Developing and Validating the Co-Creation Rainbow Framework: Assessing Whether Methods Enact Co-Creation Characteristics in a Mixed-Methods Health CASCADE Study

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Introduction: Empowerment, participation, collective creativity, collective intelligence, and decision-making are recognized as essential characteristics of co-creation. The operationalization of these characteristics relies on consideration of whether the methods employed in the process truly enact them. This requires a framework to guide the selection and comparison of methods.

Methods: We conducted a systematic screening and extraction of features from established models and frameworks that aligned with co-creation characteristics. This was followed by iterative testing to identify key features for differentiating methods, which were then incorporated into an integrated framework. The framework was subsequently validated by 12 co-creation researchers using the closed card sort method. To further refine the framework, the researchers reflected on the sorting outcomes and framework usability in a qualitative feedback form.

Results: This study created a framework called the Co-Creation Rainbow framework. It is composed of an Individual-to-Collective Continuum, five sections (Informing, Understanding, Stimulating, Collaborating, and Collective Decision-making), and three themes (Engage, Participate, and Empower). Our analysis of the closed card sorting results demonstrates the researchers successfully sorted 70% (n=436) of the methods into the framework. Additional assessment of the sorted methods uncovered a notable disparity in how researchers and practitioners engage in co-creation, particularly concerning the methods they employ.

Conclusions: The Co-Creation Rainbow framework places methods at the core of co-creation, enabling researchers and practitioners to plan, assess, and report on their processes in a structured, evidence-based manner. Acknowledging the diverse nature of co-creation, the framework emphasizes the absence of a one-size-fits-all approach, highlighting variations in collaboration depth and breadth among methods. Offering a structured language for the diverse methods used in co-creation establishes a scaffolding for comparing methods in a way that fosters transparency about the authenticity of co-creative endeavours.

Introduction

Co-creation is any act of collective creativity that involves a broad range of relevant and affected actors in creative problem-solving that aims to produce a desired outcome [1]. Co-creation involves more than the participation of any single group of actors. It is the collaborative engagement of stakeholders who are impacted by or can influence a defined problem [2]. This paper is grounded in the literature that highlights the essential characteristics of co-creation, namely, empowerment, participation, collective creativity, collective intelligence, and decision-making [3–14].

Enacting Co-Creation Characteristics

Methods are used to enact the principles, attributes, or characteristics of a methodology. Therefore, the successful application of the above-mentioned co-creation characteristics relies on thoughtful consideration of how they are enacted by methods used during the process of co-creation. A recent study by Grindell et al. (2022) emphasizes the importance of making principles visible and illustrates how methods contribute to defining and solving problems collectively [15]. Thus, planning a co-creation project requires not only consideration of the desired outcomes but also understanding how co-creators work together in each step with the use of various methods.

To successfully employ co-creators in shaping desired outcomes, individuals responsible for designing a co-creation process must possess an understanding of which methods enact different co-creation characteristics. Figure 1 below illustrates how methods can enact co-creation characteristics with an example co-creation project. The figure includes an illustrative example sourced from the 'Health CASCADE Co-Creation Database' version 1.5 [16]. In the example, Ghaziani (2020) conducted a co-creation project by using three methods

to engage co-creators in shaping spaces across two Primary Schools: drawings, model-making, and questionnaires [17]. As shown in the figure, since they did not employ any decision-making methods, two of the characteristics were not enacted in this project, empowerment, and decision-making.
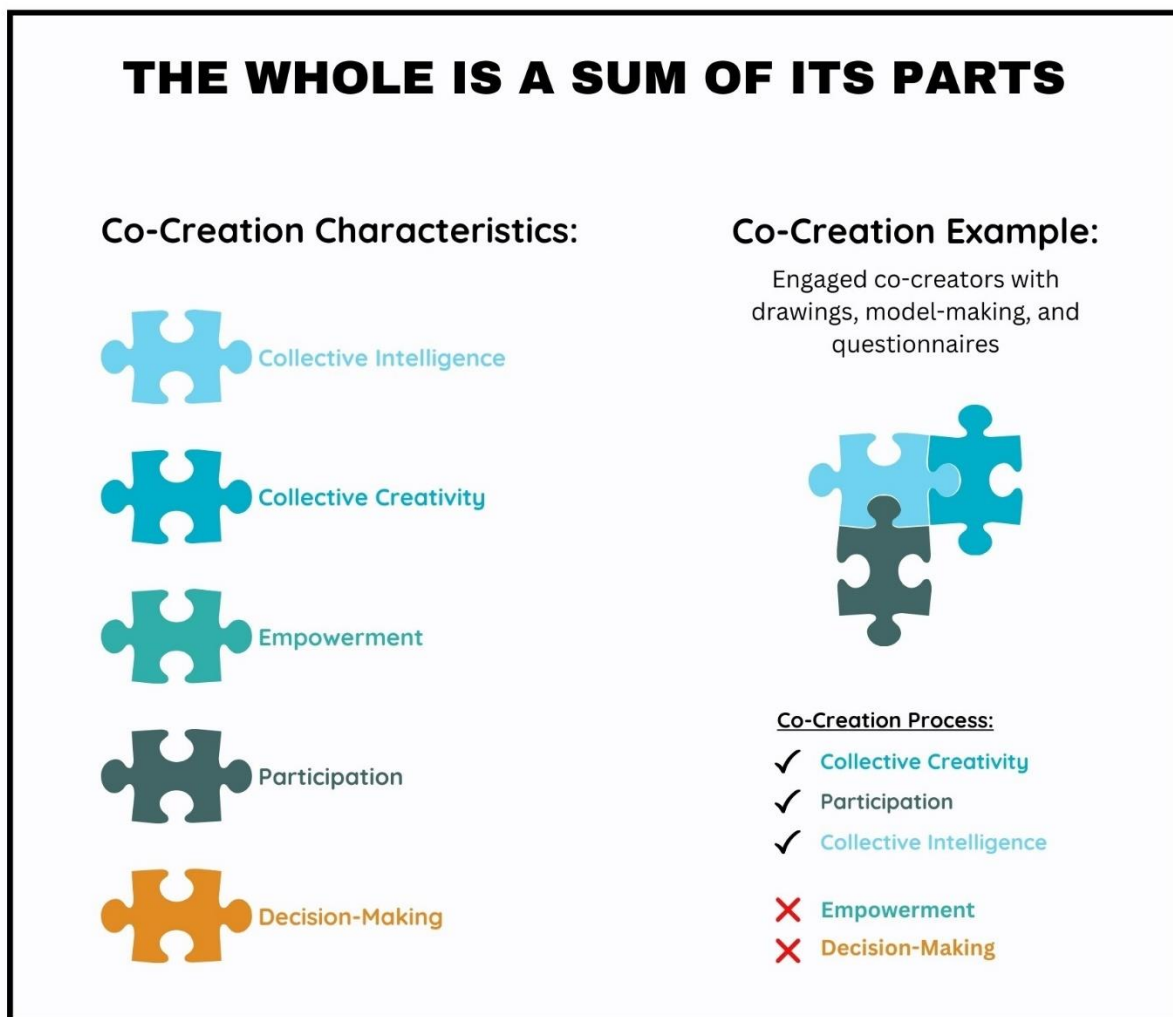

Figure 1. *Co-creation characteristic enactment by methods. Illustrative example by Ghaziani (2020) conducted a co-creation project by using three methods to engage co-creators in shaping spaces across two Primary Schools: drawings, model-making, and questionnaires.*

Despite existing process models for participation and empowerment, a gap remains in assessing the contributions of individual methods to the co-creation process. Existing models, such as *the Public Engagement Onion*, *Arnstein's Ladder of Citizen Participation*, and the *Engage-Participate-Empower Model*, primarily focus on assessing the overall co-creation

process, neglecting the important contributions of each method used in the process [7,18–20].

As described above, the added value of co-creation lies in its capacity to channel key characteristics that foster innovative problem-solving. This study aims to fill a critical gap in the assessment of methods used in the co-creation process. It seeks to create an integrated framework that offers a systematic approach to comprehending and implementing co-creation characteristics with methods. The development and validation of such a framework can transform the way researchers think about methods used in the co-creation process. It can also serve as an efficient tool for researchers and practitioners, aiding them in navigating the intricate landscape of this resource-intensive methodology.

Materials and Methods

The methods section is divided into three parts: 1) describing the working definitions that inform this study, including the establishment of new definitions; 2) the framework development; and 3) validating and finalising the framework.

Definitions

The following are the definitions used in this study.

Collective Decision-making: Due to the collaborative nature of co-creation, we adapted the Amorim and Ventura (2023) definition of shared decision-making (which refers to patients and doctors making decisions together) to create a new definition of collective decision-making in co-creation [21]. *Collective decision-making is the coordination of the decision-making process, involving every co-creator in a manner that harmonizes with their common*

priorities and overarching objectives. This approach ensures that decisions are reached

collaboratively, fostering a sense of shared ownership and commitment among all co-creators.

Empowerment: "Empowerment is a multidisciplinary concept with no universally accepted definition" [7]. Therefore, the definition of empowerment for this study was adapted from Weidenstedt (2016) and Steiner and Farmer (2018) to create a new definition of empowerment for co-creation [7,22]. *Empowerment is the process wherein power is transferred from one entity (Agent A) to another (Agent B), signifying a transformative journey from a condition of powerlessness to a state of relative control. This includes a transfer of authority in decision-making processes*.

Collective Intelligence: we applied the Nguyen et al. (2018) definition of collective intelligence. *Collective intelligence is defined as shared intelligence emerging from a group of people when they work on the same tasks, which could result in more innovative outcomes than when individuals work alone* [23].

Collective Creativity: We used the Harvey et al. (2013) definition of collective creativity. *Collective creativity occurs when group members stimulate one another's divergent thinking, and their individual ideas are aggregated into the group's creative output. Explanations for collective creativity are then based on how the group's cognitions, dynamics, and environments affect the creative process* [24]*.* It is also referred to as creative collaboration or participatory creativity [25].

Framework Development

The development of an appropriate framework for assessing whether methods enact the above-mentioned co-creation characteristics (e.g., empowerment, participation, collective

creativity, collective intelligence, and decision-making) consisted of two phases. The first phase screened and extracted existing models, and tested if these existing models could assess methods sourced from co-creation projects. The second phase focused on the creation of an integrated framework.

Phase 1: Systematic Screening and Testing of Existing Models

The method for finding relevant models was designed following the de Koning et al. (2016) approach [3]. This involved conducting multiple searches in Google Images. To generate the search strategy, search term 1 and search term 2 were combined with an AND. Table 1 visualizes the search term combinations applied in Google Images.

Table 1. Search Term combinations for the Google Images Search

Search term 1	Search term 2	Search term 3
Model	Participation	
Framework	Participation	
Model	Empowerment	
Framework	Empowerment	
Model	Collective Intelligence	
Framework	Collective Intelligence	
Model	Collective Creativity	
Framework	Collective Creativity	
Model	Decision-making	Co-Creation
Framework	Decision-making	Co-Creation
Model	Methods	Co-Creation
Framework	Methods	Co-Creation

Search term 3, co-creation, was only used in combination with search terms: 'decision-making' and 'methods.' This was because 'decision-making' and 'methods' are both broad terms on their own, and adding in co-creation makes the search results more applicable to this study. This was not the case for 'participation' and 'empowerment,' because these terms are already connected to the engagement of people in a participatory, or co-creation process.

Furthermore, 'collective intelligence' and 'collective creativity' are specified terminology, so there was no need to combine it with co-creation.

Due to the high number of search results for the Google Images search, as suggested by the de Koning et al. (2016), when repetition was apparent at around 100 images, with almost no new relevant images found, this served as the stopping point [3]. Once the search was conducted, the models were screened with the selection criteria in Table 2.

Table 2. Selection Criteria for the models

Inclusion Criteria	Exclusion Criteria
Contains the name of one or more co-creation characteristics (e.g., empowerment, participation, collective creativity, collective intelligence, and decision-making).	Does not contain any of the co-creation characteristics.
Is clear and concise in both language and the image quality.	Is unclear and difficult to understand based on the image.
Is not specific to a certain field (psychology, health services, etc), and can be used in different sectors or methodologies.	Is designed for a specific field of research (e.g., environmental science, physical activity).
Is written in English.	Is not written in English.

Models adhering to the inclusion criteria were extracted. Subsequently, these models underwent a second screening to determine their applicability in assessing methods employed in specific steps of the process, rather than the entire co-creation project. Inclusion criteria considered models that provided example methods within specific features or offered a clear description facilitating the integration of methods. Models meeting these screening criteria proceeded to phase 2.

Phase 2: Creating the Framework

The creation of the framework involved an iterative consensus-building process with co-creation experts from the Health CASCADE network[1] (AS, DMA, MV, and NS). Included models were tested on a subset of extracted methods to evaluate their efficacy in method assessment. If a feature of the model or the entire model enabled the sorting of multiple methods, it was included. The included features or models were combined into an integrated framework, which was tested in the same way. During this testing process, the co-creation experts had periodic discussions to clarify their assumptions, reflections, and findings. This was done until a consensus was reached about the suitability and usefulness of the key features included in the integrated framework. Upon achieving consensus, this finalized version was officially designated the Co-Creation Rainbow framework.

Validating the Framework

The Co-Creation Rainbow framework intends to differentiate methods from each other; therefore, comparative analysis was identified as an appropriate method for assessing the usefulness and accuracy of this framework. The purpose of comparative analysis is to understand the similarities and differences between two or more things and to use that understanding to draw conclusions or make decisions. To perform a comparative analysis by identifying similarities and differences between methods, we used the following steps: identification; comparison criteria; recruitment; closed card sort Method; analysis; and summary. These steps are summarized in Table 3.

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[1] Health CASCADE is a Marie Skłodowska-Curie Innovative Training Network funded by the European Union's Horizon 2020 research and innovation programme under Marie Skłodowska-Curie grant agreement n° 956501 [26].

Table 3. Steps of the Comparative Analysis Process

Step	Description
1. Identification	Identified the 'Health CASCADE Co-Creation Methods Inventory' [27] as a the best dataset to source methods for comparison.
2. Criteria	Features of the Co-Creation Rainbow framework generated in the first part of this study was determined as the criteria for comparison.
3. Recruitment	Recruited geographically dispersed co-creation experts and academic researchers to take part in this part of the study.
4. Closed Card Sort Method	Sorted methods to the Co-Creation Rainbow framework using the closed card sort method.
5. Analysis	Agreement rates as well as outlier methods were calculated to show the accuracy of the framework. The lead researcher (DMA) generated a report of the outcomes of the analysis, which was shared with the rest of the researchers for reflection.
6. Summary	Summarized the strengths and weaknesses of the framework and the differences between each list of methods based on the analysis.

Step 1: Identification

Step 1 focused on identifying an appropriate dataset of methods to use in the testing of the Co-Creation Rainbow framework. The Agnello (2023) open-access dataset called the 'Co-Creation Methods Inventory: Sourced from Academic and Grey Literature' [27] was selected as the most applicable for this study. This dataset was selected because our study aims to characterize and compare methods using the Co-Creation Rainbow framework, and it stands as the sole accessible online resource with an extensive collection of methods employed in co-creation projects. Given the nature of the comparative analysis, necessitating a comparison between two distinct groups of methods, we focused on sourcing two specific sets of methods derived from the dataset: 1) those sourced from grey literature, and 2) those sourced from academic literature.

Step 2: Comparison Criteria

Features of the Co-Creation Rainbow framework, which was created in the first part of this study, served as the criteria for comparison of the methods. The comparison criteria were the sections of the Co-Creation Rainbow framework plus a category for analysis methods. Details on the framework can be found in the Results section below.

Step 3: Recruitment

While there is some debate as to the suggested number of people to undertake card sorting, ranging from 4 to 20 individuals, most of the studies include 6 to 12 individuals [28]. Based on this information, we aimed to recruit up to 12 researchers. The recruitment began by reaching out to members of the Health CASCADE co-creation network to recruit co-creation experts. Using a snowballing sampling method, additional researchers were recruited based on recommendations from the Health CASCADE colleagues. The researchers were invited through an email invitation, and they could confirm their participation in this study by responding to the email. Those who agreed to participate were also invited to join the study as co-authors to support the analysis step and the writing of this manuscript. No personal data was collected about the researchers, and they only provided input anonymously through an online card sorting software. Thus, no ethical approval was sought for this study.

Step 4: Closed Card Sort Method

Closed card sorting is a post-design method where participants sort cards into pre-existing categories and must use the categories provided to them by the study administrator to test an information architecture [28]. In this study, a free web-based card sorting platform, called MAZE was used [29]. An online interface was selected to accommodate the geographically dispersed researchers and to enable faster analysis of the outcomes. To support the

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researchers in their task, they were provided with a guidance document that described the specific steps for taking part in the online sorting task. The researchers were also provided with a document that contained each method name, and an accompanying description. After completing the card sorting task, researchers were invited to respond to post-task questions: 1) considering the options available, please add any additional categories you think were missing, and 2) please provide any reflections on the activity you did today, or your experience sorting the methods. Their responses to these questions were collected and included in the final report for further discussion, reflection, and refinement of the Co-Creation Rainbow framework. Once the activity was launched, the researchers were given three weeks to complete the sorting task.

Step 5a: Analysis of the Co-Creation Rainbow framework

Upon completion of the closed card sort method, agreement rates were calculated for each observation, meaning the method plus its assigned category. Following established practice for the closed card sort method, any card (e.g., method) with an agreement rate of 50% or higher (i.e., when 6 or more researchers sorted that method to the category) was allocated to that category. If the agreement rate fell below 50%, the method was considered unsorted [28]. The aggregated outcomes were generated into a report and subsequently shared with the researchers for their reflection and feedback.

To test the validity of the Co-Creation Rainbow framework, an overall agreement rate of sorted methods was calculated. In determining the overall agreement rate of the framework, an absolute level of agreement was set at 100%, indicating unanimous categorization by all 12 researchers for all methods. Mirroring the methodology applied to individual methods, a 50% agreement rate was established as the target for satisfactory performance. The

agreement rate for each category (e.g., a section of the framework) was calculated and then organized into 10% brackets from 0% to 100%, generating a histogram.

Step 5b: Comparison of Methods

An additional analysis was conducted to compare the difference between the two sets of methods: those sourced from academic literature and those obtained from grey literature. This was achieved by incorporating the source type designation for each sorted method. Consequently, the ultimate compilation of sorted methods was divided into two categories: 1) academic literature and 2) grey literature. Subsequently, the percentage of the two source types (i.e., academic, or grey literature) was calculated for each category (e.g., a section of the Co-Creation Rainbow framework).

Step 6: Summarized

The researchers were requested to reflect on a summary report of the findings from the closed card sort method by providing feedback directly into the report, and in a qualitative feedback form. This form invited researchers to contemplate the aspects of the findings they considered most pertinent, express their confidence in the framework's usefulness, and provide insights on methods that didn't achieve a high enough agreement rate (e.g., under 50%) for inclusion in the framework. Researchers were also encouraged to share any additional thoughts or reflections. A blank version of this form can be found in the S1 Appendix. Their responses to this form, including the extraction of key quotes, were used to shape the summarization of the findings in this study.

Results and Discussion

Framework Development

The initial search and screening process yielded 83 models, and further details regarding the search term combinations, corresponding findings, and the overall count of models can be found in Table 4.

Table 4. Model and Framework Search Strategy and Results

Search term 1	Search term 2	Search term 3	Screened Models	Included Models
Model	Participation	—	100	23
Framework	Participation	—	100	5
Model	Empowerment	—	100	23
Framework	Empowerment	—	100	1
Model	Collective Intelligence	—	100	5
Framework	Collective Intelligence	—	100	5
Model	Collective Creativity	—	100	4
Framework	Collective Creativity	—	100	4
Model	Decision-making	Co-Creation[1]	100	6
Framework	Decision-making	Co-Creation	100	0
Model	Methods	Co-Creation	100	4
Framework	Methods	Co-Creation	100	3
TOTAL INCLUDED MODELS				**83**

Out of the 83 extracted models, 25 were included after screening for their capacity to accommodate methods. These 25 models progressed to the testing phase of the process, and Figure 2 illustrates these models alongside their associated co-creation characteristics. For comprehensive information about the included models, including their sources, descriptions, and associated co-creation characteristics, please refer to the S2 Appendix.

Among the 25 included models, participation was present in 56% (14/25), decision-making in 52% (13/25), empowerment in 44% (11/25), collective intelligence in 12% (3/25), and collective creativity in only 8% (2/25).

As depicted in Figure 2, the two models with the most characteristics are: 1) the *Alternative Models of the Group Creative Process* [24] with collective intelligence, collective creativity, and decision-making; and 2) the *IAP2 Spectrum of Public Participation* [30,31], covering participation, empowerment, and decision-making. Fourteen models exhibit two co-creation characteristics, with five models including participation and decision-making (*Stage model of participation, Ladder of Citizen Participation, Continuum of Public Participation, Wellcome Trust's Public Participation Onion, and the Spectrum of Public Participation*). Four models include participation and empowerment (*Matrix of Participation, An Effective Community Participation Model, Wheel of Participation, Engage, Participate and Empower Model*). Two models include empowerment and decision-making (*the Coproduction Framework and the Consultation versus Collaboration versus Co-Creation*). Two models include collective intelligence and decision-making (*the Framework of process of mobilizing collective intelligence and the Five Capacities for Collective Intelligence*). One model included collective creativity and decision-making' (*Three Capabilities of Innovation*).

Moreover, there are models with only one co-creation characteristic. Four models for participation (*the Typology of Participation, A Ladder by Kanji and Greenwood, an Analytical framework for conducting comparative surveys and country case studies, and The framework of web-based co-design*). Four models for empowerment (*The Empowerment Process Model, Know How Innovations' Empowerment Model, Our Creative Empowerment Model, and the*

Ladder of Empowerment). One model for decision-making (*Collaborative Stances for Team Decision-Making*).
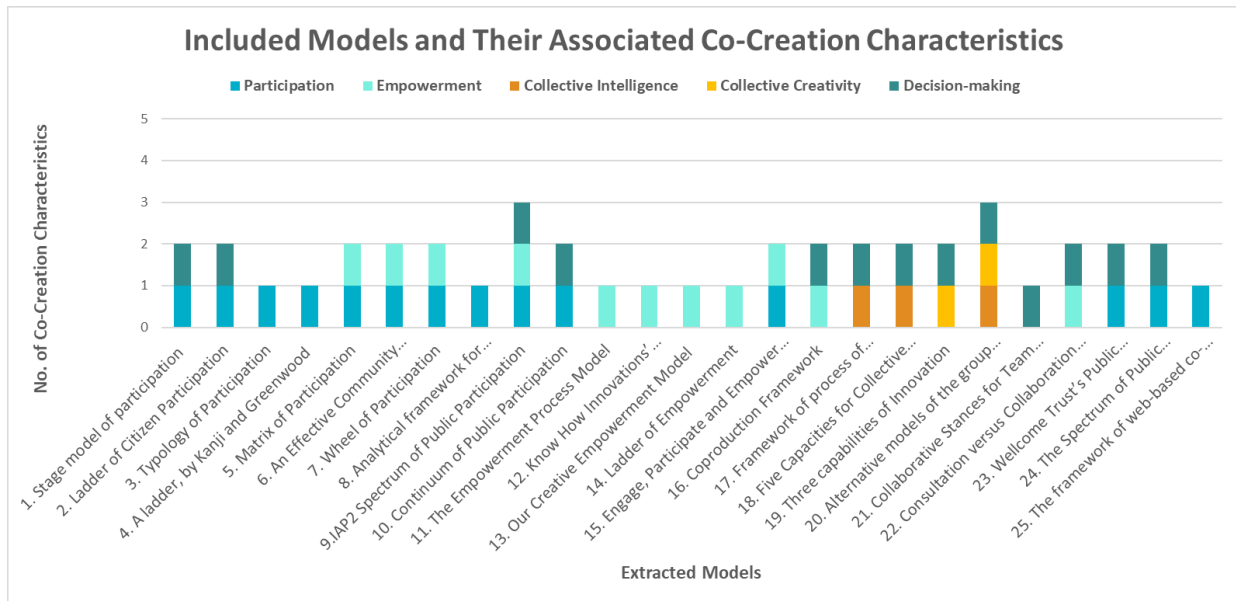
Figure 2. *Included models and their associated co-creation characteristics. The graph represented the distribution of co-creation characteristics to the 25 included models.*

Phase 2: Creating the Framework

Key features or descriptions were extracted from 20 of the 25 included models. The card sort method led to the exclusion of the following five models, as they did not accommodate any of the methods: 1) *A Ladder by Kanji and Greenwood* [32]; 2) *the Matrix of Participation* [32]; 3) *the Empowerment Process Model*; 4) *Our Creative Empowerment Model* [33]; and 5) *Collaborative Stances for Team Decision-Making* [34]. Figure 3 below illustrates the steps that resulted in the final inclusion of the 20 models, resembling a PRISMA-like flow chart. For the 20 models that were included, key features were extracted and integrated into the framework. A summary of the key features sourced from the 20 models can be found in the S3 Appendix.
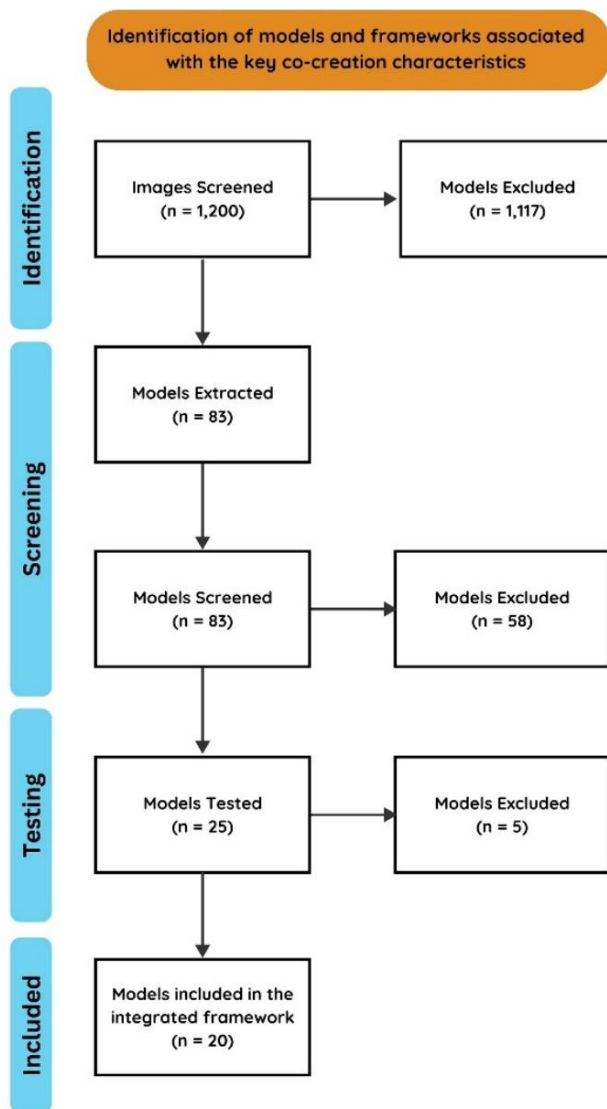
Figure 3. *PRISMA-like flow chart of models and frameworks. Visualize the steps from identification to the inclusion of the final set of 20 models and frameworks associated with co-creation characteristics.*

These steps resulted in the creation of an integrated framework, named The Co-Creation Rainbow framework, which synthesizes the strengths, descriptions, and features of 20 different models and frameworks. This establishes the Co-Creation Rainbow framework as a robust integrated framework that incorporates features from established models used to assess co-creation characteristics.

The name 'Co-Creation Rainbow' framework was chosen to underscore the framework's focus on assessing methods designed to invite co-creators into a process that had varying degrees

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or levels of participation, progressing from engagement to empowerment. This framework focuses on assessing methods involving co-creators, distinguishing them from those solely utilized by researchers or practitioners without co-creators. The term 'rainbow' signifies the diverse characteristics and positions of methods within the framework, serving as a visual metaphor that underscores that no single point holds more significance than another. Instead, the framework is designed to discern how methods contribute to the spectrum of co-creation characteristics. This name highlights the concept that co-creation can manifest in diverse forms and intensities, providing a systematic approach to understanding and assessing methods used in the co-creation process.

The Co-Creation Rainbow framework

The forthcoming section provides detailed descriptions of the key aspects of the resulting framework, accompanied by justifications and implications for these components.

Individual-to-Collective Continuum

Co-creation is not an individual achievement, but a cumulative work of a collective variety of individuals, using the dimension of creativity in their work [25]. Additionally, the dimensions of individual and collective creativity are interconnected, so it is necessary to examine both phenomena [35]. Therefore, across the bottom of the Co-Creation Rainbow framework is a continuum from individual to collective, reflecting integrated features of collective intelligence and creativity. This emphasizes that some methods only engage the co-creators on an individual basis, while others engage the collective.

In terms of unlocking collective intelligence, co-creation enables the blending of ideas, perspectives, and experiences with crowd dynamics [36,37]. Woolley et al (2015) highlight

that collective intelligence is an emergent property that arises from both the aggregation of the group-member characteristics, as well as group structures, norms, and routines, which regulate the group behaviour in a way that enhances coordination and collaboration. Their research also highlights that to perform well, a group is dependent on social perceptiveness, distribution of speaking turns, level of diversity, and the use of creative or innovative methods [38], and Skaržauskienė and Kalinauskas (2014) examine how collective creativity is a tool for encouraging collective intelligence [35]. To achieve collective intelligence, a group of co-creators need to be facilitated to combine their ideas, drawing upon their differences, in a safe atmosphere that fosters group cohesion [5,8]. The increased engagement, while performing a collective creative task, accumulates knowledge more efficiently and improves the creative solution, whilst successful innovation requires effective and creative work [35]. For instance, Bojovic et al. (2021) highlight how workshops (that include several methods) can actively engage co-creators in knowledge exchange, challenge them to confront opinions, build consensus, and find common solutions for potentially conflicting interests and views [39]. Collective intelligence and creativity are markedly influenced by the methods used in the co-creation process, making this an important feature of the Co-Creation Rainbow framework.

However, it is essential to not rely solely on collective intelligence or creativity. For example, Bojovic et al. (2021) suggest that when seeking insight into stakeholders' needs, perceptions, and rationales, a more meaningful exchange can be achieved through one-on-one interviews. Interviews encourage co-creators to express themselves freely, facilitating the emergence of new narratives [39]. Miller (2021) also discusses the risk of collective intelligence, called "groupthink." Groupthink is when humans tend to conform to the group, more than we tend to stand up for what we think individually [40]. He argues that collective intelligence only

arises when we first individually investigate the situation with our own set of data, and from the lens of our own unique experience and understanding, and then come together to aggregate our collective view [40].

The above descriptions demonstrate the importance of setting a distinct objective for a step in the co-creation process, to determine where one should source a method from the Individual-to-Collective Continuum. Therefore, this feature of the Co-Creation Rainbow framework is a continuum with no position valued more than the other. This continuum is visualized in the framework in Figure 3 below.

Interlocking Sections

An integral aspect of the Co-Creation Rainbow framework is its circular structure, formed by interlocking sections spanning the Individual-to-Collective Continuum. These sections mirror the order of those found in the Duarte et al. (2018) *Stage Model of Participation* [41], and *the Wellcome Trust's Public Engagement Onion* [42,43]. The section order closely corresponds to *the Spectrum of Public Engagement* and the *IAP2 Spectrum of Public Participation* [30,31]. Each section within the framework holds a distinct position on the Individual-to-Collective Continuum, aligning with specific objectives users aim to accomplish through their selected methods. The uniqueness of each section stems from its association with a different user objective.

To better describe the sections presented in Table 5, the literature contains some examples of where methods fit in the features of some related models. For instance, *the IAP2 Spectrum of Public Participation* (2007) model provides some example methods for the 'Informing Section,' such as fact sheets and websites [30,31]. *Beltain's Spectrum of Public Engagement* also gives examples of methods to inform, such as public lectures or writing books [43], and

the Wheel of Participation by Davidson (1998) shows Leaflets as an example method or tool for informing co-creators [30,42,44,45]. *The IAP2 Spectrum of Public Participation* (2007) and the *Wheel of Participation* by Davidson (1998) models provide some example methods for the 'Understanding Section,' such as focus groups and surveys [30,31,44], and *Beltain's Spectrum of Public Engagement* shows that Interactive Exhibits can be an example method to use to consult, or understand, co-creators [43]. Bojovic et al. (2021) discuss how the hackathon method is being used to stimulate creativity in problem-solving and enable the co-development of new shared knowledge [39], making hackathons a good example of a 'Stimulating Section' method. *The Wheel of Participation* by Davidson (1998) provides some examples of creating partnerships that fit nicely in the 'Collaborating Section,' such as Design Games [30,42,44,45]. Additionally, *the Continuum of Public Participation* by Muronda (2017) gives some additional 'Collaborating Section' examples, such as workshops, which contain several different types of methods [46]. *The IAP2 Spectrum of Public Participation* (2007) model provides some example methods for the 'Collective Decision-making Section,' such as consensus-building or participatory decision-making methods, Citizen Juries, and ballots [30,31]. These examples are included in Table 5.

Table 5. Sections of the Co-Creation Rainbow framework

Section	Description	Examples
Informing	A method to provide information to the co-creators or inform them of the key aspects about the co-creation process.	Fact sheets, websites, public lectures, writing books, or leaflets [30,31,43]
Understanding	A method aimed at comprehending the co-creator's experience; it involves actively or passively gathering knowledge, data, or feedback from the co-creator.	Focus groups, surveys, or Interactive Exhibits [30,31,42–45]
Stimulating	A method to stimulate the co-creator's individual or collective intelligence and	Hackathon [39]

	creativity, or energize them, thereby stimulating the co-creation process.	
Collaborating	A method that facilitates collaborative engagement among co-creators, fostering collective intelligence and creativity. It provides a platform for elaborating on existing ideas or generating new ones. Co-creators with diverse expertise and perspectives engage in dialogue, activities, and working relationships, excluding involvement in decision-making.	Design Games, or Workshops [30,42,44–46]
Decision-making	A method designed to involve co-creators in decision-making. Co-creators collectively influence decisions to define the direction of the co-creation process or take specific actions.	Consensus-building or participatory decision-making methods, Citizen Juries, and ballots [30,31]

Overlayed Themes

To underscore the progression from engaging to participating, and then finally to empowerment in co-creation, as is described in the Steiner and Farmer (2018) study [7], the Co-Creation Rainbow framework includes three themes that overlap with the five sections of the framework: Engage, Participate and Empower. Descriptive details and associated sections are presented in Table 6. The positioning of each theme within a section is based on their interrelations with the models from which they were derived. This strategic arrangement highlights the sequential stages of transferring power from organizers to the co-creators during the co-creation session. As articulated by Grove et al. (2014), empowerment extends beyond mere participation but encompasses the ability to take part in decision-making processes and effect the outcomes [47].

Table 6. Engage, Participate, Empower Themes of the Co-Creation Rainbow framework.

Themes	Description	Associated section(s)
Engage	Co-creators identify potential co-creation opportunities and relevant stakeholders. They're involved through various communication methods, laying the groundwork for co-creation. They also provide their individual knowledge, experiences, and perspectives to enrich the co-creation process.	Informing and Understanding
Participate	Co-creators actively contribute to the co-creation process, collaborating through iterative dialogue and fostering in-depth working relationships to develop solutions.	Stimulating and Collaborating
Empower	Co-creators are empowered to participate in decision-making processes, enabling them to achieve their personal and community goals.	Collective Decision-making

The Co-Creation Rainbow framework takes a similar approach to that outlined in Weidensted's (2016) perspective on empowerment, acknowledging that power transfer occurs within a social context and may necessitate structural changes to the process [22]. Successful empowerment within the co-creation process requires co-creators to recognize the variability in power distribution and assess their positions and agential options. This alignment with Weidensted's insights emphasizes the dynamic nature of power transfer during co-creation, considering both social dynamics and potential structural modifications [22].

The significance of visualizing the progression from Engage to Empower lies in the understanding that various methods facilitate the transfer of power from one entity to another. Steiner and Farmer (2018) describe this as a gradual process, commencing with engagement, and progressing through participation, with both serving as prerequisites for

empowerment. They assert, "engagement is a precondition of empowerment, and it is insufficient — alone — to empower communities [7]." In evaluating participation, flexibility is acknowledged, allowing adjustments to engagement levels based on the circumstances at different points in the co-creation process. Thus, the objective is not to relentlessly chase high participation levels, as it is not most appropriate to every situation [41].

The final framework, including the Individual-to-Collective Continuum, the five sections (Informing, Understanding, Stimulating, Collaborating, and Collective Decision-Making) and three themes (Engage, Participate, Empower), is visualized in Figure 4.

Figure 4. *The Co-Creation Rainbow framework. The final framework includes the Individual-to-Collective Continuum across the bottom or the figure; five sections forming the arc of the rainbow (Informing, Understanding, Stimulating, Collaborating, and Collective Decision-Making), and three themes (Engage, Participate, Empower) that span the five sections.*

Validating the Co-Creation Rainbow framework

The results of the closed card sort method are divided into two categories: sorted and unsorted methods. Sorted methods had an agreement rate of 50% or more, placing the sorted

methods into one of the five sections of the Co-Creation Rainbow framework. Unsorted

methods had an agreement rate that was less than 50% and consequently were not assigned

to the framework. Out of 619 methods, 70% (n=436) were successfully sorted into the five

sections of the Co-Creation Rainbow framework and the 'Analysis' category: Informing

Section (n=8), Understanding (n=174), Stimulating (n=150), Collaborating (n=63), Collective

Decision-making (n=21), and Analysis category (n=20). Additionally, 29.5% (n=183) of the

methods did not achieve a high enough agreement rate for inclusion in the Co-Creation

Rainbow framework. Figure 5 is a visualization of where some example methods are sorted

to the Co-Creation Rainbow framework. For a comprehensive list of sorted methods, including

agreement rates and sources, refer to the S4 Appendix.

Figure 5. The Co-Creation Rainbow framework with example methods. The final framework includes five sections forming the arc of the rainbow (Informing, Understanding, Stimulating, Collaborating, and Collective Decision-Making), where the methods are placed into the framework. This fig shows some example methods, but the total number of methods included per layer are: Informing (n=8), Understanding (n=174), Stimulating (n=150), Collaborating (n=63), and Collective Decision-making (n=21).

Figure 6 contains the distribution of the overall agreement rates for the Co-Creation Rainbow framework. As mentioned above, 70% of the agreement rates were 50% or higher, with a prominent concentration at the highest level of 90-100%. This calculation was replicated for each category, encompassing the five sections of the Co-Creation Rainbow framework and the Analysis category. The results are depicted in Figure 6.
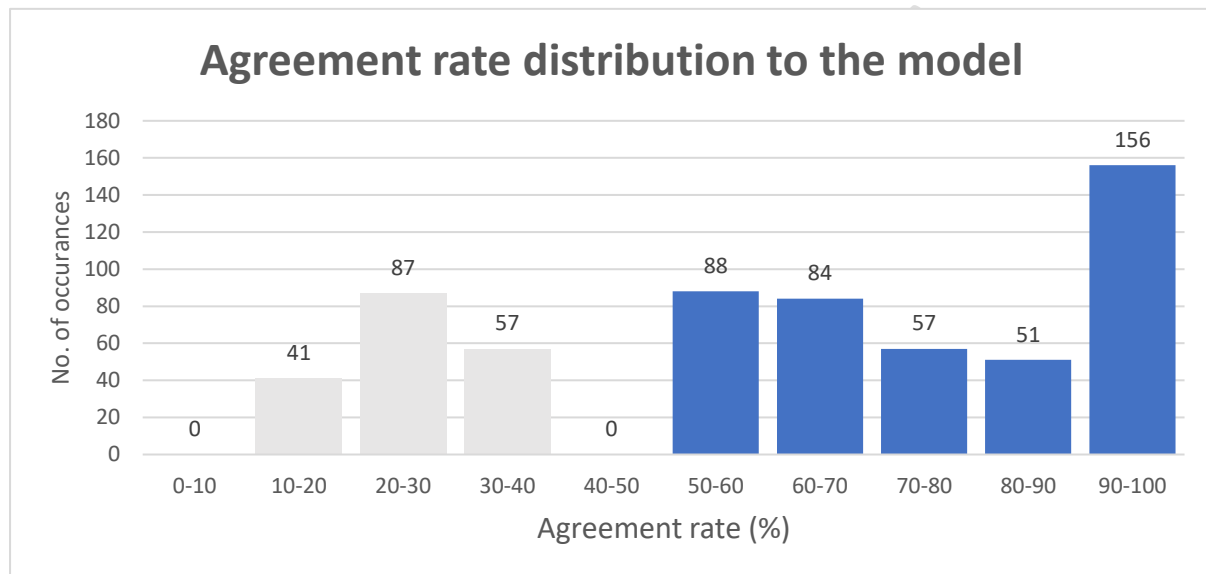
Figure 6. *Agreement rate distribution from 0 to 100%. The agreement rates are divided into 10% brackets. The occurrence is the method plus its assigned category, e.g., a decision made by the researcher taking part in the sorting method.*

Figure 7 illustrates that Understanding (n=99, in the 90-100% agreement rate bracket), Stimulating (n=34, in the 90-100% agreement rate bracket) and Analysis (n=10, in the 90-100% agreement rate bracket) were the top three categories with the highest agreement rates among all the researchers. Stimulating has the second highest agreement rate, with a more even distribution of agreements across the various rate brackets (e.g. n=29, 50-60%; n=34, 60-70%; n=25, 70-80%; and n=28, 80-90%), suggesting potential ambiguity in determining which methods align with this section. While Collaborating demonstrates some high levels of agreement (n=22, 60-70% agreement rate bracket), a substantial number of agreements fall within the 50-70% range, hinting at potential challenges for a subset of

researchers in sorting methods for this section. Moreover, Informing and Collective Decision-making has the fewest methods sorted to them, with an even distribution across agreement rates. This may be attributed to the limited sample size of methods suitable for these sections.

Agreement Rates per Category

	50-60	60-70	70-80	80-90	90-100
Analysis	3	2	3	2	10
Informing	1	3	1	1	2
Decision-making	6	4	6	3	2
Collaborating	20	22	8	4	9
Stimulating	29	34	25	28	34
Understanding	29	19	14	13	99

Agreement Rates (%)

■ Analysis   ■ Informing   ■ Decision-making   ■ Collaborating   ■ Stimulating   ■ Understanding
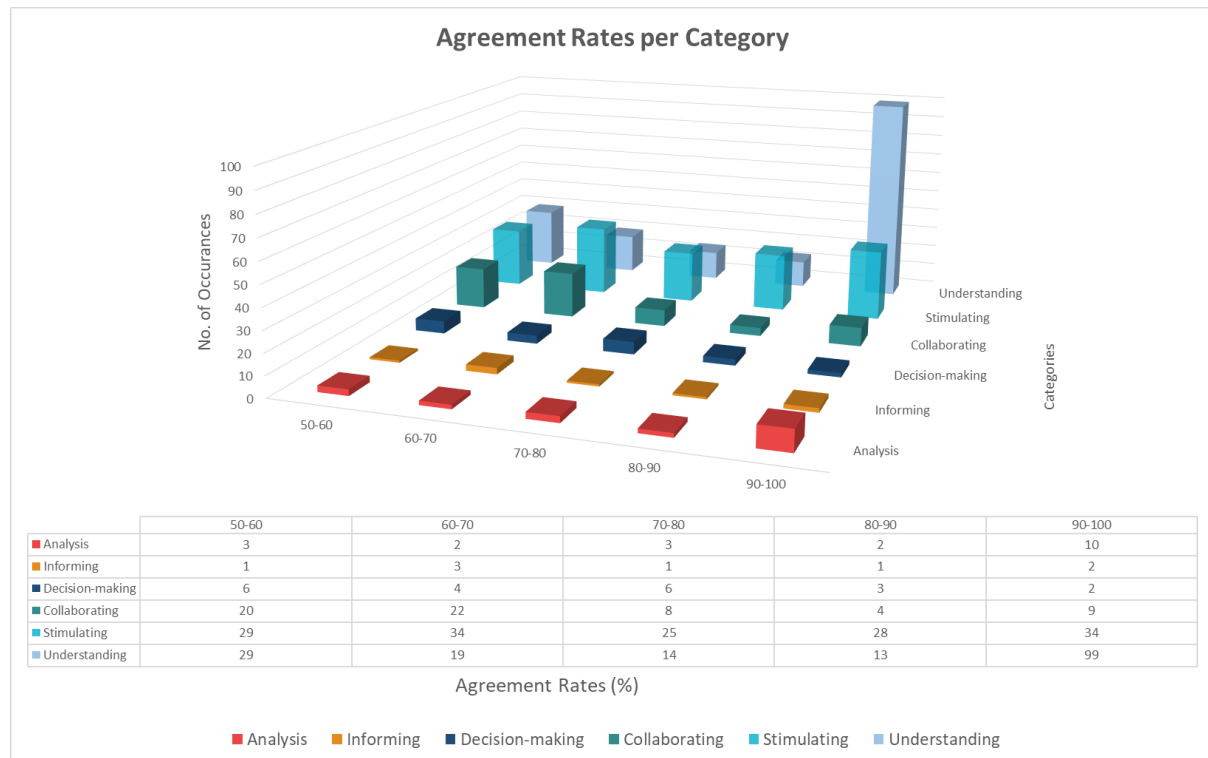
Figure 7. Agreement rates per sections of the Co-Creation Rainbow framework. The agreement rates span from 50 to 100%, grouped in 10% brackets. Each section has its own set of agreement rates and occurrences, which are visualized in the table below the graph.

Discussions with co-authors on the results of the closed card sort method revealed that may of the methods categorized under the "Analysis" category (e.g., Quantitative Bibliometric Analysis or Discourse Analysis) were not designed to involve co-creators, rendering them beyond the scope of the Co-Creation Rainbow framework. This contributed to the removal of the Analysis category and the final refinement of the framework. It is noteworthy that while these analysis methods are crucial in the co-creation process, they are not incorporated into the Co-Creation Rainbow framework.

Step 5b: Comparison of Methods

Figure 8 visualizes the proportion of sorted methods based on the type of literature they were sourced from. This assessment reveals that academic literature applies methods that aim to understand co-creators (77% in the Understanding section). This reveals that methods used in co-creation projects published in academic literature are sourcing individual intelligence, knowledge, or experiences, and are extremely limited when it comes to enacting other co-creation characteristics, such as collective intelligence, collective creativity, collective decision-making, or empowerment. Interestingly, very few academics stimulate the co-creation process, with only 4% of the methods in the Stimulating section. This could be because stimulating methods are most likely underreported in academic literature since they are often used as energizers, and therefore not considered methods, according to existing definitions.

In comparison, the grey literature methods were mainly sorted into the Stimulating (96%), Informing (75%), and Collaborating (73%) sections. Consequently, methods used by practitioners (in the grey literature) are enacting characteristics such as participation, collective intelligence, and collective creativity, with little enactment of empowerment and collective decision-making. Further research should be conducted to investigate why there is this divide between how co-creation is conducted in academic literature versus grey literature sources.
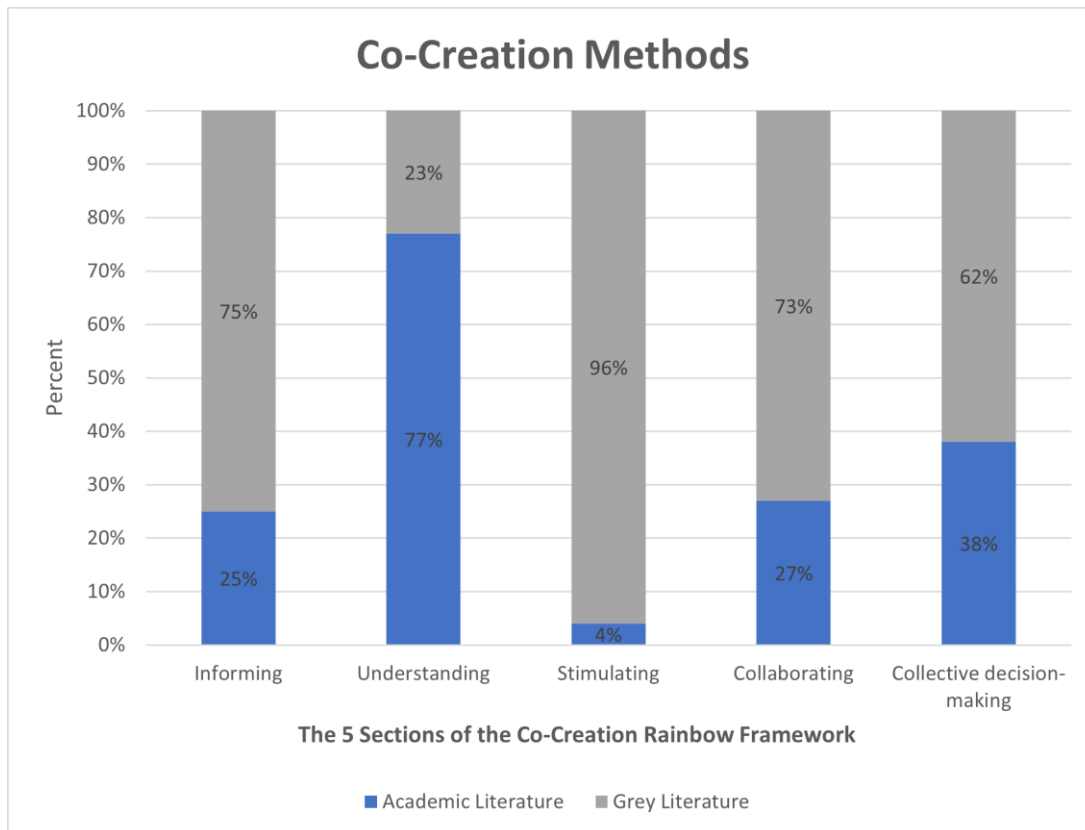
Figure 8. *Percentage of methods sourced from either academic or grey literature. The Co-Creation Rainbow framework sections are on the x-axis, and the percentage is on the y-axis.*

Step 6: Summarize

The researchers who took part in the closed card sort method shared some valuable insights when they reflected on the outcomes of the analysis. Some quotes include: "*I like [this framework]! It appears to be very easy to use.*" Another researcher reflected, "*[This framework] will be a handy tool for co-creation sessions…for working with people through sessions, it will be a great pillar to go off of when deciding what methods are good to use in co-creation…to be more systematic on how the co-creation session [is designed].*" One researcher stated, "*I am confident [the framework] does work and I appreciate the sections. I believe it can help teams think about methods generally as much as using it to select methods.*"

While the overall framework is valid and participants emphasized its ease of use and applicability, certain variations in the results were observed. For instance, based on Figure 6, the Understanding Section appears to be the easiest section to sort methods into, while the Stimulating and Collective Decision-making Sections may present more challenges. One researcher highlights this in their reflections, stating, "*I think perhaps the confusion comes when it's a method that supports the procedural aspect of the process. E.g., tools that can help advance and plan the process that can also be stimulating but also decision-making as they imply decisions on how to go forward.*" However, it is important to note that the instructions provided to the researchers explicitly stated that if a method seemed to fit into more than one section of the Co-Creation Rainbow framework, they were advised to place it in the section further to the left. In the example mentioned above, the researcher would place the method in the Collective Decision-making section. Therefore, some of the variability in the results may be attributed to the researcher's adherence to the instructions, rather than questioning the validity of the framework.

While most methods found their place within the framework, it is notable that 29.5% remained unsorted. There are likely several reasons for this result. A plausible explanation could be attributed to limitations in the information provided during the closed card sort method. For instance, one researcher reflected that there may have been limits in the information provided to them when completing the task, stating, "*perhaps there were some misunderstandings about the [co-creation method] definitions, or different interpretations of the [co-creation method].*" Therefore, it is possible that the unsorted methods can be assigned to a section of the Co-Creation Rainbow framework by providing researchers with more details or examples of the methods in question.

Moreover, given that the framework specifically targets methods involving co-creators, there may be instances where certain methods remained unsorted because they aren't designed for co-creator involvement, as exemplified by analysis methods. This underscores the significance of understanding the specific objectives of methods, recognizing that certain methods, like those geared towards analysis, can be valuable in a co-creation process, but may not be applied in a manner that allows them to be sorted to the Co-Creation Rainbow framework.

Conclusions

Actualizing characteristics of co-creation throughout the process is pivotal for fostering innovation and unleashing the full power of co-creation. While existing co-creation research has predominantly delved into the principles (the 'what'), this study uniquely bridges the gap between theoretical concepts and practical implementation (the 'how') in co-creation processes by focusing on methods.

The Co-Creation Rainbow framework emerges as a framework designed through the integration of features distilled from 20 existing models and validated by a group of co-creation researchers. This framework enables researchers to attribute co-creation characteristics to each method employed, providing a tool for articulating the impact of each method on the co-creation process. It facilitates an increased understanding of co-creator participation, encompassing decision-making, empowerment, and the utilization of collective or individual intelligence and creativity. Moreover, the Co-Creation Rainbow framework introduces a structured language for articulating how methods contribute to the overall process, fostering transparency about the authenticity of co-creative endeavours. The Co-Creation Rainbow framework places methods at the centre of co-creation and enables

researchers to plan, assess, and report on their co-creation process in a structured, evidence-based way. Designed to reflect the diverse nature of co-creation, the framework acknowledges a spectrum of methods. It underscores the notion that co-creation is inherently varied and dynamic, advocating against a one-size-fits-all approach and recognizing the variability in the depth and breadth of engagement facilitated by different methods.

Through the application of the Co-Creation Rainbow framework, our study revealed a notable gap in how researchers and practitioners engage in co-creation, particularly in terms of the methods they employ. Academic researchers tend to utilize collaborative methods less frequently compared to their counterparts outside academia. Conversely, practitioners and individuals outside academia exhibit a higher propensity for employing stimulating and collaborative methods. Intriguingly, both academic researchers and practitioners are not effectively creating platforms for co-creators to engage in collective decision-making. This recognition of a disparity in co-creation approaches emphasizes the Co-Creation Rainbow framework's role, not only as a tool but also as a potential catalyst for visualizing and bridging gaps in co-creation practices. Moving forward, this framework stands as a valuable resource, guiding researchers and practitioners alike toward a more co-creative approach. It provides them with a tool to easily access methods from across the Co-Creation Rainbow framework.

Limitations

There are known limits to the card sort method regarding consistency between participants. This lack of consistency can weaken results and meaning [28]. Additionally, there is a potential for bias in the study due to possible subjective interpretation by the researcher sorting each method. However, to mitigate these risks we had an optimal number of card-sorting

participants, provided clear instructions and definitions, and excluded methods with an agreement level below 50%.

Authors' contributions

This study was conceived by DMA, SC, and AS, and DMA led the study. The data curation, analysis, search strategy, and figures were developed by DMA. The manuscript was written by DMA. The manuscript was edited by AS, DH, DMA, FC, GRL, JB, JR, LD, LMcC, MM, MV, NS, QA, QL, and SC. Version 1 of the Co-Creation Rainbow framework was created by AS, DMA, MV, and NS. DH, DMA, FC, GRL, JB, LD, LMcC, MM, MV, NS, QA, and QL engaged in the closed card sort method. DMA performed the card sort analysis and analysis. DH, DMA, FC, GRL, JB, JR, LD, LMcC, MM, MV, NS, QA, and QL took part in the refinement and finalization of the Co-Creation Rainbow framework. The manuscript was reviewed and approved by all authors.

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S1 Appendix. Closed Card Sort Outcome Reflections Sheet

Date:_____

<u>Reflections:</u>

1. Can you please review the attached report and reply to the comments/questions I input on the document using the 'comments' feature?

2. This is a 38-page report with charts, figures, and tables – so it is likely too much to include in the manuscript. Can you reflect on what aspects you think are most interesting to include in the manuscript?

3. Can you comment on the report in the following ways:
   - Based on the results, do you feel confident that the Co-Creation Rainbow framework is useful for characterizing methods?

   - Why do you think the unsorted methods have such a low average agreement? Do you notice any patterns in the set of cards?

   - Any other general reflections on the outcomes?

S2 Appendix. Methods-specific Models from the Extracted set
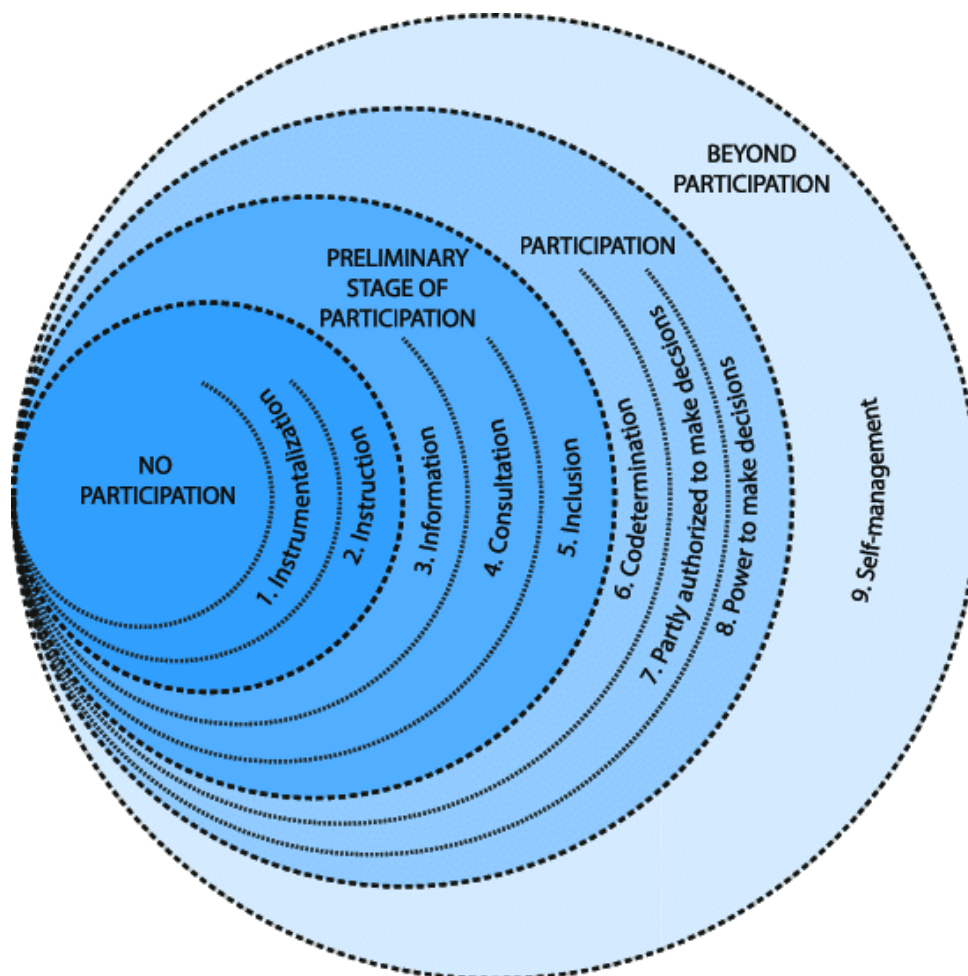
1.

Name: Stage model of participation based on Wright et al., by Duarte et al. (2018)

Source: Google Images Search > [41]

Co-Creation Characteristics: Participation and decision-making

Description:

- Instrumentalization, Instruction, and Information: levels 1 to 3 are, strictly speaking, not considered as participation. Co-researchers are consulted or asked for their opinion.
- Information, Consultation, and Inclusion: levels 3 to 5 are valuable prerequisites for participatory processes. Co-researchers are consulted or asked for their opinion.
- Codetermination: Once a process reaches level 6, it can be regarded as being truly participatory. At this level, practice-partners or community partners are (partially) given the power to make decisions. co-researchers are not only consulted or asked for their opinion (as it applies to the preliminary stages). They are also encouraged to make decisions concerning the research process while liaising with the researchers.

- Partly authorized to make decisions: At level 7, they are authorized to implement minor project components of the research process at their discretion.
- Power to make decisions: Reaching level 8, the power and control over decisions shift from researchers to co-researchers. At this level, practice- or community partners take important decisions essentially by themselves, while researchers assume the role of mere consultants.
- Self-management: Level 9 surpasses participation, as individuals take full responsibility and possess total decision power. At this stage, researchers are no longer involved.

2.
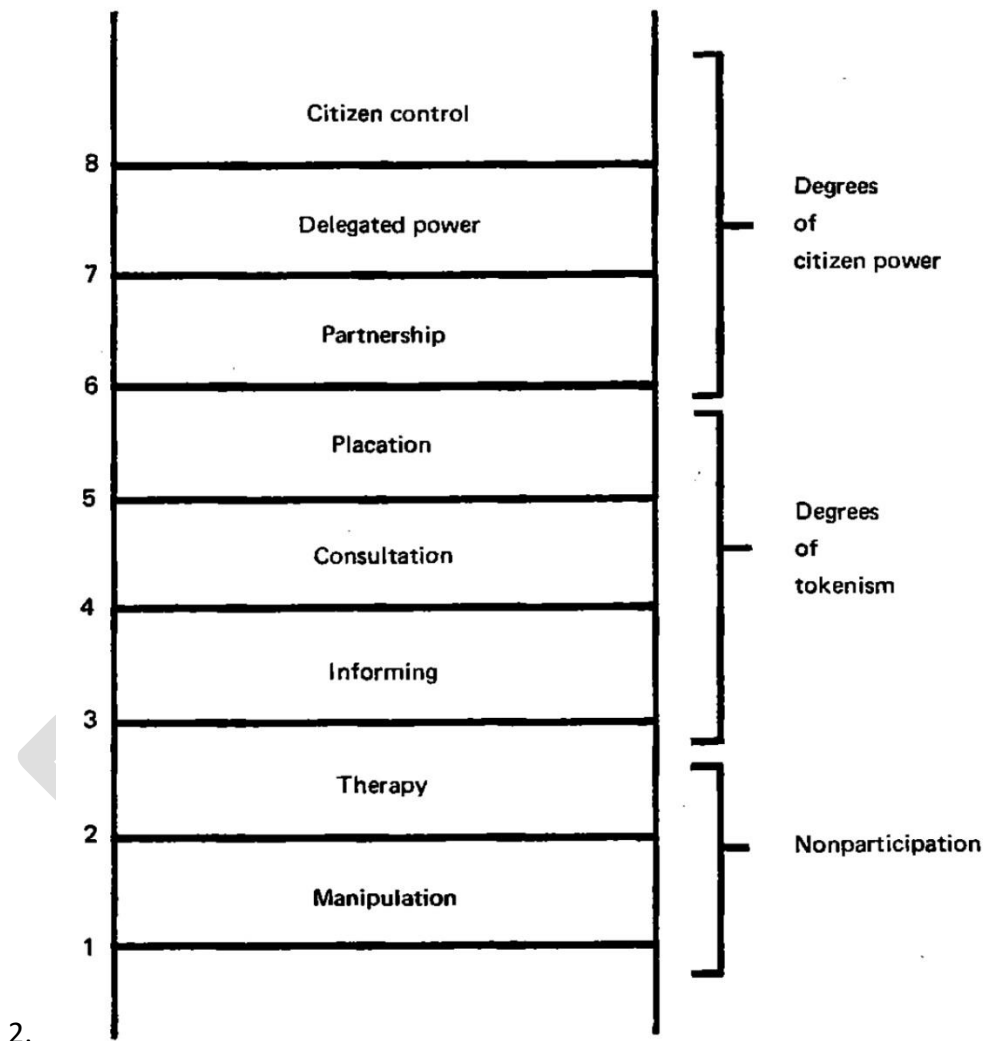
Name: Ladder of Citizen Participation, by Arnstein (1969)

Source: Google Images Search > [48]

Co-Creation Characteristics: Participation and decision-making

Description:

- Manipulation: An "illusory" form of participation, manipulation occurs when public institutions, officials, or administrators mislead citizens into believing they are being given power in a process that has been intentionally manufactured to deny them power.
- Therapy: Participation as therapy occurs when public officials and administrators "assume that powerlessness is synonymous with mental illness," and they create pseudo-participatory programs that attempt to convince citizens that they are the problem when in fact it's established institutions and policies that are creating the problems for citizens.
- Informing: While Arnstein acknowledges that informing "citizens of their rights, responsibilities, and options can be the most important first step toward legitimate citizen participation," she also notes that "too frequently the emphasis is placed on a one-way flow of information—from officials to citizens—with no channel provided for feedback and no power for negotiation…meetings can also be turned into vehicles for one-way communication by the simple device of providing superficial information, discouraging questions, or giving irrelevant answers."
- Consultation: When consultation processes "not combined with other modes of participation, this rung of the ladder is still a sham since it offers no assurance that citizen concerns and ideas will be taken into account. The most frequent methods used for consulting people are attitude surveys, neighborhood meetings, and public hearings. When power holders restrict the input of citizens' ideas solely to this level, participation remains just a window-dressing ritual. People are primarily perceived as statistical abstractions, and participation is measured by how many come to meetings, take brochures home, or answer a questionnaire.
- Placation: Placation occurs when citizens are granted a limited degree of influence in a process, but their participation is largely or entirely tokenistic: citizens are merely involved only to demonstrate that they were involved. In Arnstein's words: "An example of placation strategy is to place a few hand-picked 'worthy' poor on boards of Community Action Agencies or on public bodies like the board of education, police commission, or housing authority. If they are not accountable to a constituency in the community and if the traditional power elite hold the majority of seats, the have-nots can be easily outvoted and outfoxed."
- Partnership: Participation as partnership occurs when public institutions, officials, or administrators allow citizens to negotiate better deals, veto decisions, share funding, or put forward requests that are at least partially fulfilled. In Arnstein's words: "At this rung of the ladder, power is in fact redistributed through negotiation between citizens and powerholders. They agree to share planning and decision-making responsibilities through such structures as joint policy boards, planning committees, and mechanisms for resolving impasses." Arnstein does note, however, that in many partnership situations, power is not voluntarily shared by public institutions, but rather taken by the citizens through actions such as protests, campaigns, or community organizing.

- Delegated Power: Participation as delegated power occurs when public institutions, officials, or administrators give up at least some degree of control, management, decision-making authority, or funding to citizens. For example, a citizen board or corporation that is tasked with managing a community program, rather than merely participating in a program managed by a city, would be an example of delegated power.
- Citizen Control: Arnstein's words, when "participants or residents can govern a program or an institution, be in full charge of policy and managerial aspects, and be able to negotiate the conditions under which 'outsiders' may change them." In citizen-control situations, for example, public funding would flow directly to a community organization, and that organization would have full control over how that funding is allocated.
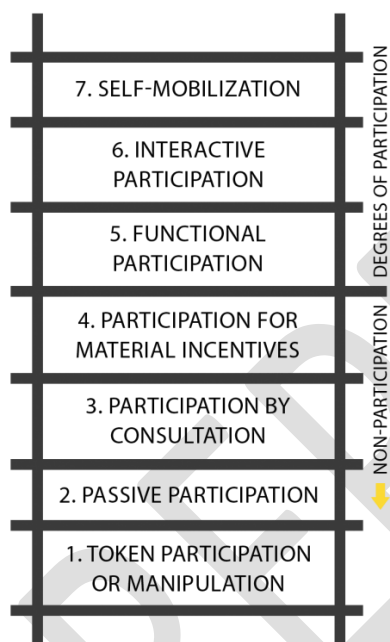
3.

Name: Typology of Participation, by Pretty (1995)

Source: Google Images Search > [32,49]

Co-Creation Characteristics: Participation

Description:

- Manipulative participation: a pretense, unelected and powerless individuals.
- Passive participation: people just receive decisions in which they have had no part.
- Participation by consultation: no sharing of problem definition nor analysis of responses.
- Participation for material incentives: cash or other bonuses but only in the short term.
- Functional participation: not real power-sharing; looks good but decisions are taken externally.

- Interactive participation: joint responsibility for defining and achieving goals, analysis, and stakeholder development.
- Self-mobilization: independent initiatives, external agents invited in, local control of resources and outcomes.

4.

Name: A ladder, by Kanji and Greenwood (2001)

Source: Google Images Search > [32]

Co-Creation Characteristics: Participation

Description:
- Compliance: where tasks with incentives are assigned but the agenda and process is directed by outsiders.
- Consultation: where local opinions are sought, outsiders analyse and decide the course of action.
- Cooperation: where local people work with outsiders to determine priorities; the responsibility to direct the process lies with outsiders.
- Co-learning: where local people and outsiders share knowledge, create new understanding, and work together to form action plans.
- Collective action: where local people set their own agenda and mobilise to carry it out in the absence of outsiders.

		A Individual complaint and feedback	B Surveys and one-off events and consultations	C Practice initiatives: time limited, focused activity	D Peer activity: training, research, evaluation	E Young representatives on advisory groups and shadow boards	F Young people involved in governance - with or without adults
LADDER OF PARTICIPATION	8 Youth initiated - shared decisions with adults						
	7 Youth initiated and directed						
	6 Adult initiated and shared decisions						
	5 Consulted and informed						
	4 Assigned and informed						
	3 Tokenism						
	2 Decoration						
	1 Manipulation						

5.

Name: Matrix of Participation, by Badham and Davies (2007)

Source: Google Images Search > [32]

Co-Creation Characteristics: Participation an empowerment

Description: When using the Matrix, participants could use different colours to differentiate between one-off, short- and long-term initiatives and approaches. This continuum commences at the left-hand side, representing one-off and short-term events or activities; and progresses to capture more structured, intensive, and long-term initiatives on the right. A spread of engagement across the Matrix is likely to evidence an organizational practice that is dynamic, energetic, and responsive to the needs of young people; such a mix illustrates a commitment to a sustainable practice that shares the responsibility with young people.
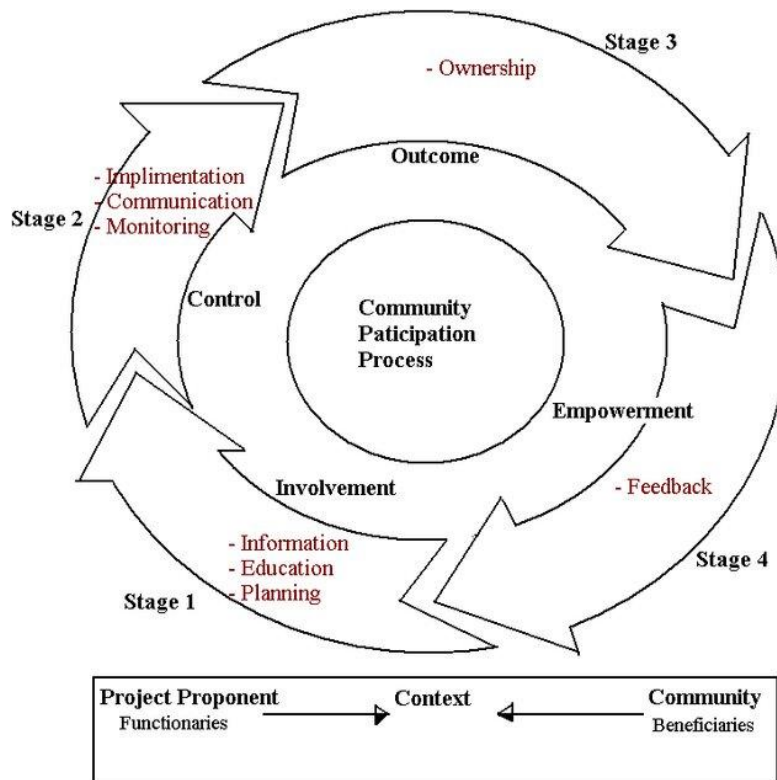
6.

Name: An Effective Community Participation Model (World Bank, 2004)

Source: Google Images Search > [50]

Co-Creation Characteristics: Participation and Empowerment

Description:
- **Stage 1: Information, Education and Planning (IEP) Stage** = provides adequate and timely information, educating people about the development initiatives and outlining a plan of action which is critical in generating a process of participation.
- **Stage 2: Implementation, Coordination and Monitoring (ICM) Stage** = which holds that once local people are well informed about the development project, they are in a better position to plan activities by themselves to implement in a project.
- **Stage 3: Ownership and Control Stage =** where local people should share the project cost if not in monetary terms, at least in time and effort. This sharing of cost will give them a feeling of ownership, belonging and commit them to the project.
- **Stage 4: Feedback Stage of Participation** = includes consultations with local people to access their need and evaluate outcome of development projects, and hold local people accounted for successes and failure.
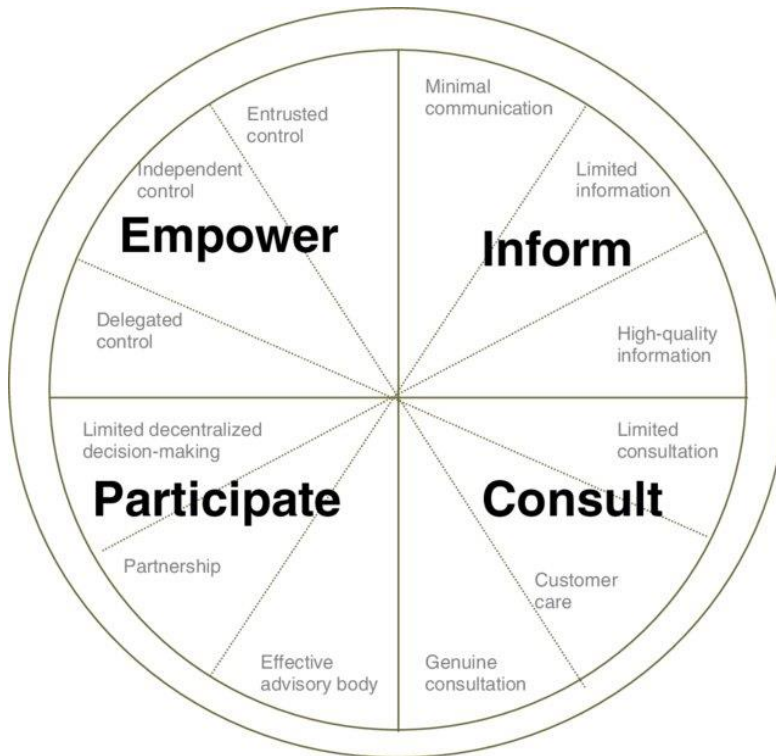
7.
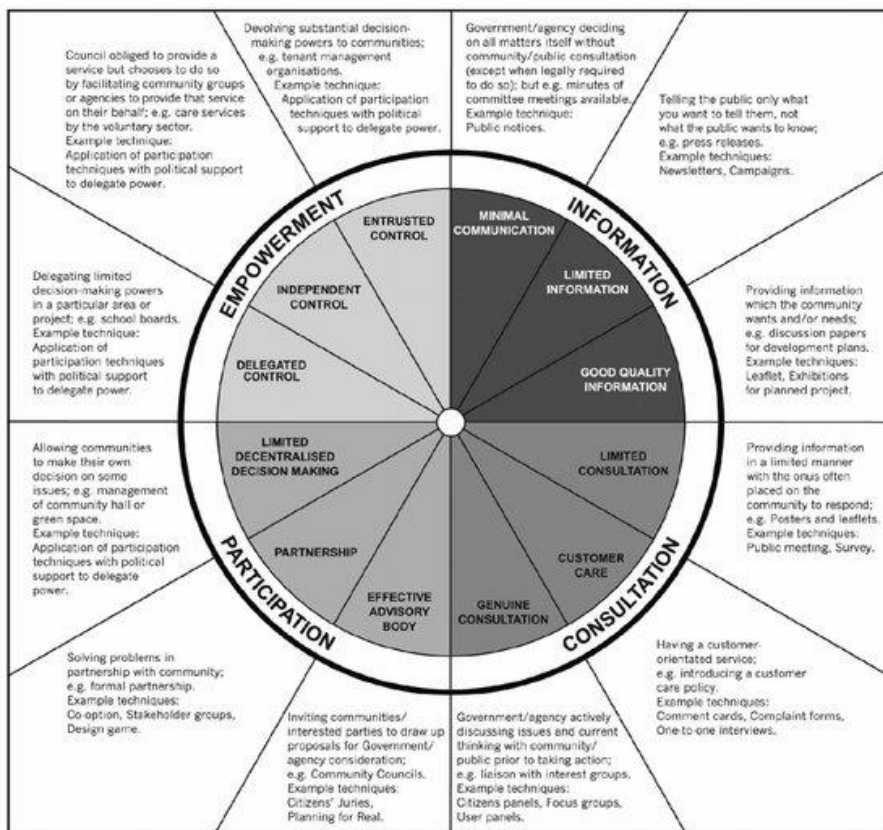
Name: Wheel of Participation, by Davidson (1998)

Source: Google Images Search > [30,42,44,45]

Co-Creation Characteristics: Participation and Empowerment

Description:

- Minimal Communication: Government/agency deciding on all matters itself without community/public consultation (except when legally required to do so); but e.g. minutes of committee meetings available. Example techniques: Public notices.
- Limited Information: Telling the public only what you want to tell them, not what the public wants to know; e.g. press releases. Example techniques = Newsletters, Campaigns.
- Good Quality Information: Providing information which the community wants and/or needs; e.g. discussion papers for development plans. Example techniques: Leaflets, Exhibitions for planned project.
- Limited Consultation: Providing information in a limited manner with the onus often placed on the community to respond; e.g. Posters and leaflets. Example techniques: Public meeting, Survey.
- Customer Care: Having a customer-oriented service; e.g. introducing customer care policy. Example techniques: Comment cards, Complaint forms, One-to-One interviews.
- Genuine Consultation: Government/agency actively discussing issues and current thinking with community/public prior to taking action; e.g. liaison with interest groups. Example techniques: Citizen panels, Focus groups, User panels.
- Effective Advisory Body: Inviting communities/interested parties to draw up proposals for government/agency consideration; e.g. community councils. Example techniques: Citizens' Juries, Planning for Real.
- Partnership: Solving problems in partnership with community; e.g. formal partnership. Example techniques: co-option, stakeholder groups, design game.
- Limited Decentralised Decision Making: Allowing communities to make their own decision on some issues; e.g. management of community hall or green space. Example technique: Application of participation techniques with political support to delegate power.
- Delegated Control: Delegating limited decision-making powers in a particular area or project; e.g. school boards. Example technique: Application of participation techniques with political support to delegate power.
- Independent Control: Council obliged to provide a service but chooses to do so by facilitating community groups or agencies to provide that service on their behalf; e.g. care services by voluntary sector. Example technique: Application of participation techniques with political support to delegate power.
- Entrusted Control: Devolving substantial decision-making powers to communities; e.g. tenant management organization. Example technique = Application of participation techniques with political support to delegate power.

Increasing level of citizen involvement and influence on policy-making
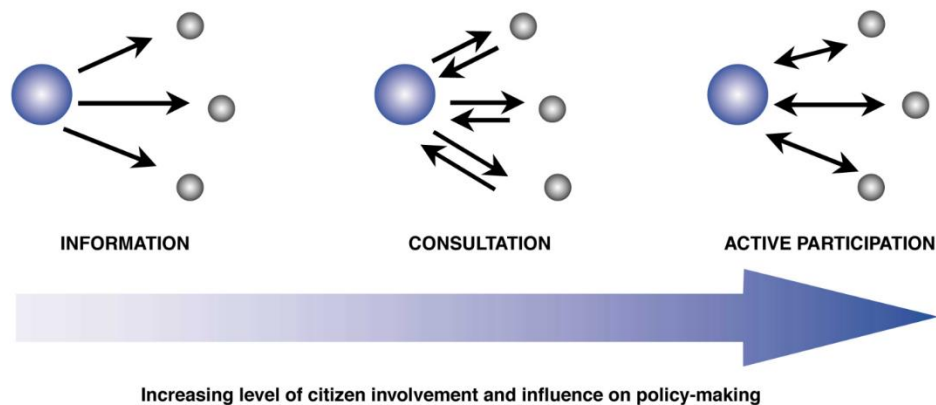
8.

Name: Analytical framework for conducting comparative surveys and country case studies

Source: Google Images Search > [30,51]

Co-Creation Characteristics: Participation

Description:

- Information: Information is a one-way relationship in which government produces and delivers information for use by citizens. It covers both "passive" access to information upon demand by citizens and "active" measures by government to disseminate information to citizens. Examples include: access to public records, official gazettes, government websites.

- Consultation: Consultation is a two-way relationship in which citizens provide feedback to government. It is based on the prior definition by government of the issue on which citizens' views are being sought and requires the provision of information. Governments define the issues for consultation, set the questions and manage the process, while citizens are invited to contribute their views and opinions. Examples include: public opinion surveys, comments on draft legislation.

- Active Participation: Active participation is a relation based on partnership with government, in which citizens actively engage in defining the process and content of policy-making. It acknowledges equal standing for citizens in setting the agenda, proposing policy options, and shaping the policy dialogue – although the responsibility for the final decision or policy formulation rests with government. Examples include: consensus conferences, citizens' juries."

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision. We will seek your feedback on drafts and proposals.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will work together with you to formulate solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

9.

	Inform	Consult	Involve	Collaborate	Empower
Public participation goal	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the public.
Promise to the public	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.
Example techniques	■ Fact sheets ■ Web sites ■ Open houses	■ Public comment ■ Focus groups ■ Surveys ■ Public meetings	■ Workshops ■ Deliberative polling	■ Citizen advisory committees ■ Consensus-building ■ Participatory decision-making	■ Citizen juries ■ Ballots ■ Delegated decision

Name: IAP2 – Spectrum of Public Participation, by the International Association for Public Participation (2007)

Source: Google Images Search > [30,31]

Co-Creation Characteristics: Participation, decision-making, and empowerment

Description:
- Inform: To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities, and/or solutions. Examples = Fact sheets, websites, and open houses.
- Consult: To obtain public feedback on analysis, alternatives, and/or decisions. Examples = public comment, focus groups, surveys, and public meetings.
- Involve: To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered. Examples = Workshops and Deliberative polling.
- Collaborate: To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution. Examples = Citizen advisory committees, Consensus-building, and participatory decision-making.
- Empower: To place final decision-making in the hands of the public. Examples = Citizen juries, ballots, and delegated decisions.

Information Exchange	Consultation	Collaboration	Co-management / Control
Information is communicated primarily in one direction, with limited opportunity for dialogue.	Public opinions are sought and considered in expert or managerial decision-making. Information flows in two directions but decision-makers not obliged to integrate comments received.	Representatives of the public are actively involved in developing solutions and directly influencing decisions. This usually involves iterative activities, dialogue, and in-depth working relationships with more focus on joint responsibilities.	Decision-making authority and sometimes responsibility for organizing public participation is partly or wholly delegated directly to the public or their representatives.
Examples: – Discussion paper – Comment sheet	Examples: – Public hearing – Survey – Open house	Examples: – Round tables – Workshops – Public advisory committees	Examples: – Community forest board

10.

Name: Continuum of Public Participation, by Muronda (2017)

Source: Google Images Search > [46]

Co-Creation Characteristics: Participation and decision-making

Description:

- Information Exchange: Information is communicated primarily in one direction, with limited opportunity for dialogue. Examples = discussion papers and comment sheet.
- Consultation: Public opinions are sought and considered in expert or managerial decision-making. Information flows in two directions but decision-makers are not obliged to integrate comments received. Examples = Public hearing, survey, and an open house.
- Collaboration: Representatives of the public are actively involved in developing solutions and directly influencing decisions. This usually involved iterative activities, dialogue, and in-depth working relationships with more focus on join responsibilities. Examples = round tables, workshops, and public advisory committees.
- Co-management / Control: Decision-making authority and sometimes responsibility for organizing public participation is partly or wholly delegated directly to the public or their representatives. Examples = community forest board.

EMPOWERMENT PROCESS MODEL
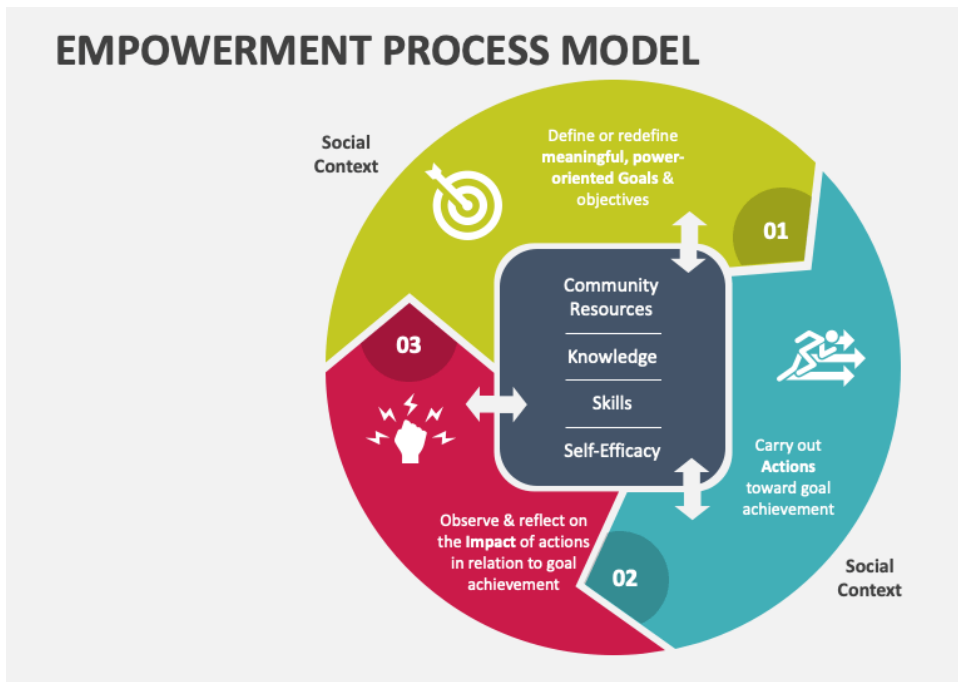
11.
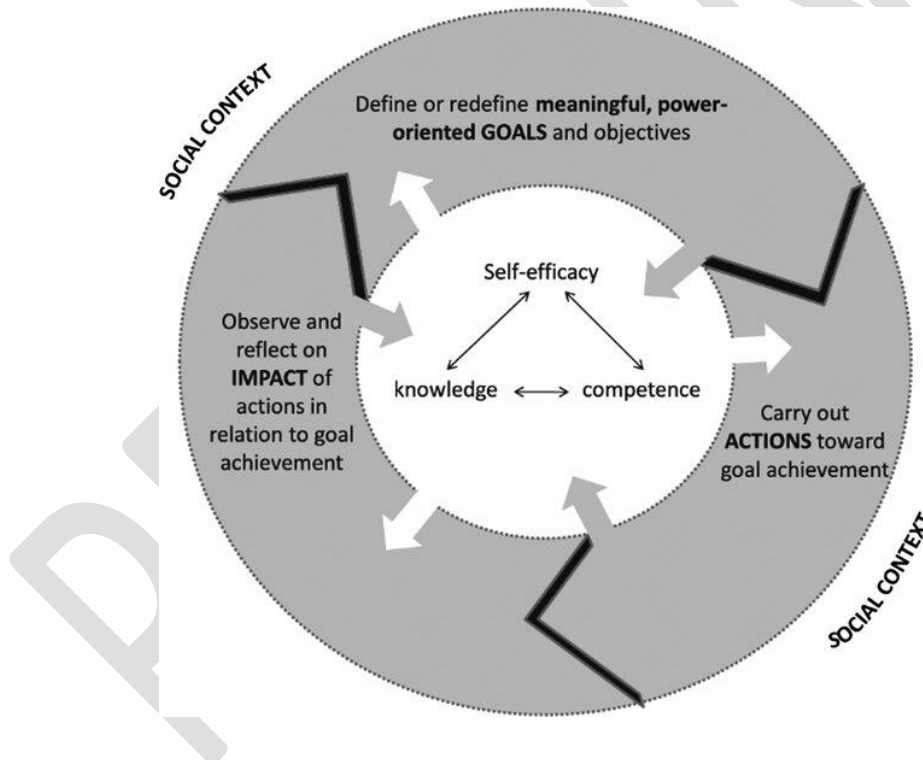
Name: The Empowerment Process Model, by Cattaneo and Goodman (2015)

Source: Google Images Search > [52]

Co-Creation Characteristics: Empowerment

Description: It is a model that clarifies the characteristics of empowerment. The source article

defines empowerment as meaningful shift in the experience of power attained through

interaction in the social world. The model describes the process of building empowerment as

an iterative one, in which a person who lacks power sets a personally meaningful goal oriented toward increasing power, takes action, and makes progress toward that goal, drawing on his or her evolving self-efficacy, knowledge, skills, and community resources and supports, and observes and reflects on the impact of his or her actions. It is a process focused on specific goals, and it extends beyond the intrapsychic realm. After describing the model and the definition of power on which it rests, the article details the ways in which the model addresses challenges to the conceptualization of empowerment.

- Define or redefine meaningful, power-oriented goals and objectives.
- Carry out actions towards goal achievement.
- Observe and reflect on impact of the actions in relation to the goal achievement.

12.

Name: Know How Innovations' Empowerment Model, 2017

Source: Google Images Search > [53]

Co-Creation Characteristics: Empowerment

Description: The matrix has two parameters, Knowledge, and Authority. Knowledge = The necessary, relevant information, skill, and experience to evaluate appropriate scenarios and make sound decisions. The gaining of knowledge is a continuous and unceasing process and, hence, must be regulated to prevent overwhelming the individual. Learning never stops. The more knowledge and experience an individual possesses the better the quality and outcomes of their decisions. Authority = The ability and willingness to independently make sound decisions and take action without prior approval of a supervisor. Authority is metered out in incrementally greater degrees as the individual gains the necessary knowledge and experience. It is a structured and controlled process.

- <u>Disempowerment (less knowledge – less authority)</u>: When knowledge and skill progression is low priority and the workforce is allowed little to no authority, they become disempowered. Individual workers have no clear development path to learn the skills to gain greater authority within the organization. Individuals work alone with no opportunity or need for teams. This workforce feels a sense of isolation and has no loyalty to the organization.
- <u>Constrained Empowerment (More Knowledge – Less Authority)</u>: Knowledge without authority is constrained empowerment. This workforce has no clear development path to gaining greater authority and rank within the organization. Deeply knowledgeable and highly skilled, this workforce possesses excellent problem-solving abilities and a penchant for innovation. However, they soon lose interest due to a lack of leadership encouragement, support, and forward momentum. This workforce feels stifled when their tremendous innovative potential remains untapped, which leads to a sense of abandonment.
- <u>Blind Empowerment (Less Knowledge – More Authority)</u>: Authority without relevant knowledge is blind empowerment. Individuals feel a sense of false empowerment as they wield unbridled authority for decisions and action. This workforce feels a strong sense of entitlement. However, this workforce lacks sufficient relevant knowledge to back their authority with sound thought and structure. A strongly individualistic environment, employees believe that success and progression in the organization is entirely in their own hands. Team cohesion is weak in this arena with individuals jostling for personal credit and success.
- <u>True Empowerment (More Knowledge – More Authority)</u>: Progressively greater knowledge-backed authority fuels true empowerment. This workforce possesses the knowledge to make sound decisions, actuated by their authority for relevant action. The inclusive yet independent culture creates a sense of ownership among the

employees. This is an unstoppable workforce able to deliver innovation on demand and leverage the collective intellect to solve complex problems.

13.
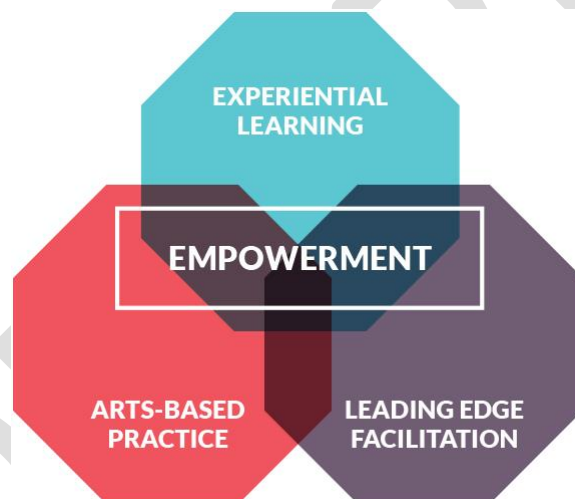
Name: Our Experience Model and Our Creative Empowerment Model

Source: Google Images Search > [33]

Co-Creation Characteristics: Empowerment

Description:

- Experiential Learning: Hands-on experiences spark new perspectives. Participation and reflection ignite possibility, offer insight, and transform attitudes, behaviors, and beliefs.
- Arts-based practice: People thrive in arts-based environments. Easy-to-lead activities drawn from art forms like poetry, visual arts, music, and theater boost bonding and creativity, build motivation, and bring joy into the process of learning.

- Leading Edge Facilitation: Social and empathetic growth happens best in well-facilitated groups. The most current techniques in leadership and group dynamics prepare practitioners to build great groups.

Community Empowerment

RUNG 5	Political Empowerment
RUNG 4	Socio-Political Empowerment
RUNG 3	Mediated Empowerment
RUNG 2	Embedded Individual Empowerment
RUNG 1	Atomistic Individual Empowerment
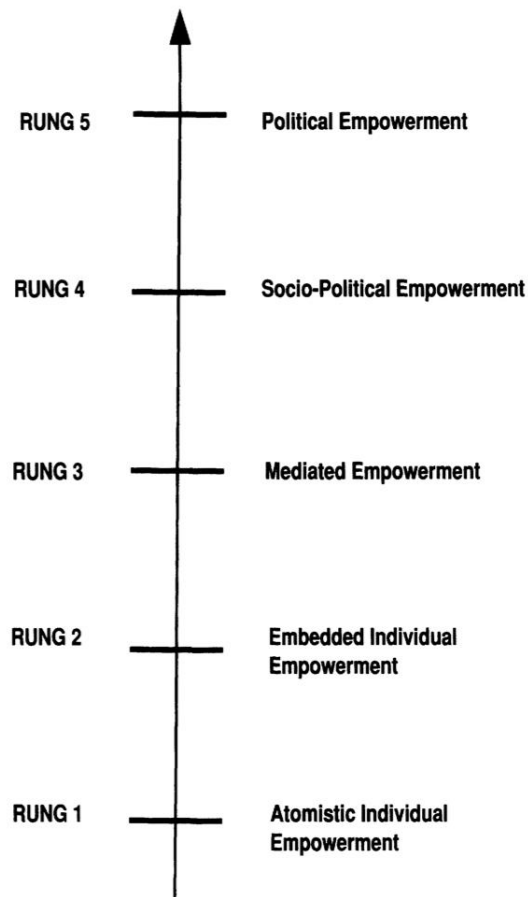
Individual Empowerment

14.

Name: Ladder of Empowerment, by Rocha et al. (1997)

Source: Google Images Search > [54,55]
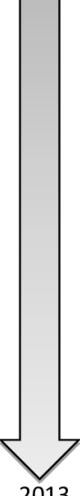
Co-Creation Characteristics: Empowerment

Description:

- Atomistic individual empowerment: the locus is the individual; the goal is increasing individual efficacy; and the process consists of altering the emotional or physical state of the individual. Atomistic individual empowerment is built upon the rational actor model and explains the competences of one person. It is conceptually modeled after mental health treatment processes and refers to changing individual characteristics in the tradition of the psychology of individual differences, often taking the form of increased coping skills. Strength is gained from the support of powerful others, and feelings of power are gained through self-control.

56

- Embedded individual empowerment: Emphasis is placed on the individual's immediate context. Although the locus of empowerment is individual, the process clearly includes recognition of the importance of the surrounding environment. It considers the person-environment fit, contextual variables and their relationship to empowerment. Empowerment is the ability to understand one's external context, to maneuver through it at a heightened level of facility with the goal of increasing personal efficacy and satisfaction. Power is typified by support and strength gained from setting and organization participation; and in which the experience of power derives from the pursuit of autonomy through self-understanding and self-directed action.

- Mediated Empowerment: Is a highly professionalized model in which the process of empowerment is mediated by an expert or professional. The locus in this type can either be the individual or community, depending upon the specific circumstances. Its goals are to provide knowledge and information necessary for individual or community decision making and action. This revolves around relationship, between the expert and the client/consumer, through which empowerment is realized.

- Socio-Political Empowerment: This model of individual and community empowerment focuses on what has been termed transformative populism, in which community development is conceptualized as developing the people who comprise the community as the first priority, then attending the physical development of the neighborhoods in which people live. This type of empowerment focuses on the process of change within a community locus in the context of collaborative struggle to alter social, political, or economic relations. This type of empowerment uses collaborative, grassroots, political action as a benchmark, and it consists of two core elements: 1) critical reflection by the community and members-of-community (individuals) rethinking their relationship to structures of power; and 2) collective action upon those structures. The power experiences that characterize this type of empowerment is developmental in nature; at each developmental phase, a different type of power experience will predominate for the community as well as for members of the community.

- Political Empowerment: This type of empowerment is the community, conceptualized as a network of like-minded individuals with or without a geographic dimension as its defining characteristic. The process of empowerment is political action directed toward institutional change. It can be comprised of voting and voter registration. It involves expanded access to group resources, e.g. in education, housing, employment, government benefits, health care, or political representation. The focus is not on the process of change within the individual or group, but on the outcome, thus equating empowerment with visible results. The primary power experience is a group version of stage three, the community experience of competition for a winning resource, such as the control of the resource allocation process through which community resources are garnered.

Cause		Time		Effect	Processes observed
Funding source	Project manager support	2011 ↓ 2013	Integration of community members and project implementation	Platform for community engagement	Incentive to **engage** community members in the C4C concept
Inclusion in a regional programme				Trigger of community participation	
Community involvement				Development of social capital	Community **participation** in the project delivery
Local needs and aspirations				Development of new and appreciation of existing resources	
Successful completion of a project				Enhancement of community confidence	**Empowerment** and self-belief in ability to deliver new projects
Willingness to carry on local community initiatives				Generation of added value	

15.

Name: Engage, Participate and Empower Model, by Steiner and Farmer (2018)

Source: Google Images Search > [7]

Co-Creation Characteristics: Empowerment and Participation

Description: Empowerment is an outcome of the process. Through the engagement and participation stimulated, there was evidence that the C4C programme grew links between different people and groups within the communities, and thus increased social capital.

- Engage: incentive to engage community members in the Capacity for Change Community development initiative. Triggered by 1) Funding as a stimulus of initial engagement; and 2) Support of project manager and the development of interests in running a local project. Effect = platform for community engagement, and trigger of community participation. The key actor is the project manager. The observed empowerment practice is exogenous. Community development is focused on capacity building.
- Participate: Community participation in the project delivery. Triggered by 1) being part of a regional programme as a trigger of community participation; 2) confidence as an essential component build community empowerment; and 3) development of social capital and integrated leadership through community involvement. Effect = development of social capital and appreciation of existing resource. The key actor is the project manager with increasing power of community members. The observed empowerment practice is exogenous with endogenous.
- Empower: Self-belief in ability to deliver the new projects. Triggered by 1) development of appreciation of existing resources; and 2) citizen power. Effect =

Enhanced community confidence, and generation of added value. The key actors are the community members. The observed empowerment practice is endogenous.

16.
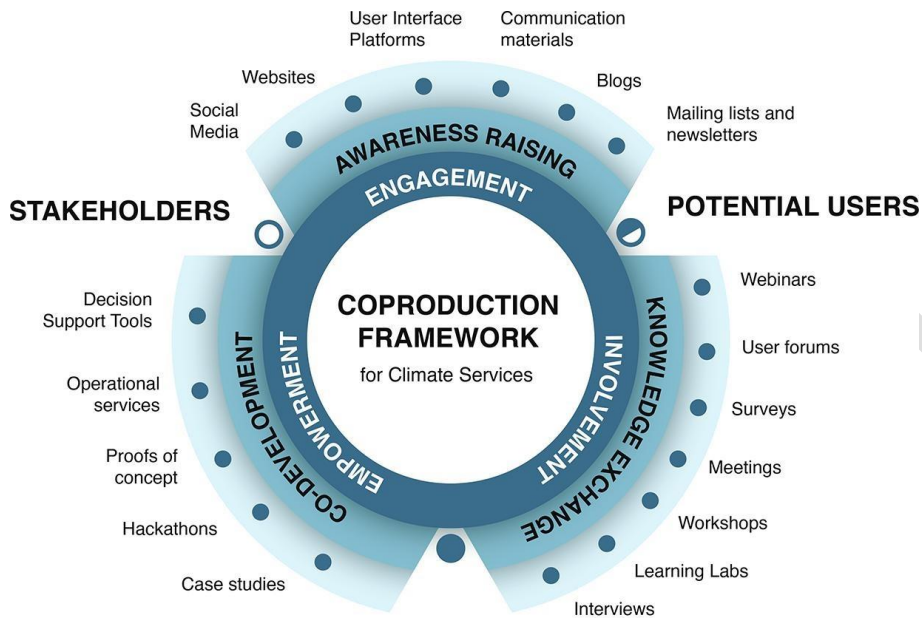
Name: Coproduction Framework, by Bojovic et al. (2021)

Source: Google Images Search > [39]

Co-Creation Characteristics: Empowerment and decision-making,

Description: This is an iterative framework. The status of participants gradually changes as they move through the framework, from stakeholders to potential users, to champion users. The more we learn from the knowledge exchange and co-development of new knowledge in the involvement and empowerment realms, the more customized material we have for sharing and engaging with new stakeholders. The three realms that form the coproduction framework for climate services are not discrete phases but rather a continuum: they build on and interact with each other as the coproduction process builds throughout the cycle.

- Engagement realm: The framework engages stakeholders by raising awareness through different communication tools. Building awareness about existing initiatives and available knowledge is the first step in facilitating access to climate data. Far-reaching web-tools have a key role in establishing this initial engagement of

stakeholders. Information and communication technologies, epitomised by the Internet, provide an excellent opportunity for engaging citizens, raising awareness about climate information, and scaling up participation. Other approaches such as interactive user-interfaces and blogs can be more effective by allowing for bi-directional and more dynamic engagement. The engagement realm should continue throughout the co-production process.

- <u>Involvement realm</u>: It then involves stakeholders in knowledge exchange and co-learning, using various participatory approaches. A more involved and intensive approach includes interaction with stakeholders through surveys, interviews, and meetings. An online survey can easily reach a large number of stakeholders, provided they are motivated to participate. Prior engagement activities can add to this motivation. To deepen our understanding of stakeholders' needs, perceptions, and rationales, we need a more intensive and meaningful exchange that can be achieved through interviews. Although semi-structured interviews are time-intensive, they can encourage participants to speak freely and enable the emergence of new discourses and narratives. In workshops, round-tables and focus groups, participants can actively exchange knowledge, confront opinions, and sort out disagreements, build consensus and find common solutions for potentially conflicting interests and views. If skillfully facilitated, open online discussion spaces such as thematic online forums can also provide strong involvement, while the issue of the pre-selection of participants can be addressed by such spaces being made freely open for everyone to participate.

- <u>Empowerment realm</u>: it empowers users of climate services, who take part in their co-development. From the network of participants established in the previous steps, there are stakeholders who want to be more actively involved in problem analysis, exploring, and identifying possible as well as preferred solutions, the so called "champion users". Building on the information-sharing and knowledge-exchange accomplished in the previous coproduction realms, this realm involves more thorough interaction with champion users. Collaborating on a case study or a service prototype development allows data providers and champion users to co-develop a tailored service, test its usability, and assess its added value. Only a service that proves useful and practical for users and that is tested with them can have a role in decision-making processes, meaningfully informing decisions that require consideration of past, current or future climate changes. Increasingly, hackathons and hackathon-like events, e.g. climathons are being used to stimulate creativity in problem solving and enable co-development of new, shared knowledge. This part of the process is here termed "empowerment" and can include incremental or transformative learning. This process generates a sense of shared ownership, since responsibilities are redistributed among all the participants. Finally, these newly built relationships can positively affect information-sharing and awareness-raising within collaborators' networks.

17.

Define purposes of mobilizing CI	Who are participants	Method to recruit participants	Select incentives	How participants can contribute	How participants can interact	Evaluate and decision making
Generate ideas	Public	Crowdsourcing marketplaces	Financial incentives	Independent contribution	No interaction	Evaluate and decide by a panel of expert
Generate evaluation	Target group	Open call on social media	Recognition	Competition	Participants can communicate with each other	
Solve problems		Target existing online community	Develop knowledge	Collaboration	Participants can communicate with organizers	Evaluate and decide by end-users
Create intellectual outputs	Expert	Target offline community	Trigger intrinsic motivation	Playing games		
Difficulties to integrate CI in traditional process	• Risk of selective participation • Risk of unqualified participants	•Protect privacy data of participants •Risk of selective participation	• Inappropriate incentives • Risk of violation of intellectual property rights	• Unclear task description • Risk of low quality contribution	•Lack of platform for interaction •Risk of dominant voices	Risk of bias in decision making

Challenges and Risks

Name: Framework of process of mobilizing collective intelligence, by Nguyen et al. (2018)

Source: Google Images Search > [23]

Co-Creation Characteristics: Collective intelligence and decision-making

Description: The framework presents the types of participants, how participants contribute to projects, interactions among participants, and the evaluation of participants' contributions and decision-making according to the different reasons for using collective intelligence. To generate an evaluation and solve problems, independent contributions were used often, with mostly no interaction among participants. In contrast, competition was often used to generate ideas, and participants were able to exchange ideas and receive feedback from each other. To create intellectual products, participants collaborated with each other and were able to receive feedback from other participants and organizers to improve their products.

- Independent contribution of participants (collection): work is divided into small pieces; participants can work independently. There is a mechanism for aggregating contributions from all participants (e.g. averaging, voting).
- Competition: gives a well-defined problem to solve. Gives clear criteria for evaluation to recognize innovative ideas. Provides a strong communication plan for before, during and after the competition. Uses different channels to publicize the competition in advance and provides real-time updates. Gives time to participants to understand the problem such as organizing an introduction workshop, providing a data set, and tutorials for training. Provides a forum for participants to exchange ideas and form their teams. Rewards for winners.

- Play games: Web-based, mobile-based applications accessible to a wide range of participants. Provides tutorials to participants. Creates different levels of complexity. Real-time update and leader boards are used to increase engagement from participants.
- Collaboration: Work is not able to be divided into independent pieces. Provides a platform for discussion, a way to record ideas from all participants (e.g. Wikis), and a moderator who supports the discussion. Provides tools to navigate ideas contributed by participants (e.g. text analysis) to identify patterns of ideas; automatic team matching.

18.

A Team Inventory: Five Capacities for Collective Intelligence

1. Compassionate Honesty
Truthfully and thoughtfully expressing our views, with courtesy and care.

Signs of Success	Practice More When…
✓ Many people openly express their views in meetings. ✓ When someone departs from team agreements (ex., interrupts or belittles someone else), another calls out the behavior and helps get the team back on track. ✓ Team members express gratitude and appreciation for those who offer their concerns.	⇒ Team meetings are heavily dominated by a few strong voices. ⇒ Team members who express their honest views are shunned by the group. ⇒ Team members avoid important and difficult conversations.

2. Diversity of Input
Seeking out perspectives that differ from our own, when trying to solve problems and come up with new ideas.

Signs of Success	Practice More When…
✓ Important conversations include diverse voices from a wide range of perspectives and backgrounds. ✓ Team members seek out the views of quieter members. ✓ Team members ask lots of questions, in order to understand the situation from many angels.	⇒ A few people from similar backgrounds, are making most of the decisions. ⇒ Team members are not asking questions of one another.

3. Independent Investigation
Investigating situations through the unique lens of our values, experiences, and set of data.

Signs of Success	Practice More When…
✓ Team members independently examine data before coming together to make important decisions. ✓ Teams utilize practices that support independent thinking, such as the consent process, reflection time, and/or breaking out into pairs for small group discussions.	⇒ Team members quickly conform their views to those of the group, instead of first forming their own opinion. ⇒ Decisions around the future, tend to look like decisions from the past.

4. Ideas Belong to the Group
Sharing ideas with detachment from our ego and contributing them fully to the group.

Signs of Success	Practice More When…
✓ Team members share ideas freely, and allow these ideas to be challenged, shaped, and molded by the group. ✓ Team members quickly embrace ideas from others when they are better than their own. ✓ After each view has been considered, we submit to the majority decision, and move the group forward.	⇒ Team members tend to cling to and defend their personal opinion. ⇒ Team members use possessive phrases like "my idea" or "your idea".

5. Unified Commitment to Act
Speaking and acting with unity, and whole-heartedly executing decisions.

Signs of Success	Practice More When…
✓ Team members communicate public support for decisions, even though they may have privately disagreed. ✓ Team members keep their commitments and act in accordance with team decisions.	⇒ Team members vocalize disagreement with group decisions after they are made. ⇒ Execution of decisions is falling short.

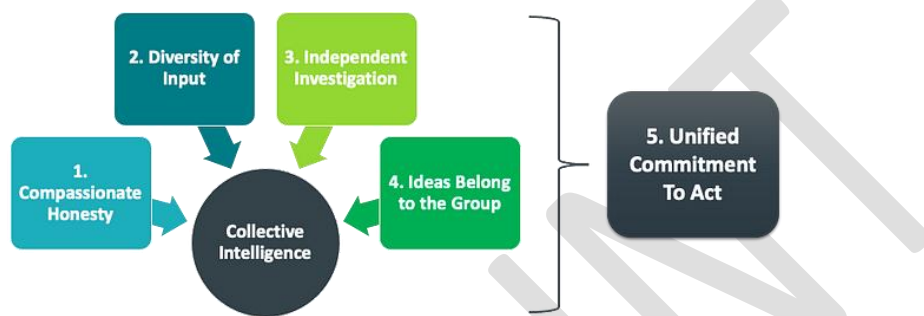**Name**: Five Capacities for Collective Intelligence, Miller (2021)

Source: Google Images Search > [40]

Co-Creation Characteristics: Collective intelligence and decision-making

Description:

- Compassionate Honesty: Collective intelligence requires a commitment to discovering 'the best solution' or 'the truth'. Truth can only be discovered through honesty. In the absence of honesty, the best solutions and most creative ideas will remain hidden from us. When we hear a difficult yet honest message from someone who is uncaring and rude, it is easy to dismiss it. On the other hand, when the speaker is compassionate and caring, we are much more likely to hear what they have to say, explore that different perspective, and seek to understand even the most challenging suggestion.

- Diversity of Input: Research consistently shows that diverse groups of problem solvers consistently outperform homogenous groups — even when those homogeneous groups are made up of the best and brightest individuals.

- Independent investigations: Surprisingly, experiment after experiment, shows that humans tend to conform to the group, MORE than we tend to stand up for what we think individually. This phenomenon, known as "groupthink" has been noted as the cause of many decision-making disasters in the world, such as the Space Shuttle Challenger Disaster. At times, we might conform to the group due to fear of being different. At other times, it may be that we simply have not taken the time, done the research, nor given the topic enough thought to come up with our own independent view. Collective intelligence only arises when we first individually investigate the situation with our own set of data and from the lens of our own unique experience and understanding, and then come together to aggregate our collective view.

- Ideas belong to the group: When our ego is attached to our ideas, we work hard to defend those ideas — even when they are wrong. When, on the other hand, we contribute those to the group, it is much easier challenge them, test them, and mold them into something much better than the original. Just as fire is used to test and refine gold, similarly, testing, and challenging ideas, purifies and perfects them. Furthermore, if we believe in a "field of consciousness", then giving ideas to the group makes perfect sense. This concept maintains that there is field, which is a source of inspiration and creativity, and it is equally available to all. Through developing our personal consciousness, we can more readily access this field. If ideas come from a field of consciousness, then they do not belong to us, as individuals. We are merely vessels, though which these ideas travel.

- Unified Commitment to Act: Action is the most important phase of decision-making. When we act with unified conviction, we generate a powerful force that supports our collective success. Furthermore, unified action enables us to clearly see the results of our decision, so that even when the idea is imperfect, we can continuously improve our decisions and actions. Sharing dissenting views after a decision is made, undermines the decision, weakens the team as whole, and sets up the team for failure. Decision-making is meaningless if we fail in executing those decisions.

THREE CAPABILITIES OF INNOVATION

CREATIVE ABRASION
The ability to generate ideas through discourse and debate

CREATIVE RESOLUTION
The ability to make integrative decisions that combine disparate or even opposing ideas

CREATIVE AGILITY
The ability to test and experiment through quick pursuit, reflection, and adjustment

SOURCE LINDA HILL, GREG BRANDEAU, EMILY TRUELOVE, AND KENT LINEBACK   HBR.ORG

19.

Name: Three capabilities of Innovation, Hill et al. (2015)

Source: Google Images Search > [56]

Co-Creation Characteristics: Collective creativity and decision-making

Description:

- Creative Abrasion: New and useful ideas emerge as people with diverse expertise, experience, or points of view thrash out their differences. The kind of collaboration that produces innovation is more than simple "get-along" cooperation. It involves and should involve passionate discussion and disagreement. To collaborate means making oneself vulnerable to hard questions and push-back. Not everyone wants to do that all the time. It's no wonder that some and perhaps many people choose to remain silent rather than participate.

- Creative Agility: Almost by definition, a truly creative solution is something that cannot be foreseen or planned. Thus, innovation is a problem-solving process that proceeds by trial-and-error. A portfolio of ideas is generated and tested, then revised, and retested, in an often-lengthy process of repeated experimentation. Instead of following some linear process that can be carefully planned in advance, it's messy and unpredictable. Organizations that innovate not only attempt new things, but they invite failure as part of the cost of discovery.

- Creative Resolution: Integrating ideas – incorporating the best of option A and option B to create something new, option C, that's better than A or B – often produces the most innovative solution. However, the process of integration can be inherently discomforting, emotionally, and intellectually. The problem – and the leadership challenge – arises because options A and B are often incompatible, even completely opposable, ideas. To arrive at option C means people must keep both A and B on the table, and that is difficult to do. When faced with two seemingly mutually exclusive alternatives, the human impulse is to choose one and discard the

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other as soon as possible, or to forge a simple compromise. It takes courage to hold open a multitude of possibilities long enough that new ways of combining them can emerge. There is often great pressure to make a choice, any choice, and move on. Innovative teams, however, know that integrative decision-making often involves more than simply and mechanically combining ideas. Rather, it requires a willingness to play with ideas and experiments until they "click." Discoveries emerge through constant iteration, through trying different approaches, including approaches that at first seemed inconsistent, through the involvement of lots of talented people, and through a willingness to wait and see what works and what doesn't.
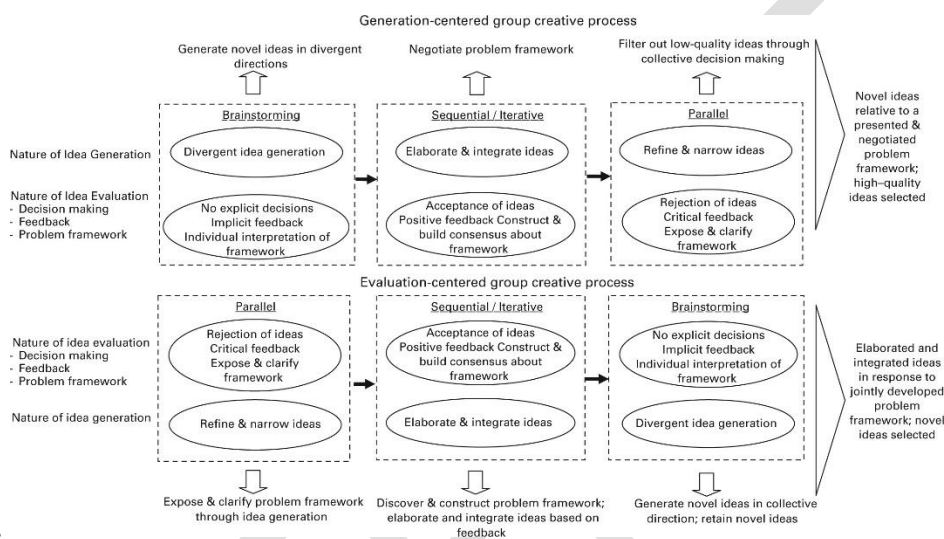
20.

Name: Alternative models of the group creative process, Harvey et al. (2013)

Source: Google Images Search > [24]

Co-Creation Characteristics: Collective creativity, collective intelligence, and decision-making

Description: Examining the 33 meeting segments revealed four different modes of interaction over creative ideas. In brainstorming mode, ideas were generated without evaluation; in sequential interactions, one idea was generated, elaborated, and evaluated; in parallel interactions, several ideas were generated and then evaluated simultaneously; and in iterative interactions, the group evaluated multiple ideas with reference to group goals. Each mode involved different ways of evaluating and generating ideas. Groups did not engage in the four modes of interaction in the same sequence over time. Instead, we observed two broad ways that the modes of interactions were ordered.

- Brainstorming mode: In some cases, groups interacted in a way that closely resembled the traditional conception of idea generation. Brainstorming mode was characterized by group members generating ideas with little if any evaluation, relying on their own interpretation of the problem framework to do so. Decisions rarely occurred in this mode. Groups exchanged a great deal of information either before or during brainstorming, but information was rarely used to elaborate or evaluate ideas. Groups also very rarely made decisions about ideas in brainstorming mode.
- Sequential mode: A second pattern was the sequential generation, discussion, and evaluation of one idea at a time. In this mode, groups elaborated on ideas and built consensus about the problem framework by considering the advantages and disadvantages of each idea. Sequential mode was the most productive. Ideas generated in this mode tended to be elaborations of existing ideas, because members generally agreed with and built on a focal idea. Sequential discussion of new ideas therefore appeared to be a mechanism through which groups attended to and built on a single idea, rather than diverging in different directions. Sequential interactions also built consensus about the problem framework.
- Parallel mode: A third mode that emerged from the data was the parallel discussion of multiple ideas at the same time. In parallel mode, groups generated then compared and contrasted a small number of ideas, clarifying the problem framework and making decisions. Ideas generated in parallel mode tended to be alternatives to one another. Because ideas were compared with one another, the nature of idea generation was often to disagree and therefore to refine rather than build on ideas. These disagreements were task-based conflicts between group members. Their effect was to narrow the scope of ideas. This conflict did not prevent idea generation, however.
- Iterative mode: an iterative interaction in which groups introduced and discussed one idea, then introduced a new idea without directly comparing it with the previous idea, then returned to the original idea. Ideas from earlier in the group discussion may have been re-introduced in this mode. This mode involved integrating ideas and shaping the problem framework in the process of making decisions. In iterative mode, group interactions are also built on and elaborated ideas, similar to sequential interactions, but by moving back and forth between ideas, groups also identified ways to integrate multiple ideas. This seemed to occur naturally, in response to additional information or others' ideas, rather than because the group was focused on a particular idea. Disagreements during this type of interaction tended to focus on a single idea, rather than the trade-offs between ideas. This contrasts with parallel discussions, in which group members argued that others' ideas, such as focusing on a specific disease category, were not possible. As in parallel and sequential interactions, ideas were likely to be decided on in iterative mode.

21.

Name: Collaborative Stances for Team Decision-Making, by Penner (2022)

Source: Google Images Search > [34]

Co-Creation Characteristics: Decision-making
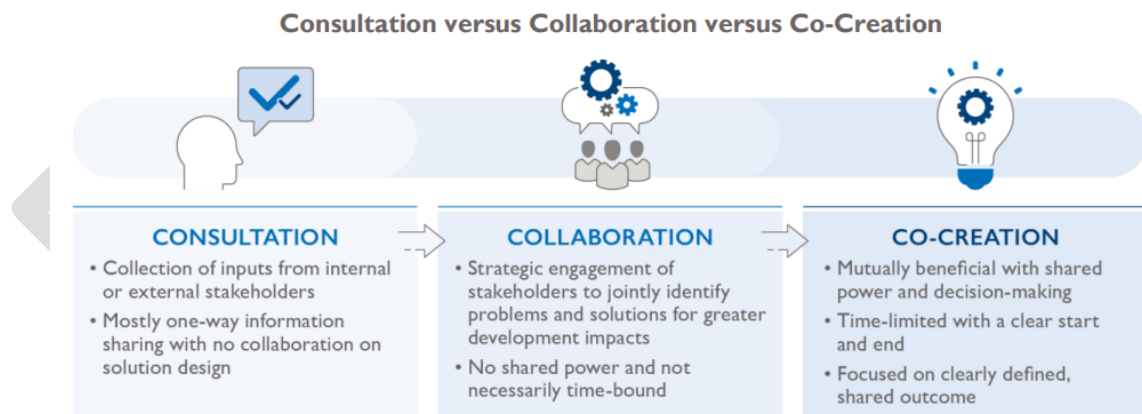
22.

Name: Consultation versus Collaboration versus Co-Creation

Source: Google Images Search > [57]

Co-Creation Characteristics: Empowerment and Decision-making

Description:

- Consultation: Collection of inputs from internal and external stakeholders. Mostly one-way information sharing with no collaboration on solution design.

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- <u>Collaboration</u>: Strategic engagement of stakeholders to jointly identify problems and solutions for greater development impacts. No shared power and not necessarily time-bound.
- <u>Co-Creation</u>: Mutually beneficial with shared power and decision-making. Time-limited with a clear start and end. Focused on clearly defined, shared outcome.

23.

Name: Wellcome Trust's Public Engagement Onion

Source: Google Images Search > [42,43]

Co-Creation Characteristics: Participation and Decision-making

Description: Many of the more recent participation models, such as the Wellcome Trust's 'Onion', focus on public engagement with research (PER). This model shows how different activities can enable publics to influence research and policy to different extents and is used by organisations such as Oxford University to inform their PER activity. The outer layer of the onion is made up of one-way interactions designed to share information, but as you peel away the sections the opportunities for dialogue grow until at the centre of the onion the power is transferred to the public.
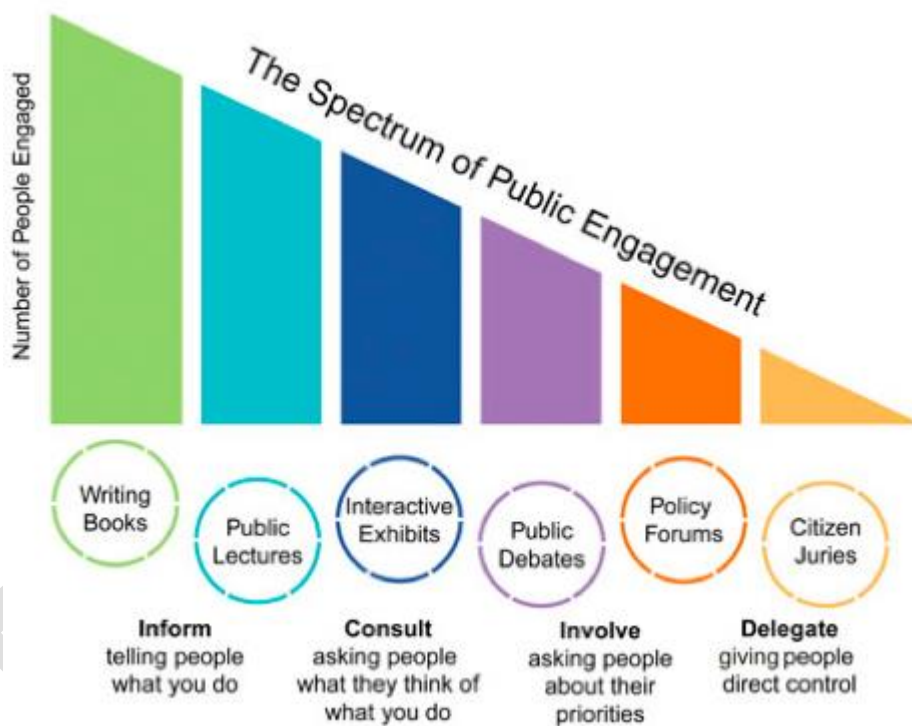
24.

Name: The Spectrum of Public Engagement, by Beltain

Source: Google Images Search > [43]

Co-Creation Characteristics: Participation and Decision-making

Description: Edinburgh University's Beltain Public Engagement network to develop their own model which goes one step further to consider the number of people involved at each level. Shaped like a wedge, this model helps to show the value at both ends of the scale. Lighter

touch activities only designed to inform can have wider reach, while more intense projects

with smaller groups can have a deeper impact.
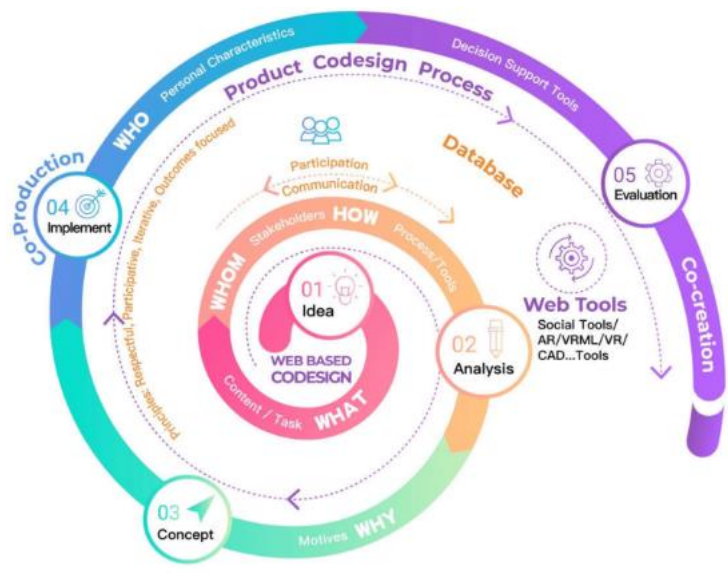
25.

Name: The framework of web-based co-design, by Kang et al. (2020)

Source: Google Images Search > [58]

Co-Creation Characteristics: Participation

Description: An online co-design project usually starts with the submission of an idea. The

online product co-design process is divided into five main steps:

- Idea: An individual, team, or society comes up with an idea.
- Analysis: Co-planning and developing product strategies, gathering general and specific materials, and conduct data mining and social diffusion research.
- Concept: Open-innovation collaborative design, understanding and clearly defining the issue.
- Implement: Build prototypes and implement plans. It is enabled by digital production technologies. This step involves the management and delivery process of co-production.
- Evaluate: Testing the idea and improvements. Evaluation is not limited to the final product but is based on iterative and participatory relational processes.

S3 Appendix. Source Model and Component

The table below illustrates which components of the source models were added to the integrated framework.

Source Model Name	Extracted Component	Source Description of the Component	Component of the Co-Enact Framework
1. Stage model of participation (Duarte et al. 2018) [41]	1. Power to make decisions	The power and control over decisions shift from researchers to co-researchers. At this level, practice- or community partners take important decisions essentially by themselves, while researchers assume the role of mere consultants.	Collective decision-making section; Empower Theme
2. Ladder of Citizen Participation (Arnstein 1969) [48]	2. Partnership	They agree to share planning and decision-making responsibilities through such structures as joint policy boards, planning committees, and mechanisms for resolving impasses.	Collective decision-making section
Ladder of Citizen Participation (Arnstein 1969) [48]	3. Delegated Power	Participation as delegated power occurs when public institutions, officials, or administrators give up at least some degree of control, management, decision-making authority	Collective decision-making section
3. IAP2 Spectrum of Public Participation (IAP2 2007) [30,31]	4. Collaborate	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution. Examples = Citizen advisory committees, Consensus-building, and participatory decision-making.	Collective decision-making section
IAP2 Spectrum of Public Participation (IAP2 2007) [30,31]	5. Inform	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities, and/or solutions. Examples = Fact sheets, websites, and open houses.	Informing section

IAP2 Spectrum of Public Participation (IAP2 2007) [30,31]	6. Empower	To place final decision-making in the hands of the public. Examples = Citizen juries, ballots, and delegated decisions	Empower Theme; Collective decision-making section
IAP2 Spectrum of Public Participation (IAP2 2007) [30,31]	7. Consult	To obtain public feedback on analysis, alternatives, and/or decisions. Examples = public comment, focus groups, surveys, and public meetings.	Understanding Section
4. Coproduction Framework (Bojovic et al. 2022) [39]	8. Engagement realm	The framework engages stakeholders by raising awareness through different communication tools. Building awareness about existing initiatives and available knowledge is the first step in facilitating access	Engagement Theme
Coproduction Framework (Bojovic et al. 2022) [39]	9. Involvement realm	To deepen our understanding of stakeholders' needs, perceptions, and rationales, we need a more intensive and meaningful exchange that can be achieved through interviews. Semi-structured interviews can encourage participants to speak freely and enable the emergence of new discourses and narratives.	Understanding Section
Coproduction Framework (Bojovic et al. 2022) [39]	10. Empowerment realm	it empowers users who take part in their co-development. From the network of participants established in the previous steps, there are stakeholders who want to be more actively involved in problem analysis, exploring, and identifying possible as well as preferred solutions. This process generates a sense of shared ownership, since responsibilities are redistributed among all the participants.	Empower Theme
Coproduction Framework (Bojovic et al. 2022) [39]	11. Empowerment realm	Collaborating on a case study or a service prototype development allows data providers and champion users to co-develop a tailored service, test its usability and assess its added value.	Collaborating Section

5. Framework of process of mobilizing collective intelligence (Nguyen et al. 2018) [23]	12. Collaboration	Work is not able to be divided into independent pieces. Provides a platform for discussion, a way to record ideas from all participants (e.g. Wikis), and a moderator who supports the discussion.	Collaborating Section
Framework of process of mobilizing collective intelligence (Nguyen et al. 2018) [23]	13. Collaboration	Provides tools to navigate ideas contributed by participants (e.g. text analysis) to identify patterns of ideas; automatic team matching.	Analysis Category
Framework of process of mobilizing collective intelligence (Nguyen et al. 2018) [23]	14. Independent contribution of participants	work is divided into small pieces; participants can work independently. There is a mechanism for aggregating contributions from all participants	Individual to Collective Spectrum
6. Five Capacities for Collective Intelligence (Miller 2021) [40]	15. Independent investigations	"groupthink" has been noted as the cause of many decision-making disasters in the world. Collective intelligence only arises when we first individually investigate the situation with our own set of data and from the lens of our own unique experience and understanding, and then come together to aggregate our collective view.	Individual to Collective Spectrum
Five Capacities for Collective Intelligence (Miller 2021) [40]	16. Unified Commitment to Act	Action is the most important phase of decision-making. Unified action enables us to clearly see the results of our decision, so that even when the idea is imperfect, we can continuously improve our decisions and actions.	Individual to Collective Spectrum; Collective decision-making section
7. Three capabilities of Innovation (Hill et al. 2015) [56]	17. Creative Abrasion	New and useful ideas emerge as people with diverse expertise, experience, or points of view thrash out their differences. The kind of collaboration that produces innovation is more than simple "get-along" cooperation. It involves and should involve passionate discussion and disagreement. To collaborate means making	Individual to Collective Spectrum; Collaborating Section

		oneself vulnerable to hard questions and push-back.	
Three capabilities of Innovation (Hill et al. 2015) [56]	18. Creative Resolution	There is often great pressure to make a choice, any choice, and move on. Innovative teams, however, know that integrative decision-making often involves more than simply and mechanically combining ideas. Rather, it requires a willingness to play with ideas and experiments until they "click." Discoveries emerge through constant iteration and through the involvement of lots of talented people, and through a willingness to wait and see what works and what does not.	Individual to Collective Spectrum; Collective decision-making section
8. Alternative models of the group creative process (Harvey et al. 2013) [24]	19. Brainstorming mode	Brainstorming mode was characterized by group members generating ideas with little if any evaluation, relying on their own interpretation of the problem framework to do so. Decisions rarely occurred in this mode. Groups exchanged a great deal of information either before or during brainstorming, but information was rarely used to elaborate or evaluate ideas	Stimulating Section
Alternative models of the group creative process (Harvey et al. 2013) [24]	20. Sequential mode	In this mode, groups elaborated on ideas and built consensus about the problem framework by considering the advantages and disadvantages of each idea. Sequential discussion of new ideas therefore appeared to be a mechanism through which groups attended to and built on a single idea, rather than diverging in different directions.	Collaborating Section
9. Consultation versus Collaboration versus Co-Creation [57]	21. Consultation	Collection of inputs from internal and external stakeholders. Mostly one-way information sharing with no collaboration on solution design.	Understanding Section
Consultation versus Collaboration	22. Collaboration	Strategic engagement of stakeholders to jointly identify problems and solutions for	Collaborating Section

		greater development impacts. No shared power.	
Consultation versus Collaboration versus Co-Creation [57]	23. Co-Creation	Mutually beneficial with shared power and decision-making. Time-limited with a clear start and end. Focused on clearly defined, shared outcome.	Collective decision-making section
10. Wellcome Trust's Public Engagement Onion [42,43]	24. Information	The first layer and it includes: website, TV programme, magazine article, library resources, science/history lectures/talks, and magazine article.	Informing Section
Wellcome Trust's Public Engagement Onion [42,43]	25. Stimulating Debate	Second layer and it includes: Science centres, public debate, interactive websites, theatre in education, creative approaches, education programmes, and exhibitions.	Stimulating Section
Wellcome Trust's Public Engagement Onion [42,43]	26. Understanding Thinking	Third layer and it includes: online consultation, focus group on research topic, opinion polls, consultation/public reviewer.	Understanding Section
Wellcome Trust's Public Engagement Onion [42,43]	27. Collaboration/Co-Production	Fourth layer and it includes: People's panels, citizen jury, advisory/user committee, education course design and development, co-produced lectures, consensus conference, etc.	Collaborating Section
Wellcome Trust's Public Engagement Onion [42,43]	28. Making Decisions	Fifth layer and it includes: Scientific Advisory Board representative, Committee representative.	Collective decision-making section
11. The Spectrum of Public Engagement (Beltain) [43]	29. Inform	Telling people what you do. Example: writing books or public lectures. Involves the most people.	Informing Section
The Spectrum of Public Engagement (Beltain) [43]	30. Consult	Asking people what they think of what you do. Example: Interactive Exhibits. This involves less people than inform.	Understanding Section
12. An Effective Community Participation Model (World Bank, 2004) [50]	31. Stage 1: Information, Education and Planning (IEP) Stage	Provides adequate and timely information, educating people about the development initiatives and outlining a plan of action which is critical in generating a process of participation.	Informing Section

An Effective Community Participation Model (World Bank, 2004) [50]	32. Stage 4: Feedback Stage of Participation	Includes consultations with local people to access their need and evaluate outcome of development projects, and hold local people accounted for successes and failure.	Understanding Section
13. Wheel of Participation (Davidson 1998) [30,42,44,45]	33. Good Quality Information	Providing information which the community wants and/or needs; e.g. discussion papers for development plans. Example techniques: Leaflets, Exhibitions for planned project.	Informing Section
Wheel of Participation (Davidson 1998) [30,42,44,45]	34. Genuine Consultation	Government/agency actively discussing issues and current thinking with community/public prior to taking action; e.g. liaison with interest groups. Example techniques: Citizen panels, Focus groups, User panels.	Understanding Section
Wheel of Participation (Davidson 1998) [30,42,44,45]	35. Partnership	Solving problems in partnership with community; e.g. formal partnership. Example techniques: co-option, stakeholder groups, design game.	Collaborating Section
Wheel of Participation (Davidson 1998) [30,42,44,45]	36. Delegated Control	Delegating limited decision-making powers in a particular area or project	Collective decision-making section
14. Analytical framework for conducting comparative surveys and country case Studies [30,51]	37. Consultation	Consultation is a two-way relationship in which citizens provide feedback to government. It is based on the prior definition by government of the issue on which citizens' views are being sought and requires the provision of information. Governments define the issues for consultation, set the questions and manage the process, while citizens are invited to contribute their views and opinions. Examples include public opinion surveys, comments on draft legislation.	Understanding Section
15. Know How Innovations' Empowerment Model (2017) [53]	38. True Empowerment (More	Progressively greater knowledge-backed authority fuels true empowerment. This workforce possesses the	Empower Theme

	Knowledge – More Authority)	knowledge to make sound decisions, actuated by their authority for relevant action. The inclusive yet independent culture creates a sense of ownership among the employees.	
16. Ladder of Empowerment (Rocha et al. 1997) [54,55]	39. Mediated Empowerment	Is a highly professionalized model in which the process of empowerment is mediate by an expert or professional. The locus in this type can either be the individual or community. Its goals are to provide knowledge and information necessary for individual or community decision making and action.	Empower Theme; Collective decision-making section
17. Engage, Participate and Empower Model (Steiner and Farmer 2018) [7]	40. Engage	Platform for community engagement, and trigger of community participation	Engage Theme
18. The framework of web-based co-design (Kang et al. 2020) [58]	41. Analysis	Gathering the general and specific materials and conduct data mining and social diffusion research.	Analysis Category
19. Typology of Participation (Pretty 1995) [32,49]	42. Functional Participation	not real power-sharing; looks good but decisions are taken externally.	Participate Theme
20. Continuum of Public Participation (Muronda 2017) [46]	43. Collaboration	Representatives of the public are actively involved in developing solutions and directly influencing decisions. This usually involved iterative activities, dialogue, and in-depth working relationships with more focus on join responsibilities. Examples = round tables, workshops, and public advisory committees.	Participate Theme; Collaborating Section

S4 Appendix. The Co-Creation Rainbow framework: Card Sorting Outcome Report

Definitions
- **Agreement rate** = The agreement rate is the percentage of users agreeing that a card belongs in this category.
- **Category** = the section of the hybrid
- **Card** = the method to be sorted into the category

Card Sorting Outcomes
Sorted Cards (Methods):

These cards had an agreement rate of 50% or more, placing them into a distinct section of the framework. Therefore, these methods are added to the Co-Creation Rainbow framework at this stage. A total of 416 methods were sorted into the 5 sections of the Co-Creation Rainbow framework, and 20 were sorted into the analysis group.

Table S1. Sorted Cards				
Number	**Sorted Cards (method name)**	**Section**	**Agreement rate (%)**	**Sourced from Grey or Academic Lit.**
1.	Pie Chart Agenda	Informing	90.91	Grey
2.	Operation Manual(S)	Informing	90.91	Grey
3.	Audiovisual Patient Information	Informing	81.82	Academic
4.	Pecha Kucha / Ignite	Informing	72.73	Grey
5.	RACI Matrix	Informing	63.64	Grey
6.	Train The Trainer / Train-The-Trainer	Informing	63.64	Academic
7.	Video Prototyping	Informing	63.64	Grey
8.	IDOARRT Meeting Design	Informing	54.44	Grey
9.	Ad-Hoc User Acceptance Questionnaire	Understanding	100	Academic

10.	Capability Opportunity Motivation And Behaviour (COM-B) Self-Evaluation Questionnaire	Understanding	100	Academic
11.	Cherokee Self-Reliance Questionnaire	Understanding	100	Academic
12.	Community-Based Survey / Community Based Survey	Understanding	100	Academic
13.	Daily Diaries / Daily Diary Method	Understanding	100	Academic
14.	Direct Observation(S)	Understanding	100	Academic
15.	Ethnographic Interviews	Understanding	100	Academic
16.	Ethnographic Observation	Understanding	100	Academic
17.	Evidence-Based Practice Questionnaire	Understanding	100	Academic
18.	Expert Interviews	Understanding	100	Academic
19.	Exploratory Interviews	Understanding	100	Academic
20.	Face-To-Face Interviews / Face-To-Face Dialogue / In-Person Interviews	Understanding	100	Academic
21.	Health Literacy Questionnaire	Understanding	100	Academic
22.	Health Questionnaire	Understanding	100	Academic
23.	Health Survey	Understanding	100	Academic
24.	In-Depth Interviews	Understanding	100	Academic
25.	Individual Interviews	Understanding	100	Academic
26.	Key Informant Interviews	Understanding	100	Academic
27.	Narrative Interviews	Understanding	100	Academic
28.	Non-Participant Observation	Understanding	100	Academic
29.	Observational Study	Understanding	100	Academic
30.	One-To-One Interviews	Understanding	100	Academic

31.	Online Questionnaire / Internet Questionnaire / Web-Based Questionnaire	Understanding	100	Academic
32.	Open-Ended Interview(S)	Understanding	100	Academic
33.	Open-Ended Questionnaire / Open Ended Questionnaire	Understanding	100	Academic
34.	Participant Observation	Understanding	100	Academic
35.	Participatory Observation(S)	Understanding	100	Academic
36.	Picker Patient Experience Questionnaire	Understanding	100	Academic
37.	Psychiatric Inpatient Experience Questionnaire	Understanding	100	Academic
38.	Psychiatric Out‐Patient Experiences Questionnaire (Popeq)	Understanding	100	Academic
39.	Qualitative Interviews	Understanding	100	Academic
40.	Qualitative Survey / Qualitative Questionnaire	Understanding	100	Academic
41.	Quality Involvement Questionnaire	Understanding	100	Academic
42.	Quality Of Life Questionnaire (QOLQ)	Understanding	100	Academic
43.	Quantitative Interviews / Standardized Interviews	Understanding	100	Academic
44.	Quantitative Survey	Understanding	100	Academic
45.	Semi-Structured Interviews / Semistructured Interviews / Semi-Structured Dialogues	Understanding	100	Academic
46.	Stakeholder Values Questionnaire	Understanding	100	Academic
47.	Stakeholder Interviews	Understanding	100	Academic
48.	Structured Interviews	Understanding	100	Academic

49.	Students International Physical Activity Questionnaire	Understanding	100	Academic
50.	Telephone Interview(S) / Phone Interview	Understanding	100	Academic
51.	Telephone Survey /Computer-Assisted Telephone Interviewing (CATI)	Understanding	100	Academic
52.	Therapeutic Engagement Questionnaire	Understanding	100	Academic
53.	Travel Diaries / Travel Journals	Understanding	100	Academic
54.	Unstructured Interviews	Understanding	100	Academic
55.	Virtual Reality Symptoms Questionnaire	Understanding	100	Academic
56.	Working Alliance Inventory – Short Revised (Wai-Sr)	Understanding	100	Academic
57.	Bespoke Questionnaire	Understanding	100	Academic
58.	Close Ended Questionnaire	Understanding	100	Academic
59.	Cross-Sectional Observations	Understanding	100	Academic
60.	Elicitation Interview	Understanding	100	Academic
61.	Evaluation Questionnaire	Understanding	100	Academic
62.	Exit Interview(S)	Understanding	100	Academic
63.	Feedback Questionnaire	Understanding	100	Academic
64.	Field Notes / Ethnographic Field Notes / Observations Field Notes / Qualitative Field Notes / Personal Field Notes	Understanding	100	Academic
65.	Field Observation(S)	Understanding	100	Academic
66.	Geo-Questionnaire	Understanding	100	Academic
67.	Interactive Interviewing	Understanding	100	Academic
68.	Intercept Interviews	Understanding	100	Academic

69.	Interviewer-Administered Questionnaire	Understanding	100	Academic
70.	Patient Narratives / Patient Experience Narratives	Understanding	100	Academic
71.	Patient Satisfaction Questionnaire	Understanding	100	Academic
72.	Personal Diaries / Customer Diaries	Understanding	100	Academic
73.	Postintervention Questionnaires	Understanding	100	Academic
74.	Practical Observations	Understanding	100	Academic
75.	Satisfaction Questionnaire	Understanding	100	Academic
76.	Self-Administered Questionnaire	Understanding	100	Academic
77.	Self-Reporting Questionnaire (SRQ)	Understanding	100	Academic
78.	Semistructured Questionnaire / Semi-Structured Questionnaire	Understanding	100	Academic
79.	Standardized Questionnaire	Understanding	100	Academic
80.	Structured Questionnaire	Understanding	100	Academic
81.	Systematic Observation	Understanding	100	Academic
82.	Usability Questionnaire	Understanding	100	Academic
83.	User Narratives / Life Journey Narratives	Understanding	100	Academic
84.	Videotaped Observations	Understanding	100	Academic
85.	Community Consultation	Understanding	90.91	Academic
86.	Convergent Interviews / Convergent Interviewing	Understanding	90.91	Academic
87.	Cross-Sectional Survey	Understanding	90.91	Academic
88.	Environmental Survey	Understanding	90.91	Academic
89.	Experiential Observation	Understanding	90.91	Academic
90.	Expert Consultation	Understanding	90.91	Academic
91.	Motivational Interviewing	Understanding	90.91	Academic

92.	Patient Diaries	Understanding	90.91	Academic
93.	People Shadowing	Understanding	90.91	Grey
94.	Practice Environment Scale Of The Nursing Work Index (PES-NWI)	Understanding	90.91	Academic
95.	Questionnaire Survey / Questionnaire Surveys	Understanding	90.91	Academic
96.	Reflective Diaries	Understanding	90.91	Academic
97.	Scenario-Based Interviews / Situational Interviews	Understanding	90.91	Grey
98.	Second-Order Observation	Understanding	90.91	Academic
99.	Walk-Along Interviews / Go-Alongs / Walking Interviews	Understanding	90.91	Academic
100.	Contextual Observation	Understanding	90.91	Grey
101.	Contingent Valuation	Understanding	90.91	Academic
102.	Naturalistic Observations	Understanding	90.91	Academic
103.	Peers Observing Peers	Understanding	90.91	Grey
104.	Personal Narratives (PN)	Understanding	90.91	Academic
105.	Pictogram Interview	Understanding	90.91	Grey
106.	Repertory Grid Technique	Understanding	90.91	Academic
107.	Self-Assessment Questionnaire	Understanding	90.91	Grey
108.	Critical Incident Technique (CIT)	Understanding	81.82	Academic
109.	Day-In-The-Life Mapping	Understanding	81.82	Grey
110.	Emotional Touchpoints	Understanding	81.82	Academic
111.	Mental Mapping	Understanding	81.82	Grey
112.	Participatory Survey	Understanding	81.82	Academic
113.	Reflection Notes	Understanding	81.82	Academic
114.	Stakeholder Consultation	Understanding	81.82	Academic
115.	Insights And Learnings	Understanding	81.82	Grey
116.	Narrative Ethnography	Understanding	81.82	Academic

117.	Narrative Interview	Understanding	81.82	Academic
118.	Pathographies	Understanding	81.82	Academic
119.	Reflective Field Notes / Reflexive Field Notes	Understanding	81.82	Academic
120.	Reflective Narratives	Understanding	81.82	Academic
121.	Cognitive Mapping	Understanding	72.73	Academic
122.	Neighborhood Mapping	Understanding	72.73	Academic
123.	Q-Methodology	Understanding	72.73	Academic
124.	Structured Interview Matrix Facilitation Technique / Interview Matrix (SIM)	Understanding	72.73	Academic
125.	We Saw, We Heard	Understanding	72.73	Grey
126.	Behavioural Observation	Understanding	72.73	Grey
127.	Case Study Method	Understanding	72.73	Academic
128.	Conversation Capture	Understanding	72.73	Grey
129.	Explanatory Narratives	Understanding	72.73	Academic
130.	Pain-Gain Map	Understanding	72.73	Grey
131.	Photojournal	Understanding	72.73	Grey
132.	Reference Project / Case Studies	Understanding	72.73	Grey
133.	Self-Assessment Method	Understanding	72.73	Academic
134.	Show Me Your Values	Understanding	72.73	Grey
135.	Asset Mapping	Understanding	63.64	Academic
136.	Goal Attainment Scaling (Gas)	Understanding	63.64	Academic
137.	Learning Log	Understanding	63.64	Grey
138.	Participatory Surveillance	Understanding	63.64	Academic
139.	Product Prototyping	Understanding	63.64	Academic
140.	Reflective Writing	Understanding	63.64	Academic
141.	The Five Whys Method	Understanding	63.64	Academic
142.	Direct Experience Storyboard	Understanding	63.64	Grey

143.	Emotional Journey	Understanding	63.64	Grey
144.	Experience Mapping /Experience Mapping / Customer Journey Mapping	Understanding	63.64	Grey
145.	Guided Conversation	Understanding	63.64	Academic
146.	Reflective Practice	Understanding	63.64	Academic
147.	Resource Flow	Understanding	63.64	Grey
148.	Retrospective Case Note Review	Understanding	63.64	Academic
149.	Summing Up Rounds	Understanding	63.64	Grey
150.	User Tests	Understanding	63.64	Grey
151.	Videovoice / Videovoice Diaries	Understanding	63.64	Academic
152.	Visual Narratives / Visual Storytelling	Understanding	63.64	Academic
153.	Writing A Letter To Yourself	Understanding	63.64	Grey
154.	4 Plus 1 Question	Understanding	54.55	Grey
155.	Break Up Letter / Love Letter	Understanding	54.55	Grey
156.	Card Sort	Understanding	54.55	Academic
157.	Empathy Map / Empathy Mapping	Understanding	54.55	Grey
158.	Feedback Map	Understanding	54.55	Grey
159.	Five-Fingered Consensus/ Fist To Five	Understanding	54.55	Grey
160.	Fuzzy Cognitive Mapping	Understanding	54.55	Academic
161.	GIS Mapping Techniques / GIS	Understanding	54.55	Academic
162.	Good Day/Bad Day	Understanding	54.55	Grey
163.	Group Delphi	Understanding	54.55	Grey
164.	Mind Mapping	Understanding	54.55	Academic
165.	Photo Voice / Photovoice / Photo Interview(S) / Photo Diary	Understanding	54.55	Academic

166.	Power Mapping	Understanding	54.55	Academic
167.	Social Mapping	Understanding	54.55	Academic
168.	Speed Boat	Understanding	54.55	Grey
169.	Structured Reflection	Understanding	54.55	Academic
170.	The AIR Feedback Model	Understanding	54.55	Grey
171.	Audio-Recordings	Understanding	54.55	Academic
172.	Concept Walkthrough	Understanding	54.55	Grey
173.	Deliberative Poll / Deliberative Polling	Understanding	54.55	Grey
174.	Narrative Scenarios	Understanding	54.55	Academic
175.	Narratives	Understanding	54.55	Academic
176.	Personal Take-Aways	Understanding	54.55	Grey
177.	Reflection Workshop(S)	Understanding	54.55	Academic
178.	Science Mapping	Understanding	54.55	Academic
179.	Service Safari	Understanding	54.55	Grey
180.	Show And Tell	Understanding	54.55	Grey
181.	The Circle Of Trust / Trust Circle	Understanding	54.55	Grey
182.	Thumbs Spectrum	Understanding	54.55	Grey
183.	Bodystorming	Stimulating	100	Grey
184.	I Love You Honey…	Stimulating	100	Grey
185.	Marimba!	Stimulating	100	Grey
186.	Shake All Hands	Stimulating	100	Grey
187.	Shake Down 5-4-3-2-1 / Shake Down	Stimulating	100	Grey
188.	Trigger Storming	Stimulating	100	Grey
189.	Figure Storming	Stimulating	100	Grey
190.	Go Bananas	Stimulating	100	Grey
191.	Hello Kitty	Stimulating	100	Grey
192.	Hot Air Balloon	Stimulating	100	Grey
193.	Love Your Neighbour?	Stimulating	100	Grey

194.	Portrait Drawing	Stimulating	100	Grey
195.	Rock Paper Scissor Tournament	Stimulating	100	Grey
196.	Stop And Go	Stimulating	100	Grey
197.	The Viking	Stimulating	100	Grey
198.	What Are You Doing?	Stimulating	100	Grey
199.	What's In The Bag?	Stimulating	100	Grey
200.	Who Are We Now?	Stimulating	100	Grey
201.	Who Is It?	Stimulating	100	Grey
202.	Keys Method	Stimulating	90.91	Grey
203.	Questorming	Stimulating	90.91	Grey
204.	The Reverse Perspective	Stimulating	90.91	Grey
205.	Count Up / Count To Ten	Stimulating	90.91	Grey
206.	Dance, Dance, Dance	Stimulating	90.91	Grey
207.	Draw Toast	Stimulating	90.91	Grey
208.	Find Your Pair	Stimulating	90.91	Grey
209.	Graphic Jam	Stimulating	90.91	Grey
210.	Green, Heart, I	Stimulating	90.91	Grey
211.	Ideastorming / Ideastorms	Stimulating	90.91	Grey
212.	Line-Up	Stimulating	90.91	Grey
213.	Pronoun Rounds	Stimulating	90.91	Grey
214.	Reverse Brainstorming / Reverse Thinking	Stimulating	90.91	Grey
215.	Start Your Day	Stimulating	90.91	Grey
216.	The Shouting Game	Stimulating	90.91	Grey
217.	"What If" Brainstorming / What If-Ing	Stimulating	81.82	Grey
218.	4 Quadrants	Stimulating	81.82	Grey
219.	Brainstorming	Stimulating	81.82	Academic
220.	Challenge Prizes	Stimulating	81.82	Grey

221.	Draw An Apple / Apple-Drawing Ideation	Stimulating	81.82	Grey
222.	Portrait Gallery	Stimulating	81.82	Grey
223.	Round Robin / Round Robin Brainstorming	Stimulating	81.82	Grey
224.	Sky The Limit Brainstorm	Stimulating	81.82	Grey
225.	Starbursting	Stimulating	81.82	Grey
226.	Trust Falls In Pairs	Stimulating	81.82	Grey
227.	Two Truths And A Lie	Stimulating	81.82	Grey
228.	Wizards, Pixies, Giants / Giants, Wizards, Elves	Stimulating	81.82	Grey
229.	Bed Sheet Ping-Pong	Stimulating	81.82	Grey
230.	Connect The Dots	Stimulating	81.82	Grey
231.	Human Machine	Stimulating	81.82	Grey
232.	Knot Game / Untangle Yourself	Stimulating	81.82	Grey
233.	Lower A Bamboo Cane To The Ground	Stimulating	81.82	Grey
234.	Pass A Loop Round The Circle	Stimulating	81.82	Grey
235.	Pass The Squeeze	Stimulating	81.82	Grey
236.	Rain Making	Stimulating	81.82	Grey
237.	Role Storming / Rolestorming	Stimulating	81.82	Grey
238.	Shrinking Islands	Stimulating	81.82	Grey
239.	Structured Brainstorm	Stimulating	81.82	Academic
240.	Sync Claps	Stimulating	81.82	Grey
241.	The 6 Thinking Hats / Feedback Hats	Stimulating	81.82	Grey
242.	Trading Cards	Stimulating	81.82	Grey
243.	Trust Ladder	Stimulating	81.82	Grey
244.	Walkabout	Stimulating	81.82	Grey
245.	3-12-3 Brainstorm	Stimulating	72.73	Grey

246.	Apple-Drawing Ideation	Stimulating	72.73	Grey
247.	Bisociation	Stimulating	72.73	Grey
248.	Check-In / Check-Out	Stimulating	72.73	Grey
249.	Cover Story	Stimulating	72.73	Grey
250.	Crazy 8's	Stimulating	72.73	Grey
251.	Forced Analogy	Stimulating	72.73	Grey
252.	Mingle	Stimulating	72.73	Grey
253.	Mirroring	Stimulating	72.73	Grey
254.	My Daily P.A.C.T	Stimulating	72.73	Grey
255.	Post-Up	Stimulating	72.73	Grey
256.	Quiet Brainstorming / Silent Brainstorming	Stimulating	72.73	Grey
257.	Super Hero	Stimulating	72.73	Grey
258.	Who Inspires Us?	Stimulating	72.73	Grey
259.	Write A Blurb	Stimulating	72.73	Grey
260.	Body Part Twister	Stimulating	72.73	Grey
261.	Image-ination	Stimulating	72.73	Grey
262.	Inspiration Walk	Stimulating	72.73	Grey
263.	Pair Introductions / Introduction In Pairs	Stimulating	72.73	Grey
264.	People Bingo	Stimulating	72.73	Grey
265.	Protobot	Stimulating	72.73	Grey
266.	Start Small	Stimulating	72.73	Grey
267.	Stinky Fish	Stimulating	72.73	Grey
268.	The Anti-Problem	Stimulating	72.73	Grey
269.	This N' That	Stimulating	72.73	Grey
270.	5-4-3-2-1 Grounding Technique	Stimulating	63.64	Grey
271.	6*8*5 Method	Stimulating	63.64	Grey

272.	Brain Writing / Brainwriting / Group Passing / Slip Writing	Stimulating	63.64	Grey
273.	Feedback: Appreciation Mingle	Stimulating	63.64	Grey
274.	Feedback: I Appreciate…	Stimulating	63.64	Grey
275.	Future Wheel	Stimulating	63.64	Grey
276.	I Like, I Wish, I Wonder / I Like, I Wish, What If	Stimulating	63.64	Grey
277.	Jam Session / Design Jam / Innovation Jam	Stimulating	63.64	Grey
278.	Lo-Tech Social Networking / Low-Tech Social Network	Stimulating	63.64	Grey
279.	Marshmallow Challenge	Stimulating	63.64	Grey
280.	Mood Board(S)	Stimulating	63.64	Grey
281.	NUF Test	Stimulating	63.64	Grey
282.	Opening Circle	Stimulating	63.64	Grey
283.	Prune The Future	Stimulating	63.64	Grey
284.	Question Balloons	Stimulating	63.64	Grey
285.	Roving Ideastorms	Stimulating	63.64	Grey
286.	Squiggle Birds	Stimulating	63.64	Grey
287.	Synesthesia	Stimulating	63.64	Grey
288.	Talking Stick(S) / Wooden Stick	Stimulating	63.64	Grey
289.	Air Time Mastermind	Stimulating	63.64	Grey
290.	Crazy 8	Stimulating	63.64	Grey
291.	Crocodile River	Stimulating	63.64	Grey
292.	Current Strongest Impression	Stimulating	63.64	Grey
293.	Dinner Challenge	Stimulating	63.64	Grey
294.	Go-Round(S)	Stimulating	63.64	Grey
295.	Mission Impossible	Stimulating	63.64	Grey
296.	Object Brainstorm	Stimulating	63.64	Grey

297.	Picture Yourself	Stimulating	63.64	Grey
298.	Prune The Product Tree	Stimulating	63.64	Grey
299.	Random Inputs	Stimulating	63.64	Grey
300.	Rollercoaster / Rollercoaster Check-In	Stimulating	63.64	Grey
301.	Science Fiction Prototyping (SFP)	Stimulating	63.64	Grey
302.	The Blind Side	Stimulating	63.64	Grey
303.	Whole Product Game	Stimulating	63.64	Grey
304.	A Journey Of Discovery	Stimulating	54.55	Grey
305.	Campfire Method	Stimulating	54.55	Grey
306.	Ethos, Logos, Pathos	Stimulating	54.55	Grey
307.	Feedback: Start, Stop, Continue / Start, Stop, Continue	Stimulating	54.55	Grey
308.	Hero Stories	Stimulating	54.55	Grey
309.	How-Now-Wow Matrix	Stimulating	54.55	Grey
310.	Kanban Pizza Game	Stimulating	54.55	Grey
311.	LEGO Serious Play / LEGO® Serious Play	Stimulating	54.55	Academic
312.	Lego Challenge	Stimulating	54.55	Grey
313.	Letter To Myself	Stimulating	54.55	Grey
314.	Quickly Sketch Noting / Sketchnoting	Stimulating	54.55	Grey
315.	Role-Playing Game / Role Play(S)	Stimulating	54.55	Academic
316.	Skill Share	Stimulating	54.55	Grey
317.	Talking Chips	Stimulating	54.55	Grey
318.	WhoDo	Stimulating	54.55	Grey
319.	Brainwriting 6-3-5	Stimulating	54.55	Grey
320.	Closing Circle	Stimulating	54.55	Grey
321.	Coach Yourself Out Of A Funk In 3 Steps	Stimulating	54.55	Grey

322.	Difficult Co-Creators	Stimulating	54.55	Grey
323.	Extreme Characters	Stimulating	54.55	Grey
324.	Future Backcasting	Stimulating	54.55	Grey
325.	Habit Reflection: Create A Habit That Sticks	Stimulating	54.55	Grey
326.	Here, There, Everywhere	Stimulating	54.55	Grey
327.	Innovation Tournament	Stimulating	54.55	Academic
328.	Paint A Picture	Stimulating	54.55	Grey
329.	Story Puzzle	Stimulating	54.55	Grey
330.	Team Brainstorming	Stimulating	54.55	Academic
331.	Tomorrow's Narratives / Tomorrow's Headline / Advertising Posters / Service Evidencing / Future Newspaper / Newspaper Headlines Of The Future	Stimulating	54.55	Grey
332.	Unintended Consequences / Dormant Opportunities	Stimulating	54.55	Grey
333.	Flower Of Thoughts	Collaborating	100	Grey
334.	Fish Bowl / Fishbowl	Collaborating	100	Grey
335.	Collective Reflection	Collaborating	90.91	Academic
336.	Collective Vision Building	Collaborating	90.91	Academic
337.	Idea & Concept Development	Collaborating	90.91	Grey
338.	Open Space Technology	Collaborating	90.91	Grey
339.	Walt Disney Method	Collaborating	90.91	Grey
340.	World Café	Collaborating	90.91	Academic
341.	Collective Narratives	Collaborating	90.91	Academic
342.	90-Minute Prototypes	Collaborating	81.82	Grey
343.	Align On Your Impact Goals	Collaborating	81.82	Grey
344.	Idea Remix	Collaborating	81.82	Grey

345.	Sketching Group / C-Sketch / Collaborative Sketching / 5-1-3 G	Collaborating	81.82	Grey
346.	Alignment & Autonomy	Collaborating	72.73	Grey
347.	Carousel / Carousel Technique	Collaborating	72.73	Grey
348.	Design The Box	Collaborating	72.73	Grey
349.	Dilemma Café	Collaborating	72.73	Grey
350.	Group Model Building / Group-Model Building / Group Model-Building / Building A Model	Collaborating	72.73	Academic
351.	Participatory System Dynamics (SD)	Collaborating	72.73	Academic
352.	People Map / People Mapping	Collaborating	72.73	Grey
353.	Public Stack Puzzle	Collaborating	72.73	Grey
354.	1,2,4, All!	Collaborating	63.64	Grey
355.	5 Bold Steps	Collaborating	63.64	Grey
356.	Action Group(S)	Collaborating	63.64	Academic
357.	Collaborative Pilot Schedule	Collaborating	63.64	Grey
358.	Dialogue Cafés	Collaborating	63.64	Academic
359.	Dialogue Of Wisdom (Wisdom Dialogues)	Collaborating	63.64	Academic
360.	Do, Redo & Undo	Collaborating	63.64	Grey
361.	Geographical Mapping / GIS	Collaborating	63.64	Grey
362.	Group Level Assessment	Collaborating	63.64	Academic
363.	Grow An Idea	Collaborating	63.64	Grey
364.	Innovation Portfolio Exercise	Collaborating	63.64	Grey
365.	Lights, Camera, Action!	Collaborating	63.64	Grey
366.	Nagging	Collaborating	63.64	Grey
367.	Neo-Socratic Dialogue	Collaborating	63.64	Grey

368.	Vision Factory	Collaborating	63.64	Grey
369.	Collaboration Analysis/ Collaborative Data Analysis	Collaborating	63.64	Academic
370.	Draw The Problem	Collaborating	63.64	Grey
371.	Future Mapping / Future Map	Collaborating	63.64	Grey
372.	Make A World	Collaborating	63.64	Grey
373.	Mini-Campaign Challenge	Collaborating	63.64	Grey
374.	Participatory Photography (PP)	Collaborating	63.64	Academic
375.	Video Card Family Game	Collaborating	63.64	Grey
376.	Atomize	Collaborating	54.55	Grey
377.	Cogenerative Dialogues (Cogens)	Collaborating	54.55	Academic
378.	Four Square Story	Collaborating	54.55	Grey
379.	Life Café	Collaborating	54.55	Academic
380.	Participatory Theatre	Collaborating	54.55	Academic
381.	Post-It Note Race / Sticky Note Race	Collaborating	54.55	Grey
382.	Quaker Conversation / Quaker Dialogue	Collaborating	54.55	Grey
383.	The Blue Sky Vision Exercise / Blue Skye Envisioning	Collaborating	54.55	Grey
384.	Argument Map / Argument Mapping	Collaborating	54.55	Grey
385.	Bundle Ideas	Collaborating	54.55	Grey
386.	Challenge Cards	Collaborating	54.55	Grey
387.	Collaborative Mapping (Aka Citizen Mapping)	Collaborating	54.55	Academic
388.	Conflict Responses	Collaborating	54.55	Grey
389.	Customer, Employee, Shareholder	Collaborating	54.55	Grey
390.	Design Critique	Collaborating	54.55	Grey

391.	Engineering Your Team OS	Collaborating	54.55	Grey
392.	Friend Or Foe?	Collaborating	54.55	Grey
393.	Future Trends	Collaborating	54.55	Grey
394.	Mash-Up Innovation / Mash-Ups	Collaborating	54.55	Grey
395.	Scenario Mapping	Collaborating	54.55	Academic
396.	Dotmocracy / Dot Voting / Coloured Dot Voting / Prioritisation Dots	Decision-Making	100	Grey
397.	Impact/Effort Matrix / Impact & Effort Matrix	Decision-Making	100	Grey
398.	Near And Dear	Decision-Making	81.82	Grey
399.	Yonmenkaigi System Method	Decision-Making	81.82	Academic
400.	Pair-Wise Ranking	Decision-Making	81.82	Academic
401.	20/20 Vision	Decision-Making	72.73	Grey
402.	3 Action Steps	Decision-Making	72.73	Grey
403.	Non-Structural Fuzzy Decision Support System	Decision-Making	72.73	Academic
404.	Simple Multi-Attribute Rating Technique (SMART)	Decision-Making	72.73	Academic
405.	Sorting Important To/For	Decision-Making	72.73	Grey
406.	Electronic Voting	Decision-Making	72.73	Academic
407.	Direct Ranking / Direct Matrix Ranking	Decision-Making	63.64	Academic
408.	Forced Ranking	Decision-Making	63.64	Grey
409.	Urgent/Important Grid (Aka Eisenhower Matrix, Or	Decision-Making	63.64	Grey

	Eisenhower Decision Matrix)			
410.	Diamond Ranking / Diamond Ranking Strategy	Decision-Making	63.64	Grey
411.	Deliberative Dialogue	Decision-Making	54.55	Academic
412.	Interdisciplinary Work Groups	Decision-Making	54.55	Grey
413.	Narrow The Set	Decision-Making	54.55	Grey
414.	Soft Systems Methodology	Decision-Making	54.55	Academic
415.	Bang-For-The-Buck	Decision-Making	54.55	Grey
416.	Pros & Cons / Pros Cons List	Decision-Making	54.55	Grey
417.	Content Analysis / Qualitative Content Analysis	Analysis	100	Academic
418.	Foucauldian Discourse Analysis	Analysis	100	Academic
419.	Structural Equation Modeling (SEM)	Analysis	100	Academic
420.	Thematic Analysis (TA)	Analysis	100	Academic
421.	Discourse Analysis	Analysis	100	Academic
422.	Framework Analysis	Analysis	100	Academic
423.	Fuzzy Set Qualitative Comparative Analysis (FS/QCA)	Analysis	100	Academic
424.	Quantitative Bibliometric Analysis	Analysis	100	Academic
425.	Critical Appraisal	Analysis	90.91	Academic
426.	Comparison Analysis	Analysis	90.91	Academic
427.	Opinion Mining / Sentiment Analysis	Analysis	81.82	Grey

428.	Two-Step Clustering Method	Analysis	81.82	Academic
429.	Analytic Hierarchy Process	Analysis	72.73	Academic
430.	Cost Benefit Analysis / Cost-Benefit Analysis	Analysis	72.73	Academic
431.	Quantitative Forecasting	Analysis	72.73	Academic
432.	Legal Analysis	Analysis	63.64	Academic
433.	Systematic Mapping	Analysis	63.64	Academic
434.	Analytic Network Process	Analysis	54.55	Academic
435.	Benchmarking	Analysis	54.55	Academic
436.	Test-Retest Method / Test-Retest Reliability	Analysis	54.55	Academic

Outlier Cards (unsorted Methods):

These cards had too low of an agreement rate to be placed in a section of the framework. Therefore, these methods will <u>not</u> be added to the Co-Creation Rainbow framework at this stage. A total of 183 methods did not have enough of an agreement to be sorted into the Co-Creation Rainbow framework.

Table S2. Outlier Cards (unsorted Methods)				
Number	**Method name**	**Potential Section(s)**	**Avg. Agreement rate (%)**	**Sourced from Grey or Academic Lit.**
1.	Scenario Workshop(S)	Collaborating, Decision-Making or Stimulating	33.33	Grey
2.	History Map / History Mapping	Collaborating, Stimulating, or Understanding	33.33	Grey
3.	A/B Testing	Analysis, Understanding, or Collaborating	33.33	Grey

4.	Deliberative Online Forum	Collaborating, Decision-Making or Understanding	33.33	Grey
5.	Democs (Deliberative Meetings Organised By Citizens)	Decision-Making, Collaborating, Stimulating	33.33	Grey
6.	Is - Is Not - Does - Does Not	Stimulating, Collaborating, or Understanding	33.33	Grey
7.	Matchstick Discussion	Collaborating, Stimulating or Understanding	33.33	Grey
8.	Onboarding Kit	Informing, Collaborating, or Stimulating	33.33	Grey
9.	Paired Listening	Stimulating, Collaborating or Understanding	33.33	Grey
10.	Science Theatre	Stimulating, Collaborating, or Informing	33.33	Grey
11.	$100 Test	Decision-Making, Stimulating, or Collaborating	33.33	Grey
12.	Button Method	Collaborating, Stimulating, or Understanding	33.33	Grey
13.	Caravan Method	Stimulating, Collaborating or Understanding	33.33	Grey
14.	Circle Of Influence	Collaborating, Decision-Making or Understanding	33.33	Grey
15.	Collaborative Brainstorming / Crowdstorming	Collaborating, Stimulating, or Understanding	33.33	Grey
16.	Elevator Pitch	Stimulating, Informing or Understanding	33.33	Grey

17.	Explore Your Values	Stimulating, Understanding, or Decision-Making	33.33	Grey
18.	Exploring Client Centricity	Collaborating, Understanding, or Decision-Making	33.33	Grey
19.	Find Themes	Analysis, Understanding or Collaborating	33.33	Grey
20.	Flip It	Collaborating, Stimulating, or Informing	33.33	Grey
21.	Hero's Journey Agenda	Informing, Stimulating, or Understanding	33.33	Grey
22.	Knowledge Hunt	Collaborating, Stimulating and Understanding	33.33	Grey
23.	Lightning Decision Jam	Collaborating, Decision-Making, Understanding	33.33	Grey
24.	One Word Before Leaving	Stimulating, Understanding, and Decision-Making	33.33	Grey
25.	Paired Roleplay	Stimulating, Collaborating, or Decision-Making	33.33	Grey
26.	Personal Presentations	Stimulating, Informing, Understanding	33.33	Grey
27.	Plus/Delta	Understanding, Collaborating, or Stimulating	33.33	Grey
28.	Post The Path	Understanding, Collaborating, or Stimulating	33.33	Grey
29.	Rapid Research	Collaborating, Stimulating, or Understanding	33.33	Grey
30.	Relationship Circle	Collaborating, Analysis, or Understanding	33.33	Grey

31.	Reverse Role Play	Collaborating, Stimulating or Decision-Making	33.33	Grey
32.	Stakeholder Working Groups	Understanding, Decision-Making, or Collaborating	33.33	Grey
33.	Step Ladder Brainstorming / Stepladder Technique	Decision-making, Stimulating, or Collaborating	33.33	Grey
34.	Take A Stand	Collaborating, Stimulating, or Understanding	33.33	Grey
35.	The Sketch Game	Stimulating, Collaborating, or Understanding	33.33	Grey
36.	Understanding Chain / Understanding Chain Game	Collaborating, Stimulating, or Understanding	33.33	Grey
37.	Welcome To My World	Understanding, Collaborating, or Stimulating	33.33	Grey
38.	Concept Mapping / Conceptual Mapping	Understanding, Analysis, or Collaborating	33.33	Academic
39.	Critical Dialogue	Stimulating, Collaborating or Understanding	33.33	Academic
40.	Two-Way Dialogue / Two-Way Communication	Collaborating, Stimulating, or Understanding	33.33	Academic
41.	Causal Loop Diagrams	Understanding, Analysis or Collaborating	33.33	Academic
42.	Likert Scale	Understanding, Decision-Making or Analysis	33.33	Academic
43.	Reflection Meetings	Stimulating, Understanding or Collaborating	33.33	Academic

44.	Memos	Analysis, Understanding or Stimulating	33.33	Academic
45.	Scenario Analysis	Analysis, Understanding or Collaborating	33.33	Academic
46.	Stakeholder Mapping	Understanding, Analysis or Collaborating	33.33	Academic
47.	Facilitated Dialogue	Collaborating, Stimulating or Understanding	33.33	Academic
48.	Forum Theatre	Collaborating, Stimulating, or Informing	33.33	Academic
49.	Participatory Social Network Mapping	Collaborating, Understanding, or Analysis	33.33	Academic
50.	Wealth Ranking	Decision-Making, Understanding, Collaborating	33.33	Academic
51.	Participatory Art-Based Inquiry	Stimulating, Collaborating, or Understanding	33.33	Academic
52.	Reflective Group Sessions	Understanding, Collaborating, or Stimulating	33.33	Academic
53.	Transformative Dialogues (TD)	Collaborating, Understanding or Stimulating	33.33	Academic
54.	Note To Self	Stimulating, Understanding, or Analysis	30.3	Grey
55.	Hand Signals	Stimulating, Collaborating, or Informing	30.3	Grey
56.	Red: Green Cards	Understanding, Stimulating, or Collaborating	30.3	Grey
57.	Circles Of Connection	Collaborating, Stimulating, Understanding or Decision-Making	25	Grey

58.	Deliberative Poll / Deliberative Polling	Understanding, Decision-making, Informing or Stimulating	25	Grey
59.	Idea Card(S)	Collaborating, Stimulating, Decision-Making, or Understanding	25	Grey
60.	Idea Dashboard	Stimulating, Informing, Collaborating or Understanding	25	Grey
61.	Parking Lot / Parking Space	Collaborating, Stimulating, Decision-Making, or Understanding	25	Grey
62.	Six Thinking Hats	Stimulating, Collaborating, Understanding, or Analysis	25	Grey
63.	Valorisation Panels / User Committee	Decision-Making, Collaborating, Understanding, or Stimulating	25	Grey
64.	Commons Mapping	Understanding, Collaborating, Decision-making, or Stimulating	25	Grey
65.	Context Mapping	Collaborating, Understanding, Stimulating, or Informing	25	Grey
66.	Controlled Dialogue	Stimulating, Collaborating, Informing or Understanding	25	Grey
67.	Mapping Organizational Culture	Collaborating, Understanding, Stimulating, or Informing	25	Grey
68.	Spectrum Lines	Decision-Making, Collaborating, Stimulating, or Understanding	25	Grey

69.	Stakeholder(S) Trust Map	Understanding, Collaborating, Analysis or Stimulating	25	Grey
70.	Street Vote	Understanding, Decision-Making, Stimulating, or Collaborating	25	Grey
71.	Value Map / Value Mapping	Understanding, Collaborating, Analysis or Decision-Making	25	Grey
72.	Walk Shop	Understanding, Collaborating, Stimulating, or Informing	25	Grey
73.	Action Plan Workshop: The Arrow / The Arrow	Collaborating, Decision-Making, Stimulating, or Informing	25	Grey
74.	Analogous Inspiration	Decision-Making, Collaborating, Analysis or Understanding	25	Grey
75.	Appreciation Train	Stimulating, Collaborating, Analysis or Understanding	25	Grey
76.	Back-Turned Feedback	Understanding, Collaborating, Stimulating, or Analysis	25	Grey
77.	Build & Run Prototypes	Collaborating, Understanding, Informing, or Stimulating	25	Grey
78.	Circles And Soup	Decision-Making, Collaborating, Understanding, or Stimulating	25	Grey
79.	Demands Continuums	Collaborating, Understanding, Analysis, or Stimulating	25	Grey
80.	Diffusion Curve Reflection	Stimulating, Understanding, Collaborating or Analysis	25	Grey
81.	Draw It	Stimulating, Understanding,	25	Grey

		Collaborating, or Informing		
82.	Dynamic Personas	Collaborating, Understanding, Analysis or Stimulating	25	Grey
83.	Ecology Mapping (*Same As Ecosystem Map)	Understanding, Collaborating, Stimulating, or Analysis	25	Grey
84.	Function Vision Mapping / Function Mapping	Collaborating, Analysis, Understanding, or Decision-Making	25	Grey
85.	Graphic Gameplan	Collaborating, Decision-Making, Understanding, or Stimulating	25	Grey
86.	Gut Check	Stimulating, Collaborating, Understanding, or Decision-Making	25	Grey
87.	Heart, Hand, Mind	Stimulating, Collaborating, Understanding, or Decision-Making	25	Grey
88.	Heuristic Ideation Technique	Collaborating, Stimulating, Analysis, or Informing	25	Grey
89.	Live Prototyping	Analysis, Collaborating, Understanding, Decision-Making	25	Grey
90.	Memory Wall	Stimulating, Collaborating, Analysis or Understanding	25	Grey
91.	Methodkit For Team Development	Collaborating, Understanding, Stimulating, or Analysis	25	Grey
92.	Myers-Briggs Team Reflection	Collaborating, Stimulating, Understanding, or Analysis	25	Grey

93.	Pattern Quest	Collaborating, Understanding, Analysis or Stimulating	25	Grey
94.	Pessimist Vs. Optimist	Collaborating, Stimulating, Understanding, or Informing	25	Grey
95.	Pre-Mortem / Premortem	Collaborating, Stimulating, Understanding, or Analysis	25	Grey
96.	Product Pinocchio	Collaborating, Decision-Making, Stimulating or Understanding	25	Grey
97.	Project Wrap-Up	Understanding, Collaborating, Stimulating, or Decision-Making	25	Grey
98.	Question Walk / Walking Questions	Stimulating, Collaborating, Informing or Understanding	25	Grey
99.	Rings Of Connection	Stimulating, Collaborating, Analysis or Understanding	25	Grey
100.	Scenario Slider	Collaborating, Stimulating, Analysis, or Understanding	25	Grey
101.	Selection Idea Matrix/Idea Selection Table	Collaborating, Decision-Making, Analysis or Stimulating	25	Grey
102.	Share Inspiring Stories	Understanding, Stimulating, Collaborating, or Informing	25	Grey
103.	SOAR Analysis	Analysis, Collaborating, Stimulating or Understanding	25	Grey
104.	Staple Yourself To Something	Stimulating, Collaborating, Informing or Understanding	25	Grey

105.	Synthesis Wall	Collaborating, Understanding, Decision-Making or Informing	25	Grey
106.	System Map / System Mapping	Collaborating, Understanding, Analysis or Stimulating	25	Grey
107.	System Scenario	Collaborating, Understanding, Analysis, or Stimulating	25	Grey
108.	Team Purpose & Culture	Collaborating, Understanding, Stimulating, or Informing	25	Grey
109.	Team Retrospective / Retros	Understanding, Stimulating, Collaborating, or Informing	25	Grey
110.	Teams Self-Assessment	Understanding, Collaborating, Stimulating, or Analysis	25	Grey
111.	The Doughnut	Stimulating, Understanding, Collaborating, or Informing	25	Grey
112.	Timelapse	Understanding, Stimulating, Collaborating, or Analysis	25	Grey
113.	Transition Journey	Understanding, Collaborating, Informing, or Stimulating	25	Grey
114.	User Day-Parting	Stimulating, Collaborating, Analysis or Understanding	25	Grey
115.	Ways To Grow Framework	Collaborating, Stimulating, Understanding, or Analysis	25	Grey
116.	Participatory GIS / PGIS / Public Participation GIS	Collaborating, Understanding, Stimulating, or Decision-Making	25	Academic

117.	Nominal Group Technique	Decision-Making, Stimulating, Collaborating, or Analysis	25	Academic
118.	Problem Trees / Problem Analysis / Situational Analysis	Understanding, Collaborating, Analysis, or Stimulating	25	Academic
119.	Forecasting	Decision-Making, Understanding, Analysis, or Stimulating	25	Academic
120.	Stakeholder Dialogue(S)	Collaborating, Stimulating, Understanding, or Informing	25	Academic
121.	Think Aloud / Think-Aloud / Thinking Aloud	Stimulating, Understanding, Informing, or Collaborating	25	Academic
122.	Reflexive Dialogue / Reflective Dialogue(S)	Collaborating, Stimulating, Understanding or Analysis	25	Academic
123.	Participatory Reflection (And Action)	Collaborating, Understanding, Stimulating, or Decision-Making	25	Academic
124.	Constructive Dialogue	Collaborating, Stimulating, Understanding, or Analysis	25	Academic
125.	Participatory Systems Mapping (PSM)	Collaborating, Understanding, Analysis, or Decision-Making	25	Academic
126.	Participatory Theme Elicitation (PTE)	Collaborating, Understanding, Analysis or Stimulating	25	Academic
127.	Visual Mapping	Understanding, Analysis, Collaborating, or Stimulating	25	Academic

128.	Scenario Narratives / Exploratory Scenario Narratives	Decision-Making, Understanding, Stimulating, or Collaborating	25	Academic
129.	Critical Self-Reflection (Reflective Essay)	Stimulating, Understanding, Analysis or Collaborating	25	Academic
130.	Design Meeting	Decision-Making, Collaborating, Analysis or Informing	25	Academic
131.	Horizontal Dialogues	Understanding, Stimulating, Collaborating, or Informing	25	Academic
132.	Most Significant Change Method / Most Significant Change Technique (MSC)	Collaborating, Understanding, Analysis or Decision-Making	25	Academic
133.	Actor-Centred Mapping / Actor Mapping	Understanding, Analysis, Collaborating or Informing	25	Academic
134.	ARDI (Actors Resources Dynamics And Interactions) Approach	Understanding, Analysis, Collaborating or Informing	25	Academic
135.	Arts-Infused Dialogue / Art Dialogue	Understanding, Collaborating, Stimulating, or Informing	25	Academic
136.	Optimized Honeycomb Model For User Experience (UX)	Understanding, Analysis, Informing, Stimulating	22.73	Academic
137.	Back Of The Napkin	Informing, Stimulating, Analysis or Collaborating	22.73	Grey
138.	Signal Cards	Understanding, Stimulating, Collaborating, or Informing	22.73	Grey

139.	7ps Framework	Stimulating, Understanding, Collaborating, or Informing	22.73	Grey
140.	Balloon And Kite Mapping	Understanding, Stimulating, Analysis, or Collaborating	22.73	Grey
141.	Extremes And Mainstreams	Understanding, Stimulating, Analysis or Collaborating	22.73	Grey
142.	Iteration Dice	Decision-Making, Stimulating, Collaborating, or Informing	22.73	Grey
143.	Rapid Prototyping	Understanding, Collaborating, Analysis or Stimulating	22.73	Academic
144.	Listening Levels	Understanding, Collaborating, Stimulating, Analysis or Informing	20	Grey
145.	Who/What/When Matrix	Decision-Making, Collaborating, Informing, Stimulating or Analysis	20	Grey
146.	Affinity Diagram / Affinity Diagramming / Affinity Map / Affinity Mapping	Collaborating, Analysis, Understanding, Informing or Stimulating	20	Grey
147.	Ambition Ranking	Decision-Making, Understanding, Stimulating, Analysis or Collaborating	20	Grey
148.	Photo Safari	Collaborating, Understanding, Analysis, Decision-Making or Stimulating	20	Grey
149.	Stakeholder Journey	Understanding, Stimulating, Collaborating, Analysis, or Informing	20	Grey

150.	2 Minutes Madness	Stimulating, Analysis, Collaborating, Informing or Understanding	20	Grey
151.	3d-Prop	Collaborating, stimulating, Analysis, Informing, or Understanding	20	Grey
152.	Actions For Retrospectives	Collaborating, Decision-Making, Stimulating, Informing, or Understanding	20	Grey
153.	Altitude	Stimulating, Collaborating, Analysis, Decision-Making or Informing	20	Grey
154.	Blink Testing	Understanding, Stimulating, Analysis, Collaborating, or informing	20	Grey
155.	Ecosystems Loops	Understanding, Collaborating, Analysis, Informing, or Stimulating	20	Grey
156.	Frame Your Design Challenge	Collaborating, Analysis, Stimulating, Understanding, or Informing	20	Grey
157.	Long Range Forecasts	Collaborating, Informing, Stimulating, Understanding or Decision-Making	20	Grey
158.	Paper Prototyping	Collaborating, Understanding, Analysis, Informing or Stimulating	20	Grey
159.	Personal Swot Assessment	Understanding, Analysis, Stimulating, Collaborating, or Informing	20	Grey
160.	Project Mid-Way Evaluation	Collaborating, Understanding, Analysis, Decision-Making or Stimulating	20	Grey

161.	Project Point Of Departure	Collaborating, Decision-Making, Understanding, Informing or Stimulating	20	Grey
162.	Quantify Yourself	Stimulating, Understanding, Analysis, Collaborating, or Informing	20	Grey
163.	Remember The Future	Understanding, Collaborating, Decision-Making, Analysis, or Stimulating	20	Grey
164.	Rough Prototyping	Collaborating, Analysis, Stimulating, Understanding, or Informing	20	Grey
165.	Service Roadmap	Collaborating, Informing, Analysis, Decision-Making or Stimulating	20	Grey
166.	Spectrum Mapping	Understanding, Analysis, Collaborating, Stimulating, or Decision-Making	20	Grey
167.	Telling Our Stories	Collaborating, Understanding, Stimulating, Analysis, or Informing	20	Grey
168.	Digital Stories / Digital Storytelling	Stimulating, Analysis, Collaborating, Understanding, or Informing	20	Academic
169.	Convenience Sampling	Analysis, Understanding, Collaborating, Informing or Stimulating	20	Academic
170.	Purposeful Sampling / Judgmental Sampling	Analysis, Understanding, Collaborating, Informing or Stimulating	20	Academic
171.	Random Sampling	Analysis, Understanding, Collaborating, Informing or Stimulating	20	Academic

172.	Rapid Participatory Appraisal (RPA)	Understanding, Collaborating, Analysis, Decision-Making or Stimulating	20	Academic
173.	Maximum Variation Sampling	Analysis, Understanding, Collaborating, Informing, or Stimulating	20	Academic
174.	Impact Mapping	Understanding, Collaborating, Decision-Making, Analysis or Informing	20	Academic
175.	Opportunistic Sampling	Analysis, Understanding, Collaborating, Informing or Stimulating	20	Academic
176.	Pair-Wise Comparison	Analysis, Decision-Making, Collaborating, Stimulating, or Understanding	20	Academic
177.	Solution Trees / Opportunity Solution Tree (OST)	Analysis, Understanding, Collaborating, Informing or Stimulating	20	Academic
178.	Temperature Check	Stimulating, Understanding, Analysis, Collaborating or Informing	18.18	Grey
179.	Seasonal Calendar	Understanding, Informing, Analysis, Collaborating, or Stimulating	18.18	Academic
180.	Values Tree	Stimulating, Collaborating, Informing, Analysis, Decision-Making or Understanding	16.67	Grey
181.	Assumption Mapper / Assumption Mapping	Collaborating, Decision-Making, Understanding, Analysis, Informing or Stimulating	16.67	Grey
182.	Road Mapping	Decision-Making, Analysis, Stimulating,	16.67	Grey

		Collaborating, Informing or Understanding		
183.	Persona Method	Understanding, Decision-Making, Stimulating, Analysis, Collaborating or Informing	16.67	Academic

Post-Sorting Reflection Questions

When the card sorting participant completed the closed card sorting task, they were asked a few questions to gauge their immediate reflections. The following are the responses from the card sorting participants.

Q1: Considering the options available, please add any additional categories you think were missing?
- "I was comfortable with the categories added. I would perhaps consider adding sub-groups to themes. Could be *that* stimulating is "stimulating exchange/idea creation" and separately something like "stimulating the process forward" (I added there some methods that helped recap and co-creators be on the same page, e.g. identify next steps, etc). Also, for the Understanding may be worth adding, as you mentioned, a distinction between ones that can be "active" and ones that can't be "actively involving co-creators.""
- "maybe something about specific 'tools' for lack of a better word that would enable to group recordings, cards, visual tools more effectively?"
- "One consideration I had is to split stimulation into generation and energizing. "
- "I think I would consider a separate category for methods that can contribute to the co-creation process itself, for example, methods used for co-creators to get to know each other or building trust."
- "Maybe a category for cards that we consider not to be co-creation methods? "
- "I suggest expanding on the analysis category, maybe dividing it into collaborative analysis, theory/model/framework, and data analysis method."
- "no additional category is needed."

Q2: Please provide any reflections on the activity you did today, or your experience sorting the methods:
- "I appreciated the categories. I don't feel they need changing - just perhaps some further sub-themes or clarification. "

- "It was quite challenging to explore and understand the different categories, but once the cards were sorted (approximately halfway through) it becomes much clearer the division among the different categories."
- "it took me 4h. I became confused halfway through as the various items to be categorised are sometimes similar (for example why the distinction in so many different types of interviews?) or sometimes difficult to apportion to a scope when they are tools, like note to self or audio recording. "
- "It was faster than I thought, and actually very interesting. I also realized that I actually used way more methods in practice than I thought (I just didn't identify them as such)."
- "It was nice to see that most methods fit within the sections of the Co-Creation Rainbow framework. I think that if we had the opportunity to use a model/taxonomy like this when we were conducting our co-creation session it would have had a big impact on our preparation."
- "Super helpful to have the descriptions of the categories in-built to quickly refer to. Extremely helpful having the Word document methods and the method list in Maze in the same order because it was easier to match up and find methods to sort. "
- "This was difficult because there are nuances in levels of power and equality in each category, which can determine whether something is collaborative or not. "
- "I like the [Co-Creation Rainbow] framework. It looks super! But while sorting the methods, I found that there are some overlapping between collaborating and understanding, (like World Cafe...), and between informing and understanding (like product prototyping...)... It makes sense for the overlapping, I think. I think it is worth noting."
- "I highlighted some for myself to discuss whether these belong in methods."
- It took me over five hours – I wasn't familiar with a lot of the methods so had to use the Word document, which was 34000 words so took a while to get through and Google.
- I'm not sure different types of sampling are 'methods' so I'd maybe remove them? Sampling would be done before any co-creation started."
- "I did not sort a few methods that I think should be removed from this set. There were some duplicates. Some mapping methods were hard to place between stimulating vs. collaborating. "

The Final Co-Creation Rainbow Framework

The Co-Creation Rainbow framework contains a total of 430 methods that were sorted into

the 5 sections of the framework, and the 'analysis' category.

Informing = 8 methods

1. Pie Chart Agenda
2. Operation Manual(S)
3. Audiovisual Patient Information
4. Pecha Kucha / Ignite
5. RACI Matrix
6. Train The Trainer / Train-The-Trainer
7. Video Prototyping
8. IDOARRT Meeting Design

Understanding = 174 methods

1. Ad-Hoc User Acceptance Questionnaire
2. Capability Opportunity Motivation And Behaviour (COM-B) Self-Evaluation Questionnaire
3. Cherokee Self-Reliance Questionnaire
4. Community-Based Survey / Community Based Survey
5. Daily Diaries / Daily Diary Method
6. Direct Observation(S)
7. Ethnographic Interviews
8. Ethnographic Observation
9. Evidence-Based Practice Questionnaire
10. Expert Interviews
11. Exploratory Interviews
12. Face-To-Face Interviews / Face-To-Face Dialogue / In-Person Interviews
13. Health Literacy Questionnaire
14. Health Questionnaire
15. Health Survey
16. In-Depth Interviews
17. Individual Interviews
18. Key Informant Interviews
19. Narrative Interviews
20. Non-Participant Observation
21. Observational Study
22. One-To-One Interviews
23. Online Questionnaire / Internet Questionnaire / Web-Based Questionnaire
24. Open-Ended Interview(S)
25. Open-Ended Questionnaire / Open Ended Questionnaire
26. Participant Observation
27. Participatory Observation(S)
28. Picker Patient Experience Questionnaire
29. Psychiatric Inpatient Experience Questionnaire (PIPEQ)
30. Psychiatric Out‐Patient Experiences Questionnaire (POPEQ)

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31. Qualitative Interviews
32. Qualitative Survey / Qualitative Questionnaire
33. Quality Involvement Questionnaire
34. Quality Of Life Questionnaire (QOLQ)
35. Quantitative Interviews / Standardized Interviews
36. Quantitative Survey
37. Semi-Structured Interviews / Semistructured Interviews / Semi-Structured Dialogues
38. Stakeholder Values Questionnaire
39. Stakeholder Interviews
40. Structured Interviews
41. Students International Physical Activity Questionnaire (IPAQ)
42. Telephone Interview(S) / Phone Interview
43. Telephone Survey /Computer-Assisted Telephone Interviewing (CATI)
44. Therapeutic Engagement Questionnaire (TEQ)
45. Travel Diaries / Travel Journals
46. Unstructured Interviews
47. Virtual Reality Symptoms Questionnaire (VRSQ)
48. Working Alliance Inventory – Short Revised (WAI-SR)
49. Bespoke Questionnaire
50. Close Ended Questionnaire
51. Cross-Sectional Observations
52. Elicitation Interview
53. Evaluation Questionnaire
54. Exit Interview(S)
55. Feedback Questionnaire
56. Field Notes / Ethnographic Field Notes / Observations Field Notes / Qualitative Field Notes / Personal Field Notes
57. Field Observation(S)
58. Geo-Questionnaire
59. Interactive Interviewing
60. Intercept Interviews
61. Interviewer-Administered Questionnaire
62. Patient Narratives / Patient Experience Narratives
63. Patient Satisfaction Questionnaire
64. Personal Diaries / Customer Diaries
65. Postintervention Questionnaires
66. Practical Observations
67. Satisfaction Questionnaire
68. Self-Administered Questionnaire
69. Self-Reporting Questionnaire (SRQ)
70. Semistructured Questionnaire / Semi-Structured Questionnaire
71. Standardized Questionnaire
72. Structured Questionnaire
73. Systematic Observation

74. Usability Questionnaire
75. User Narratives / Life Journey Narratives
76. Videotaped Observations
77. Community Consultation
78. Convergent Interviews / Convergent Interviewing
79. Cross-Sectional Survey
80. Environmental Survey
81. Experiential Observation
82. Expert Consultation
83. Motivational Interviewing
84. Patient Diaries
85. People Shadowing
86. Practice Environment Scale Of The Nursing Work Index
87. Questionnaire Survey / Questionnaire Surveys
88. Reflective Diaries
89. Scenario-Based Interviews / Situational Interviews
90. Second-Order Observation
91. Walk-Along Interviews / Go-Alongs / Walking Interviews
92. Contextual Observation
93. Contingent Valuation
94. Naturalistic Observations
95. Peers Observing Peers
96. Personal Narratives
97. Pictogram Interview
98. Repertory Grid Technique
99. Self-Assessment Questionnaire
100. Critical Incident Technique (Cit)
101. Day-In-The-Life Mapping
102. Emotional Touchpoints
103. Mental Mapping
104. Participatory Survey
105. Reflection Notes
106. Stakeholder Consultation
107. Insights And Learnings
108. Narrative Ethnography
109. Narrative Interview
110. Pathographies
111. Reflective Field Notes / Reflexive Field Notes
112. Reflective Narratives
113. Cognitive Mapping
114. Neighborhood Mapping
115. Q-Methodology
116. Structured Interview Matrix Facilitation Technique / Interview Matrix (Sim)
117. We Saw, We Heard

118. Behavioural Observation
119. Case Study Method
120. Conversation Capture
121. Explanatory Narratives
122. Pain-Gain Map
123. Photojournal
124. Reference Project / Case Studies
125. Self-Assessment Method
126. Show Me Your Values
127. Asset Mapping
128. Goal Attainment Scaling (GAS)
129. Learning Log
130. Participatory Surveillance
131. Product Prototyping
132. Reflective Writing
133. The Five Whys Method
134. Direct Experience Storyboard
135. Emotional Journey
136. Experience Mapping /Experience Mapping / Customer Journey Mapping
137. Guided Conversation
138. Reflective Practice
139. Resource Flow
140. Retrospective Case Note Review
141. Summing Up Rounds
142. User Tests
143. Videovoice / Videovoice Diaries
144. Visual Narratives / Visual Storytelling
145. Writing A Letter To Yourself
146. 4 Plus 1 Question
147. Break Up Letter / Love Letter
148. Card Sort
149. Empathy Map / Empathy Mapping
150. Feedback Map
151. Five-Fingered Consensus/ Fist To Five
152. Fuzzy Cognitive Mapping (FCM)
153. GIS Mapping Techniques / GIS
154. Good Day/Bad Day
155. Group Delphi
156. Mind Mapping
157. Photo Voice / Photovoice / Photo Interview(S) / Photo Diary
158. Power Mapping
159. Social Mapping
160. Speed Boat
161. Structured Reflection

Stimulating = 150 methods

29. Ideastorming / Ideastorms
30. Line-Up
31. Pronoun Rounds
32. Reverse Brainstorming / Reverse Thinking
33. Start Your Day
34. The Shouting Game
35. "What If" Brainstorming / What If-Ing
36. 4 Quadrants
37. Brainstorming
38. Challenge Prizes
39. Draw An Apple / Apple-Drawing Ideation
40. Portrait Gallery
41. Round Robin / Round Robin Brainstorming
42. Sky The Limit Brainstorm
43. Starbursting
44. Trust Falls In Pairs
45. Two Truths And A Lie
46. Wizards, Pixies, Giants / Giants, Wizards, Elves
47. Bed Sheet Ping-Pong
48. Connect The Dots
49. Human Machine
50. Knot Game / Untangle Yourself
51. Lower A Bamboo Cane To The Ground
52. Pass A Loop Round The Circle
53. Pass The Squeeze
54. Rain Making
55. Role Storming / Rolestorming
56. Shrinking Islands
57. Structured Brainstorm
58. Sync Claps
59. The 6 Thinking Hats / Feedback Hats
60. Trading Cards
61. Trust Ladder
62. Walkabout
63. 3-12-3 Brainstorm
64. Apple-Drawing Ideation
65. Bisociation
66. Check-In / Check-Out
67. Cover Story
68. Crazy 8's
69. Forced Analogy
70. Mingle
71. Mirroring
72. My Daily P.A.C.T

73. Post-Up
74. Quiet Brainstorming / Silent Brainstorming
75. Super Hero
76. Who Inspires Us?
77. Write A Blurb
78. Body Part Twister
79. Image-ination
80. Inspiration Walk
81. Pair Introductions / Introduction In Pairs
82. People Bingo
83. Protobot
84. Start Small
85. Stinky Fish
86. The Anti-Problem
87. This N' That
88. 5-4-3-2-1 Grounding Technique
89. 6*8*5 Method
90. Brain Writing / Brainwriting / Group Passing / Slip Writing
91. Feedback: Appreciation Mingle
92. Feedback: I Appreciate…
93. Future Wheel
94. I Like, I Wish, I Wonder / I Like, I Wish, What If
95. Jam Session / Design Jam / Innovation Jam
96. Lo-Tech Social Networking / Low-Tech Social Network
97. Marshmallow Challenge
98. Mood Board(S)
99. NUF Test
100. Opening Circle
101. Prune The Future
102. Question Balloons
103. Roving Ideastorms
104. Squiggle Birds
105. Synesthesia
106. Talking Stick(S) / Wooden Stick
107. Air Time Mastermind
108. Crazy 8
109. Crocodile River
110. Current Strongest Impression
111. Dinner Challenge
112. Go-Round(S)
113. Mission Impossible
114. Object Brainstorm
115. Picture Yourself
116. Prune The Product Tree

117. Random Inputs
118. Rollercoaster / Rollercoaster Check-In
119. Science Fiction Prototyping (SFP)
120. The Blind Side
121. Whole Product Game
122. A Journey Of Discovery
123. Campfire Method
124. Ethos, Logos, Pathos
125. Feedback: Start, Stop, Continue / Start, Stop, Continue
126. Hero Stories
127. How-Now-Wow Matrix
128. Kanban Pizza Game
129. LEGO Serious Play / LEGO® Serious Play
130. Lego Challenge
131. Letter To Myself
132. Quickly Sketch Noting / Sketchnoting
133. Role-Playing Game / Role Play(S)
134. Skill Share
135. Talking Chips
136. WhoDo
137. Brainwriting 6-3-5
138. Closing Circle
139. Coach Yourself Out Of A Funk In 3 Steps
140. Difficult Co-Creators
141. Extreme Characters
142. Future Backcasting
143. Habit Reflection: Create A Habit That Sticks
144. Here, There, Everywhere
145. Innovation Tournament
146. Paint A Picture
147. Story Puzzle
148. Team Brainstorming
149. Tomorrow's Narratives / Tomorrow's Headline / Advertising Posters / Service Evidencing / Future Newspaper / Newspaper Headlines Of The Future
150. Unintended Consequences / Dormant Opportunities

Collaborating = 63 methods

1. Flower Of Thoughts
2. Fish Bowl / Fishbowl
3. Collective Reflection
4. Collective Vision Building
5. Idea & Concept Development
6. Open Space Technology

7. Walt Disney Method
8. World Café
9. Collective Narratives
10. 90-Minute Prototypes
11. Align On Your Impact Goals
12. Idea Remix
13. Sketching Group / C-Sketch / Collaborative Sketching / 5-1-3 G
14. Alignment & Autonomy
15. Carousel / Carousel Technique
16. Design The Box
17. Dilemma Café
18. Group Model Building / Group-Model Building / Group Model-Building / Building A Model
19. Participatory System Dynamics (SD)
20. People Map / People Mapping
21. Public Stack Puzzle
22. 1,2,4, All!
23. 5 Bold Steps
24. Action Group(S)
25. Collaborative Pilot Schedule
26. Dialogue Cafés
27. Dialogue Of Wisdom (Wisdom Dialogues)
28. Do, Redo & Undo
29. Geographical Mapping / GIS
30. Group Level Assessment (GLA)
31. Grow An Idea
32. Innovation Portfolio Exercise
33. Lights, Camera, Action!
34. Nagging
35. Neo-Socratic Dialogue
36. Vision Factory
37. Collaboration Analysis/ Collaborative Data Analysis
38. Draw The Problem
39. Future Mapping / Future Map
40. Make A World
41. Mini-Campaign Challenge
42. Participatory Photography (PP)
43. Video Card Family Game
44. Atomize
45. Cogenerative Dialogues (Cogens)
46. Four Square Story
47. Life Café
48. Participatory Theatre
49. Post-It Note Race / Sticky Note Race

50. Quaker Conversation / Quaker Dialogue
51. The Blue Sky Vision Exercise / Blue Skye Envisioning
52. Argument Map / Argument Mapping
53. Bundle Ideas
54. Challenge Cards
55. Collaborative Mapping (Aka Citizen Mapping)
56. Conflict Responses
57. Customer, Employee, Shareholder
58. Design Critique
59. Engineering Your Team OS
60. Friend Or Foe?
61. Future Trends
62. Mash-Up Innovation / Mash-Ups
63. Scenario Mapping

Collective Decision-making = 21 methods

1. Dotmocracy / Dot Voting / Coloured Dot Voting / Prioritisation Dots
2. Impact/Effort Matrix / Impact & Effort Matrix
3. Near And Dear
4. Yonmenkaigi System Method (YSM)
5. Pair-Wise Ranking
6. 20/20 Vision
7. 3 Action Steps
8. Non-Structural Fuzzy Decision Support System (NSFDSS)
9. Simple Multi-Attribute Rating Technique (SMART)
10. Sorting Important To/For
11. Electronic Voting
12. Direct Ranking (Direct Matrix Ranking DMR)
13. Forced Ranking
14. Urgent/Important Grid (Aka Eisenhower Matrix, Or Eisenhower Decision Matrix)
15. Diamond Ranking / Diamond Ranking Strategy
16. Deliberative Dialogue
17. Interdisciplinary Work Groups
18. Narrow The Set
19. Soft Systems Methodology (SSM)
20. Bang-For-The-Buck
21. Pros & Cons / Pros Cons List

Analysis = 20 methods

1. Content Analysis / Qualitative Content Analysis
2. Foucauldian Discourse Analysis
3. Structural Equation Modeling (SEM)

4. Thematic Analysis (TA)
5. Discourse Analysis
6. Framework Analysis
7. Fuzzy Set Qualitative Comparative Analysis (FS/QCA)
8. Quantitative Bibliometric Analysis
9. Critical Appraisal
10. Comparison Analysis
11. Opinion Mining / Sentiment Analysis
12. Two-Step Clustering Method
13. Analytic Hierarchy Process (AHP)
14. Cost Benefit Analysis / Cost-Benefit Analysis
15. Quantitative Forecasting
16. Legal Analysis
17. Systematic Mapping
18. Analytic Network Process (ANP)
19. Benchmarking
20. Test-Retest Method / Test-Retest Reliability