Annex A. PROJECT OVERVIEW

Objectives and broad design features of PIAAC

1. PIAAC is conceived as an international, multi-cycle programme focusing on the assessment of adult skills and competencies. In addition to testing fundamental cognitive skills required for successful participation in the economy and society of the 21st century, PIAAC will seek to assess non-cognitive skills, as well as collect information on the degree adults use their skills in the workplace, individual labour market outcomes and educational pathways, and a wide range of other background characteristics. The objectives and broad design parameters of PIAAC are summarised below.

Objectives

2. The objectives of the 2nd cycle of PIAAC are: (a) to provide a profile of the information processing skills and other transversal skills possessed by adults that contribute to effective functioning in education and in 21st century labour markets, as well as to broader well-being in modern societies; (b) to deepen our understanding of the relationships between these skills and social and economic outcomes, as well as the individual, institutional and social factors that contribute to the development, maintenance, and loss of such skills over the lifecycle; (c) to provide information that can help policy makers and others design better policies regarding the development and maintenance of skill, and to help individuals and society putting these skills to the most productive use.

Basic design features of PIAAC

Overview

3. The 2nd cycle of PIAAC will involve the administration of a Direct Assessment of cognitive skills (DA) and of a Background Questionnaire (BQ) that will collect information on the socio-demographic profile of respondents and on his/her educational and labour market career, including information about the tasks performed on the job and the practice of cognitive skills at work and in everyday life. The questionnaire will also elicit the non-cognitive skills of respondents through the use of validated scales from personality psychology. These instruments will be administered to a sample of adults in their home. The total duration of the administration is expected to be in the order of 90-105 minutes on average, with 30-45 minutes devoted to the Background Questionnaire and other self-reported information, and about 60 minutes devoted to the Direct Assessment.

4. Some elements of the Study (such as particular domains of the cognitive Direct Assessment, or particular modules of the Background Questionnaire) may be optional in the sense that Participants would be free to decide whether or not they want to administer those elements. It is expected that the OECD and the PIAAC Board of Participating

Countries (BPC) will take a final decision on optional elements of PIAAC in the course of 2018.

5. In addition, Participants have the possibility of augmenting the basic design of PIAAC. This includes oversampling particular groups of the target population (e.g. young people, immigrants) and increasing sample sizes to be able to report results for sub-national entities (e.g. States, provinces or cities). All sub-national entities within a country/economy will be expected to adopt an identical survey design.

6. Participants have also the possibility of adding a set of questions in their national version of the BQ. This additional set of questions will not take more than 5 minutes of administration time.

7. Participants may also undertake studies linked to PIAAC, such as administering PIAAC to special samples. Examples in the 1st cycle of PIAAC included the administration of PIAAC to individuals who had participated in previous waves of PISA and a separate study of older adults. For the 2nd cycle, it is possible that some Participants may undertake a linking study involving the administration of both PISA and PIAAC instruments to a sample of 15 year olds in conjunction with the administration of PIAAC and PISA in 2021. The possibility of conducting experiments in order to evaluate the impact of financial or non-financial incentives has also been discussed. The Contractor will be available to discuss with Participants the implementation of special studies linked to PIAAC, including but not restricted to the ones mentioned in this paragraph.

8. Oversampling of groups within the PIAAC target population, and the addition of questions to the national version of the BQ (as specified in Paragraphs 5 and 6) will be covered within the price of the Contract. The costs of work associated with special studies are not covered by the Contract. If Participants wish to engage the Contractor to work with them, this will be done through a separate agreement between the Participant concerned and the Contractor.

9. The Contractor will inform and coordinate with the OECD regarding the implementation of special studies and national options, and will ensure that the implementation of national options does not jeopardize the comparability of results across countries.

The direct assessment

10. The core of PIAAC is a direct assessment of adult information-processing skills, understood as "interest, attitude and ability of individuals to appropriately use socio-cultural tools, including digital technology and communication tools, to access, manage, integrate and evaluate information, construct new knowledge, and communicate with others in order to participate effectively in society". PIAAC is intended to develop an integrated measure of competence, encompassing the range of performance from mastery of the basic building blocks to the capacity to effectively manage complex tasks. To achieve this goal, three areas of competence will be assessed:

- Literacy;
- Numeracy; and
- Adaptive Problem Solving.

11. The conceptual framework for the assessment of literacy is expected to be largely unchanged with respect to the 1st cycle. The numeracy framework will be updated and revised, on the basis of work carried out in Tout et al. (2017). In the case of the assessments of literacy and numeracy, the assessments will be linked psychometrically to

the assessments administered in the 1st cycle to allow the measurement of change in the proficiency of the adult population over time. The assessment of Adaptive Problem Solving will replace the assessment of Problem Solving in Technology-Rich Environments administered in the 1st cycle. A conceptual framework for the domain of Adaptive Problem Solving will need to be developed, on the basis of work carried out by Greiff et al. (2017).

12. In order to obtain more information about the skills of adults with low levels of proficiency in literacy, an assessment of 'reading components' skills will be administered, as was done in the 1st cycle. In addition to this, a new assessment of 'numeracy components' skills will be introduced, assuming the Numeracy Expert Group agrees to a definition of numeracy component skills and defines how they should be measured.

The background questionnaire (the BQ module)

13. The Background Questionnaire will consist of several modules, collecting information on:

- Socio-economic and demographic background of respondents;
- Education and training;
- Current status and work history;
- Current work;
- Last job;
- Literacy, Numeracy, and ICT practices at work;
- Literacy, Numeracy, and ICT practices in everyday life;
- The Working environment;
- Non-labour market outcomes;
- Social and emotional skills.

Target population

14. The target population for PIAAC is persons of working age, defined as individuals aged between 16 and 65 years. It is envisaged that some Participants may wish to focus attention on particular sub-groups of the population as noted in paragraph 5 above.

Sample

15. The sampling unit for PIAAC will be individuals or, in the case of Participants not having register-based sampling frames, the household. The minimum sample size required to produce reliable estimates of skills at the national level in a Participant is expected to be between 4,000 and 5,000. As stated above, Participants will have the option of boosting sample size and over-sampling to obtain estimates for sub-populations of special interest. Some Participants might want to increase sample size to get reliable estimates at the sub-national level (e.g. states, regions, or provinces).

Future cycles of assessment and links to previous international adult skills surveys

16. PIAAC is conceived as an on-going programme involving the administration of assessments at regular intervals of 10 year.

17. PIAAC will continue to develop as a tool which possesses a relatively stable core component (to allow comparison of change over time) but is flexible enough to investigate a range of different policy issues over time and incorporate technical and scientific advances.

18. The 2nd cycle of PIAAC will be linked psychometrically with the 1st cycle in the domains of Literacy and Numeracy. Such link would also ensure the comparability of results with previous international skills surveys, namely the International Adult Literacy Survey (IALS, administered between 1994 and 1998) and the Adult Literacy and Life Skills Survey (ALLS, administered over 2002-2007).

Delivery mechanism

19. The Direct Assessment component of PIAAC will be delivered as a computer-based assessment. A single tablet device will be used for all participating adults across all Participants. The tablet will be connected to a keyboard for the interviewer to administer the background questionnaire. It could then be separated and handed to the respondent with a stylus for the rest of the session (although respondents will have the possibility to use the keyboard, if they want to do so). Each respondent will receive a tutorial on the use of the tablet. The stylus will allow the tablet to function much like a paper-and-pencil instrument in terms of not requiring many ICT skills. Using tablets will also allow some sections of the BQ to be self-administered. Usability testing, as described in Section 2.4.3, will be conducted with a subset of the cognitive items with a small sample (8-12) of individuals. This testing will inform item development and the design of the tablet tutorial. The Field Trial will be used to test the comparability of results with those obtained in the 1st cycle. The MS design will allow for the possibility that the paper-based instruments used in the 1st cycle may be used in the Main Study pending the results of the Field Trial (see Section 2.2 of Annex B).

Participation and funding

20. Participation in PIAAC is open to all 35 OECD member countries. Participation by non-member countries/economies will be possible within the framework of the PIAAC Global relations Strategy. The international development costs for the project will be financed by contributions from Participants.

Project management

21. PIAAC is governed by a board consisting of the OECD countries participating in the study (plus the European Commission) known as that Board of Participating Countries (BPC). The BPC is expected to meet twice a year over the life of the project. The OECD will provide secretariat services to the BPC. Representatives of the Contractor attend meetings of the BPC as required.

22. The BPC will work with the OECD to steer the PIAAC project. Its role will include providing policy direction to the project, taking key decisions relating to the design and conduct of the project and ensuring compliance with the policy objectives and design parameters at key milestones during the implementation of the project.

23. The OECD will be responsible for the management of the contract with the Contractor and will be the interface between the BPC and the Contractor.

24. Each Participant will nominate a National Project Manager (NPM) who will be the primary contact point for the Contractor in the day to day dealings with that Participant. It is expected that NPMs will be assessment/survey specialists. NPMs will liaise with the Contractor on all issues related to the implementation of the PIAAC assessment in their country/economy.

Role of Participants in the implementation of PIAAC

25. Within the frameworks and standards established for the project, authorities in Participants will be responsible for drawing national samples, translating survey instruments and questionnaires into the languages to be used in national assessments, administering both the Field Trial and the Main Study, scoring of all open ended responses, submitting data to the contractor, cooperating in the cleaning of data, sample weighting and preparing national reports.

Annex B. STATEMENT OF WORK

1. Introduction

1.1. Members of the consortium

1. The organisations forming part of the Contractor's consortium are Educational Testing Service (ETS) and the following ETS subcontractors: Westat, cApStAn, the Research Centre for Education and the Labour Market (ROA) at the Maastricht University, GESIS – Leibniz Institute for the Social Sciences (GESIS) and the International Association for the Evaluation of Educational Achievement (IEA).

2. Any change in the Contractor's Consortium is subject to the provision of Clause 12 of the Contract.

1.2. Key personnel

3. For the purposes of this Contract, the following Personnel shall be considered to be key personnel: Irwin Kirsch (International Survey Director), Laura Halderman (Project Manager), Claudia Tamassia (Strategic Advisor), Mary Louise Lennon (Coordinator of Test Development), Kentaro Yamamoto (Manager of Survey Design and Analytics), Andrea Ferrari (Project Manager for linguistic quality control procedures), Laura Wäyrynen (Project Lead at cApStAn), Beatrice Rammstedt (Project Director at GESIS), Ralph Carstens (Project Director at IEA), Rolf van der Velden (Project Director at ROA), Leyla Mohadjer (Project Director at Westat). Any change in the Contractor's key personnel is subject to the provision of Clause 5.2 of the Contract.

4. The International Survey Director and the Project Manager must devote the majority of their time to the management of the project and must be available to interact with the staff of the Organisation on an on-going basis.

1.3. Working language

5. The language to be used exclusively in all documents, assessment instruments, questionnaires and other written material prepared by the Contractor will be English. All meetings for which the Contractor will be responsible (meetings of National Project managers, Expert Group meetings and meetings of the Technical Advisory Group) will be conducted in English.

1.4. Communication

6. The Contractor will ensure that there is regular and effective communication with the OECD and Participants through their National Project Managers.

2. Description of tasks

2.1. Project management

7. The Contractor will appoint Dr. Irwin Kirsch as the International Survey Director. In his role, Dr. Kirsch will have the responsibility for:

- liaising with the OECD, the Board of Participating Countries (BPC), and the various Expert Groups;
- attending meetings of the BPC and of the Technical Advisory Group (TAG);
- establishing and managing the contract with the OECD;
- maintaining an integrated project plan that recognises and incorporates all the work associated with PIAAC in a coherent and effective manner;
- ensuring that the various aspects of the project meets PIAAC standards and are delivered within the specified timeframe and budget.

2.1.1. The PIAAC Portal: project management tasks

8. The Contractor will develop a web-based PIAAC portal (as part of the PIAAC platform described in Section 2.4), which will make necessary resources and functions available to all Participants through a single access point. The Portal will focus around four key areas: communication, task monitoring, content management, and training and support.

9. The Portal will provide a central location for communication between and among the Contractor and national centres. It will contain, among others:

- A searchable archive of e-mail communications to all countries;
- Repositories for important project documents;
- Contact lists for the key project personnel, both within the consortium and the Participants;
- Calendars of important events and milestones;
- A search function;
- A system of email notifications.

10. The Portal will allow National Project Managers (NPMs) and the Contractor to track progress with the implementation of tasks involved with the survey in each Participant country/economy and keep track of potential problems that may interfere with a Participant's ability to meet project timelines or technical standards. For this purpose, the Portal will contain a monitoring area that displays the status of key tasks defined in each workflow.

11. The Portal will provide a delivery mechanism for uploading and downloading materials between national centres and the Contractor. Each task will be associated with a workflow that defines a process and allows files to be transferred from Participants to the Contractor and back in ways that avoid potential conflicts that could result if multiple

users were working on files at the same time. Additionally, the Portal will provide a mechanism for submission and storage of databases and documents (such as manuals, user guides and process explanations) and will allow this archive of materials to be continuously updated.

12. Full training for using the platform will be provided to Participants prior to the Field Trial (FT). An abbreviated, refresher version of this training will be presented prior to the Main Study.

13. The Portal will also support the following activities (to be detailed in the following sections of this Annex): item development; translation and adaptation; and sampling, data management, and data analysis. These sites will offer the following functionality:

- Item Development: this will be a resource for item development guidelines, as well as a location to which Participants can upload new items that they have created. Uploading items will be a structured process, requiring that a form be filled out that provides metadata about the item (e.g., item classifications).
- Translation and Adaptation: the translation and adaptation of cognitive items and questions from the Background Questionnaire will require extensive communications and exchange of data between the Contractor and the Participants. In addition, to ensure the quality and comparability of the translations, firm procedures will need to be placed on the process. The Web tools can support this by implementing a workflow for the translation/adaptation process. This workflow will make explicit the handoffs and approvals that will be needed for this process, as well as create an audit trail of the artefacts that are created and modified throughout.
- Sampling, data management, and data analysis: like item development, the activities around sampling and dealing with the data created by the assessment will benefit greatly from Web based tools. These tools will support the transfer of data between Participants and the Contractor, noting that most of the actual response data management will occur offline at the national level for reasons of confidentiality and security, as well as serve as a repository for information on procedures and processes and a forum for discussion when issues arise.

14. These activity-specific sites will be developed for each Participant. They will be run in a secure mode. Users will require an ID and password in order to access the Web sites, and logs of Web site activities will be maintained for auditing purposes. HTTP/S protocols, which employ SSL/TLS for encryption of all communications, will be used to secure all interactions with the Web sites.

15. An initial version of the PIAAC Portal will be operational in April 2018 and be fully functional by end June 2018. Access to Participant specific tasks will be added by end of July 2018. More information on the PIAAC Portal, in particular concerning the functionalities of the Portal to support instrument development, are set in Section 2.4.1.

2.1.2. Risk Management

16. The Contractor will develop a Risk Management Plan which sets out potential risks to the implementation of the project, their likelihood and criticality along with planned remedies. This should be developed in conjunction with the OECD and provided to the OECD by end July 2018. Specific risks will be identified in the quarterly reports, along with plans on how best to mitigate them. Such risks will also be discussed as needed with other contractors and the OECD.

2.1.3. Reporting

17. The Contractor will submit reports on progress against the agreed project timetable for each of the quarters ending 30 March, 30 June, 30 September and 31 December. Additionally, an annual budgetary update including the distribution of resources (physical and human) by task must be prepared and submitted to the OECD no later than 30 January in each year of the Contract covering the previous calendar year. These documents are to be submitted to the OECD, which will report to the PIAAC BPC on the progress and implementation of PIAAC.

2.1.4. Security

18. The Contractor will put in place appropriate confidentiality agreements with all its Personnel and its subcontractors' Personnel to ensure the security of materials. The Contractor will keep secure all advice and outcomes arising from relevant meetings and decision-making.

19. The OECD will put in place appropriate confidentiality arrangements with National Project Managers and members of the national teams or contractors hired by the NPMs. The Contractor will assume that NPMs are responsible for ensuring confidentiality of any PIAAC materials for all members of their teams. The OECD will also put in place appropriate confidentiality arrangements with any other contractor that is not part of the Consortium identified in Section 1.1.

20. The Contractor will ensure that appropriate confidentiality arrangements are in place before commencing communications with members of the Technical Advisory Group and of the Subject Matter Expert Groups (see 2.1.15 and 2.5.1) and any other subcontractors under the supervision of the Contractor and that communications remain targeted at people with whom confidentiality arrangements are in place.

21. The communication of policies and outcomes will be conducted via the OECD. All enquiries received by the Contractor from members of the public who are not involved in the implementation of the survey will be referred to the OECD, or where appropriate, be directed to information in the public domain.

2.1.5. Contact list maintenance

22. The Contractor will maintain the following contact lists:

- National Project Managers;
- Secure contacts with sub-contractors of the Contractor;
- Contractor's Experts and Staff.

23. For these groups the Contractor will make regular efforts to ensure the membership lists and corresponding contact details are accurate.

2.1.6. Communication with national project centres

24. The Contractor will primarily communicate with the National Project Manager in each National Project Centre. The Contractor will communicate with other designated key staff in National Centres where the National Project Manager does not take an active part in the implementation of the survey.

2.1.7. Operational information

25. Operational information will be communicated to the NPMs and to organisations implementing PIAAC in Participants in the form of operational manuals, meeting documents and e-mail circulars from the Project Director. Documents will be made available via secure websites and e-mail. All documents will be of a high quality with regard to content, presentation and identification.

26. The Contractor will make available all disseminated documents through a secure website. The Contractor will investigate mechanisms for circulars e-mailed to the National Project Centres to be made available on the website.

27. The Contractor will be required to become actively involved in the activities of National Project Centres at a number of stages. This will particularly be the case when National Project Centres are addressing issues such as: sampling, instrument translation, instrument adaptation, and the adaptations to operations manuals. The purposes of this involvement will include quality control, knowledge transfer, and to ensure that the specified procedures are appropriately adapted for each specific Participant. These communications between National Project Centres and the Contractor will involve on-going dialogue mainly in the form of e-mail and some face-to-face discussion at scheduled NPM meetings. The Personnel for these activities will be selected on their ability to provide authoritative clear advice in their area of expertise and for their ability to communicate constructively. To maintain appropriate standards of accountability for both the Contractor and National Project Centre, the Contractor will keep a central archive of all communications containing advice relating to key activities.

2.1.8. Requests for information

28. The Contractor will have central e-mail addresses to which general or specific queries from organisations implementing PIAAC in Participants will be sent. This approach ensures that the most appropriate person responds and adds efficiency to the communication process. In addition, the Contractor will provide, on its secure website, the contact details and designated area of expertise for all the Contractor's experts. E-mails sent to the central e-mail address will be opened and forwarded to the appropriate expert each working day throughout the survey.

29. Queries relating to all aspects of the project will be made throughout the cycle. To ensure that these queries are systematically addressed and forwarded to an appropriate Contractor expert Personnel, taking into consideration that some experts may be unavailable at various times during the cycle due to leave or overseas travel, the contractor will implement a procedure to ensure that each query is answered in a timely manner. The expert Personnel will then be required to copy the central e-mail address with the response. The response will then be recorded and archived. All queries will be tracked until they have been satisfactorily addressed.

2.1.9. Document naming conventions

30. The Contractor will implement a consistent and descriptive method for the naming of files for all documents and in particular meeting. All meeting documents will have a file name that reflects the group for which the document is prepared, the year and month in which the meeting took place, and the number of the document. The file names for all documents will be reflected in the agenda for the meeting for which the document is prepared. Where practical, all documents will have the date, file name and version number embedded in the footer or header of the document. All meeting documents will

have the document name, meeting name, meeting date, and meeting venue clearly visible on the cover and include appropriate OECD and Contractor information. Where a document has been distributed at a previous meeting, or where a document is a modified version of a document distributed at a previous meeting, this fact will be reflected on the cover of the meeting document.

2.1.10. Version control

31. The Contractor will implement a system for version control of documents within the PIAAC Portal. This system will involve a central registry of all manuals, meeting papers, instruments, and appropriate other documents produced by the Contractor. The document registry will contain file name stems, document descriptions and other information including version numbers. The registry will be in the form of a database and directly linked to Contractor's Personnel computers and to the Contractor's secure website.

2.1.11. Document dissemination

32. The Contractor will disseminate a wide range of documents in a variety of ways to maximise access to information for the relevant countries/economies, contractors and the OECD. The Contractor will develop a secure website accessible with a username and password to provide continuous access to official documents as appropriate. The purpose of this website will be to provide continuous access to specific pages for each specific group. The Contractor's website allows for the targeted dissemination of all materials. The Contractor will also continue to disseminate official documents to Participants through e-mails sent by the Project Director. Where appropriate, the Contractor will also disseminate documents and other materials via express international courier. The Contractor's dissemination strategy will be designed to maximise access to targeted Participants and to maintain security of documents.

2.1.12. Information dissemination

33. In addition to disseminating documents, the Contractor's secure website will also display a range of current information including a calendar listing key project dates relating to meetings and dispatches as well as contact information for all key countries/economies, contractors and OECD staff. The key date information will facilitate planning by National Project Centres and members of the expert groups. The display of the contact details will encourage informal communication between key Participants.

34. Whenever requested, the Contractor will make available the dissemination capabilities of the secure website to the OECD for posting bulletins, meeting minutes, and such other material as the OECD deems relevant.

2.1.13. Access to information and project documentation

35. The Contractor will make available to the OECD all information disseminated to National Project Centres through the secure website.

36. The Contractor will archive all project documentation, tools, applications and materials produced as part of the project in an easily accessible format. The archived materials will be transferred to the OECD on completion of the Contract.

2.1.14. National Project Managers

37. The OECD and the Contractor will jointly call, organise, and host meetings of NPMs. Nine NPM meetings are anticipated during the Contract, including one training sessions before the Field Trial and one prior to the Main Study. Provisions for meeting facilities will be the responsibility of the Contractor. Compensation and travel costs for NPMs will be met by Participants and the OECD will meet the costs of participation of OECD staff.

38. The Contractor will develop a description of the role and expected profile of NPMs and its intended working relationships with these managers for consideration and agreement by the BPC at the start of the contract. The NPM will coordinate, supervise and communicate tasks related to the development and implementation of PIAAC. In particular, they are responsible for all coordination, management and communication aspects within three major areas:

- Committees and meetings: i) Organise national committees and groups of subject area experts to contribute to the implementation and development of the survey and its instruments; and ii) attend up to two annual meetings of National Project Managers organised by the Contractor.
- Communication and reporting: i) Communicate the Participant's official position on a range of aspects of the project, both to the Contractor and at NPM meetings; ii) prepare reports on the preparation and implementation stages of the Field Trial and Main Study; iii) monitor and utilise the PIAAC website for communications on all project related activities; iv) prepare summaries of data file layouts and local additions to coding schemes; v) conduct national analyses; vi) review draft international reports; and vii) coordinate the preparation of national reports of results.
- Operational tasks: Implement all operational tasks related to; i) test development, ii) translation and adaptation; iii) sampling, iv) survey operations including administration and scoring of the instruments; v) IT support during the interview; vi) quality control; vii) data file preparation; and viii) data products

2.1.15. Technical Advisory Group (TAG)

39. The Contractor must ensure the overall technical quality of PIAAC. To this end, a Technical Advisory Group (TAG) will be established which will be managed by the Contractor.

40. The TAG will count five members, including the Chair.

41. The TAG will have responsibility for advising both the Contractor and the OECD on operational issues; issues related to the measurement of cognitive variables such as literacy, numeracy, problem solving and components skills; and issues around comparability, such as effects of potential item by Participant interactions, sampling, and variance estimation for reporting. The TAG will also be consulted on issues surrounding methodological advances and issues related to reporting and the dissemination of data products and online analysis systems.

42. It is anticipated that the OECD will bring modifications to the proposed programme of work to the BPC for review and discussion. Issues that may be considered range from modifications to the assessment design, to frameworks and items for the various instruments, to translation and verification procedures, to sampling and survey operations, to analysis and reporting. The chair of the TAG will have responsibility, along with the

OECD and the Contractor, for establishing meeting agenda and facilitating discussions and recommendations around these issues and for reporting to the BPC on matters discussed at the TAG meetings.

43. Members of the TAG will be appointed by the OECD in consultation with the BPC and the Contractor. The Contractor will suggest names of potential members of the TAG to the OECD. The Contractor will be responsible for all aspects of the organisation of meetings of the TAG including the compensation of members. Three face-to-face meetings of the TAG will be held over the life of the project, with additional consultations as needed. Meetings of the TAG will be attended by one representative of the European Commission. The European Commission will fully cover the costs related to the participation of its representative.

2.1.16. Processes to apply regarding countries/economies that wish to implement PIAAC under a direct contract with the Contractor

44. Should the Contractor receive a request from a country/economy other than the members of the European Union mentioned in Clause 3.2 of the Contract to implement PIAAC under an agreement with the Contractor, such a request should be referred to the Organisation. In conjunction with the Contractor, the Organisation will conduct an evaluation of the capacity of the country/economy to implement PIAAC to the required standards and of the impact of the addition of the country/economy on the project as a whole. A key component of this evaluation will be the capacity of the Contractor to provide the services requested without negatively impacting the implementation of the survey. The Contractor will only enter into an agreement with a country/economy to provide services relating to their participation in PIAAC having received the written approval of the OECD.

45. The services to be provided to a country/economy under a bilateral agreement will be identical to those that would be provided to Participants under the terms of this Contract. Countries/economies implementing PIAAC under a bilateral arrangement will be expected to meet the same standards and quality requirements and follow the same procedures as other Participants.

46. Such countries/economies will participate in NPM meetings but will not participate in BPC meetings or other meetings arranged under the auspices of the Organisation.

47. No agreement will be entered into by the Contractor with any country/economy to provide services for the implementation of PIAAC after 31 October 2018.

2.1.17. Security policies

48. The Contractor will comply with data privacy principles and policies practised by the OECD and with the national requirements of Participants. In particular, the Contractor shall ensure that all individuals from whom personal data are collected through/processed in the PIAAC Portal are duly aware that they may request at any time that the Contractor corrects their personal information on the PIAAC Portal and may also request the deletion of such information. Unless otherwise instructed by the OECD, the Contractor shall ensure that all personal data collected through/processed in the PIAAC Portal are permanently erased at the end of the Contract.

49. The Contractor will be committed to the confidentiality of information in its systems and the security of tests and test items. Contractor's Personnel will be obligated to respect the privacy and confidentiality of information, for example by signing related

agreements and affidavits, explicitly describing the personal responsibility employees have.

50. The Contractor will maintain dedicated structures and Personnel with responsibility for information security, physical security, test security, disaster recovery/business continuity, privacy and internal audit.

51. The Contractor will adopt ISO 27000 as the information security framework and the foundation of its corporate information protection policies.

52. The Contractor will comply with applicable legal and regulatory obligations. Compliance will be measured through internal and external audits and management review.

53. IEA Hamburg will follow the German BSI Grundschutz catalogue of measures for data availability, security and confidentiality. Dedicated Personnel within and outside IEA's IT department will monitor and supervise the compliance with this catalogue. Similar provision will exist for each subcontractor that will need to work with respondents' data across the lifecycle of the project.

54. The Contractor will use secure transfer protocols, including file-based technologies to securely exchange data over the Internet, e.g. through Secure File Transfer Protocol (SFTP).

2.2. Finalisation of the assessment design

55. In order to help Participants in deciding on the final design of the Survey, the Contractor will assist the OECD in the development of a paper discussing the benefits and drawbacks of adopting a design in which a touch-screen tablet is used as the only delivery device for all participating adults in all participating countries/economies. The paper will also illustrate how the Field Trial will be used to test for the absence of mode effects.

56. The Contractor will also prepare a presentation to be delivered in front of the PIAAC Board of Participating Countries in April 2018. The presentation will illustrate the functionalities of the tablet and some of the expected response formats, and will describe past experiences in which similar tablets were used to administer a cognitive assessment similar to the one administered in PIAAC.

57. The presentation will be provided to the Organisation by mid-March 2018.

58. The survey design will have the following basic features:

- Sixty minutes will be allocated to the direct assessment of cognitive domains and up to 45 minutes will be allocated to the Background Questionnaire;
- The direct assessment will cover the domains of literacy, numeracy, and adaptive problem solving;
- The measures of literacy and numeracy will be linked to the 1st cycle of PIAAC and to previous adult skills surveys (IALS and ALL);
- The design will include a locator test, an assessment of literacy components, and an assessment of numeracy skills components (if this can be defined and specified by the Numeracy Expert Group);
- An integrated digital platform will be used to deliver the survey instruments, as well as capture and export the background and assessment data;

- The delivery platform will be able to record log files data for monitoring survey operations and for providing information on the strategies and processes that respondents use when answering questions or performing the tasks of the cognitive assessment.
- Even in the case it is decided that a touch-screen tablet will be the only delivery device for the 2nd cycle of PIAAC, the Survey design will allow for the possibility that the paper-based instruments used in the 1st cycle will be used in some countries or for some particular groups of the population in the Main Study, in light of the results of the Field Trial.
- The Survey design will allow for the possibility that some Participants choose not to administer some components of the Study. This might include, for example, the assessment of Adaptive Problem Solving and of literacy or numeracy components. Some modules of the BQ could also be designated as international options.

59. Following the results of the locator test, respondents will be directed into up to three branches. Respondents failing the locator would only be administered the literacy and numeracy skills component assessment. Respondents passing the locator with a low score would be administered the components and the regular literacy and numeracy assessment. A random subsample of respondents passing the locator with high scores would be administered, other than the normal literacy, numeracy and adaptive problem solving assessment, also the component assessment.

60. The direct assessment of literacy, numeracy, and adaptive problem solving will follow a multistage adaptive design in the MS.

61. The Contractor will be open to including national options in the survey design, such as the oversampling of particular subgroups of the population and the inclusion of additional modules in the BQ. The implementation of national options will be regulated by the provisions in paragraphs 4-9 of Annex A.

62. The Contractor will be open to review and modify the design of the Main Study in light of the results emerging from the Field Trial.

63. The Field Trial will be designed to test not only survey instruments and procedures, but also elements of the survey design. This will include, but not be limited to:

- Testing mode effects deriving from the delivery device;
- Testing the presence of ordering effects for the self-administered modules of the BQ;
- Testing the feasibility for self-administration of some sections of the BQ;

2.3. Finalisation of assessment frameworks

64. The Contractor will finalise the assessment frameworks for the domains of:

- Literacy and reading component skills;
- Numeracy and, if feasible, numeracy component skills; and
- Adaptive Problem Solving.

65. For the Literacy and reading component framework, the expert group is expected to recommend relatively minor updates to the framework used in the 1st cycle of PIAAC.

66. For Numeracy and numeracy components, the Contractor will work with the Numeracy Expert Group to review the framework used in the 1st cycle of PIAAC

following the recommendations outlined in Tout et al. (2017), and , if deemed feasible in the judgment of the experts, a framework for the assessment of numeracy components.

67. The development of the framework for Adaptive Problem Solving will be informed by the work presented in Greiff et al. (2017).

68. The Contractor will ensure that all completed frameworks:

- Reflect the thinking of current experts in the field as well as the views of the Participants;
- Take into account the characteristics of the target population;
- Provide an overall definition of the construct;
- Organise the domain;
- Identify task characteristics;
- Operationalise task characteristics;
- Recommend the relative weights for the features to be measured; and
- Map the developed tasks back onto the framework.

69. The completed frameworks for each assessment domain in PIAAC will be finalised and submitted to the OECD, for approval by the BPC by December 2018.

2.4. The test development and delivery platform

70. The Contractor will base the digital platform for the 2nd cycle of PIAAC on the platform that has already been employed for the development and delivery of the 2015 and 2018 cycles of the Programme for International Student Assessment (PISA).

71. The PIAAC platform will adopt the HTML5 format. All translated item content of cycle 1 items that are identified as trend items will be transferred by the Contractor to the HTML5 format. Native Windows technology will be used to deliver the assessment.

2.4.1. Functionalities of the PIAAC Portal to support instrument development

72. The PIAAC Portal will include a set of key tools and functionalities to support the following aspects of the instruments development process:

- Task monitoring tools, to allow Participants, the Contractor, and the OECD to follow progress on a range of development and delivery processes according to a specified and integrated timeline. The Portal will include a task overview for each national centre to highlight tasks that are not yet complete or behind schedule, as well as an automatic message system that will alert users of any change in the status of a task.
- Content management, by providing a space where development files can be uploaded and downloaded for easy sharing between Participants and the Contractor.
- Item preview, in both the source and target language.

73. The PIAAC Portal will allow all instruments used in the second cycle of PIAAC to be previewed. The previews will be fully interactive, and will appear as close as possible to those that will be used during the interview. Access to these previews will be available based on the security controls implemented by the Portal.

2.4.2. Item development

74. Platform developers will work in conjunction with item developers and with the Subject Matter Expert Groups (SMEGs) in order to better understand the PIAAC domains

and measurement goals and in order to lend their perspective to help the SMEGs understand possible technical constraints of the platform.

75. The platform will support a range of item types and response modes that can be delivered on tablets or laptops for both the direct assessment and the background questionnaire, including:

- Multiple choice (single and multiple selection options);
- Text entry;
- Numeric entry (including free entry of a numeric response);
- Drag and drop;
- Drop-down menus;
- Hot spots (selecting areas within a text or image);
- Sliders;
- Radio buttons.
- Domain-specific functionalities will be developed as needed, notably for the assessment of Adaptive Problem Solving.

76. The Portal will contain a workflow management system, in which each component of the process for instrument development will be defined as a sequence of activities, which will then be assigned to the associated role(s). The system will be designed to provide Participants with flexibility in terms of how they work through steps that they handle internally.

77. The platform will support all languages used in Participant countries/economies, including right-to-left languages. In addition, the following PIAAC-specific features will be accommodated:

- Assessment and questionnaire materials to be provided in a variety of languages;
- Preparation of a "localisable" source version of assessment materials and questionnaires released for translation/adaptation/verification;
- Preparation of national versions through a process that includes: translation and reconciliation/review, verification, post-verification reviews, layout adaptation, content-related final check, and sign-off on assembled/packaged instruments;
- Possibility for Participants to adapt the source version, collaborate on common versions, or to borrow a verified version from another Participant sharing the same language;
- A survey design that includes Field Trial and Main Study phases and linkages to previous and future rounds (in order to retrieve previously used material and archiving materials for future use);
- Integration of computer-based scoring rules into the workflow.

2.4.3. Delivery of BQ and Direct Assessment

78. A single device will be used for the administration of the BQ and of the direct assessment. The device will be a Windows-based tablet, with a minimum screen diagonal of 12 inches. The tablet will be paired with a digital stylus and with a detachable keyboard that interviewers will use during the CAPI portion of the interview. Response modes to be supported by the tablet will be discussed and agreed upon with the relevant Subject Matter Expert Groups.

79. The supply of devices for test delivery will be the responsibility of Participants. The Contractor will define the necessary technical specifications for the test delivery

devices (e.g. processor speed, memory capacity, screen display, etc.) and will be responsible for verifying that the requirements have been adhered to by Participants.

80. No accommodations for respondents with special needs (e.g. for the sight or hearing impaired) will be provided.

81. Prior to the Field Trial, the Contractor will conduct usability testing for a subset of the cognitive items as delivered on tablets with a small sample of individuals representing the target population. This includes adults between 16-65 years of age, having different educational backgrounds and work experience, and various amounts of computer familiarity. This testing will inform item development (notably, the choice of item format) and the design of the tablet tutorial. Usability testing may also focus on any difference between trend and new items in terms of the navigation tools associated with stimulus materials and response modes for the items.

82. The Contractor will ensure that the PIAAC assessments are sufficiently robust to be delivered without compromising the validity or reliability of the tests in the PIAAC test environment – i.e. delivered in respondents' households on a dedicated tablet under the control of one interviewer.

83. The delivery system must be sufficiently secure to prevent respondents interfering with, tampering with or manipulating tests in any way (e.g. by crashing the computer). The system must also be sufficiently robust to recover from interruptions in testing for whatever reason. It must possess the functionality permitting recovery of all data (answers, results, behavioural data, chosen language, etc.) stored in the previous test sessions and the capacity to make these data available and fully functional in the restarted test as well as functionality which directs respondents to the last displayed item of the interrupted test when the system and test are restarted.

84. The Contractor will ensure that the level of security provided by the digital platform is compliant with industry-standard encryption (i.e., the entire code base and all test data including results are encrypted). Protocols to limit access to the test delivery computers (e.g. controls over passwords) to appropriate personnel (e.g. NPMs and interviewers) will be developed and provided to Participants.

85. The platform will allow the recording of standard process data such as response and timing data. The Contractor will consult with the OECD and the SMEGs to agree on a set of process data that should be recorded in the course of the assessment.

86. Standard data to be captured by the platform during test administration include response and timing data. The PIAAC platform will include Application Programme Interfaces (APIs) that enable bidirectional communication of data between the item and the platform. The APIs will make it possible to send and retrieve data from the platform, including:

- Item-based descriptive information;
- Respondent information;
- Test and delivery platform information;
- Response to the item;
- Item endorsement;
- Score; and
- Time to complete the item.

87. The platform will use an event logger to keep track of respondents' behaviours and actions, use statistics, and detailed timing data. These events will include any action

during the course of a respondent's performance that test developers and psychometrician, in conjunction with SMEGs and the OECD, will deem to be important for further secondary analyses or for scoring items.

88. The PIAAC platform will be capable of scoring automatically all range of item types that will be developed and used in the PIAAC assessment. The platform development team will work closely with the SMEGs to ensure that newly developed item format can be automatically scored by the platform. The Contractor will explore the possibility of scoring performance items algorithmically, combining information on the end result with information about the process followed by the respondent to complete the task. The platform team will work with the SMEGs to define new item types that can be automatically scored.

89. In case some respondents undertake the assessment using paper and pencil, paper-based responses will be scored on scoring sheets or within the booklets and then entered into the IEA Data Management Expert (DME) by data entry staff at national centres. Tools will be provided to allow each scoring manager to generate intermediate and final reliability reports.

2.4.4. Technical support

90. The Contractor will provide technical support regarding the translation software for Participants and national contractors in all phases of the PIAAC survey from item development in 2018 and 2019 to the Field Trial in 2020, to the Main Study in 2021.

91. The Contractor will provide support manuals, training, and technical support to all users of the digital platform. As appropriate, the Portal will host webinars and video-based training. Face-to-face training sessions will also be organised in the course of NPMs meetings. Trained NPMs will then be in charge of training members of their national teams.

92. Technical support for the use of the platform will be provided via electronic communication. The Contractor will respond to all support requests within one business day. Additionally, the Portal will contain a list of Frequently Asked Questions and responses, which will be regularly updated. When necessary, online meetings via Skype or other means will be organised to discuss complex or urgent problems.

2.5. Development of assessment instruments

93. The Contractor will develop valid and reliable assessment instruments in each of the five domains included in the assessment. In developing the assessment instruments, the Contractor will:

- Establish and manage three subject matter expert groups (see below);
- Create item pools for each of the assessment domains based on the specifications outlined in the finalised frameworks;
- Encourage Participants to develop and submit items around each framework;
- Use existing items (reauthoring them into the new HTML5-based environment) to ensure the links with previous adult surveys measuring literacy and numeracy;
- Assess the impact of any differences between the presentation and functionality of trend stimuli from cycle 1;
- Perform usability testing with a small sample of adults to make sure that the interface is understood and appropriate for the PIAAC population;

- Evaluate the presence of any mode effect between the computer based assessment in cycle 1 and tablet based approach for cycle 2;
- Use online communication and collaboration tools to facilitate international debate and feedback; and
- Prepare reports that map all assessment items back to the respective aspects of the frameworks.

94. In creating new items and assessment tasks in all domains, the Contractor will encourage and facilitate the submission of assessment materials, texts, and items by Participants. This will include the organisation of item writing workshops and webinars in April 2018. Guidelines will be developed for NPMs regarding the submission of materials. The guidelines will help operationalise critical aspects of each framework. For example, they will articulate features that make an item particularly appropriate for measuring adult competence in a particular domain. In addition, they will emphasise the importance of including those features that are most needed to round out the item pool in accordance with the frameworks.

95. Review of item writing guidelines will be discussed during the first meeting of NPMs in May 2018, along with a review of assessment design and frameworks and a discussion of trend items to be retained in the second cycle.

96. In order to ensure that the assessment tasks reflect a cross-linguistic and cross-cultural perspective, the Contractor will encourage Participant participation as well as engage a group of culturally diverse subject matter experts and professional test developers to develop items. A translatability assessment will be an integral part of the item development process. In creating new items, the test developers will make extensive use of texts, item material, and task ideas submitted by Participants.

97. As a final step in ensuring equivalence of cognitive assessment instruments across Participants, a psychometric analysis of items functioning during the Field Trial will be conducted. In particular, measures of differential item functioning (DIF) will be utilised to examine the data for Participant-by-item interactions.

98. All items for cycle 2 will be designed to be automatically scored. In addition, the item development process will be carried out with a view to exploit as much as possible the opportunities offered by process and log file data. Log file data can be used both for item scoring and as a source of additional information on test-taking behaviours.

2.5.1. Subject Matter Expert Groups (SMEGs)

99. The Contractor will establish three SMEGs (one each in the domains of adaptive problem solving, literacy and numeracy respectively). The role of the SMEGs will be to support the development of assessment frameworks and assessment instruments. The Contractor will manage the work of the SMEGs in conjunction with the OECD. The Contractor will ensure the coordination of the work of the Expert Groups and also ensure that Participants are kept fully informed about, and have the opportunity to contribute to, the work of the SMEGs. The Contractor will have ultimate responsibility for ensuring that all Participants are provided with the opportunity to participate in the development of the assessment instruments.

100. The SMEG for Numeracy will consist of six experts, including a Chair. The Adaptive Problem Solving SMEG will consist of six experts including a Chair. The SMEG for Literacy will consist of five experts including a Chair. The members of each SMEG, including the respective Chairs, will be appointed by the OECD in consultation

with the BPC and the Contractor. The Contractor will suggest names of potential members of the SMEGs to the OECD by the end of February 2018.

101. The Contractor will organise and support meetings of the SMEGs and will be responsible for managing the logistics and bearing the costs of such meetings, including provision of meeting facilities, travel, and the compensation of members of the SMEGs.

102. Five face-to-face meetings of the Numeracy and Adaptive Problem Solving Expert Groups, and three face-to-face meetings of the Literacy Expert Group will be held over the life of the project. A provisional schedule of meetings and the likely focus of their agendas can be found in Annex C.

103. Mary Louise Lennon will act as test development coordinator. In this role, she will be responsible for assuring that SMEG members are kept abreast of the project's progress, for scheduling and arranging meetings and preparing meeting agenda in conjunction with the Contractor and the OECD, for preparing meeting materials in advance of the meeting, for preparing and distributing summaries of the SMEGs recommendations and deliberations, and for disseminating copies of all appropriate papers and reports associated with each assessment domain.

2.5.2. Validating instruments

104. The Contractor will implement a comprehensive validation strategy for the assessment instruments. This will include the use of the following approaches:

- Item writing workshops;
- Translatability assessments;
- Usability testing for the tablets with a small sample of participants;
- Mode effect studies (as noted in the proposal, section 7.4); and
- Psychometric analysis of Differential Item Functioning.

105. Particular attention will be paid to the results of the Field Trial, which will be a full-scale dress rehearsal. Field Trial data will be thoroughly analysed to ensure that the routing, the operationalisations of the key concepts, and the translations function as intended, and that the scales and items have appropriate psychometric properties.

2.6. The Background Questionnaire

106. The Contractor will be assisted by ROA, cApStAn and GESIS in the development of the Background Questionnaire (BQ), building on the BQ that was used for the 1st cycle of PIAAC, as well as on the developmental work carried out by various expert groups (Allen et al., 2017; Quintini et al., 2017).

107. The BQ will be constructed to collect information on the socio-demographic profile of respondents and on their educational attainment and labour market career, including information about the tasks performed on the job and the practice of their skills at work and in everyday life. The contractor will incorporate in the BQ the scales provided by the OECD for measuring the social and emotional skills of respondents.

108. The contractor will also develop a short version of the BQ (Core BQ), for administration to adults who are not proficient in the language in which the BQ and the Direct Assessment is administered and who do not speak the language of the interviewer. The Core BQ will be available in the languages spoken by the more common minority groups living in the participating country/economy, and will be designed to be self-administered to respondents.

109. The Contractor will validate the international comparability on a selected subset of the BQ items in a mixed-method pilot test (to be conducted in five participating countries/economies) and in the Field Trial with all items and all Participants.

110. As part of the development and validation process, the Contractor will establish a BQ expert group to provide advice and guidance.

2.6.1. Conceptual framework

111. The Contractor will update the BQ conceptual framework that was used in the 1st cycle of PIAAC. The updated conceptual framework should reflect the undergoing transformations in the labour markets and in the economic structure of OECD countries, and the consequences these have on the development, acquisition and evolution of skills.

112. The framework should also reflect accurately the current role that cognitive, social and emotional skills play in determining economic and non-economic outcomes of adults in modern societies. The updated framework will be made available to the OECD and the BPC by November 2018.

2.6.2. The development of the Background Questionnaire

113. The BQ will contain the following sections:

- A – Demographic characteristics and socio-economic background of respondents;
- B – Education and training;
- C – Current status and work history;
- D – Current job;
- E – Last job;
- F – Literacy, Numeracy and ICT practices at work;
- G – Literacy, Numeracy and ICT practices in everyday life;
- H – Working environment;
- I – Non-labour market outcomes;
- J – Social and emotional skills.

114. The administration of the BQ should take between 30 and 45 minutes.

115. The contractor will work with the BQ Expert Group on the revision of items used in the BQ of the 1st cycle and will identify trend items that need to remain unchanged to allow data to be comparable across cycles. It is expected that a large share of items will be retained, especially in Sections A, C, D, and E.

116. Section B will be revised building on the proposals contained in Allen et al. (2017). In particular, the contractor will make concrete proposals to have a better measurement of educational pathways, foreign qualifications, non-formal education and training and informal learning.

117. Similarly, revisions are expected in sections F, G, and H, building on work undertaken by the expert group on skills use and mismatch appointed by the OECD (see Quintini et al., 2017).

118. A fully pre-developed model to measure social and emotional skills (Section J) will be provided to the Contractor. The Contractor will integrate the module into the PIAAC master BQ and workflow. The module will be centrally translated by cApStAn. GESIS will specify the translation procedures and will assist Participants in identifying experts in the field that can review the translation.

119. The module on social and emotional skills will be self-administered. The Contractor will work with the BQ Expert Group and the OECD to identify other sections of the BQ that could be well suited to self-administration, with the objective of achieving savings in administration time.

120. The Contractor will perform a prioritization exercise in order to identify which items will need to be identical across cycles (trend items). The list of trend items will be developed in strict cooperation with the OECD and the BQ expert group, and will be submitted to the BPC for final approval. Trend item will be retained in their current form.

121. The Contractor will also identify items that, although designed to measure the same construct, need to be changed, for various reasons (e.g. to improve the flow of the questionnaire, or to reduce cognitive burden on respondents).

122. In addition to trend and modified items, the Contractor will develop new items. To the extent possible, these will be taken from existing international surveys.

123. The Contractor will prepare an overview of new and modified items, drawing on the work of the various expert groups. For each question or set of questions, time estimates will also be provided. Such overview will be shared and discussed with the OECD and the BQ Expert Group. The contractor will then formulate a proposal for the inclusion of new and modified items in the Field Trial. Such proposal will be also informed by the results of pre-tests.

2.6.3. The Background Questionnaire Expert Group

124. The Contractor will establish a BQ Expert Group. The role of the BQ Expert Group will be to support the development of the conceptual framework and questionnaire instruments. The Contractor will manage the work of the Expert Group in conjunction with the OECD. The Contractor will ensure that Participants are kept fully informed about, and have the opportunity to contribute to, the work of the Expert Group.

125. The BQ Expert Group will consist of eight experts including a Chair. Members of the Expert Group should come from a range of different disciplines and Participants. The members of the BQ Expert Group, including the respective Chair, will be appointed by the OECD in consultation with the BPC and the Contractor. One member of the BQ Expert Group will be nominated by the European Commission. The Contractor will suggest names of potential members of the BQ Expert Group to the OECD by the end of February 2018.

126. The Contractor will organise and support meetings of the BQ Expert Group and will be responsible for managing the logistics and bearing the costs of such meetings, including provision of meeting facilities, travel, and the compensation of members of the BQ Expert Group, with the exception of the member of the group nominated by the European Commission, that will fully cover the costs related to the participation of this member to the meetings and the activities of the BQ Expert Group.

127. Four face-to-face meetings of the BQ Expert Group will be held over the life of the project. A provisional schedule of meetings and the likely focus of their agendas can be found in Annex C.

2.6.4. Validation strategy for the Background Questionnaire

128. The Contractor will prepare and implement a comprehensive validation strategy to ensure the cross-cultural and cross-national reliability and validity of the BQ. This will include a strategy for carrying out a mixed-method pilot study with a subset of BQ items

in five participating countries, followed by a comprehensive Field Trial in all countries/economies.

129. The results of the pre-test will inform the selection of items to be included in the Field Trial. The Field Trial version of the BQ should be designed to be as close as possible to the final version to be used in the Main Study.

130. Different actors will be involved in the development of the pre-test and Field Trial questionnaire. Feedbacks on the cultural appropriateness of the instruments will be provided by linguists (during the translatability assessment), NPMs, and expert group members. The contractor will coordinate the different stages and actors of the process, in such a way that they can inform and enhance each other.

131. The mixed-method pre-test will combine quantitative and qualitative testing. The qualitative testing part will take the form of open-ended cognitive probes, in order to understand whether items are understood in a comparable manner across Participants.

132. The pre-test will be conducted in five participating countries/economies (and languages), covering an as broad as possible spread of cultures and language groups. The pre-test will be a web-administered survey, with an approximate sample size of 500 respondents in each participating country. The sample will be drawn from online panels, and quotas will be used to ensure adequate representation according to age, education, gender, and possibly other relevant variables to be identified.

133. The pre-test questionnaire will contain selected modified and new items, as well as existing trend items that are considered necessary for statistical validation. Selected items will be followed by open-ended questions, with the aim of testing, for instance, how respondents understood key terms. The pre-test will include an online cognitive component, developed by GESIS.

134. Selected items to be included in the pre-test will be centrally translated by cApStAn.

135. The pre-test data will be analysed quantitatively and qualitatively. The quantitative analysis will aim at investigating whether the operationalisations do indeed cover the intended constructs, whether the constructs are predictive of important outcome variables, and whether the operationalisations prove to be cross-culturally equivalent. The analyses will focus on comparability across Participants with respect to timing, non-response, variability, internal consistency of scales, and construct and criterion validity.

136. The qualitative analysis will focus on comparable item understanding and potential causes of non-equivalence. Based on a coding scheme, answers to open-ended probes will be coded and the prevalence of codes across Participants will be assessed.

137. Both quantitative and qualitative analyses will address cross-cultural non-equivalence and deviations. Depending on the identified source of non-equivalence, remedies will be taken such as discarding an item, rewording the source version of an item, adding an item-by-item guideline for translation, correcting a wrong or suboptimal translation, or selecting a specific wording alternative. The results from the pre-test will feed into the BQ Field Trial version.

138. The Field Trial (FT) will be used to ensure that the routing, the operationalisations of the key concepts, and the translations function as intended, and that the scales and items have appropriate psychometric properties.

139. FT data will be thoroughly analysed. In particular, attention will be paid to:

- The full distribution of response timings, for each section of the BQ and for specific groups of respondents;
- How smoothly the filtering of the questions worked;
- Item non-response and variability, in order to identify potential floor or ceiling effects;
- The factorial structure and the measurement accuracy of all multi-items scales.

140. The FT will also be used to assess the feasibility of self-administration for some sections of the BQ, through randomisation of respondents to different modes of delivery. Randomisation of the order of some sections of the BQ will also be used to assess the existence of placement effects.

2.6.5. Development of a Core Background Questionnaire

141. The Contractor will develop a short version of the BQ (referred to as the "Core BQ"). The Core BQ will be designed in order to obtain key information on the characteristics of respondents that would not be able to answer to the full version of the BQ because of insufficient proficiency in the language in which the BQ is administered in their country/economy.

142. The Core BQ should be available in a range of languages spoken by the main minority linguistic groups residing in each country/economy. The Core BQ will be designed to be self-administered, as it will likely be in a language that the interviewer is not able to speak.

143. The Contractor, in cooperation with the OECD and the BQ Expert Group, will identify items from the full master BQ that will be used to form the Core BQ. The Core BQ will contain no routing, dynamic text, or other elements requiring logical syntax. Items selected to form the Core BQ will be screened for complexity and potential ambiguity and, if necessary, a simplified version of the items will be created.

144. Whenever possible, the Contractor will draw on existing translated versions of BQ items. For up to eight prioritised languages not covered by existing national questionnaires, Core BQ items will be centrally translated by the Contractor.

145. The Contractor will provide clear procedures and guidelines, as well as appropriate training, to ensure that standardised selection and administration criteria for the Core BQ are implemented in all participating countries/economies.

2.7. Translation and adaptation

146. Participants will be responsible for the translation of data collection instruments from English into the national languages to be used in PIAAC and their adaptation to national circumstances. The Contractor will ensure the quality of the translations and the appropriateness of the adaptations made by Participants and their cross-national comparability.

147. The Contractor will:

- Perform a translatability assessment for all newly developed assessment and questionnaire items;
- Produce general translation and adaptation guidelines;
- Compile bilingual glossaries;

- Provide an application that generates searchable translation memories for existing national versions;
- Develop a web-based application that is able to perform automated compliance and consistency checks using regular expressions;
- Prepare customised user guides for national translators and national reviewers, prepare a training module for Participants and provide specific training in translating and adapting PIAAC data collection instruments using the tools and format to be provided by the Contractor. This training session will occur at the March 2019 NPM meeting and will involve a presentation and hands-on exercises.
- Design a monitoring tool to permit Participants to document their adaptations and so that verifiers can document their interventions (in English). This monitoring tool will be a key document throughout the adaptation and verification procedure. It will serve as the verification archive and will provide a qualitative and a quantitative assessment of the linguistic quality of national versions and of the equivalence thereof with the source versions.

148. The translatability assessment will consist in submitting draft version of new items (both BQ items and cognitive assessment items) to a pool of experienced linguists who, together, cover a broad range of PIAAC language groups. The experts will produce draft translations of these items, in order to identify potential translation, adaptation, or cultural issues. Each item will be scrutinised by at least three linguists from different language groups and will be run through VeryFire, cApStAn's database containing the outcome of previous analyses of draft source versions. For each fuzzy match with a previously identified issue, a report will display the comments and suggestions made at that time.

149. The feedback will be collated by a team of senior linguists at cApStAn. All issues that have prompted feedbacks from two or more linguists will give rise to suggestions in the form of a translation/adaptation note, or a proposal for alternative wording of the item.

150. The translatability report will be shared with item developers.

151. In parallel with the translatability assessment, item and questionnaire developers, supported by GESIS cross-cultural survey methodologists, will produce translation and adaptation notes that explain the underlying constructs and offer additional guidelines for translation and adaptation.

152. These two sets of notes will be merged and harmonised. The final versions of item-by-item notes will be entered into a centralised monitoring tool used to document the entire translation, adaptation and verification history of each item in each language.

153. The translation and adaptation notes will be imported into the translation documents, so that they appear in the translation tool when a translator processes a text segment.

154. General translation and adaptation guidelines will be produced for both the BQ and the Direct Assessment. They will include definitions of translation steps, qualifications of translation personnel, and general translation requirements. They will also include clear assignments and descriptions of respective Participant and Contractor responsibilities. These are expected to differ between trend items from cycle 1 (that are to remain unchanged), cycle 1 items that have been in some way modified (in the case of the BQ), and newly developed cycle 2 items.

155. For the BQ, structural adaptations will have clear guidelines and be limited to questions that require a national context to make the meaning clear to respondents.

Adaptations are foreseen regarding the questions on educational qualifications, currency and prefilled lists of countries and languages for immigrants. The Contractor will use a verification procedure in which all national adaptations will be approved by content experts from the Contractor.

156. The Contractor will ensure full compliance with the XLIFF standard, so that national translation teams can handle text to be translated without worrying about layout and style, as layout elements will be represented as locked tags. All elements that should not be translated will be either protected or hidden. The digital platform will allow translated items to be fully previewed by simply refreshing the preview page on the platform.

157. A bilingual glossary for each target version will be created. The Contractor will provide a web-based application that can be used to automatically verify consistent adherence to the glossary.

2.7.1. Translation and linguistic adaptation of the Background Questionnaire and the Direct Assessment

158. Trend BQ items that Participants have already translated in cycle 1 will be pre-filled in the existing translation and locked to prevent involuntary modifications. Changes to trend items will only be allowed if Participants have identified errors in their national versions.

159. Text segments with (centrally) modified trend items will be pre-filled with existing translations and flagged for Participants. These items will be submitted for verification by the international verification team set up by the Contractor. Verifiers will document their interventions and suggestions in English in the centralised monitoring tool.

160. As for BQ items, cognitive trend items will not be re-translated. If the need arises to revise cognitive trend items to correct errors in a national version, revisions will be implemented centrally by the Contractor.

161. New BQ items will need to be translated following the General Translation and Adaptation Guidelines. All translations of newly developed items will be submitted for verification.

162. A centralised translation process will be implemented for the items intended to measure social and emotional skills. National domain experts will be involved in the translation and verification process.

163. A centralised translation process will also be implemented for the translation of Core BQ items into prominent minority languages, in the event a translation is not already available from other PIAAC Participants.

164. Each national BQ will be tailored to agreed-upon national structural adaptations, in English. These English-language placeholders will be back-translations from the national adaptations used for documentation and communication purposes. Participants will enter their country-specific versions of these items into the translation tool.

165. Newly developed cognitive items will be translated by national centres following the procedures outlined in the General Translation and Adaptation Guidelines. Translations produced by national centres will then be submitted for verification.

166. The Contractor will perform a full verification for the Field Test. In the Main Study, verification will focus on assessing whether edits made between the Field Trial and the Main Study have been correctly implemented and whether or not they comply

with the PIAAC translation and adaptation guidelines. The Contractor will implement a system to "lock" final versions administered at Field Trial and to make sure that all subsequent edits are tracked and documented.

167. The Contractor will provide a help desk facility to support Participants throughout the verification process.

168. The final costs for translation and verification will be based on the final number of Participants and national versions. The budget associated with the Contract assumes that each Participant implements the Survey in only one language. If a Participant wants to implement the Survey in more than one language, the cost per additional language will be €15,060 as specified in clause 4.1.3 of the contract.

2.8. Scaling, Linking and Analysis

169. The Contractor will scale the PIAAC assessment data using IRT modelling. The Contractor will use the 2PL/GPMC model as the basis of its scaling activities.

170. In case a paper-based version of the assessment is administered, the Contractor will place the results of the computer based and the paper based versions of the assessment on common scales. The scale linkage in the PIAAC assessment will utilise a method that provides the strongest possible link between the two delivery modes by means of a concurrent scaling of the data collected in the different modalities.

171. The Contractor will link the literacy and numeracy cognitive scales from the 2nd cycle of PIAAC with that from the 1st cycle of PIAAC, as well as IALS and ALLS assessments, to permit analysis of trends for those Participants that have participated in more than one round of assessment. This will involve the use of common items that have been administered in past assessments.

172. The linking of data with previous round of international assessments will be established by jointly estimating item parameters on the combined set of data from the various assessments.

173. Other methodological explorations will be conducted in order to understand any potential effects of the use of more technology-based tasks around the new or revised frameworks for literacy, numeracy, and adaptive problem solving. In particular, the Contractor will make any effort to improve the comparability of measures by treating potential item-by-country interactions and changes in items characteristics over time.

174. In the course of the Field Trial, a mode effect study based on randomised assignment of respondents to either the paper-based or the tablet-based assessment will be carried out to ensure the absence of item-by-mode interaction.

175. The Contractor will work with the BQ Expert Group to identify BQ items that could be jointly analysed in order to construct scales that can provide a quantitative measure of an attitude, or of a latent unobservable trait of the respondent.

176. In scaling the data, the Contractor will verify the invariance of the IRT parameters across groups (e.g. in the form of item-by-country-by cycle interactions). The Contractor will also use a country-specific population model to capture the unique relationship of background variables and proficiency.

177. The Contractor will submit a detailed analysis and reporting plan to the OECD for review and approval by the BPC. This plan will include analytic strategies to explore factors that are associated with performance differences of test takers and Participants, as

well as information on advanced analytical strategies that make best use of the data while ensuring they remain accessible to policy makers and researchers.

178. The Contractor will fully document the steps taken and the results obtained during the process of data analysis, and will ensure that sufficient information is provided in publicly available documents (such as the Technical Report) to allow replication of the outcomes of the scaling process by other researchers.

2.9. Sampling

2.9.1. Sampling plans

179. The Contractor will prepare sampling plans to be followed by Participants in drawing national samples. The Contractor will work with Participants to develop and finalise the sample design plans for the Field Trial and the Main Study. To do so, the Contractor will use a series of standard forms to collect information about the population, the sample design approach Participants would like to follow, the international and national options, and quality control procedures.

180. The core sample design for PIAAC will be a stratified multi-stage clustered area sample. As the type of sampling frames will vary between Participants, some deviations from the core design can be expected. The Contractor will allow for flexibility in the sample design on the basis of a thorough assessment of the quality of sampling frames, and adaptation to each Participant's best sampling scenario.

181. The Contractor will develop and use a set of Quality Control Forms to collect information about sampling frames at each stage.

182. Participants will be required to use a probability sample design in which each person in the survey target population has a known non-zero chance of selection. Participants will be required to use random selection methods with calculable probabilities of selection at each stage of sampling. The sampling unit for PIAAC will be defined as the housing unit (for Participants that base their sampling design on registries, the sampling unit will be the individual). The goal will be to select one person per household. In the case of Participants with highly variable household sizes this approach may result in highly variable sampling weights and consequently very large variances. In such cases, the Contractor will work with these Participants to arrive at an optimum design for their sample. The ultimate unit of analysis will be the individual.

183. The core design will be developed to represent the non-institutional population aged 16 to 65 years. The minimum sample size for the 2nd cycle of PIAAC will depend on each Participant's sampling design, but will be in no case smaller than 4,000 cases for the core target population.

184. Participants will have the option of increasing the size of their samples to obtain reliable estimates for groups of special interest (e.g. youth or immigrants), for geographic regions (e.g. states and provinces) or to extend the age range of the population assessed (e.g. 66-74 year olds). The implementation of such oversamples will be regulated as specified in paragraphs 5-9 of Annex A.

185. After the sample selection process is completed, the Contractor will request from the Participants a survey control file (SCF) and a sample design international file (SDIF). The information from the survey control file will be loaded into the Case Management System (CMS).

2.9.2. Field Trial sample

186. The Field Trial sample will consist of a small set of purposively-selected Primary Sampling Units that vary by geography, urbanicity, and other socio-economic conditions. All Quality Control forms and procedures will be developed and tested during the Field Trial. The weighting process will also be tested using Field Trial data.

2.9.3. Sampling standards

187. The Contractor will provide to the OECD and to Participants a document containing a set of sampling standards and guidelines, which will include a description of the purpose and rationale behind each set of standards. A timeline will also be included, for both the Field Trial and the Main Study. The document will highlight the following:

- Definition of the target population;
- Rules for exclusion and the extent of exclusion;
- Standards pertaining to special additions to the target population;
- Guidelines and descriptions of sampling units, units of analysis and eligibility criteria (persons with physical or mental conditions, etc.) for the survey;
- Rules for definition and evaluation of sampling frames for all stages of sampling;
- Enforcement of probability sampling at all stages of selection;
- Rules for producing a sampling file (that includes all information needed for weighting);
- Substitution rules (no substitution allowed);
- Technical standards for selecting sample units at each stage of sampling, including within households;
- Procedures for randomly assigning assessment booklets (in case paper-based instruments are used) to households to meet the needs of the psychometric testing (these procedures will be automated for those taking the computerised version of the assessment);
- For area sample listings, procedures will be set in place to account for missed structures and hidden dwelling units;
- Rules regarding payments of incentives;
- Minimum acceptable sample sizes for each official language. Overall the sample size will be 5,000 for the core design plan, given a design effect of around 1.5;
- Rules regarding Participant-specific supplemental samples;
- Acceptable response rates for each level of data collection, including screener (if applicable), extended interview, and assessment;
- Methods for inference, including the weighting and variance estimation approaches;
- Precision requirements, including the degree to which the sample may be clustered;
- Rules for data masking to reduce risks of data disclosure (based on consultations with the Participants);
- Standards for conducting nonresponse bias analyses, with the range of analyses being dependent on the Participant's achieved response rates (more extensive analyses will be required in the presence of low response rates).

188. A report containing draft standards will be submitted to the OECD, and will be presented to the TAG for review and comment. Comments will also be collected from Participants. The Field Trial standards will be created as a subset of the Main Study standards, to reflect the purposes and needs of the Field Trial. The Main Study standards will be revised on the basis of lessons learned during the conduct of the Field Trial.

189. In addition, the Contractor will work with the OECD, the BPC and the *sampling referee* to develop standard procedures for dealing with Participant samples that do not meet the predetermined sampling standards.

2.9.4. Quality Control procedures

190. The Contractor will put in place a system of quality checks through standardised forms to monitor sampling-related processes.

191. Prior to the selection of samples for both the Field Trial and the Main Study data collection, the Contractor will provide each Participant with a set of guidelines to enable them to review their sample design, and the selected samples, to ensure that it is properly implemented and is consistent with the sample design goals. These will describe the quality control procedures that must be observed by Participants. The Contractor will also undertake the following validity checks regarding Participants' samples:

- The definition of the desired target population will be verified;
- All exclusions from the population will be questioned, even if it adds up to less than the threshold;
- Procedures for Participant-specific oversampling will be reviewed to ensure that these options do not interfere with the requirements for the core PIAAC sample;
- Checks will be performed on the distributions by stratum at each sampling stage;
- Checks will be performed on the actual counts of frame units with expected frame counts at all stages of sampling. A tolerance level will be set, and any deviations outside the tolerance boundaries will be followed up with questions to the Participant prior to sampling for the subsequent stage;
- The actual sampling information (such as stratification variables, clusters, sample sizes, and stages of sampling) provided by the Participant will be checked against the information given at the time of sample design;
- Calculation of selection probabilities will be reviewed;
- Disposition codes will be checked against the actual data from the screener, the background questionnaire, and the assessment to ensure the response status is correctly assigned.

192. Participants will also be given QC guidelines for monitoring their samples throughout data collection. Participants will be required to submit sample monitoring forms periodically during data collection.

193. Participants will provide the sampling information from the SCF for review before loading it into the CMS.

2.9.5. Assistance to Participants

194. The Contractor will assist the Participants during all critical steps of sample design, sample selection, and data collection monitoring. For example, the Contractor will assist Participants to assess the quality of their sampling frames to ensure the frames have (1) acceptable unduplicated coverage of the population, and (2) the information about the target population is in a format that is as accurate and up-to-date as possible. The Contractor will provide similar assistance for all other steps involved in developing the sample design and during the sample selection stages. As stated above, the Contractor will provide assistance; however, the Contractor will expend a reasonable level of effort to assist the Participants with these efforts.

195. Personnel from the Contractor will meet with the NPMs at NPM meetings on a regular basis to discuss and review the status of various sampling-related activities. Two workshops will be delivered at the NPM meetings to assist Participants with (1) sample design and selection for the Field Trial, (2) sample design and selection for the Main Study. In addition to these workshops, the Contractor will develop a set of standard sampling webinars, so that Participants can access ongoing workshops and training as needed.

2.9.6. Adaptive data collection

196. The Contractor will adopt an Adaptive Data Collection (ADC) strategy to three components of PIAAC: (1) projecting whether a sample yield target will be achieved and determining if extra cases need to be released; (2) prioritising cases for interviewers to achieve a balanced sample; and (3) providing guidelines for the number of contact attempts.

197. ADC strategies will be supported by the use of dashboards that display the status of the three components mentioned above during the data collection period.

198. The Contractor will establish operational guidance, based on the work conducted by Westat in the United States as part of the third round of the 1st cycle of PIAAC, on adapting field follow-up attempts, given the case priorities assigned to reduce nonresponse bias and reduce data collection efforts.

199. The effectiveness and impacts of ADC strategies will be tested during the Field Trial. The Contractor will then submit a technical memorandum, including a detailed description of the ADC framework, how it was used during field operations, and an assessments of its usefulness during field operations, including feedback from Participants.

200. To implement the procedures, the Contractor will draft standards and guidelines and will develop QC forms for Participants to complete to ensure the associated protocols are followed. In the application to PIAAC, guidance and advice will be provided to Participant statisticians toward the development of a response propensity model. The initial model will be used to test the operations of ADC during Field Trial, and could be updated based on the results from the Field Trial.

2.9.7. Sample weighting and variance estimation

201. The Contractor will derive sampling weights for the Main Study for all Participants. However, it is possible that some Participants may prefer to compute their own sampling weights since they are responsible for selecting their own samples. For these Participants, the Contractor will develop weighting plans, weighting standards, and QC procedures for creating weights.

202. The weighting steps will account for (1) unequal probabilities of selection of individuals in the sample for each stage of sampling, (2) adjustments for differential response rates among subgroups, and (3) calibration of the weights to population control totals. Weight trimming may also be used to reduce the variation in the weights. Final weights will be computed for each completed background questionnaire.

203. The Contractor will compute replicate weights to reflect the complex sample design, including design effects due to stratification, clustering, and the variation in the weights caused by variable sampling rates as well as weighting adjustments. Additional variance in estimates due to the use of plausible values from the posterior distributions of

scaled scores will be captured separately, although computationally the calculation of the two components will be carried out in a single program (e.g. WesVar 5.1). Fay's variation of the Balanced Repeated Replication method (BRR) will be used to facilitate variance estimation for Participants that have appropriate sample designs.

204. Quality checks will be performed after each step of the weighting process. The effect of the weighting adjustment on nonresponse bias will also be evaluated. The QC forms will be provided to Participants for review.

205. The Contractor will update the special weighting procedure for literacy-related nonresponse adopted in the 1st cycle of PIAAC in light of the availability of data from the Core BQ.

2.9.8. Nonresponse bias analysis

206. The Contractor will conduct a nonresponse bias analysis for each Participant using Westat's standardised set of computer modules (WesNRBA). In case Participants wish to conduct themselves a nonresponse bias analysis, the Contractor will provide assistance (if required) and will analyse and verify the results of the analysis performed by Participants. In order to do so, standards, plans and QC procedures will be developed for Participants that want to perform their own nonresponse bias analysis.

207. The Contractor will work with Participants to conduct a basic nonresponse bias analysis before weighting, in order to identify the best auxiliary information for reducing bias that is available for both respondents and non-respondents. Regression models or trees will be used to identify literacy-related auxiliary variables that are related to response status. An extended analysis will be performed after weighting, to evaluate the bias in outcome variables after weighting adjustments. The extent of the analysis will depend on the response rates achieved by each Participant.

208. A non-exhaustive list of nonresponse bias analyses include:

- Calculation of mean scores by the number of contact attempts;
- Calculation of the correlation between the scores and weighting variables;
- Comparison of response rates for different subgroups;
- Use of a chi-square test or estimates of relative bias to compare the distribution of auxiliary variables (correlated with proficiency) for respondents and nonrespondents;
- Comparison of weighted estimates to known external totals;
- Comparison of estimates from alternative weighting adjustments;
- Evaluation of the characteristics of persons who did not complete the survey for literacy-related reasons;
- Calculation of the potential range of bias through a sensitivity analysis.

209. The Contractor will explore the use of collected paradata to further expand the scope of nonresponse bias analysis. An additional analysis will be based on the fraction of missing information (FMI), following Nishimura, Wagner and Elliott (2015), where FMI is defined as the proportion of the total variance of an estimate explained by the between-imputation variability. An FMI that is greater than the nonresponse rate could in fact indicate the presence of non-ignorable nonresponse bias.

2.9.9. Assisting Participants with data confidentiality in national samples

210. The Contractor will be available to provide assistance and guidance to Participants relating to handling respondent information toward the public use data delivery. The

Contractor can also, upon request, estimate the re-identification risk based on a standard set of variables using base weights and information from the Sample Design International File and the Background Questionnaire.

2.9.10. The sampling referee

211. The Contractor will suggest nominations for a sampling referee, who will be appointed by the BPC. The sampling referee will ensure that the data coming from national samples meet the minimum acceptable quality standards for publication and release.

212. The Contractor will fully support the activity of the sampling referee by providing detailed and timely information regarding the quality of the national samples and any concerns regarding the adherence to sampling standards to either the OECD or the sampling referee. The Contractor will obtain detailed plans and procedures regarding the national populations, planned coverage and sample design of each Participant.

2.10. Survey operations

213. The Contractor will design survey procedures and manage survey operations for both the Field Trial and the Main Study. Survey operations and procedures for the Field Trial will be as close as possible to those of the Main Study. Survey operations and procedures for the Main Study will be appropriately reviewed and modified in light of the outcomes of the Field Trial.

2.10.1. Dashboards

214. The Contractor will design survey dashboards to monitor data collection. The dashboards will have the ability to increase granularity at the case-level if needed. The dashboards will allow national staff to monitor survey activities in real time, by providing them with a consolidated graphical representation or snapshot of multiple production and paradata reporting tools on a single page.

215. Dashboards will be populated with paradata variables that directly relate to data quality, as well as key variables from the interview and assessment.

216. Production monitoring indicators will include:

- Sample yield projections using disposition codes of cases worked;
- Ratios of actual to target sample yields;
- Distributions of the number of actual complete and expected completes by age group and gender;
- Number of completed cases by interview stage, overall and by month;
- Unweighted response rates, overall and by month;
- Interviewer hours per completed case;
- Overall case status and aggregates of contact attempts.

217. Interviewer monitoring indicators will include:

- Name and photograph of each interviewer assigned to a supervisor and, if available, his or her current location and work status (active or inactive);
- Number of unique dates and times of contacts;
- Interviewer report of technical problems;
- Interviewer location data provided by the GPS in the tablet;

- Interviewer most recent data transmission;
- Time stamps related to the case status changes as well as other case related activities;
- Number of completed interviews for the 10 most productive interviewers during the field period, overall and by month;

218. Process monitoring indicators will include:

- Device type, screen size and device performance, to detect errors related to the infrastructure;
- Minimum, maximum and average latency per case;
- Count and total duration of pauses, net time on key assessment stages;
- Overall percentage of correct answers for initial indication of response effort and targeting in conjunction with time;
- Analysis of timing information.

219. The Contractor will develop guidelines for national project staff on monitoring strategies using dashboards. Specifications for KPIs, quality thresholds, and interventions will be drafted for Participants. Guidelines will also be drafted for preventing falsifications.

220. The Contractor will develop dashboards for each Participant which will follow an agreed-upon structure and contain aggregated information on field operation tasks. Dashboards will be populated using data collected and captured in the CMS, survey control files, or sample design information file, during the interview or in national post-processing activities. The underlying SQL database tables will receive data via import of internationally predefined data packages uploaded via a web application from the IEA Data Management Expert (DME) software.

221. Data imports for dashboards will be done in update mode to always get the most recently complete status for various process indicators. Import data packages will only contain aggregated, anonymised data and Participants will be able to check content of data packages before upload. Data packages will only be uploaded once the contents are actively approved by Participants. Uploads will be logged with a timestamp within the DME software and a summary report of the uploaded data will be provided for each individual upload. For any failed or aborted uploads, diagnostic log files will be generated to a user's working directory.

222. Dashboards will be presented online on individualized websites for each Participant. For each Participant, access to the websites will be restricted to registered users who have permission to view the information displayed in the dashboards. Authorised Personnel from the Contractor will be able to access and review dashboards information individually by Participant or, where necessary, across Participants.

223. Dashboards content will be produced based on preconfigured queries that will populate standardised templates in different output formats (e.g. bar or pie charts, progress timelines…). The queries will make use of data that reside on a dedicated server hosted by the IEA Hamburg. The database tables will be populated and updated on a regular schedule by upload of new data packages from the DME software. Data will be aggregated and presented in the best possible ways to provide Participants with an overview and progress on their field operations.

224. Dashboards will be standardised so that they will contain all necessary information that must be provided to the Consortium on a regular basis. By using the international

dashboards, Participants will be able to fulfil their obligations of progress reports and updates.

225. Dashboards will be customised to special national needs in agreement with the responsible partners of the Consortium. It will also be possible to correct, adjust, or amend elements of dashboards before the Field Trial and again before the Main Study. Customisations of national dashboards versions will be subject to evaluation of additional costs and will only be provided if agreement on these can be found.

226. While all tasks related to the dashboards are part of this Statement of Work, they will be entirely financed by a contribution from a Third Party in the United States to be paid directly to the Contractor. The Contractor will be exempted from performing the tasks specified in Section 2.10.1 in case the third party does not contribute the agreed upon financial means. The Contractor shall inform the OECD if the contribution has not been received.

2.10.2. International Case Management System

227. The Contractor will develop an International Case Management System (CMS) that Participants will have the option to adopt to manage the work of interviewers and for interviewers to administer the components of the survey.

228. The CMS will provide a computerised meeting place for management and field staff where information about cases is updated and shared and where actions regarding cases can be performed quickly and effectively. The CMS will also provide the ability to generate data collection reports as needed to monitor production.

229. The interviewer component of the CMS will include the ability to upload cases into the tablet, launch instruments, transmit data from completed or partially completed cases, to electronically record information about contacts and assign interim disposition codes to reflect outcome, and the means to review case history.

230. The management component of the CMS will include the following elements:

- Case loading and exporting;
- Case assignment and re-assignment;
- Assignment of disposition codes to finalised cases;
- Case history display;
- Case resetting;
- Filtering and sorting by several case characteristics;
- Adaptive design features, such as flagging high-priority cases or deselecting low-priority cases;
- Management reports and interfaces;
- Validation interface to track validation efforts.

231. The following management reports will be developed:

- Production report (case completed by geographical region, closed out cases, etc.);
- Response rate report (by instrument);
- Disposition code report (by interviewer);
- Assignment history of non-finalised cases report;
- Unassigned cases report;
- Interviewer (CAPI) transmission report;
- Validation report (by interviewer);
- Interview timing reports;

- Missing data items report (by interviewer)

232. The CMS will use a client-server architecture, with one component running on the interviewer tablet and another running on a central server. On the tablet, interviewers will have an easy-to-use interface where they can see the cases that have been assigned to them, including names and addresses. The system will give interviewers the ability to record contact attempts. In countries/economies where a screener is required as part of the selection process, this will be part of the CMS as well. Once respondents are identified, the interviewer will use the CMS to launch the BQ and direct assessment.

233. The CMS client will synchronise information with the central server using standard internet protocols. This synchronisation will reconcile case status between the tablets and the server, and download any new cases that have been assigned. Results data from cases which have been partially or fully completed will be sent to the server for integration into the national database. Interviewers will need access to an internet connection on a regular basis to perform the synchronisation. This can be accomplished with either a Wi-Fi connection or a 4G cellular data connection.

234. The national centres will have a graphical user interface to the server component where they can manage the survey within their country/economy. There will be a means for loading the cases to be released to the interviewers. If needed, it will be possible to reassign cases to other interviewers, or close them out via this management interface. National centre staff will be able to view the status of individual cases and override case dispositions if necessary. The CMS will provide a series of reports that summarise the current survey yield and progress for national centre staff. These reports will be designed with the input of the survey operations team and will display indicators for monitoring the cases that have been closed or are in progress.

235. For QC purposes, the Contractor will investigate with Participants the possibility of recording GPS location information for cases.

236. Participants have the option not to adopt the international CMS, in case they have access to an equivalent system. Participants that opt out of the international CMS will have access to the same interfaces (APIs) that the international CMS uses to control the survey delivery platform, to monitor status of cases delivered in the platform, and to extract results data from the platform.

237. It will be a national responsibility to implement the integration of its systems with the delivery platform as well as all Consortium-mandated data extraction and validation of correct integration. The Contractor will support this process by providing documentation and answering technical questions about the interface.

238. The interface to the international CMS will allow standardised imports of a subset of data previously collected and captured in the CMS. Data from the CMS will be imported into one or multiple dedicated tables of the DME software's underlying database.

239. The subset of data imported from the CMS will be used for QC purposes. The interface will be customised for use with the international CMS but will also provide options to import data files from national case management systems, provided the national systems follow an internationally defined structure. In case of imports from nationally developed CMS, Participants will need to take responsibility to follow internationally defined naming conventions and formats.

240. Reports produced by the DME software will be based on preconfigured queries that will populate standardised templates in different output formats. Reports will be

standardised in a way such that they will contain all necessary information that is due to be provided to the Consortium on a regular basis. Reports can be customised to national needs in agreement with the Consortium. It will also be possible to correct, adjust, or amend contents of the reports before the Field Trial and again before the Main Study.

2.10.3. Development of survey operations procedures and quality controls

241. The Contractor will assist Participants with planning and executing the PIAAC survey. The Contractor will provide continual support to Participants throughout the life of the contract to help ensure all survey operations processes, including data collection activities, are completed in compliance with the PIAAC Technical Standards and Guidelines (TSG).

242. The Contractor will develop technical standards for PIAAC with the aim of ensuring that all Participants collect data using sound methodology and best operational practices so that PIAAC data/results are valid, reliable, and comparable across Participants and over time. Special emphasis will be placed on the administration of the data collection instruments and meeting response rate goals.

243. Standards will be developed for all tasks that must be carried out by survey operations staff in the conduct of the study. The standards will cover the following tasks and activities:

- Sampling related activities as required by a Participant's sample design that could include the need to create a sampling frame of addresses; collection of information about the household composition of a sampled unit; or, procedures for systematically selecting eligible respondents within a sampled household;
- Interviewer instructions for administering the Background Questionnaire, as well as instructions related to the administration of the Core Background Questionnaire;
- Procedures for dealing with language issues across the survey and specific to each Participant;
- Strategies for promoting survey participation and obtaining high response rates, including the use of monetary and non-monetary incentives for interviewers and respondents and refusal avoidance and conversion strategies;
- Effective respondent contact strategies that include the use of an introductory letter and a study brochure to explain the purpose of the survey to respondents, as well as materials for non-response such as endorsement and conversion letters;
- Guidelines for contacting sampled respondents that include effective methods for recording and monitoring contacts and how to monitor the progress of data collection;
- Guidelines for hiring data collection staff;
- Guidelines for hiring scorers;
- Procedures for maintaining confidentiality and data security during data collection;
- Quality control procedures for verifying data collection activities; and
- Guidelines for monitoring quality control.

244. The Contractor will develop a QC and management manual that will provide Participants with the materials and guidance they need to implement the following fieldwork QC procedures:

- Validation and call-backs: Field supervisors will follow up with a percentage of the cases after finalisation to verify the interview and assessment took place or that the case was handled properly if the interview and assessment did not take place. The

Contractor will provide the forms to carry out validation procedures and Participants will have the possibility to adapt them.

- Interview monitoring: Participants will be able to decide if they want to use audio recording or observations (or both) to ensure that the interview was conducted according to agreed-upon procedures.
- Management and QC report: Various reports and dashboards will be built into the system to help Participants get the insight needed for monitoring data collection and for early identification of problems or issues.

2.10.4. Update of the PIAAC Technical Standards and Guidelines (TSG)

245. The Contractor will review and revise the Technical Standards and Guidelines adopted during the 1st cycle of PIAAC. The revised cycle 2 Technical Standards will be submitted to the OECD and the TAG to solicit further input as well as for iterative review.

246. The Contractor will work towards enhancing PIAAC TSG in the following areas:

- Developing comprehensive standards for the use of the international CMS, which will impact standards on the management of fieldwork production, interview recordings, and QC through the real-time monitoring of data collection;
- Refining the existing standards for national training materials used by Participants to ensure consistency in interviewer training content;
- Evaluating the cycle 1 TSG related to the hiring and management structure of field staff;
- Revising the standards related to time spent on various components of interviewer training;
- Evaluating cycle 1 standards related to home study and modifying these to recommendations;
- Instituting standards for the evaluation of interviewers after completing interviewer training;
- Developing standards for Participants using data collection agencies;
- Developing standards for conducting the Screener Instrument;
- Evaluating standards related to the use of incentives and revising as necessary;
- Revising standards that describe the use of disposition codes for increased accuracy.

247. The revised cycle 2 TSG will be implemented during the Field Trial and refined further before the conduct of the Main Study if needed.

248. The standards will be submitted to the OECD and TAG for review, then the BPC for approval. Any recommendations received will be incorporated in the TSG. The NPMs will have an opportunity to review and provide comments to determine if the standards present any undue difficulties for the Participants. A final set of standards will be delivered before the Field Trial.

249. The initial draft of the revised TSG will be provided to OECD and Participants in June 2019. Revisions to standards will be discussed during the fourth NPM meeting in October 2019. Comments by OECD and NPMs will be incorporated by December 2019. Standards will be then finalised and sent to NPMs and National Centres in January 2020.

250. The Contractor will provide support to Participants and will monitor adherence to the standards. To this end, a national survey implementation questionnaire, called the National Survey Design and Planning Report, will be provided to all Participants ahead of the planning phase. The information collected in this questionnaire will cover details on:

- Ethics of the survey;
- Survey planning;
- Survey instruments, including the CMS;
- Translation and adaptation;
- Information technology;
- Field management;
- Training field staff;
- Data collection;
- Data processing;
- Data file creation;
- Data confidentiality and security;
- Quality assurance and quality control.

251. The Contractor will develop and implement a monitoring programme to track compliance with the project's quality guidelines. The monitoring programme will include the following components:

- National monitoring reports to track each Participant's adherence to every major data collection task. This component will include a pre-data collection and data collection form that Participants will complete on a monthly basis during the Field Trial and the Main Study, as well as an interviewer training form to be completed by NPMs after the completion of each interviewers' training session.
- International monitoring reports, to track overall adherence to the standards across Participants. This component will include monthly survey operations status reports, interviewer debriefing reports, data collection Field Trial and Main Study reports, and final quality control reports.
- Frequent communications, including pre-data collection and data collection conference calls on a monthly basis with each Participant during the Field Trial and Main Study data collection periods, as well as ad-hoc communication through email or Skype
- A training programme, including instruction manuals, for national centres and survey organisations. This component will include training materials for interviewers and for interviewers' trainers, a quality control and management manual, and quality control training on both the national and international quality control process for national centre project staff.

252. The Contractor will ensure close monitoring of the project timeline, both for the Field Trial and the Main Study. To this end, the Contractor will engage in frequent communication with the OECD and will produce monthly reports for Participants and the OECD, to be shared through the PIAAC Portal.

2.10.5. Training National Project Staff

253. The Contractor will develop training materials that cover all aspects of survey implementation and field management, as well as develop a training programme.

254. A comprehensive international training for NPMs will cover in detail interviewer procedures as well as present an overview of field management and QC practices. The entire training for national project staff will be presented during NPM meeting 5 before the Field Trial. Once the Field Trial has been completed, the training programme will be reassessed in light of the Field Trial experience.

255. The training package for survey interviewers will cover the following topics:

- General interviewing techniques;
- Introduction and history of the PIAAC survey;
- Introduction to the tablet;
- Use of the delivery platform;
- Use of the international CMS;
- Locating sampled households;
- Recordkeeping and handling of case materials;
- Administering the screener;
- Administering the BQ, including the core BQ and the sections designed for self-administration;
- Administering the Direct Assessment;
- Use of disposition codes;
- Gaining respondents' cooperation;
- Quality control.

256. Survey operations training materials will be developed on the basis of the materials adopted in cycle 1. They will include detailed training scripts, along with interactive and hands-on practice using exercises and scripted role plays. Home study training materials will also be provided. All of the training materials will be available for translation and adaptation into national languages, to be used in national training sessions.

257. The standard instructional material that the Contractor will provide for interviewer training will include the following:

- Training guide that will include training scripts, slides, handouts, exercises, and answer keys;
- Interviewer procedures field manual;
- Home study exercise booklet;
- Case management system instruction manual.

258. A wide range of materials will also be developed to train Participant representatives on all aspects of field management. Specific guidance materials and tutorials for national project staff will be developed for all new features in cycle 2 that will further facilitate the management and monitoring of data collection (e.g. dashboards and adaptive data collection strategies).

259. Drafts of training materials will be provided to Participants well ahead of the Field Trial to allow NPMs to provide feedback.

260. Existing training material will be expanded to incorporate multimode training sessions, such as video sessions and webinars. Training sessions will be recorded, so that Participants can access them at any time.

261. A dress rehearsal of the Field Trial international training will be conducted in advance of the NPM meeting to train national project staff. Staff from the OECD will attend this dress rehearsal.

262. During the NPM training sessions, the survey operations team will conduct in-person consultations with Participant Personnel in attendance.

2.10.6. Reducing nonresponse rates

263. The Contractor will recommend strategies for promoting survey participation, and will provide sample materials that Participants can adopt to illustrate the goals of the survey to respondents.

264. The Contractor will provide Participants with a Non-Interview Response Form for interviewers to record information about nonresponse case outcomes.

265. The Contractor will encourage Participants to employ field management strategies and procedures to minimise nonresponse.

266. The Contractor will work with Participants to identify languages spoken by large minorities in each Participant country/economy, and will recommend that Participants recruit interviewers fluent in these minority languages.

267. The Contractor will be willing to discuss, with any interested Participants, the design and inclusion in the Field Trial of a special study aiming to assess the efficacy and effectiveness of offering financial and non-financial incentives to adults who are selected to participate in the Survey. Any such study would be treated as a national option that is not covered by the Contract but conducted through a separate agreement between the Participant concerned and the Contractor.

2.11. Post-collection data processing

2.11.1. Data capture and integration

268. The Contractor will provide each Participant with standard and mandatory software to integrate, manage, and validate national data. The software that will be used for this purpose is the IEA Data Management Expert (DME) software, developed by the IEA Hamburg, which reflects both the international and the national record layout (codebooks) and supports the addition and adaptation of variables. The codebook will include all specifications for the variables that will be part of the database. These specifications will include labels for the variables, the values, format, missing codes, and validation criteria.

269. The DME will maintain a relational database for all sampling, response, workflow and log file data. The DME will read, parse, transform and integrate data from the different sources in PIAAC. It will support the export and import to and from several file formats to integrate data and to interface with external processes. In addition, the software will support manual data entry.

270. The software will have automated built-in checks for duplicate identification codes, checks for double data entry accuracy, as well as several checks for inconsistent records within and across datasets. For example, the software will verify that each record in the background data set has a matching record in the sampling data set.

271. Participants will be required to use this mandatory software and run the checks to ensure, as much as possible, that the within-country data capture and integration accurately and authentically reflect the values given by the sampled persons and/or the interviewer, as well as to ensure consistency and completeness.

272. The software will have the capability of generating series of reports that give an overview of the data quality and field operations progress. A list of internationally set indicators will be the base for such summary reports. Each Participant will be required to generate and review these reports during field operations and prior to submitting the database to the international processing centre.

273. A representative from each Participant will be required to attend a multi-day workshop to receive training on the set-up and use of these applications. One of these workshops will be conducted prior to the Field Trial, and another prior to the Main Study.

2.11.2. Coding of education, industry and occupation

274. The Contractor will review the standardised set of rules, procedures and guidelines used in the 1st cycle of PIAAC for the coding of open responses in the BQ and will establish appropriate quality control procedures.

275. The Contractor will provide Participants with an extensive set of materials to assist them in preparing for the coding procedure. The Contractor will also provide detailed training in workshops (for the Field Trial and for the Main Study) from international experts, and will give detailed instructions as to how Participants should recruit and train coders.

276. International experts designated by the Contractor will be available to answer support requests from Participants during the data processing phases in Field Trial and Main Study.

277. The Contractor will implement a set of quality control and documentation procedures to ensure that the coding of key variables lead to accurate and internationally comparable information in each participating country/economy. These procedures will stipulate things such as the control and documentation procedures to be followed in case of both manual and automatic coding, verification of coding accuracy through double coding, the maximum allowable coding error rates and the steps to be taken in case this error rate is exceeded. International experts at the IEA will review and evaluate the quality control reports and documentation as sent by Participants.

2.11.3. International data processing

278. Upon receipt of the national databases from each Participant, IEA will archive these data to an international database. Each Participant will also be required to submit data documentation.

279. Initial review of data at the IEA will include the evaluation of the supporting documentation and verification of consistency among datasets contained in the database.

280. The IEA will undertake a thorough program-based data cleaning. First, data will be read from the DME software and checked for structural integrity and deviations from the international variable layout. Then, any national adaptation will be recoded so that each national dataset follows a common variable layout across Participants and also include nationally adapted or added variables. Next, records and variables will be checked for consistency. Finally, requested analysis variables will be derived and added.

281. The Contractor will ensure extensive and detailed communication between the IEA Hamburg and any Participant on data inconsistencies and their resolution. Detailed reports will be provided to NPMs on any such issues.

282. Once the data files are made consistent with the international database structure, a set of IEA cleaning programmes will be used on the data to apply several standard cleaning rules. The software, under selected conditions, will be capable of automatically correct inconsistencies. A log of each and every modification made to the data will be kept so that the original database can be recreated or specific changes undone.

283. When using the cleaning software, each problem detected with the data will be labelled with a unique number, a description of the problem will be written to a report, and the action taken by the program or Personnel of the IEA will be recorded. If problems are identified that could not be automatically rectified, they will be reported to the responsible NPM and the OECD.

284. The cleaning program will consist of three different parts:

- Checks related to identification variables;
- Checks related to linkages of variables within a dataset and records between datasets;
- Checks related to BQ variables.

285. These parts of the cleaning program will run separately and consecutively.

286. The post-cleaning stage will run a set of checks and flags issues that relate to the consistency of the data after this stage. These checks will only be used for quality control.

287. The finalisation phase will repeat many of the checks previously performed, in order to ensure that automated or incidental data editing has not introduced any new inconsistencies or wild codes into the data. In addition, new checks will be performed intended to ensure data integrity.

288. At the export stage, data products for PIAAC will be produced. These will be file sets in multiple flat formats for each Participant. The export stage will allow for different kind of export scenarios that will relate to the different data products needed in the course of building the final international dissemination databases, the public use file (PUF).

2.11.4. Computing and including derived variables and scores

289. The Contractor will follow three criteria in order to decide whether to provide centrally created derived variables:

- If there is a clear and strong demand concept involved;
- If there is a consensus as to the particular form the resulting indicator should take;
- If the derivation cannot be easily achieved by subsequent users of the data.

290. The post-cleaning, finalisation and export stages will be used to derive such additional reporting variables.

291. A number of variables related to sample design will be derived from sample design, case initialisation and BQ information. Final disposition codes for the Direct Assessment, the BQ, as well as overall combined indicators will be set according to internationally defined rules following the standards and guidelines.

292. When the data are cleaned and restructured according to the international database structure, the cleaned data will be sent for weighting. After the weights are calculated, files including the weights, as well as imputation and variance estimation variables will be sent to the IEA for adding these to the database.

293. The data will also be sent to the team working on scaling, linking and analysis for further processing, specifically for calculating indicators and scores.

2.12. Data products and analysis tools

2.12.1. Preparation and documentation of data products

294. The Contractor will deliver the following data products and services:

- *International Database*. A complete and fully documented data product for use by the OECD, the BPC, and Participants in conducting analyses to support reporting of results (available January 2023).

- *PIAAC Data Explorer*. A Web-based analysis and reporting tool that permits users to interrogate the PIAAC database and produce presentation quality tabular and graphical summaries of the data for a wide range of potential users (public use version available in November 2023, preliminary and restricted access version available for Participants and the OECD in May 2023).
- *PIAAC IDB Analyzer*. An SPSS plug-in that permits users to analyse the PIAAC database and produce statistical summaries of the data (Preliminary version available for Participants and the OECD in May 2023, final public use version available for release in release in November 2023).
- *Public Use Data File (PUF)*. File sets in SPSS and SAS format for each participating country containing microdata that allow external researchers to conduct their own analysis, and are portable into other common statistical packages such as STATA and R. Other than the information collected through the BQ and Direct Assessment, the Public Use File will contain processing information related to the conditions under which the administration of the survey instruments took place and to the flow followed by the respondents in answering to the various questions of the assessment. To protect the confidentiality of individuals, 'personally identifiable information' (PII) maintained for the purposes of the conduct of PIAAC will be excluded from the public use data product. Participants may further require the suppression or the coarsening of variables to be included in the PUF (Available in final version in November 2023).
- *Technical Report*. A thorough document that covers all aspects of PIAAC, from data collection through reporting of results (First draft transmitted to the OECD in September 2023, final version transmitted to the in November 2023).
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295. The Contractor will deliver to the OECD and to Participants a complete, fully documented dataset in preliminary form in January 2023. These data shall include, but not be limited to, all response and demographic information collected from the field, all weighting and variance estimation variables to be used in the analysis, and all derived indicators and estimates of competencies. After a period of review, a final version of the database will be delivered, encompassing all additions, corrections and deletions indicated in the review.

296. The database shall include the following types of electronic files:

- Data files, containing all the variables indicated above, as well as appropriate linking information;
- Codebook documents, describing the structure of the different data files;
- Data processing documentation, describing the data processing and cleaning procedures undertaken;
- Documentation of national adaptations and subsequent recordings;
- Documentation of systematic recordings and case-level edits.

297. All corrections to the data files will be documented in a common programming language (e.g. SAS, SQL).

2.12.2. International Master Database

298. Final data products for PIAAC will be file sets in SPSS and SAS format for each Participant. Each database will consist of one main flat file holding respondent/household level information, a set of files holding information relating to the study of scoring reliability within and across Participants, a simplified/aggregated audit log file holding

interview process and timing data, and, for each respondent, a set of cognitive log files native to the CBA platform used in PIAAC.

299. There will be the following data versions for PIAAC:

- A data version that will correspond to the master database that will be used for processing, weighting, analysis and archiving. These files will always include all cases and all variables originally submitted, including national variables, and all derived variables. These full information files will only be made available to the OECD, they will be kept strictly confidential and will not be shared beyond the organisations and individuals involved in the analysis and weighting. This preliminary data version will be transmitted to the OECD by January 2023;
- Another data version will correspond to preliminary and final national databases. These files will always include all cases and all variables originally submitted, including national variables, and almost all derived variables. It will exclude a small set of internal, interim or redundant variables produced as part of the scaling and analysis process and only relevant for the purpose of archiving. This data version will be provided only to concerned Participants by May 2023;
- A final version will contain data that will be made available as Public Use File (PUF). These files will only contain cases that will be included in analysis and weighting, as well as only agreed-upon international variables. To protect the confidentiality of individuals, personally identifiable information maintained for the purposes of the conduct of PIAAC will be excluded. Suppression and/or coarsening may be applied for Participants requesting them. The final version of the PUF will be released in November 2023.
- The Contractor will ensure that the various PIAAC databases are in formats that can be readily imported to a variety of formats in order to allow external researchers to carry out independent analysis using common statistical and presentation software (such as R or STATA), but is not responsible for the actual import software.

2.12.3. Analysis and reporting tools

300. The Contractor will deliver to the OECD and to Participants two analysis tools. An enhanced version of the ETS PIAAC Cycle 1 Data Explorer will allow users to navigate a secure OECD-hosted database that includes all PIAAC assessment cycles via a web browser. A micro-data analyser will enable local computer access and analysis of PIAAC public-use (i.e., restricted-access) databases.

301. The underlying analysis engines within the tools will efficiently perform the required analytical computations, taking into account the use of sampling weights, the complex multistage cluster sample design of PIAAC, and the use of multiple imputed proficiency estimates (the "plausible values").

302. The Contractor will also release to the OECD and to Participants the IEA International Database Analyzer (IEA IDB Analyzer). The IEA IDB Analyzer creates SPSS or SAS syntax that can be used to combine files from across different Participants, and perform analyses with these international databases. It generates SPSS or SAS syntax that takes into account information from the sampling design in the computation of sampling variance, and handles plausible values. The code generated by the IEA IDB Analyzer will enable the user to compute descriptive statistics and conduct statistical hypothesis testing among groups in the population without having to write programming code. The IEA IDB Analyzer will be licensed free of cost, not sold, and will be for use only in accordance with the terms of the licensing agreement.

303. The IEA IDB Analyzer will allow to perform the following analyses:

- Percentages and means;
- Percentages only;
- Linear regressions;
- Logistic regressions;
- Benchmarks;
- Correlations;
- Percentiles;
- Differences by performance groups.

304. The Contractor will also provide a PIAAC Data Explorer, a real-time, publicly available interactive web-based analysis and reporting application. The Data Explorer will allow the users to query and analyse the PIAAC International Database via a web browser.

305. The Data Explorer will produce a diverse range of tabular summaries of statistics including, but not limited to, means, standard deviations, percentages by subgroups, percentages by levels, and percentiles. All statistics will be computed taking into account the sampling and assessment design. The Data Explorer will be capable of conducting significance testing of statistics within different groups or across jurisdictions and years, and of displaying the results in a tabular or graphical format. The Explorer will allow results to be exported to MS Word, MS Excel, or HTML formats. The Explorer will not require a user to install a local application on their computing device. Its full range of functionalities will be accessible via the most widely used web browsers from any computer connected to the internet.

306. The PIAAC Data Explorer will allow users to explore respondents' achievements in combination with scores or background variables collected as part of past adult literacy surveys such as IALS, ALL, and the 1st cycle of PIAAC. The Contractor will identify and document all valid questionnaire variable linkages with previous surveys and, when necessary, incorporate data transformations into the Explorer database that ensure direct comparability with variables from previous surveys.

307. The source of PIAAC Cycle 2 Data that will be part of the PIAAC Data Explorer will be a subset of the PIAAC Cycle 2 international database approved by the OECD and Participants. Each Participant will have the opportunity to coarsen, suppress, or eliminate PIAAC Data Explorer micro-data variables to ensure that their respective confidentiality standards are met. Data Explorer users will not be able to access the underlying, secure micro data.

308. The PIAAC Data Explorer will contain, among others, the following capabilities:

- Creation of a world map representing Participating Member countries;
- Support for customised error handling and footnoting pertaining to PIAAC;
- The ability to handle all domains, including their performance levels, in a single analysis framework;
- Transition to HTML5 SVG rendering for increased data visualisation;
- The ability to analyse interactions of performance levels with independent variables.

309. The Contractor will create a restricted and a public version of the Data Explorer. Both versions will be hosted on OECD web servers. The restricted version will be for sole use of the OECD and Participants and will support pre-public release internal

analysis, quality control, and reporting processes. Access will be private and secure, limited to pre-approved staff. This version will contain data for every Participant, including each Participant's own national variables. These national variables will only be accessible to each Participant through individual login controls. All international variables will be visible to all Participants, but the Participant names will be masked to respect any confidentiality issues. The Participants may then use these results to suppress international variables from inclusion in the public Data Explorer database. The Contractor will deliver the restricted-use Data Explorer for internal review by May 2023.

310. The public version of the Data Explorer will reside on the OECD public web portal and will allow the world audience web access to a secure (protected by OECD firewalls and security mechanisms) database to navigate, analyse, and produce report quality tables and graphics. This version will contain only the international set of variables. Participants will be given the opportunity to suppress data for any international variable that may compromise confidentiality from this public-access application. The Contractor will deliver the public-use version of the Data Explorer in conjunction with the public release of the PIAAC data products and international report.

311. The PIAAC Data Explorer will utilise open-standard technologies, including XML, and will be compatible with all widely used browsers, including Internet Explorer, Safari, Firefox, and Chrome.

312. The Contractor will work with OECD Staff to deploy the PIAAC Data Explorer. Tasks include negotiating remote computer access with OECD Staff, providing specifications for all hosting equipment, delivering incremental changes to OECD to refine and perfect the data, deploying pre-release versions of the Data Explorer with login security to provide advance review of the data, and deploying a live version of the Data Explorer when all data were considered acceptable for release.

2.12.4. Support to the OECD and Participants

313. The Contractor will be available to provide statistical and technical support to the OECD during the preparation of the international report, which will be the responsibility of the OECD. In particular, the Contractor should be ready to respond to queries on all issues concerning the data (e.g. collection, coding, cleaning, imputation, scaling).

314. The Contractor will not be expected to provide support to Participants in the preparation of national reports. However, it will be expected to provide advice, if the need arises, to those preparing national reports on the technical matters to do with the construction and use of the PIAAC data set. The Contractor can stipulate separate contracts with Participants, should they require more extensive assistance.

2.12.5. Producing and Confidentialising Public-use Files

315. The public-use files will maintain all international variables approved for release by the BPC. Any and all national variables will be dropped. In addition, all international variables earmarked for suppression by a Participant will be blanked. The public-use file will only include records which fulfil criteria set for cases to be used in weighting and analysis. Each data export will be uniquely identified by an export data and an export version variable in the data files.

316. A preliminary international database will be created first for internal review and to ensure that all processes and procedures for analysing data are in place. This database will include originally submitted, initially cleaned, and where applicable, perturbed data. Further, this database will contain the design weights provided by Participants.

317. In a next step, the first international database for analysis will be created. This database will include weights and a basic set of scripted derived variables.

318. Once the initial data analysis and generation of the majority of derived variables and plausible values will be computed, the second international database will be produced and shared with the OECD in order to prepare the international report.

319. Release of preliminary national databases to Participants for review and approval will be prepared and provided at the same time. Participants will be asked to review their preliminary national databases within a reasonable amount of time.

320. The Contractor and the OECD will then agree on final data changes and error corrections to be applied, if necessary, to improve the validity and quality of the data.

321. Participants will further be asked to identify variables for suppression in any public-use file releases on the basis of a preliminary list of variables earmarked for inclusion by the OECD. Once such suppressions will have been implemented, draft national public-use files will be released to Participants for final review and sign-off.

2.12.6. Quality Control

322. The Contractor will put in place quality control measures that will include, but not be limited, to the following:

- Monitoring of Participant data collection activities early in the assessment period and, if necessary, recommending real-time adjustments;
- Designing and implementing thorough quality control processes in data processing, analysis, and reporting of the data;
- Ensuring adherence to the OECD standards for ensuring accuracy; and
- Documenting quality control procedures in PIAAC technical reports.

323. The Contractor will use a systematic quality assurance approach in order to achieve PIAAC data quality and objectives. The methodology will integrate data retrieval, computation, comparison, and resolution procedures to ensure that all generated statistical results are correct. Robotic verification and error reporting mechanisms will compare the results generated by independent computation engines for validation, and resolution if necessary.

324. The ETS quality control methodology will retrieve data files and compute reporting statistics using three analysis tools: the Data Explorer, the ETS proprietary statistical computation system (SDT), and a third-party micro data analyser. Each tool will use its own data retrieval mechanisms and statistical computation engines to generate results. Prior to the first execution of the procedures described in the following, the three tools will be extensively calibrated with each other to ensure that the data processing performed by each tool produces extraction files that are isomorphic and produce identical results for the statistics common to both programs.

325. Using an ETS quality control robot procedure, the control scripts and results HTML document produced by the ETS proprietary SDT software will be used to generate analysis requests for the Data Explorer, one for each variable, and the results returned from the Data Explorer will be compared with those in the SDT HTML document. The results of these comparisons will be posted to a QC report document where differences above specified criteria will be flagged. For selected statistics, a subset of critical variables will be selected for additional quality-assurance analysis using a micro-data analyser. The analyser results will be stored in an XML document. The QC robot

procedure will process the SDT HTML and the analyser XML and add the comparison results to the QC report file where differences above specified criteria will be flagged and subsequently examined.