



# SmartDelphi.

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SmartDelphi is a platform that uses data intelligence to align experts and users to make strategic decisions. It is designed for institutions and businesses that want to have a strategic advantage in times of uncertainties. In a complex and interconnected world, most of the time the quantitative data available is not enough, so we need to rely on experts when making important decisions. SmartDelphi was created as user-friendly platform where you can get strategic insights using participative techniques; in the last 4 years more than 3500 experts participated in 62 projects forecasting industry trends and defining policies. The team has been working with participative projects for more than 10 years, being references in the Health sector specifically. SmartDelphi is a working product with organic demand, and an experienced team willing to grow the service and take it to other industries.

## The story behind Delphi

The RAND Corp, a fully-fledged inventing machine, made up the Delphi method as a prediction system which relies on structurally compiling opinions from a group of experts<sup>1</sup>. To develop the technique — named after the Greek god Delfos — RAND researchers applied the principle of collective thinking. The first use of Delphi was in the 50s at the request of the USA Air Force to forecast the impact of a potential 3rd World War. The researchers asked a group of experts to iteratively anonymously answer a questionnaire. At each iteration, experts would receive comments and follow-up questions based on the overall answers of the group until the responses were all aligned as a collective consensus. The compass behind the method is that a forecast agreed upon among a group of experts must be far more accurate than any forecast a single expert could ever make. Moreover, anonymity helped the experts provide honest answers and reflect on themselves and the group when receiving feedback for the next iterations<sup>2</sup>.

Although some authors consider Delphi a developing methodology, it is broadly acknowledged as a useful structured approach to gathering contributions from selected experts using questionnaires. In fact, before the absence of more precise analytical tools, researchers often apply the Delphi approach as it is methodological, structured, and scientifically proven. Some of the common questions we could see in a Delphi are:

The RAND Corp:



- What are the probable consequences of [an event]?
- What are the risks and benefits of [a decision]?
- What are the advantages and disadvantages of [a set of options]?

There are variants and adaptations of the Delphi method used in businesses, economics, education, health and governance, and others. Complex domains, like health, are ideal for such a method as there are unlimited problems for which part of the solution requires combining knowledge and expertise from diverse professionals and patients. In this context, Delphi is widely used to effectively measure the consensus of a group and therefore answer questions that else wise wouldn't be possible.

## Digital Delphi

Results of the Delphi method are subject to the number of iterations and the number of experts involved. Thereof, the cost and time are limitations to the practice of the method: the more experts, the more expensive it is. Moreover, the execution of a Delphi can be throttled by the inability to set up recurrent face-to-face meetings among experts or participants. Digital technologies could help us overcome some of these limitations.

Since the introduction of the first computing technologies in the '70s, digital Delphis have been developed, and the method has dramatically evolved. Delphi conferencing was the first implementation to use in a computer<sup>3</sup>. The evolution of digital tools has allowed expanding the usability of the methodology with new strategies: networking, live data processing<sup>4</sup> and social networks, among others, open up new opportunities for innovation in the method<sup>5</sup>. When combined with the current paradigmatic changes and the need for tools to apply methodologies like Delphi, the development of different takes on its application is fostered.

Digital technologies will keep offering new functions and ease:

- sharing information and connecting in groups of people. We could imagine huge expert networks applying and sharing their experience and knowledge in real-time.
- the real-time and systemic analysis of all sorts of data which will increase transparency and insights in our social circles and workplaces<sup>6</sup>.

If you think of the combination of these two applications, we should possibly begin to look beyond the Delphi method and use it instead as a source of inspiration for a new normal for collaboration and participation.

Co-design and co-creation are becoming more present in many areas. The development of products and innovative services based on the systematic collaboration of agents and interest groups has allowed the development of operative systems (e.g. open source programs) to urban systems. The instances where innovation is enabled collectively by big groups of experts or even multitudes<sup>7</sup> are becoming more frequent by the day. And beyond their application in academia or market products, they also hold a massive potential in democracy and politics<sup>8</sup>.

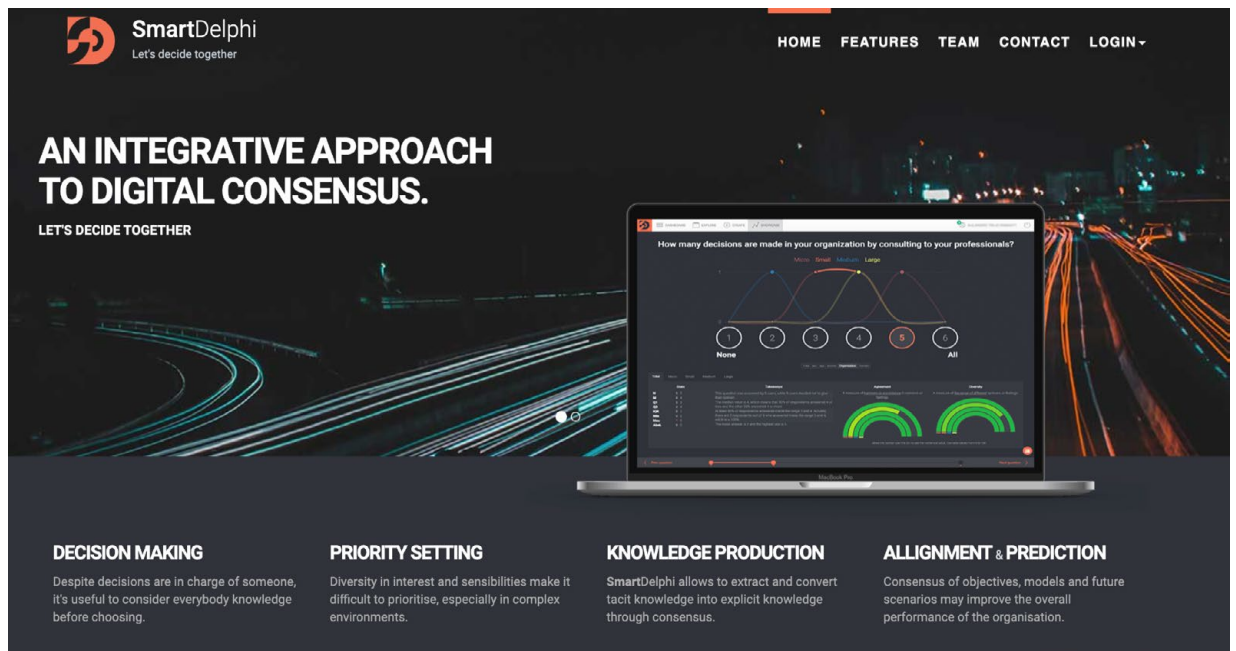
## Sometimes there is no better resort

Delphi studies, either traditional or digital, are used when there are no empirical data in the area of research or there are no better methods which could provide more accurate results. This situation could be due to the complexity of the issue (i.e. there are too many variables) or there is not enough information available. In these cases, it makes a lot of sense to leverage the (mostly tacit) knowledge and experience that experts withhold.

The reason of being for Delphi studies is to unveil where “informed opinions” stand around a certain topic or area and identify whether or not these conform to a “consensus”. Such insights can be very useful to focus the debate where consensus has not been reached yet, to make informed decisions or simply move forward in research.

The participants in a Delphi are experts in their field, so they are not simply asked to give their opinion, preference or desire, but a combination of these with their knowledge and experience. Moreover, their contribution shall not be limited to asking a questionnaire or questions but to formulating the questions in the first place.

As with any approach or tool, we cannot blindly rely on the method, much informed the expert collective is. Delphi shall be critically used and contextualised; the result we gather is ordered and methodological, but so it is directly dependent on the chosen topic and experts or target group (i.e. biases in the target group will result in biases in the results).



The image shows the SmartDelphi landing page. At the top left is the SmartDelphi logo with the tagline "Let's decide together". To the right is a navigation menu with links for HOME, FEATURES, TEAM, CONTACT, and LOGIN. The main heading reads "AN INTEGRATIVE APPROACH TO DIGITAL CONSENSUS." followed by the sub-heading "LET'S DECIDE TOGETHER". In the center, a laptop displays a survey interface with a question: "How many decisions are made in your organization by consulting to your professionals?". Below the question is a horizontal bar chart with six points labeled 1 through 6, corresponding to "None", "Small", "Medium", "Large", and "All". The chart shows a distribution curve peaking at point 5. Below the chart are two circular progress indicators. At the bottom, there are four columns of text describing the tool's capabilities: Decision Making, Priority Setting, Knowledge Production, and Alignment & Prediction.

**SmartDelphi**  
Let's decide together

HOME FEATURES TEAM CONTACT LOGIN

## AN INTEGRATIVE APPROACH TO DIGITAL CONSENSUS.

LET'S DECIDE TOGETHER

How many decisions are made in your organization by consulting to your professionals?

None 2 3 4 5 All

**DECISION MAKING**  
Despite decisions are in charge of someone, it's useful to consider everybody knowledge before choosing.

**PRIORITY SETTING**  
Diversity in interest and sensibilities make it difficult to prioritise, especially in complex environments.

**KNOWLEDGE PRODUCTION**  
SmartDelphi allows to extract and convert tacit knowledge into explicit knowledge through consensus.

**ALIGNMENT & PREDICTION**  
Consensus of objectives, models and future scenarios may improve the overall performance of the organisation.

Fig. 1. SmartDelphi landing page

## SmartDelphi, delphi in real-time

### The art of asking

As we mentioned, the Delphi technique is a way to gather experts' opinions and knowledge on a topic in a way that can be far more efficient than meetings and discussion panels but to make the most out of a Delphi it is of the utmost importance to ask the right questions. In our real-time Delphi implementation, SmartDelphi, experts express their opinion through a quantitative vote on a customisable scale with semantic differentials. In the following figure, experts would answer with a number from 1 to 6 where 1 is "not at all" and 6 is "certainly". SmartDelphi allows customising the range of answers and the numerical difference among possible answers as well as the semantic differentials.

There are some tips to ask good questions in Delphi questionnaires, assuming the idea behind the question is relevant to the study.

- The question must be as concise and clear as possible so it can be understood with a single read.
- The question should be as specific as possible as it will increase the usefulness and relevance of the answers.
- The question must not be expressed in biased terms or directed towards the best answer. The language shall be the most neutral as possible.
- When formulating the question one should forecast what answers might there be and what use they have to make sure the question is relevant and has an interest.
- Instead of asking a question one could also make an affirmative sentence (i.e. a hypothesis), and ask participants to indicate their agreeableness to it.
- Consider that differences in semantic differentials can completely change the answers. Therefore, be mindful of the nuances in potential answers and the most appropriate response scale (e.g. do we expect anyone to be in the extreme? Maybe we could not offer the option to answer in the extreme).
- As much as possible, avoid binominal questions (yes/no), as they provide little nuanced information.
- As much as possible, repeat the semantic differentials throughout the questionnaire. They add coherence and help respondents avoid mistakes if they overlook the semantic differentials.
- Think well of the order of the questions. Is your study more relevant to have them randomly, or is there a purpose in the order (e.g. starting with broad questions and slowly narrowing down the topic)?
- Consider that sometimes it might be more appropriate to ask an open question and gather qualitative insights.

The real-time Delphi uses implicit iterations. There is no time frame for each iteration

because the results don't have to be analysed and shared again with the experts. Instead, experts get feedback immediately after their answers to be able to adjust their responses. In some cases, one might even want to do the Delphi in a meeting and hold discussions on the results along with the vote casting. The advantage of this deployment of Delphi is that if the area of study is specific, it can provide better results by involving more experts while taking less time and effort.



Fig. 2.

## Sharp decisions

Online vote casting allows the introduction of a range of innovative functionalities. One we find especially interesting is the voluntary vote correction or modification: to allow respondents to change the direction of their vote based on the results. Functions as such offer new advantages but also some risks.

Firstly, the respondent gets insights into where they stand within the group and among those with a similar profile by immediately presenting the casting results. With this

information, the participant can reflect on their vote and eventually change it to enable a broader consensus.

The risk of such a feature comes from the principle of social conformity, which states that people are prone to adjust their behaviour and thinking to that of a group to fit in<sup>9</sup>. Nonetheless, we must consider that if participants are experts who are critical and have criteria, they might not be much conditioned by social conformity. On the other hand, we could see the contrary behaviour instead: modifying one's behaviour or thinking to stand off from the group.

Although we use the Delphi methodology to calibrate experts' opinions with the feedback from the group, it is nonetheless important to remember to participants that changing their vote is voluntary.

## Data in consensus procedures



Fig.3. Data dashboard with an overview of all questions and their evolution over time.



The SmartDelphi system has a registry of all the vote-casting processes. Beyond the information that is displayed to participants, managers have access to broader insights and information during the process:

- The results of the blind vote
- The changes in the votes over the time frame vote casting was open

SmartDelphi allows us to know certain aspects of the vote evolution and therefore identify singular behaviours among groups of participants — although not for individual participants since the vote is anonymous. The consensus makes sense precisely because of the transparency of the votes and the possibility for participants to change their votes.



Fig.4. View of the responses by age group.



## SmartDelphi features

<b>Access</b>	<p><b>Registered users</b> with email and password. Access to the platform and possibility to store several Delphi processes.</p> <p><b>Anonymous</b> access with a generic code. User self-generation.</p>
<b>Profile questions</b>	<p>All users must state their gender and age range.</p> <p>Each Delphi can include up to 8 customizable profile questions (limited to 8 answers each).</p>
<b>User roles</b>	<p><b>Owner</b> The Delphi creator (only registered users)</p> <p><b>Viewer</b> Can access the results in real time (only registered users)</p> <p><b>Voter</b> Default role for an anonymous user.</p>
<b>Projects visibility</b>	<p><b>Public</b> Registered users can access without permission. Anonymous via code.</p> <p><b>Private</b> Participation via invitation (registered and anonymous) or request (registered only). Code access also available.</p> <p><b>Hidden</b> Participation only by invitation.</p> <p><b>Free</b> Public projects limited to 5 questions, 2 profile questions and 10 users.</p>
<b>Items (Questions, statements, indicators, ...)</b>	<p>Each item is associated with a quantitative response according to a Likert-type scale with semantic differentials.</p> <p>Up to 40 items can be added with quantitative response according to a Likert scale with semantic differentials.</p> <p>For each question it is possible to customize both the scale and the texts of the semantic differentials.</p>
<b>Quantitative user response</b>	<p>The first response is blind, viewing only the question and the scale.</p> <p>Once the answer is given, the descriptive statistical information of the participants is displayed</p> <p>From that moment on, the user has the possibility of modifying his/her vote as many times as he/she wishes.</p> <p>The user has the option of omitting the answer (NS / NC).</p>

<b>Qualitative user response</b>	<p>Once answered the first time, each question opens up the option for comments and discussion via a forum.</p> <p>Every Delphi process has a final open form (optional response) with two satisfaction questions (about the process and the platform) and an open text field.</p>
<b>Open answer items</b>	Possibility to add open-answer questions (text field) interspersed between closed-answer questions (scales).
<b>Rich content</b>	Questions may incorporate HTML code, video and image.
<b>Customization</b>	<p>Not available.</p> <p>Welcome page for each Delphi project can be customised with text and image.</p>
<b>Data Statistics</b>	<p>For each question, the user can access graphed values of median and IQR, totals and for each of the profiles.</p> <p>For each question, qualitative and quantitative indicators of the degree of consensus are presented.</p>
<b>Tracking</b>	<p>Viewer and owners can access the Delphi dashboard at any time.</p> <p>First votes (blind) result.</p> <p>Realtime results and queries by date range</p> <p>Filter results by any profile.</p>
<b>Data Export</b>	Export by project or question in Excel or CSV format.
<b>Platform Languages</b>	English, Spanish, and Catalan.
<b>Text input</b>	Support for all languages.
<b>Acessibility</b>	<p>Responsive design for all devices.</p> <p>Clear and dark modes.</p>
<b>Considerations</b>	<p>In order to maintain consistency of statistical results, once user participation in the Delphi has been initiated, the structure of the content cannot be changed:</p> <ul style="list-style-type: none"> <li>- Profile options</li> <li>- Number of questions</li> <li>- Scales</li> </ul> <p>If any of these elements are modified, a new Delphi must be started with a new access code and a new vote must be taken.</p>

## A case study: SmartDelphi to define persistent COVID.

SmartDelphi has been used in the CIBERPOSTCOVID project by the Consorcio de Investigación Biomédica en Red (CIBER, Carlos III Health Institute, Spanish Ministry of Science and Innovation).

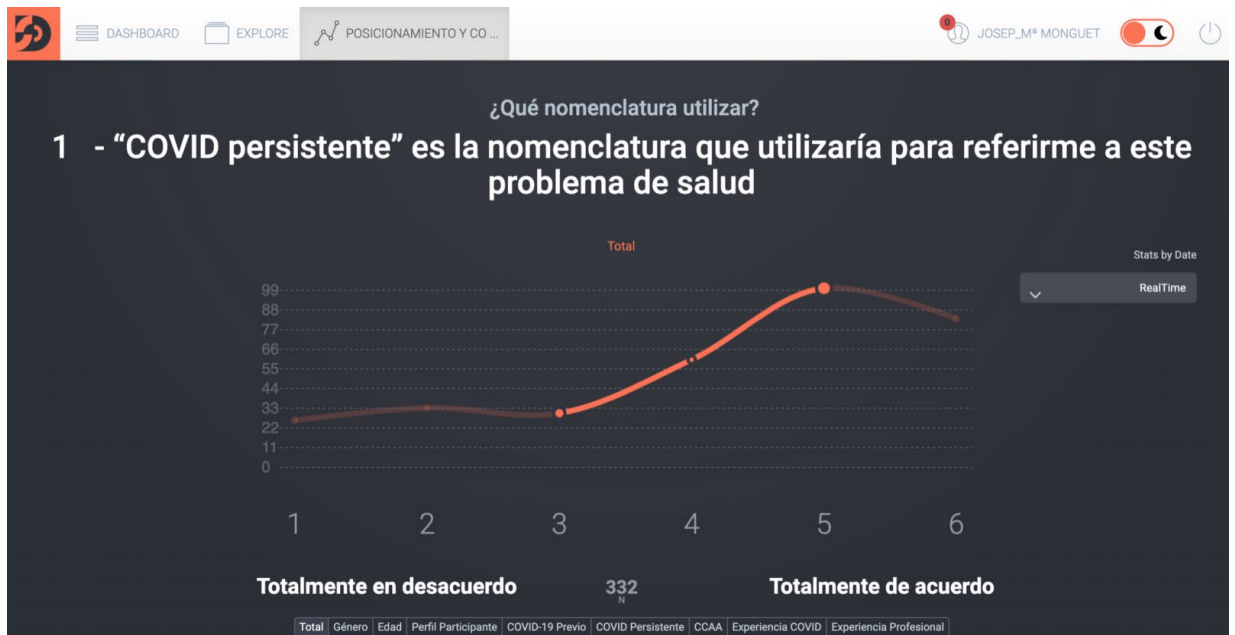


Fig. 5. First question of the CIBERPOSTCOVID Delphi.



# Notes

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- 2 Dalkey, N., & Helmer, O. (1963). An experimental application of the Delphi method to the use of experts. *Management science*, 9(3), 458-467.
- 3 Turoff, M. (1972, May). Delphi and its potential impact on information systems. In *Proceedings of the November 16-18, 1971, fall joint computer conference* (pp. 317-326).
- 4 [https://en.wikipedia.org/wiki/Real-time\\_Delphi](https://en.wikipedia.org/wiki/Real-time_Delphi)
- 5 Turoff, M., & Linstone, H. A. (2002). *The Delphi method-techniques and applications*.
- 6 Social networks allow for a quantitative approach to individual and collective behaviour study: Pentland, A. (2014). *Social physics: How good ideas spread-the lessons from a new science*. Penguin.
- 7 Surowiecki, J. (2005). *The wisdom of crowds*. Anchor.
- 8 Fluid transmission of ideas and knowledge can replace social hierarchies and dominant politics: Lévy, P., & Bononno, R. (1997). *Collective intelligence: Mankind's emerging world in cyberspace*. Perseus books.
- 9 Conformism is a form of social influence which causes people to change their beliefs or behaviours to fit in a dominant social group.