

**EVALUATION OF THE STATE  
HEALTH INFORMATION EXCHANGE  
COOPERATIVE AGREEMENT  
PROGRAM**

**National Survey on Health Information  
Exchange in Clinical Laboratories:  
Cognitive Interviewing Report**

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## Executive Summary

This document summarizes a series of interviews designed to elicit the cognitive processes respondents use to complete two versions of the *National Survey on Health Information Exchange in Clinical Laboratories*. Cognitive interviewing is an established technique to pre-test survey instruments and materials, such as cover letters and supplemental information, which will be fielded in a larger sample via hardcopy mail-out. While not as robust or effective as a field test, cognitive research techniques can provide useful information to questionnaire designers seeking to improve wording and response options for complex measures or difficult questions to answer. For this pre-test, we used both personal contacts and data from the Clinical Laboratory Improvement Amendments (CLIA) database collected by the Centers for Medicare & Medicaid Services to identify potential respondents from small and large independent and hospital medical laboratories, which were administratively independent or affiliated with a centralized entity. In July 2012, we conducted one round of interviews for each instrument; nine interviews were conducted for a hospital based instrument and three interviews were conducted for an instrument designed for independent labs. Four experienced, NORC cognitive interviewers were trained for this project, working from structured interview protocols. We used both quantitative coding and open-ended notes to identify questions where there are problems in comprehension, information retrieval, or communication of the response.

These two instruments seek to collect information which will provide crucial state and national data on the status and volume of laboratory information exchange occurring electronically, reporting capacity, and other key measures of electronic exchange. These measures of the new and complex concepts that surround the development of a nationwide health IT infrastructure are essential to inform major changes in the operations and information systems of clinical laboratories.

The major findings of this cognitive testing effort suggest that both the administrative structure of laboratories and the health information exchange process are variable and in a state of transition. We found particular difficulties in defining the terms “affiliated physicians” and “final billable tests” across all respondents. Respondents were also uncertain how to respond if their laboratory was affiliated with other laboratories either administratively or technically. Technical terms such as “free text” or “coded format” presented problems if the respondent was not in the IT/LIS departments of the labs or if they did not consult with staff on the technical side of the laboratory. Similar comprehension and reporting experiences occurred for reporting on transaction volumes, particularly where the laboratories did not collect the information in the normal course of business practice or it was not part of the lab work flow.

In those instances, respondents estimated the answers using a variety of techniques. Finally, several questions included mutually exclusive response categories that did not match respondents' experiences because they fell into more than one of the categories. Other smaller definitional and informational issues occurred throughout the questionnaire, all of which have simple solutions.

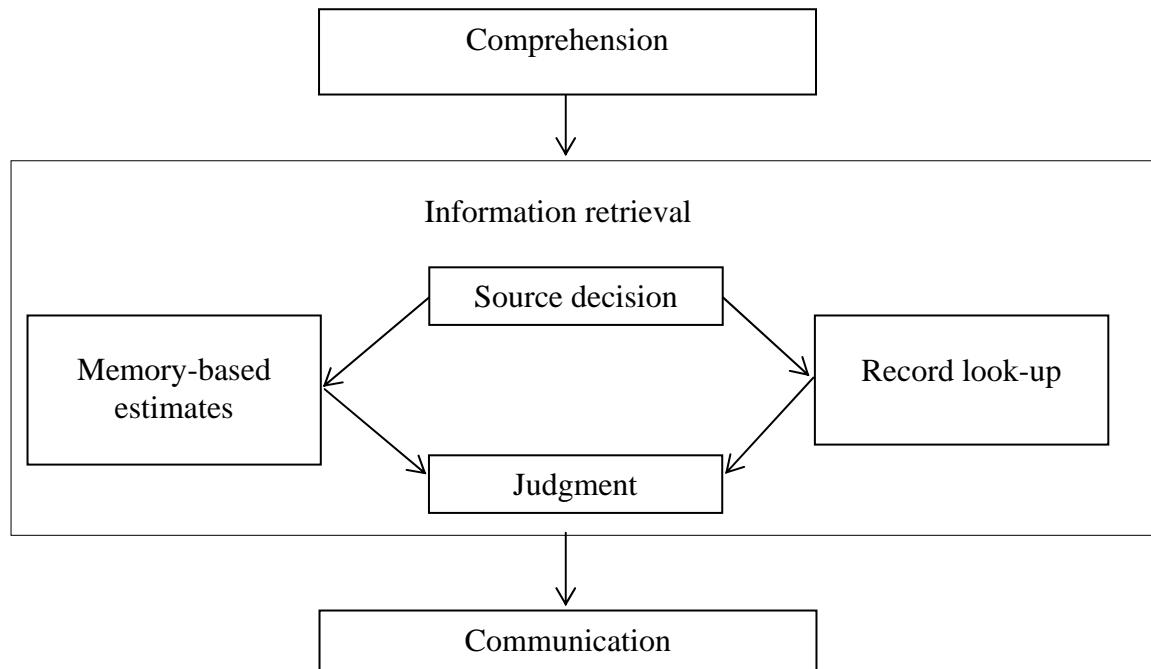
We conclude this report with a summary of the limitation of cognitive interviewing as a singular pre-test methodology as well as a full list of recommendations for modification of both the questionnaire and the cover letter. In summary, while additional testing might prove useful, we believe that due to cost and time constraints, this exercise has provided sufficient information to revise the questionnaires and proceed with the survey process upon approval from the Office of Management and Budget.

## Introduction

Cognitive interviewing represents one important tool for pretesting survey instruments before they go into the field. This qualitative methodology is designed to address the cognitive processes respondents use when they answer survey questions. There are many cognitive interviewing techniques which can run the gamut from loosely organized “think aloud” interviews to structured “verbal probing” to elicit particular conceptual domains.

In this application, we used structured verbal probing for a variety of reasons including our decision to mail a copy of the survey in advance of the interview and our interest in focusing on specific concerns we had with words, concepts, and phrases in draft questions and response categories. Figure 1 illustrates the survey cognition model used to build our testing protocols.

Figure 1. Theoretical Survey Response Model for the National Survey on Health Information Exchange in Clinical Laboratories



Adapted from Sherman & Cantor, 1991, *Toward a Response Model in Establishment Surveys*, Measurement Error in Surveys, Biemer et. al (ed).

We were particularly interested in the comprehension of key terms, the retrieval of factual information, and the communication of that information into a response to a survey question. Because much of the terminology in the electronic exchange of health information continues to emerge, we wanted to test whether respondents to this survey have a shared understanding of the concepts of interest or have consistent access to the information required. The aim of the cognitive protocols was to elicit the range of concepts and definitions used by respondents. The second challenge of this survey, which may be unique to establishment or institutional surveys, was whether data are routinely collected in labs that conform to the categories we have created for this purpose. The exercise of recalling specific numbers is difficult if there is not a “map” from the concepts to the types of data normally collected in business practice. Finally, because there was substantial variability in the size and functioning of labs, we needed to understand whether we have provided labs with the appropriate answer choices to communicate their particular responses.

The protocols, which are included in Appendices A and B, provided for both narrative and coded responses by the cognitive interviewers. We analyzed the data coded by interviewers in the interview protocols and supplemented the analysis with selective review of audio recordings of the interviews. We also conducted informal debriefings with the interviewers, which provided qualitative impressions and opinions about respondent difficulties and possible solutions. These elements allowed us to understand both the nature and the depth of the cognitive issues that have arisen in the questionnaires and develop recommended improvements to the instruments. The final tabulation of coded responses appears in Appendix C.

## Methods

In this section, we describe the method by which we selected and recruited candidate laboratories for the cognitive interview process. We also describe the recruitment process, interviewer training, and the final completed sample of respondents.

### Sample definition

While cognitive interviewing does not require a statistically valid sampling plan, we chose a recruitment strategy that would maximize our ability to recruit a broad range of laboratories. Our goal was to conduct nine interviews in hospital labs using the hospital-based instrument and nine interviews with independent labs using the independent-based instrument. The heterogeneity of medical laboratories and their degree of technical sophistication prompted us to select as complex a sample as possible. To aid in sample

selection, we geocoded the CLIA data file and also matched the hospital labs to data from the American Hospital Survey. We wanted to recruit large and small laboratories as well as those that were part of a multi-site laboratory group and those that had a single site and operated independently.

For independents, we eliminated all laboratories that we could not geocode and then identified labs in metropolitan and non-metropolitan counties as a proxy for small and large labs. We also looked at organization names from the CLIA database to identify whether or not the laboratory belonged to a larger affiliate. The final step was to match the resulting file to a list received from the College of American Pathologists that provided a name and address for the laboratory director. The final matched file was used to generate potential respondents within the respective subgroups described in Table 1 shown below:

**Table 1: Cognitive Interview Recruitment Goals for Independent Labs**

|              | Multisite | Single site | Total |
|--------------|-----------|-------------|-------|
| <b>Small</b> | 2         | 3           | 5     |
| <b>Large</b> | 2         | 2           | 4     |
| <b>Total</b> | 4         | 5           | 9     |

For hospitals, we followed a similar plan using data from the American Hospital Association 2011 survey of hospitals. First, we used the geocoded addresses on the CLIA database and, then, used fuzzy matching software to match to addresses on the AHA survey<sup>1</sup>. We eliminated hospitals that did not match and cross classified the resulting list using two variables: “total number of beds” and “whether more than 1 lab was matched to the hospital system.” Again, the final step was to match the resulting file to a list received from the College of American Pathologists that provided a name and phone number for the laboratory director. We found email addresses through Google searches. The final matched file was used to generate potential respondents within the subgroups described in Table 2 shown below:

**Table 2: Cognitive Interview Recruitment Goals for Hospital Labs**

|              | Multisite | Single site | Total |
|--------------|-----------|-------------|-------|
| <b>Small</b> | 2         | 3           | 5     |
| <b>Large</b> | 2         | 2           | 4     |
| <b>Total</b> | 4         | 5           | 9     |

<sup>1</sup>Fuzzy matching allows for incomplete text strings or abbreviations to be used in the matching process. It is a useful method when the matching items are text strings or free form texts which addresses often are because of the mode of entry.

## Recruitment

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### Methods

We selected respondents who represent both large and small independent and hospital laboratories with and without multiple sites. NORC used leads within the field, including contacts within laboratory associations, to help reach out to potential respondents. In addition, NORC supplemented these leads by selecting, at random, potential respondents with the desired characteristics from the CLIA and AHA datasets described above. Additional contact information for potential respondents was obtained via web searches. In total, we made 10 cold calls, sent 66 initial contact emails, 56 follow-up emails, 33 follow-up calls, and 37 mail packets consisting of hard copies of the cover letter and applicable survey instrument. Initial contact emails, sent from the Project Director's mailbox, informed potential respondents of the survey and invited them to participate in the survey instrument testing. The email also provided a link to a Doodle calendar, where respondents could anonymously select the most convenient available time slot. Follow up emails were sent, at minimum, two days following the initial contact email. Follow-up phone calls generally took place two days after the follow-up emails.

### Final Result

NORC scheduled 14 interviews, and successfully completed 12 interviews. We achieved our goal for testing the hospital-based instrument (conducted nine interviews) but fell short of achieving our goal to test the independent-based instrument (conducted three interviews). Two scheduled respondents did not dial-in to their interviews at the designated time and did not respond to requests to reschedule their interviews. Table 3 displayed below provides the characteristics of the labs that participated.

**Table 3: Final Laboratory Respondent Characteristics**

|                          | Multisite | Single site |
|--------------------------|-----------|-------------|
| <b>Small Hospital</b>    | 4         | 1           |
| <b>Large Hospital</b>    | 2         | 2           |
| <b>Small Independent</b> | 0         | 0           |
| <b>Large Independent</b> | 2         | 1           |
| <b>Total</b>             | 8         | 4           |

## **Interviewing methods and protocols**

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NORC developed two scripted protocols to help guide the interviews, one for the hospital laboratory questionnaire (Version A—Hospitals) and another for the independent laboratory questionnaire (Version B—Independents). Each protocol consisted of an introduction to the survey and the purpose of the cognitive interview, request for permission to record, and questions and probes to gain feedback on the cover letter and each survey item.

The NORC interviewing team consisted of four NORC staff members, all of whom had previous experience conducting cognitive interviews. Prior to the interview period, interviewers went through a three-hour training session. During the training, each question and associated probes in the protocols was carefully reviewed to ensure the interviewers understood the protocol and could administer it easily. The training also provided an opportunity for interviewers to familiarize themselves with the questionnaires and ask questions of the survey development team to obtain further content knowledge. Interviewers were also instructed on how to open the conference line and begin/end recording via the Conference Plus recording feature associated with the conference line number.

Upon receiving respondents' notice of the intent to participate, NORC emailed a meeting invitation with conference line information to the respondent and respective interviewer. In addition, if not previously done, NORC mailed the respondent a packet including hardcopies of the cover letter and survey instrument. Prior to the interview, NORC sent a meeting reminder with an electronic copy of the questionnaire attached to ensure that the respondent has access to the material. All calls were recorded, with the respondents' permission. Following the interview, the recording files were downloaded into a secure folder. Each respondent was assigned a random identification number to ensure anonymity. All protocols were coded by the interviewers and compiled for analysis.

## **Results**

This section provides an overview of the main issues discovered during the cognitive interviews. Results are divided into three sections based on the three sources of error previously discussed in the conceptual model: issues of comprehension about concepts and terms, issues of information retrieval, and issues of the communication of responses. Each of these sections discuss key aspects of both questionnaires (Version A and B); namely, cover letter, Section 1: General Information, Section 2: Current Systems and

Technical Architecture, Section 3: Methods Used to Send Lab Results and Volume of Exchange, Section 4: Lab Exchange Standards, and Section 5: Implementation of Guidelines and Regulations.

For each element, we start by summarizing main findings, then, we provide recommendations for consideration to improve the survey instrument.

## **Issues of Comprehension**

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### **Cover Letter**

Most respondents expressed that the wording and language used in the cover letter are clear. The following statement seemed to work well: “This survey should be completed by the lab director, the lab manager, or another individual who is most knowledgeable about your laboratory’s information exchange capacities.” Respondents appreciated that the cover letter mentions assistance from other staff members is expected throughout the survey process.

Respondents interpreted the term “most knowledgeable” person as the person with the most experience in the lab, or as the lab employee with technical experience, in particular a staff member from the IT or LIS departments. In cases where respondents attempted to complete the questionnaire without first reviewing the survey, they sought help from others midway through. In cases where the respondent examined the questionnaire first, the survey instrument was passed along to the person thought to be most knowledgeable, in particular, an IT or LIS manager. There were some cases in which the person taking ownership of the questionnaire had to contact people from other departments, such as billing, suggesting that the term “most knowledgeable” can also include staff from the accounting department.

An identified source of confusion in the cover letter was to the abbreviation “NORC.” Since there is no description of the acronym, it might potentially lead to confusion about the solicitor or the request. Respondents also mentioned the cover letter should give an estimation of the time it takes to complete the survey that is as accurate as possible. Some respondents also suggested that the letter should provide direct examples to illustrate the value of the survey rather than the vague reference to collecting “crucial state and national data.” Several respondents also suggested addressing respondents with correct titles whenever possible (i.e., Dr. vs. Mr.).

## ***Section 1: General Information***

Overall, respondents did not have problems understanding questions in Section 1 in both Versions (A—hospitals and B—regional and independent). There were several terms, nonetheless, that did have comprehension issues. Some respondents indicated that it would be more useful if the list of definitions provided as part of the questionnaire was placed at the beginning of the questionnaire. Respondents did not notice the list until they finished the questionnaire.

For instance, responses to Q1 (Version A—Hospitals) suggest the term “non-academic affiliated laboratory” may be unclear for some respondents because no definition is provided. Also, responses to Q5 (Version A—Hospitals)/Q6 (Version B—Independents) suggest that the phrase “perform any of the following types of clinical pathology testing” could be confusing because, in some cases, labs take orders for tests that they do not conduct in house. Responses collected about Q2 (Version B—Independents) suggest that some confusion may arise because it is not clear the intent of this question. One respondent defined reference lab as a lab that cannot perform all tests/lab works so they have to send out to a different lab while another respondent understood it to mean a lab that provides both clinical and anatomical testing for hospitals and other labs.

## ***Section 2: Current Systems and Technical Architecture***

Section 2 in both instruments did not have a large number of comprehension issues. Respondents found the introductory statement helpful and successful in serving as a reminder that respondents should consult with LIS\IT staff members to complete this section.

Responses to questions concerning whether a Lab information System (LIS)/Lab Information Management Systems (LIMS) system supports multiple or single laboratories (Q7 [Version A—Hospitals]/Q8 [Version B—Independents]) suggest that confusion arises when multiple laboratories are located in a single facility. Some respondents suggested that asking for the physical location of the facility (to convey the idea of multiple sites), or providing a definition of multiple sites, would help make the meaning of the question more accurate.

The response category “commercial system” in Q9 (Version A—Hospitals)/Q10 (Version B—Independents) also created confusion. Some respondents interpreted the term as “off-the-shelf” software purchased from a vendor but managed by the lab, while other respondents understood it as software developed and managed by a third party vendor.

### **Section 3: Methods Used to Send Lab Results and Volume of Exchange**

Responses to survey items in Section 3 suggest there are terms not consistently understood across respondents. In particular, responses to Q10 (Version A—Hospitals) suggest the expression “physicians affiliated with your hospital” is subject to several interpretations including: “paid physicians,” “outreach doctors,” “physicians approved,” “physicians on staff,” “physicians with a professional relationship with the hospital,” or “physicians employed by the hospital.” In the instance of a small hospital lab, “midwives” were also confused with physicians. Further, some respondents suggested that the term “ordering provider” might be preferable to “ordering physicians.” In some states other providers, i.e., registered nurses, not just physicians, are credentialed to order lab results.

The interpretation of the term “physicians affiliated with your hospital” has a direct link to the numbers reported in the volume questions. For instance, a respondent chose not to answer Q11 (Version A—Hospitals) because the “physicians affiliated with the hospital” was interpreted as “doctors directly employed by the hospital.” For this respondent, no doctors were directly employed by the hospital in 2011 so the respondent reported that there were no billable tests sent to “ordering physicians.”

The phrase “final billable tests” was subject to comprehension issues as well. In the context of Q10 (Version A—Hospitals), the phrase had several interpretations such as “tests that went to quality control,” “billable tests that are ordered by physicians,” “test lab performed and for which they bill,” and “tests that had received a result and could be billed.” Some respondents suggested alternative and presumably clearer concepts could be “reportable tests,” “ordered tests,” “test results, not test,” “test results not bills” “total final billable ordered tests,” “tests including both in-patient and out-patient testing,” “captive work versus outreach work,” or even “CPT codes.” Respondents indicated that depending on the concept to be measured (whether billable test, reportable tests or other kind of tests), different departments are likely to be involved in reporting numbers.

Furthermore, responses to Q10 (Version A—Hospitals) suggest that labs may have different interpretations of the two expressions combined in a single question stem (“ordering physicians affiliated with your hospital” and “total final billable tests”). Some labs interpreted the question as the number of bills sent to physicians, apparently overlooking or giving less importance to the word “tests.” In particular, a respondent mentioned that they do not bill physicians employed by the hospital, as they typically bill insurance companies or patients. It seems that for some respondents the term “affiliated with your hospital” would not be clear until they reach Q14 (Version A—Hospitals). One of the

respondents included all billable test in Q10 (Version A—Hospitals) but had to amend the answer once the respondent tried to complete answer Q14 (Version A—Hospitals).

Responses to Q11 (Version B—Independents) indicate similar problems with the term “final billable tests” to those found in Q10 (Version A—Hospitals). The comprehension issue again lay in interpretations of “final billable tests” or what constitutes “final billable tests.” In the case of Q11 (Version B—Independents) unlike hospitals, the expression “ordering physician” did not pose problems. It is consistently understood as “the doctor who requested the work,” or the “the doctor whose signature was on the requisition.”

Responses to Q11 (Version A—Hospitals) /Q12 (Version B—Independents) suggest that the terms “non discrete data (free-text format),” “electronic discrete data (no free-text format),” and “electronic mixed format (free text and non-free text format)” are consistently understood. Some responses suggest that in a few instances these terms may present comprehension issues. In particular, “free-text and “no free-text” appeared to be confusing. One respondent was not able to infer the meaning from the description provided. It seems the respondent was not able to determine which files are searchable and which ones are not. This respondent felt it would be useful to include a related reference as to whether the format is searchable or not, as part of the question stem. This was not an issue for respondents with a technical background. For specialized respondents (LIS/IT respondents), the “free text vs. non-free text” prompt was straightforward.

The phrase “coded format such as LOINC or SNOMED CT” was consistently understood overall, but it may have some comprehension issues for some respondents. In particular, responses to Q12 (Version A—Hospitals)/Q13 (Version B—Independents) suggests that the word “coded format” may not be clear to respondents without a technical background. In one instance, a respondent indicated that the term “coded format” is confusing because they have their own interpretation of the term (using codes in their Orchard Laboratory Information System), but they have the notion that there is a more nationally recognized code format for results as well. The respondent further indicated that a better phrasing for Q12 (Version A) would be “Are you sending codified formats such as LOINC or SNOMED on a lab interphase to an: HIS/ HIE / outside physician practice/EHR.” The interviewer’s motivation for providing this suggestion is that the interviewer assumed that the intention of the question is to inquire about preparation for Stage 2 Meaningful Use, where labs are expected to send LOINC codes in addition to results. For this laboratory, the term “lab interphase” would be important to better understand the intention of the question.

## **Section 4: Lab Exchange Standards**

Respondents, generally, understood the questions in Section 4 and did not find them difficult to answer. Respondents are familiar with whether their lab uses HL7, though some respondents were not familiar with the different Versions of the standard. Similarly, respondents understood the meaning of LOINC and were aware of their labs' LOINC capabilities and experiences.

## **Section 5: Implementation of Guidelines and Regulations**

Many respondents noted that they are unfamiliar with the “LRI guide” and although the definition was helpful, they suggested it did not provide enough information to ensure their understanding. One respondent suggested that a web link to additional information would be useful. Some respondents looked up additional information (via Google) to better understand the question. The respondents’ lack of understanding was reflected in their inability to confidently answer Q21 (Version A—Hospitals)/ Q18 (Version B—Independents). Even after they understood the definition of LRI guide, many respondents said that they were unfamiliar with it.

### **Definitions and End Instructions**

Most respondents did not use the definitions, though they noted that they were complete and would be helpful. One respondent suggested that it would be helpful to refer to the definitions at the beginning of the survey so that people are aware of them.

Respondents noted that the instructions to return the survey were clear and that they would prefer to mail their completed surveys. Some respondents suggested that they would ultimately prefer an electronic survey because it would be easier and increase the likelihood that IT staff would be willing to cooperate.

### **Recommendation**

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- Add a note in the cover letter to the respondent to review the questionnaire first.
- Describe NORC and its role in the cover letter.
- Move definitions up front or to a separate brochure or instruction page.
- Define multiple laboratories as those who share a common administrative structure.

- For hospitals, change “physicians affiliated with the hospital” to “physicians with a professional relationship to the hospital.”
- Change “ordering physicians” to “ordering practitioners.”
- Change final billable tests to “final test results” in all instances including questions that measures the size of the lab overall. Further, include an accompanying definition to describe the intention and meaning of the phrase.
- Drop question about LRI guide.

## **Issues of Information Retrieval**

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### **Cover Letter**

No issues related to information retrieval are noticed in the cover letter.

### **Section 1: General Information**

Most respondents did not have problems recalling the information necessary to answer the questions in Section 1. For Q3 (Version A—Hospitals)/ Q4 (Version B—Independents), respondents noted that this is information most lab managers would not need to look up. A few respondents reported they consulted other documents (e.g., the budget) to report the number of FTE in their labs. They noted that obtaining this information was not demanding.

### **Section 2: Current Systems and Technical Architecture**

Respondents did not have trouble recalling the information to answer the questions in this section. A few respondents noted that it might be helpful to have the assistance of the LIS manager for these questions, as suggested on the survey. One respondent suggested that IT staff could assist with these questions.

### **Section 3: Methods Used to Send Lab Results and Volume of Exchange**

Responses to survey questions in this section indicate some respondents experienced difficulties retrieving information to answer these questions.

Some respondents experienced problems retrieving relevant information regarding volume questions because they have data for a ‘Fiscal Year’ and not a ‘Calendar Year.’ Some respondents would have provided information nevertheless, without noting the reported reference period of 2011.

Responses to volume questions suggest in some questions respondents would consult records while in other questions, they would just estimate numbers. Not all information is organized in a way that can be easily retrieved. In particular, responses to Q10 (Version A—Hospitals)/Q11 (Version B—Independents) suggest that respondents would attempt first to obtain this information from records, and if not available, they would estimate. Responses to Q13 (Version A—Hospitals) and Q14 (Version B—Independents) suggest that respondents will not have this information readily available in their records (i.e., organized by standards such as LOINC and SNOMED CT). Consequently, they would estimate numbers for Q13 (Version A—Hospitals)/Q14 (Version B—Independents).

Responses to Q12 (Version A—Hospitals)/Q13 (Version B—Independents) also suggest that their ability to retrieve information is also related to the way the flow of information works. In particular, respondents seem to have problems providing information regarding option (c) and (d) when results are sent to an HIE systems at the state level, given that the questions focuses on information sent to ordering physicians. Options (a) and (b) appear less problematic. In one instance, a respondent from a hospital lab indicated that they have a web portal through which physicians are able to access the hospital HIS system and it does contain laboratory results. However, the hospital lab does not send LOINC codes to the core HIS system. The lab is beginning to implement the process of sending results to the State HIE, and maintaining a map of lab tests, results and LOINC codes. Further, the respondent mentioned that the process for sending information to outside physicians is by first sending information to the State HIE, which then sends the information on to outside physicians’ practices software. The interviewer expressed that this process may be different across states.

Responses to Q11 (Version B—Independents) suggest that multisite independent labs would have problems retrieving information (i.e., running a query) to report how many total final billable tests were sent to “ordering physicians” as criterion. That is, it appears the volume records cannot be easily sorted, grouped or filtered based on “ordering physician.” Independent labs are more used to retrieving information based on “traditional” schemes, or references such as “patient billing,” “client billing,” “hospital billing,” or “insurance billing.” As respondents tried to figure out the best way to retrieve volume data during the interviews, they indicated that thorough searches would be needed through various records or databases to extract data involving ordering physicians. Respondents’ answers suggest that if they have not conducted exhaustive searches, they underestimate their volume transactions by

exchange category. Since all interviews were conducted over the telephone—not site visits—, interviewers were not able to determine the accuracy of the estimates.

### ***Section 4: Lab Exchange Standards***

Many respondents said that much of information for Section 4 is derived from their day-to-day activities and responsibilities, so it is easy for them to recall. Respondents were able to recall the necessary information to answer the questions in this section. Some respondents suggested that Q20 (Version A—Hospitals)/ Q17 (Version B—Independents)—issues concerning adoption of LOINC codes—may require assistance from other staff, such as the LIS manager. While most respondents knew whether or not their lab used HL7, as asked in Q18 (Version A—Hospitals)/ Q15 (Version B—Independents), many had to consult with IT staff to provide what HL7 version they use. Similarly, one respondent suggested that they would reach out to the systems manager to answer Q19 (Version A—Hospitals).

### ***Section 5: Implementation of Guidelines and Regulations***

Respondents did not express trouble retrieving information for this section, though, as previously noted, many expressed unfamiliarity with “LRI guides” in Q21 (Version A—Hospitals)/ Q18 (Version B—Independents) which hindered their ability to answer the question. Once they understood the question, they did not have trouble answering it. Respondents did not have trouble recalling information for Q22 (Version A—Hospitals)/ Q19 (Version B—Independents), or sub-question Q22a (Version A—Hospitals)/ Q19a (Version B—Independents). In one instance, the respondent suggested adding a link relevant for this definition.

### **Recommendation**

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- Provide a check box at the beginning of Section 3 that allows them to choose the reporting reference period to be calendar year or fiscal year (if they differ).
- Revise Q12 (Version A—Hospitals)/ Q13 (Version B—Independents) to eliminate options c and d as they seem to be inconsistent with laboratory work flow.

## **Issues of Communication of Answers**

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### **Cover Letter**

No issues related to communication of answers are noticed in the cover letter.

### **Section 1: General Information**

Respondents noted little difficulty in articulating their information with the provided answer choices in Section 1. However, respondents suggested that the answer options for Q1 (Version A /B) did not completely describe their type of lab. For instance, one respondent noted that her lab is affiliated with a university, but ultimately selected “Hospital or Health System” as the best answer to describe the lab. Another respondent, using Version B—Independents, whose lab was owned by a national headquarters, was unsure whether to select “commercial laboratory” or “other” to indicate this business model.

Responses to Q2 (Version A—Hospitals) / Q3 (Version B—Independents) suggest that in the category “Other,” some respondents would report as job title “Chief Information Officer.”

Regarding Q3 (Version A—Hospitals)/ Q4 (Version B—Independents), some respondents noted that they have full-time equivalents (i.e., two people working half time, which equates to one fulltime person) and other employees, such as couriers and non-professional staff, who they excluded from their response. In addition, respondents noted that current ranges for Q3 (Version A—Hospitals) are low. Some respondents suggested that their number of FTEs is as high as 100, although one respondent noted that their lab had over 600 FTE. A respondent from an independent lab noted that it was not clear whether to answer for the local lab or for the national headquarters.

A few respondents also noted that there are other categories that can be included as answer choices to Q5 (Version A—Hospitals)/ Q6 (Version B—Independents). Suggested categories included: immunohematology, flow cytometry, molecular, urinalysis, coagulation, and bacteriology.

### **Section 2: Current Systems and Technical Architecture**

There were few communication problems evident in Section 2. One minor issue that a respondent reported for Q8 (Version A—Hospitals) was that the respondent’s lab uses a commercial version for some types of tests and an in-house version for others, thus a response for ‘mixed’ LIS would be most accurate. Another respondent uses different software packages depending on the type of tests.

### ***Section 3: Methods Used to Send Lab Results and Volume of Exchange***

Responses to Q10a (Version A—Hospitals) /Q11a (Version B—Independents) suggest that labs would be able to communicate their answers using the current ranges in the questionnaire, overall. A respondent from a multisite independent lab nonetheless, thought that some labs would not be conducting anywhere near 500,000 tests. Thus, the respondent suggested having an intermediate range with a 250,000 cut-off. Similarly, a respondent from a small hospital lab indicated that options in Q10a (Version A—Hospitals) are very high. This respondent indicated that in the respondent’s state, only one lab is likely to complete over 500,000 in a year. Further, the respondent suggested using more detailed response options; namely, (1) 0-250,000, (2) 250,000-500,000, and (3) 500,000 or more.

Responses to Q13a (Version A—Hospitals)/Q14a (Version B—Independents) suggest that the range provided should be larger to allow respondents to find the category that best fits their lab. No specific suggestions were provided by respondents for these questions.

### ***Section 4: Lab Exchange Standards***

Respondents had few communication issues in Section 4. One respondent suggested not limiting respondents to one response option, rather these “select-one-box” questions should be “check all that apply” to accommodate various combinations of standards. In addition, one respondent reported that their lab does not report LOINC codes, but they do enter LOINC codes. In this instance, the respondent is able to provide information for Q20 (Version A—Hospitals), despite the instructions to skip to Q21 (Version A—Hospitals). For Q20 (Version A—Hospitals), one respondent chose answer #2 (Our laboratory does not have LOINC codes/mapping for some of our tests) as it best reflected the lab’s circumstances, although the respondent noted that the lab does have LOINC codes for all of the tests, but not all of the parts of the tests have codes. The respondent suggested changing or adding ‘only part of the tests’ to the answer option.

In response to Q16 (Version B—Independents), one respondent suggested that we may want to capture the percentage of lab results done in LOINC/SNOMED because, as the respondent noted, there are not LOINC codes available for all existing lab tests.

## ***Section 5: Implementation of Guidelines and Regulations***

Respondents expressed few communication issues in Section 5. A few respondents noted that the response to Q22 (Version A—Hospitals) is dependent on whether it is legal to share laboratory information with patients, which is not a detail currently captured. One respondent also explained that the lab results are posted to a patient portal that is supported by the hospital, but the lab itself does not support or provide access to the portal. Regarding Q21 (Version A—Hospitals), one respondent mentioned they are piloting the LRI guide, but have not fully implemented it.

## **Recommendation**

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- Q 13a (Version A—Hospitals)\ Q14a (Version B—Independents), for labs that belong to a larger entity, add an explanatory line that suggests that they should report for their own lab.
- Expand questions that ask for numbers of billable tests (or results) to 4 categories with over 500,000 as the top of the range.
- Allow for a check all the apply on Q 20(Version A—Hospitals)\ Q17 (Version B—Independents).
- For Q22 (Version A—Hospitals), add a category that says “it is not legal in my state to send lab results directly to patients.”
- For Q22 (Version A—Hospitals), refine question wording so it is clear that results sharing should come directly from the lab.

## **Conclusion**

## **Limitations**

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Cognitive interviewing, which does not include probability-based samples and does not fully reproduce field conditions, has limitations as a true test of the functionality of the questionnaire. For this particular instrument, there are three aspects of our design that limit the value of the data collected from this exercise in cognitive interviewing. First, as noted, our sampling plan did not yield an adequate number of small independent laboratories. Given that this is a study of the spread of technological change, this will have inferential consequences for the comprehension of technical terms. Smaller, remote laboratories will likely not have the same understanding of terms and their business models are likely to be substantially different. Similarly, small sample sizes limit the variability we observed both in the

cognition of terms and the types of technological systems used to transmit lab results. Finally, we chose to use a formalized interviewing process rather than the more informative “think aloud” interviewing, which allows respond to provide substantial narrative substance to their responses. More structured cognitive interviewing carries with it many benefits but shares with the main questionnaire the problem of limiting our knowledge of the cognitive processes by which respondents arrive at their responses.

Taken together, these difficulties with cognitive interviewing and our particular design suggest that the questionnaire revisions suggested by these interviews should be carefully reviewed for substantive and technical fit to the subject matter and the analytic goals.

## **Summary Findings**

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Overall, the cognitive interviews suggest that there is still substantial variation in the interpretations of key terms in this instrument. The most important source of confusion is the appropriate term to be used for questions that seek to measure volume of test results. The primary difficulty appears to be identifying the summary term to be used for the lab tests and whether it should be anchored in the patient, the billing unit, or the single elements of any test panel. The term “affiliated physician” appears to pose smaller but similar definitional problems for the hospital version of the questionnaire. Variations in interpretation may reflect true variations in how physicians are attached to hospitals. Similarly, the administrative structure of laboratories, which may include a group of affiliated but distinct laboratories or fully centralized and administratively integrated collection of physical laboratory locations, cause both cognitive issues and uncertainties in reporting. Finally, there are several instances in which the questionnaire did not offer enough response categories or restricted response options and, thus, limited the respondents’ ability to find an appropriate way to map their experience to the questionnaire.

## **Final Recommendations**

### **Cover Letter**

- Add a note in the cover letter to the respondent to review the questionnaire first.
- Describe NORC and its role in the cover letter.
- Move definitions up front or to a separate brochure or instruction page.

## **Section 1: General Information**

- None

## **Section 2: Current Systems and Technical Architecture**

- For Q7 (Version A—Hospitals)/ Q8 (Version B—Independents) define multiple laboratories as those who share a common administrative structure.

## **Section 3: Methods Used to Send Lab Results and Volume of Exchange**

- Provide a check box at the beginning of Section 3 that allows them to choose the reporting reference period to be calendar year or fiscal year (if they differ).
- For hospitals, change physicians affiliated with the hospital to “physicians with a professional relationship to the hospital.”
- Change “ordering physicians” to “ordering practitioners.”
- Change final billable tests to “final test results” in all instances including questions that measures the size of the lab overall. Further, include an accompanying definition to describe the intention and meaning of the phrase.
- Expand volume of test ranges to 4 categories with over 500,000 as the top of the range.
- Revise questions Q12 (Version A—Hospitals)/ Q13 (Version B—Independents) to eliminate options c and d as they seem to be inconsistent with laboratory work flow.

## **Section 4: Lab Exchange Standards**

- Allow for a check all the apply on Q20 (Version A—Hospitals)/ Q17 (Version B—Independents).

## **Section 5: Implementation of Guidelines and Regulations**

- For Q22 (Version A—Hospitals), add a category that says “it is not legal in my state to send lab results directly to patients.”
- For Q22 (Version A—Hospitals), refine question wording so it is clear that results sharing should come directly from the lab.

- Drop question about LRI guide.
- Q 13a (Version A—Hospitals)\ Q14a (Version B—Independents), for labs that belong to a larger entity, add an explanatory line that suggests that they should report for their own lab.

## **Appendix A: Cognitive Interviewing Protocol – Version A (Hospitals)**

### **COGNITIVE INTERVIEWING PROTOCOL**

#### **2012 NATIONAL SURVEY ON HEALTH INFORMATION EXCHANGE IN CLINICAL LABORATORIES**

### **Version A (Hospitals)**

|                             |                      |
|-----------------------------|----------------------|
| Lab ID                      |                      |
| Appointment Date (MM/DD/YY) | ____ / ____ / ____ / |
| Appointment Time            | ____ : ____ AM/PM    |
| Interviewer name            |                      |
| Additional observations     |                      |

## Calling instructions

 **Interviewer:** Make sure you are in a quiet room. Please call the designed telephone number:  
1-866-688-8062  
Passcode: 9071660  
Moderator Code: 5022660

Make sure the respondent can hear you well on the phone.

## Introduction

**[Interviewer read]:** Hello. My name is [YOUR NAME]. I work at NORC at the University of Chicago. We are very grateful for your time and willingness to participate. NORC is developing a survey questionnaire that will be used in a national survey of clinical laboratories funded by the U.S. Department of Health and Human Services (DHHS), Office of the National Coordinator for Health Information Technology (ONC).

The survey will assess the electronic exchange of key laboratory information across the United States. To help improve the self-administered questionnaire, NORC is conducting interviews to assess the ease of navigation of the questionnaire; the clarity of the questionnaire items; the level of difficulty involved with collecting the requested information; the amount of time it takes to complete the questionnaire; and to find out whether we have missed anything in the various topics we are interested in.

We recently sent you a mailing with a letter describing the purpose of the survey and a copy of the hardcopy survey questionnaire. Were you able to complete the survey questionnaire?

 **Interviewer:** If yes, thank the respondent for completing the questionnaire ahead of time. If no, say that it is ok if he/she did not complete it ahead of time, and let them know that they can fill it out as you go through the questions. If the respondent does not have copy of the questionnaire, mention that there's an electronic copy attached to the meeting invitation they recently received.

**[Interviewer read]:** This conversation should take about an hour. Your participation involves answering questions about your lab's electronic exchange capabilities. While there is no direct benefit to you or your lab for participating in this survey, your feedback will help make critical improvements to the survey questionnaire. All your feedback is very important to us, and we want to make sure we don't miss any comments.

We would like to audiotape our discussion today. I want to assure you, however, that all of your comments are strictly confidential and will be used for research purposes only. Your participation in this study is entirely voluntary. You can refuse to answer any question and you can stop the interview at any time. If at any point during the interview you wish to withdraw as a participant, please just tell me and we will stop.

May I audiotape our conversation?

 **Interviewer:** If R provides consent, please continue. If not, DO NOT audiotape but continue with the interview stating that the conversation is not being audiotaped. Press \*2 to begin recording. Once a recording is initiated, all participants are informed by an automated message that the conference is being recorded. To stop the recording, again press \*2 or the recording will automatically end when the last participant hangs up.

Do you have any questions before I begin?

 **Interviewer:** Answer any respondent questions or concerns.

Do you agree to participate in this study as I have described it?

 **Interviewer:** If yes, thank the respondent and proceed. If not, thank the respondent for his/her time and finish.  
If the respondent wants to learn more about the project, feel free to provide Dr. Prashila Dullabh's contact information: [Dullabh-prashila@norc.org](mailto:Dullabh-prashila@norc.org), or (301) 634-9418. Also, if the respondent asks for our IRB approval number, feel free to share that our research was submitted for review and determined not to be human subjects research by the NORC Institutional Review Board (IRB00000967), under its Federal Assurance

#FWA00000142. For questions about their rights as a study participant, they may call Kathleen Parks, the NORC IRB Administrator, at toll-free number 866-309-0542.

## Interview

**[Interviewer read]:** We will divide the interview into two sections today. The first part is about the materials we sent to you in a mail package a few days ago, including the cover letter. Then, we'll talk about the questionnaire. Let's talk about the cover letter first. Please turn to the cover letter.



**Interviewer:** Although we will use your notes and recordings to obtain detailed feedback for the write-up, please use the coding scheme provided throughout this protocol to facilitate the summary of main findings. Do not read the coding scheme to the respondent.

Probe CL1: This cover letter is very similar to the Version that we will use for the actual survey. Is there anything unclear or confusing that you've noticed in our letter? If yes, which parts?

- 1  R pointed out confusing parts  
2  R **did not** point out confusing parts

Probe CL2: Please tell me how you figured it out the best person to answer this questionnaire?

- 1  R experienced difficulties figuring out the best person  
2  R **did not** experience difficulties figuring out the best person

Probe CL3:  
What does the phrase “*most knowledgeable person about your laboratory’s information exchange capacities*” mean to you?

- 1  R seemed **certain** about the meaning of the phrase  
2  R seemed **uncertain** about the meaning of the phrase

Probe CL4:

Is there anything you would change or re-phrase in this cover letter to improve our chances of cooperation?

- 1  R provided a suggestion  
2  R **did not** provide a suggestion

**[Interviewer read]:** Let's now talk about the questionnaire.

As you may have noticed, this Version is a working document. Therefore, some instructions and sections are still missing, and some numbers are yet to be added. However, we have developed questions and we want to find out how well they will perform when asked in the actual survey.



**Interviewer:** If the respondent completed the questionnaire in advanced, please ask how long it took to complete it. Otherwise, go to the next question.

**[Interviewer read if R completed the questionnaire in advanced]:** Before covering these specific questions, though, let me ask you, how long did it take you to complete the questionnaire?

ProbeT |\_\_\_\_|hr |\_\_\_\_|mins

Thank you. Now, I'd like ask you some specific questions about our questionnaire. So, please turn to the questionnaire.



**Interviewer:** The current protocol was created under the assumption that R completed the questionnaire in advance. But if R couldn't complete it ahead of time, be aware that you'll have to rephrase a bit some of the questions. For example, instead of asking 'Did you receive assistance from other lab members to answer this question', you'll have to ask: 'Would you have to ask for assistance to other lab members to answer this question'

Probe Q1 (Section 1, Q1):

Let's talk about Question 1. What was your answer to this question? |\_\_\_\_|

Please tell me how you figured out the best description for your lab's affiliation or ownership?

Was it difficult to answer this question? Why?

Did you receive assistance from other lab members to answer this question? 1 |\_\_\_\_| Yes 2 |\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer this question?

- 1  R seemed to experience difficulties to understand the meaning of the survey question  
2  R **did not** seem to experience difficulties to understand the meaning of the survey question

- 1  R seemed to experience difficulties to retrieve relevant information to answer the survey question  
2  R **did not** seem to experience difficulties to retrieve relevant information to answer the survey question

Probe Q2 (Section 1, Q2):

What was your answer to this question? |\_\_\_\_|

How hard was it to figure out your answer? Why?

[IF R ANSWERED "Other" ASK:] You indicated that your title is [FILL IN RESPONDENT'S ANSWER]. Is this a job title that you think exist also in other laboratories, or it's unique to your lab?

Did you receive assistance from other lab members to answer this question? 1 | \_\_\_ | Yes 2 | \_\_\_ | No  
If yes, What's the position of the person who helped you to answer this question?

|   |   |
|---|---|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |
|---|---|

Probe Q3 (Section 1, Q3):

What was your answer to this question? | \_\_\_ |

How did you estimate the number of FTE in your lab?

How hard was it to figure out your answer? Why?

Did you receive assistance from other lab members to answer this question? 1 | \_\_\_ | Yes 2 | \_\_\_ | No  
If yes, What's the position of the person who helped you to answer this question?

|   |   |
|---|---|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |
|---|---|

Probe Q4 (Section 1, Q4):

What was your answer to this question? | \_\_\_ |

How hard was to identify the description of the type of testing your lab performs? Why?

Did you receive assistance from other lab members to answer this question? 1 | \_\_\_ | Yes 2 | \_\_\_ | No  
If yes, What's the position of the person who helped you to answer this question?

[IF R ANSWERED "1" TO Q4, GO TO PROBE Q6]

|   |   |
|---|---|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |
|---|---|

Probe Q5 (Section 1, Q5):

What were your answers to these items?

A.|\_\_\_\_| B.|\_\_\_\_| C.|\_\_\_\_| D.|\_\_\_\_| E.|\_\_\_\_|

How hard was it to figure out your answer to each item? Why?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_| Yes 2|\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer these questions?

|                            |   |                            |   |
|----------------------------|---|----------------------------|---|
| 1 <input type="checkbox"/> | R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> | R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe S2 (Section 2, Intro):

I want to ask you about the paragraph we have at the beginning of section 2. In this part, we suggest working with the LIS or LIMS manager.

How effective do you think this suggestion is? Why?

Did the suggestion lead you to ask for help to other staff members in your lab?

|                            |  |
|----------------------------|--|
| 1 <input type="checkbox"/> | R asked for help to others based on the suggestion       |
| 2 <input type="checkbox"/> | R did not ask for help to others based on the suggestion |

Probe Q6 (Section 2, Q6):

What was your answer to this question? |\_\_\_\_|

How hard was it to figure out your answer? Why?

What does the expression “*Laboratory Information System*” mean to you?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_| Yes 2|\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

[IF R ANSWERED 2 or 3 TO Q6, GO TO PROBE Q10]

|                            |   |                            |   |
|----------------------------|---|----------------------------|---|
| 1 <input type="checkbox"/> | R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> | R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q7 (Section 2, Q7):

What was your answer to this question? |\_\_\_\_|

How hard was it to figure out your answer? Why?

What does the expression “*multiple laboratories*” mean to you?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_| Yes 2|\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

|   |   |
|---|---|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |
|---|---|

Probe Q8 (Section 2, Q8):

What was your answer to this question? |\_\_\_\_|

How hard was it to figure out your answer? Why?

What does the term "*commercial system*" mean to you?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_| Yes 2|\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

[IF R ANSWERED 2,3 or 4 TO Q8, GO TO PROBE Q10]

|   |   |
|---|---|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |
|---|---|

Probe Q9 (Section 2, Q9):

What were your answers to these items?

|         |          |          |
|---------|----------|----------|
| 1. ____ | 6. ____  | 11. ____ |
| 2. ____ | 7. ____  | 12. ____ |
| 3. ____ | 8. ____  | 13. ____ |
| 4. ____ | 9. ____  | 14. ____ |
| 5. ____ | 10. ____ | 15. ____ |

How hard was it to figure out your answer to each item? Why?

Which item was the most problematic? Why?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_| Yes 2|\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer these questions?

|   |   |
|---|---|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question<br>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |
|---|---|

Probe Q10 (Section 3, Q10):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to understand instructions to this question? Why?

What does the expression "**total final billable tests**" mean to you?

When you read the phrase "*ordering physicians affiliated with your hospital*" what came to your mind?

Was the term "*calendar year 2011*" confusing to you? Why?

[IF R ANSWERED "Don't know" to Q10, GO TO PROBE Q10a; otherwise, ask the following questions]

Did you provide your answer based on records or did you estimate the number?

- 1  Records  
2  Estimates

Was it hard to retrieve information for *calendar year 2011* (from January 2011 to December 2011)? Why?

How did you figure out the *total billable tests* your lab sent to *ordering physicians affiliated with your hospital*?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer this question?

Even though you didn't select "Don't Know", how reasonable you think is the range provided in Q10a? Would you suggest changing the current range to better capture information? How?

|                            |   |                            |   |
|----------------------------|---|----------------------------|---|
| 1 <input type="checkbox"/> | R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> | R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q10a (Section 3, Q10a):

What was your answer to this question? |\_\_\_\_|

How did you figure out the answer to this question?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer this question?

How reasonable is the range provided in the question? Would you suggest changing the current range to better capture information? How?

|  |  |
|--|--|
| <p>1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question</p> | <p>1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question</p> |
|--|--|

Probe Q11 (Section 3, Q11):

What were your answers to these items?

A.|\_\_\_\_| B.|\_\_\_\_| C.|\_\_\_\_| D.|\_\_\_\_|

How hard was it to figure out your answer to each item? Why?

What does the expression "*final billable tests*" mean to you?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_| Yes 2|\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer these questions?

In your opinion, is the expression "*electronic non-discrete data*" confusing? Why?

Is the expression "*electronic discrete data*" confusing? Why?

Is the expression "*electronic mixed format*" confusing? Why?

|  |  |
|--|--|
| <p>1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question</p> | <p>1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question</p> |
|--|--|

Probe Q12 (Section 3, Q12):

What were your answers to these items?

A.|\_\_\_\_| B.|\_\_\_\_| C.|\_\_\_\_| D.|\_\_\_\_|

How hard was it to figure out your answer to each item? Why?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_| Yes 2|\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer these questions?

In your opinion, is the expression "*coded format such as LOINC or SNOMED CT*" confusing? Why?

Is there anything you would change in this question? What? How?

|  |  |
|--|--|
| <p>1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question</p> | <p>1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question</p> |
|--|--|

Probe Q13 (Section 3, Q13):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to understand the meaning of this question? Why?

[IF R ANSWERED "Don't know" to Q13, GO TO PROBE Q13a; otherwise, ask the following questions]

Did you provide your answer based on records or did you estimate the number?

- 1  Records  
2  Estimates

Was it hard to retrieve this information for *calendar year 2011* (from January 2011 to December 2011)? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No

If yes, What's the position of the person who helped you to answer this question?

Even though you didn't select "Don't Know", how reasonable you think is the range provided in Q13a? Would you suggest changing the current range to better capture information? How?

- 1  R seemed to experience difficulties to understand the meaning of the survey question  
2  R **did not** seem to experience difficulties to understand the meaning of the survey question

- 1  R seemed to experience difficulties to retrieve relevant information to answer the survey question  
2  R **did not** seem to experience difficulties to retrieve relevant information to answer the survey question

Probe Q13a (Section 3, Q13a):

What was your answer to this question? |\_\_\_\_|

How did you figure out the answer to this question?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No

If yes, What's the position of the person who helped you to answer this question?

How reasonable is the range provided in the question? Would you suggest changing the current range to better capture information? How?

- 1  R seemed to experience difficulties to understand the meaning of the survey question  
2  R **did not** seem to experience difficulties to understand the meaning of the survey question

- 1  R seemed to experience difficulties to retrieve relevant information to answer the survey question  
2  R **did not** seem to experience difficulties to retrieve relevant information to answer the survey question

Probe Q14 (Section 3, Q14):

As you surely noticed Question 14 through Question 17 are similar to previous questions. The focus of questions 14 to 17, however, is now on ordering physicians **not affiliated** with your hospital.

When you hear the phrase "*ordering physicians not affiliated with your hospital*", what comes to you mind?

What was your answer to question Q14? |\_\_\_\_\_|

How did you figure out the answer to this question?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No

If yes, What's the position of the person who helped you to answer this question?

Regarding Q14a, in your view, how reasonable is the range provided in the question? Would you suggest changing the current range to better capture information? How?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q15 (Section 3, Q15):

What were your answers to these items?

A.|\_\_\_\_| B.|\_\_\_\_| C.|\_\_\_\_| D.|\_\_\_\_|

Earlier, we discussed a set of similar questions (in Q11). Q15 is now focused on physicians **not affiliated** to your hospital. Did you experience any problems —other than those mentioned in Q11— with the items in Question 15? Which problems?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer these questions?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q16 (Section 3, Q16):

What were your answers to these items?

A.|\_\_\_\_| B.|\_\_\_\_| C.|\_\_\_\_| D.|\_\_\_\_|

We discussed similar issues in Question 12. Did you experience problems other than those mentioned in Q12 with the items in Question 16? Which problems?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer these questions?

|  |   |
|--|---|
| 1 <input type="checkbox"/> R seemed <b>uncertain</b> about the answers to these survey questions | 1 <input type="checkbox"/> R expressed difficulties to answer these survey questions              |
| 2 <input type="checkbox"/> R seemed <b>certain</b> about the answers to these survey questions   | 2 <input type="checkbox"/> R <b>did not</b> express difficulties to answer these survey questions |

Probe Q17 (Section 3, Q17):

What was your answer to this question? |\_\_\_\_\_|

As before, this question is similar to Q13. Did you experience problems other than those mentioned in Q13 with the items in Question 17? Which problems?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No

If yes, What's the position of the person who helped you to answer this question?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe S4 (Section 4, Intro):

At the beginning of section 4, we provide a brief definition of HL7.

Did you find this definition helpful or not for the understanding of subsequent questions? Why?

1  R indicated the definition **was** helpful

2  R indicated the definition **was not** helpful

Probe Q18 (Section 3, Q18):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No

If yes, What's the position of the person who helped you to answer this question?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q19 (Section 3, Q19):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No

If yes, What's the position of the person who helped you to answer this question?

|  |  |
|--|--|
| <p>1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question</p> | <p>1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question</p> |
|--|--|

Probe Q20 (Section 3, Q20):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No

If yes, What's the position of the person who helped you to answer this question?

|  |  |
|--|--|
| <p>1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question</p> | <p>1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question</p> |
|--|--|

Probe S5 (Section 5, Intro):

At the beginning of section 5, we provide a brief definition of the "LRI guide."

Did the definition help you or not understand the meaning of subsequent questions? Why?

1  R indicated the definition **was** helpful

2  R indicated the definition **was not** helpful

Probe Q21 (Section 5, Q21):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No

If yes, What's the position of the person who helped you to answer this question?

|  |  |
|--|--|
| <p>1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question</p> | <p>1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question</p> |
|--|--|

Probe Q22 (Section 5, Q22):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No

If yes, What's the position of the person who helped you to answer this question?

|  |  |
|--|--|
| <p>1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question</p> | <p>1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question</p> |
|--|--|

Probe Q22a (Section 5, Q22a):

Which were your answers to these items?

A.|\_\_\_\_| B.|\_\_\_\_| C.|\_\_\_\_| D.|\_\_\_\_|

How hard was it to figure out your answer to these questions? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_| Yes 2|\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

- 1  R seemed to experience difficulties to understand the meaning of the survey items
- 2  R **did not** seem to experience difficulties to understand the meaning of the survey items

- 1  R seemed to experience difficulties to retrieve relevant information to answer the survey items
- 2  R **did not** seem to experience difficulties to retrieve relevant information to answer the survey items

Probe QD (Definitions):

You may have noticed that we provide a list of definitions in the back of the questionnaire (ordered alphabetically).

Did you use this list? 1|\_\_\_\_| Yes 2|\_\_\_\_|No

Did you find these definitions helpful or not? Why?

If there any other definition that you can think of that can be useful in this list?

- 1  R indicated the list of definitions **was** helpful
- 2  R indicated the list of definitions **was not** helpful

Probe EQ (Instructions to return the questionnaire by mail):

You may have noticed that we provided instructions to return the questionnaire upon completion. I'd like to have your feedback about the instructions we provided in the last page. Are these instructions clear enough in your perspective?

- 1  R indicated the instructions **are** clear enough
- 2  R indicated the instructions **are not** clear enough

**End of interview**



**Interviewer:** Thank the respondent for his/her time and his/her help. Ask if there is anything else R would like to add. To stop the recording, again press \*2 or the recording will automatically end when the last participant hangs up.

These are all the questions I had for you. We sincerely appreciate your time and help. Your answers are very helpful to improve our questionnaire. Is there anything else you would like to add?

Thank you again, and have a good day.

**Appendix B: Cognitive Interviewing Protocol – Version B  
(Non-hospitals: regional & independent)**

**COGNITIVE INTERVIEWING PROTOCOL**

**2012 NATIONAL SURVEY ON HEALTH  
INFORMATION EXCHANGE IN CLINICAL  
LABORATORIES**

**Version B (Non-hospitals:  
regional & independent)**

|                             |                      |
|-----------------------------|----------------------|
| Lab ID                      |                      |
| Appointment Date (MM/DD/YY) | ____ / ____ / ____ / |
| Appointment Time            | ____ : ____ AM/PM    |
| Interviewer name            |                      |
| Additional observations     |                      |

## Calling instructions

 **Interviewer:** Make sure you are in a quiet room. Please call the designed telephone number:  
1-866-688-8062  
Passcode: 9071660  
Moderator Code: 5022660

Make sure the respondent can hear you well on the phone.

## Introduction

**[Interviewer read]:** Hello. My name is [YOUR NAME]. I work at NORC at the University of Chicago. We are very grateful for your time and willingness to participate. NORC is developing a survey questionnaire that will be used in a national survey of clinical laboratories funded by the U.S. Department of Health and Human Services (DHHS), Office of the National Coordinator for Health Information Technology (ONC).

The survey will assess the electronic exchange of key laboratory information across the United States. To help improve the self-administered questionnaire, NORC is conducting interviews to assess the ease of navigation of the questionnaire; the clarity of the questionnaire items; the level of difficulty involved with collecting the requested information; the amount of time it takes to complete the questionnaire; and to find out whether we have missed anything in the various topics we are interested in.

We recently sent you a mailing with a letter describing the purpose of the survey and a copy of the hardcopy survey questionnaire. Were you able to complete the survey questionnaire?

 **Interviewer:** If yes, thank the respondent for completing the questionnaire ahead of time. If no, say that it is ok if he/she did not complete it ahead of time, and let them know that they can fill it out as you go through the questions. If the respondent does not have copy of the questionnaire, mention that there's an electronic copy attached to the meeting invitation they recently received.

**[Interviewer read]:** This conversation should take about an hour. Your participation involves answering questions about your lab's electronic exchange capabilities. While there is no direct benefit to you or your lab for participating in this survey, your feedback will help make critical improvements to the survey questionnaire. All your feedback is very important to us, and we want to make sure we don't miss any comments.

We would like to audiotape our discussion today. I want to assure you, however, that all of your comments are strictly confidential and will be used for research purposes only. Your participation in this study is entirely voluntary. You can refuse to answer any question and you can stop the interview at any time. If at any point during the interview you wish to withdraw as a participant, please just tell me and we will stop.

May I audiotape our conversation?

 **Interviewer:** If R provides consent, please continue. If not, DO NOT audiotape but continue with the interview stating that the conversation is not being audiotaped. Press \*2 to begin recording. Once a recording is initiated, all participants are informed by an automated message that the conference is being recorded. To stop the recording, again press \*2 or the recording will automatically end when the last participant hangs up.

Do you have any questions before I begin?

 **Interviewer:** Answer any respondent questions or concerns.

Do you agree to participate in this study as I have described it?

 **Interviewer:** If yes, thank the respondent and proceed. If not, thank the respondent for his/her time and finish.  
If the respondent wants to learn more about the project, feel free to provide Dr. Prashila Dullabh's contact information: [Dullabh-prashila@norc.org](mailto:Dullabh-prashila@norc.org), or (301) 634-9418. Also, if the respondent asks for our IRB approval number, feel free to share that our research was submitted for review and determined not to be human subjects research by the NORC Institutional Review Board (IRB00000967), under its Federal Assurance

#FWA00000142. For questions about their rights as a study participant, they may call Kathleen Parks, the NORC IRB Administrator, at toll-free number 866-309-0542.

## Interview

**[Interviewer read]:** We will divide the interview into two sections today. The first part is about the materials we sent to you in a mail package a few days ago, including the cover letter. Then, we'll talk about the questionnaire. Let's talk about the cover letter first. Please turn to the cover letter.



**Interviewer:** Although we will use your notes and recordings to obtain detailed feedback for the write-up, please use the coding scheme provided throughout this protocol to facilitate the summary of main findings. Do not read the coding scheme to the respondent.

Probe CL1: This cover letter is very similar to the Version that we will use for the actual survey. Is there anything unclear or confusing that you've noticed in our letter? If yes, which parts?

- |                            |  |
|----------------------------|--|
| 1 <input type="checkbox"/> | R pointed out confusing parts              |
| 2 <input type="checkbox"/> | R <b>did not</b> point out confusing parts |

Probe CL2: Please tell me how you figured it out the best person to answer this questionnaire?

- |                            |   |
|----------------------------|---|
| 1 <input type="checkbox"/> | R experienced difficulties figuring out the best person               |
| 2 <input type="checkbox"/> | R <b>did not</b> experience difficulties figuring out the best person |

Probe CL3:  
What does the phrase "most knowledgeable person about your laboratory's information exchange capacities" mean to you?

- |                            |   |
|----------------------------|---|
| 1 <input type="checkbox"/> | R seemed <b>certain</b> about the meaning of the phrase   |
| 2 <input type="checkbox"/> | R seemed <b>uncertain</b> about the meaning of the phrase |

Probe CL4:  
Is there anything you would change or re-phrase in this cover letter to improve our chances of cooperation?

- |                            |                                       |
|----------------------------|---------------------------------------|
| 1 <input type="checkbox"/> | R provided a suggestion               |
| 2 <input type="checkbox"/> | R <b>did not</b> provide a suggestion |

**[Interviewer read]:** Let's now talk about the questionnaire.

As you may have noticed, this Version is a working document. Therefore, some instructions and sections are still missing, and some numbers are yet to be added. However, we have developed questions and we want to find out how well they will perform when asked in the actual survey.



**Interviewer:** If the respondent completed the questionnaire in advanced, please ask how long it took to complete it. Otherwise, go to the next question.

**[Interviewer read if R completed the questionnaire in advanced]:** Before covering these specific questions, though, let me ask you, how long did it take you to complete the questionnaire?

ProbeT |\_\_\_\_|hr |\_\_\_\_|mins

Thank you. Now, I'd like ask you some specific questions about our questionnaire. So, please turn to the questionnaire.



**Interviewer:** The current protocol was created under the assumption that R completed the questionnaire in advance. But if R couldn't complete it ahead of time, be aware that you'll have to rephrase a bit some of the questions. For example, instead of asking 'Did you receive assistance from other lab members to answer this question', you'll have to ask: "Would you have to ask for assistance to other lab members to answer this question"

Probe Q1 (Section 1, Q1):

Let's talk about Question 1. What was your answer to this question? |\_\_\_\_|

Please tell me how you figured out the best description for your lab's affiliation or ownership?

Was it difficult to answer this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_| Yes 2|\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

1  R seemed to experience difficulties to understand the meaning of the survey question

2  R **did not** seem to experience difficulties to understand the meaning of the survey question

R seemed to experience difficulties to retrieve relevant information to answer the survey question

R **did not** seem to experience difficulties to retrieve relevant information to answer the survey question

Probe Q2 (Section 1, Q1):

Let's talk about Question 1. What was your answer to this question? |\_\_\_\_|

Please tell me how you figured out the best description for your lab's affiliation or ownership?

Was it difficult to answer this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_| Yes 2|\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

1  R seemed to experience difficulties to understand the meaning of the survey question

2  R **did not** seem to experience difficulties to understand the meaning of the survey question

1  R seemed to experience difficulties to retrieve relevant information to answer the survey question

2  R **did not** seem to experience difficulties to retrieve relevant information to answer the survey question

| question  | survey question  |   |  |  |  |
|---|--|---|--|--|--|
| <p>Probe Q3 (Section 1, Q3):<br/>           What was your answer to this question?  _____ <br/>           How hard was it to figure out your answer? Why?</p> <p>[IF R ANSWERED "Other" ASK:] You indicated that your title is [FILL IN RESPONDENT'S ANSWER]. Is this a job title that you think exist also in other laboratories, or it's unique to your lab?</p> <p>Did you receive assistance from other lab members to answer this question? 1 _____  Yes 2 _____ No<br/>           If yes, What's the position of the person who helped you to answer this question?</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">           1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question         </td> <td style="width: 50%;">           1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question         </td> </tr> <tr> <td>           2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question         </td> <td>           2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question         </td> </tr> </table> | 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question                            | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |  |
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question   | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |   |  |  |  |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question  | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |   |  |  |  |
| <p>Probe Q4 (Section 1, Q3):<br/>           What was your answer to this question?  _____ <br/>           How did you estimate the number of FTE in your lab?</p> <p>How hard was it to figure out your answer? Why?</p> <p>Did you receive assistance from other lab members to answer this question? 1 _____  Yes 2 _____ No<br/>           If yes, What's the position of the person who helped you to answer this question?</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">           1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question         </td> <td style="width: 50%;">           1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question         </td> </tr> <tr> <td>           2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question         </td> <td>           2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question         </td> </tr> </table>   | 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question                            | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |  |
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question   | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |   |  |  |  |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question  | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |   |  |  |  |
| <p>Probe Q5 (Section 1, Q5):<br/>           What was your answer to this question?  _____ <br/>           How hard was to identify the description of the type of testing your lab performs? Why?</p> <p>Did you receive assistance from other lab members to answer this question? 1 _____  Yes 2 _____ No<br/>           If yes, What's the position of the person who helped you to answer this question?</p> <p>[IF R ANSWERED "1" TO Q5, GO TO PROBE Q7]</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">           1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question         </td> <td style="width: 50%;">           1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question         </td> </tr> <tr> <td>           2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question         </td> <td>           2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question         </td> </tr> </table>   | 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question                            | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |  |
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question   | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |   |  |  |  |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question  | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |   |  |  |  |

| question | survey question |
|----------|-----------------|
|----------|-----------------|

Probe Q6 (Section 1, Q6):

What were your answers to these items?

A.|\_\_\_\_\_| B.|\_\_\_\_\_| C.|\_\_\_\_\_| D.|\_\_\_\_\_| E.|\_\_\_\_|

How hard was it to figure out your answer to each item? Why?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer these questions?

- |  |  |
|--|--|
| <p>1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question</p> | <p>1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question</p> |
|--|--|

Probe S2 (Section 2, Intro):

I want to ask you about the paragraph we have at the beginning of section 2. In this part, we suggest working with the LIS or LIMS manager.

How effective do you think this suggestion is? Why?

Did the suggestion lead you to ask for help to other staff members in your lab?

- |  |
|--|
| <p>1 <input type="checkbox"/> R asked for help to others based on the suggestion</p> <p>2 <input type="checkbox"/> R <b>did not</b> ask for help to others based on the suggestion</p> |
|--|

Probe Q7 (Section 2, Q7):

What was your answer to this question? |\_\_\_\_|

How hard was it to figure out your answer? Why?

What does the expression "*Laboratory Information System*" mean to you?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer this question?

[IF R ANSWERED 2 or 3 TO Q7, GO TO PROBE Q11]

- |  |  |
|--|--|
| <p>1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question</p> | <p>1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question</p> <p>2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question</p> |
|--|--|

Probe Q8 (Section 2, Q8):

What was your answer to this question? |\_\_\_\_|

How hard was it to figure out your answer? Why?

What does the expression "*multiple laboratories*" mean to you?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q9 (Section 2, Q9):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer? Why?

What does the term "*commercial system*" mean to you?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

[IF R ANSWERED 2,3 or 4 TO Q8, GO TO PROBE Q11]

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q10 (Section 2, Q10):

What were your answers to these items?

|         |          |          |
|---------|----------|----------|
| 1. ____ | 6. ____  | 11. ____ |
| 2. ____ | 7. ____  | 12. ____ |
| 3. ____ | 8. ____  | 13. ____ |
| 4. ____ | 9. ____  | 14. ____ |
| 5. ____ | 10. ____ | 15. ____ |

How hard was it to figure out your answer to each item? Why?

Which item was the most problematic? Why?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer these questions?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q11 (Section 3, Q11):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to understand instructions to this question? Why?

What does the expression “**total final billable tests**” mean to you?

When you read the phrase “*ordering physicians*” what came to your mind?

Was the term “*calendar year 2011*” confusing to you? Why?

[IF R ANSWERED “Don’t know” to Q11, GO TO PROBE Q11a; otherwise, ask the following questions]  
Did you provide your answer based on records or did you estimate the number?

- 1  Records  
2  Estimates

Was it hard to retrieve information for *calendar year 2011* (from January 2011 to December 2011)? Why?

How did you figure out the *total billable tests* your lab sent to *ordering physicians*?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_| Yes 2|\_\_\_\_| No  
If yes, What’s the position of the person who helped you to answer this question?

Even though you didn’t select “Don’t Know”, how reasonable you think is the range provided in Q11a? Would you suggest changing the current range to better capture information? How?

|                            |   |                            |   |
|----------------------------|---|----------------------------|---|
| 1 <input type="checkbox"/> | R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> | R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q11a (Section 3, Q11a):

What was your answer to this question? |\_\_\_\_|

How did you figure out the answer to this question?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_| Yes 2|\_\_\_\_| No  
If yes, What’s the position of the person who helped you to answer this question?

How reasonable is the range provided in the question? Would you suggest changing the current range to better capture information? How?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q12 (Section 3, Q12):

What were your answers to these items?

A.|\_\_\_\_| B.|\_\_\_\_| C.|\_\_\_\_| D.|\_\_\_\_|

How hard was it to figure out your answer to each item? Why?

What does the expression “*final billable tests*” mean to you?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_| Yes 2|\_\_\_\_|No

If yes, What's the position of the person who helped you to answer these questions?

In your opinion, is the expression “*electronic non-discrete data*” confusing? Why?

Is the expression “*electronic discrete data*” confusing? Why?

Is the expression “*electronic mixed format*” confusing? Why?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q13 (Section 3, Q13):

What were your answers to these items?

A.|\_\_\_\_| B.|\_\_\_\_| C.|\_\_\_\_| D.|\_\_\_\_|

How hard was it to figure out your answer to each item? Why?

Did you receive assistance from other lab members to answer these questions? 1|\_\_\_\_| Yes 2|\_\_\_\_|No

If yes, What's the position of the person who helped you to answer these questions?

In your opinion, is the expression “*coded format such as LOINC or SNOMED CT*” confusing? Why?

Is there anything you would change in this question? What? How?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q14 (Section 3, Q14):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to understand the meaning of this question? Why?

[IF R ANSWERED "Don't know" to Q13, GO TO PROBE Q13a; otherwise, ask the following questions]

Did you provide your answer based on records or did you estimate the number?

- 1  Records  
2  Estimates

Was it hard to retrieve this information for *calendar year 2011* (from January 2011 to December 2011)? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

Even though you didn't select "Don't Know", how reasonable you think is the range provided in Q14a? Would you suggest changing the current range to better capture information? How?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q14a (Section 3, Q14a):

What was your answer to this question? |\_\_\_\_|

How did you figure out the answer to this question?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

How reasonable is the range provided in the question? Would you suggest changing the current range to better capture information? How?

|  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe S4 (Section 4, Intro):

At the beginning of section 4, we provide a brief definition of HL7.

Did you find this definition helpful or not for the understanding of subsequent questions? Why?

- 1  R indicated the definition **was** helpful  
2  R indicated the definition **was not** helpful

Probe Q15 (Section 3, Q15):

What was your answer to this question? |\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

- |  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q16 (Section 3, Q16):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

- |  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q17 (Section 3, Q17):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_|No  
If yes, What's the position of the person who helped you to answer this question?

- |  |  |
|--|--|
| 1 <input type="checkbox"/> R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe S5 (Section 5, Intro):

At the beginning of section 5, we provide a brief definition of the "LRI guide."

Did the definition help you or not understand the meaning of subsequent questions? Why?

- |  |
|--|
| 1 <input type="checkbox"/> R indicated the definition <b>was</b> helpful     |
| 2 <input type="checkbox"/> R indicated the definition <b>was not</b> helpful |

Probe Q18 (Section 5, Q18):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer this question?

|                            |   |                            |   |
|----------------------------|---|----------------------------|---|
| 1 <input type="checkbox"/> | R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> | R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q19 (Section 5, Q19):

What was your answer to this question? |\_\_\_\_\_|

How hard was it to figure out your answer to this question? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer this question?

|                            |   |                            |   |
|----------------------------|---|----------------------------|---|
| 1 <input type="checkbox"/> | R seemed to experience difficulties to understand the meaning of the survey question              | 1 <input type="checkbox"/> | R seemed to experience difficulties to retrieve relevant information to answer the survey question              |
| 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to understand the meaning of the survey question | 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey question |

Probe Q19a (Section 5, Q19a):

Which were your answers to these items?

A.|\_\_\_\_\_| B.|\_\_\_\_\_| C.|\_\_\_\_\_| D.|\_\_\_\_\_|

How hard was it to figure out your answer to these questions? Why?

Did you receive assistance from other lab members to answer this question? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No  
If yes, What's the position of the person who helped you to answer this question?

|                            |  |                            |  |
|----------------------------|--|----------------------------|--|
| 1 <input type="checkbox"/> | R seemed to experience difficulties to understand the meaning of the survey items              | 1 <input type="checkbox"/> | R seemed to experience difficulties to retrieve relevant information to answer the survey items              |
| 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to understand the meaning of the survey items | 2 <input type="checkbox"/> | R <b>did not</b> seem to experience difficulties to retrieve relevant information to answer the survey items |

Probe QD (Definitions):

You may have noticed that we provide a list of definitions in the back of the questionnaire (ordered alphabetically).

Did you use this list? 1|\_\_\_\_\_| Yes 2|\_\_\_\_\_| No

Did you find these definitions helpful or not? Why?

If there any other definition that you can think of that can be useful in this list?

- |                            |   |
|----------------------------|---|
| 1 <input type="checkbox"/> | R indicated the list of definitions was helpful     |
| 2 <input type="checkbox"/> | R indicated the list of definitions was not helpful |

Probe EQ (Instructions to return the questionnaire by mail):

You may have noticed that we provided instructions to return the questionnaire upon completion. I'd like to have your feedback about the instructions we provided in the last page. Are these instructions clear enough in your perspective?

- |                            |  |
|----------------------------|--|
| 1 <input type="checkbox"/> | R indicated the instructions <b>are</b> clear enough     |
| 2 <input type="checkbox"/> | R indicated the instructions <b>are not</b> clear enough |

#### End of interview

 **Interviewer:** Thank the respondent for his/her time and his/her help. Ask if there is anything else R would like to add. To stop the recording, again press \*2 or the recording will automatically end when the last participant hangs up.

These are all the questions I had for you. We sincerely appreciate your time and help. Your answers are very helpful to improve our questionnaire. Is there anything else you would like to add?

Thank you again, and have a good day.

## Appendix C: Final Tabulation of Coded Responses

| Independent survey Q# | Hospital survey Q# | Question  | Number reporting comprehension issues | Total (N=12) | Number reporting retrieval issues | Total (N=12) |
|-----------------------|--------------------|---|---------------------------------------|--------------|-----------------------------------|--------------|
| CL1                   | CL1                | <i>This cover letter is very similar to the Version that we will use for the actual survey. Is there anything unclear or confusing that you've noticed in our letter? If yes, which parts?</i>                    | 10                                    | 12           | n/a                               | n/a          |
| CL2                   | CL2                | <i>Please tell me how you figured it out the best person to answer this questionnaire?</i>  | 10                                    | 11           | n/a                               | n/a          |
| CL3                   | CL3                | <i>What does the phrase “most knowledgeable person about your laboratory’s information exchange capacities” mean to you?</i>  | 3                                     | 12           | n/a                               | n/a          |
| CL4                   | CL4                | <i>Is there anything you would change or re-phrase in this cover letter to improve our chances of cooperation?</i>  | 9                                     | 12           | n/a                               | n/a          |
| Q1                    | Q1                 | Which option below best describes your laboratory’s organizational affiliation or ownership?  | 10                                    | 12           | 9                                 | 11           |
| Q2                    | n/a                | Is your laboratory a reference laboratory?  | 2                                     | 2            | 2                                 | 2            |
| Q3                    | Q2                 | What is your job title?   | 11                                    | 12           | 10                                | 11           |
| Q4                    | Q3                 | How many full time employees (FTEs) currently work in your laboratory at this site?   | 10                                    | 12           | 11                                | 11           |
| Q5                    | Q4                 | Which option below best describes the type of testing your laboratory performs?   | 11                                    | 11           | 9                                 | 10           |
| Q6                    | Q5                 | Does your laboratory perform any of the following types of clinical pathology testing?  | 8                                     | 11           | 10                                | 10           |
| S2                    | S2                 | <i>In this part, we suggest working with the LIS or LIMS manager.<br/>How effective do you think this suggestion is? Why?<br/>Did the suggestion lead you to ask for help to other staff members in your lab?</i> | 8                                     | 10           | n/a                               | n/a          |

| <b>Independent survey Q#</b> | <b>Hospital survey Q#</b>                                     | <b>Question</b>  | <b>Number reporting comprehension issues</b> | <b>Total (N=12)</b> | <b>Number reporting retrieval issues</b> | <b>Total (N=12)</b> |
|------------------------------|---|--|--|---------------------|--|---------------------|
| Q7                           | Q6  | Does your laboratory currently use a Laboratory Information System (LIS/LIMS)?   | 10   | 12                  | 11                                       | 11                  |
| Q8                           | Q7  | Does your Laboratory Information System (LIS/LIMS) support multiple laboratories or only one laboratory?   | 8  | 11                  | 9  | 10                  |
| Q9                           | Q8  | What type of Laboratory Information System (LIS/LIMS) does your laboratory currently use?  | 11   | 11                  | 9  | 10                  |
| Q10                          | Q9  | Which vendor(s) supplies your Laboratory Information System(s) (LIS/LIMS)?   | 7  | 10                  | 5  | 9                   |
| Q11                          | Q10<br>(question specific to affiliated ordering physicians)  | Approximately, how many total final billable tests did your lab send to ordering physicians during calendar year 2011? Please consult your records to answer this question. If records are not available, please provide your best estimate. | 6  | 11                  | 5  | 10                  |
| Q11a                         | Q10a<br>(question specific to affiliated ordering physicians) | Would the number of total final billable tests be 499,999 or less, or 500,000 or more?   | 1  | 1                   | 0  | 1                   |
| Q12                          | Q11<br>(question specific to affiliated ordering physicians)  | Did your laboratory send final billable tests to ordering physicians during calendar year 2011 using any of the following methods?   | 6  | 10                  | 6  | 9                   |

| <b>Independent survey Q#</b> | <b>Hospital survey Q#</b>                                     | <b>Question</b>  | <b>Number reporting comprehension issues</b> | <b>Total (N=12)</b> | <b>Number reporting retrieval issues</b> | <b>Total (N=12)</b> |
|------------------------------|---|--|--|---------------------|--|---------------------|
| Q13                          | Q12<br>(question specific to affiliated ordering physicians)  | Did your laboratory send final billable tests in coded format such as LOINC or SNOMED CT standard to ordering physicians during calendar year 2011 using any of the following methods?   | 6  | 11                  | 7  | 10                  |
| Q14                          | Q13<br>(question specific to affiliated ordering physicians)  | Approximately, how many final billable tests coded based on standards such as LOINC or SNOMED CT did your lab send during calendar year 2011 to ordering physicians using electronic health records (EHR)? Please consult your records to answer this question. If records are not available, please provide your best estimate. | 5  | 8                   | 4  | 8                   |
| Q14a                         | Q13a<br>(question specific to affiliated ordering physicians) | Would the number of final billable tests be 124,999 or less, or 125,000 or more?   | 2  | 2                   | 1  | 2                   |
| n/a                          | Q14 & Q14a  | Approximately, how many total final billable tests did your lab send to ordering physicians not affiliated with your hospital during calendar year 2011?<br><br>Would the number of total final billable tests be 499,999 or less, or 500,000 or more?   | 4  | 6                   | 4  | 6                   |
| n/a                          | Q15   | Did your laboratory send final billable tests to ordering physicians not affiliated with your hospital during calendar year 2011 using any of the  | 5  | 5                   | 5  | 5                   |

| <b>Independent survey Q#</b> | <b>Hospital survey Q#</b> | <b>Question</b>  | <b>Number reporting comprehension issues</b> | <b>Total (N=12)</b> | <b>Number reporting retrieval issues</b> | <b>Total (N=12)</b> |
|------------------------------|---------------------------|--|--|---------------------|--|---------------------|
|                              |                           | following methods?   |  |                     |  |                     |
| n/a                          | Q16                       | Did your laboratory send final billable tests in coded format such as LOINC or SNOMED CT standard to ordering physicians not affiliated with your hospital during calendar year 2011 using any of the following methods?   | 5  | 5                   | 5  | 5                   |
| n/a                          | Q17/Q17a                  | Approximately, how many final billable tests coded based on standards such as LOINC or SNOMED CT did your lab send during calendar year 2011 to ordering physicians not affiliated with your hospital using electronic health records (EHR)?/ Would the number of final billable tests be 124,999 or less, or 125,000 or more? | 1  | 1                   | 1  | 1                   |
| S4                           | S4                        | <i>At the beginning of section 4, we provide a brief definition of HL7. Did you find this definition helpful or not for the understanding of subsequent questions? Why?</i>  | 2  | 9                   | n/a                                      | n/a                 |
| Q15                          | Q18                       | Which of the following messaging standards are currently in use by your laboratory for result reporting?   | 10   | 11                  | 7  | 11                  |
| Q16                          | Q19                       | Which vocabulary standard for lab result reporting is currently in use by your laboratory?   | 9  | 11                  | 9  | 11                  |
| Q17                          | Q20                       | Which one of the following issues concerning adoption of LOINC codes for sending results best describes the current situation in your laboratory?  | 5  | 7                   | 6  | 7                   |
| S5                           | S5                        | <i>At the beginning of section 5, we provide a brief definition of the “LRI guide.” Did the definition help you or not understand the meaning of</i>   | 4  | 10                  | n/a                                      | n/a                 |

| <b>Independent survey Q#</b> | <b>Hospital survey Q#</b> | <b>Question</b>   | <b>Number reporting comprehension issues</b> | <b>Total (N=12)</b> | <b>Number reporting retrieval issues</b> | <b>Total (N=12)</b> |
|------------------------------|---------------------------|---|--|---------------------|--|---------------------|
|                              |                           | <i>subsequent questions? Why?</i>   |  |                     |  |                     |
| Q18                          | Q21                       | Has your laboratory implemented the LRI guide for lab result content and format?  | 9  | 10                  | 6  | 10                  |
| Q19                          | Q22                       | Does your laboratory allow patients, or their representatives direct access to their laboratory results?  | 8  | 9                   | 8  | 9                   |
| Q19a                         | Q22a                      | If YES, please indicate which of the following methods of delivery your laboratory anticipates using to deliver results directly to patients or patients' representatives.  | 3  | 4                   | 3  | 4                   |
| QD                           | QD                        | <i>You may have noticed that we provide a list of definitions in the back of the questionnaire (ordered alphabetically). Did you use this list? Did you find these definitions helpful or not? Why?</i>   | 2  | 9                   | n/a                                      | n/a                 |
| ED                           | ED                        | <i>You may have noticed that we provided instructions to return the questionnaire upon completion. I'd like to have your feedback about the instructions we provided in the last page. Are these instructions clear enough in your perspective?</i> | 1  | 9                   | n/a                                      | n/a                 |