

To Capture the Information Needs of End-Users of Open Data - Guidelines to design methods

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1 Introduction

Hackathons are a common approach used to stimulate the reuse of open government data (OGD). The contests are often organized by public organizations who, in the role of publishers, produce and share OGD, which is free data for anyone to reuse without restrictions, for any purpose. The data can be economic spreadsheets, local activity calendars, or public infrastructure databases. Reusers are the people or organizations who develop solutions based on the OGD. The data is shared as its creation was funded by public money, as such it belongs to everyone. The reuses of OGD can lead to new services and products that improve processes, decision-making, and the life quality of citizens.

Hackathons have engaged reusers and developed solutions. They are driven by people who work with technology, but tend to result in solutions disconnected from the real needs of end-users (citizens who are expected to use the solutions). The solutions have thus had little impact beyond the tech communities and OGD is seldom reused. The benefits of OGD are at risk of being lost, as publishers and reusers have ignored the unfulfilled information needs of end-users. Reusers are at risk of wasting resources by creating products that will not be used; a situation that can easily be avoided from the start by better anticipating end-users' needs.

This popular science article presents two examples of methods to capture information needs of end users as sources of inspiration and practical guidance. It also gives design guidelines for anyone implementing their own methods to better capture the needs of end users. The appendices provide material

as further support for publishers and reusers, such as a checklist and cards to be printed. The results of the method can inform publishers about data valued by the target group, while it can inspire reusers to create or improve solutions based on OGD. Thus, it can help publishers and reusers to get more value out of their OGD solutions and avoid wasting resources and time.

In the next sections, we first present the method illustrated with two examples of implementation: with end-users and with publishers. We conclude with general recommendations to design such methods; the guidelines are drawn from our experience and previous research.

2 Methods to capture information needs of end-users

In this section, we first introduce the main concepts and actors involved in the method. Then, we provide examples of applications based on two methods conducted with different public groups (end-users and publishers) in different settings (face-to-face workshop and online webinar). Both are structured in three phases.

2.1 Why do information needs matter?

Data is unprocessed information, a representation of facts that can be captured, manipulated and stored (e.g., in databases or repositories). A set of data becomes useful when people have made sense of it in context, in other words, when it has become information. We cannot say that people need data, but they do need information to answer everyday questions or build their knowledge about their personal interests or job-related tasks. Data and information increase in value as they are used.

Information needs are secondary needs, which appear when people realize that they have a lack of knowledge on a subject. However, information needs are not simple to express and identify. Given that knowledge is personal, subjective and anchored in the person, the need for information is specific to each individual. It varies according to the prior knowledge, the status occupied in society, and the context in which this need appears (e.g., work, leisure, and family time). A method that attempts to capture information needs to consider these issues. It is important to select a target group and help them express their information needs.

2.2 Example of a method to capture end-user's information needs

In Table 1, we provide an example of a method wherein we used activities and tools to allow OGD publishers, reusers or end-users to capture information needs of groups of end-users.

The **actors** involved in the method are:

- *The Implementer*: actors that implement the method in a concrete context and most likely users of its insights (e.g., the municipality of Stockholm or developers at the local Innovation Center).
- *The Participants*: in the collaborative sessions, the voluntary end-users, recruited based on the match between their profile and the theme of the session, or the publishers or reusers that try to understand the end-users' information needs. For the collaborative sessions, plan a group of on average 8 to 10 participants for best results.
- *The Facilitator*: person who takes charge of the facilitation and enables the discussions in the collaborative sessions. His or her responsibility is to set the tempo, ensure a good understanding of the questions, and keep the focus of the discussions. Hire at least 1 facilitator per group of 10 participants.

We divided the method into three phases: to (1) prepare the participants, (2) brainstorm in a collaborative workshop, and (3) further analyse and complement the insights. We applied it with two different public groups: a group of end-users in face-to-face workshops and a group of publishers in a virtual webinar. The activities and tools were scaled to the audience. However, both followed the same

structure, and resulted in the identification of information needs. In Table 1, we summarize the phases, their objectives and deliverables. A summary of the activities performed for each phase is described in continuation, and examples of tools are provided in Appendix.

Table 1: Overview of a method

Phases	Objectives	Deliverables
Phase 1. <i>Preparation</i>	<ol style="list-style-type: none"> 1. Define a context and issue based on previous knowledge (field knowledge, strategic priorities) 2. Define the profile, roles, and categories of information needs of the end-users based on previous knowledge 3. Prepare the participants for the workshop (awareness of the topic and concepts) 	<ol style="list-style-type: none"> 1. A precise context, problem and group of end-users with categories of needs 2. A kit of preparatory activities for the participants
Phase 2. <i>Collaborative workshop</i>	<ol style="list-style-type: none"> 1. Enable the participants to identify end-user' information needs, existing solutions and their weaknesses, and possible dream solutions in a given context. 	<ol style="list-style-type: none"> 1. New insights: <ul style="list-style-type: none"> - Information needs (spontaneous and reflexive) - Overview of the competing solutions - Dream solutions
Phase 3. <i>Analysis + Relevance check</i>	<ol style="list-style-type: none"> 1. Confirm the ideas and intuitions (dream solutions) with end-users and knowledgeable experts 2. Connect the information needs of participants with released or releasable OGD 3. Inspire possible solutions development and OGD users 	<ol style="list-style-type: none"> 1. A framed project 2. The identification of valued OGD 3. The identification of future development avenues

2.3 Application of the method with a group of end-users

In the first application, the implementers of the method were the researchers, in the role of a publisher or reuser. The participants of the collaborative workshop were end-users: a group of students of the University of Namur, in Belgium. We organized a face-to-face workshop. The problem raised was the need of information when people move for the first time in a new city (context). We used short scenarios to clarify the role participants' should take into consideration: students, new inhabitants of the city, and users of information services. The setting of the scenario was: "*You have just arrived in a new city, as part of your studies. You have moved, but are not settled.*"

For the preparation (phase 1), we selected information needs categories based on literature and the results of one tentative workshop. We developed a *sensitization kit* (see Appendix A) made of questions and short challenges (diary, photo game, postcards with missions and questions) relating to their lifestyle and how they search for information, as a training to the intellectual process we use in the workshop. Just before the session, we used a PowerPoint presentation (see Appendix C) to remind the participants of the main concepts.

In the second phase, at the beginning of the collective session, we introduced a short scenario and used story plots, suggested through questions, to create knowledge gaps in relation to the information needs categories: *What information do you need to (1) socialize and make new friends, (2) integrate yourself into local community life, (3) eat and drink, and (4) discover the city?* The plot formulated in a question forced them to choose a topic, stay in a role, and remember their own experiences of knowledge gaps and information searches. Then, we used a question scheme carried by small cards (see Appendix D). It is an idea-writing technique: a structured brainstorming alternating personal and collective reflection and ending with a presentation of the ideas in plenary session. The participants had to think in pairs and identify activities and information related to the topic and context (in a given situation, e.g., socialize and make new friends in a new city; in a given role, e.g., as a young student, what I want to do is... What information will I need?). They wrote their insights on the small cards. The second card asked them to identify existing solutions for a need, what information they satisfy and

what challenges or frustrations the participant faced with. They had to think and write for themselves. The last card asked them to develop dream solutions. They worked in small groups of 4-6 people and imagined solutions to address the needs and weaknesses previously identified. The groups presented one of their solutions to the class.

In the last phase, we analysed the results by studying the relationship between the cards and similarities and differences between them. We also discussed the result with an experienced start-up group (reusers) to check the market relevance of the ideas and possible connections with OGD.

2.4 Application of the method with a group of publishers

In the second application, the implementer of the method was an agency in charge of training public actors to release OGD, and the participants of the collaborative workshop were the publishers. The end users were involved in phase 3. We organized virtual webinars. The instructions and activities were organized through a conference call software, allowing plenary sessions and breakout rooms. The situations (context, problem, end-user profiles and categories of end-users information needs) were brought by participants. Therefore, **the preparation phase** was mostly undertaken by the participants while the facilitator provided the tools to help them clarify their situation. They defined the problem using a problem statement canvas, the context using a map of stakeholders and their information channels (related to the problem), and the end-users using a personal canvas. A short introduction to the main concepts was included in the oral and written instructions. Their written preparation was used as a short scenario.

In the second phase, the participants were given the case of another participant (short scenario) and they were given time to read the written preparation. We then used the idea-writing technique and created plots with the help of a double-axis canvas. At the top of the canvas, they reported the problem and a persona, considered to be a typical representative of an end-user group. They then had to think for themselves and, based on their experience, to fill in the first cells of the table, answering two types of questions: (1) *Activities: What would my persona do in that issue? What problem does he try to solve?* (2) *Information Need: What information need does he have for that specific activity?* After a while, they were split into small groups and break-out rooms to share and compare their ideas, and answer the last question: (3) *Potential difficulties to solve this information need (Use related, Organization related)*. To close the session, they were asked to summarize their ideal project or solution and briefly introduce it in the plenary session.

In the last phase, they were asked to compare their insights with real end-users (using interviews, group interviews, surveys), with colleagues, a higher-level or more knowledgeable stakeholder, and try to analyse the existing information demand regarding their issue. All new insights were wrapped up into an improved project draft. The guidelines can as such also serve as a warm-up method for working with OGD as a publisher.

3 The Guidelines

From this experience and previous research, we created nine guidelines that we present thereafter. The guidelines are more abstract recommendations that can be implemented in different activities and tools to design tailored methods and produce rich insights.

Set of Guidelines: Aim Actors and Context

For the implementers to capture the end-users' information needs in a everyday, information-rich context, we recommend:

Guideline 1: General principle

(1) To employ a mix of activities and tools to better grasp the complexity of information needs, involving end-users, but with little impact on them.

Reason: information needs are personal, context-related and role-based: the involvement of the end-users is essential to visualize these needs. But, they are also complex and time-consuming to identify. We sought a balance between complexity and time invested (efficiency) in the implementation of the method and the interactions with all the stakeholders (especially, the end-users).

Guidelines 2-3 : Main data collection method

(2) To employ a collective intelligence-based workshop as a key data collection method, using creative tools and activities (i.e., tools that encourage the ideation with the use of text, pictures, to present ideas) and idea-writing techniques (i.e., written structured brainstorming, that uses variation of work dynamics, personal and in small groups, with a final presentation of the ideas in a plenary session), with the guidance of a facilitator.

Reason: information needs are difficult to express spontaneously and in words (people have dormant information needs, unexpressed needs, misguided needs). Collective workshops have been proven to be an efficient technique to identify people's information needs. Creative tools can help participants to express latent needs, thoughts and feelings, and idea writing techniques ensure input from a diverse range of people and temperaments.

(3) To use preparatory materials and activities for the participants that aim at developing their understanding of the information needs concept and issues of the context.

Reason: an appropriate preparation can raise the awareness and understanding of the participants about the abstract concepts and questions used in the workshop, stimulate their memory about the plots given in the short scenarios, improve the quality of their production during the session, and finally increase the social interactions, their enjoyment and sense of efficacy, as they are known as important motivational factors in innovative communities.

Guidelines 4-6 : Adaptation to the purpose and context

(4) To employ short scenarios to focus the participants on clearly identified roles and contexts, and the plots to trigger a knowledge gap (a brief, but memorable information seeking episode triggered by the problem situation).

Reason: information needs are context-related, personal, and appear when people realize a lack of knowledge, which can be prompted by a problem situation.

(5) To use predefined categories of information needs, in regard with the roles and context at stake.

Reason: information needs can be broad and poorly pre-selected information needs can lead to irrelevant information solutions. Openness is, as such, important.

(6) To suit the short scenarios with a relevant issue for the three actors (publisher, reuser, end-users), and link them to the OGD already or likely available.

Reason: the interest of the publisher is needed to release OGD, the motivation and knowledge of the reuser is needed to invest time, skills and resources in developing solutions, and a fit with the need of the end-users is needed to increase the relevance, acceptance and use of the solution. This also helps to identify actual needs.

Guidelines 7 : Intellectual process

(7) To use a sequential question scheme that guides the participants in the intellectual process of information needs exploration. It starts with the identification of primary needs in a given context and role, and the actions or tasks required to fulfill that need. It continues with identification of the information needs behind the tasks (by listing the needed and missed information and the weaknesses of existing solutions). It wraps up on ideas for new solutions.

Reason: information needs are secondary needs and can be identified by tracking first the tasks, then information, and finally categories of data. People often need time to reflect and process them to suggest them properly. The use of activity, existing solution, and future solution help to give a frame to the need and make it more understandable.

Guidelines 8-9 : Purpose of the results

(8) To ensure that the method results in the identification of information needs of groups of users.

Reason: the development of information solutions should satisfy more than one person to be sustainable and economically viable. It is important to study the result for similarities and quirks. Results that are fragmented often indicate that the participants lacked experience with the information needed, as such it is important to ensure that the participants are a good representation of the target group.

(9) To ensure that the material produced by the method can be used by publishers for dataset prioritization and by reusers for inspiration to OGD innovation, considering the alternative information solutions that exist.

Reason: publishers tend to follow a supply logic, reusers tend to develop solutions with little impact, and the information needs are embedded in an environment (stakeholders, channels, habits in information use, other partial solutions available) that is important to evaluate when designing new information solutions.

Appendices

Appendix A Sensitization Kit

Why and how to design a sensitization kit for an Information Needs workshop? Sensitizing is a process where participants are triggered, encouraged, and motivated to think, reflect, and explore aspects of their personal context in their own time and environment. It prepares the participants to access their experiences, and being aware of it, express, and discuss their needs. A sensitization kit consists of little activities or exercises sent to the participants before a participatory workshop. The longer and deeper the sensitization, the higher quality information collected. In the context of information needs, the sensitization kit aims at meeting **two main objectives**: (1) sensitize the participants to the abstract concept of information needs and (2) drill the ideation of their information seek habits and related frustrations, focusing on one specific role. Table 2 gives some examples of activities to help reach these objectives.

Table 2: Activity examples for a sensitization kit.

Objective	Example of activities	Focus
1. Sensitize	<i>Today I needed...</i> Think back about your day. Remember a situation when you needed information. What kind of information did you need? What was the context? Your role at the moment? The situation? How did you solve that information need? Write it down in your diary.	Understand the Information Need concept and its contextual contingencies
	<i>Information is everywhere!</i> Today when you are on your way to work, to school, or taking a walk with your dog, observe your environment. Take as much pictures as possible with your smartphone, of information solution. What information is provided to you? Collect, print out the pictures, and add a few notes on them to remember their context.	Understand the multiplicity of information solution
	<i>The world is going wrong, I tell you!</i> According to you, what are the major challenges with information provision. List at least 5 problems and explain why they bother you. Write these down in your diary.	Identify general issues and challenges relevant to the workshop theme
2. Drill the ideation	<i>Not happy.</i> Remember a past experience when you were frustrated about the lack of information and how it impacted you. Draw a table with three columns. Write in the first column the problem you identified, in the second the information missing, and in the third how it impacted you.	Connect activities to frustration and information needs
	<i>An e-mail to the future</i> Imagine you can communicate with engineers in the future and ask for anything. Any possible solution to your information needs. What ideal solution would you ask for to satisfy your need? How would it help you? Send them your request via email.	Free creativity
	<i>Buy my solution, the best information product!</i> You have created your dream solution! Amazing! Write in a few sentences its commercial possibilities. Convince us by explaining all the information the solution provides.	Identify information sets needed for a solution/package

Appendix B Material for a face-to-face workshop: Check-list

Material: Check-list

Phase 1. Preparation

- ☐ Registration form to collect contact details of the participants (online or on paper)
- ☐ Sensitization kit, cf. appendix A
- ☐ Communication material (posters, email, flyers), to recruit volunteers

Phase 2. Collaborative workshop

- ☐ A spacious room with tables and chairs arranged in square, allowing to sit 4 to 6 persons per table, multiplied by the expected number of participants
- ☐ Beamer, large screen and laptop or printed version of the PowerPoint presentation (1 exemplar per participant), cf. appendix C
- ☐ printed cards (up to 5 cards of each per participant), cf. appendix D
- ☐ Pencils
- ☐ Soft drinks and possibly snacks

Phase 3. Output Analysis

- ☐ Filled cards
- ☐ Mind-maps of the results
- ☐ Flipchart or whiteboard, pencils and post-it

Appendix C Power Point Presentation

The PowerPoint presentation includes the introduction of the general concepts, the instructions and provides examples for the participants. The facilitator are free to adapt with their own corporate identity and style guide (logos, colors). The presentation can be found here <https://tinyurl.com/ttqv7qa>

Appendix D Cards

The cards are recommended to be printed on an A3 then cut into smaller cards. These cards are presented below. The cards can also be found here <https://tinyurl.com/qsymjp5>

Activity:

#A

What I want...

Activity:

#A

What I want...

Activity:

#A

What I want...

Activity:

#A

What I want...

What information will I need?

a)

b)

c)

d)

e)

f)

g)

What information will I need?

a)

b)

c)

d)

e)

f)

g)

What information will I need?

a)

b)

c)

d)

e)

f)

g)

What information will I need?

a)

b)

c)

d)

e)

f)

g)

Activity:

#A

What I want...

Activity:

#A

What I want...

Activity:

#A

What I want...

Activity:

#A

What I want...

What information will I need?

a)

b)

c)

d)

e)

f)

g)

What information will I need?

a)

b)

c)

d)

e)

f)

g)

What information will I need?

a)

b)

c)

d)

e)

f)

g)

What information will I need?

a)

b)

c)

d)

e)

f)

g)

Existing
Solution:

#ES

What information needs can it satisfy?

What challenges / problems can you see with
it?

- a)
- b)
- c)
- d)
- e)
- f)
- g)

Existing
Solution:

#ES

What information needs can it satisfy?

What challenges / problems can you see with
it?

- a)
- b)
- c)
- d)
- e)
- f)
- g)

Existing
Solution:

#ES

What information needs can it satisfy?

What challenges / problems can you see with
it?

- a)
- b)
- c)
- d)
- e)
- f)
- g)

Existing
Solution:

#ES

What information needs can it satisfy?

What challenges / problems can you see with
it?

- a)
- b)
- c)
- d)
- e)
- f)
- g)

Existing
Solution:

#ES

What information needs can it satisfy?

What challenges / problems can you see with
it?

- a)
- b)
- c)
- d)
- e)
- f)
- g)

Existing
Solution:

#ES

What information needs can it satisfy?

What challenges / problems can you see with
it?

- a)
- b)
- c)
- d)
- e)
- f)
- g)

Existing
Solution:

#ES

What information needs can it satisfy?

What challenges / problems can you see with
it?

- a)
- b)
- c)
- d)
- e)
- f)
- g)

Existing
Solution:

#ES

What information needs can it satisfy?

What challenges / problems can you see with
it?

- a)
- b)
- c)
- d)
- e)
- f)
- g)

Dream Solution:

#DS

Shortly describe your solution!

Dream Solution:

#DS

Shortly describe your solution!

Dream Solution:

#DS

Shortly describe your solution!

Dream Solution:

#DS

Shortly describe your solution!

What information needs will it satisfy?
What problems will it solve?

What information needs will it satisfy?
What problems will it solve?

What information needs will it satisfy?
What problems will it solve?

What information needs will it satisfy?
What problems will it solve?

Dream Solution:

#DS

Shortly describe your solution!

Dream Solution:

#DS

Shortly describe your solution!

Dream Solution:

#DS

Shortly describe your solution!

Dream Solution:

#DS

Shortly describe your solution!

What information needs will it satisfy?
What problems will it solve?

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What problems will it solve?