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mixed mode:

Design and
implementation
in the Czech
context

*manual
for researchers and
data users*

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Mixed mode: Design and implementation in the Czech context. Manual for researchers and sponsors.

Author team:

Barbora Hubatková, Martin Lakomý (Department of Sociology, Faculty of Social Studies, Masaryk University, Joštova 10, Brno, Czech Republic)

Roman Skotnica, Lýdia Barbušová, Petr Horn, Filip Rozsíval (FOCUS – Marketing & Social Research, Vrchlického sad 1894, Brno, Czech Republic)

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This manual was translated from Czech to English using Deepl software and went through a professional proofreading.

List of contents

Guiding principles

➢ Questionnaire surveys are still the most appropriate tool for understanding certain topics, and representative sampling (within a national population or a specific group of people) is still the most validated approach.

➢ The different types of questionnaires – face-to-face, telephone, online – all have several shortcomings, which we try to address by combining them into a mixed mode.

➢ Different forms of questioning can be combined within the mixed-mode method. Our recommendation is simple and increasingly accessible online interviewing complemented by, for example, face-to-face interviewing.

➢ If our goal is to randomly select from the entire population, we choose between random digit dialling methods and personal visits to households selected from the address register.

➢ Careful questionnaire design is a key stage in the process, which should result in, among other things, a questionnaire that can be used in different modes of questioning and for different types of electronic devices.

➢ In addition to the consideration of mode, the rules of simplicity, clarity, and limited scope apply to the design of the questionnaire – these should be the characteristics of the whole questionnaire and the individual questions.

➢ Particular attention should be paid to sensitive and attitudinal questions, which are at the highest risk of bias and potential differences between interviewing methods.

➢ When recruiting respondents to cooperate, we try to use all possible motivational elements – gaining their trust, generating interest, offering a financial incentive/ contribution to charity, emphasizing the importance of the research, or offering another interview mode.

➢ The key aspects of every data collection process are pleasant and professional communication, repeatedly contacting unresponsive numbers or households, reminding them of pending surveys, and thanking them for their participation.

➢ The application and dissemination of results are important factors in respondent trust.

➢ We also consider the different modes of questioning when using the data – we control for possible differences in responses and take into account possible biases in the modes of questioning.

➢ The impact of the mode of data collection – and differences between modes – should be considered in any data analysis, given the rapidly growing combinations of modes in different types of surveys.

Introduction – why do we need surveys?

Population censuses, 'big data', online panels, social networks – all of these give the impression that classical sample surveys can no longer provide any new information, i.e., knowledge that would not be accessible in any other way. Why send interviewers to a thousand selected households if the Census collects data on all of them? Why overload respondents with questions about who they vote for, where they spend their weekends, where they shop, what their marital status is, or how many children they have, when all of this can be either tracked in population registers or inferred from mobile phone location, online shopping history, Twitter accounts, or Facebook photos?

The idea of a sample survey also seems outdated in the light of changing lifestyles. In an increasingly busy everyday life, it is quite difficult for potential respondents to find 20, 30, or 40 minutes of time for a questionnaire, let alone one where a stranger is scheduled to come to their home. We know from interviewers that face-to-face (and telephone) interviews are becoming increasingly difficult to conduct due to the reluctance of those being approached. This **increases the cost of interviewing and reduces confidence in the data collected** and interest in interviewing positions. At the same time, privacy concerns are increasing among respondents. With this comes a growing number of questions that may be perceived as sensitive, ranging from 'typically problematic' topics like income levels down to home furnishings. It therefore becomes increasingly desirable to work with respondents who actively want to participate in social surveys, such as members of online panels.

In addition, the last few decades have seen an unprecedented **surge** in various polls (be it e-shop satisfaction questionnaires or student surveys) and other overwhelming communication, as well as in opportunities to express opinions, especially via social networks. In addition, people are exposed to offers of energy providers, investment opportunities and mobile operators bordering on the fraudulent, further reducing trust and feelings of security when approached at random (in person or over the phone) to participate in a survey. Trust in official institutions is also relatively low. In this context, both the willingness to participate in surveys and their perceived usefulness disappear.

Despite all these changes, questionnaire surveys still make sense today. From a methodological standpoint, for example, it is crucial to maintain the continuity of long-term surveys that track change over time. Online panels, although conceived as representative, are then typically the result of 'self-selection' of the respondents involved, and as such **leave out groups of people less willing or less able to participate in** online surveys.

Still, the reasons are also purely practical. While the amount of so-called big data is increasing, such data are far from ideal, their processing is time-consuming and technically demanding, and they often

contain a different kind of information than what sample surveys usually collect. Other types of data, such as state-collected data on citizens (marriages, divorces, numbers of children, etc.), are highly sensitive in nature and therefore relatively difficult to obtain, not to mention authorised to be merged with other information sources. The element of consent also comes into play – if data (e.g., photos, comments, social media statuses) are publicly available, do their authors automatically agree to their processing and analysis? What does such data tell us about people anyway? And how should we treat those who do not use social networks or, indeed, the internet? Do we disqualify them from research? In other words, how do we ensure the generalisability of the results back to the population?

To answer the question in the title, **questionnaire surveys continue to be used to collect specific and thematic data** (e.g., values, attitudes, behaviours) through methodologically grounded, detailed, **replicable and tested procedures.** These procedures ensure that the **data relates back to the society in which it was collected in a known, quantifiable way.** At the same time, survey data also allow for an easy linking of different variables (e.g., education level with attitudes toward divorce) in a single dataset – thus answering almost any research question. They also have clearly defined rules of consent and anonymisation, give respondents greater control over the nature of the information disclosed, and standard and newly developed statistical analysis procedures can be applied to them.

None of the above, however, means that sample surveys should not be responsive to changes in the 'field' and subject to innovation. On the contrary, **innovation** is crucial to maintaining the relevance and functioning of surveys. One promising innovation is the **mixed-mode survey**. The currently extensively developed use of mixed-mode surveys to contact respondents and collect their responses is the focus of this manual.

This thematic manual consists of two general parts. The first part is theoretical and briefly summarises the terminology of questionnaire surveys and the main parameters of mixed-mode surveys. It is, in essence, an **overview of the current literature** (a list of references can be found at the end of the document). The second part is practical and summarises the recommended procedure for the preparation and implementation of the mixed-mode version of CAWI + CAPI and for the analysis of the data obtained. Here, **we draw on the results of testing the proposed methodology directly in the field.**

This manual is intended for **implementers** (research agencies, academic institutions), **commissioners** (public institutions, companies, NGOs, media, academic institutions) and **users** (all of the above, including other entities working with data) of questionnaire surveys. To meet the needs of these groups of readers, the manual presents information for a) implementing mixed-mode, b) considering it when commissioning data collection, and c) reflecting on data generation when analysing and

processing the results. The individual chapters build on each other rather loosely and can therefore be read selectively according to current needs.

Standard interviewing techniques[1]

Survey data can be collected in several different, long-established ways (modes). These are broadly divided into (1) **interviewer-assisted interviewing** and (2) **self-completion**. The first category includes the methods under the acronyms PAPI, CAPI, and CATI, and the second category includes PAP, CASI, and CAWI (see Box 1 for a summary of acronyms). PAPI and CAPI are face-to-face interviews with the interviewer present and differ only in the form of the questionnaire (paper, electronic); CATI is a telephone interview. In PAP, CASI, and CAWI, the respondent completes a paper questionnaire, an electronic off-line questionnaire (e.g., on the interviewer's computer), or an online questionnaire via any device.

Box 1. Glossary: modes of inquiry

PAPI (*pen-and-paper interviewing*) – *face-to-face interviewing, interviewing in the presence of the interviewer using a paper questionnaire*

PAP (*pen-and-paper*) – *self-administered paper questionnaire*

CAPI (*computer-assisted personal interviewing*) – *personal interviewing, interviewing with the participation of the interviewer using a questionnaire on a computer, typically a laptop or tablet*

CATI (*computer-assisted telephone interviewing*)

CASI (*computer-assisted self-interviewing*) – *self-completion of an electronic off-line questionnaire on a computer, typically self-completion on the interviewer's computer*

CAWI (*computer-assisted web interviewing*) – *self-completion of an online questionnaire in a browser or a questionnaire downloaded via an application*

The choice of mode is based, for example, on the type of research, the length of the questionnaire, the sensitivity of the questions, survey budget, or available contact details. Face-to-face interviews are suitable for longer and more complex questionnaires, especially those conducted as part of academic research. Telephone interviewing is used for short questionnaires, ideally within about 10 minutes.

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[1] This section, up to the chapter 'Implementation of Mixed-mode in the Czech Republic', is strongly based on existing findings, a list of which is provided at the end of the document. We have refrained from citing sources directly for the information in the text due to a) the unscientific format of this work and b) following the goal of maximum readability of the text.

Self-completion is also used for shorter and simpler questionnaires or questionnaires (or parts of questionnaires[2]) asking for private or sensitive information (e.g., about partnerships and sexuality). Whether the interviewer uses paper or electronic questionnaires often depends on the agency's practice and equipment, but the trend is clearly towards electronic versions.

Currently, the use of self-completion online (CAWI) is increasing. In the Czech context, CAWI is largely used for marketing research or public opinion research, whereby registered members of online panels[3] (i.e., not randomly selected respondents) are interviewed. Interest in the use of CAWI is also growing in the academic research sphere, in part as a consequence of the limitations caused by the COVID-19 pandemic.

Benefits and challenges of traditional data collection modes

Although long tested and used, the 'traditional' methods of collecting survey data (PAPI, CAPI, CATI, CASI) have their limits. **Face-to-face interviewing** is characterised by high response rates and good data quality, but it is costly and time consuming, and the answers to some questions may be biased by the presence of the interviewer (e.g., giving socially acceptable answers). In **telephone interviewing**, respondents are more likely to agree with items or give positive answers, and there is typically a 'recency effect', where respondents are on average more likely to choose the last option offered. At the same time, visual information cannot be used in telephone interviews, for example, respondents cannot rate pictures or videos; visualisation of verbally described long scales or keeping the offered response options in memory is also a problem. CATI is not suitable for longer questionnaires, has a lower response rate and tends to underrepresent people without phones, people not answering unknown numbers, and people unable or unwilling to complete long phone calls. However, telephone interviewing is cheaper than face-to-face interviewing, and does not involve letting strangers into the home. **Self-completion** modes are typically cheaper than interviewer-administered modes, are suitable for sensitive questions, and are often preferred by respondents (this is particularly true of paper questionnaires). At the same time, however, respondents cannot be assisted if they do not understand a question or are unsure how to complete the questionnaire correctly. There is also no control over whether the questionnaire was actually completed by the respondent. Computer-assisted

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[2] For example, in CAPI interviewing, the interviewer may have the respondent complete one or more questions independently or may hand over a section of the questionnaire for the respondent to complete completely independently.

[3] By online panel we mean an existing database of repeatedly interviewed respondents.

self-completion (CASI) can encounter the low computer literacy of the respondent (when interviewing in person).

Benefits and challenges of online self-completion

Computer-assisted web interviewing (CAWI) has been on the rise since the beginning of the new millennium. Its benefits lie (compared to the aforementioned modes) in the possibility of cheaper, faster, and more automated questioning using new technologies. CAWI is flexible in terms of the time and place of completion and automation of the process, allowing the inclusion of complex filters, videos, images, and graphics, convenient analysis of responses during collection, and reduction of interviewer influence when asking sensitive questions.

Despite these advantages, however, the online mode has shortcomings that make it difficult to use as a stand-alone mode of data collection. First, CAWI surveys have the lowest response rate compared to other modes. Second, the population of Internet users is not identical to the general population, so a certain proportion of potential respondents are not able to participate in the survey. Thirdly, CAWI seems to be particularly prone to various kinds of 'satisficing', i.e., the type of behaviour in which respondents do not pay enough attention to the questionnaire. Typical examples are suspiciously short completion time or a high share of invalid answers such as 'don't knows'. These problems become more acute as the length of the questionnaire increases or as respondents become less motivated. Fourth, online questionnaires can be completed on a variety of devices with different parameters (display size, operating system, web browser, control method) ranging from personal computers to smartphones. Thus, different respondents may view the questionnaire differently. At the same time, mobile devices increase the likelihood of multitasking, being in the presence of other people, or completing the questionnaire in places that are not methodologically suitable. All of this can have a negative impact on the quality of the data collected.

Mixed-mode survey designs

The purpose of **mixed-mode surveys is to make use of the strengths** of each quantitative method while overcoming its greatest limitations. This approach aims at faster data collection with lower costs, better population coverage, higher response rates and higher data quality than most modes can offer on their own. However, the efficiency of a mixed-mode design relative to a single mode always depends on the particular mode that serves as the baseline. In principle, 'mixed-mode survey' is an

umbrella term that refers to a rich range of procedures and possible combinations. Its use must therefore always be carefully planned, as different combinations vary in their suitability to different research purposes.

The term mixed-mode survey can refer to both the data collection phase itself and the phase of reaching respondents, or to the combination of the two. It can be deployed either **concurrently** or **sequentially** during data collection. In a concurrent design, data collection is conducted in multiple modes simultaneously (in parallel) and the mode of data collection depends on the choice of respondent, available contact details or technical equipment of the respondents. The sequential design includes a main mode and a follow-up mode, targeting, for example, underrepresented groups.

Mixed-mode surveys can also be conducted '**within**' respondents (all respondents complete all modes, for instance face-to-face interviews supplemented by self-completion) or '**across'** respondents (some respondents are interviewed in a different mode than others). A mixed-mode design can also arise **over time**, typically when a longitudinal survey changes the way it collects data over time. Mixed-mode design should also be acknowledged where, within the same international survey, data from the same wave **in different countries are collected in different modes** according to local possibilities. **In the second part of this manual, we will primarily discuss mixed-mode design 'across' respondents at one point in time and in one country.**

Selected mode combination options are discussed in Table 1. The assumption of all designs is the **meaningful comparability of the** obtained data. However, the different data collection modes differ in three main respects, namely (1) **the presence or absence of an interviewer**, (2) the **way the information is received** (heard, read), and (3) **the way the response is recorded** (oral, written, keyboard and mouse, touch screen). Thus, the resulting data may also differ. This can be avoided to some extent by combining related modes (i.e., modes with/without interviewer presence). However, such an approach is not always feasible; for example, if the questionnaire is based on visual information (pictures, videos, long scales, scales with pictograms), CAPI cannot be effectively combined with telephone interviewing.

Table 1. Use of mixed-mode survey for data collection across respondents – selected variants, no distinction between 'main' and 'secondary' modes

	CAPI/PAPI	CATI	PAP (self-filling)
CAWI	PROS: Suitable for complex questionnaires and questionnaires with visual elements. Suitable where some respondents find it inconvenient to be interviewed online or do not want to interact with an interviewer. Suitable for sensitive questions where CAPI is supplemented by CASI. Suitable for longer-term surveys where recruitment and email acquisition are ongoing by visiting the interviewer. CONS: The need to obtain the respondent's email address. The link to the questionnaire may 'get stuck' in spam. Online questionnaire is easier to complete with a low level of consistency, or even not completed. Each mode is characterised by a different type of information reception (read/heard). BIAS: recency effect (CAPI), primacy effect (CAWI), increased risk of satisficing (CAWI)	PROS: Suitable for shorter surveys regardless of complexity; suitable if some respondents do not have time for telephone interviews during normal working hours. CONS: Not very suitable for asking sensitive questions. Problem of using long scales and other visual elements. Each mode is characterised by a different type of information reception (read/heard). BIAS: recency effect (CATI), propensity to agree (CATI), primacy effect (CAWI) + increased risk of satisficing (CAWI)	PROS: Suitable where a proportion of respondents do not have access to the internet, or do not trust the online questionnaire, and where the questionnaire does not contain visual effects (e.g., videos) and complex filters. Same type of information received (read). Same flexibility in terms of respondent's time availability. CONS: The need to obtain the respondent's email address. The link to the questionnaire may 'get stuck' in spam. Data from paper questionnaires must be converted (manually, by computer) into digital form, which is time consuming and can lead to errors. BIAS: primacy effect (both), increased risk of satisficing (CAWI/both)
CAPI /PAPI		PROS: Suitable for shorter questionnaires without long scales and other visual elements. In case of a longer questionnaire, several calls may be made. Suitable if some of the respondents do not agree with the interviewer's visit. No difference in the way the information is received. CONS: Not suitable for questionnaires containing sensitive questions – CAPI procedures for asking sensitive questions (cards, CASI) cannot be used for telephone interviewing. Pictures or videos cannot be used. BIAS: recency effect and social desirability bias (both modes), tendency to give positive or agreeing responses in CATI	PROS: Suitable for less complex questionnaires without a lot of filters. Suitable where some respondents cannot or do not want to interact with the interviewer. The paper questionnaire can be mailed or left in the mailbox when the interviewer visits, along with an information leaflet and instructions for sending it. CONS: Potentially lower motivation to participate in self-completion. Data from paper questionnaires have to be converted (manually, by computer) into digital form, which is time consuming, and errors can occur. Each mode is characterised by a different type of information reception (read/heard). BIAS: recency effect (CAPI), primacy effect (PAP)

An alternative to using the same questionnaire for both modes (*unimodal* design) is to adapt the questionnaire to the logic of each mode, which should ensure better data comparability. However, some methodological manuals do not recommend this type of design. In general, **there is currently no one 'best' combination of modes or exact guide to mixed-mode design**. The suitability of the questionnaire for each mode and the comparability of results across modes should always be maximised.

Over time, online interviewing[4], typically in conjunction with face-to-face interviewing, has become a frequent element of mixed-mode design. This push-to-web trend is prevalent in many large international longitudinal surveys, both cross-sectional and panel. As the Czech Republic is a long-standing member of many of these research infrastructures[5], the gradual introduction of mixed-mode surveys is also taking place in the domestic context. At the same time, the findings from other country contexts will not be directly applicable, as the success of different data collection techniques, elements or combinations of data collection techniques **varies across countries**.

Implementation of the mixed-mode design in the Czech Republic[6]

The successful implementation of mixed-mode surveys is to some extent **influenced by the national context**. Countries differ in their data collection traditions, respondent behaviour, technical equipment, legal framework, or available sampling frames. As a result, different modes and their combinations vary in their effectiveness. Thus, it is difficult – at least at present – to formulate a universal recommendation or the best strategy for implementing a mixed-mode design.

In the Czech context, the choice of mode often depends on the type of research: academic research (with longer and more complex questionnaires) favours face-to-face interviews (CAPI or PAPI), marketing research more often uses telephone or online panel interviews. Mixed-mode surveys are currently used, typically either a combination of CAPI and PAPI (i.e., the interviewer uses a computer-based questionnaire or a paper questionnaire) or, to a lesser extent, mixed-mode design 'within'

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[4] It represents a kind of 'bridging' phase between traditional data collection practices and the full transition to the online environment expected in the near future.

[5] For example, European Values Study, European Social Survey, Generations and Gender Programme, International Social Survey Programme.

[6] The following sections of the text are based mainly on our findings but also to a large extent on existing knowledge. We do not refer to sources directly in the text due to a) the non-scientific format of the work and b) the goal of making the text as readable as possible.

respondents (i.e., all respondents answer different types of questionnaires). Other combinations are relatively rare, and there is a lack of systematic methodological discussion.[7]

The Czech population – as elsewhere in the Western world – is experiencing '**over-surveying**[8]', although in our opinion the term oversaturation would be more appropriate. The problem does not stem from an increase in the number of professional surveys, but from unsolicited phone calls and visits by various vendors, from the oversaturation of newsletters, customer satisfaction surveys, student surveys, and similar types of surveys. Because of this burden, respondents tend to be sceptical of legitimate surveys. Privacy concerns are on the rise and traditional methods of data collection, such as household surveys, are no longer effective. This trend, accelerated by the COVID-19 pandemic, is reflected in the ever-declining response rates of both CAPI and CATI.

But at the same time, general population surveys **cannot simply be 'moved online'**. Internet coverage is not yet complete and varies considerably according to the socio-demographic characteristics of households and individuals – as does the use of computers and smartphones (see Table 2, Figure 1). In addition, the most effective way of recruiting respondents is still a visit by an interviewer to the household.

Table 2. ICT usage in the Czech Republic – households and individuals, 2020

	%
Households with a computer (total)	**79**
Households of people aged 65+ with a computer	40
Lowest income households with a computer (1st income quartile)	44
Households with internet (total)	**82**
Households of people aged 65+ with internet	41
Lowest income households with internet (1st income quartile)	50
Households with a landline* (total)	**14**
*Households of people aged 70+ with a landline**	25
Households with a mobile phone (total)	**99.5**
of which with a smartphone	76
Households of people aged 65+ with a mobile phone	98
of which with a smartphone	27
Lowest income households with a mobile phone (1st income quartile)	98
of which with a smartphone	43
People aged 16+ using a mobile phone	**99**
of which using a smartphone	73

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[7] A dramatic break in current practice is occurring, especially with the advent of the covid-19 pandemic, which has shifted many traditional collections to online or telephone interviewing and has probably brought partially irreversible changes (interaction, trust, interviewer networks) to face-to-face interviewing options.
[8] The term refers to a certain fatigue of potential respondents caused by the excessive amount of research and surveys of various kinds to which they are exposed on a daily basis. This 'fatigue' results in a reluctance to participate in surveys, often regardless of their type, topic, or focus.

People aged 65+ using a mobile phone	98
of which using a smartphone	23
People aged 16+ using the internet	**81**
People aged 65+ using the internet	40
People aged 16+ using the internet on their mobile phone	**68**
People aged 65+ using the internet on their mobile phone	16

Source: CSO, 2021, Information Society in Numbers – 2021, https://www.czso.cz/csu/czso/informacni-spolecnost-v-cislech-2021

*For 2016. CSO, 2019, Information Society in Numbers – 2019, https://www.czso.cz/csu/czso/informacni-spolecnost-v-cislech-2018; latest available data

Figure 1. Smartphone, internet, and mobile internet usage by highest educational attainment in 2020, age 25-64
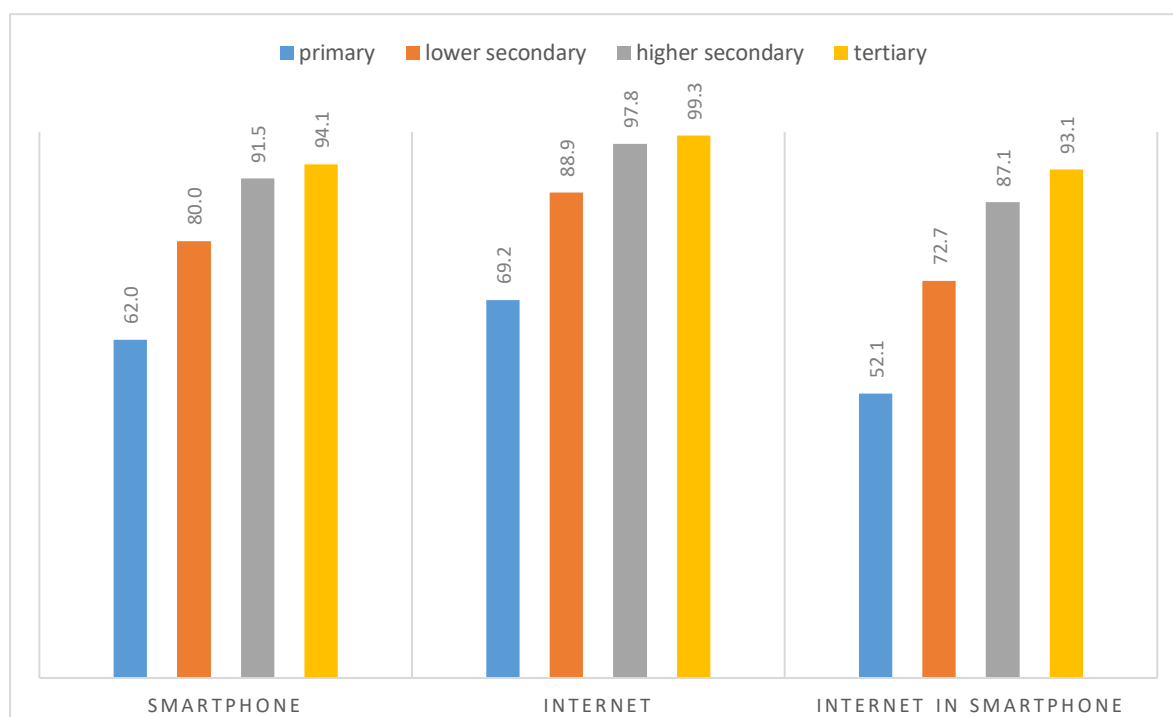
Source: own data processing by CSO, 2021, Information Society in Numbers – 2021,
https://www.czso.cz/csu/czso/informacni-spolecnost-v-cislech-2021 (Tables C1, C2, C3)

For a population accessible through different communication channels, the willingness to cooperate is crucial and should be encouraged by all means (a) for all those reached, and even more specifically (b) for regularly underrepresented groups. Lotteries or gifts do not work very well in providing extrinsic motivation (gift only in CAPI), cash vouchers and especially cash incentives are more effective. Cash incentives work not only when paid to the respondent, but also as an option to donate the reward to charity (especially in design where cash cannot simply be handed over). Willingness also depends on the topic of the survey. Hence, when preparing a survey, it is also useful to think about how to frame and present it to respondents.

Procedures for the implementation of mixed-mode design in the Czech context

In the next part of the manual, we will fully discuss the practicalities of implementing mixed-mode design in the Czech environment. Specifically, we will present the **most promising combination of online interviewing (CAWI) and face-to-face interviewing (CAPI), across respondents**. While the recommendations are not universal, they are based on the existing literature and on testing this design in the Czech setting (see Box 2). They are therefore (with some reflection) well applicable to different types of surveys.

Box 2. Background – design and testing of mixed-mode data collection within the TAČR project 'Development of multimode technique and application of this survey mode in areas of population, sociological, and marketing research'

This manual is based on the conclusions of the project 'Development of multimode technique and application of this survey mode in areas of population, sociological, and marketing research' implemented between 2019 and 2022 by the Department of Sociology at the Faculty of Social Studies of Masaryk University and the agency FOCUS – Marketing & Social Research. As the name implies, the project focused on **designing and testing the most promising variant of mixed-mode design in the Czech environment**. A combination of online and face-to-face interviews (CAWI and CAPI) was tested 'across' respondents. The purpose of the project was also to upgrade the FocusIS software so that mixed-mode data could be collected efficiently and effectively.

The project had a sociological and a marketing branch and the mixed-mode design was tested on questionnaires typical for both areas. The marketing questionnaire focused on lifestyle, shopping, housekeeping, and 'pleasures and vices'. The sociological questionnaire focused on thematic areas related to partnership, political preferences, and quality of life and included several sensitive questions. Both **questionnaires were deliberately designed to be long (40-50 minutes)** to test the willingness of respondents to complete such questionnaires (particularly typical of sociological surveys) online. Respondents were entitled to a reward for completion, which they could waive in favour of a donation to charity. The online questionnaire could be saved continuously and returned to later.

The sample of CAWI respondents was drawn by random sampling and the supplementary sample for CAPI by quota sampling from the general population aged 18+. The project did not use online panel members.

The design of the mixed-mode survey within this project can be briefly described as follows:
    (1) recruitment by random digit dialling method
    (2) sending a link and data collection using the CAWI method
    (3) respondent recruitment via CAPI with the inclusion of CASI for sensitive questions

Mixed-mode design testing focused on the following main aspects:

(1) Implementation – we tested whether and how successfully the data can currently be collected using the two chosen modes, especially the online mode. Testing shows that a **larger proportion of the questionnaires can indeed be collected online** and thus CAPI can be deployed as 'only' a supplementary method for collecting underrepresented groups. Technically, the proposed design is feasible without major problems.

(2) Efficiency – costs are higher than using an online panel, with the aim to achieve better population coverage. At the same time, the costs are lower than with traditional face-to-face interviewing and recruitment, at the risk of a lower quality sample. Comparison with CATI is not relevant, this mode is offered for other types of interviews (shorter, without sensitive topics).

(3) Response – the **response rate is rather low**, although it cannot be quantified either in CATI recruitment or in quota face-to-face recruitment. Groups that are underrepresented in CAWI can be quota-replenished in CAPI, or partially replenished by face-to-face random sampling.

(4) Mode effect – we further tested whether and to what extent the data collected by CAWI and CAPI modes are comparable, what their quality is, and how the mode effect looks in the Czech context. We focused in part on the comparison of questions on income, partner and sexual behaviour, financial problems and foreclosures, and socially problematic behaviour (gambling, marijuana, alcohol). The results indicate that the **mode effect clearly exists in the Czech data, but its strength and severity vary according to the nature of the questions**. The effect is found particularly in sensitive questions (despite the use of CASI in face-to-face interviewing) and in batteries, with the quality of battery data appearing higher in online interviewing. However, the mode effect is very difficult to distinguish from the effect of selection and different sample composition. The mixed design of CAWI+CAPI, as well as the invariance of the data obtained by it, will need to be further tested in future methodological research.

Online data collection is the primary mode in our design. The purpose is to collect as high a proportion of questionnaires as possible through CAWI. This should by default be both faster and more economical. It should be **faster** because the respondent can complete the questionnaire de facto immediately after receiving the link. Longer, more complex questionnaire with visual elements can be used without major problems. In addition, the speed of data collection is not limited by the number of interviewers. It should be **more economical** because it is not necessary to pay the interviewers. However, the cost-effectiveness needs to be taken with a grain of salt – it is necessary to put funds into recruitment, whether by telephone, in person or by mail. It is also important to motivate respondents by rewarding them for completing the survey. Given the current state of the field, these input costs may be high, but should guarantee a good response rate and high quality of data collected.

Personal interviewing (CAPI) is then used to reach groups that are systematically underrepresented within the main mode. In this respect, face-to-face sampling of certain quota traits or random face-to-face sampling is possible (with the assumption of a higher representation of younger groups in online

interviewing and older groups in face-to-face interviewing). Ideally, respondents for both modes are selected in the same way (e.g., by probability or quota sampling). If this is not possible, it must be considered that the mode effect (discussed below) will not be reliably distinguishable from the sampling effect in data analysis.

Note that **CAPI is preferred over PAPI in our design because the** same questionnaire can be used for both groups of respondents (e.g., difficult filters, long scales, images, and videos, etc.). The use of CAPI or PAPI often depends on the agency's practice; therefore, the exact form of face-to-face interviewing must be agreed upon with the agency or institution conducting the data collection.

Preparing the questionnaire

The preparation of the questionnaire is – other than the sampling method – the key point of any survey. Without a **good research instrument,** it is not possible to obtain high quality, valid, and reliable data. And if we do not maximise the chance of obtaining such data, the survey is virtually meaningless and, as a result, only contributes to the deterioration of the conditions for data collection. At the same time, good quality data should not be an end in itself – the primary motivation for all survey research should be to answer clearly formulated research questions, whether for academic work, public policy, or a client brief. In general, questionnaire design should begin only after the objectives of the collection have been clearly defined.

Even if our intentions are clearly defined, the preparation of the actual collection should be preceded by a **search of existing, available data sources**. The desired data may already have been collected in domestic or international surveys, and probably on a larger scale and of a higher quality than the usual commissioning bodies are able to achieve. Examples of information-rich and reliable data sources include the European Values Study, the European Social Survey, and the Survey of Health, Ageing and Retirement in Europe. Even if such datasets do not contain all the necessary information, they are useful as a source of validated questions for the survey itself. If we want to ask about political preferences, feelings of loneliness, attitudes towards marriage or satisfaction with life, it is always better to use established formulations than to invent new questions. In other words, the questions need not (and often should not) be original, but reliable (clear, understandable, non-confusing, tested).

However, this brings us to the rules of questionnaire preparation, the discussion of which is beyond the scope of this manual. For more information, we refer the reader to the relevant methodological literature. In brief, the questionnaire should be as short as possible, understandable to all groups in the target population, and relevant to all; it should be thematically and substantively interesting to

respondents and should not contain questions that respondents might subjectively perceive as offensive. In determining the order of questions, we aim for logical coherence, from simple and general questions to more complex ones, with socio-demographic questions at the end (if we need to know them). The questions themselves should be simple, clear, with full coverage of possible answers including 'don't know' or 'don't want to answer', thoroughly checked by several pairs of eyes. Open-ended questions should be used minimally.

Taking modes into account when designing the questionnaire

In addition to all the general rules associated with the preparation of the survey instrument, **it is necessary to consider the specifics of both modes used**, i.e., CAWI and CAPI. The rule of preparing a multi-mode questionnaire applies whenever there is a possibility of moving the questionnaire to another mode. As already summarised in Table 1, CAPI is a mode based on interaction between interviewer and respondent (interviewer reads the questions, respondent answers), CAWI is based on self-completion (respondent reads and answers the questions). Thus, the modes differ in the way they receive information (auditory vs. visual), which is associated in the literature with somewhat different **cognitive processes**[9]. Long scales are an example: the verbal description 'Answer using a scale from 0 to 10, where 0 means *not at all* and 10 means *completely*' is different from seeing the scale in front of you[10] as

Not at all 0   1   2   3   4   5   6   7   8   9   10 Completely

In addition, in a self-completion situation, respondents can read the question as many times as they need, whereas in an interview situation, shyness or lack of time can keep repetition to a minimum. Even the most precise wording will not guarantee that both groups of respondents are de facto answering the same question. In fact, in a self-completion situation, the respondent can spend as much time as needed on the questionnaire, or even interrupt it completely and come back to it later (if the questionnaire allows it), whereas in an interviewer-completion situation there is a narrow timeframe to which the interaction must be limited (about 60 minutes). On the other hand, such a limited and clearly structured interviewing situation ensures that the questionnaire is successfully completed; in the case of self-completion, there is a risk that the respondent will end up not completing the

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[9] At the same time, respondents with visual or hearing limitations are systematically dropped from each type of survey, which can be an important bias for specific topics.
[10] But this problem is not so significant. Face-to-face interviewing for long scales or more demanding enumerations normally uses paper cards or turning the monitor towards the respondent. It is therefore particularly important not to forget these visual aids when preparing CAPI interviews.

questionnaire due to delays. Too fast completion in both modes (and too slow completion especially in CAWI) indicates a potential data quality problem.

A related issue, which primarily affects CAWI respondents, is the **display of the questionnaire on different devices** and in different web browsers. This again means that different respondents see and perceive the questionnaire differently and may answer it differently. For example, our scale from 0 to 10 fits comfortably on a standard desktop or laptop computer monitor and tablet, but on a mobile phone display (especially in portrait orientation) it may be 'cut off', wrinkled or disproportionately reduced, e.g.:

At all   0   1   2   3   4   5

6   7   8   9   10   Completely

When using a mobile phone, respondents may be more likely to choose the answer that is currently visible, rather than the one that best fits their opinion or situation. They may also interrupt the questionnaire altogether due to its lack of clarity. On the other hand, respondents **often choose the device that they themselves work with most often**. Thus, the parameters of the devices used, which could be perceived as problematic, do not necessarily affect the quality of the data – precisely because the respondents are used to their devices. We will discuss the differences between devices in the subsections on data collection and analysis.

Sensitive issues are important to consider. While self-completion is appropriate for such questions, face-to-face questioning can be problematic. If the respondent is answering a sensitive question posed by the interviewer (e.g., 'have you ever used drugs', 'how many sexual partners you have had in your life', 'have you ever attempted suicide'), they may tend to answer according to social conventions rather than truthfully, which may introduce bias into the data. In extreme cases, the respondent is then so surprised by such questions that he/she stops the interview. This is, however, an eventuality that is not entirely unavoidable even with self-completion. So before including a potentially sensitive question, consider whether it is really necessary and, if so, add a short introduction or explanation, such as 'Different people have different world views/life experiences/opinions etc.'. The use of CASI mode is a very useful option.

Modes also differ by working with special 'don't know' or 'don't want to answer' responses, which should be offered in online surveys (where all questions are usually mandatory) where their inclusion makes sense. The interviewer usually does not actively offer these options. In a mixed-mode survey, one might also consider a uniform approach and offer special answers in both options (an honest 'don't know' is more valuable information than an essentially forced substantial answer). In our testing, we only offered special responses in CAWI (they occurred spontaneously in CAPI) and the amount did not

vary significantly, so we accept this as a workable practice for now (for measures such as administering sensitive questions via CASI and offering CAWI variants). In CAWI, we can also visually distinguish these variants from valid responses to simulate their implicit presence in CAPI queries. This can be done by indenting, placing them towards the edge of the page, allowing them to move to the next page without clicking the answer, or highlighting the 'don't know' option when attempting to skip the question.

Questionnaire – practical tips

When constructing a questionnaire for data collection using a combination of CAWI and CAPI, we recommend the following:

Construct a single **questionnaire**, as similar as possible, for both CAWI (with respondent instructions if necessary) and CAPI (with interviewer instructions). In other words, the questionnaire needs to be adapted to both modes so that it can be implemented in the same way in each of them (*unimodal design*). In this combination of modes, the capabilities of CAWI adapt to the limitations of CAPI:

The **wording of the questions** should be clear enough so that respondents can easily understand the question in both written and audible form. The **response options should also** be clear, not too broad. For more complex questions and long scales, batteries, or lists in CAPI, we suggest using CASI mode (turning the monitor towards the respondent) and/or paper cards. This unifies the way information is received, at least where problems could potentially arise. This should reduce the mode effect.

Sensitive questions need to be dealt with in CAPI mode. As in the previous case, we propose a strategic use of **CASI mode**, where the respondent completes the relevant questions independently on the interviewer's computer, with as much privacy as possible (see Box 3 for more details). Typical sensitive questions include those on income, health status, so-called pathological behaviour, or sex life. However, different groups of respondents may perceive the sensitivity of specific questions differently. The degree of sensitivity can be the subject of pilot testing.

The questionnaire should be kept **as short as possible** within the needs of the research.[11] It should be kept in mind that although CAWI respondents can typically complete the questionnaire in several sittings, CAPI respondents do not usually have this option. At the same time, CAWI respondents will

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[11] 2000 words including numeric characters in the responses equals about 15 minutes of talk time, CAWI may be slightly faster. We often find that short questionnaires of up to 10 minutes are also suitable for online surveys, but in the social sciences, for example, surveys are often designed for a lower limit of 30 minutes. Our own testing shows that the main issue is respondent recruitment rather than the length of the questionnaire: once respondents have clicked through, they will in most cases complete the entire questionnaire, regardless of length. At the same time, they can use the option to fill in the questionnaire in parts.

be less motivated to complete a long questionnaire. Therefore, the involvement of elements to enhance focus and motivation (monetary incentive vs. donation to a charity for completing the questionnaire, importance of the topic, usefulness of the results, indispensability of the respondent, smooth and polite communication, trust in the researcher and the field-work agency) is particularly important in CAWI.

Box 3. CASI mode

Computer-assisted self-interviewing (CASI) **is defined as the self-completion of part of a questionnaire on the interviewer's computer/tablet** as part of a face-to-face interview. Completion is as **private as possible**, i.e., the respondents read and answer the question by themselves, with the monitor facing them, and then save the answers themselves so that the interviewer does not know the answer. The CASI mode should be indicated in the questionnaire by the instruction 'turn the monitor towards the respondent' and accompanied by a short explanation of what the respondent should do.

However, even CASI cannot fully simulate self-completion in private, without an interviewer. Indeed, the mere presence of another parson always has the potential to bias the answers. The mode of data collection must therefore be considered in the analysis.

The **visual design of** the questionnaire must take into account the fact that CAPI respondents will either not see the questionnaire at all or will only see some parts of it. As visuals (e.g., colours, animated transitions between pages, illustrative images, etc.) can also influence responses, we recommend using them sparingly. Of course, pictures, videos, or pictograms (e.g., scales with smiley faces) can be used, but they must be visible to all respondents. Therefore, do not forget 'turn the monitor towards the respondent' in the instructions to the interviewer wherever applicable. This instruction can also be used for long scales or batteries; alternatively, interviewers can be provided with paper cards.

Due to the relatively wide range of **different electronic devices** (desktops, laptops, smartphones, tablets) on which the CAWI questionnaire can be completed, the number of questions per page of the questionnaire or the inclusion of long scales should be considered. For example, in longer batteries, we can spread each item out on a separate page; such a measure slows the interviewing slightly but has not led to respondent dropout in our interviews and has greatly increased data quality. Long scales are better reduced or replaced by selecting a numerical response in a scroll window (but this in turn yields more means and outliers).

Appropriate devices can be recommended to respondents in the guidelines, but we should not require particular types of devices or outright block devices we believe to be 'inappropriate'. This may reinforce selection bias (different representation of devices in different groups of people), reinforce

measurement error (if some respondents work with a device they are not used to) or make respondents decline participation in the survey. A more appropriate solution is to set up the questionnaire to allow for **a change of device** during completion (i.e., the questionnaire can be saved, closed, and reopened on a different device). The most appropriate orientation of small mobile devices (portrait, landscape) can also be recommended.

The combination of CAWI and CAPI assumes that the questionnaire will be **programmed in specialised software**. If the data is collected by a professional agency, then it is necessary to consult in advance what possibilities are available on the software they use. In general, we recommend that the questionnaire be programmed so that it can be saved and reopened later. This should accommodate the length of the questionnaire and the time capacity of CAWI respondents, and allow for any change of device. However, this feature may also come in handy for interviewers in the field. It may also be useful to be able to overview the collected data and store both modes in a common database.

We would also recommend:

> - a very concise and clear first page of the questionnaire
> - more detailed instructions on the second page or in the invitation letter
> - enabling respondents to 'go back' to any question they had already answered
> - force answers (CAWI), but with the offer of special answers (such as 'don't know')
> - do not show the progress bar for long questionnaires, but consider its inclusion into shorter, not particularly complex questionnaires (where it can motivate full completion)

The use of specialised software should enable the collection of **paradata** – additional information about the interview situation that can be used for data quality control. Typical paradata is the length of time taken to complete the questionnaire; however, depending on the type of software, it should also be possible to collect data such as time spent on individual pages, changes in answers, backward scrolling, type of device used, operating system, geographical location of the respondent[12], etc. Again, the software options should be consulted with the data collector.

A few words on recruitment

A well-designed questionnaire is only one part of successful data collection. Another key element is the selection and recruitment of respondents. Especially in relation to selection, there are intense methodological discussions. While in academia, proponents of traditional methodological approaches

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[12] Location and other similarly sensitive data should be collected with the consent of the respondent.

(i.e., various types of random sampling) prevail, representatives of agencies that often collect data for researchers also recommend non-random sampling, such as quota sampling. They point out that in the Czech context in general – in contrast to countries that use population registers – random sampling is no longer reliably achievable. On the one hand, respondents are less willing to participate and harder to reach at randomly selected addresses. On the other hand, the number of interviewers and their geographic coverage are also declining; this is due to deteriorating field conditions, increased scrutiny by agencies, and prolonged outages during pandemic periods. Even with mixed-mode design, these issues remain relevant and represent one of the main **barriers to** successful in-person recruitment and data collection.

In our project, we decided not to use the random address selection method or the random walk method (both via interviewers), but to recruit respondents **by Random Digit Dialling** (RDD), which is another existing method of recruiting a random sample. It is recommended to call each number at least three times at different times of the day to ensure the most balanced sample. In our design, mobile phone numbers and landline numbers were included in a 90:10 ratio. Although most of the country's population now owns a mobile phone, while landlines are in decline and concentrated in, for example, businesses, we consider the inclusion of landlines to be methodologically correct due to the better coverage of the underrepresented older parts of the population (see Table 2 for details).

It is important to note that RDD has several shortcomings. The randomised process generates many non-existent numbers. However, even if a number exists, non-answering is a problem; it is not always possible to distinguish between non-existent numbers and numbers that are simply not picking up. Even where an operator does get through to the respondent, rejections are common; roughly as common as with recruitment at physical addresses. Moreover, even where respondents agree to participate, just under half of them actually completes the questionnaire. Thus, the overall response rate cannot be calculated precisely, but is very low. While some parameters of the respondents (gender, region) correspond to the population, the representation in terms of age and (especially) education is skewed. The cost of human resources (agency call centre operators) is lower than for face-to-face interviewing, but this advantage is offset by high incentives for respondents.

Note also that some respondents will react negatively to the call, and many will want to know where the caller got their private number. It is therefore necessary to prepare a **brief explanation of** the logic of random dialling and to reassure the individual that their number has not been taken from any database and will not be stored in any database.

During the recruitment call, it is necessary to gain the **trust of** the respondent as quickly as possible, especially by mentioning a credible research sponsor, the reputation of the agency (which should

ensure easy retrieval of information on the web) along with a financial incentive. According to our analysis, the most common reasons for refusing to participate are general disinterest, lack of time, timing, or lack of internet access (when recruiting for CAWI). For such situations it is good to have flexible scheduling of call times ready, even if each of these reasons is only an excuse for some respondents. Ideally, respondents without Internet access should be moved to in-person mode (concurrent design). However, our testing shows that (a) very few of these individuals agree to see an interviewer and (b) the telephone recruitment system for CAWI with subsequent dispatch of an interviewer to a specific respondent is very costly. Note, however, that it is important that respondents **for both modes are recruited in the same way**, either randomly or non-randomly (e.g., quota sampling). Otherwise, it will not be possible to distinguish analytically between the mode and the sampling design effects.

In general, it can be summarised that telephone recruitment of a random sample is not entirely ideal, but with a lower budget and a lower response requirement (compared to in-person recruitment) it works quite well. Interviewer visit, for example, combined with a high financial incentive, remains the gold standard for random sample recruitment, but its sustainability may continue to decline both in terms of financial cost and willingness to let interviewers into the home, and in terms of declining density of interviewer networks. Online or telephone panels are alternatives targeting quota sampling, where data quality depends primarily on the nature and topic of the survey.

Mixed-mode data collection

In parallel or sequentially?

As we have already summarised in the first part of this manual, the mixed-mode data collection can be performed in two ways, i.e., parallel (when both modes are collected simultaneously) or sequential (when one mode is collected first, then the other follows). The choice of a particular method depends in part on the knowledge of the population under study. If we can already tell which groups of respondents are likely to participate in a particular mode, there is no reason why the chosen modes should not be deployed simultaneously. For example, if random (or quota) selection is chosen for both modes, both modes can be run simultaneously. Conversely, if we are not completely sure of the recruitment success for a given mode, we can wait until we have the baseline sample characteristics to deploy the second mode and target specific sub-populations with the second mode. However, the ambition for random selection is not achievable with this approach.

Our testing shows that within telephone recruitment for CAWI, the groups of people with lower education (primary and secondary education without matriculation) and people over 65 years of age (with the single age group 45-54 years overrepresented) are systematically underrepresented in the final sample. Targeted incentives, such as more attempts or reminders, increased incentives, and rejecting CAWI respondents with higher education, can be used to obtain a larger representation of groups with lower education. An alternative is in-person recruitment or selection from an online panel. Some imbalances in random selection can also be addressed with weights.

Questionnaire distribution, reminders, incentives

In the case of CAWI, the questionnaire can be sent to the respondent immediately after successful recruitment and this procedure **is recommended**. In this way, the respondent has the questionnaire readily available and can participate at their earliest convenience. This should foster higher response rates. We recommend a software solution for this procedure (e.g., see Box 4) rather than manual administration. If software is not available, it is essential to systematise the process so that delays are minimal and that there are no errors, duplications, etc. when sending out questionnaires. The larger the sample, the more important this coordination is. In principle, even a simple spreadsheet should be sufficient, but it is crucial that the data in the spreadsheet is updated in real time (while being fully secure).

Box 4. FocusIS software

> Within the project, we focused not only on the development of the optimal mixed-mode design, but also its software solution. As a co-participant in the project, Focus Agency has been using and developing FocusIS software for a long time, which has been adapted to the current demands of online polling, and especially **data collection in all major mode combinations**. FocusIS has thus acquired a set of features in terms of basic operation, question format, automation of contacting and distributing the questionnaire, mode compatibility and more.
>
> The key to the mixed-mode method is the functions of:
> a) quota sharing between modes
> b) contact management between modes
> c) possibility to continue filling in answers on another device
> d) automatic sending of new invitations + reminders + thank you messages
> e) automatic/manual call time scheduling
> f) adaptation to different types of devices
> g) secure archiving of new data types

> Not necessary, but methodologically beneficial are the possibilities of automatic collection of (para)data (time of collection, mode, type of device and its characteristics, and even GPS location) or conducting a split-ballot experiment (random assignment of survey conditions or question/answer variants to respondents).
>
> Other suitable software solutions are of course available on the Czech market and in Czech agencies or international branches of Czech agencies. However, it is always advisable to check whether research ideas are fully technically feasible with the agency before starting cooperation.

However, not every CAWI respondent will complete the questionnaire straight away. The reasons may vary from a momentary lack of time to a 'agree and don't complete' strategy where agreeing to participate is de facto an escape from the recruitment situation. How long a delay is or is not acceptable depends on the specific research design and any time constraints of the fieldwork. In general, however, the likelihood that a respondent will complete the questionnaire decreases over time. Because every consent to participate 'counts', **reminders** should be included into the research design. Again, their timing and form are a matter of design, but it is certainly a good idea to have at least one reminder in a different mode than the data collection. In our project, one email reminder five days after agreeing to participate and one telephone reminder (involving checking the email address) eight days after agreeing to participate worked well; further reminders or extending the interval had no substantive benefit.

Willingness to participate can be encouraged by deploying **rewards for completion**. The most appropriate **reward** for a mixed design is a **financial incentive** (rather than gifts, vouchers, lotteries), in an amount according to the budget and the difficulty of the investigation. While all types of incentives can be easily given in CAPI, the main motivator is the person of the interviewer, and a gift works in addition to the financial amount. In CAWI or CATI, however, it is difficult to hand over a reward to newly recruited respondents, as well as to convince them of the fairness of the offer.

You can also include the option to donate the allocated financial incentive to **charity**. This may motivate respondents to participate; secondly, it may serve as a meaningful 'escape option' for those who do not want to fill in the personal information required for the payment. If a donation to charity is included as an option, it is good to inform respondents once it has been made, for instance by publishing the information on the website of the agency or organisation. The choice of a charitable organisation is a sensitive matter, where, based on partial knowledge (e.g., from focus groups), it is advisable to avoid organisations with divisive positions in particular cultural contexts. An option is to work with a general 'donation to charity' and choose an organisation after the collection is over or to give a choice of organisations.

In four of our surveys, the promise of a financial incentive did help CATI recruitment, but it was the promise rather than the absolute amount that worked. However, around 60% of respondents eventually gave up the reward in favour of charitable causes. Although the various incentive levels did not affect the response rate, a higher incentive did affect the willingness to complete personal details to pay it compared to the option of forgoing the reward in favour of a charity.

Finally, note that even the best configuration of incentives and reminders is never fully successful. However, it should be borne in mind that participation in the survey is voluntary and that **any respondent** therefore has the **right simply to not complete the survey**, regardless of prior consent.

Modes and devices

Although this topic has already been discussed above, we summarise the main points: unless instructed otherwise, CAWI respondents will complete the online questionnaire **on different devices with different parameters** (different operating systems, personal settings, display sizes, keyboard types, etc.). Data from our project indicate that a smartphone is used by about a fifth of online respondents, a desktop computer by about a third of respondents, a laptop by just under half of respondents and a tablet by only about 5% of online respondents.

An appropriate device can be recommended, but should not be mandated to avoid measurement errors and dropouts. If the different devices have been taken into account in the design and programming phases, there should be no problems. To prevent respondents dropping out due to poor device choice, we recommend programming the questionnaire so that it can be **saved and reopened on a different device**. We can inform respondents of this possibility in the cover letter or on the front page of the questionnaire itself.

There should be few or no device issues in CAPI mode where the data is collected by a professional agency. This is because the agency either equips its interviewers with the same or similar types of device and/or provides interviewer training and specialised software. If we are collecting the data ourselves – and if we are not able to purchase the equipment – then we should at least make a note of the equipment that the interviewers will be using and possibly add 'equipment' as a variable in the CAPI version of the questionnaire.

Real-time field monitoring and helpdesk

A basic **overview of the fieldwork progress** in real time should be a standard part of any data collection regardless of mode, but it is especially important in the case of mixed-mode design. This is because it can highlight potential problems and allow for flexible and timely solutions. In a sequential design, monitoring is used to determine which groups will be collected by the second mode.

A communication channel to address respondents' questions or concerns, either a phone number or a dedicated email, should also be a standard. For practical reasons, the subject (agency) running the field work should be the primary contact as they will be the most able to provide useful assistance.

Analysis of mixed-mode survey data

Given the differences between modes (see Box 1), it is necessary to consider that different data collection procedures may generate different data (the so-called **mode effect**). Indeed, respondents with the same characteristics may answer differently in different modes, precisely because of the effect of the mode used, for example because some hear the question while others read it, or because of different levels of privacy. Existing studies document a good invariance of related modes and minor systematic differences between the with-interviewer and without-interviewer modes (which are combined within our design). In other words, the mode must be accounted for in the analysis to avoid biased results. The **data documentation** should highlight these potential differences and the need to control for them in mixed surveys.

The go-to starting point is a simple **exploratory analysis** which shows whether and how responses to each question differ by mode and whether the differences between modes are substantively and statistically significant. This can be done by means of bivariate tables and comparisons of means, including the standard statistical tests (t-test, chi-square; such comparisons work when the composition of the samples is relatively similar, otherwise we must control for differences, see below). Sensitive and attitudinal questions are suitable for comparison. The proportion of invalid responses and missing values can also be the subject of comparison, not just simple similarities/differences in valid responses. For example, we compared missing responses (the 'I don't want to answer' option) between modes for the question 'What is the total monthly income of your entire household?' and 'Have you ever had sexual intercourse?'. 12% of CAWI and 14% of CAPI respondents refused to answer the first question, while 9% of CAWI and 10% of CAPI respondents refused to answer the second question. Even controlling for the different sample composition, this indicator is fully comparable (both questions were offered by interviewers through CASI).

If the exploration finds that the responses significantly differ by mode, it is appropriate to follow up with types of analyses that use **more complex and sophisticated statistical methods** that will better indicate whether the data can be used meaningfully as a whole (see Box 5 for more).

Note, however, that differences in responding, especially differences found at the descriptive level, are **not necessarily the result of mode effects**. Indeed, they may result from the **specifics of sample composition**, typically demographic characteristics (where we are recruiting underrepresented groups) or selection (where respondents themselves choose their preferred mode). Thus, as part of the exploration, we should **control** the mode effects for a basic set of respondent characteristics (gender, age, education, size of municipality, region, etc.).

Box 5. Some statistical procedures for testing data invariance

Although basic descriptive statistics (proportions, means, missing responses, etc.) provide useful basic insight into the dataset, they do not answer questions about data invariance with sufficient precision. In other words, while we can find differences, we do not know if they are due to the mode itself, selection, or some other systematic error.

Ways to advance beyond elementary description are discussed in the literature and are likely to multiply in the near future. For example, **regression** may be one advancement: to test for invariance, we propose a logistic or linear regression model with variables whose individual effects are known from previous analyses. We then estimate the model on the data for each mode separately and for both in aggregate and compare the results. Comparisons with other data sources or an actual outcome, such as in voting behaviour, may also be used. If the models generate significantly different estimates, the data probably cannot be considered invariant.

Multi-group **confirmatory factor analysis** (MG CFA) is used to determine several degrees of invariance. The logic is to estimate a series of models with increasingly strict specifications. By comparing the models, we can then confirm or reject metric and scalar invariance. Reliable data should be invariant at both levels.

If we fail to prove the invariance, we need to validate through logical checks and other data sources, and analyse the data with the mode as a control variable (if we consider the data from both modes relevant).

Data by device

All the above also applies to the **devices** used to fill the online mode. Although several international studies show no major differences between devices regarding the quality and comparability of the resulting data, devices typically differ in the length of completion, with smartphone respondents taking the longest to complete. This may not just be due to connection quality (i.e., delays between moving from one page of the questionnaire to the next), but also due to longer time spent on the page. This may mean that mobile respondents are engaged in other activities while completing their questionnaire. However, slower completion may also be due to the format of the questionnaire on a small display. Existing findings also show that mobile phone respondents differ in their basic characteristics from users of other devices. However, it is important to note that these differences are likely to decrease over time as the number of smartphone users increases.

In our surveys, we did not observe any significant differences between devices. As an example, the average number of the most frequently selected response category in the 14-item technostress battery is summarised in Figure 2. As we can see, this value does not differ for individual devices in the CAWI mode.

Figure 2. Average number of the most frequently selected category as an indicator of data quality in a 14-item battery.
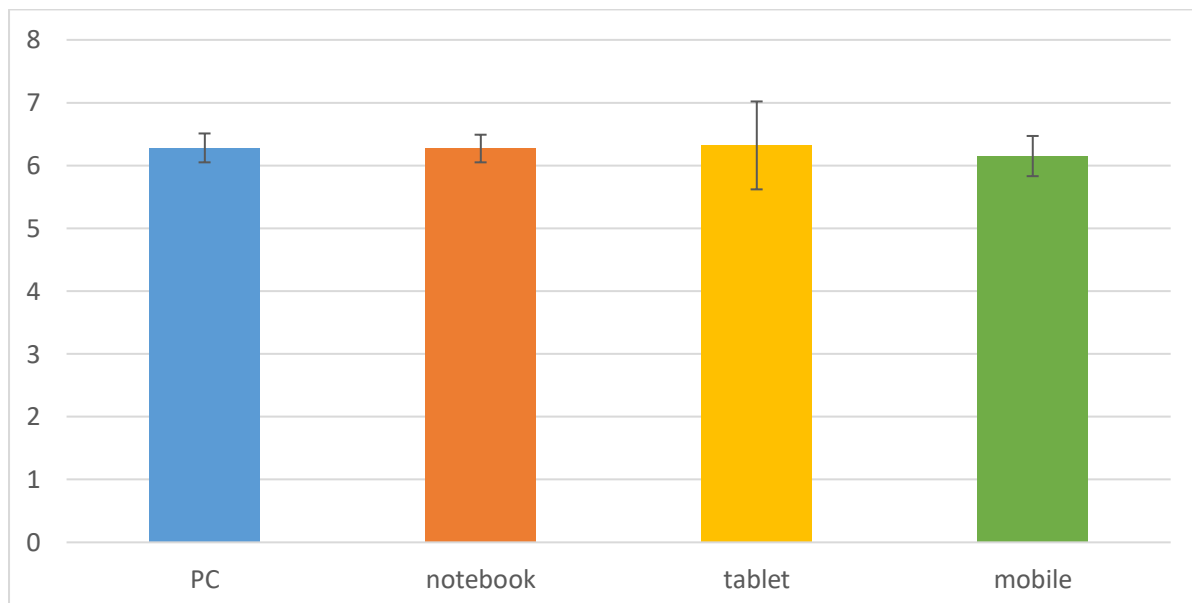
Dissemination of results, dissemination of data

If we have taken the mode into account in the analysis, it is not necessary to discuss the design of the survey when we present the results in a brief form. It is, however, appropriate to mention it in academic texts, which should also include a more detailed description of the logic of the sample design, the mode effect, the analysis procedure and any problems or persistent biases. A precise description of data collection and tips for the best analytical strategy should also be included in the **data documentation** if the data are made available to the wider scientific community.

As part of **respondent care**, a good practice would be to inform respondents in some way about the results of the survey they have participated in. This can be done in a targeted way (sending out brochures or links to the results) or in a non-targeted way, by publishing the results to a wider audience on the website or social media pages of the sponsor or agency, or as a news article in online or print media. It should be noted that in the emerging information society we should (also for the sake of convincing respondents to participate in the future) strive to make the most of our data, to ensure its easy accessibility, and to popularise the findings.

Conclusion

If we are not satisfied with the available data and decide to embark on the adventure of collecting our own data, it is good to think of it as a process that connects several groups of people. First, it is important to plan the process from the beginning in consultation with experts (from an agency or network of agencies or from an academic institution). Next, we need to remember to reach our target population in the best way possible and to be able to collect the data efficiently. In the end, it is primarily the respondents who give us their time and information; they should be treated with respect, and in addition to the motivational elements mentioned above, we should express our gratitude after the fact, leave space to 'complain' about the questionnaire, and offer to send the elementary results. The whole process is often challenging, yet this is how we can obtain irreplaceable information, usually unavailable in any other way.

List of references

ANDREWS, Dorine, Blair NONNECKE & Jennifer PREECE. 2003. „Electronic Survey Methodology: A Case Study in Reaching Hard-To-Involve Internet Users." *International Journal of Human-Computer Interaction* 16(2): 185–210.

BETHLEHEM, Jelke & Silvia BIFFIGNANDI. 2011. *Handbook of web surveys* (Vol. 567). Hoboken, NJ: John Wiley & Sons.

BOSNJAK, Michael, Robert BAUER & Kai W. WEYANDT. 2018. „Mixed Devices in Online Surveys: Prevalence, Determinants, and Consequences." Pp. 53-65 in Axel THEOBALD (ed.). *Mobile Research*. Wiesbaden: Springer Gabler.

BUCHTÍK, Martin. 2012. „Smíšené módy sběru dat v kvantitativním sociálněvědním výzkumu." *Data a výzkum-SDA Info* 6(2): 129–149.

CALLEGARO, Mario, Katja Lozar MANFREDA & Vasja VEHOVAR. 2015. *Web survey methodology*. London: Sage.

CONRAD Frederick G., Mick P. COUPER, Roger TOURANGEAU & Chan ZHANG. 2017. „Reducing Speeding in Web Surveys by Providing Immediate Feedback." *Survey Research Methods* 11(1): 45–61.

COOK, Colleen, Fred HEATH & Russel L. THOMPSON. 2000. „A Meta-Analysis of Response Rates in Web- Or Internet-Based Surveys." *Educational and Psychological Measurement* 60(6): 821–836.

COUPER, Mick P. 2000. „Web Surveys – A Review of Issues and Approaches." *Public Opinion Quarterly* 64(4): 464–494.

COUPER, Mick P. 2017. „New Developments in Survey Data Collection." *Annual Review of Sociology* 43: 121–145.

ČSÚ, 2019, Informační společnost v číslech – 2019, https://www.czso.cz/csu/czso/informacni-spolecnost-v-cislech-2018; poslední dostupná data

ČSÚ, 2021, Informační společnost v číslech – 2021, https://www.czso.cz/csu/czso/informacni-spolecnost-v-cislech-2021

DE LEEUW, Edith. D. & Joop J. HOX. 2011. „Internet Surveys As Part Of A Mixed-Mode Design." Pp. 45–76 in Marcel DAS et al. (eds.)*. Social and Behavioral Research and the Internet: Advances in Applied Methods and Research Strategies.* New York: Routledge/ Taylor & Francis Group.

DE LEEUW, Edith D., Z. Tuba SUZER-GURTEKIN & Joop J. HOX. 2018. „The Design and Implementation of Mixed-mode Surveys." Pp. 387–408 in Timothy P. JOHNSON, Beth-Ellen PENNELL, Ineke A. L. STOOP & Brita DORER (eds.). *Advances in Comparative Survey Methods: Multinational, Multiregional, and Multicultural Contexts (3MC)*. New York: John Wiley & Sons.

DE LEEUW, Edith D. & Vera TOEPOEL. 2018. „Mixed-Mode and Mixed-Device Surveys". Pp. 51-61 in David L. VANNETTE & Jon A. KROSNICK (eds). *The Palgrave Handbook of Survey Research*. Cham: Palgrave Macmillan.

DILLMAN, Don A., Jolene D. SMYTH & Leah M. CHRISTIAN. 2014. *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. Hoboken, NJ: John Wiley & Sons.

EVANS, Joel. R. & Anil MATHUR. 2005. „The Value of Online Surveys." *Internet research* 15(2): 195–219.

FAN, Weimiao & Zheng YAN. 2010. „Factors Affecting Response Rates of The Web Survey: A Systematic Review." *Computers in Human Behavior* 16(2): 132–139.

HOX, Joop. Edith D. DE LEEUW, E. D. & Thomas KLAUSCH. 2017. „Mixed Mode Research: Issues in Design and Analysis." Pp. 511–530 in Paul BIEMER et al. (eds.). *Total Survey Error in Practice: Improving Quality in the Era of Big Data*. New York: Wiley.

HUBATKOVÁ, Barbora & Martin LAKOMÝ. 2021. „Smíšený mód a online dotazování: mezinárodní praxe a tuzemská připravenost na implementaci." *Sociální studia/Social Studies* 18(1): 13-33.

KREJČÍ, Jindřich. 2009. *Kvalita sociálněvědních výběrových šetření v České republice*. Praha: Sociologické nakladatelství (SLON).

LUGTIG, Peter & Vera TOEPOEL. 2016. „The Use of Pcs, Smartphones, and Tablets in a Probability-Based Panel Survey: Effects on Survey Measurement Error." *Social Science Computer Review* 34(1): 78–94.

LYNN, Peter. 2020. „Evaluating Push-To-Web Methodology for Mixed-Mode Surveys Using Address-Based Samples." *Survey Research Methods* 14(1): 19–30.

MARTIN, Peter. 2011. „A Good Mix? Mixed Mode Data Collection and Cross-National Surveys." *Ask. Research & Methods* 20: 5–26.

PILECKÁ, Jarmila. 2016. *Smíšené módy sběru dat: PAPI a CAPI srovnání*. Diplomová práce. Praha: Univerzita Karlova.

RYBÍN, Filip. 2021. *Sampling Fusion: Ekvivalence měření tří módů sběru dat*. Diplomová práce. Praha: Univerzita Karlova.

SIMAR. 2019. *Výroční zpráva o stavu výzkumného trhu*. Cit. 17. dubna 2020 (https://simar.cz/assets/media/files/assets/uploads/Vyrocni_zprava_o_stavu_vyzkumneho_trhu_20 18.pdf).

SMYTH, Jolene D. & Jennie E. PEARSON. 2011. „Internet Survey Methods: A Review of Strengths, Weaknesses, and Innovations." Pp. 11–44 in Marcel DAS et al. (eds.)*. Social and Behavioral Research and the Internet: Advances in Applied Methods and Research Strategies.* New York: Routledge/ Taylor & Francis Group.

STRUMINSKAYA, Bella, Kai WEYANDT & Michael BOSNJAK. 2015. „The Effects of Questionnaire Completion Using Mobile Devices on Data Quality. Evidence from a Probability-Based General Population Panel." M*ethods, Data, Analyses* 9(2): 261–292.

TOEPOEL, Vera & Peter LUGTIG. 2015. "Introduction: Online Surveys are Mixed-Device Surveys. Issues Associated with the Use of Different (Mobile) Devices in Web Surveys." *Methods, Data, Analyses* 9(2): 155–162.

TOURANGEAU, Roger. 2017. „Mixing Modes: Tradeoffs among Coverage, Nonresponse, and Measurement Error." Pp. 115–132 in Paul BIEMER et al. (eds.). *Total Survey Error in Practice: Improving Quality in the Era of Big Data*. New York: Wiley.

VILLAR, Ana & Rory FITZGERALD. 2017. „Using Mixed Modes in Survey Data Research: Results from Six Experiments." Pp. 273–310 in Michael J. BREEN (ed.). *Values and Identities in Europe: Evidence from the European Social Survey*. London: Routledge.