

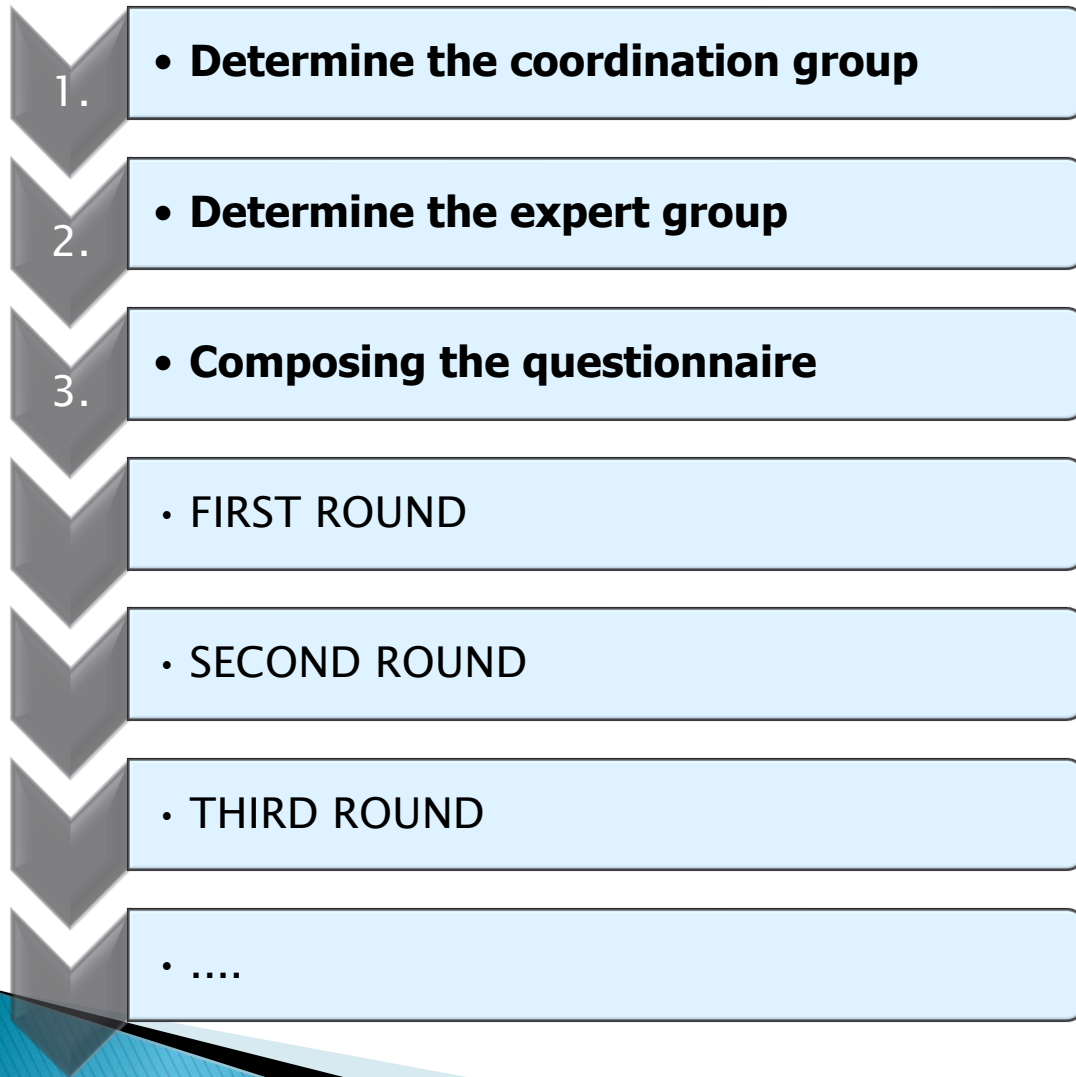
Delphi method

Exercise 2

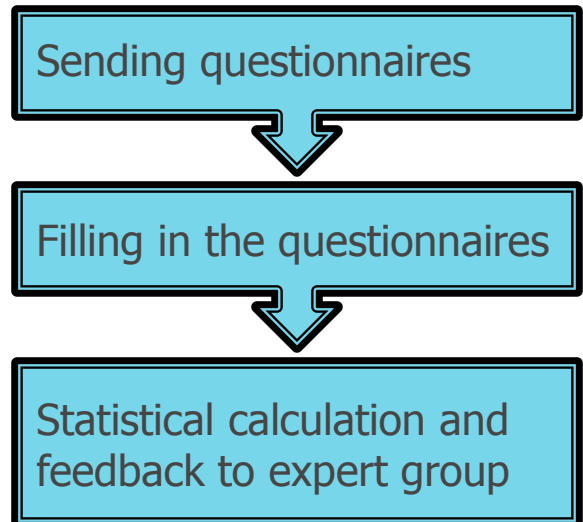
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Steps in conducting Delphi Method



ROUND:



Variations in answers

1 answer

3 answers

x

o (optimistic)
m (expected)
p (pessimistic)

Question no. _____

_____ Round

In how many years	0	1	2	3	4	5	6	7	8	9
Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Expert	Predictions									
1		X								
2	X									
3			X							
4		X								
5						X				
6					X					

Statistical calculation (1 answer)

$$t_n = \frac{1}{n} \sum_{i=1}^k t_i f_i$$

▶ t_n - average time of occurrence

▶ f_i - frequency

$$\delta_n^2 = \frac{1}{n} \sum_{i=1}^k f_i t_i^2 - t_n^2$$

■ Dispersion

$$\delta_n = \sqrt{\delta_n^2}$$

■ Standard deviation

In how many years	0	1	2	3	4	5	6	7	8	9
Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Expert	Predictions									
1				o		m	p			
2						m				
3					o	m	p			
4					o		m	p		
5				m						
6						o	m	p		
7					m					

Statistical calculation (3 answers)

$$t_i = \frac{r_1 O_i + r_2 m_i + r_3 P_i}{r_1 + r_2 + r_3}$$

r_1, r_2 i r_3 are given by PERT method
 $r_1=1, r_2=4$ i $r_3=1$

$$\sigma_i^2 = \frac{P_i - O_i}{r_4}$$

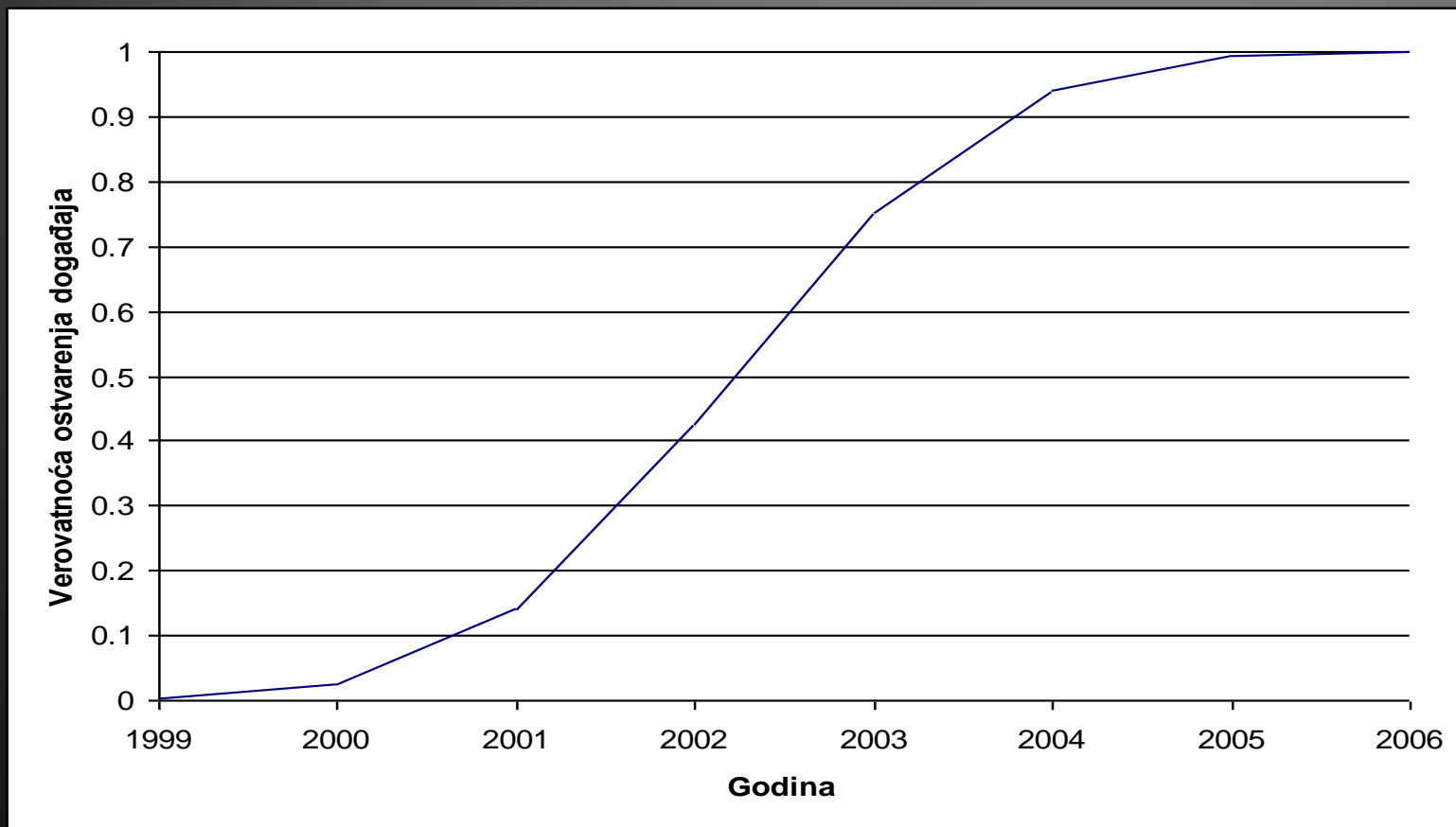
$r_4=36$

Overall expected time of occurrence and dispersion are calculated by equations:

$$t_n = \frac{1}{n} \sum_{i=1}^n t_i$$

$$\delta_n^2 = \frac{1}{n} \left[\sum_{i=1}^n \delta_i^2 + \sum_{i=1}^n (t_i - t_n)^2 \right]$$

Probability of occurrence



Exercise: Calculating statistical values using software

When can we expect implementation of technology T in our organization?

Expert	2013	2014	2015	2016	2017	2018	2019	2020
1				X				
2					X			
3					X			
4				X				
5					X			
6				X				
7			X					
8						X		
9		X						

Exercise: Calculating statistical values using software

▶ Based on the information gathered from experts we will calculate statistical values:

Average time:

$$t_n = \frac{1}{n} \sum_{i=1}^k t_i f_i$$

Dispersion:

$$\delta^2_n = \frac{1}{n} \sum_{i=1}^k f_i t_i^2 - t_n^2$$

Standard Deviation:

$$\delta_n = \sqrt{\delta^2_n}$$

IN OUR EXAMPLE: $t_n = 3,22$ $\delta_n^2 = 1,3$ $\delta_n = 1,14$

Presentation of results

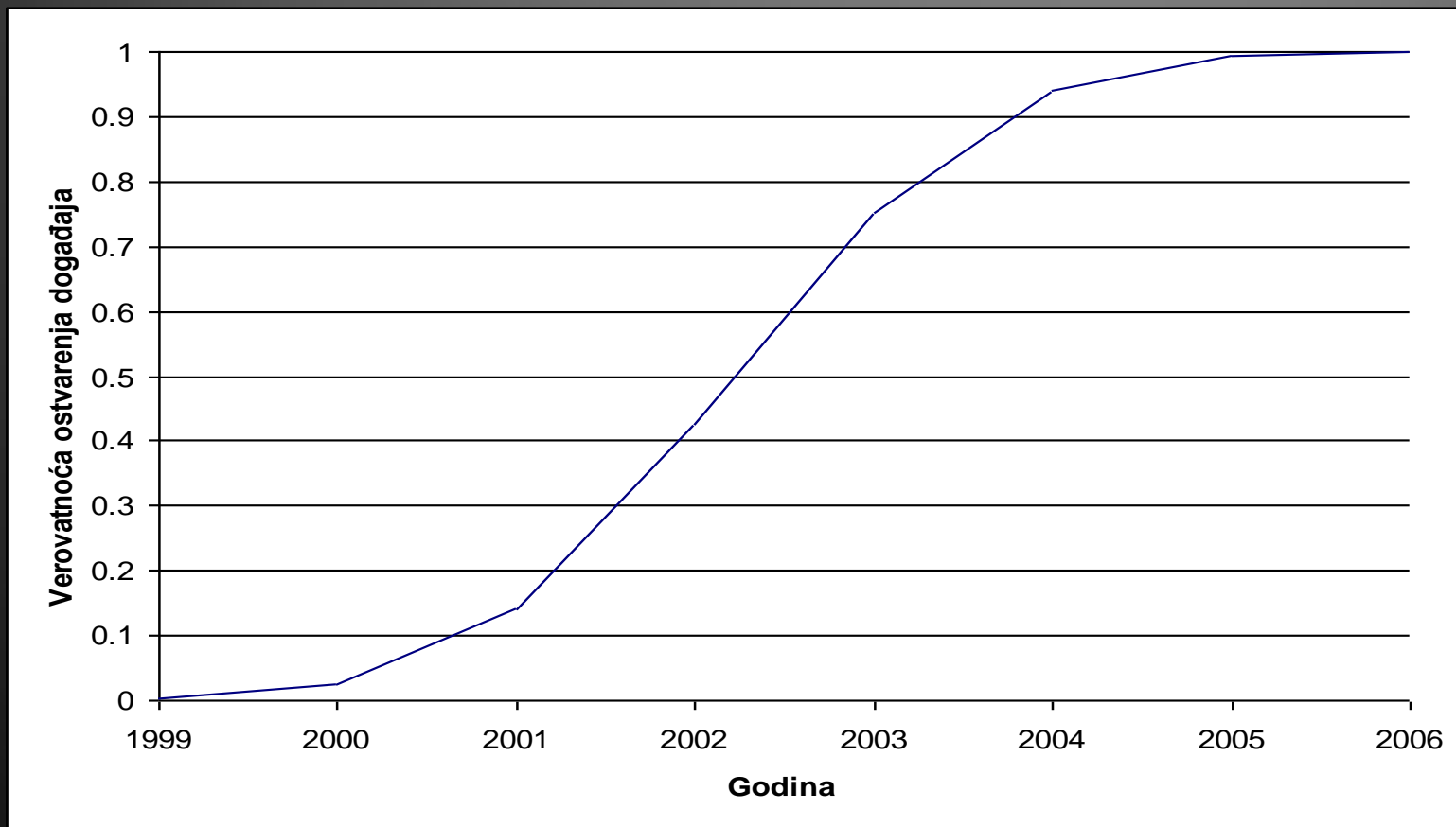
Statistical measures

Graphical presentation

Verbal description

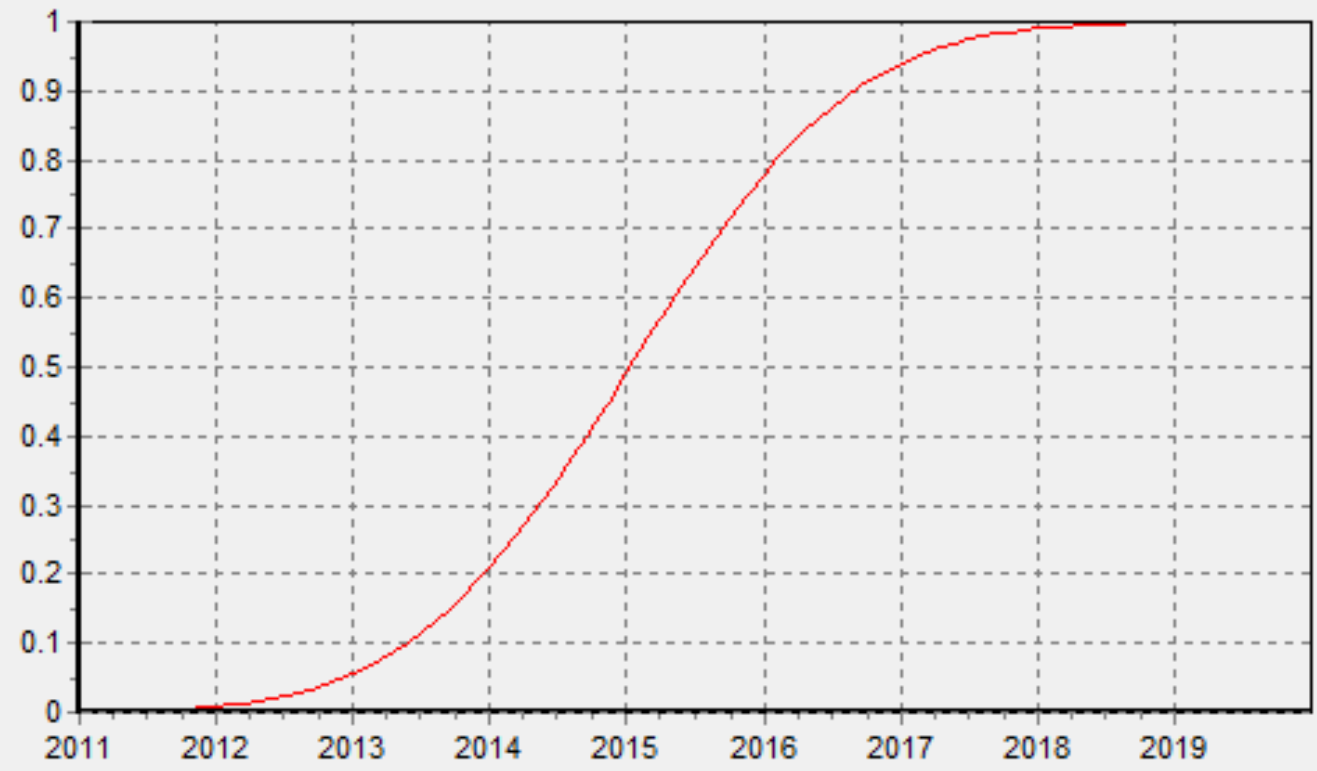


Probability of occurrence



Krug 1, Pitanje 2: Q2

	P događaja
2011	0.0008
2012	0.0089
2013	0.0563
2014	0.2110
2015	0.4926
2016	0.7780
2017	0.9394
2018	0.9902
2019	0.9991



Aritmeticka sredina:
4.0238

Varijansa:
1.2753

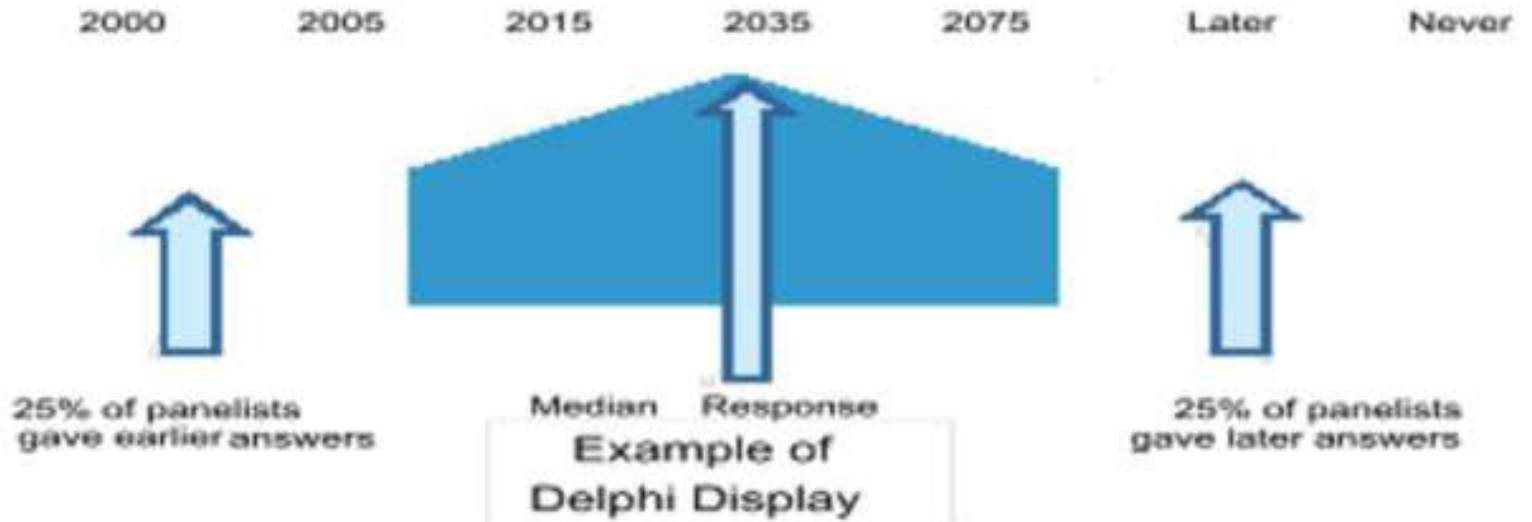
Standardna devijacija:
1.1293

Pitanje
Sledece
Prethodno

Krug
Sledeci
Prethodni

OK

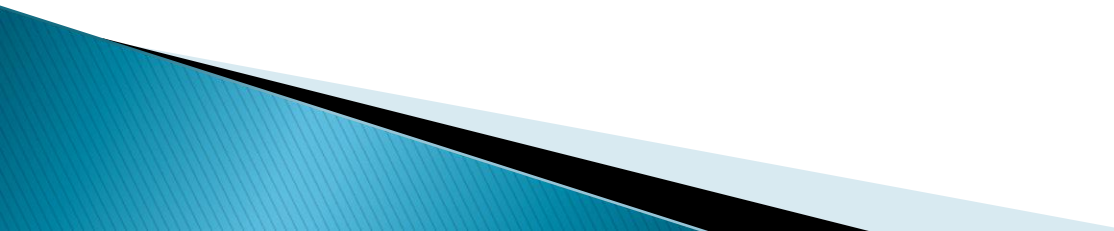
Presentation of results



The method continues to be used extensively.

In September of 2008, a review was made of the Scopus data base (which includes articles from 15,000 peer-reviewed professional journals from 4,000 publishers, proceedings papers, and trade publications) and 105 publications were identified in response to the search terms “Delphi study.”

By far, the largest field of study which employed the method was health sciences.



Strengths of Delphi

FLEXIBILITY

The method is flexible enough to be applied in a variety of situations and to a wide range of complex problems

ITERATIVE APPROACH

The iterative approach allows experts to reconsider their judgements in the light of feedback

PROCESS

The process also gives participants more time to think through their ideas before committing themselves to them, leading to a better quality of response

ANONYMITY

The anonymity of the approach enables experts to express their opinions freely, without institutional loyalties or group pressures getting in the way

Strengths of Delphi

RECORD THOUGHTS

The process generates a record of the group's thoughts, which can be reviewed as required

EVALUATION

The method can be used to evaluate the spread of opinion as well as consensus points

NO INFLUENCE

The potential influence of personality is also removed in this way

Weaknesses of Delphi

Delphi can be extremely sensitive to:

the level of panelists' expertise

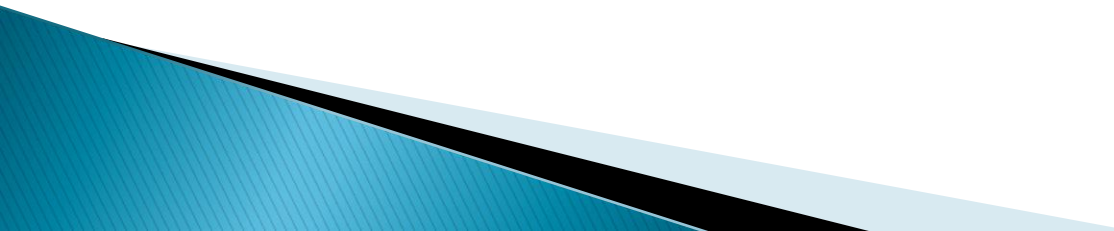
the administration of the questionnaire

the composition of the panel

the clarity of the questions



Proposed Best-Practice Guidelines

- The Delphi method should not be seen as a main tool of investigation but a means of supporting/extending studies.
 - The topic must be appropriate, for example there must be no widely-perceived 'correct answers' to the questions posed.
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Delphi Method

Advantages

Use of field experts

Avoids communication problems

Eliminates hierarchy influence

Disadvantages

Members are physically dispersed

No direct interaction of participants

May take a long time to complete

Successful Delphi implementation

- ❑ The Delphi method should not be seen as a main tool of investigation but a means of supporting/extending studies
- ❑ The topic must be appropriate for example there must be no widely-perceived 'correct answers' to the questions posed.
- ❑ Questions must be pilot-tested
- ❑ Panelists should be recognized experts in their field
- ❑ The panel should comprise a good balance of different disciplines and areas of expertise

Successful Delphi implementation

- ❑ Adequate time must be given to experts to think deeply about the questions
- ❑ Selected experts should have a strong interest in the outcome of the project
- ❑ Experts must also believe that Delphi method is a valid way to predict future events
- ❑ Full anonymity must be preserved between the panelists
- ❑ The coordination group should be always available for further information or for clarifying the questions

Some of the reasons of Delphi failure

- ⦿ Overspecifying the structure of the Delphi and not allowing for the contribution of other perspectives related to the problem
 - ⦿ Assuming that Delphi can be a surrogate for all other human communications in a given situation
 - ⦿ Ignoring and not exploring disagreements, so that discouraged dissenters drop out and an artificial consensus is generated
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