8 – Our current thinking (simplified), what do you think? What is missing? (open question)

This question focused on the three main pillars of the CircularPSP project. These are:

AI applications (participants were triggered to consider ChatGPT as an example)

Overall, the link with generative AI was deemed positive among intermediaries as it can increase end-user efficiency. In Berlin, it was mentioned that it should be open source. Participants also stated that it could be applied to suggest new interventions/projects based on available data and needs, offer real-time notification for projects, and model the tendering process and steps (Istanbul). Attendees highlighted the need to ensure data security and comply with trustworthy AI principles.[8] It was also suggested to assess different AI approaches, including the ones that allow real-time internet connection. Interestingly, in Guimarães and Istanbul, it was mentioned that one application could be using AI to translate technical and academic terms and discussions into understandable insights for non-specialised audiences to facilitate engagement.

CE platform for municipal staff and local businesses

It was suggested to be broad in scope (include different dimensions) and to avoid complexity. Similarly, it should be integrated with as many existing platform services (hosted by the municipality) and data sources as possible. This will help expand the CE ecosystem by facilitating access to information and insights from previous projects or research (and related service delivery). Participants also mentioned that it should enable searching for new business model opportunities. When asked about applications, one focus group said it should support industry applications, like those around *industrial symbiosis*, such as a materials and by-products marketplace. Particularly, participants to Helsinki's session also brought up viability questions about such a platform (e.g. who would ultimately own and maintain the platform? How would it be sustainable after the project ends? And what could be examples of commercial, economic or societal features that ensure engagement of external actors (businesses, associations and civil society organisations)?

Templates for circular action

In general, this was deemed helpful for replicability purposes (as it can increase efficiency), but it was mentioned that it should be flexible to account for different city contexts. Attendees also highlighted that these need to be set out as a solution to a specific problem and suggested focusing on reducing waste generation and accompanying such templates with goals and Workflows (discussed in Istanbul's session). As a reflection, participants to Slovenia's focus group said this would ultimately reduce the procurers' workload and empower them to expand CE solutions through their tendering processes.

Missing aspects

Lastly, participants were reminded to state missing elements which should be considered in the context of the CircularPSP project. These were the most discussed ones:

- Although the CircularPSP solution should solve local problems, it needs to consider, from its inception, how to facilitate exchange across participating sites to promote mutual learning and replication of good practices.
- The awareness-raising and educational component needs to be strengthened, particularly among the users not involved but relevant to the process, e.g. staff working on legal departments to make them aware of the importance of innovative CE solutions, as well as average citizens, who influence the service delivery design deployed by the local administrations. Therefore, education around basic questions (e.g. Why does CE matter? What is its ultimate goal? Or how does that affect my working performance/life).
- It could make a more explicit link to how the project contributes to the Sustainable Development Goals (SDGs), i.e. how it helps municipalities to fulfil their commitments in this regard.

[8] To this respect, the project has already started assessing how this needs to be addressed, particularly in relation to the Ethics guidelines introduced by the European Commission, available here: Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self-assessment | Shaping Europe's digital future (europa.eu).

- Concerning the technology, some intermediaries suggested considering solutions based on Distributed Ledger Technology (DLT) and Blockchain.

Q9 – Planning the transition to Circular Economy: Where does your city stand? What do you need? (open question)

Overall, intermediaries expressed that CE is a well-positioned topic in their Cities and has gained political momentum (note, the selection of Cities represents leading CE Cities in Europe). However, this has yet to be fully translated into concrete actions by administrations to implement more CE solutions[9]. Although citizens have also become more aware of the potential of CE, this process is far from generalised. It requires tailored awareness raising to speed up CE by appropriately responding to the different knowledge needs of society (e.g. interested, responsive users *vis-à-vis* less exposed ones, such as pupils and youngsters).

Intermediaries mentioned that necessary factors to ramp up CE include: exchanging about municipalities' experiences and knowledge gained with their strategies (mentioned in all sites), promoting public-private partnerships in strategic sectors, encouraging transparency by releasing data on operation and process explanations (mentioned in Helsinki) and incentivising the establishment of the reuse and repair sectors (expressed in Sandyford).

Q10 – What else is needed on City level to accelerate the transition towards circular economy? (open question)

Attendees emphasised that organisations, and particularly all units within local administrations, need to be convinced about the potential of CE. Therefore, tailored approaches to awareness-raising and capacity-building for administrations were recurringly mentioned across sites (and must involve citizens as they are service delivery users and potential customers of CE businesses). Additionally, intermediaries in Sandyford expressed that promoting a more active use of baselines is needed to have evidence-based insights about CE impacts. Attendees also reflected on the opportunity that R-strategies pose for business resilience, as, for instance, scarce resources can be recycled, reused or remanufactured, which makes businesses less dependent on imports.

Participants in Helsinki's focus group stressed that more pilots must be in place, requiring legislation and legal provisions to adapt to new policy instruments to deepen CE. The former goes along the lines of what was mentioned by several stakeholders as a challenge in Q3.

Specific questions municipal staff

Q7 – What else is missing so that you and your colleagues can further advance circular economy in your city? (open question)

A wide range of answers to this question was provided by municipal staff. In Sandyford and Berlin, it was argued that municipalities should have criteria and tender guidelines on how to work with CE and circular companies. Related to this, a common definition of CE was desired by municipalities in Sweden and Slovenia. Involving stakeholders with a platform where citizens and entrepreneurs can submit ideas and proposals was an idea discussed in Istanbul. More specific platform needs were mentioned in Sweden, like the inclusion of CPV-codes and tools to make calculations in Swedish krona.

[9] Although it is important to note that CE strategies exist (at different levels) in all sites, and this constitutes a first step towards a new economic paradigm focused on circularity.

Specific questions businesses/SME

Q11 – Have you ever bid for a local tender (any, including circular)? Describe your experience (open question):

The discussion shows that the experience of businesses and SMEs with public tenders is heterogeneous. Some companies express their willingness to bid, although the success rate is usually moderate, while others declare not to be interested due to how cumbersome the process can get. Several representatives agreed that, in most cases, the procedures are lengthy and challenging to grasp, specifications are complex (several administrative requirements which come out as a burden), and tenders are not widely advertised. Also, information about future calls is not easily available (announced in advance), which subtracts companies' ability to prepare in advance.

When referred to opportunities for CE, several participants across the sites said that it is still a very underdeveloped area, as most tenders are looking to buy (as opposed to acquiring access via subscription services) or are unaware of CE solutions. Some expressed that the tender budget is not realistic for such applications, capping it at a value below the production costs. The former was interpreted as a signal of the limited knowledge of certain administrations about the actual cost of these solutions. Also, in some cases, due to a lack of systems integration, companies need to sign up under different platforms, deterring them from bidding. This points to the need for solutions that integrate information from municipalities and web portals as much as possible, to facilitate businesses' participation. To this extent, local administrations could induce market demand by prioritising procurement based on reused, recycled, remanufactured or other goods based on production that follows the R-strategies.

Q12 – How could your company collaborate with your local administration to strengthen circular economy in your city? (open question)

In most focus groups, business representatives emphasised that awareness campaigns are still needed, and suggestions to move forward include collaboration via public-private partnerships focused on concrete examples. Similarly, participants suggested that local administrations provide more information on e-waste and improve the recycling infrastructure. Attendees stated that making a case for CE requires further endeavours to illustrate how new business models can be used to sort out the sites' needs (e.g. via practical examples of how servitisation can substitute typical procurement) and train staff within administrations (including procurement, legal and technical civil servants).

Annex IV: Survey among other procurers

The following information is supplementary. In case of any contradiction with the Challenge Brief, the Challenge Brief supersedes the following content.

The content is a copy of content provided in deliverable D1.1. Requirements. Conclusions at the time (i.e. take away insights) have been removed in this annex.

A survey was developed and conducted to gain more information from other Cities and organisations facing transition towards CE. An extensive process to develop the survey took place, in which all procurers and other partners in the consortium provided feedback. Different types of questions were designed, i.e. open questions, scale questions and closed questions. In total, 18 questions were designed and agreed upon by all procurers. Finally, all the questions are were translated into each local language.

The objective of this survey was to gain insights in the following subjects:

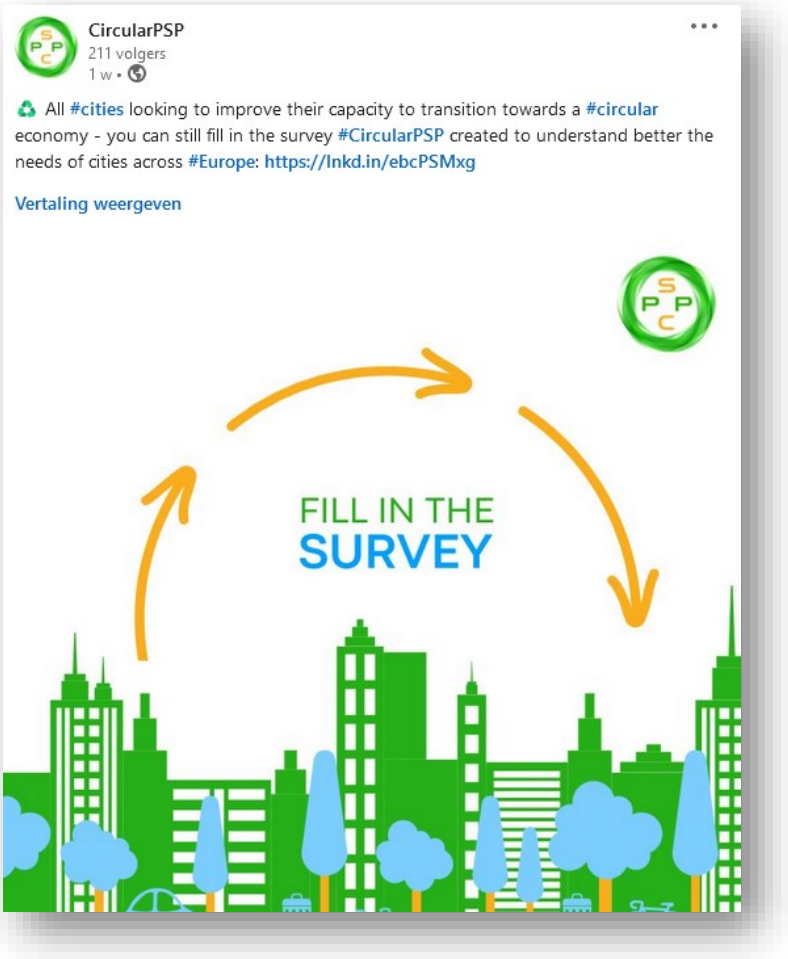
- Perception of CE expertise, strategy and staff in the municipality/organisation.

- Challenges and obstacles regarding CE implementation in the municipality/organisation.
- Requirements and features of a CE-solution.

The survey follows a structure in which these subjects are successively addressed. It starts with an introduction, followed by a section focused on CE practices and ends with a section on challenges and needs.

The survey was promoted in several ways, social media posts were made on LinkedIn, Twitter and Mastodon, see Figure 2 for an example. Additionally, a link to the survey was shared during all Open Market Consultations (OMCs) and on the CircularPSP website. Procurers promoted the survey in their local language as well via their own dissemination channels.

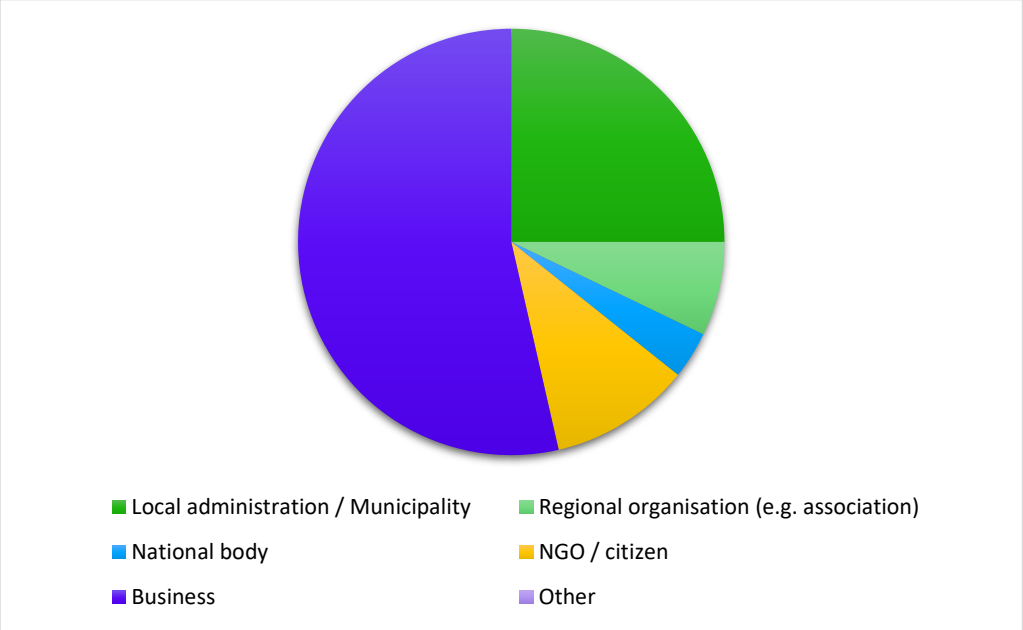
Figure 2. LinkedIn Post Survey



Respondents' profile

The survey was aimed at municipalities and organisations in all procurer countries, and from almost all the procurer countries people filled in this survey. The local administration in Berlin was well represented, but also two businesses from London and even a public health organisation from Greece participated. In total, 25 responses were collected. Figure 3 shows the different types of organisations that participated in the survey. 75% of the respondents consisted of only two groups: almost half of the participants were representatives of businesses, followed by more than a quarter of employees from local administrations or municipalities. Other participants represented national bodies, regional organisations or NGOs.

Figure 3. Results of question 2: Please indicate the level of the organisation you represent



Survey results

Perception of CE expertise, strategy and staff

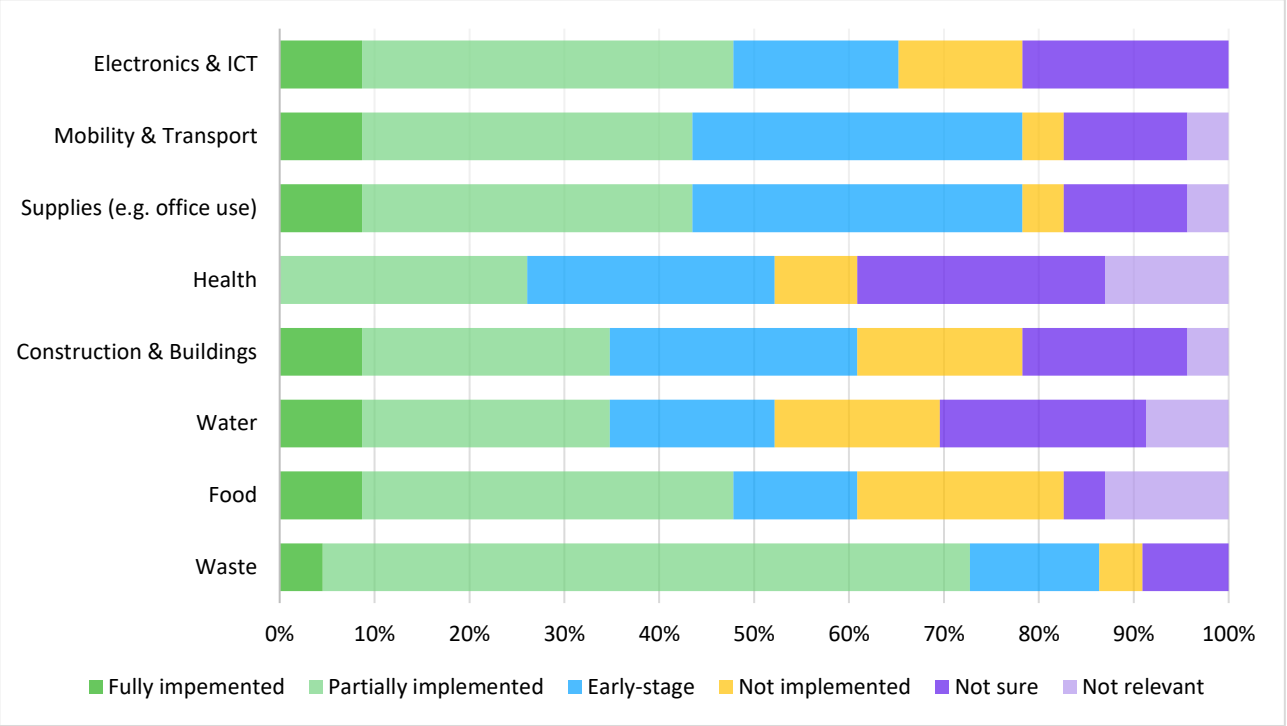
The first part of the survey focused on the CE expertise in the respective organisation, followed by the CE strategy, details on staff members working on CE and finally trainings.

Question 3 showed that a vast majority of the participants rated their CE expertise at seven or higher (out of ten). More than 25% rated their CE expertise even at nine out of ten. This reflects that the survey was most likely answered solely by persons who are already active in the field of CE and not by regular staff. This follows from survey dissemination addressing those interesting in the topic. The approach of a wider selection of staff was achieved through focus groups.

Question 4 was an open question asking for examples on how respondents are working with CE. Answers differed from waste management, sustainability consultation to concrete measures like avoiding plastic cutlery at events.

Similarly, 60% of the participants answered to question 5 that their respective organisation has a CE strategy. A clear difference between businesses and municipalities is noticed here, 38% of the businesses answered that there was a CE strategy, compared to 56% of the municipalities.

Figure 4. Results of question 6: Considering the following areas of relevance for Circular Economy, can you please rate how implemented they are in your city or organisation?

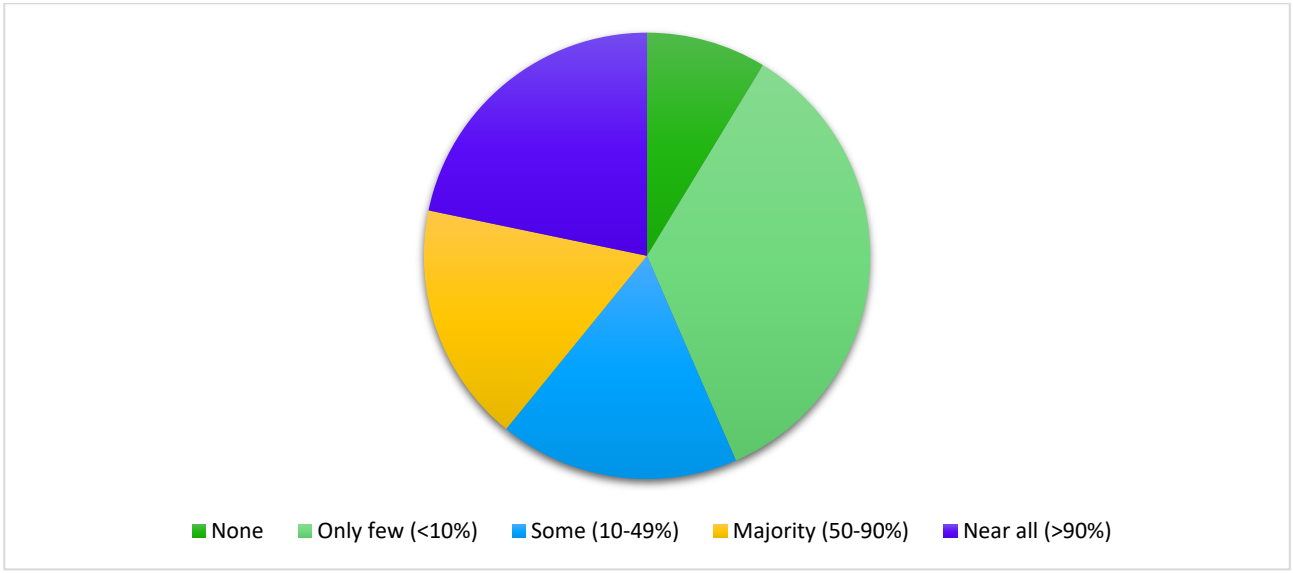


Question 6 asked about the relevance of eight areas for CE and to what extent CE is implemented in each area. Figure 4 shows that the outcomes varied a lot, but for each area most respondents answered that CE is not fully implemented in these eight areas. In six areas, only 8.7% of the respondents answered that CE is fully implemented, in the health domain nobody considered CE fully implemented. A substantial part of the respondents thinks that CE is partially implemented, in every area this share is at least 26% and in the domain of waste 68% of the respondents considered CE partially implemented. Interestingly, 13% of respondents considered CE not relevant in the domains of food and health.

Questions 7 asked whether a permanent CE expert is working across departments and (if yes) question 8 on how much time this expert allocates to CE tasks (question 8). A clear majority of 64% noted that there is a permanent CE expert working, but only in 25% of the cases this was exclusive dedication. 45% of the respondents stated that this expert allocates less than 50% of his/her time to CE tasks.

Question 9 focussed on the proportion of staff that implements CE principles, Figure 5 gives an overview of the answers provided. In most cases (35%) the respondents stated that only a small proportion of staff members is implementing CE principles in the respective organisation. The other answers were quite equally divided, 17% noted that some (between 10-49%) staff members are implementing CE practices, 17% said the majority and 17% said near all. Subsequently, question 10 asked whether staff has access and time for training on CE principles and strategies. A majority of 60% indicated that there is access and time for this.

Figure 5. Results of question 9: What proportion of staff is implementing circular economy principles in your city or organisation?



Question 11 was an open question about the precise amount of time of and type of training. The answers did not provide new information.

Take-away insights: Respondents perceive their CE expertise and strategy in general positively. The availability of resources in terms of experts, time and training seems to be an area of improvement.

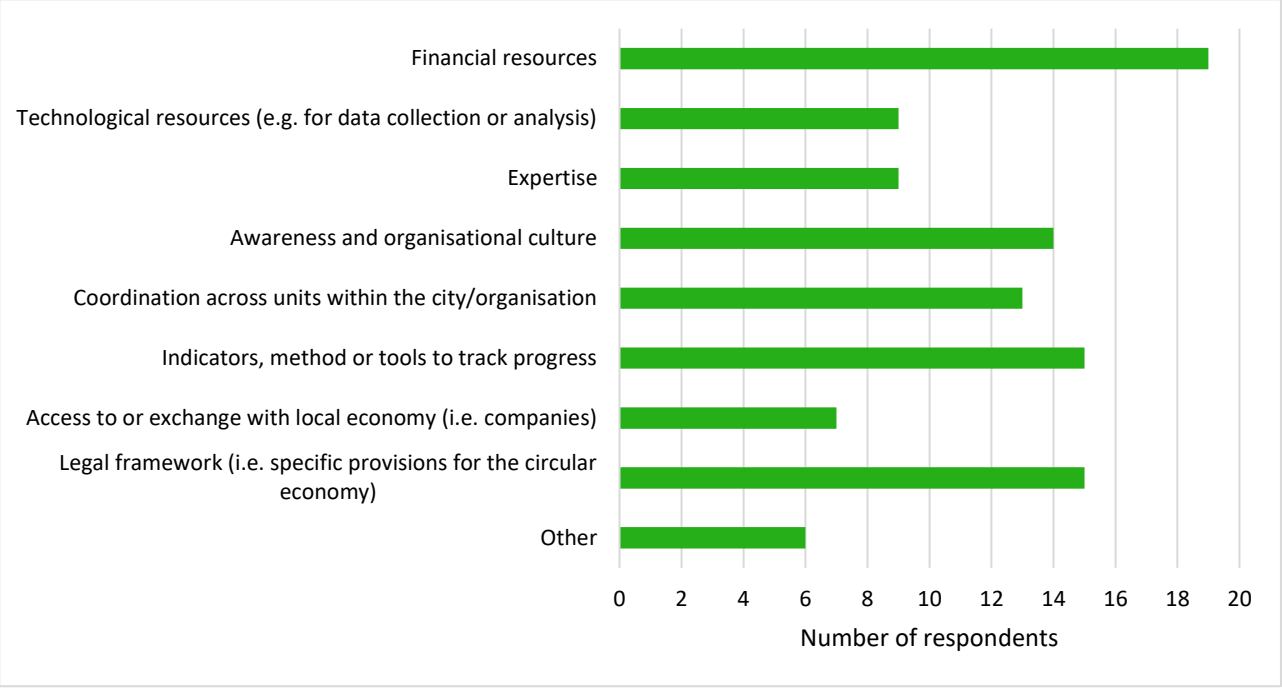
Challenges and obstacles regarding CE implementation

The second part of the survey consisted of challenges and obstacles regarding CE implementation.

Question 12 was an open question asking what respondents perceived as the greatest challenge for CE. Many different answers were provided, but a lack of investments and knowledge recurred often. Related to a lack of knowledge, a frequent response was that there is a general misunderstanding of CE. One respondent argued that many people consider CE as exclusively one activity (often recycling), not ignoring thereby R-strategies with higher degrees of circularity. Another interesting answer mentioned multiple times was the discrepancy between the willingness of citizens to become more circular and their consumption in reality.

Question 13 asked respondents to identify core obstacles in widening and/or deepening CE practices, see Figure 6 for the details. In accordance with question 12, financial resources are perceived as core obstacles. 15 respondents also identified the legal framework and indicators, methods or tools to track progress as core obstacles. Regarding the latter, only two municipalities identified indicators, methods or tools as an obstacle, compared to six businesses. A lack of awareness and organisational culture is also different perceived by these user groups. Only one municipality indicated that this was a core obstacle, compared to eight businesses. A final core obstacle mentioned equally by all respondents was coordination across units within the city/organisation, which is indicated 13 times.

Figure 6. Results question 13: What are your core obstacles in widening and / or deepening Circular Economy practice?



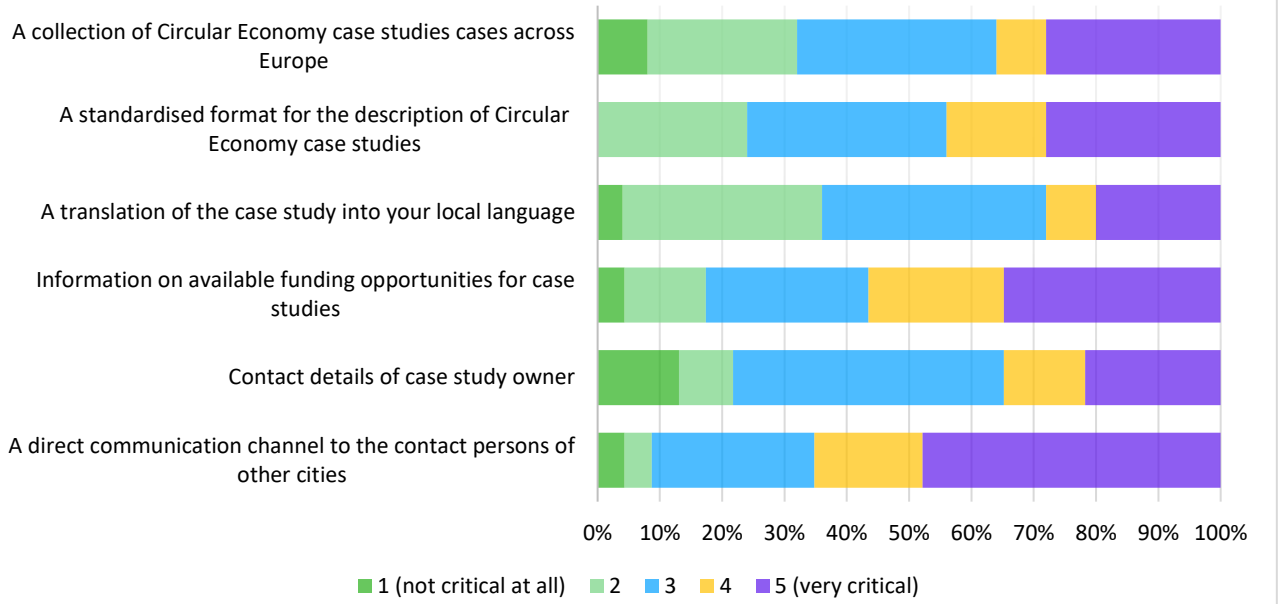
Take-away insights: Overall, respondents identified financial resources as the core barrier to progress on CE practices. Other barriers indicated were indicators to track progress or the legal framework. Businesses perceived awareness and organisational culture more as a challenge than municipalities.

Requirements and features of a CE-solution

The final part of the survey focused on the desired requirements and features of the CircularPSP solution.

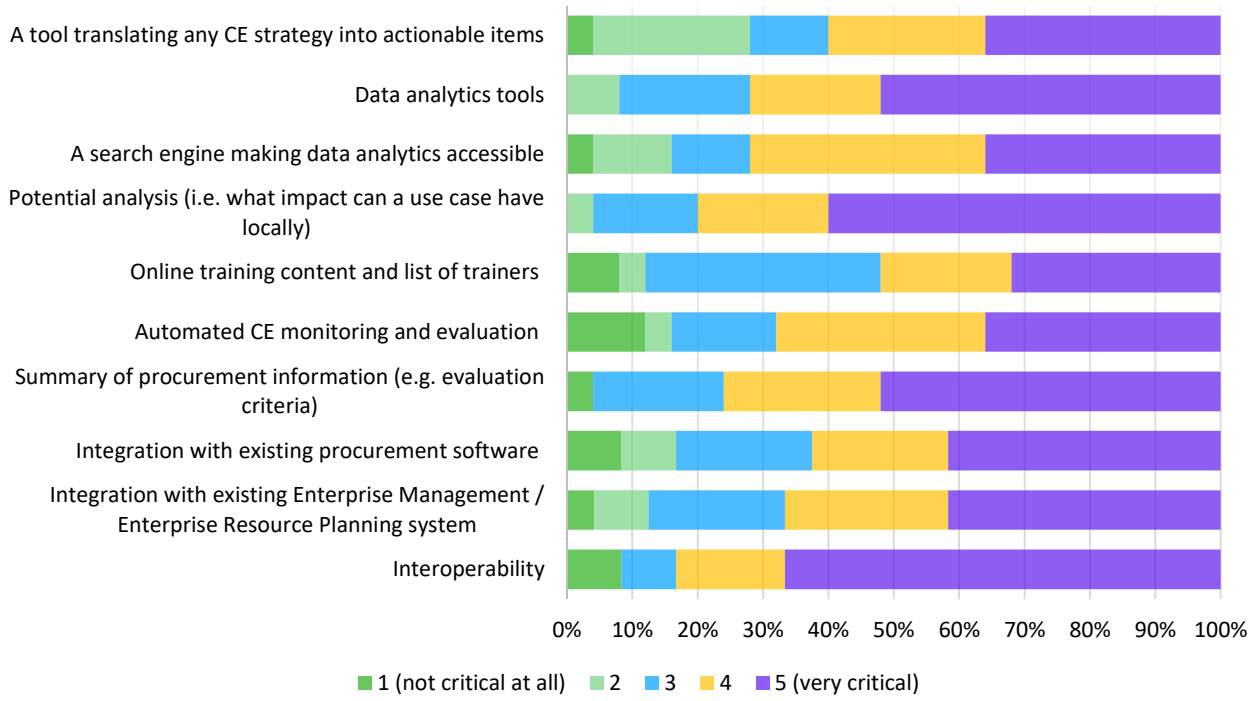
Question 14 asked respondents about the importance of six resources, as shown in Figure 7. Respondents rated six resources on a scale from not critical at all to very critical. Almost half of the respondents stated that a direct communication channel to contact persons of other Cities is critical. Another resource perceived as critical (22%) or very critical (35%) was the need for information on available funding opportunities for case studies. A third resource that a substantial share (44%) of the respondents considered as critical or very critical was a standardised format for the description of CE case studies. Contact details of the case study owner, or translations of case studies in local languages were perceived as the least important resources. Overall, most resources are deemed to be important to at least some extent, a rating of “not critical at all” or “not critical” is not indicated by more than one third of the respondents for any resource.

Figure 7. Results of question 14: Please rate how important the following resources would be for your city or organisation to learn about Circular Economy.



Question 15 shifted the focus from the importance of resources to the importance of features of a CircularPSP solution. As shown in Figure 8 respondents rated ten features on a similar scale as in question 14. Two-third of the respondents indicated interoperability as very critical for a solution, 17% as critical. A potential analysis feature to estimate local impacts of use cases was also considered important by the majority of respondents (60% rated very critical and 20% critical). Related to an analysis feature, data analytics tools are perceived as critical or very critical by 72%. More than three quarters of the respondents also desired a feature in which procurement information is summarised, for example with evaluation criteria. One of the least important features according to the respondents is a translation tool in local language, as similar to question 14. However, overall the respondents indicate that all the features listed are to some extent critical, a rating of “not critical at all” or “not critical” is for almost every feature indicated by less than 25% of the respondents.

Figure 8. Results from question 15: Please rate how important the following features of the intended web-platform would be for you to widen and/or deepen Circular Economy practice in your city/organisation.



Question 16 asked which procurement and/or enterprise management software was used by the respondents, the results are not considered as relevant for this report.

Question 17 was an open question about other features that a cross-city circular economy platform should provide. Again, a wide range of answers was provided, amongst others: The platform should contain information on supply and demand for materials (for example with CPV codes) and on other platform users. Other features mentioned were a compilation of good practices, carbon accounting, and predictive analytics including benchmarking.

Take-away insights: Respondents rated a direct communication channel to contact persons of other Cities as the most critical resource for a solution and interoperability as the most critical feature of a solution. Analysis and data analytic tools are other features considered to be important to assess and evaluate impacts. Overall, only a small share of the respondents indicated features as non-critical, indicating that all features are perceived as important to some extent.

Question 18 had a promotional purpose; the results are therefore not relevant for this report.