IMBA-ICF linking by integrating consensus methods: How group consensus of experts can contribute to in-depth linking of instruments to the ICF

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Consensus methods integrated in the implementation of the ICF linking rules: how group consensus of experts can contribute to in-depth linking of instruments to the ICF.

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Abstract (200 words)

Purpose:

Methods:

Results:

Conclusion:

Keywords: (5-8)

Implications for rehabilitation (two to four main bullet points drawing out the implications for rehabilitation for your paper. This should be uploaded as a separate document)

Introduction

It is not only a challenge for researchers to select the most appropriate outcome measures, but health information is also collected in various ways [1]. For instance; information about the same domain (e.g. work ability) can be collected from different perspectives and through different types of assessments. Each instrument uses a different approach, unit of measurement and scale to map its construct. To increase the comparability of instruments and the interpretation of results, a common frame of reference is needed, for which the International Classification of Functioning, disability and health (ICF) can be used as a relevant framework [1-3]. In 2001 the World Health Organization (WHO) presented the ICF that was developed to provide a common framework and language in order to describe health, functioning and disability. The ICF is based on a biopsychosocial model in which the relation between physical, mental and social factors, is taken into account and can be made clear to reach the aims of the classification [4-6]. The ICF aims to improve the communication between patients, healthcare providers, policy makers and researchers. The comprehensive set of ICF categories makes it possible to describe the functional (dis)abilities of an individual. Because the ICF is an internationally accepted frame of reference and serves as a common language within health care, the interest and importance of linking instruments to the ICF has grown in recent years. The linking rules provide a clear roadmap to link items from existing assessment instruments to the appropriate categories as described in the ICF.

The ICF linking rules

ICF liking rules (table 1) were updated in 2016 [3], building further on previously published linking rules from 2002 and 2005 [1,2], consisting of ten rules, which need to be followed chronologically. The linking rules were refined on the basis of experience in research and practice, with the aim of improving transparency of the documentation of the linking process [3]. ICF linking rules have been developed for the content comparison of instruments to the ICF [7]. It makes it possible to compare, interpret and integrate information and results from different instruments in practice and in research. Even more it can support researchers and health professionals in choosing instruments depending on which ICF categories they want to operationalize or measure.

The need to combine the ICF linking rules with consensus methods in the IMBA-ICF linking study

In our research project, a specific work-related documentation tool IMBA (Integration von Menschen mit Behinderungen in die Arbeitsweld) was being linked to the ICF. The rationale to link the IMBA to the ICF was grounded in a cooperation between the Belgian Center of Knowledge in Work incapacity (CKWC) of the National Institute for Health and Disability Insurance (NIHDI) who promotes the use of the ICF in their policy. The CKWC promotes the ICF as a reference framework in Return To Work (RTW) and (dis)ability evaluation, but the CKWC is looking for specific work-related assessments and instruments that are relevant in this context. In this perspective the CKWC formulated the question to link the IMBA to the ICF. The primary objective of this linking study was to describe which concepts of ICF are covered by IMBA. The linking of IMBA and ICF will form a basis from which to analyse the opportunities of both instruments in the context of RTW and to discuss a possible integration.

There were specific considerations for linking the work-related documentation tool IMBA to the ICF because both instruments have their added value in the context of RTW. There is an increasing agreement between health care professionals to use the ICF as a common language in the context of RTW and disability evaluation. The ICF provides a reference framework to standardize communication and reporting within the RTW process, between all different stakeholders [8-10]. IMBA is a work-related documentation tool based on profile comparison by describing work capacity and work demands. By using a standardized terminology, both the patient's capacity profile and the requirement profile of a particular job are created using the same items and scoring system. Therefore the interaction between the demands of a particular job and the capacity of an individual becomes clear and the competences to return to work after a trauma or disease are visualized. Consequently the support needed and the opportunities for growth can be determined (job training, adaptation of tasks and/or adaptation of the working environment [11-13].

In using the refined linking rules, too much ambiguities remained and therefore, the aim of this paper is to demonstrate how the use of consensus methods in combination with the ICF linking rules can contribute to in-depth linking of instruments to the ICF. In this paper we aim to clarify the reason for combining ICF linking rules with the Delhpi and Nominal Group Technique in the context of a specific research project. Results on the IMBA-ICF linking will be described in a following paper.

Methods

It is recommended by the authors of the linking rules [3] to carry out the linking with two independent researchers. When ambiguity occurs, a third researcher should be consulted to decide on the most appropriate linking. However, due to the large set of IMBA items it was not feasible to follow this procedure. IMBA is an instrument that has only recently been integrated into the field of RTW in Belgium. It is a comprehensive documentation tool that requires training and certification. In Belgium, the group of researchers/health professionals who are both trained in IMBA and the ICF is limited. Therefore the involvement of these experts as independent researchers to go through the entire ICF linking process was challenging. However, there were health professionals who are trained in one of these two instruments and who could contribute to the linking from their expertise within the field of RTW. As Landeta and colleagues [14] indicated in the development of his hybrid delphi technique, experts only have limited time, it is not evident to bring them together in face-to-face meetings and they have different needs and interests. It is therefore necessary to develop the right methodology for a specific research project in which experts are involved.

Within the IMBA-ICF linking research, we faced the challenge to establish a profound yet efficient methodology whereby the involvement of these experts from different domains of the RTW context (occupational rehabilitation services, social security and occupational medicine), trained in IMBA and/or ICF became possible. This led to the search of integrating consensus methods into the linking process. In this method section the 10 linking rules (table 1) will be used as a starting point, since they are thoroughly and scientifically substantiated [1-3] there is no need to deviate from this rules. In this study we describe how consensus methods were applied to realize the implementation of specific rules. An argumentation is built up for how and why certain consensus methods were applied during specific times in the linking process. Based on the IMBA-ICF linking case, this will be illustrated in concrete terms and examples will be discussed further.

PLACEMENT TABLE 1

Table 1: Refined ICF Linking Rules [3]

Implementation of linking rule 1:

Clearly, profound knowledge of the concepts, definitions and structure of the ICF is an important requirement for applying the ICF linking rules and is the first rule. In the IMBA-

ICF linking case, we therefore implemented a thorough preparation phase. The main researcher studied graduated as a master in occupational therapy, were she studied the IC both in the basic and master training. Experience in using the model was therefore present. As part of this project, the ICF e-learning tool [15] was consulted before the start of the linking process. This e-learning tool can be a good starting point to become familiar with the ICF, but even if you are experienced in using the ICF, it is recommended to use this tool prior to a linking study. Experience and knowledge about the technical aspects of the ICF are in addition to the content and definitions very important during a linking study, as indicated in the first linking rule. The ICF e-learning tool can certainly be supportive in this case and clearly illustrates the hierarchy and structure of codes. The main researcher also studied the instrument to be linked (IMBA in this case) by theoretical training and using the instrument in practice.

Implementation of linking rules 2, 3 & 4:

The next step is the identification of the concepts that need to be linked to the ICF. This means that the content of items is analyzed and decisions need to be taken on the information to be linked to the ICF. Therefore main concepts and additional concepts need to be identified (see rules 2 and 3, table 1). When the information needs to be linked is identified, the purpose for which this information is collected must also be clear, so that the perspective can be identified and documented, as further explained in rule 4 (table 1). In the linking between IMBA and ICF on which this paper aims, the application of these 3 rules was realized by the execution of a structural analysis of the concepts by the main researcher, whereby the relevant information from each of the 70 IMBA main items was filtered and divided into main concepts and additional concepts. Studied information and decisions made, were registered in an extensive linking table describing the following elements: IMBA items and definitions, perspective adopted in information, identified main concepts and identified additional concepts (table 2).

PLACEMENT TABLE 2

Table 2: Fragment of an extensive linking table

Implementation of linking rules 5-10:

When the instrument that is linked has response options, the approach in the categorization of these response options can be identified and documented (see rule 5, table 1). When concepts and perspectives are identified, this information needs to be linked to the most specific ICF category (see rule 6, table 1). In some cases, linking to a specific ICF code is not possible, rules 7 to 10 (Table 1) discuss what the other options are in the linking process. These rules were rigorously implemented in the IMBA-ICF linking.

In the implementation of rules 5-10, the principal investigator in the IMBA-ICF linking case started with the initial linking. Every main and additional concept of the 70 IMBA items was linked to the most specific ICF category. The extensive linking table (table 2) was therefore completed with the following elements: ICF category of main concepts, ICF category of additional concepts and an annotation. The ICF linking decision tree (figure 1) and the ICF browser [16] were used as supporting tools. The ICF linking decision tree supports in reasoning whether certain concepts are part of the ICF and, if so, which components and chapters these belong to. Complementary, the use of the browser can be supportive to link de concept to the most relevant and specific ICF category 2nd, 3rd and 4th level. The browser shows the structure and hierarchy of ICF codes in a well-arranged way. In addition, the search engine can be used to search specifically for terms. The browser will show in which ICF codes and associated definitions the concepts can be found.

PLACEMENT FIGURE 1

Figure 1: Linking Decision Tree [3]

After the initial linking, a structured linking that was preceded by a reasoning process was established. However, this linking was not validated yet, since there only was one researcher involved in the linking process. It is from this point that consensus methods were integrated to involve experts and to develop a valid linking. Therefore an expert panel of key informants was compiled using a combination of purposive sampling techniques. When sampling the key informants, the heterogeneous (maximum variation) and homogeneous sampling techniques were applied [17,18]. The researchers opted for a homogeneous group in terms of expertise. theoretical knowledge about the instrument being linked (IMBA in this case) and/or the ICF was a requirement. In addition a heterogeneous group was sampled in terms of setting in which the participants were using the IMBA and/or ICF. An expert panel of 8 key informants

was sampled, in which the experts shared a common knowledge (homogeneous) about a clearly defined content (IMBA and ICF), but were employed in different settings (heterogeneous). Consequently the linking was carried out from the same content and prior knowledge and the linking output is supported by various stakeholders from the professional field. When addressing potential experts, the main researcher planned a meeting to explain the project and to argue why these individuals are an important partner in the research project. Therefore the participant experience project ownership, which is important to improve commitment and increase the response rate during the research procedure [19]. In the IMBA-ICF linking case the expert panel consisted of 5 occupational therapists, 2 physical therapists and 1 occupational physician. The following settings were represented: occupational medicine, vocational rehabilitation, policy, academics and organizations specialized in job placement and vocational re-integration. All the experts received an informed consent and gave permission to integrate their opinions in the results.

The use of consensus methods to verify the content validity of the IMBA-ICF linking

The 8 key informants of the expert panel were involved in a first feedback round in order to verify the content validity of the initial linking. A deliberate choice was made to apply the Delphi technique [19-23] during the first feedback round. The linking of some items was rather obvious during the initial linking, it was therefore decided to filter these out so there would be time available in later stages for the discussion of items where linking to the ICF is not that evident. Time efficiency was important at this stage, therefore he Delphi technique was found suitable for this objective because large numbers of experts can be included from different areas because there is no need to physically bring the experts together. In addition the fact that anonymity is presented and the process is not influenced by possible dominating participation of one expert were also significant main features to use the Delphi technique.

The experts received a semi-structured questionnaire by e-mail in which they could formulate whether or not they agreed with the proposed linking. In case of disagreement, the experts were given the opportunity to formulate new proposals, in other words to propose a new ICF category. To complete the questionnaire, some necessary attachments were also sent to the expert by e-mail:

(1) Explanatory notes in which the approach of the linking process, the linking rules and the application of the ICF browser were explained;

(2) Summarized linking tables (table 3) where the experts can easily consult IMBA and ICF items and definition;
(3) Extensive linking tables (table 2) for when experts want to consult the reasoning process.

PLACEMENT TABLE 3

Table 3: Fragment of a summarized linking table

Based on this questionnaire, the implementation of linking rules 6 to 10 was actually repeated in a way that was feasible in time, with the involvement of several experts, and offered in a structured way causing that specific knowledge of linking rules is not necessary to be able to contribute to the linking as a whole. Experts were given 2 months to study the linking and return their response by e-mail. The literature is ambiguous when it comes to the strength of the agreement rate that should be accepted as consensus. Loughlin & Moore [24] describe an agreement rate of 51%, Sumsion [25] recommends 70% and Green et al. [22] 80%. In the IMBA-ICF linking case a 70% agreement rate was applied to be efficient but still strict. The results of the feedback rounds were described in an audit trail in which consensus, feedback and new proposals were registered. The results of feedback round 1 and adjustments in the linking output were registered in a chronological audit trail (table 4).

PLACEMENT TABLE 4

Table 2: Fragment of a chronological audit trail

After processing feedback round 1, an expert committee was organized to discuss items where no consensus was reached regarding the linking. A structured approach and efficiency remained important at this stage because 20 items still needed to be discussed. In addition, we found it very important to give the experts the opportunity to formulate their opinion so that the output of the linking is viewed from different perspectives and is therefore relevant to the professional field. The Nominal Group Technique [26-29] was applied here because of the following main features studied in the literature review of Harvey & Holmes [27]:

(1) The involvement of experts from a specific professional field in structured face-to-face meetings, ensures the collection of first-hand information which makes results relevant to the professional field;

(2) NGT is time and money efficient. A large amount of information can be collected in a relative short time period of a single meeting. A limited budget is sufficient for a location and some catering facilities;
(3) The method requires little preparation from participants;
(4) Results and consensus become clear during the session or meeting, this ensures satisfaction among the participants;
(5) The structured design ensures balanced participation, with all group members having an equivalent representation;
(6) The collaborative nature of this method ensures that participants are given the opportunity to give their opinion and are encouraged to contribute information. This ensures that participants experience "ownership" of the project, which increases the chances of implementation of the results in clinical practice.

However the great amount of arguments in favour of using the NGT, organizing a NGT meeting can be challenging. In the IMBA-ICF linking case we remained close to the structure suggested in the literature on NGT [26,29]. The items that did not reach consensus in feedback round 1 and the new proposals were structured into a schedule to guide the discussion in the expert committee. An example of this is illustrated in table 5.

PLACEMENT TABLE 5

Table 3: Fragment of a pre-structured guideline for the expert committee

Two small groups of experts (3-4) were formed and two moderators were assigned to lead the discussions. Based on the pre-structured guideline, the items that did not reach consensus were discussed. The moderator explained the feedback and new proposals that were collected from feedback round 1 (generating ideas). The experts were then asked to think about these proposals and to discuss in group whether they could agree with one of these new proposals or would rather formulate another proposal (collecting and discussing ideas). Experts were given around 15 minutes per item for this. The moderator had the responsibility to let every participant argument their proposal. Then the two moderators formulated the decision that was made in their group. If consensus was reached, the process continued for the next item. If there was no consensus between the two groups, the possibility was initially offered to find a consensus between the two groups of experts through discussion, but limited in time to 15 minutes. If no consensus could be reached, then there was a vote whereby the principle of

70% agreement was applied (voting on the ideas). Thus linking rules 6 to 10 were repeated, but on the basis of a structured discussion between experts in which the moderators have expertise in the application of the linking rules. The discussions during the expert committee were recorded and stored as backup. Argumentations and consensus were registered in an audit trail. The results of the expert committee and adjustments in the linking output were registered in a chronological audit trail (table 4)

A second feedback round was held to question the inconsistencies in the IMBA-ICF linking that arose from decisions made during the expert committee. The methodology used was analogue to that of the first feedback round. The results were fed back to the experts in a short questionnaire with 5 questions. The experts were given the opportunity to indicate whether or not they agreed with the proposed adjustments to achieve more consistency in the linking. Results of this second feedback were again registered in the chronological audit trail (table 4) During the final validation phase a meeting was organized with two IMBA experts directly from the Institute for Quality assurance in Prevention and Rehabilitation (IQPR), the institution responsible for the development of IMBA. These experts closely followed the theoretical developments of IMBA and also have practical experience in the use of IMBA. The IQPR experts examined the results of the linking in order to refine the output. During the expert meeting, decisions were made on items that did not yet reach consensus during the expert committee and/or the second feedback round. These experts also received an informed consent and agreed to include their opinions in the research project. Adjustments were again registered in the chronological audit trail (table 4) which resulted in the definitive results of the IMBA-ICF linking.

Results

The refined ICF linking rules [3] were strictly followed and consensus methods were used in the implementation of these rules. This resulted in 7 phases, followed chronologically and where the involvement of experts was the core element. A step-by-step process involving various experts requires good preparation, structured documentation and presentation of results. This is important to communicate preliminary results with experts and to register progress in a way that makes the decision-making process clear for the researchers, experts and also future users who want to consult the linking after the research project. Therefore

these results describe a guideline starting from a flowchart (figure 2), in which each phase is explained with a step-by-step approach and key points.

PLACEMENT FIGURE 2

Figure 2: Flowchart linking methodology

Phase 1: preparation phase

- Acquire profound knowledge of ICF concepts, definitions and structure. It's recommended to use the ICF e-learning tool [15] to support this objective (linking rule 1, table 1).
- Acquire profound knowledge in the instrument to be linked. Ensure that the available literature and manuals are thoroughly reviewed.

Phase 2: Sampling the expert panel

- Compile an expert panel that is heterogeneous in terms of setting: Address health professionals from various domains so that different perspectives are involved in the linking study (e.g. IMBA-ICF linking case: occupational medicine, vocational rehabilitation, organizations specialized in job placement and vocational re-integration, policy and academic world.)
- Compile an expert panel that is homogeneous in knowledge: specifically ask for the available knowledge and experience in ICF and or the instrument that will be linked.
- Plan a meeting to explain the project to the experts and to argue why they are an important partner in the research project.

Phase 3: Initial linking

- Follow the ICF linking rules strictly and document the reasoning process accurately. This phase carried out by the (main)researcher who studies the linking rules.
- For each item, ask yourself the question 'what is this information about?' and identify main and additional concepts (linking rules 2 and 3, table 1).
- For each item, ask yourself the question 'What is the purpose for which this information is collected?' and identify the perspective (linking rule 4, table 1).

- If applicable, identify the categorization of response options and the most frequently used approach (linking rule 5, table 1).
- Link the information (main and additional concepts) to the most specific ICF category. This is the rigorously implementation of linking rule 6-10 (table 1). The linking decision tree can support this objective (figure 1).
- Register Studied information and decisions made in an extensive linking table (table 2).
- Structure this information in a summarized linking tables (table 3) in which only the items, the linked ICF categories and the definitions are represented.
- The preliminary results will be available at the end of phase 3.

Phase 4: Feedback round 1

- Prepare a semi-structured questionnaire, send it by e-mail to the experts and allow 1 to 2 months to give the experts the opportunity to:
    - Indicate whether they agree or disagree with the proposed linking to the ICF.
    - Formulate new proposals in case of disagreement.
- Send explanatory notes to explain the approach of the linking process, the linking rules and the application of the ICF browser.
- Send the summarized and extensive tables as attachments, these are necessary for the experts to consult while completing the questionnaire.
- Apply a 70% agreement rate.
- Register the agreement rate, feedback and new proposals in an audit trail.
- Document the adjustments made during this phase relative to the initial linking in a chronological audit trail (table 4).

Phase 5: Expert committee

- Structure the items that did not reach consensus in feedback round 1 in a schedule (table 5). This document will guide the moderator and the experts through the discussion.
- Depending on the group size, compile two (or more) small groups of experts (3-4). Ensure that different settings are represented and assign a moderator to each group.
- Let the moderator explain the feedback and new proposals for the linking per item (generating ideas).

- Let de experts think about these proposals and let them discuss if they (dis)agree. In case of disagreement, de moderator needs to stimulate the group in formulating a new proposal (collecting and discussing ideas). Limit this in time depending on the amount of items needs to be discussed (15 minutes).
- The moderators of the small groups formulate the decisions made in their group, (dis)agreement then becomes clear.
- In case of disagreement, offer the experts the possibility to reach consensus through discussion, but limit this in time (15 minutes). If no consensus can be reached, let the experts vote and apply a 70% agreement rate.
- Register the consensus and argumentations in an audit trail.
- Document the adjustments made during this phase relative to the initial linking and the output of the first feedback round in a chronological audit trail (table 4)

Phase 6: Feedback round 2

- Pay attention to inconsistencies that may arise from decisions made during the expert committee. Decisions made during the expert committee may have an impact on items of which the linking was approved during previous phases. Therefore it's possible that the linking of these items must also be refined and/or adjusted.
- For the items where inconsistency is found: formulate proposals/adjustments to achieve the most appropriate ICF linking, whereby arguments from the expert committee are taken into account.
- Integrate these proposals in a semi-structured questionnaire and give experts the opportunity to:
    - Indicate whether they agree or disagree with the proposals.
    - formulate a new proposal in case of disagreement.
- Apply a 70% agreement rate.
- Register the output in a chronological audit trail (table 4), so changes throughout phases can easily be consulted.
- At the end of this phase, the predefinitve results are available.

Phase 7: Expert meeting

- If possible, organize a meeting with researchers who are directly involved in the development of the instrument being linked to the ICF.
- Let this researchers examine the predefinitive results and refine where necessary.
- Register the consensus and argumentations in an audit trail.
- Document the adjustments made during this phase relative to the predefinitive results in a chronological audit trail (table 4)
- At the end of this phase, the definitive results are available.

Conclusion and recommendations

Due to the extensiveness of IMBA and the specific training required, the amount of researchers who have both the in-depth IMBA knowledge and the skills and resources to apply the linking procedure, was very limited. By encountering these challenges in the IMBA-ICF linking project, a possible integration of the Delphi and Nominal Group Technique with the ICF linking rules was explored to achieve a qualitative linking. We can conclude that it is possible to use consensus methods in the implementation of the linking rules. Integration of consensus methods make it possible for the linking process to be conducted by a single researcher, involving experts to validate the initial linking, in an efficient manner and in a culture of collaboration. Moreover, by applying the suggested methodology an in-depth linking can be established because linking rules are rigorously applied throughout different phases. In addition, very valuable insights were formulated for both IMBA and ICF, because the concepts of both instruments are thoroughly and repeatedly analyzed by different experts. In the last validation phase, the IMBA experts confirmed that the predefined linking that was already achieved by involving the experts was very well founded and was in line with both the content and the perspective of the IMBA concepts. No remarkable adjustments were made in the final phase, it was just a refinement to achieve the final linking output. We can therefore conclude that content validity is strengthened by integrating consensus methods.

The advantage of involving experts from different backgrounds is that they can contribute from their perspective to the linking of instruments to the ICF. In this way the linking process is not only carried out from the perspective of two or three independent researchers. A heterogeneous (maximum variation) sampling technique is important to compose an expert panel that is diverse in term of setting and background. A limitation of the suggested

methodology remains that there is a deviation from the ICF linking rules [1-3] in which it is proposed that the linking is carried out by at least 2 independent researchers. Independence is not present in the methodology described above because experts start from an initial linking that is established by only a single researcher. Howerver, through the repeated application of the linking rules throughout the phases in combination with the final validation by the original research group, valid linking is nevertheless achieved. The involvement of the original research group of the instrument that is being linked, the completion of various phases in which the linking rules are strictly and repeatedly applied, are therefore very important elements. The application of a homogeneous sampling technique in necessary to compose an expert panel that is homogeneous in terms knowledge and expertise. Consequently this will of strengthen the content validity of the linking.

Knowledge and experience about the instrument being linked to the ICF is necessary to answer questions during the linking process e.g. “what is this item about?” and "from which perspective is this information collected?" Therefore in our experience it is important to emphasize that this substantive knowledge about the instrument being linked to the ICF is just as important as good knowledge about the ICF. The main researcher is therefore preferably trained in both instruments in order to perform a thorough initial linking.
In the IMBA-ICF linking case this was a challenge due to the required training and certification in IMBA and the presence of German-language materials that are not always available in an accessible way. That is why the importance of collaboration with the original research group is emphasized once again. They can support with training and delivery of materials.

Both the Delphi and Nominal Group Technique have had added value due to the specific properties of these techniques. By using the Delphi technique the initial selection of (un)approved items could be established by the involvement of experts in an efficient way. All that is needed is a well-prepared initial linking and a questionnaire in which feedback can be indicated. The strictness depends on the agreement rate that is applied. The higher the agreement rate, the less quickly the linking of a certain item will be approved, the more phases this item will go through and the stronger the linking output will be. Concerning NGT, the structured design but still adaptive nature of the NGT protocol was experienced as a strong feature when used within the expert committee. The protocol structured the discussions, but depending on the degree of consensus that is pursued, the time available and the composition of the expert panel, it was possible to adjust certain steps in the protocol. For

example in this case the silent generation of ideas was replaced by a robin round. In addition, this technique gave the experts the opportunity to formulate their opinion from their perspective, creating support for the linking output at the end of this process. However, literature states that in general there are limited clear guidelines on the application of consensus methods: (1) how criteria are determined for the selection of experts (2) what is a good size for the expert panel (3) how many rounds are necessary (4) which agreement rate is best applied (5) which analysis techniques are best applied in the processing of results [19].

By adding two consensus methods to the implementation of the linking rules, it can become a challenge to maintain an overview of the linking process and to integrate all input from the experts. Therefore a well-structured data collection is necessary. With the establishment of a detailed guideline of the IMBA-ICF linking, with reference to methods for data collection (and examples), a practice based results is achieved which can support fellow researchers. It is a guideline of how the nominal group technique and the Delphi technique were applied, which can overcome the challenges mentioned by Keeney et al [19].

To summarize, in case of linking items from complex instruments to the ICF, a face to face consensus method with experts is advised. the Delphi and Nominal Group Technique proved to be very suitable for implementing the linking rules and involving experts in an efficient and collaborative way. The suggested methodology in this article can be used for this goal, whereby the following success factors are important to be applied:

- In-depth knowledge of both ICF and the instrument that is being linked.
- Collaboration with the research group of the instrument being linked.
- Integration of the Delphi and Nominal Group Technique to realize the implementation of certain linking rules in an efficient manner.
- The rigorous and repeated application of the linking rules through different phases.
- The application of the homogeneous sampling technique in term of in knowledge, and a heterogeneous sampling technique in setting and background.
- A structured method for data collection.

Disclosure statement

The authors declare that there is no conflict of interest.

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